AUTOMOBILE MARKET ANALYSIS

5.1 The Major Auto Makers

In 1987, 8.2 million automobiles and 4.8 million trucks and buses were produced in the world, in a total of 26 different countries. The automobile industry is dominated by the industry giants as well as having smaller companies in the various countries of the world, and is summarized as follows:

Canada/U.S.:	Ford, General Motors, Chrysler
Japan:	Toyota, Nissan, Isuzu, Suzuki, Daihatsu, Honda, Mazda, Mitsubishi, Subaru, Fuji.
France:	Peugeot, Citroen, Renault
West Germany:	Volkswagen, Opel, Daimler, Ford, BMW, Audi
England:	British Leyland, Ford, Vauxhall, Talbot
Sweden:	Volvo, Saab
Spain:	SEAT, FASA, GM, Ford
Italy:	Fiat, Alfa Romeo
U.S.S.R.:	Lada
South Korea:	Hyundai

All of the above companies produce over 45,000 vehicles per year in the countries mentioned.

The size of the world car, truck and bus industries is shown in the exhibits.

5.2 Prices of Typical Non-Electric Cars

The automobile market can be segmented in a variety of ways, as demonstrated by the following "Wards Automotive" categorization. The approximate price range was determined for Vancouver, B.C. by contacting new car dealers, and is as follows:

Minicompact Regular	$6-10,000
Minicompact Specialty	$ 15,000
Subcompact Regular	$ 8,000
Subcompact Specialty	$ 8-12,000
Compact Regular	$13-21,000
Compact Special	$11-15,000
Intermediate Regular	$15-25,000
Intermediate Special	$14-18,000
Full Size	$17-25,000
Luxury Regular	$ 24,000
Luxury Special	$26-32,000
	$ 42,000

Another industry grouping is used in Western Canada, by a confidential industry research group, as follows:

Sub-compact	$10,000 and Less
Compact	$11-13,000
Small Sporty	$12-14,000
Small Luxury	$20-40,000
Intermediate	$14-18,000
Full Size	$16-20,000
Luxury	$20-40,000
Luxury Sports	$30-60,000

The vehicles are internal combustion ("IC") powered, either carburetor aspirated, fuel injected or diesel powered. The fuels can vary, with gasoline or diesel being replaced by compressed natural gas ("CNG"), propane, diesel oil, or gasoline supplemented by methanol or ethanol. The vehicles are passenger sedans, vans, trucks, and buses.

In the United States, in new car registrations in 1987, the market is shared by various brands and car makers as follows:

5.3 U.S. New Car Registrations, 1987

	Market Share	Numbers
General Motors		
Chevrolet	14.7	1,493
Pontiac	6.9	697
Oldsmobile	7.1	716
Buick	5.5	556
Cadillac	2.5	258
	36.8%	3,720
Chrysler		
Dodge	4.0	407
Plymouth	3.4	344
Chrysler	2.9	296
Jeep/Eagle	0.4	45
	10.8%	1,092
Ford Motors		
Ford	14.0	1,417
Mercury	4.7	463
Lincoln	1.6	166
	20.3%	2,061
Imports		
Toyota	6.1	613
Honda	6.0	609
Nissan	5.1	511
Hyundai	2.6	259
Mazda	2.1	213
Volkswagen	1.8	178
Subaru	1.7	172
Acura	1.0	103
Volvo	1.0	100
Mercedes Benz	0.9	92
All Others	10.1	774
	35.8%	3,625
Minus: Domestic sponsored imports (double counted)	3.7	376
	100.0%	10,122

Source: 1988 Ward's Automotive Yearbook

5.4 Kit and Specialty Cars

A very relevant market niche category in the automobile market are kit and specialty cars, which are aesthetic and operating reproductions of particularly appealing cars produced in the past 50 years, or specialty cars such as "Dune Buggies" or "American Hot Rod" designs. These cars are significant because they confirm the market's demand for unconventional vehicles, some of which are sold at luxury car prices.

Examples of such cars are reproductions of the Excalibur, the 1932 Ford Roadster, the 1936 Mercedes Benz 540K, the 1939 Jaguar SS 100, and the 1952 MG TD. Prices ranged from $ 5,000 for a dune buggy to $US 75,000 for the Excalibur (which is no longer in business). First Canadian Specialty Automotive Ltd., of Kelowna, B.C., have sold production prototype units from $CDN 27,000 to $CDN 40,000 since 1984. A current price of $CDN 42,000 has been quoted.

5.5 Automotive Trends

The Detroit auto makers have many short-term competitive pressures to occupy themselves. Industry reviews do not mention any interest in switching to a replacement to the gasoline powered automobile. Instead, industry reviews talk about lower market share domestically, are silent on stories of export successes, talk about increased world wide production capacity, production shortages, union problems, etc.

