

MARKET POTENTIAL

4.1 The World market for Truck, Vans, and Cars

The world automotive market is enormous, and represents the annual production and sale of 46.6 million vehicles.

Leading Countries	Cars	Truck-Bus	Total
NORTH AMERICA			
U.S.A.	7,099,829	3,825,776	10,925,605
Canada	809,818	825,333	1,635,151
Mexico	266,142	129,116	395,258
Total	8,175,789	4,780,225	12,956,014
WESTERN EUROPE			
W. Germany	4,373,629	260,444	4,634,073
France	3,051,830	441,380	3,493,210
Italy	1,701,267	199,312	1,900,579
Great Britain	1,142,985	246,727	1,389,712
Spain	1,402,574	301,899	1,704,473
Belgium	1,123,409	72,765	1,196,174
Sweden	431,777	69,500	501,277
Netherlands	110,000	15,000	125,000
Portugal	73,270	21,500	94,770
Austria	6,600	3,456	10,056
Total	13,417,341	1,631,983	15,049,324
OTHERS			
Japan	7,891,087	4,358,087	12,249,174
U.S.S.R.	1,329,000	940,000	2,269,000
Brazil	789,310	139,112	928,422
Australia	225,180	14,400	239,580
Poland	301,000	62,220	363,220
Czechoslovakia	171,902	50,000	221,902
East Germany	230,000	47,000	277,000
Yugoslavia	305,100	82,400	387,500
Rep. of Korea	793,125	186,614	979,739
India	107,000	97,000	204,000
Argentina	158,774	34,542	193,316
Hungary	174,884	16,000	16,000
Taiwan	174,884	49,300	224,184
Total	12,476,362	6,076,675	18,553,037
Grand Total	34,069,492	12,488,883	46,558,375

It is estimated that just in B.C., Alberta, Man./Sask., Washington and Oregon area these represent a combined annual market of 1,010,000 cars, where easily over 10,000 EXAR-1's could be sold annually.

4.1.2 Prices of Typical Non-Electric Cars

The automobile market is divided into various categories based on size, style, and price 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:

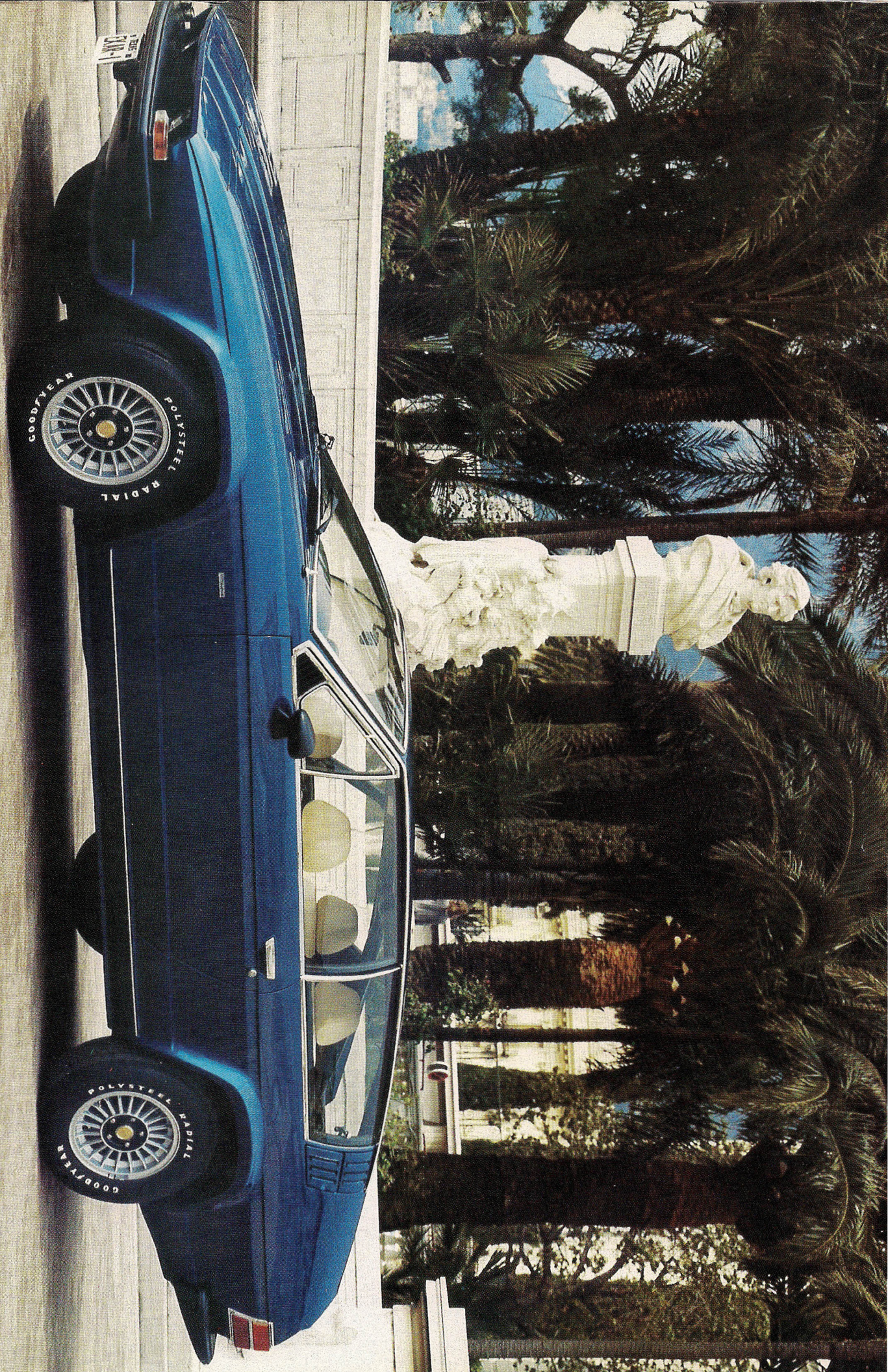
Minicompact Regular	\$6-10,000
Minicompact Specialty	\$15,000
Subcompact Regular	\$8-12,000
Subcompact Specialty	\$13-21,000
Compact Regular	\$11-15,000
Compact Special	\$15-25,000
Intermediate Regular	\$14-18,000
Intermediate Special	\$17-25,000
Full Size	\$24,000
Luxury Regular	\$26-32,000
Luxury Special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

