July 1987

## MEETING NOTICE

The next meeting will be July 17th, at *CRAGIN FEDERAL SAVINGS & LOAN* 333 W. Wesley St. Wheaton, Ill. -Time - 7:30 P.M. *sharp.* Guests are welcome and need not be members to attend the meeting.

## THE PRES SEZ

This past month, I have started rebuilding my DAF to improve its performance by increasing the system voltage from 36 to 48 volts. Gelcells were originally considered but the available underhood space is not adequate to accomodate the 13-inch battery dimension. For those of you having sufficient space, this newsletter issue includes Gelcell info originally obtained by George Kranovich.

Members wishing to phone me during working hours may call 383-8005.

The video final script incorporating suggestions made at the June meeting will be available at the July meeting. We will also discuss summer events which offer opportunities to exhibit our club car.

*BILL*

*fold* . . . . . .

F. V. E. A. A.

FOX VALLEY ELECTRIC
AUTO ASSOCIATION
624 Pershing St. Wheaton, Il 60187

FIRST CLASS

ADDRESS CORRECTION
REQUESTED

Minutes FVEAA Meeting 6/19/87 at Cragin Federal Savings & Loan Office, Wheaton, IL

President W. H. Shafer called the meeting to order at 6:42PM.

There were 23 members present.

Treasurer V. Vana reported that there is $899.97 in the NOW checking account and $772.90 in the savings account.

Twelve members represented the Club at the Hamfest at Sante Fe park on June 14. The club car add member Geroge Krajnovich's hybrid car were on display.

The "Endura" electric car is on display at the Museum of Science and Industry.

The draft of the script for video taping as prepared by president W. H. Shafer was approved for further processing.

It was decided to use the club car "as is" for the summer driving season and use the car this winter as a "laboratory" to improve performance.

John Stockberger will obtain two magnetic signs for the club car.

John Newton reported that he rode in a "Bradley" electric sport car in California and that it had a range of 40 miles at California expressway speeds. It uses a 20 HP GE Motor and 17 - 6V batteries. (John was one of 2400 swimmers participating in a swim meet at Stanford University.)

The Denver Electric Vehicle Club is sponsoring an International Symposium on August 22 and 23 in Denver, Colorado.

Dana Mock reported that Motorola is dropping production of the TO3 Series transistor that is used in our controllers. Dana will report more on this later.

Ken Woods reported that he had the club car from 5/24/87 to 6/14/87. He put 138.7 miles on the odometer with 9 trips averaging 15.2 miles per trip including 1.5 miles of towing. The total KWH used was 58.9 giving an average of 0.43 KWH/mile traveled or at the City of Naperville rate of 0.07 ¢/KWH gives a cost of 0.03 ¢/mile. The batteries were on line for 166 hours and 46 minutes over 11 different time periods for an average of 15 hrs. 5 min. per charge time.

The Club Car was used for the City of Naperville Memorial Day Parade in addition to trips to Drs. office, bank, store, library etc. There is no question that an electric vehicle, as represented by our club car can provide over 50% of our daily transportation needs in an urban setting.

The meeting was adjourned at 9:22PM.

Respectfully submitted,
Kenneth R. Woods
Kenneth R. Woods, Secretary

**Globe** Battery Division | JOHNSON CONTROLS

## Industrial Products Group

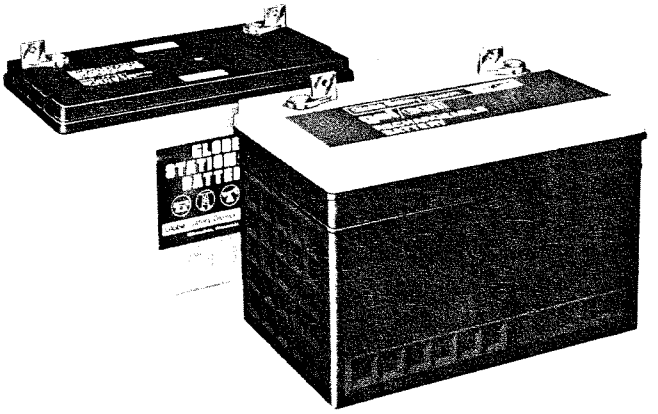
# Batteries Designed for CATV Standby Power
## Standard and Gelled Electrolyte

