



SANTA CLARA (CA.) CHAPTER RALLY RESULTS

RALLY '90 - The Good, the Bad, and the Ugly.

Wow, some rally! The top two EVs went more than 90 miles, and at normal driving speeds. Proving once again how practical EVs are in reality right now! Interest is increasing as the environmental issue is very big now in addition to gas prices and availability. Will there be a short fall? No lines yet, but there are only one half as many stations now as in the 70's--but everyone has electricity. What could be more convenient than charging at home? And EVs offer the option of being charged from solar or wind sources giving zero cost per mile for fuel. All this while producing NO global warming gases, pollution or contribution to the heat load of the planet.

I want to thank the people that made the rally possible by putting in a lot of behind the scenes work in preparation, and at the event itself. The key people were Lee Hemstreet and his wife Dottie, Larry Burriesci, Hal Monroe, Alan Downs and myself. Other big helpers were: John Newell, Chuck Olson, Pat and Al Hardage, Judy Horn-McGinnis, and of course all of the judges and hams for their help. Dave Hall, Gene Fowler, Forrest Carrol, George Curry, Doug Spotten, Swede Swenson, Tom Scherf, Andy Anderson, Clair Donahue and the Sunnyvale Emergency NET and PAARA. I hope I didn't overlook anyone. Also a special thanks to Dr. John Reuhl and the Stanford students led by Stefan Heck for bringing out the Hybrid car and the SUNSurfer for display. The interest in these displays was phenomenal. I only wished that they could have stayed all afternoon. And lastly, a great thanks to Lockheed for the authority to use their parking lot. Well, that is only some of the good of the Rally.

Now for the bad. We had an inadequate PA system that led to total confusion for the restart after lunch. There were other start-up problems with the new location. The course arrows were forgotten by an overworked rally crew. I expected several displays of parts, etc. to be there for sale.

In addition, our last minute efforts to set up both a Rally and a Symposium failed. When the last of three possible speakers cancelled out on our severely overworked crew, I decided it was time to pull the plug on the Symposium for this year. Considering that we almost did the same for the Rally, due to a shortage of volunteer help, we did well indeed on this Rally. I hope that with

increased interest leading to new members, that next year we will have the NECESSARY 12-15 (or more) key people as well as the same complement of judges, hams, etc. to do the next Rally and Symposium correctly. Otherwise I don't feel that it is fair for the same few dedicated souls to break their backs again. Come on people, let's pull together to make this club grow. The time is now!

So much for the good and the bad. Now to the only ugly aspect of the Rally. The almost non-existent pre and post media coverage (there was some video taping and one pre, and one post event newspaper story). For this I can only blame myself and the media, as I did the publicity. I contacted almost 20 media channels (newspaper, TV and Radio Stations) by mail AND by phone, with almost NO interest generated on their part. They felt that EVs and the Rally were old news, that it had already been covered and could not see the important tie-in to the events in the Middle East, and the environment, not to mention balance of payments.

I could understand this indifference when gas was cheaper, and few had an awareness of the environment, but that has changed. The only thing that is currently lacking a repeat of '73 is that there are NO lines to get people really riled up and panicky, YET. I guess that that is the proverbial "2 x 4" at the side of the head that it takes to get the media's (and the public's) attention. Facts, figures and even great demonstrations of the EVs reality doesn't get the attention of a public/media which is asleep at the wheel of their gas guzzlers. Perhaps the CO2 poisoning has already put their brains to sleep, or worse.

Short of gas lines as a "2 X 4", I don't know how to tell our story. Any and all suggestions are valued. Please send them to me directly, or through the newsletter address. All criticisms, constructive or otherwise, are welcome. That's how we grow.

Next month: Ideas for the Rally, the Symposium the future of the club and the content of the newsletter. Let's hear from you.

Charge it up! Pb (Paul Brasch) 10/19/90

ELECTRO - AUTOMOTIVE

P. O. Box 1113

Felton, CA 95018-1113

408 - 429-1989

P R E S S R E L E A S E

SANTA CRUZ--Electro Automotive, the leading supplier of electric car conversion components and kits, has announced plans to establish a statewide network of facilities to convert gas cars to electricity. This announcement came in response to stringent vehicle emissions rules recently approved by the California Air Resources Board.

The new emissions rules will take effect in stages over the next twelve years. By 2003, 10% of all cars sold in California must produce zero emissions. Only electric cars can meet that standard.

"With this kind of mandate, the demand for electric cars is going to skyrocket in the next few years," said Electro Automotive President Michael Brown. "A network of conversion facilities will help fill the gap between demand and production."

Electro Automotive will provide training, marketing assistance, wholesale components, and technical support to technicians at selected facilities across the state. These facilities will be able to convert existing gas cars for private individuals or fleet applications.

Environmental concerns, such as global warming due to the "greenhouse effect", have brought increased attention to electrics in the past year. The current mid-east crisis and newly adopted emissions standards are expected to intensify that interest.

In addition to being pollution-free, the electric car is more reliable and requires less maintenance than a gas car because it has far fewer components subject to wear or failure.

Electric vehicles are ideally suited to be "second cars" for local commuting and errands. Typical conversions can reach speeds of 65 mph and travel 60 miles on a charge. The best conversions can exceed 100 miles range. The average American household has 1.8 vehicles, with the average commute being 8.5 miles, and the average vehicle traveling 26.5 miles total per day.