4.1.3 Sales of Cars in B.C. by Market Segment

The B.C. market was analyzed in terms of new car sales by market segment to determine the market potential for the EXAR-1.

	Jan-Oct/88	%	Price Range
Subcompact	18,260	24.6	\$10,000
Compact	24,498	33.0	11-13,000
Small sporty	8,950	12.2	12-14,000
Small luxury	2,055	2.8	20-40,000
Intermediate	13,640	18.4	14-18,000
Full size	1,149	1.6	24,000
Luxury	4,430	6.0	20-40,000
Luxury	1,045	1.4	30-60,000
Total	74,027	100.0	

Because of the uniqueness of the EXAR-1 and advantages towards environmental sales these areas can be expected to produce even higher sales.



EXAR-1

Ametrان
AMERICAN ELECTRONIC CORPORATION, TANNINGTON, CONNECTICUT

Your **FIRST** electronic
powered automobile...
anything else is obsolete!

FROM TODAY'S ELECTRONIC TECHNOLOGY

A totally new concept in automotive design that embodies advanced construction, safety and electronic power systems that deliver the most economical transportation in automotive history.

THE EXAR-1 IS A REALITY TODAY!

The only intelligent automobile for our times with unique styling, solid construction, and virtually maintenance-free systems that have been engineered to free you from costly maintenance and return pride of ownership.

THE EXAR-1 After years of innovative engineering is READY. More than incredible economy and easy responsive handling is the factor of eliminating automotive pollutants from the air we breathe and freeing us from our reliance on imported petroleum for transportation.

The age of the ELECTRONIC AUTOMOBILE HAS BEGUN.

... ANYTHING ELSE IS OBSOLETE!

THE EXAR-1 A FUTURISTIC YET CONSERVATIVE MASTERPIECE OF EUROPEAN DESIGN.

STANDARD FEATURES

BODY/CHASSIS

- : FRONT-WHEEL OR REAR-WHEEL DRIVE (OPTIONAL)
- : RACK AND PINION POWER ASSISTED STEERING
- : FOUR-WHEEL DISC BRAKES WITH DUAL MASTER CYLINDERS
- : 4-SPEED SEMI-AUTOMATIC ELECTRONICALLY CONTROLLED TRANSMISSION
- : 4-WHEEL INDEPENDENT SUSPENSION
- : GOODYEAR LOW-ROLLING RESISTANCE RADIAL TIRES
- : WRAP AROUND ENERGY ABSORBING G.E. ALL-LEXAN BUMPERS
- : RECTANGULAR HALOGEN BEAM HEADLAMPS
- : ROOMY 2-DOOR COUPE CAN ACCOMMODATE 5 PASSENGERS
- : AERODYNAMIC DESIGN BY PIETRO FRUA OF ITALY
- : THICK ACRYLIC PIGMENT FINISH/KEVLAR
- : SPORTY ALUMINUM ALLOY WHEELS
- : DESIGNER COLORS: BLUE, YELLOW, WHITE, GREEN, RED, BLACK, BRONZE, AND SILVER

INTERIOR/COMFORT

- : CRAIG AM/FM/CB RADIO AND CASSETTE STEREO SYSTEM
- : HEATER-PROGRAMMABLE LIQUID FUEL BY STEWART WARNER
- : AIR CONDITIONING-SANKYO NEW GENERATION COMPRESSOR DESIGN
- : ON-BOARD AUTOMATIC CHARGER
- : RECLINING CONTOURED BUCKET SEATS
- : ADJUSTABLE HEAD RESTRAINTS FRONT AND REAR
- : INTERIOR UPHOLSTERY IN RUGGED TEX-LEATHER
- : THICK STAIN RESISTANT CARPETING
- : DELUXE DASH AND INTERIOR
- : SEAT BELT AND SHOULDER HARNESS SYSTEM*
- : TINTED WINDSHIELD
- : REAR WINDOW DEFROSTER
- : 2-SPEED WIPERS/WASHERS
- : EASY-TO-SEE INSTRUMENTATION (SEE SPECIFICATIONS)

*Air Bags if available by production time.