### Standard Electrolyte

- **6VHC 96** 12 Volts, 96 Ampere Hours Liquid Electrolyte
  Group 29 13" long
  6.8" wide 9.4" high

  Maintenance Free
  Through the use of Lead Calcium Grids

  Rugged Plates
  Heavier lead grids than automotive style batteries for longer life on continuous charge



### Gelled Electrolyte

*All of the features above PLUS Gelled Electrolyte!!*

- **GC 12800A** Gel/Cell 12 Volts, 80 Ampere Hours, Group 29
  13" long 6.8" wide 9.4" high
- **GC 12550A** Gel/Cell 12 Volts, 55 Ampere Hours, Group 24
  10.2" long 6.8" wide 8.8" high

  Gelled Electrolyte
  — No spillage problems
  — Use or transport in any position
  — Meets requirements of those states prohibiting pole mounted liquid batteries

  Pressure Relief Vents
  — For even less gassing / Lower water loss / Longer life

  Excellent Deep Cycle Life
  — Over 200 full discharge cycles available with Globe Gel/Cell Batteries

## Batteries Designed for the Needs of CATV Power

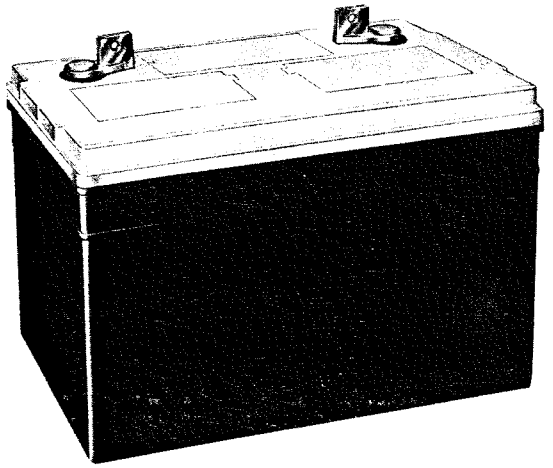
Contact:
Globe Battery Division
Johnson Controls Inc.
Industrial Products Group
900 E. Keefe Avenue
Milwaukee, Wisconsin
(414) 228-2393

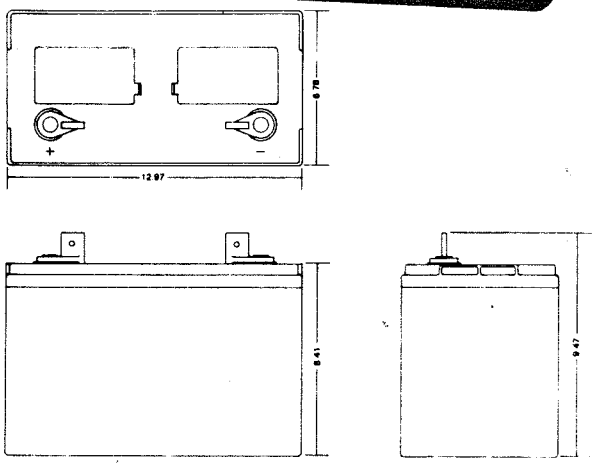
# Globe Battery Division

JOHNSON CONTROLS

5757 NORTH GREEN BAY AVENUE ● MILWAUKEE, WISCONSIN 53201
414-228-2393 TWX #910-262-3084 TELEX 026-650








TOLERANCE: ± 03 **DIMENSIONS (INCHES)**

## GC12800 SPECIFICATIONS

| | | |
|---|---|---|
| 1. | Nominal voltage | 12 volts (6 cells) |
| 2. | Nominal capacity at: | |
| | 4.0 amps (20 hr. rate) to | 10.5 80 A H |
| | 7.0 amps (10 hr. rate) | 10.3 70 A H. |
| | 12.5 amps (5 hr. rate) | 10.15 62.5 A.H. |
| | 45.0 amps (1 hr. rate) | 9.8 45 A H |
| | 72.0 amps (30 min. rate) | 9.6 36 A H |
| 3. | Weight | 50 lbs |
| 4. | Internal resistance of charged battery | Approx 6.0 milliohms |
| 5. | Maximum discharge current | 800 amperes |
| 6. | Operating temperature range | |
| | Discharge | -76° to + 140°F |
| | Charge | -4°F to + 122°F |
| 7. | Case material | Polypropylene |
| 8. | Vents | Pressure relief vents permanently attached |
| 9. | Grid material | Lead calcium |

10. Sealed construction – batteries utilize a fully gelled electrolyte – will not leak or spill even if left upside down for extended time periods.