Electro Automotive was founded in 1979 as a mail order supplier of components and kits for conversions. Michael Brown served as a consultant to the Stanford University Solar Electric Car Project in 1987, and has recently published a step-by-step manual for doing conversions. Electro Automotive supplies components to individuals and electric car builders across the United States and Canada, as well as overseas. CONTACT: Shari Prange

THE FOLLOWING PAGE ---- features the NAV prototype developed jointly by Nippon Steel Corp. and Tokyo R&D Co. Ltd. This copy is from CAR STYLING, Sept. 1990. The letters NAV come from "NEXT generation ADVANCED electric VEHICLE". It is an interesting concept, the elimination of a motor in the chassis frees up a lot of space. Mr. Shimizu, head of the Regional Planning Research Lab, was doing research in electric cars when he met with Mr. Masao Ono of Tokyo R&D and from there the two went on to the present development. While most people believe that lack of a good battery is the main reason EVs have not caught on, Mr. Shimizu takes the refreshing approach of not expecting any improvement in the battery and proceeds to deal with materials that can have a bearing on performance with lead acid batteries installed. The NAV uses new materials extensively. The motor's permanent magnets are of rare earth elements and the chassis uses an aluminum and kevlar honey-combed material surrounded with CFRP. --- The use of rare earth magnets in motor development is relatively new but we already know that the weight of electric motors can be considerably reduced with their use. We have here in B.C. some experimental results that show output horsepower in the range of FIVE HP per .1lb of motor. We hope to be able to feature one of these motors in a future issue of our news magazine.

VANCOUVER ELECTRIC VEHICLE ASSOCIATION



Specifications

Measurements

Overall length	4440 mm
Overall width	1720 mm
Overall height	1265 mm
Curb weight	1200 kg
G.V.W.	1420 kg
Performance	
Max. speed	110 km/h
Range	240 km (at 40 km/h)

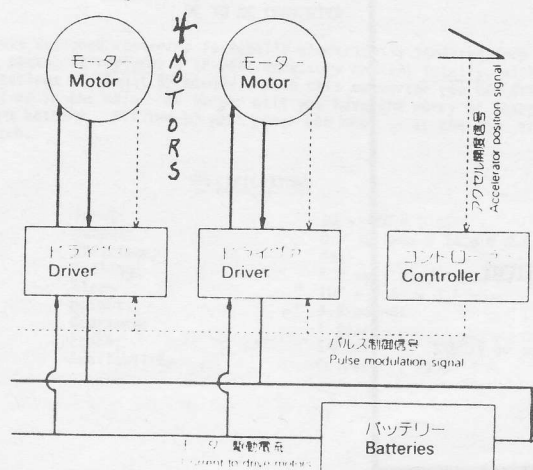
Motor

Type	DC motor
Power Rating	5 kW x 4
Max. power	13 kW x 4
Max. torque	20 kgm x 4
Chassis	
Suspension	double wishbones at four corners
Brakes	discs/discs
Tires	205/50-17

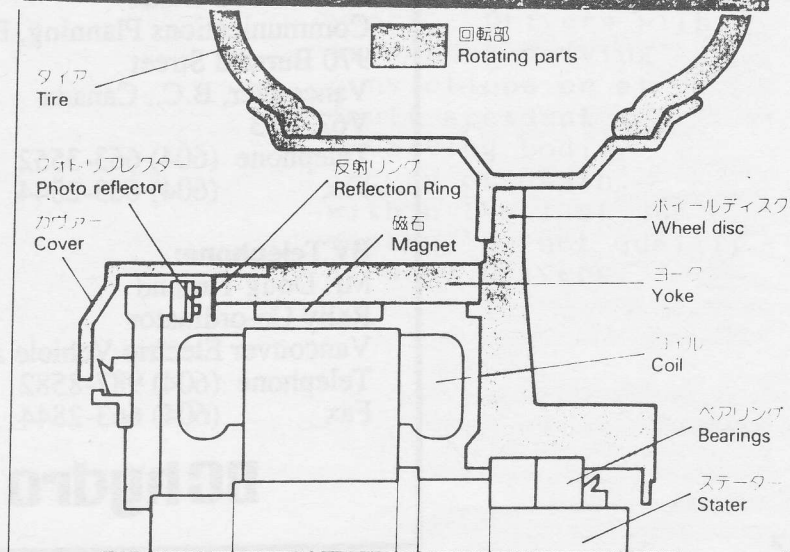
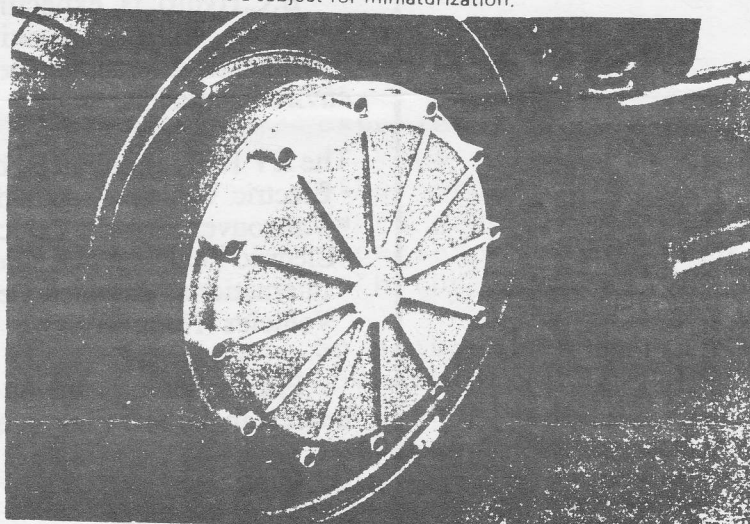
NAV

Motor The outer rotor type motor. The yoke is made of steel and the cover and wheel disc are made of magnesium. The motor doesn't use brushes, detecting the rotor revolution speed angle with the use of photo-reflectors.

Outline of the current circuits The motor is operated by current supplied in ON/OFF pulses from the batteries through the driver's MOS-FET (a type of large capacity transistor). The pulses are controlled by the signals received from the accelerator and, normally, the longer the ON signal is present the higher the motor's torque. The timing for current supply to the three coils of each motor is controlled by the driver which receives rotor position signal.



