F.V.E.A.A. NEWSLETTER

MAY 1985

MEETING NOTICE

THE NEXT MEETING WILL BE FRIDAY MAY 17th, at MID AMERICA FEDERAL SAVINGS 250 E. ROOSEVELT RD. WHEATON, ILLINOIS. - TIME - 7:30 P.M.

LETTER FROM THE PRESIDENT

SINCE DAYLIGHT SAVINGS TIME IS HERE, WE CAN SPEND SOME TIME BEFORE THIS MONTH'S MEETING LOOKING AT ELECTRIC CARS IN THE PARKING LOT, THAT IS, IF A FEW PEOPLE WILL BE KIND ENOUGH TO BRING THEIR VEHICLES.

AT ONE OF OUR MEETINGS THIS SUMMER, PERHAPS IN JULY, WE WILL MAKE AN EFFORT TO HAVE A SHOW OF ALL OR MOST OF OUR CARS AND MAYBE WE CAN INVITE THE PUBLIC, AT LEAST THOSE AROUND WHEATON.

WE HAVE SEVERAL THINGS TO DISCUSS AT THIS MEETING, INCLUDING THE POSSIBLE ACQUISITION, BY THE CLUB, OF AN ELECTRIC CAR. WE HAVE ONE IN MIND WHICH IS NOW BEING EVALUATED BY THE MEMBERS OF THE BOARD.

ALSO, WE NEED TWO VOLUNTEERS, ONE TO ORGANIZE AN ELECTRIC CAR RALLY FOR LATE IN THE SUMMER, AND THE OTHER TO TAKE CHARGE OF THE ITEMS THE CLUB HAS FOR SALE.

SEE YOU AT THE MEETING.

Thank you.

Dana Mock
President

NOTE

MEMBERSHIP LIST ON PAGE 2 IS A NEW MEMBERSHIP LIST. IT HAS BEEN CORRECTED AND UPDATED TO THE BEST OF OUR KNOWLEDGE. WE REGRET ANY INCONVENIENCE WHICH THE PREVIOULY PUBLISHED LIST MAY HAVE CAUSED. (editor)

F.V.E.A.A.

FOX VALLEY ELECTRIC AUTO ASSOCIATION
624 PERSHING ST. WHEATON, ILL. 60187

FIRST CLASS

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40 RECORDS PRINTED

WHERE ARE ALL THE EV'S?

Yes, where are the 10,000 Electric Autos the D.O.E. 160 million dollar ELECTRIC AND HYBRID VEHICLE PROGRAM was to put on the roads by 1986? Except for a few prototype cars built at cost of many millions, there is very little to show of any consequence.

Ford's Manager of Strategy for New-Product Concepts Richard Morrissett says, "We weren't particularly excited about the demonstration project. I happen to believe in free enterprise, and I hate to see the government involved in any facet of our business."

The lackadaisical efforts of the auto people to promote the Electric Auto are nothing but a ploy to pacify the government and hoodwink the people. We are more convinced than ever that they are fighting to keep the Electrics in the background and would do anything to deter others from getting them on the road.

Henry Ford II has said "I don't see the Electric Car as a feasible method of transportation in my lifetime."

Lee Iacocca of Chrysler has said " I've had so much experience with Electrics, all bad. WE put millions into Electric Cars at my former employer (Ford) and we never could cut it. Electric Cars need a breakthrough like a polio vaccine almost. You have to have a battery that really does the job. Once you have the battery, the car will follow. Until then forget it. In this century, no way. "

When you consider and analyze a few reasons, you can see why the auto companies will not or should not be self-assertive in advancing the Electrics.

Remember, the top officials in a company are holders of large blocks of stock not only in the auto firm but also may have many shares in the oil companies. They are not about to do anything that will jeopardize their dividends or earnings-like a no-gas car.

Reason #1 It is claimed that an auto plant will not set up an assembly line unless assured of yearly sales of 100,000 units of a single model. Such a market for Electrics at this time is most unlikely.

Reason #2 Detroit's tremendous investment in the piston engine is perhaps the strongest deterrent to a widespread takeover by electric power in the near future.

Reason #3 After-market sales. Thirty to forty billions are spent in the U.S.A. alone each year for auto parts like spark plugs; carburators; filters; alternators; fuel and water pumps; starters; hoses; fan belts; mufflers; in addition to many other parts. Electric autos do not require such replacement parts.