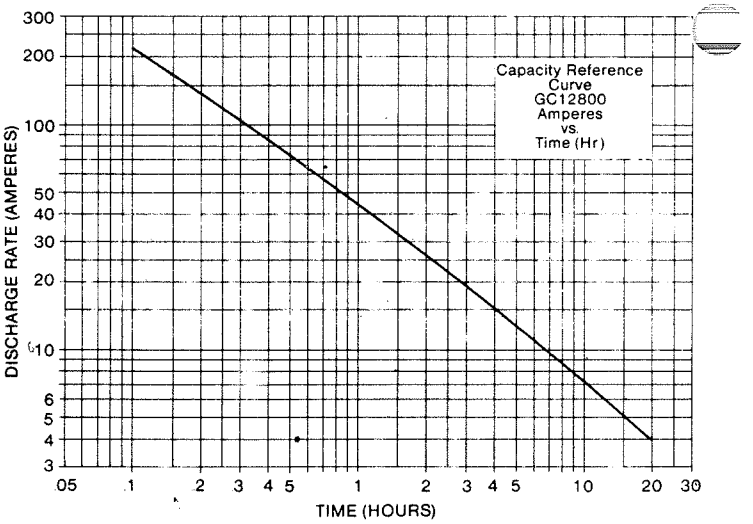
11. **Flag terminals.**

## TYPICAL PERFORMANCE DATA

1. Reserve capacity (80°F)
   25 amps to 10.5 volts — 130 Min

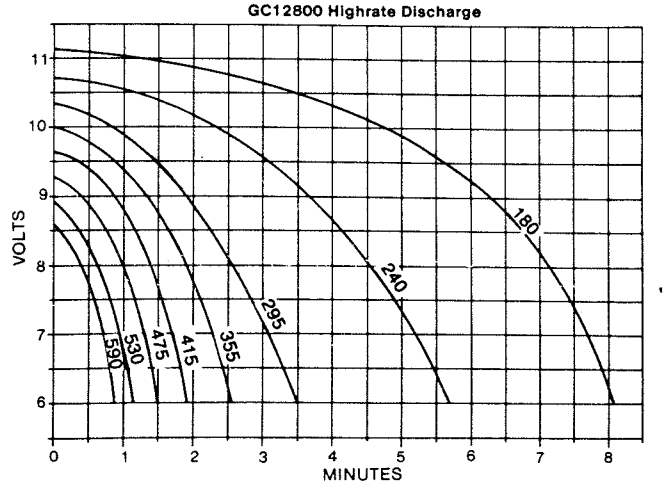
2. Low temperature discharge 410 amps @ 0°F
   5 sec. voltage — 7.7
   30 sec. voltage — 7.4
   time to 7.2 volts — 75 Min

**Discharge Curve (Long Duration)**



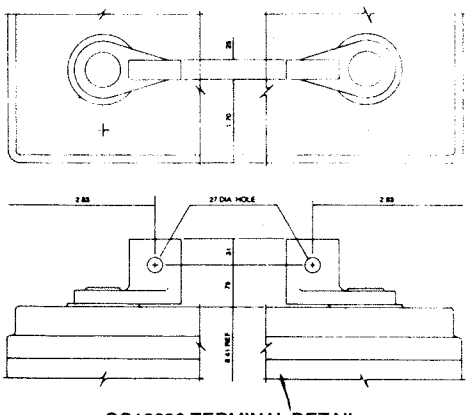

Out-Point for Battery Discharge is △2V from Initial 10 Second Voltage

**GC12800 Highrate Discharge**




NOTES:

- Batteries tested after 12 hour float at 14.4 volts. Tests run at 73°F.
- Engineering minimum values. Does not include connection losses between batteries.
- IEEE suggests when sizing a battery for less than the 1 minute rate, use the 1 minute rate as a maximum discharge rate to the desired voltage level.