COMPUTER

CONTROLS/MONITORS . . . ENERGY FLOW, ANTI-THEFT SYSTEM, INEBRIATION PAD, OPTIMUM GEAR, BRAKE WEAR, BATTERY CONDITION AND WATER LEVEL, CHARGING CYCLE, CABIN TEMPERATURE, MESSAGES, AMMETER, VOLTMETER, PLUS MANY, MANY, MORE . . .

PARTS NOT NEEDED

SPARK PLUGS, DISTRIBUTOR, CRANKCASE, PISTONS, RADIATOR, WATER PUMP, FUEL PUMP, CARBURETOR, HOSES, IGNITION, FAN BELT, VALVES, MUFFLER, TAILPIPE, AIR & OIL FILTER, CONDENSOR, STARTER, AND POINTS, ETC. . .

DRIVE SYSTEM

The EXAR-1 electric motor powers this automobile at speeds compatible to today's modern highways with ease and silence. The high performance GE electric motor system has been created to keep performing at peak efficiency for more miles than you ever thought possible, virtually maintenance free.

ENERGY SYSTEM

The energy unit developed by one of America's outstanding makers of automotive batteries can be recharged by using a common 110-volt or 220-volt AC outlet in conjunction with the automatic charger unit that is built into the car. The range of 75 to 100 miles should allow most commuters to travel several days between charging, even allowing for use of the radio, cassette deck, heater/defroster, windshield wipers, headlamps, and the array of exclusive equipment that the EXAR-1 features.

This remarkable energy system brings you 'miles for pennies' economy and is warranted by Amectran and its maker. For convenience, an energy gauge shows you the amount of charge remaining in the system.

HANDCRAFTED CONSTRUCTION

Engineered safety begins with a molded acrylic body reinforced with 'Kevlar' that has impact and damage-resistant properties of no other car made. EXAR-1 coachwork will surround you with beauty and reassuring safety for years of driving pleasure. The color is actually pigmented in the material rather than painted on the surface.

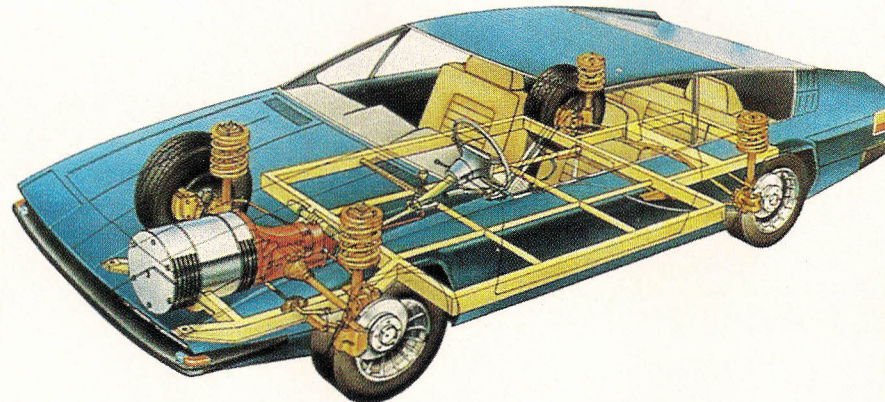
Another innovation is body parts that are easily replaceable at very low cost in modular systems, should severe damage ever cause this to be necessary.

Couple this tough, durable, rust-proof body with steel beam construction in the EXAR-1 frame and you can begin to realize Amectran's emphasis on safety and lasting beauty.

COMPUTER

The micro-computer in the EXAR-1 is used for a variety of tasks and is central to the advanced technology of the vehicle. Although its major function is to optimize the flow of electricity from the battery system to the motor, it also performs a myriad of tasks for safety, diagnosis, security, and convenience.

Immediately upon stepping into your EXAR-1, the computer acts as an inebriation device asking you to match 6 random numbers that appear on the screen. Next, when you enter in your personal identification code and the screen responds by flashing "POWER ON" you are ready to experience the thrill of driving the EXAR-1.



SPECIFICATIONS

PRICE**

All equipment standard
No factory options
(Suggested Price) \$18,000 CDN.

GENERAL

Maximum Speed 85
Curb Weight, lb. 3,000
Weight Distribution (w/Driver)
Front/Rear (%) 49/51
Track, Front/Rear 57.9/58.3
Wheelbase, in. 105.9
Length 198.0
Width 69.0
Height 49.6
Ground Clearance 6.0

CHASSIS & BODY

Layout Front Motor/front drive
Body/Frame Separate vacuum
formed Acrylic/Kevlar body
with multi-tubular 4130
Chrome/Alloy steel frame.
Aerodynamics 0.28 Coefficient of
Drag
Brake System Discs front & rear,
power assisted; regenerative
braking.
Wheels Cast alloy, 15 x 6
Tires Goodyear HR 78-15" low
rolling resistance radials
Steering Rack & Pinion, power
assisted
Suspension Independent, by
MacPherson front & rear
coil springs/telescopic
damper struts, lower
wishbones, anti-roll bar

SAFETY

Will meet all Department of Transportation Regulations.