Package layout The seating arrangement favors the front seats so that the car is more of a 2 + 2 than a four-seater. The five 150 Ah batteries are located in the lower portion of the nose and the DC/DC converter (120 V to 12 V) that is necessary to operate the headlights, turn signals and other electrical accessories can be seen back above the batteries. There are also five more batteries in the rear with attached current management device. The device for switching such large currents is quite big and it will be a subject for miniaturization.



**INTERNATIONAL
ELECTRIC VEHICLE
RALLY
VANCOUVER, VICTORIA
British Columbia, Canada**

April 16 - 18, 1991

B.C.Hydro, a public Electric Utility, is sponsoring an invitational Electric Vehicle Rally in conjunction with the Annual Electric Energy Forum, to be held in Victoria, B.C., Canada, April 16 to 18, 1991. The EV Rally will start at noon on the 16th from B.C.Hydro's Vancouver Head Office and proceed 64 kilometres (40 miles) to Victoria. On the 17th, the Vehicles will participate in demonstration laps in downtown Victoria. Selected vehicles will be displayed at the Forum in the Victoria Conference Centre.

Councilman Marvin Braude, City of Los Angeles, California will start the EV Rally and will speak to the Forum delegates at 2:30 p.m. on April 17.

B.C.Hydro is expecting 400 attendees including utility executives, educators, consultants, government representatives and environmentalists.

The EV Rally is endorsed by:

- Electric Vehicle Association of Canada
- Vancouver Electric Vehicle Association
- Electric Vehicle Association of the Americas
- International Research Centre for Electric Vehicles (Hong Kong)

For further information and to express an interest in participating, please contact:

By Mail:

Mr. Andrew Baker
Communications Planning, B.C. Hydro
970 Burrard Street
Vancouver, B.C., Canada
V6Z 1Y3
Telephone (604) 663-3552
Fax (604) 663-2844

By Telephone:

Mr. Doug Turland
Rally Co-ordinator
Vancouver Electric Vehicle Association
Telephone (604) 987-8582
Fax (604) 663-2844

BC Hydro 

SANTA CLARA (CA) 1990 RALLY RESULTS

Award	place	car # & name	official laps	miles
1st	1	10 Lloyd Wenzel	23	94.3
	2	13 Tony DeBellis	22+1	90.2 (94.3)
	3	6 Chuck Olson	18	73.8
	4	2 Larry Burriesci	15	61.5
	5	4 John Newell	14	57.4
	6	16 Bob Schneeveis	13	53.3
	7	8 Scott Cornell	12	49.2
	8	7 Bill Williams	12	49.2
	9	5 Jean Bardon	12	49.2
	10	1 Lee Hemstreet	11	45.1
	11	15 Tony Brasil	11	45.1
	12	11 Roy Paulson	11	45.1
	13	3 Stan Skokan	10	41
	14	9 John Wasylina	10	41
Best Looking	15	12 Don Gillis	7	28.7
	16	14 Bill Kuehl	5	20.5

EV INSURANCE ?

HENDERSON INSURANCE AGENCY
1687 LAUREL ST.
SAN CARLOS, CA. 94070

October 12, 1990

NOTICE TO ELECTRIC CAR OWNERS

LIABILITY AND PHYSICAL DAMAGE INSURANCE IS AVAILABLE THROUGH THIS AGENCY FOR THOSE WHO QUALIFY UNDER THE STATE OF CALIFORNIA GOOD DRIVER REQUIREMENTS.

"GOOD DRIVER" IS DEFINED AS:

- A. All drivers in the household must have three years driving record experience. Copies of drivers' licenses or other proof of three years of driving experience is required with the application.
- B. No driver in the household may have had more than one chargeable violation point per DMV during the previous three years. Drivers with any drunk driving convictions or at fault accident involving bodily injury or death, within the last 36 months, do not qualify as Good Drivers.

EVS • Electric Vehicle Systems, Inc.

231 Kuss Road, Danville, CA 94526 • 415 837 5345 • 1 to 5 P.M.

CHARGER

The newly designed charger is totally isolated from the wall. This important safety feature is only found on very expensive and heavy chargers. In addition, this new charger is virtually noiseless -- to the ear or the radio frequency spectrum. It features a simple programmable control panel that allows the user to:

- Set the maximum current
- Set the trickle-charge rate and duration
- Set the maximum voltage limit
- Set the time of charge to take advantage of cheap off peak power.

With these features the charger pays for itself with increased battery life and decreased power costs.

SPECIFICATIONS

Input:	110 V AC, 15 Amps
Output:	0-145 V D.C., 0 - 14 Amps
Efficiency:	90%
Size:	10" x 12" x 4"
Weight:	11 pounds
Price:	\$525/1 \$475/5
Guarantee:	1 year
Availability:	October 1, 1990

DC TO DC CONVERTER

This newly designed converter is totally electrically isolated from the main battery pack. It replaces a 12 volt accessory battery totally, with a net weight savings of almost 50 pounds. With this converter you can drive safely at night or in the rain. No longer will you have the worry of charging your accessory battery. All the 12 volt power you need -- at the turn of your key switch.

SPECIFICATIONS

Input:	50 - 120 V D.C.
Output:	0 - 30 Amps @ 14.5 V D.C.
Efficiency:	85%
Cooling:	1.2 watt fan, integral
Size:	10" x 7.5" x 3.1"
Weight:	4.2 pounds
Guarantee:	1 year
Price:	\$400/1 \$350/5 or more
Availability:	October 1, 1990

XA-100

Electric Vehicle with Unlimited Range Option

The automobile symbolizes the American way of life: the freedom and independence to go where you want to go. But burning gasoline increasingly means depending on foreign countries for oil and polluting the air in the cities. Most people imagine that in the distant future cars will be clean and electric. We don't have to wait that long, however. The XA-100 Electric Vehicle with Unlimited Range Option demonstrates that we have the technology today to begin the switch to electric automobiles.