GC12800 TERMINAL DETAIL

# THE CASE FOR SHUNT MOTORS

"FOR SIMILAR MOTOR DESIGNS, THE TOTAL FIELD EXCITATION POWER REQUIREMENT DOES NOT CHANGE, FOR IT DOES NOT MATTER WHETHER THIS IS OBTAINED BY SHUNT OR SERIES FIELD COILS." PM WOULD ALSO APPLY IF/WHEN AVAILABLE IN POWER RANGE NEEDED.*

SERIES MOTORS HAVE BEEN ALMOST COMPLETLY ELIMINATED FROM MODERN ELECTRIC VEHICLE DESIGN, "BECAUSE OF PROBLEMS WITH CONTROLLERS, POORER EFFICIENCY AND THE ADDED COMPLEXITY NECESSARY FOR REGENERATIVE BRAKING."*

THE MOST POPULAR MOTOR FOR THE 30 VEHICLES STUDIED WAS THE LUCAS CAV TYPE MT305 40 KW DC SHUNT, 216 VOLTS. THIS SAME MOTOR WILL BE USED IN THE NEW GM VAN PROGRAM. LARGER VEHICLES, 90 PASSENGER BUSSES AND 3.5 TO 7.5 TON TRUCKS USED BOSCH MOTOR 90 KW, 360 VOLTS ALL SHUNT. THESE VEHICLES ARE FROM FIVE COUNTRIES AND SIX MANUFACTURES.

I have not found any vehicle designed in the past five years, or now under development, that uses a series motor. It is of course true that a series motor has very good start up torque, however, there is an old saying "you don't get nothing for nothing". In our case this means high torque, high current so if you want a dragster maybe you should use a series motor. The main problem here is the chain reaction set up by this more torque more current characteristic, since the motor current flows through the series field this means more current more torque, more torque more current etc. This also sets up another chain, with battery power the more current the lower the voltage, the lower the voltage the higher the current etc. again. If you would like a real shock (no pun intended) use two volt meters one directly on the motor terminals and the other directly on the battery terminals and observe the difference in readings under normal driving conditions, and this is not all the voltage drop because you probably have at least double that in the inter-connections on your battery pack. The only problem I have ever found with a shunt motor driving an electric vehicle is that many designers including some professionals do not seem to know what to do with the field. When the field current in a shunt motor under load is reduced the armature current rises very rapidly, with battery operated equipment the idea is to keep the armature current as low as possible so my recomendation is to ALWAYS RUN FULL RATED FIELD CURRENT. Many designs use the shunt field to vary the speed at the high end since the motor does run faster as the field is lowered, I do not believe the small change in speed is worth the extra current. You do need a field controller to regulate the regenative braking and charge rate. Bypass field controller in drive mode.

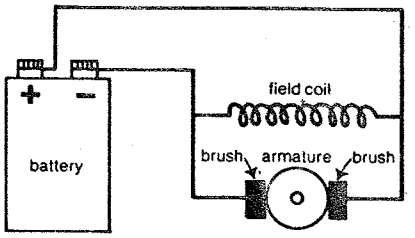



**Figure M-6. SHUNT MOTOR**

Notice how the field coil (electromagnet) and the armature receive current independent of each other.

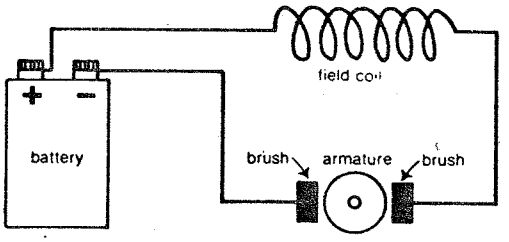



**Figure M-5. SERIES MOTOR**

In the series wound motor, the field coil is in "series" with the armature. The energy must go "through" the field coil before reaching the armature.

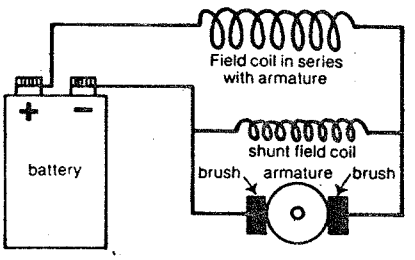



**Figure M-7. COMPOUND MOTOR**

Notice the two field coils. If a switch were provided to isolate the series field, there would be an even greater flexibility, allowing the unit to start out as a compound and run as a shunt motor.