MOTOR & DRIVETRAIN

Type Series wound
Weight (lbs) 225
HP rating 19
RPM @ 144v 3000
Transmission 4-speed Manual-
Select Automatic

MOTOR & DRIVETRAIN

Gear Ratios 4th (1.13) 4.18:1
3rd (1.46) 5.40:1
2nd (2.11) 7.81:1
1st (3.46) 12.80:1

Final Drive Ratio 3.7:1

ENERGY STORAGE

Type Lead/Acid, 6-v
Voltage, v. 144
Weight, lb. 1600

CONTROLLER & CHARGER

Type SCR TRANSISTOR, with
regenerative braking
Charger On-board
Input voltage 220-v or 110-v
Maximum Output amperage 40

SPEED IN GEARS

4th gear Passing up to 85 mph
3rd gear 60 mph & under
(combination highway
and local)
2nd gear Under 30 mph
(neighbourhood traffic)
1st gear start & bumper-to-bumper

ENERGY ECONOMY

Normal Driving 75-100 miles/charge
Equivalent to 125-180 mpg conventional ICE vehicle

INSTRUMENTATION

Speedometer, Tachometer, Odometer,
Energy indicator, Motor Temperature,
Fuel Gauge (heater), Digital Clock, &
On-board Computer Diagnostic System

Warning Lights: Brake System, Power
On, Rear Window Heat, Seatbelts,
Hazard, High/Low Beam, Directionals,
Tank, Air, Low Energy.

MAINTENANCE

Service: Air-Tires As Needed
Water-Batteries As Indicated
by Computer
Lubrication —
Chassis As Required

THE EXAR 1 . . .
THE WORLD'S FIRST REAL
PRODUCTION-READY ELECTRONIC
POWERED AUTOMOBILE

FOR MORE INFORMATION CONTACT:



WESTERN MOTOR ASSOCIATION
Fred D. Helsel, Marketing Manager

204 - 1281 Johnston Road,
White Rock, B.C. V4B 3Y9

Telephone: 536-2933

Marketing Program

4.2 Basis for Current Marketing Plan

As this business plan shows, the positioning of this product is unique. There are no other production electric automobiles in the world, and none presently initiated for manufacture, with the exception of the EXAR-1.

This atypical product posture, in the 1900's, is as beneficial as the consequence of the transistor was to the vacuum tube industry. There was little or no great need for the mass marketing of the transistor, public opinion carried it forward and moved it to a place of acceptance, with every product in which it was used. Not only did the transistor eliminate the vacuum tube, but it immediately spawn other associated and improved products, visavis LSI/MOS circuitry, which further reduces the number of transistors by magnitudes. This direct relationship can be expected in the electric car industry.

There are currently, and since the late 1970's, numbers of products which are awaiting a 'real' electric automobile such as the EXAR-1 to be manufactured. These components will provide vast improvements to the electric automobile and the first firm to produce it. Research on elements, improvements to current technology, motors, drive trains and in particular, batteries, have all been in a state of limbo since there is no 'real' electric automobile for which to design these products around.

Research shows that since the late 1970's every area concerning electric automobiles has been at a snails-pace, but ready to move within two to three years of the first signs of real production, hence the EXAR-1's posture in the

market as, the first 'real production electric automobile,' assures it the preeminence it will automatically secure.

With all of these factors in mind, and the actual market test with the EXAR-1, several concrete postulates can be assumed. In the late 1970's, the inventor of the EXAR-1 presented a marketing position program to the Georgia Institute of Technology, College of Industrial Management, in which Dr. Fred C. Allvine, Professor of Marketing, concurred. The purpose was to outline a marketing program based on the advantages heretofore mentioned. For a product with such world wide demand, was there:

- 1) requirement for immediate advertising to announce the car?
- 2) sufficient media, i.e., radio, newspaper, magazine and TV, to provide ample coverage to build a customer base?
- 3) to be controversy, could it be answered prior to production?
- 4) need for a major announcement, or would it be better served by waiting for production to begin?
- 5) need to begin a major ad campaign if orders were in excess of two years in advance for all factories?
- 6) a reason to begin market studies if orders dropped below a two year minimum for all factories?

These questions formed the basis for the

marketing program which is outlined below.

4.3 Outline of Current Marketing Plan

4.3.1 Studies, Results and Plans

After several studies done through radio programs, TV announcements, news broadcasts, magazine articles, and newspaper stories, the results were quite clear. There was little or no need to provide any specific ad program during the announcement of the EXAR-1's production. In fact, if the announcement were to be for only the 'possibility' of production, hundreds of orders would ensue.

It is therefore unnecessary to spend any money for other than news release packages of sufficient detail to provide that appropriate media a path of least resistance in presenting our position, e.g.,

1) For Radio; a written announcement geared toward easy reading and clear short details. No response to take over 10 seconds. Items of interest, such as:

- A) There are 24 lead acid batteries
 - B) A 144 volt electrical system
 - C) With electric windows
 - D) A computer that:
 - a) Provides anti-theft codes
 - b) Checks if the driver is drunk
 - c) Monitors battery condition
- etc..

2) For newspapers; provide several 8 X 10 glossy black and white photographs of the car in different scenes, such as, traffic, country side, elegant fountain homes or hotels, sporting areas, charging environments, bad weather or any other locale which might interest the publication to which the package is being presented.

There will be data in the form of "who, what, why, when and where" sufficient to meet journalistic requirements, with anecdotes, and stories of interest in as many areas as

might provide good reading and 'happy endings.' Background information in detail so that the media can check easily on any statements of fact. And any other information which might lend fact, credibility, conformation and statistics, with phone numbers and names of individuals (who have approved), from who information can be obtained.