Pure electric vehicles await technological advances before they can replace gasoline automobiles. They simply can't go long distances because they take too long to recharge. But most daily driving is only for short distances, and it is possible with today's technology to build a "hybrid electric vehicle" which runs as an electric vehicle most of the time. The XA-100 is an example of such a car.

The XA-100 reverses the conventional logic that a powerful gasoline engine is needed to make an exciting car. The XA-100 looks and drives just like a five passenger, four door Chevrolet Corsica sedan. An electric motor and batteries replace the standard gasoline engine, and the XA-100 operates on stored electricity for short trips, emitting no exhaust.

For longer trips or for recharging on the road, a small gasoline motor serves as a backup, ready to charge the batteries when they get low. Because the gasoline engine is there only to generate electricity, it operates at a constant speed and may be finely tuned to reduce emissions and run efficiently. The engine can also run on other fuels.

The XA-100 plugs into any conventional electrical outlet. Recharging at night gives the car

enough battery power to commute to and from work, or just to drive around town. With its electric motor, the XA-100 accelerates briskly, and sustains highway speeds as well.

In an era of uncertain foreign oil and decreasing urban air quality, it is a good time to begin building hybrid electric cars. The XA-100 demonstrates that hybrid electric cars are ready to go, using today's technology and without abandoning existing infrastructures. For rapid and convenient refueling, gasoline can't be beaten in the near future. We can, however, design solutions which use this precious resource sparingly—and for most of our daily driving, not at all.

Major funding for the XA-100 was provided by the California Energy Commission through Electric Automobile Association (EAA), with matching volunteer work from EAA members and Stanford University students, staff and faculty. Dr. John S. Reuhl, member of the EAA and visiting scholar at Stanford University, directs the project.

Additional support has been donated by :
Chevron Research; Global Van Lines; Cooley Godward Castro Huddleson & Tatum; Delco Remy, div. of General Motors; Hewlett-Packard; S.B. Herrick; Walker Engineering; E.A.R. Specialty Components; Jet Propulsion Laboratory; The Gates Rubber Company; Motion Industries; AMETEK, Lamb Electric Division; Hayden, Inc.; AVOCET; Apple Computer; J.C. Whitney; Heinemann Electric Co.; Campbell & George Co.; Dana Automotive; Cycle City; Precision Automotive Service; Gregg's TV & Appliance; Unique Mobility; Norton Motors; Curtis PMC; FMC.

Hybrid Electric Vehicle Project, Dr. John S. Reuhl, Director
P.O. Box 8683, Stanford CA 94309 415/857-9340

Electric cars: the answer to green pressures?

FOR NEARLY a century, the attempts of inventors, entrepreneurs and large vehicle companies to launch commercially viable electric cars have stalled, usually well before they were near to reaching the marketplace.

However, environmental and political pressures might be about to provide the much-needed final push for electric vehicles.

Planned Californian legislation for the early 21st Century, which envisages a *de facto* ban on most internal combustion vehicles in that state's smog-shrouded metropolitan areas, provides an extreme example of such pressures.

But with increasingly widespread acceptance that — unlike the oil crises of the 1970s — environmental problems as they relate to vehicles will not disappear, even the motor industry giants are exploring the potential of the electric car more seriously than ever before.

General Motors chairman Mr Roger Smith insists that the world's biggest vehicle company will, within the next few years, put into true volume production a version of the Impact, a sleek electric car unveiled earlier this year — appropriately in smog-bedeviled Los Angeles — and which answers some, at least, of the many criticisms that have been levelled at such vehicles.

When demonstrated at Millbrook proving ground in the UK earlier this year, the Impact proved capable of reaching 100mph and accelerating to 60 mph in a little over eight seconds; figures which would not disgrace a conventional sports car.

Propelled by a pack of 32 batteries connected in series to provide 320 volts, it emitted, naturally, no exhaust pollutants, and has a range of up to 120 miles before a recharge is needed, although only at more conservative speeds.

However, Mr Smith declined to say precisely when or where Impact might enter production, its likely cost and other pertinent factors.

His reluctance to do so, "for commercial reasons", has inevitably provoked scepticism about the car's future.

If Impact did not in fact enter production, it would not be the first time that GM — or, indeed, Ford and some other major car makers — have declared an electric car to be

imminent, only for it not to see the light of day.

In 1980, for example, with the motor industry reeling from the second oil crisis, former GM president, Mr Elliot "Pete" Estes, said that a battery-powered hatchback would be in production at an annual rate of 100,000 units by 1984.

That it did not happen was due to a combination of familiar problems of costs, poor range and performance, longevity and other factors not living up to expectations. In addition, concern about oil prices soon diminished.

There have been a host of other disappointments in the recent history of the electric vehicle.

Also in 1980, US conglomerate Gulf & Western claimed to have found the solution to elec-

The motor industry is examining the potential of EVs more seriously than ever

tric car travel with a zinc/chlorine powerpack capable of powering a car at up to 60mph for 200 miles.

In Japan, a Ministry of Trade and Industry initiative to have manufacturers jointly put thousands of electric cars and light vans on the roads in the early 1980s did not produce the hoped-for breakthroughs in battery and other relevant technologies.

GM's Impact is not a viable proposition in its present form. It still uses lead acid batteries, which, despite being of advanced type and compact form, weigh a daunting 870 pounds and take at least two hours to charge.

Battery life is equivalent to 20,000 miles of typical US motoring, but GM admits this needs to be doubled before Impact can compete with petrol or diesel cars on whole life costs.

Similar problems are apparent in two European battery cars which were put on sale earlier this year: Fiat's Panda Elettra and an electric version of the Peugeot 205.

Both are expensive — £12,000 equivalent for the Panda, for example — and both manage only 50-60mph and perhaps a 60-mile range.