## AC PROPULSION SYSTEM

Several systems have been delivered to DOE for test, Eaton, Soleq and General Electric. The latest GE/Ford ETX-II (see Dec '86) should be under test now. With a compact modular drive unit, IPM synchronous motor using neodymium-iron-boron (NdFeB) permananent Magnets and sodium-sulfur battery this should really be a winner.

*QUOTES: From Presentations to DOE for contracts, GE, Fiat, Minicars, and South Coast tech.

NOTE: FULL FIELD, means saturation not name plate. CAUTION!! Over current can burn out field winding.

By Clarence Ellers

I HAVE THE FOLLOWING ITEMS IN STOCK FOR IMMEDIATE DELIVERY:

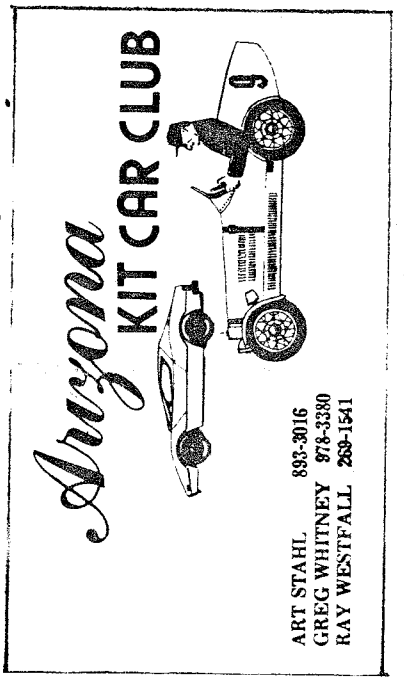
1 - 1000 AMP RELAY $30.00.
10 - 400 AMP RELAYS $25.00 EA.
12 - 200 AMP RELAYS $15.00 EA.
10 - 1000 AMP SHUNTS (CAN BE USED FOR 200, 400, 600, 800, OR 1000 AMP METERS. THESE SHUNTS HAVE SMALL 1000 AMP METERS WITH THEM, BUT A 400 OR A 600 AMP METER WOULD BE BETTER) $10.00 EA.
1 - 275 AMP SHUNT $7.00.
1 - 400 AMP SHUNT $15.00.
1 - 100 VOLT DC METER $10.00.
1 - 30 VOLT DC METER $5.00.
2 - 100 AMP FUSES $5.00 EA.
1 - 300 AMP FUSE $5.00.
1 - 400 AMP FUSE $5.00.
2 - 600 AMP FUSES $10.00 EA.
4 - 300 AMP JH-R1 GENERATORS IN LIKE NEW GOVERNMENT OVERHAULED CONDITION. (I HAVE USED THIS TYPE UNIT SUCESSFULLY IN CARS AS HEAVY AS A 1972 MAZDA STATION WAGON) $185.00 EA.
1 - 400 AMP G-29 GENERATOR IN GOOD CONDITION. (THIS TYPE UNIT HAS BEEN USED IN MANY SUCESSFUL CONVERSIONS) $ 85.00.
1 - 400 AMP G-31 GENERATOR IN GOOD CONDITION. (VERY SIMILAR TO THE G-29 LISTED ABOVE) $185.00.
1 - 400 AMP 2CM77 MOTOR-GENERATOR IN GOOD CONDITION. (THIS SEEMS TO BE THE MOTOR OF CHOICE IF YOU CAN FIND IT) $225.00
1 - GENERAL ELECTRIC DC MOTOR, #5BT1326B106, 7 1/2 HP AT 36 VOLTS AND 200 AMPS AT 3000 RPM. SERIES WOUND. 14" LONG, 7 3/8" DIAMETER, 1 1/8" X 2 1/4" KEYED SHAFT. (THIS TYPE UNIT HAS BEEN USED SUCESSFULLY TO POWER SUCH CARS AS THE VW BEETLE) $275.00.
1 - BALDOR DC MOTOR #7544D, 8HP AT 72 VOLTS AND 100 AMPS AT 3400 RPM. SERIES WOUND. 17 3/16" LONG, 9 1/2" DIAMETER, 1 1/8" X 3" KEYED SHAFT. (THIS TYPE UNIT HAS ALSO BEEN SUCESSFULLY USED TO POWER MANY CARS IN THE VW BEETLE CLASS) $400.00.