An article on industry trends, "1987: Review/Preview" in 1988 Ward's Automotive Yearbook gives a feeling for the issues preoccupying Detroit:

"In 1987, although combined General Motors Corp., Ford Motor Co. and Chrysler Corp. net profits increased by 25% to $9.5 billion, the future suddenly appeared to become a bit shaky for Detroit's Big Three auto makers."

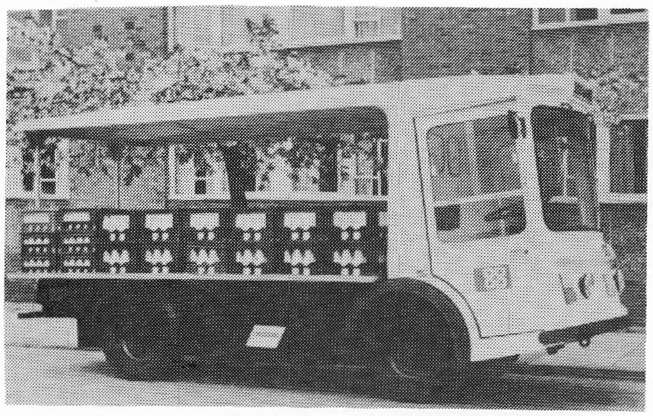
"However, the future held out no hand of welcome to Detroit's Big three. With the pressure to perform well mounting daily, imports (31.1%) and transplants (5.3%) took 36.4% of all car sales in the U.S. in 1987 vs. 31.5% in 1986, with shares of 40% to 45% of the U.S. market controlled by foreign-based companies seemingly at hand in 1988-89.

Ford Motor Co. chairman Harold A. Poling detailed what soon would be a serious worldwide auto industry problem in a Feb. 29, 1988 address when he explained that "announced additions to capacity, especially Japanese plants in North America and Europe, as well as new Korean plants, could result in worldwide automotive capacity of about 55 million units as early as 1990. This exceeds," he said, "our forecasted demand for 1990 by more than 9 million units."

In Mr. Poling's own words, overcapacity of this magnitude means the industry will be facing a brutally competitive worldwide environment."

5.6 Competitive Electric Vehicles

Electric vans are sold commercially in Britain (Bedford) and France (Societe Europeene des electromobiles Rochelaires). No companies selling electric cars commercially, except possibly on a kit car basis or by an inventor, have so far been located.



Electric cars seen in person and in pictures appear to be ordinary cars converted into electric vehicles. The exhibits and pictures of Japanese and French electric vehicles show typical electric cars. None of these vehicles have the expensive image and appearance of the EXAR-1. Most of them look like the VW Rabbit, a Toyota Corolla, and are two passenger mini-compacts.

5.7 The Relative Energy Costs of an Passenger Electric Vehicle

The cost savings in operating an electric car in Canada are substantially greater than in the U.S. because of different energy costs. In Canada, electricity costs are lower than the U.S. (approx. $.04/kwh across Canada, versus an average of $.07/kwh, in the U.S.), and gasoline costs are higher (approx. $CDN 2.16/CDN gallon versus $CDN 1.48/CDN gallon for U.S. gasoline).

The regular U.S. residential electricity rates vary from a low of $0.039/kwh in Washington State and $0.049 in Oregon, to a typical $0.07 in Colorado, $0.08 in California, and a high of $0.108 in New York and New Jersey. Exhibits summarize U.S. residential electricity rates by state for 1986. This chart does not indicate which states are considering off-peak rate incentives, such as a 50% midnight to 6 AM saving being discussed by several utilities.

Assuming the cost to recharge the EXAR-1 per 100 miles is approximately $2.00. The average cost of traveling 100 miles in a gasoline automobile would be approximately $9.00.

5.8 Attitude of Electric Utilities to Electric Vehicles

Some electric utilities in the U.S. are strong proponents of electric vehicles, as they see a new user of electric power, particularly "off-peak" power which non-hydro plants would like to sell. Electric vehicles are ideally suited to utilize "off-peak" power, which occurs from 11:00 PM to 6:00 AM, and coincides with the over-night charging pattern of batteries. Hydro utilities such as the Canadian hydro companies with large dams can reduce water flows from their dams, and thereby accommodate "off-peak" power much better than their U.S. counterparts, who have oil, coal or nuclear powered steam turbine generation systems. Hence, the U.S. utilities are contemplating leasing battery systems to EV users as one way of reducing user costs. Some utilities have suggested special "off-peak" reduced electricity rates.

Electric utilities are also interested in converting some portion of their own vehicle fleet to electricity, because this would reduce their operating costs by avoiding the purchase of gasoline and demonstrate non-polluting electric vehicles.