Battery life is again 20,000-30,000 miles, and the cost of a

replacement pack at least £1,000; a high price to pay for not obviously polluting the atmosphere (although the recharging electricity may have come from a pollutants-emitting coal- or oil-fired power station).

The situation could be markedly changed, however, by the emergence of a "superbattery", for which there are rising hopes.

UK batteries group Chloride is starting pilot production in Manchester of batteries which use sodium and sulphur as their couple, and which have proved their ability to store, size for size, up to four times as much energy as lead acid units.

Chloride has been developing the sodium sulphur battery for more than a decade, but progress was given a boost in March with the signing of a joint venture agreement with RWE (formerly Rheinisch-Westfälisches Elektrizitätswerk), the largest electric utility in West Germany, to undertake the initial commercialisation, manufacturing and marketing of the batteries.

The intention is to stimulate development of the market for such batteries with a view to later expansion into full-scale production.

As usual, there are complications — in the case of sodium/sulphur, for example, there is the requirement to operate at temperatures of more than 300 degrees Centigrade.

Nevertheless, BMW has a prototype electric 3 series car using sodium sulphur batteries, with a top speed of 60mph and a range of up to 100 miles. However, the battery pack weighs 500 pounds and has to be kept inside what is effectively a huge insulated blanket.

Chloride's optimism that the electric vehicle may be turning the final corner has been given a strong boost by developments in California and, in particular, the "Los Angeles initiative".

Although, as discussed elsewhere in this Survey, that initiative has yet to involve the major vehicle manufacturers, if hopes are realised of having a large test fleet of electric cars operational within a few years, "it could get the whole ball rolling", says Mr Bill Johnson, Chloride's batteries marketing manager.

Clean Air Bill Gets Big Boost

U.S. lawmakers agree on cutting auto smog

By Michael Ross
Los Angeles Times

Washington

House and Senate negotiators, apparently breaking a deadlock that had threatened passage of a new Clean Air Act, tentatively agreed yesterday on far-reaching measures to reduce smog-causing car emissions during the next 10 years.

The agreement extends automobile emission standards adopted by California to the rest of the nation. It also establishes a pilot program in which "clean fuel" vehicles — cars running on fuels that release only a fraction of the pollution caused by conventional gasoline — will be sold in California starting in 1996.

The plan is expected to receive formal approval when House and Senate conferees meet later this week.

The Bush administration is expected to be generally pleased by yesterday's agreement.

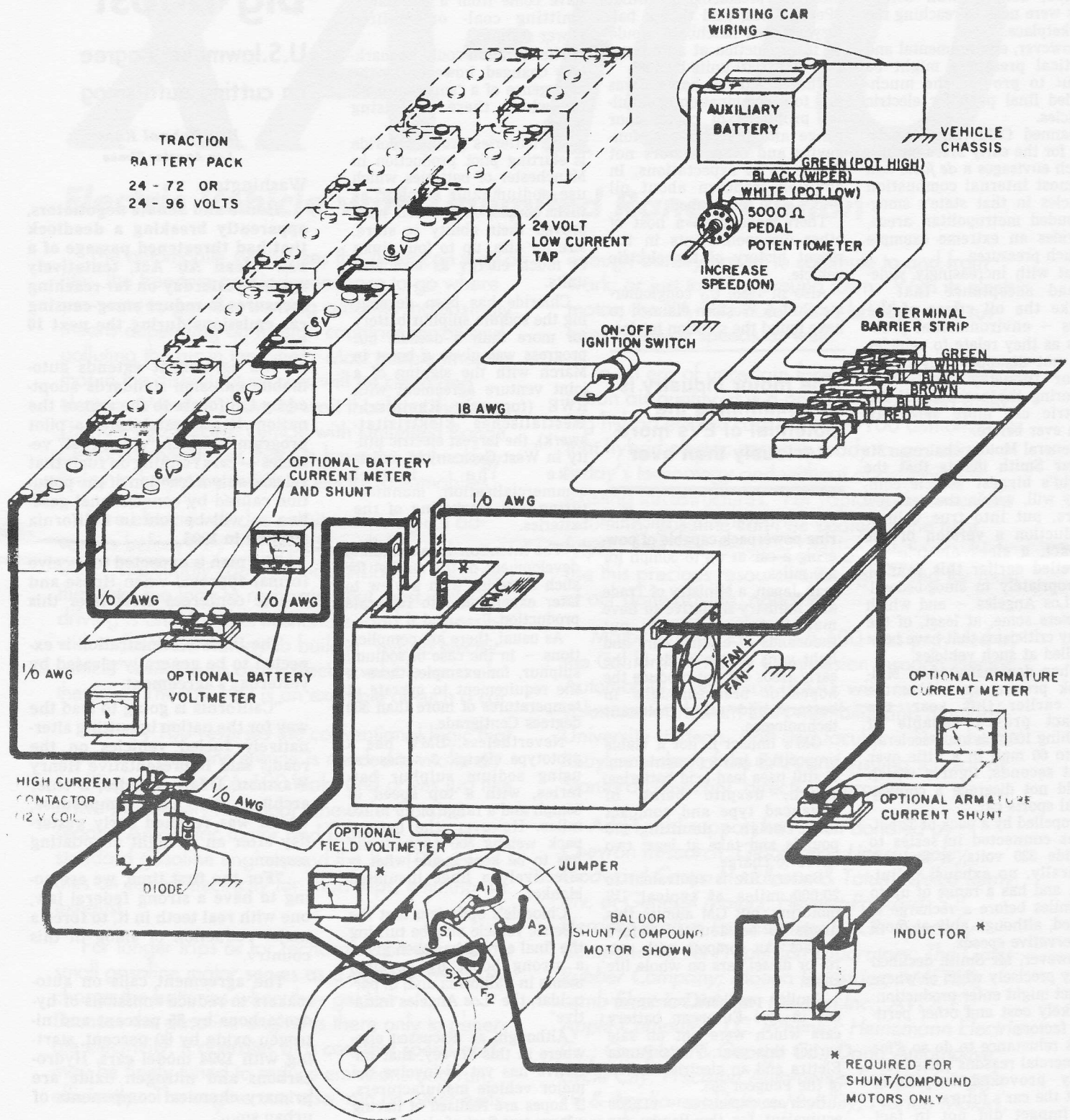
"California is going to lead the way for the nation in putting alternatively fueled vehicles on the road," said Representative Henry Waxman, D-Los Angeles, a chief architect of the compromise, which was reached early yesterday after an all-night negotiating session.