1 - 1980 BRADLEY GT II ELECTRIC KIT CAR, FACTORY-BUILT AND IN EXCELLENT CONDITION. TOTAL MILES ON CAR 3643. WILL SELL THE COMPLETE CAR FOR $3500.00 OR WILL SELL THE COMPLETE ELECTRICAL PACKAGE INCLUDING BATTERIES, MOTOR, ADAPTOR, CONTROLLER, GAUGES, AND ALL WIRING FOR $1500.00. THIS ELECTRICAL SYSTEM WILL FIT ANY VW BEETLE CHASIS.

1 - GENERAL ELECTRIC 20 HP MOTOR C/W VW ADAPTOR AND FLYWHEEL MOUNT (SAME AS MOTOR USED IN CAR ABOVE). THIS MOTOR SOLD FOR $1255.00. ALSO INCLUDED IS A BRADLEY EV-1 SCR CONTROLLER BY GE WHICH SOLD FOR $2475.00. CONTROLLER AND MOTOR ARE LIKE NEW. WILL SELL THE PACKAGE FOR $800.00.

PRICES ON LARGE PURCHASES ARE NEGOTIABLE.

IF YOU ARE INTERESTED IN ANY OF THE LISTED EQUIPMENT, I WOULD BE WILLING TO DISCUSS POSSIBLE USES OR APPLICATIONS BY PHONE OR IN PERSON. THANK YOU FOR YOUR INTEREST IN ELECTRIC AUTOMOBILES.




YOURS TRULY,

Gregory Whitney

GREGORY WHITNEY
5320 WEST KINGS AVE.
GLENDALE, AZ 85306

MEMBER, PHOENIX
CHAPTER, ELECTRIC
AUTO ASSOCIATION

602-978-3380

## Computerized Cars May Drive to Work

You can pretty much categorize eople into two groups: those who love to drive and those who don't. Readers who identify with the latter group will appreciate the following news: computers may soon eliminate the need to have a driver in a car.

Jerry Rivard, vice president and group executive of the Bendix Electronics Group of Allied Signal Corp. in Southfield, Mich., figures that by the year 2010 cars may be able to travel at speeds of up to 130 miles per hour with only a computer "at the wheel."

Speaking before a Chicago meeting of the American Association for the Advancement of Science, Rivard said that such a car will allow freeways to accommodate up to four times the amount of traffic they currently handle. Better yet, it will allow passengers to nap, play cards and do heaven knows what else while speeding toward their destinations.

"It will be no different than the subway system in Paris," said Rivard. "We'll be able to [ent instructions] and go to Florida overnight." According to Rivard, the autos will follow wires embedded in the road and use radar to keep a safe distance away rom other cars and objects.

Sounds futuristic—the sort of stuff car manufacturers like to feed to us at World's Fairs and auto shows. But, fortunately, not all automotive engineers agree with Rivard's prediction.

Speaking at the same meeting, Mounir Kamal, a technical director at the General Motors Research Laboratories in Warren, Mich., noted that a driverless auto may prove to be financially unfeasible. "There are a lot of unknowns," he said. "The technology does not allow us to do these kinds of things economically."

Kamal did predict that, one way or another, computers will continue to profoundly influence automobile design. For insta e, he noted that within three years we y see intelligent shock absorbers that can sense rough pavement and instantly compensate for it. Kamal also claimed that computer-controlled sy ems eventually will provide improved traction on icy roads by cutting power to a spinning wheel until it regains traction.

All of which is pretty good news to those of us who still love to drive.

*—John Edwards*

## GOLF CAR/EV BATTERY

East Penn Manufacturing Co., Inc. recently introduced an innovation in the construction of their golf car/EV battery that dramatically increases cycle life.

New deep pocket envelope separators give the battery substantially longer life by protecting all four sides of the plate to virtually eliminate the damaging effects of internal shorting.