3) For magazines; articles should provide a story line, something which lends to a narrative and essence in a variety of interests, e.g., environment, fuel, sports, economy, news, production, materials, tooling, engineering, women's interests, teen interests, etc, including automobile magazines. It should be noted that it is the intention of the corporation to introduce an electric automobile magazine in the vain of Car and Driver or Motor Trend, also there is little possibility that this periodical will not be very successful for two or three years, however, it will control the news as affects electric automobiles rather than leaving the corporation at the hands of auto magazines which are supported only by gasoline powered automobile companies. There are several other advantages which should be obvious, including the fact that the magazine will be produced by a subsidiary corporation this detail will eventually be ignored and provide the corporation with an authoritarian outlet for news which is beneficial to the organization. This is not an unusual operation, everyone knows that the current automobile companies have vast influence over the media and no one can expect that the electric automobile industry will not want to blow it's own horn.

4) For television; video tapes, in the proper acceptable format for commercial use, will be provided to television stations. Some of the tapes should be stories in and of themselves. Length of prepared tapes will be from 1.4 minutes to 2.5 minutes some few will be produced in the 4 to 6 minute range and expanded up to 12 minutes.

TV cameramen will be allowed to photograph everything with the exception of proprietary, secret projects or devices in the electric

PACIFIC PARKLAND

JAMES ISLAND, B.C.

6 December 1988

Pro Western Corp. Group Ltd.
117H - 14914 - 104th Avenue
Surrey, BC
V3R 1M7

Attention: Mr. Garrett Tanner

Dear Garrett;

Thank you for sending us the package on the Amectran. We have been very excited about this vehicle since viewing it on a television news documentary.

Pacific Parkland Properties Inc. is presently developing a multi-million dollar project here in the Victoria area. It is on an island and one of our concepts is a gasoline free mode of transportation.

We have looked at many types of electric vehicles from many companies which were represented at the Toronto 9th International Electric Vehicle Symposium. None attracted our serious interest until we found your electric car.

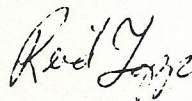
We will need about three hundred cars for our project. This would be over a period of one year and commencing in the spring of 1990.

It would appear from the suggested price structure indicated to us and the proforma sheet on the car, that we could do business.

We would appreciate being kept apprised of your progress and any interest in supplying our firm with your vehicles.

Yours truly,

PACIFIC PARKLAND PROPERTIES INC.



Reid Topp
Vice President - Marketing

RT/cjr

automobile. Assistance during the original announcements will consist of corporation personnel providing lighting and other key elements which will aid the TV media assistance in getting the very best possible footage of the EXAR-1.

The cost of this type of support will be significant, but much more valuable than a marketing campaign which has no need for a particular direction, and since it is news, rather than promotional, it's value is indisputably more consequential.

4.3.2 Controversy and Response

During the original announcements, it is to be expected that the pros and cons of the electric automobile will be discussed, there is no sense in trying to answer the negatives with advertising, during this period. It has been determined through studies as well as actual market samples that response to these types of negatives can only be beneficially answered with actual production; therefore very little exposure is necessary prior to the completion of the production facility and the assembly of the first cars off the line.

With the relatively low cost of TV equipment and tape, the corporation will photograph every aspect of preparation and completion as it occurs in order to provide a history to be used during the announcement of the completion of the facility.

4.3.3 Orders Which Exceed Two Years

Production Capabilities

If orders for the EXAR-1 exceed two years of production capability, there is no need for any major ad campaign. Regular news releases will provide the exposure necessary to ensure the public's awareness of the electric automobile. Add to this the fact that the car will be shown at automobile shows and expositions throughout the country, but also the fact that provinces and states will be wanting to open

factories of their own: this alone will make news, as well as the public offering and other offers for financing production facilities, which will no doubt take place. It is expected that during these shows, the corporation will receive some 300,000 orders with escrow deposits of \$CND 500 (per car), representing a reserve in orders that will keep fifteen factories busy for over two years.

Past history has proved that a product like this, which will be in short supply, can garner vast demand and create a market beyond the expectations of any normal consideration for that undetermined market segment, such as the electric automobile. A case in point was the Datsun 280Z. This car was expected to sell in only a small market segment, however, short supply added an element of 'desirability' and for over two and one half years the 280Z was a prized possession, which only by paying a much higher price than the dealers were asking, could you get one. The manufacture kept raising the price, but that did not discourage purchasers, and eventually the 280Z became a staple of the auto industry, and to this day a pride of ownership still exists.

The EXAR-1 is in this same position, it's customers will be of such varied ilk (See Section 4.14, 1-8) that a market trend will be difficult to establish. Therefore a major market campaign will have no effect and at this stage of it's production and cannot benefit by normal advertising methods.

Since the corporation expects to begin opening additional factories as provinces, states and public offerings or additional financing allow, the EXAR-1 will enjoy a constant revival of new attention.

In reality, it is expected that the EXAR-1 will have some three to five years before a major study will be apropos.

4.3.4 Orders Which Fall Two Years

Below Production Capabilities

In the event that orders for the EXAR-1 fall below two years in production capabilities, the corporation must then begin (at least one year before) a major ad campaign; prior to that campaign, the corporation should have accumulated an abundant data base on customers and customer profiles. With this history, a proper study can be effected. By looking at the Ford Comuta on the page preceding section 3, you will find an example of the impression of what the public conceives as an electric automobile.