"For the first time, we are going to have a strong federal law, one with real teeth in it, to force a major reduction of smog in this country."

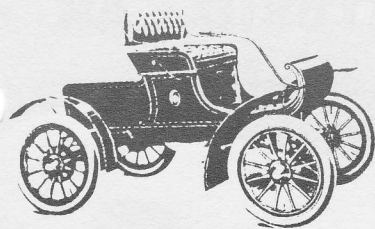
The agreement calls on automakers to reduce emissions of hydrocarbons by 35 percent and nitrogen oxide by 60 percent, starting with 1994 model cars. Hydrocarbons and nitrogen oxide are primary chemical components of urban smog.

Oil companies will be required to develop new kinds of gasoline that will burn more cleanly. The new fuels are to be sold, beginning in 1992, in the cities that have the worst problems with carbon monoxide pollution. . . .

INSTALLATION WIRING PICTORIAL



1900



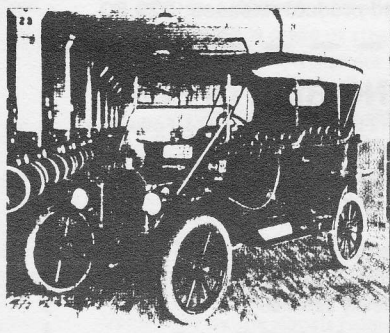
1901 Racy for its time, the curved-dash Oldsmobile was the first auto with a speedometer.



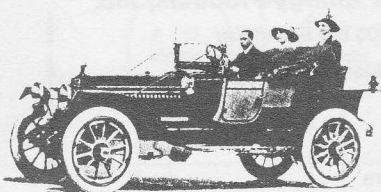
1902 Triple-A entered the lexicon—and the hearts of drivers in distress.

1905 Vincent Bryan (words) and Gus Edwards (music) serenaded the first mass-produced car.

In My Merry Oldsmobile



1908 The first Model T—tough, simple, made for dirt roads and amateur mechanics—went into production. More than 15 million followed.



1908 Anticipating a craze that would peak in the Twenties, Packard featured a rumble seat in its popular “mother-in-law” car.

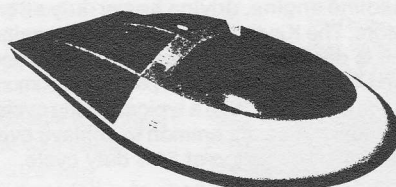
1980



1986 The Ford Taurus (shown here) and its companion, the Mercury Sable, evoking designs of the Thirties and Forties, led Ford's resurgent auto sales.



1987 Federal law allowed states to increase the speed limit on certain rural roads from 55 to 65 mph.

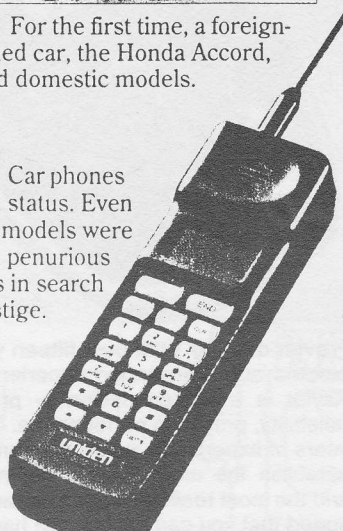


1987 In a 1,950-mile solar-car race across Australia, the experimental GM Sunraycer beat its closest rival by two-and-a-half days.



1989 For the first time, a foreign-designed car, the Honda Accord, outsold domestic models.

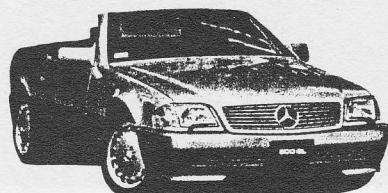
1987 Car phones gained status. Even bogus models were sold to penurious drivers in search of prestige.



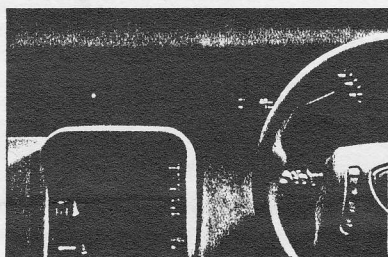
1990



Enthusiasts call Mazda's agile, affordable MX-5 Miata the top-down sports car of the decade.

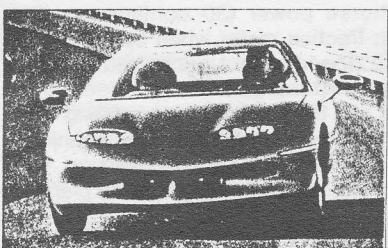
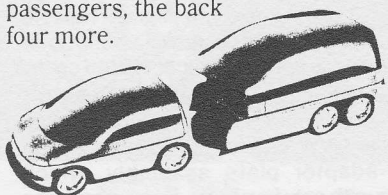


At \$85,000+, the Mercedes 500SL points to escalating prices for mass-produced luxury cars.



Mazda's navigational device uses a satellite signal to track a car's position and display it on the dashboard.

Chrysler anticipates a two-module Voyager. The front carries three passengers, the back four more.