Reason #4 When consumers revolt because of high new car prices and sales drop, prices on parts for the older cars can be increased to compensate profit wise.

Reason #5 Effect on used car prices and sales. If a sizable precentage of the 27 million families in America who own two or more cars were to get an Electric Auto as a second car, instead of keeping their old car when trading for a new car, the used car market would become flooded and prices could plunge, thus reducing profits.

Reason #6 Effect of dependable, long life of electric motors. While many people would purchase Electric Autos because they believe they contribute to eliminating air-pollution, conserving the country's energy pool and improving the international imbalance of payments, the auto people while admitting to the benefits of the Electric Auto may fear a loss in sales because the motoring public will keep the electrics longer.

Reason #7 Effect of competition. With plants operating under capacity, the auto companies are not in a position to give birth to another competitor of their own volition. They have enough competition already, trying to keep ahead of foreign makers without pushing battery-power cars.

REVIEW OF PHOTOVOLTAIC TECHNOLOGY

by Gary Mielke

Editor's Note:
This is the conclusion of a two-part series on photovoltaic development. The first part described various technologies.

Current Research

Extensive research efforts are being conducted by the federal government and private industry. The emphasis of these efforts is on the refinement of existing technologies (see technical development section above) and on reducing power conditioning and other balance-of-system costs. The current U.S.D.O.E. budget provides approximately $50 million for photovoltaic research, primarily at the Solar Energy Research Institute, Jet Propulsion Laboratory, and Sandia National Laboratories.

The federal government has established three residential photovoltaic experiment stations in Massachusetts, Florida, and New Mexico. Each of these sites is evaluating 5-8 prototype systems. A 4-kilowatt experimental system has been installed on an Amoco gas station in West Chicago, but experimental results have not been generally available from this private project.

Economics

The cost per peak watt (capacity under full sunlight conditions) of photovoltaic modules has dropped tremendously over the past 15 years, from $200 per watt in 1970 to $20 per watt in 1977 to about $10 currently. This price level equates to about $10,000 per kilowatt of generating capacity, 6 to 8 times the cost of conventional source power plants. The comparison of photovoltaic and utility plant capital costs may not be appropriate for two reasons: (1) photovoltaic systems have essentially no operating costs, but (2) their capacity is available only when the sun is shining.

In addition to the cost of the cells, the cost of balance-of-system components (power conditioners, installation, etc.) can account for 25 to 50 percent of the total system cost, although substantial price reductions are also expected in this area.

The current installed cost of a 4-kilowatt photovoltaic system, about the size necessary for an average residence, would be about $75,000-100,000. D.O.E. estimates that, at $10 per watt, the 30 year levelized current year cost of photovoltaic electricity is about $1.50 per kilowatt hour.

The extent and rapidity of future price reductions is, of course, uncertain, dependent on technical and production advances. Although previous price goals and forecasts have been notoriously overenthusiastic, most observers expect module prices to fall to about $2 per watt (1980 dollars) by 1990. At that price, a total solar electric system would cost between $4 and $8 per watt and generate electricity at a cost of about 15 to 30 cents per kilowatt hour.