Further examples are rampant throughout this report. Whether it is GM, the Japanese, French or any other group or country, you will find that they have instilled in the public the idea that an electric automobile is a small, 'not safe', uncomfortable, made-over pile, of gasoline automobile parts. This data is useless to make any current study from, and studies made with this criteria, must be ignored. The actual studies made currently, and using the EXAR-1 as the 'data model,' have improved on all aspects of sales and acceptance by the public for purchasing an electric automobile. These sales studies all affirm the expansive market for electric automobiles, which is far beyond what even Public Petroleum Ltd. concedes it can support within five to ten years. In this discussion trucks have been ignored for the reasons previously mentioned in the SUMMARY.

Other factors will affect future studies, 'after' the EXAR-1 is in production. By the time these studies are needed, battery improvement and technological improvements will have had their effect on the public, and those numbers of purchasers will only increase. We do not take into account the already predominant effect the environmental considerations are playing in the future of electric automobiles. As seen by the 'Request For Proposal' (at the end of section 8.8) issued by the City of Los Angeles, the pollution problem has prompted a

governmental move to encourage the use of electric automobiles, the proposal is for 10,000 electric cars and substantially more, in the future. This business plan could be supported by the City of Los Angeles alone, but they are not the only city in the world to have this problem, and the first factories producing electric automobiles will have an enormous advantage over any future competitors.

All this must be borne in mind when considering how vast the market for electric automobiles has become. It is indisputable that such a market exists. With a demand which will overwhelm the first manufacturers of electric automobiles, certainly Public Petroleum Ltd., as the 'first,' can count on a substantial market segment.

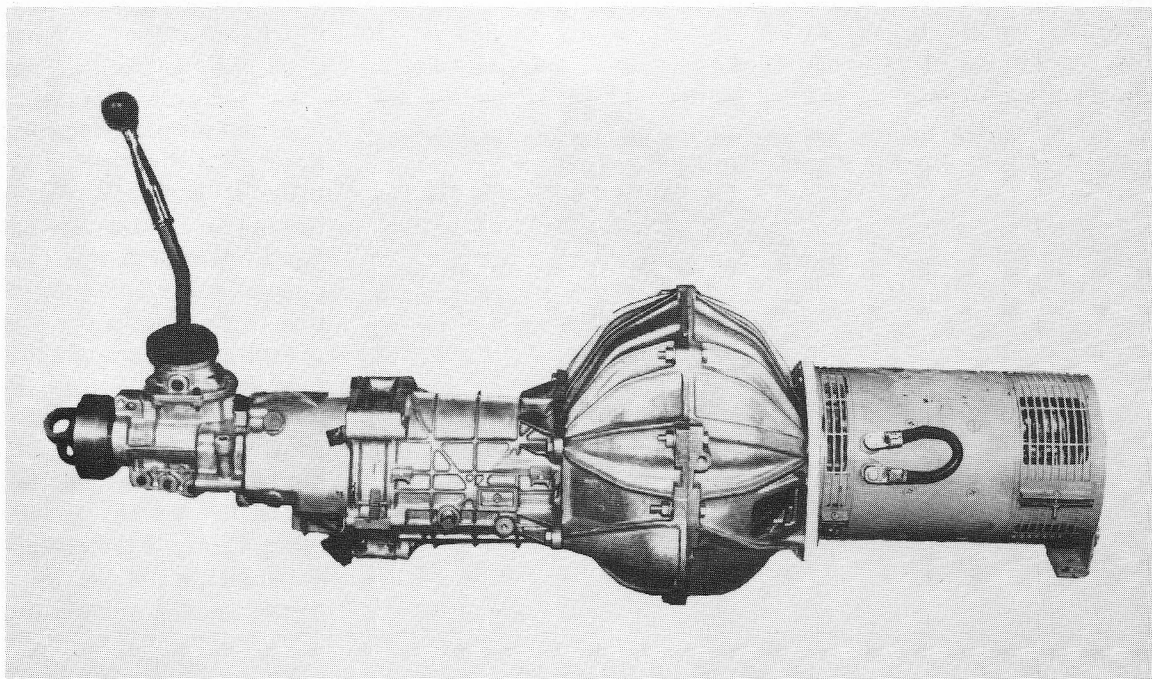
From past history, another advantage in this market is the 'wait and see' attitude which permeate all industry, with the exception of entertainment electronics. It is estimated that it will take over 4 years before the first competitor to the EXAR-1 comes on the market. First, even if a competitor has the plans to the EXAR-1, it will take at least one year to make modifications or changes to be able to offer something different. Then twelve to eighteen months to get in line for production facilities. If Public Petroleum Ltd. hasn't already contracted with the Snow Corporation and scheduled additional capacity, this would delay competition even further or cause them to use a risky uncoordinated production method. After that at least one year to produce the machinery and tools necessary to manufacture and get into production, not counting the fact that it will be at least one and a half years before the EXAR-1 hits the market and competitors will wait at least one to two years to see if it will really be accepted.