Reviving technology begun a century ago, GM contemplates production of an electric-powered car. Range: 120 miles at 55 mph.



*Estimated

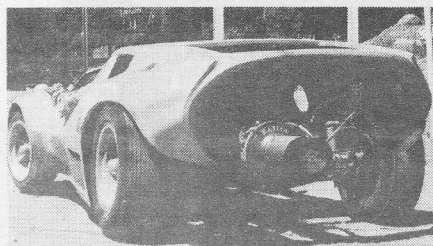
The car of the future can be yours today:

KAYLOR-KIT ELECTRIC or 100 MPG HYBRID CAR

Assemble it yourself — VW or KIT-CAR conversion

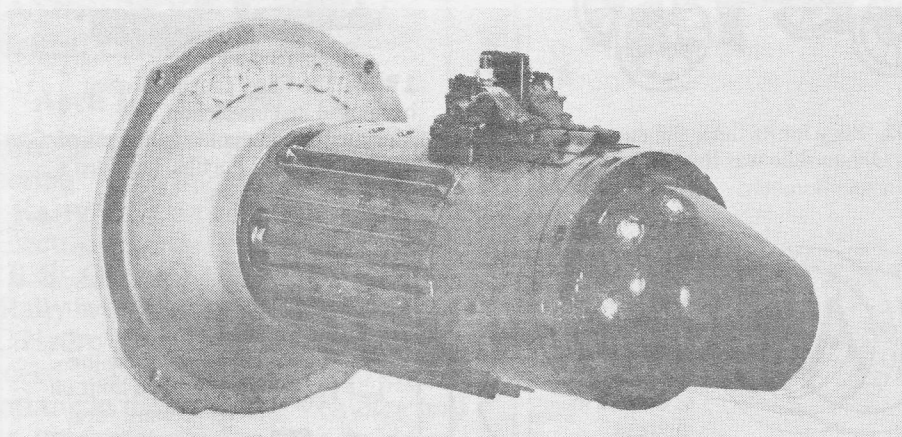
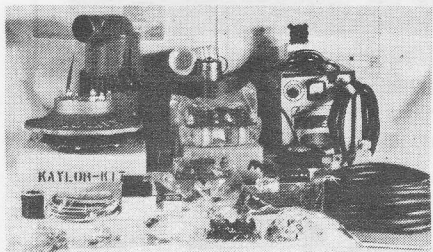
Why wait for Detroit to someday mass-produce a smog free, economic, efficient electric car? You can lead the way by converting your own VW or kit-car with the Kaylor Electric Conversion Kit. Nothing is quite like the experience of driving an electric automobile. From the first moment you hear the hum of the electric motor to the feel of its high-torque acceleration, you know this is like no other automobile that you've ever driven.

Performance no other electric auto can offer you! Unlike electric vehicles of the past, the Kaylor Conversion is a full-performance automobile propulsion system. With an ultra-light aero-dynamic fiberglass body, you can get as much as 70 miles range at 55 mph. By simply changing the connections of a few wires, (details included in plans) you can achieve speeds in excess of 75 mph! At about 30 mph your light fiberglass car could reach a range of nearly 100 miles. With a standard VW bug conversion, you can expect at about 40 mph to reach a range of 40 miles.



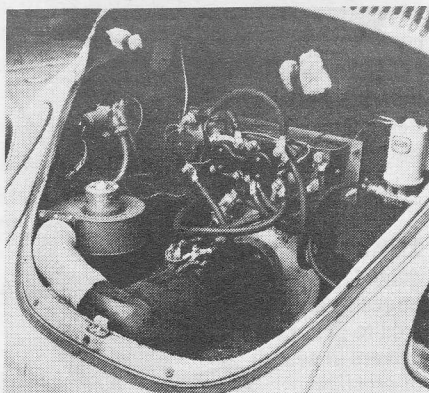
Economy that only electric power can give you! Nothing beats the lowcost of electric-powered automobiles. As an average you can expect to spend about 1½ cents a mile for electricity. On top of this savings, an electric has few moving parts to wear out. A Kaylor-Kit should give you years of reliable service while your friends will spend their hard-earned dollars on gas-car-related costs.

Simple bolt-on conversion! The Kaylor-Kit is designed with basic simplicity in mind. The entire VW engine is replaced with a motor-adaptor plate assembly, which mounts with only four bolts. Deep discharge lead acid batteries drive a powerful 100 peak horse power (30 continuous HP) electric traction motor when operating at 72 volts. Speed control is achieved through voltage switching, transistorized field control and the shifting of the existing VW transaxle. Anyone with basic mechanical skills can make a Kaylor Conversion. Kit comes with complete step-by-step plans.



Hybrid range extension! For those who want to extend their electric conversions range for long-distance driving, Kaylor-Kit is offering a range-extension unit. This unit consists of a small, light 10 HP four-stroke gasoline engine, driving heavy duty alternators. The Kaylor Hybrid Range Extension Unit is designed to be used only when you need it. Its compact design permits maximum space utilization. With a typical driving cycle, it should not be uncommon to achieve over 100 miles per gallon at 50% duty cycle.

Experience the freedom of a Kaylor-Kit! Hundreds have so far. Never will you have to wait in a gas line again. Just plug your Kaylor-Kit into any standard 110 Volt outlet overnight and by the next morning you are fully recharged. Free yourself from the high price of gasoline! The majority of electricity is generated from nonpetroleum based energy resources. Some Kaylor-Kit owners have even used solar and wind energy to recharge their cars. You're only limited by your imagination.



Proven design! With over fifteen years of electric auto conversion experience, the Kaylor is a proven design — proven in reliability, proven in performance. Through years of experience, we have been able to establish the most reliable components, and the most realistic figures on range and speed that you can expect. We have been building kits longer than any other manufacturer in the country today. We intend to remain the leader!