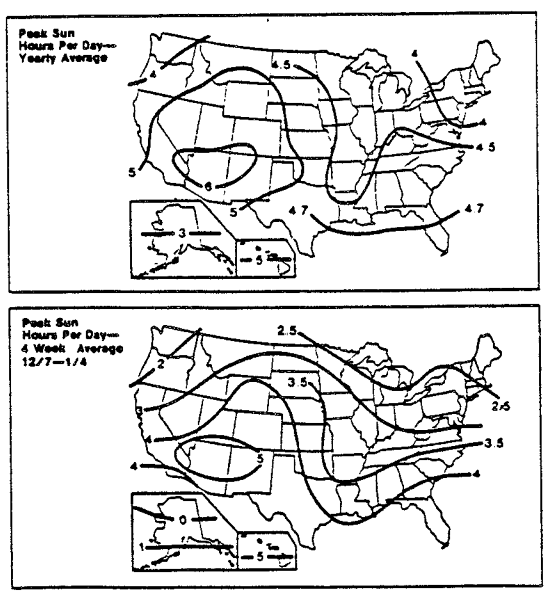
Applications

The present market for photovoltaics is limited to remote applications and certain consumer products. It is generally recognized that a photovoltaic power source can be cost-effective in areas not served by utility grids. Such applications include mountaintop communications relays, coastal navigational aids, mobile military power supplies, and isolated homesteads. In Illinois, the only known applications are track signals for the Burlington Northern Railroad and a network of stream gauging stations used by the Army Corps of Engineers and the U.S. Geological Survey to provide flood control information. Photovoltaic-powered consumer devices include pocket calculators, watches, children's toys, fence chargers, and small battery chargers for recreational vehicles and marine use.

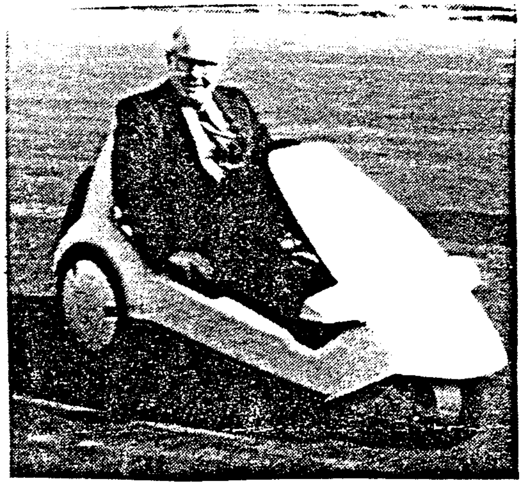
Several large demonstration systems have been funded by the federal government, including a 240-kilowatt concentrating system at Sky Harbor Airport in Phoenix, a 15-kilowatt array at an Ohio radio station, and a 60-kilowatt system at a California Air Force Base. Water pumping and small village-scale systems have been demonstrated in Arizona, Tunisia, Upper Volta, New Guinea, Pakistan, and Saudi Arabia. Two utility-scale photovoltaic power plants have been constructed in California. One megawatt of a planned 100 megawatt capacity plant has been completed by the Sacramento Municipal Utility District. The second power plant is a one megawatt system financed and installed by the ARCO Solar Company, who is selling the power to Southern California Edison. These utility-scale systems will probably be limited to the southwestern U.S. and other areas which receive high levels of insolation.

A study of future photovoltaic applications, conducted by Sandia National Laboratories, rated the potential of residential, intermediate (commercial/industrial), and central generating station installations. The researchers found that, by the year 2000, residential photovoltaic systems will be economically competitive and will provide a good market for the industry but will not constitute a significant energy souce (from the macro viewpoint) until well into the 21st century. The intermediate sector is not likely to become either an important market or a significant source, since these systems would have to be relatively large, and existing energy expenses are tax-deductible. The study found that both third party financed and utility-owned central stations would provide an important market and significant amounts of electrical generation although, again, these will probably be limited to high insolation areas.

Solar Electric Generator Systems



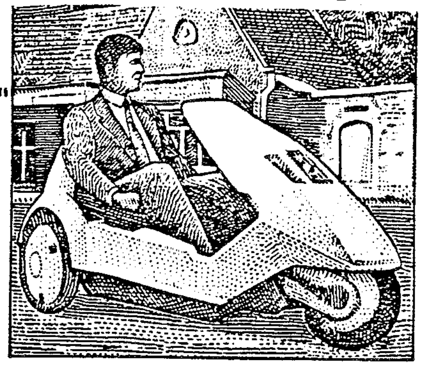
CONCERNING SIR CLIVE SINCLAIR's moped, we thought we had said about everything there was to say last month; but then Frank Flowers (Commuter Vehicles,Inc.) called to tell us that he and his son Michael (Electric Mobility Corp.) had acquired a Sinclair C-5 from the UK. We scurried down there(Sewell,NJ) as fast as possible and the result is shown at right, which is your Humble Editor taking a spin in the thing. What did we think of it, you're sure to ask. Well, it's a novelty, first of all. You sit in a semi-reclining position in the manner in which you watch a comedian that you don't like,ie.,sitting on your hands. The handle-bar is under your knees, remember. It has the On/Off switch and the brake levers for the caliper brakes. There is no speed control and no reverse, just On/Off. And we found that when we attempted a sharp turn in either direction, we squeezed the thumb between the handlebar and the seat. It's probably not a good idea to do a sharp turn "at speed," anyway. As for the speed, they say the top speed is 15 mph and you have to take their word for it, as there is no speedometer.