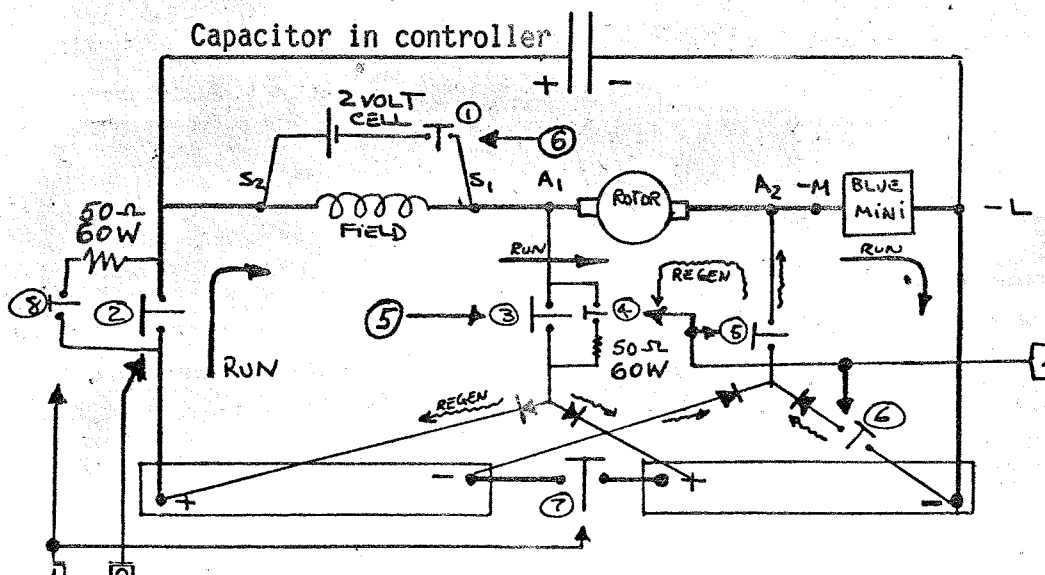
These special glass-filled envelopes are made of durable, flexible polyethylene to eliminate cracking or chipping. The glass fiber material imbeds itself into the plate surface, locking active material to the grid and significantly retarding plate shedding.

The quality, cycle life and performance of the Golf Car/EV battery are also enhanced by computer-controlled production techniques and an improved temperature-controlled plate formation process. The high density oxide used increases capacity with cycling. The polypropylene case and cover are lightweight and crack-resistent.

The battery is available with 92 and 110 minute capacities. Three different terminal configurations are also available.

*The golf car battery is one of several specialty batteries produced by East Penn, a manufacturer of automotive, industrial and specialty batteries, cables and accessories. For more information on East Penn's Golf Car/EV battery line, write to East Penn Manufacturing Co., Inc. Lyon Station, PA 19536.*

## *REGENERATION FOR SERIES MOTOR* 3



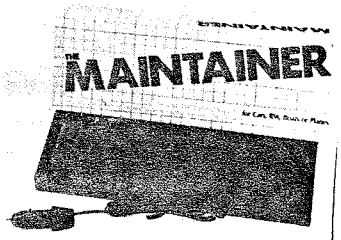

Motor: Prestolite (Series)
Controller: Blue Mini SES

With any regeneration system batteries must be paralleled to maintain current at lower speeds.
I trigger my regen. with a small normally closed relay energized from the main contactor, so when the main contactor is off the regen & parallel is on. This gives full time regen.

2-Volt Cell From Trojan

Run: Contactor 1 2
1 open-time-▸3,4,5,6,open-time-▸7,8close---▸2close
1Sec. Delay
Regen.
2,7,8open-time-▸4,5,6close-time-▸3close-time-time-▸1close
3 4 1 sec.delay-▸5 6

# SOLAR BATTERY CHARGER




Celebrating its 10th Anniversary, Solar Electric Engineering, Inc. (SEE) has introduced the Maintainer solar battery charger to the automotive aftermarket at the 1986 APAA Show.

The Maintainer answers consumer frustration and hassle over dead car, boat or airplane batteries by keeping them at peak starting power all the time! Simply plug this dashboard solar panel into the cigarette lighter socket or hook it directly to the battery to keep the battery topped off.

The 12 volt solar battery Maintainer generates an electrical charge of 70 milliamps. This is plenty of power to keep an automotive battery charged for periods of non-use.

The Maintainer measures a convenient 4" x 13" and fits right on the dash. If the vehicle is covered or in a storage garage, 12 volt extension cords are available so The Maintainer can sit outside or in a window facing the sun.

The Maintainer is excellent for offsetting the battery drain caused by a vehicle's alarm or computerized electronic systems.

The Maintainer can be plugged in at all times. There's no danger of overcharging, so no need to monitor the charge.