Why wait? We offer 3 ways to get started:

Information Package — Our least expensive approach. An overview of our conversion kit, giving you an idea of what to expect and which way you might want to go. \$6.00.

Kaylor-Kit Book — An outstanding value! Over 70 pages, totally illustrated with photos, full schematics, parts list, prices, etc. Book covers in detail basic working principles, theory, assembly instructions, all based on our electric and hybrid systems. \$19.95

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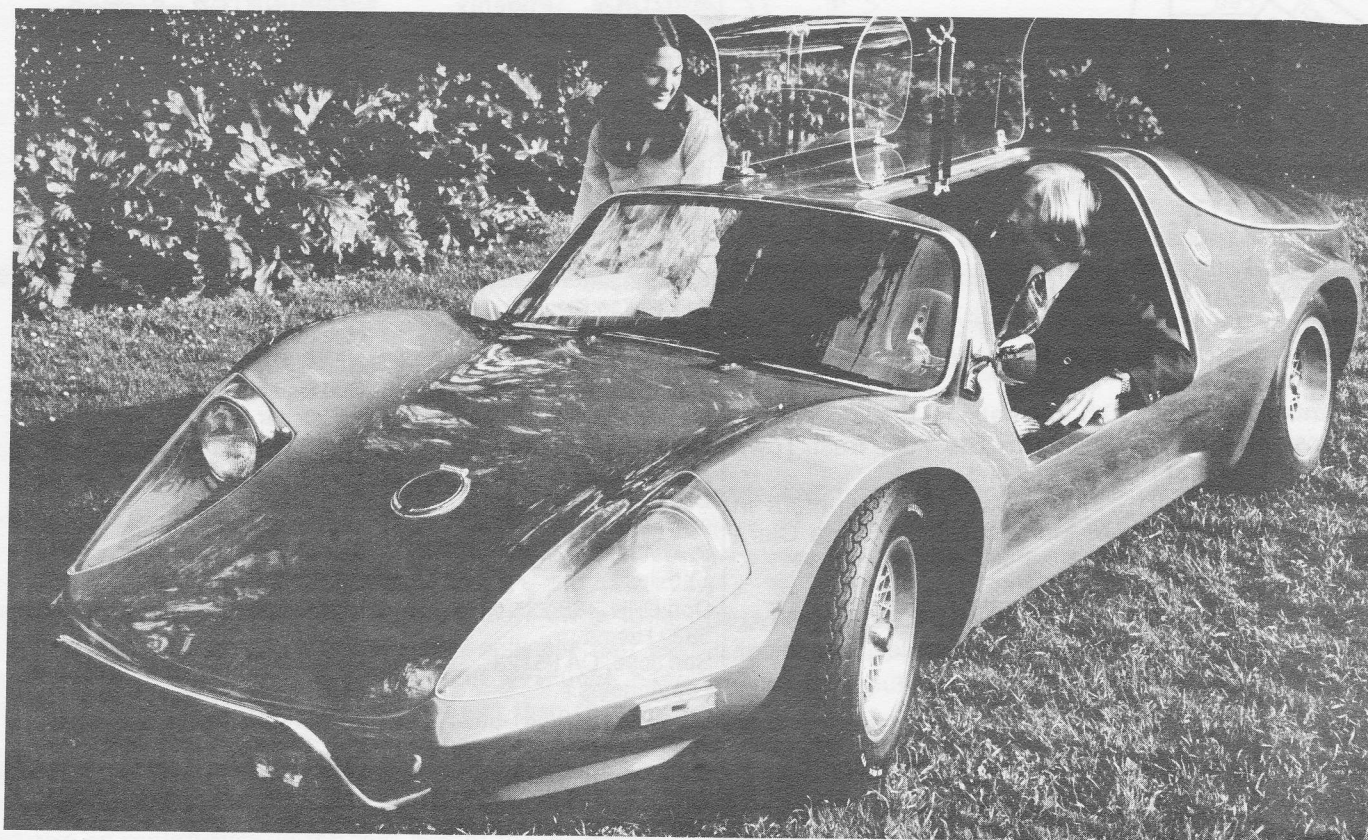
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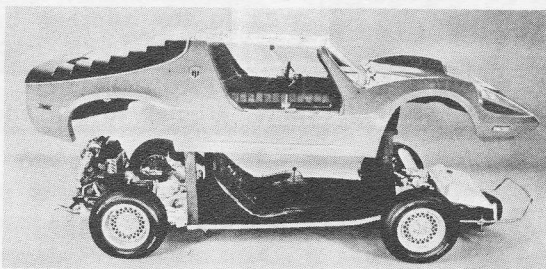
A combination of minimal aerodynamic drag, light weight, and a low center of gravity gives you the performance that others can only dream of. The Invader can be powered by a standard VW engine or any number of high performance options, making your Invader a true joy to drive and an experience that will never grow old.

While your friends will be impressed by the fact that you have built your own car, you will discover

that assembling your Invader was an easy bolt-together operation using simple hand tools. The Invader is designed to be bolted directly to an unaltered VW pan.

Through the years your Invader will prove to be your best investment. Its design and ageless lines will keep it in style, year after year. While your neighbor's Detroit car rusts away, your

fiberglass Invader will prove to be something unique and lasting that can hold its value. No other car matches the durability of the Invader! Pound for Pound, fiberglass is stronger than steel, and strength is safety. The Invader



is the strongest kit car built today because it uses Space-age aircraft type laminated construction.

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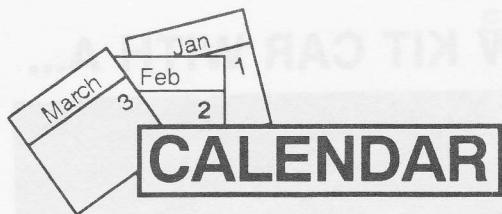
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