5.9 Assessment of Market Opportunity

1. The annual world passenger automobile market, at 34.1 million cars per year, is very

large as is just the North American market of 8.2 million cars per year. A very small market share such as 0.2%% represents 16,400 cars alone in North America, which is greater than the planned 2 shift capacity of the company's first plant.

2. The timing appears right for the introduction of an electric car, based on the progress of electric vans in Europe.

3. A $CDN 15-18,000 electric car with the styling of the EXAR-1 can be expected to appeal to the average car and innovator/early adopter market segment.

4. The next generation of batteries is expected by the time the EXAR-1's first assembly plant is constructed. This will extend travel distance, and bring even more buyers into the market.

5. The electric car industry has similarities to the personal computer industry of 1976-- large potential, years away from attracting competition from large companies and cost of entry still relatively low. It will probably be pioneered by a small company(s) like Public Petroleum with some government encouragement.

6. The Canadian marketplace offers very significant fuel economies versus gasoline, however, from indications of previous first hand experience with the EXAR-1, the total factory capacity could be sold in one or two cities in the United States, not to mention cities in Europe where gasoline is $6.00 U.S. per gallon and basic travel no more than 50 miles per day.

THE PLACE OF THE ELECTRIC VEHICLE IN THE FUTURE

No one can paint with any accuracy an energy picture of the world in the year 2000. Trends indicate that the fossil fueled private and commercial vehicles may become rare or extinct in the 21st Century. The priority of petroleum products will be directed to more essential uses, such as the production of plastics and fertilizers.

The development of a totally electric, hydrogen economy seems attractive when considering the alternatives. In such a society, electric vehicles will contribute to conservation of fossil fuels. But, individual habits regarding energy waste must change before we can face some of the problems of the distant future.

The concept of vehicle rentals may take an unusual twist in the future. The average urban dweller could have one or two electric vehicles and rent a gasoline or hydrogen powered road vehicle for vacationing. The rented pleasure vehicle could be more luxurious than one could imagine, with onboard computer, entertainment, and recreational facililties. The cost of such a vehicle would be beyond the reach of the average person to own, but not to rent for a week. Therefore, we would see families both enjoying their vacations and conserving energy.

The rental concept may be taken to another extreme to include rental of both commuter vehicle and "battery time" used. Plastic, rubber and non-corroding metals could lead to rental vehicles which are exceptionally strong and long lived, to maximize investments.

Now that we have observed the vast potential for alternate power, it is easier to understand how electric vehicles enter into the overall picture of the future. Although the new uses of hydrogen as a combustible gasoline substitute will make possible the existence of such familiar modes of transportation as airplanes, trains, cross-country trucks, and oceangoing vessels, personal transportation will probably be dominated by electric vehicles.

Recent studies have been conducted to determine the effect a large number of electric vehicles would have upon the energy producing capabilities of utilities. These studies by electric companies did not show a significant increase necessary in the capacity requirements of today's utilities.

As an example, Chicago's Commonwealth Edison noted the difference between peak and night demands for electricity is about two million kilowatts. This power would be adequate to charge 500,000 electric vehicles during the evening hours. Two hundred thousand of these vehicles would be charged by a combination of nuclear power plants and newer fossil-fuel facilities owned by Commonwealth Edison. The off-peak load demand patterns of most utilities across the U.S. have a similar pattern. Off-peak energy use could support the majority or all of the electric vehicles we could possibly produce before the year 1990. A Federal Power Commission survey indicated that thirty eight million electric vehicles could be on the road by 1990, and if only half of those were produced, the annual consumption of electricity required would reach about fifty two million megawatt-hours a year. This is equivalent to about 1% of the total projected energy production from all sources in 1990. According to these studies, it would seem that there would be a sufficient amount of power for us in the foreseeable future.

Electric vehicles complement the hydrogen society in that they will act as storage reservoirs for off-peak nuclear power station production. And they will bear the task of moving large numbers of human beings from one place to another.

Electric production from all sources of power today will not be sufficient for the additional consumption of energy used in transportation, in tomorrow's totally "electric community." The alternate systems mentioned earlier will have to be implemented, at least to some degree, because there will be demands upon electricity tomorrow that we don't see today, such as increased residential heating.