The Maintainer will extend and preserve the life of the battery. Solar charging is crucial *preventive maintenance* even for a new battery: keep it charged and it will stay healthy longer.

SEE (OTC) is a publicly owned California manufacturer with 10 years in solar electric products and power systems. The Maintainer is SEE's first consumer product targeted primarily at the automotive market.

*For further information on The Maintainer, contact Susan Bryer, Marketing Vice-President, Solar Electric Engineering, Inc., 405 East D Street, Petaluma, CA 94952, (707) 765-1986.*

You'll agree that today's car heaters just don't heat up fast enough in cold weather. Those small engines in cars are efficient but generate less heat, engineers say.

Possible solution: They're now looking at "add-on" heaters, or a return to the Corvair-style gasoline heater, or strips similar in concept to the rear-window defrosters.

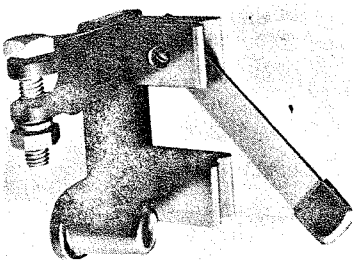
Saab, incidentally, probably has the ultimate in car heaters—the heating elements are built into the front seat cushions and backrests. You adjust the heat you need via a thermostat.

* * *

Look what's happened in 20 years. I just picked up a cake of shaving cream at a local drug store. It cost 60 cents; twenty years ago, I recall, that same shave cream cost 15 cents. An automobile today may cost $20,000; twenty years ago it cost $5,000. Has your salary quadrupled in 20 years?

* * *

# BATTERY SAFETY SWITCH



There is now a way to completely disconnect battery power without tools—simply by lifting the knife blade on a SAFETY/SWITCH™.

Five models are suitable for a wide range of applications. The switch disconnects a battery from the electrical system for maintenance, during storage, or to prevent unauthorized use of equipment. The switch helps avoid shorts and fi[illegible] while working on electrical systems.

The SAFETY/SWITCH™ discourages theft and provides for the disconnection or selection of batteries in automobiles, trucks, RVs, farm equipment, construction equipment and other expensive vehicles. Systemic battery drain associated with idle vehicles can be eliminated.

Both top terminal and side terminal batteries can be accommodated after a few minutes installation time. Each of the models is designed to handle a surge of 750 amps, and 250 amps in continuous duty. They are made of brass and copper components for heavy duty service. The SAFETY/SWITCH™ is offerd with a one-year guarantee and comes complete with installation instructions.

One model is designed with RVs in mind: it allows one to remove the "starting battery" from the circuit while the vehicle accessories remain "hot". Another model allows one to choose one of two batteries. No more dead starting batteries.

SAFETY/SWITCH™ battery disconnect switches are available from a large number of retail outlets in the U.S., as well as many mail order firms.

*They may also be purchased directly from the manufacturer, Precision Fitting and Valve Co., Inc., 10365 West 7[illegible] Street, Eden Prairie, MN 55344. Telephone toll-free 1-800-874-1259. Dealer inquiries invited.*

## HAMFESTS 1987

July 26 Sun. 7:00 a.m. $4.00
Devry Institute
3300 N. Campbell Chicago Ill

Aug. 9 Sun. 6:00 a.m. $4.00
Santa Fe Park 91st & Wolf
Rd. Willow Springs, Illinois

Aug. 23 Sun. Commodore Fest
8:00 a.m. St. Charles Ill
Kane County Fairgrounds

Sept 13 Sun. 6:00 a.m. $3.00
Santa Fe Park 91st & Wolf
Rd. Willow Springs, Illinois

Sept 19 & 20 Two days $4.00
Expo Gardens W. Northmoor rd
off 6300 block Peoria, Ill.

Sept 26 & 27 6:00 a.m. $5.00
Lake County Fairgrounds
Rts. 45 & 120 Grayslake Ill.

Oct. 25 Sun. 8:00 a.m. $3.00
Waukesha Expo Ctr. Hwys. J &
FT off I-94 Waukesha Wisc.

Oct. 31 & Nov. 1st Two days
Norris Sports Ctr. Rt. 64 &
Dunham Rd. St. Charles, Ill.

Nov. 1st Sun. 7:00 a.m. $3.00
Lake County Fairgrounds
Rts. 45 & 120 Grayslake Ill.