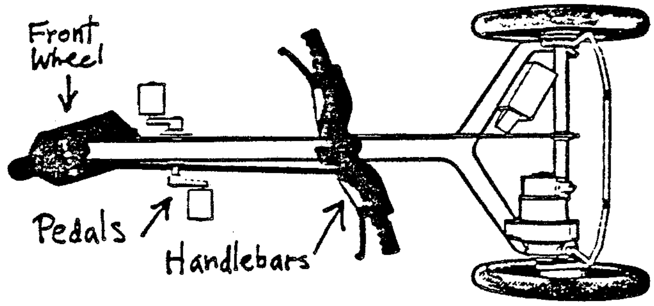


THERE's PRECIOUS LITTLE POWER FOR going up a hill, according to Michael Flowers (that's Michael on our left) but there was no hill around his plant any steeper than a driveway. By the way, Michael is a little over six feet, and you can just make out his right knee sticking up. Sinclair says you can pedal on hills and also if you "run out of gas." We found the pedals take quite a bit of pressure to get up a very slight grade. They connect, via a chain, to a rather small sprocket on the rear axle. Michael pedaled vigorously while "driving," presumably with the feeling that he was going faster than he would on battery/motor alone. We didn't see all that much difference. In last month's issue we quoted a British automotive writer as saying he is concerned about how the C-5 would fare "in the cut and thrust of our dense traffic." In contrast, your Humble Editor cannot imagine taking this "vehicle" into traffic at all. It's too low and too slow. But maybe it would be a good vehicle for those kids who are killing themselves in All Terrain Vehicles (see page 4): the C-5 is probably too slow for the kids to kill themselves.

THE ELECTRIC MOBILITY CORP. plant was very interesting for other reasons than the Sinclair C-5. They make a variety of 3-wheel electric "vehicles, with a heavy emphasis on serving the handicapped and the elderly. There are vehicles with small wheels, primarily for indoors, vehicles with big wheels suitable for outdoor use, a two-seater, and the latest, the "Rascal Rover," an indoor-outdoor vehicle.

AFTER WHAT SEEMED LIKE AEONS of promises, we finally got a good look at the so-called "commuter vehicle" to be manufactured in quantity by Sinclair Vehicle Project (SVP), an activity of British computer wizard Sir Clive Sinclair and we have to admit it was not at all what we expected. What we expected was a small, under-powered commuter car; what we see here is *not even* that, but rather a "battery-assisted moped" with one 12V automotive battery, a single seat, open-top and pedals. Among other things, the literature says, the pedals will get you home if you run out of battery. Incidentally, there is no on-board charger. The rear wheels are 16"dia.and the front wheel is 12½"dia. Overall height is 31" with 2¼" ground clearance. The story on how it rides is best told by somebody who's ridden it, so we are reproducing herewith a story in the British newspaper *The Mail on Sunday* for 12/23/84 by Frank Page, their automotive editor. Meanwhile, we would comment (and do so below) that if you want a battery-assisted moped, we have them over here ("Pedal Power") and also without pedals, such as the Cycle Chair that Michael Flowers makes, or the Palmer Industries 3-wheeler. These don't pretend to be road vehicles, however. In some restricted areas, people drive golf cars...but there's a real vehicle---much heavier, higher and with a 36-volt electrical system. Shown at right, below, is the "Cycle Chair" made by Electric Mobility Corp., with a 24-volt electric system, 20" wheels, on-board charger, 12 mph speed sans pedals, 20 mile range. The only thing it doesn't have is what Frank Page calls "star wars packaging." And, Medicare approved, it doesn't ask Senior Citizens to pedal. Now let's sit back and see how Sir Clive Sinclair makes out with the C5 . There may still be a market for it. How much does it cost ? We've heard both $1,000 and $500; but in neither case was anything said about the cost of shipping it over here. Maybe we'll get that for our next issue.





THE Sinclair C5 is smooth, quiet and huge fun. I know, because I am the first motoring writer in the world to have tested it.