TABLE 66A

REVENUE AND USE PER RESIDENTIAL CUSTOMER

BY STATE—YEAR 1986p

Division/State	Total Electric Utility Industry			Investor-Owned Electric Utilities		
	Avg. Annual Revenue per Customers	Avg. Revenue per kWh Sold	Avg. Annual kWh Use per Customer	Avg. Annual Revenue per Customer	Avg. Revenue per kWh Sold	Avg. Annual kWh Use per Customer
Total United States	**$672.01**	**7.44¢**	**9,035**	**$671.55**	**7.78¢**	**8,627**
Maine	566.66	8.18	6.919	569.68	8.19	6.956
New Hampshire	607.83	8.55	7.108	620.89	8.64	7,189
Vermont	640.30	7.91	8.094	653.85	7.84	8.338
Massachusetts	534.67	8.33	6.419	535.16	8.43	6.351
Rhode Island	497.56	8.69	5.728	497.66	8.68	5.733
Connecticut	691.30	9.29	7.439	696.75	9.34	7.458
New England	**586.50**	**8.59**	**6,814**	**590.39**	**8.67**	**6,810**
New York	593.62	10.54	5.632	599.24	10.83	5.533
New Jersey	709.35	10.67	6.650	709.80	10.68	6.640
Pennsylvania	688.99	8.87	7.766	668.83	8.68	7.759
Middle Atlantic	**649.72**	**9.90**	**6,560**	**651.94**	**10.03**	**6,499**
Ohio	584.13	7.67	7.614	675.95	7.80	8.671
Indiana	725.18	7.28	9.961	697.67	7.22	9,664
Illinois	701.13	9.52	7,363	682.27	9.61	7.102
Michigan	500.56	7.59	6,596	506.31	7.62	6.646
Wisconsin	550.83	6.83	8,063	528.70	6.91	7.646
East North Central	**610.44**	**7.95**	**7,681**	**624.68**	**8.06**	**7,768**
Minnesota	569.67	6.78	8,397	465.89	6.45	7.221
Iowa	684.27	7.73	8.848	646.24	8.15	7,933
Missouri	697.32	7.14	9,760	706.28	7.36	9.621
North Dakota	696.74	6.11	11,389	572.22	6.22	9.203
South Dakota	666.21	6.59	10.113	585.10	7.41	7,897
Nebraska	582.47	5.86	9,933	—	—	—
Kansas	707.59	8.24	8.588	715.03	8.14	8.785
West North Central	**654.70**	**7.11**	**9,214**	**629.06**	**7.40**	**8,499**
Delaware	707.53	8.37	8.455	720.97	8.56	8.437
Maryland	735.25	7.25	10,139	726.64	7.21	10.083
District of Columbia	496.91	6.83	7,279	496.81	6.83	7.279
Virginia	813.27	6.67	12.186	817.22	6.63	12,322
West Virginia	584.18	6.10	9.579	586.07	6.09	9.601
North Carolina	851.98	7.30	11,666	861.40	7.15	12,061
South Carolina	886.71	7.14	12,424	908.10	7.10	12.791
Georgia	720.54	6.55	11,006	716.13	6.70	10,692
Florida	903.21	7.97	11,330	916.75	8.00	11.455
South Atlantic	**816.97**	**7.26**	**11,249**	**819.28**	**7.26**	**11,281**
Kentucky	643.88	5.86	10,981	617.84	5.75	10.739
Tennessee	764.03	5.21	14.654	766.40	4.84	15,929
Alabama	776.87	6.50	11,943	798.09	6.97	11,457
Mississippi	780.60	6.70	11.648	810.75	6.95	11.670
East South Central	**740.84**	**5.91**	**12,538**	**734.62**	**6.50**	**11.303**
Arkansas	777.99	7.86	9.892	773.62	7.79	9,932
Louisiana	898.74	7.08	12.690	856.02	6.66	12,853
Oklahoma	740.77	7.23	10,244	721.59	6.94	10,398
Texas	791.77	6.84	11,582	833.64	6.86	12.161
West South Central	**800.70**	**7.01**	**11,422**	**816.35**	**6.89**	**11,872**
Montana	510.28	5.17	9.868	447.68	5.00	8.961
Idaho	637.49	4.53	14.081	633.70	4.44	14.270
Wyoming	538.41	6.18	8,708	457.43	5.82	7.866
Colorado	474.96	7.04	6,744	446.16	7.31	6.102
New Mexico	630.70	8.90	6.966	537.59	8.80	6.107
Arizona	870.49	8.68	10,024	877.37	9.37	9.365
Utah	586.39	7.81	7.506	627.28	8.56	7,327
Nevada	706.69	6.58	10.726	716.56	6.69	10,709
Mountain	**628.36**	**7.19**	**8,741**	**613.94**	**7.27**	**8,446**
Washington	591.97	3.92	15.112	654.64	4.92	13.307
Oregon	585.23	4.73	12.380	589.26	4.98	11.840
California	484.92	7.94	6.104	502.53	8.26	6.082
Pacific	**509.14**	**6.40**	**7,954**	**524.32**	**7.21**	**7,269**
Alaska	879.05	9.90	8.883	771.26	7.32	10.537
Hawaii	632.03	9.28	6.806	632.03	9.28	6.805
Alaska & Hawaii	**726.75**	**9.56**	**7,603**	**637.80**	**9.16**	**6,962**

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