At this point what can competitors offer, they will already be behind four years and no 'basic research' to support their efforts, while Public Petroleum Ltd. and the inventor will continue to improve the EXAR-1. This disadvantage in the lack of 'basic research' means that a real competitor must spend at

least three to four years in studying the EXAR-1 then lock down his engineering in order to go into production with a vehicle similar to the EXAR-1 a totally different vehicle will take up to five years. In any case, always in arrears of Public Petroleum Ltd..

Assuming a competitor comes on the market, what will he use? A car smaller or larger than the EXAR-1? Cheaper or more expensive than the EXAR-1? More advanced or less than the EXAR-1? All of these possibilities exist, but 1) the market can support a dozen electric automobile companies 2) response time will always make them #2 and 3) neither Public Petroleum Ltd. nor the inventor intend to sit around and let competition catch up.

If orders drop below two years of production capabilities, there is plenty of time to develop a genuine, concrete, market study and ad program to meet the problem. A problem which under any circumstances, can be expected in no less than ten years after production of the EXAR-1 and the manufacturing plan proposed for this industry.



4.4 Market Potential and Activity throughout the World

Summary

The following reports and excerpts are from various organizations throughout the world. Starting with the Japanese who only had 789 electric on road vehicles in March of 1987, reading their report, their 'purpose of establishment' reads as all of the other purposes of establishment for all of the other organizations dealing in electric and hybrid vehicles. Basic tenets of efficient utilization, elimination of pollution, the saving of natural resources and economy will permeate basically all electric automobile and/or battery companies. It is interesting to note however, that in the principal activities within the Japan Electric Vehicle Association we should remember that the Japanese policy in business is to look at products basically, ten years or further in advance of their need or intended production date. It should be noted that Japanese using substantial, influential support, cite "Setting standards and regulations for vehicles and components relating to electric vehicles, setting technical criteria for performance, etc. and popularizing of such standards and criteria" are among their principal activities. It must be pointed out here that since the popularization of electric vehicles began in 1973, basic standards for distance of 75 to 100 miles, acceleration of 0 to 60 miles an hour at between 12

and 21 seconds, top speed of at least 60 miles an hour, and a cruising speed of at least 55 miles an hour have not changed. By forcing other organizations to meet standards and regulations to which they must comply, simply makes marketing of any product more difficult. In some cases it even curtails production. By setting standards too high, where no one can meet those standards, the products' popularization is retarded. If the standards are too low, the public will not purchase the vehicles, and popularization will be retarded.

The electric car in Japan is not advantageous to their economic growth. An industry that can, over the next few years, grow to sales of some one million electric cars per year, versus the automobile industry which Japan currently controls and into which market place they provide millions of vehicles and to whom the introduction of advanced manufacturing technology detrimental to gasoline powered vehicles can certainly be expected to provide little incentive for the real promotion of research and development of electric automobiles.

Working for the popularization and practical application of electric vehicles requires simply the desire to put those vehicles on the road and to design them with the purpose of mass production and acceptance. The common denominator through all of these reports is the complexity and the large numbers of organiza-

tions and support companies involved in this type of activity. It becomes obvious throughout these different organizations, that if the popularization and production of an electric car was of real intent, certainly that production would have already taken place. If a company like Amectran can produce a car like the EXAR-1, whose proven capabilities exceed the standards which are currently accepted as the criteria for

New Electric Mazda Displayed in Tokyo

Toyo Kogyo, Mazda's manufacturer, again demonstrated just why it is one of the world's most innovative automobile manufacturers when it recently displayed a newly developed electric car at the 24th International Tokyo Motor Show. The company used a front wheel drive GLC body as the base for the prototype, along with the newly developed nickel-sulfate battery to demonstrate the latest state-of-the-art in electric car development. The resulting "urban car of the future" is part of Toyo Kogyo's alternative power/fuel

source reach and development program.

Equipped with a three-speed manual transmission, this electric car has a maximum speed of 50 miles per hour and driving range of about 100 miles, which is among the best in the world for this type of vehicle.


The technology for developing and utilizing electric vehicles in Japan has reached the highest level in the world. The Japanese auto-

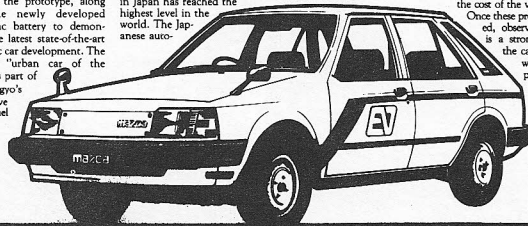
mobile manufacturers believe this not only could reduce the world's dependence on oil as a primary power source, it could open up other possible fuel sources such as coal, liquid propane gas, plant derivatives, solar energy or hydro-electricity.

What makes the car even more exciting is that it is a

"clean" means of transportation, since it doesn't emit exhaust gas and is extremely quiet.

But don't rush down to your dealer just yet, because there are a wide range of problems still to be solved before the cars can be mass marketed. For instance, Toyo Kogyo is trying to develop even smaller batteries with high performance levels and to reduce the cost of the vehicle.

Once these problems are resolved, observers believe there is a strong possibility that the cars of the future will be electrically powered. 