But despite its tremendous instant appeal the tiny single-seater — a bike with Star Wars packaging — has some disturbing drawbacks.

Page: Concerned

The C5 will have a huge potential market of youngsters who cannot start riding mopeds or motorcycles until they are 16.

And it is certainly quite unlike any conventional bike to ride. To begin with, you sit in it, not on it. The 5ft 6in body takes a wide range of body shapes and lengths including mine — and I'm 6ft 2in.

The pedals give plenty of thrust if needed on hills or when the battery is low, and the handle bars can be steered comfortably. Electric power is controlled by a simple button and although there is no normal suspension, the C5 gives a comfortable ride. It will also turn in little more than its own length.

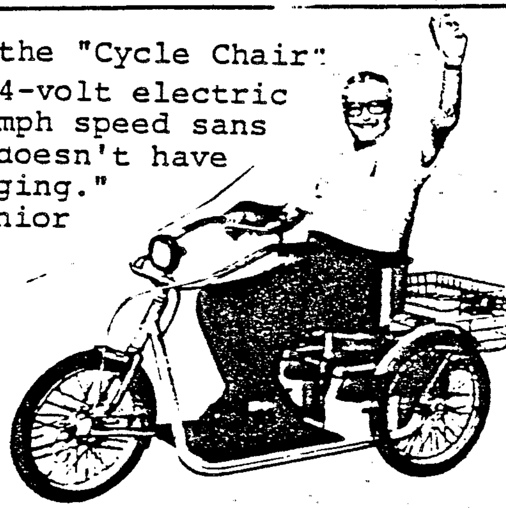
The great joy is how easy the C5 is to ride — you just get in and go. Adults hustle around as if in a dodgem car and youngsters master the controls in minutes.

But I had some worries, firstly with the brakes. I found the handlebar levers stiff to work and the brakes themselves, a bike-type caliper at the front and one rear drum, slow to react.

Then there is stability. Although the C5 keeps its centre of gravity well down, you can start it tipping by turning sharply at full speed.

Most worrying of all, is the problem of the small C5 being seen. Sinclair Vehicles will sell a safety reflector, but only as an optional extra. And despite reflective strips, it still looks very small alongside other traffic.

And I am concerned about how a tiny and slow electric trike driven by someone who has not passed a driving test, or even been required to study the Highway Code, will fare in the cut and thrust of our dense traffic.



KEVLAR provides key to practical continuously variable transmissions (CVT)

The world's automakers are competing in what could be a winner-take-all race to develop vehicles with belt-driven, continuously variable transmissions (CVTs), which provide better fuel economy and are less costly to manufacture than today's fixed gear automatic transmissions. The concept for a CVT, with a wide range of continuously variable ratios and smooth, stepless speed changes, is not new. A. G. Spaulding first invented one in 1896, and a CVT was used in the early 1900's in a car built by the Reeves Company.

Unlike an automotive fan V-belt drive which turns over sheaves of fixed diameter and width, a gearless belt-driven CVT drive operates on sheaves with variable diameters and widths.

One key link in all CVT designs is the belt, which has traditionally been made of steel, rubber or various composites, ranging from fabric and rubber; to fabric, steel mesh and rubber; and all-metal mesh designs. However, none of these have yet proven commercially viable. Now, various companies doing work in this field, including Gates, Dayco and Goodyear, are looking at rubber composites again in combination with new high-strength elastomers and KEVLAR aramid fiber.

Gates introduced its patented Power Trac® V-belt, a composite belt reinforced with KEVLAR, as a key component in a prototype CVT installed in a 1982 Plymouth Horizon. Tests indicate that the Gates CVT offers 15 percent improved gas mileage and 17 percent higher mechanical efficiency than a conventional automatic three-speed gear transmission. The former test was conducted by an EPA-certified automotive testing laboratory, and the latter was determined by a simulated EPA driving cycle using a transmission dynamometer at a Gates Research and Development facility.

"We believe that we are out front in transmission belt technology," says Bob Tone, of the Gates' Research and Development division. "That gives us an advantage in CVT design, but it is not our intent to manufacture transmissions."