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the popularization of an electric automobile, then certainly organizations with dozens of members, and support groups with huge sums of money at their disposal, could have developed the product by this time. The Japan Electric Vehicle Association states that they have spent some 5.7 billion yen in cooperation with governmental, academic and private sectors, this type of R & D and expense undoubtedly should have provided more than the large number of converted vehicles which are purported to be in operation by the Japanese. In the exhibits you will note that the automobiles which have the best range, i.e., in the 165 to 200 kilometers range have accomplished this range by using specialized batteries, e.g., iron-nickel, nickel-zinc, and zinc-bromine. The nickel-zinc batteries which have provided the range of some 200 kilometers provide only 25% more range, than does Amectran's EXAR-1 using lead acid batteries, certainly, the added cost and non-current availability of the nickel-zinc battery does not justify the additional 20 - 25 mile range which this battery provides. Basically, all of the other electric automobiles falling into the lead acid category have performances far below that of the EXAR-1. It should be further noted as you look through the exhibits, that with the exception of the modified golf cart design using a zinc-bromine battery, basically all of the other vehicles are simply conversions of gasoline powered automobiles.

The inventor of the EXAR-1, Mr. Ramirez, likens this type of research and development to replacing reciprocal engines on a twin engine aircraft with J-76 jet engines and referring to this as new jet aircraft technology, "When we consider the amount of detail and engineering which goes into the design of an internal combustion automobile this type of research seems haphazard."

It should be noted that the Electric Vehicle Development Corporation, the Electric Power Research Institute, the Department of Energy, and the various and sundry electric utility companies involved with these organizations, all seem to have the same criteria of developing

infrastructures, marketing strategies, teams of research operations, reviews of programs and analysis of current status and development. It seems that each organization requires funding, private and governmental help as well as paper researchers. Each one of these organizations lack real purpose and a dedicated production goal.

The same basic questions have not changed since 1973. 1. The sale of electric cars will be based on their performance. 2. Batteries must be improved in order to improve their performance. 3. Is the public ready for an economical, environmentally oriented, oil saving automobile with limited range and speed? 4. Can even small scale production be developed in an economical production facility?

The material in this section has been gathered as late as November 13 - 16, 1988 when the Seventh International Electrical Vehicle Symposium was held in Toronto, Canada. Materials located in the Appendices and Exhibits have been included in order to allow comparison between reports gathered from 1974-1981 and 1988. The comparison of these reports indicate that the same projects have been expanded, that their goals have not changed in the last 12 to 14 years. It should be noted that Amectran is the only company involved in this industry, who has completed the development for the production of an electric automobile that meets all of the criteria that these organizations discuss. In developing a new manufacturing technology, the question of the realization of a small scale production, at a reasonable and economical cost, has been made available. The performance of the EXAR-1 meets even those standards currently being reviewed by hightech battery usage in converted automobiles.

All of the benefits that the electric automobile will provide have not changed in the last 15 years. However, it is obvious that no company has involved itself with the necessary basic research and resources to have put together a real production electric automobile, with the exception of Amectran Corporation. In each of the following sections starting with sub-section

4.5, it should be noted, that not one country or group of countries have decided to stop research, and develop a product and allow the natural evolution of that product to come to fruition. While money is being spent and research is being done, it is evident that all of this research and planning is done by 'paper engineers' whose primary function is to do research and in no way involve themselves in actual production.

One of the things that the Seventh International Electric Vehicle Symposium indicates from all of these reports, is that there is a vast world wide interest in electric automobiles. The introduction of any production automobile would have an instant success and acceptance throughout the entire world. If nothing else, every country and group involved in electric automobile research, must immediately purchase some of these vehicles in order to maintain their credibility if they are to continue their on 'growing' research projects.

From 4.4.1 through 4.14 you will find reports from the Seventh International Electric Vehicle Symposium as referred to in the Summary to Section 4.4.

4.4.1 Japan Electric Vehicle Association

Japan Electric Vehicle Association

Establishment: August 12, 1976

Members:

41 member companies and organizations on the council. 14 support companies and organizations.

Chief Director:

Shoichiro Toyota (president of Japan Automobile Manufacturers Association, Inc.)

Purpose of Establishment:

To *promote research* and development of electric vehicles (electric automobiles, hybrid vehicle, dual mode vehicle, and other vehicles whose motive power is electricity and measures to foster their wider use, and to contribute to the sound development of industry, economy and the enhancement of the national life through conducting organized testing and survey research on systems utilizing electric vehicles as well as through the efficient utilization of energy, the prevention and elimination of pollution, and other means.

Principal Activities:

1. Investigation of the technical aspects of the production and use of electric vehicles.
2. The collection, organization, analysis, and making available in various fields of domestic and foreign material and information concerning electric vehicles.
3. Testing and research on the practical application of electric vehicles.
4. With the cooperation of related industries, conducting surveys and research on effective methods for using electric vehicles.
5. Setting standards and regulations for vehicles and components (batteries, motors, control devices, etc.) relating to electric vehicles, setting technical criteria for performance, etc. and the popularizing of such standards and criteria.
6. Working for the *popularization and practical application of electric vehicles* in cooperation with the relevant government and public agencies concerning the implementation of administrative and other measures for encouraging in tax, legal, and financial aspects, in order to promote the testing, research, and practical application of electric vehicles.
7. Making well known the practicality of electric vehicles by participating in EXPO, motor shows, and other events in order to widely promote electric vehicles both domestically and in foreign countries, and by sponsoring caravans and conducting various other kinds of publicity activities.