The company invented the V-belt more than 60 years ago, and that is still its main area of interest in this field. The new Power Trac belt is a composite structure that runs dry on steel sheaves. It is constructed of trapezoidal blocks fastened to a flat-belt tension member. The blocks are molded of rubber and fabric and have internal reinforcing members to resist the transverse or axial forces. The flat-belt tension member is made of KEVLAR and rubberized fabric. It has friction pads along the outside edges that contact the sheaves and are designed to minimize wear and slippage.

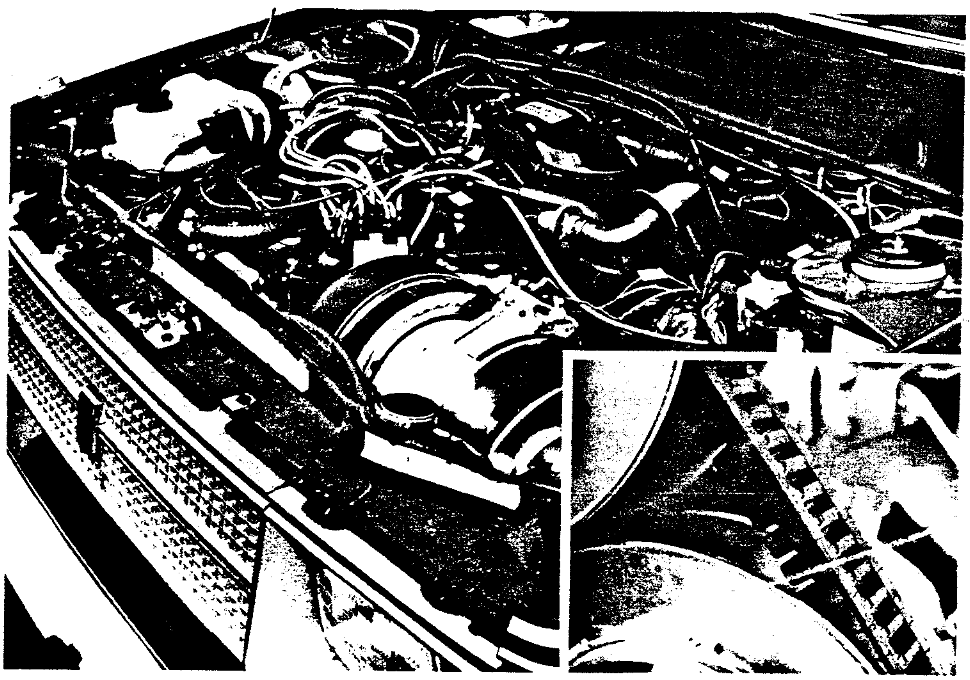
The advantage to this design, according to Gates engineers, is that it stops transverse buckling and uneven cord loading which results in the inefficiencies and shorter lives of conventional rubber belts.

It also packs more than twice the horsepower and torque-carrying capacity of a comparably sized V-belt.

The test car was driven more than 800 miles a day on a 44-mile circuit near San Antonio, Texas. The belt completed a certified road test of more than 52,000 miles. The test was designed to simulate average driving conditions including a mix of city stop-and-go traffic with frequent shifting, full throttle accelerations, and highway cruise conditions. At the test's end, the Gates belt was in excellent condition. From this data, calculations indicate that a Power Trac belt will last the lifetime of a compact-sized car with a 1.7-liter engine.

Gates built and tested the CVT concept to demonstrate two main points: (1) the feasibility of using its Power Trac belt on a commercially acceptable automotive transmission, and (2) a rubber V-belt CVT can deliver good fuel economy, smooth operation and competitive pricing in front-wheel drive cars. What's more, Gates engineers confidently point to an independent engineering study which predicts that a Power Trac CVT is expected to cost up to 20 percent less to manufacture than a conventional automatic transmission, due to its design simplicity and low parts count.

The Gates Rubber Company and Bridgestone Tire Company of Tokyo recently formed a joint venture to manufacture and market Gates CVT belts in Japan. The belt is called Turbo Trac®



A prototype, belt-driven continuously variable transmission (CVT), developed by Gates Rubber Co., has completed a 52,000-mile certified road test on a 1982 Plymouth Horizon. A key to the CVT's performance is its Gates Power Trac® belt (inset) reinforced with KEVLAR aramid.

HAMFESTS IN THE NEAR FUTURE

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