INTRODUCTION

September 4, 1980, Parade Honoring Edmond X. Ramirez Sr.

By Jeffery M. Christian, author of McGraw Hill's, "World Guide to Battery-Powered Road Transportation" which featured Amectran's EXAR-1 on the cover

Today Amectran and its EXAR-1 five passenger electric automobile are being celebrated. This brochure is intended to be a formal introduction of the reader to Amectran, highlighting this little-known firm's claim as *the* modern-day electric car company. Accordingly, this discusses some of the more significant aspects of the unlikely journey the company has taken on its way to making the EXAR-1 a reality.

To a large extent this is the story of company president Edmond X Ramirez Sr.'s aspirations and hopes: the tale of a man who has succeeded to accomplish the American dream of creating not only his own company but an entire industry. To do this is a phenomenal accomplishment in itself in this part of the 20th century. Ramirez seems ready to do it despite overwhelming odds and numerous obstacles, including reluctant and callous government officials in some agencies; apparent enemies in key positions of certain industry organizations and corporations; and the constant need to search for additional capital in order to keep the project alive. And, he has managed to create a company over which he maintains control, having taken care and extra time necessary to preserve for himself the preeminent position in his company, Amectran, and his industry, electric automobiles.

More than any other company in the industry, Amectran has dedicated itself to the mass production and marketing of electric passenger cars. Since the early 1970s Ramirez has surrounded himself with a staff of dedicated and professional people. Together they not only developed a high performance electric car that appears to meet the American public's criteria; they also have formulated a comprehensive plan outlining the manufacture and market of the vehicle which will enable Amectran to produce the car.

After more than two years of delays, The EXAR-1, which will be Amectran's first production model, arrived in the U.S. from the late in May 1980, where the production prototype was completed by the staff of master automotive designer Pietro Frua. The car was officially unveiled at two days of events including a parade, and awards luncheon, and a reception for the staff of Amectran in Berkeley, California on September 4

and fifth, 1980. The prototype will be used to make the body molds for the production line later in 1980, after which Amectran will take the car on a 15 city, eight-month tour of the country. The company hopes to secure deposits for tens of thousands of cars before and during this tour, after which it will begin production in early 1981 at 10,000-vehicle-per-year plants.

The company expects ultimately to build regional production and service centers, each capable of producing 5,000 vehicles per year on a single shift, two shifts per day. Each one not only would manufacture cars for its respective region, but also sell and service them much the same way automobiles were manufactured and marketed in the early 1900s. In developing this system of distribution, Amectran is introducing a new method of manufacturing, production servicing, sales, repairs, distribution, and inventory control which is new to the nascent automotive industry; a new industry paradigm relied on for creating an image of reliability among its customers. Amectran's emphasis on customer service is indicated by its plan to have company repair trucks for whatever service and the EXAR-1 will need.

The Road to Amectran

Ed Ramirez first considered manufacturing electric vehicles in 1972, while he was president of Stratatron, a New York-based computer company. He was living in Queens, New York, at the time with his wife and two young boys. Worried that the children would be hit by a car while riding their bicycles in the street, he decided to give them something that was exciting enough to divert their attention away from their bikes and at the same time force them to stay on the sidewalks. He came upon the idea of taking a toy pedal-powered car and electrifying. He asked an electrical engineer at Stratatron to study the possibility of making a toy electric car.

The Stratatron staff at the time was composed of 23 extremely dedicated people, mostly computer experts the firm had lured away from jobs in government agencies and at universities. The electrical engineer automatically applied the staff's standard procedure for solving problems to the electric toy car request. He outlined the problems involved in the project and assigned various experts in the firm a particular portion to solve. The staff, which was used to working long and intense hours, saw the toy car is a welcome diversion. They began immersing themselves in data and discussions of what in retrospect Ramirez calls "this dumb little car." Little by little the company in this way compiled a huge amount of information on the energy efficiency and design of the toy car.

"Somehow or another, we started thinking in terms of a real automobile," Ramirez said. "Then the staff began doing little models of a car, getting into questions concerning how parts of the vehicle were going to work, whether their projections were valid for a full-sized vehicle. We started going through the standard questions then: If this was going to work, certainly General Motors would have built one by now…. There's just too much money involved…. We don't know how to produce vehicles…. It costs hundreds of millions of dollars just to build one plant. All of the negatives anyone else would ask I threw at them and we ultimately just set the idea side. My kids never even got there toy car." Nonetheless, the exercise it stimulated a great deal of curiosity and Ramirez concerning the possibilities for building electric cars.

Shortly after this he read an article on the Japanese government-sponsored electric vehicle development program, which ran for several years in the mid-1970s. "I read that the Japanese had spent $15 million over five years to develop an electric automobile that was little more than a puddle jumper. It was about 4 x 8 in size and had a range of 48 miles at 48 mph." Ramirez said he could not believe that this was the best vehicle design the top firms in Japan could develop. "There was no way, that with all that talent, all that money, they couldn't do better than that." He said

Around that time, in 1973, Stratatron was hit by a flood, which left several feet of water in the firm's basement computer room. The flood essentially wiped out the company. The firm went out of business in August of that year after an involuntary bankruptcy petition was filed against it Ramirez began thinking more earnestly about EVs then, taking advantage of what he calls a sabbatical to consider the possibilities of the situation.

The Early Years of Amectran

"The problem never was, 'could the electric car work.' That was a foregone conclusion as far as I was concerned," he said. The problem Ramirez saw was to find a way to mass produce electric vehicles without the $200 million necessary to enter production in the way Detroit automakers operate. He realized he could never put together a company capable of doing that. Thus, if he were to enter the EV field, he knew he must develop an alternate marketing and manufacturing plan.

In late 1973 Ramirez moved to Dallas, where his brother was living. The moves, in many ways, symbolize the beginning of Amectran--an acronym of American Ecological Transportation--and the end of Ramirez's career as a computer specialist. Once he had settled in Texas, Ramirez began to spend a lot of time with his older brother, Joe A. Ramirez Jr., a design engineer who was confined to a wheelchair with multiple sclerosis. The two brothers worked together on the same engineering and design problems. After a while the work became too difficult for just the pair of them, so they began turning to engineering friends at nearby LTV-Vought and Bell helicopter for analytical assistance new bearing systems, materials, designs, and technology for safe yet lightweight body parts came out of those efforts, including the idea of using acrylic Kevlar for the body.

By this time Ramirez and his collaborators had started building test beds of various parts, testing motors and electronic components. They hired an electrical engineer who had worked for Texas Instruments for 12 years to design the electronics for the car. This man began outlining how the car would have to perform. From the beginning they worked with the supposition that electric automobile had to operate just like a gasoline powered automobile, with the exception of range capabilities, in order to be accepted by the buying public. Acceleration, top speed, payload—in all these parameters the electric car Ramirez had in mind would have to be competitive with conventional automobiles.

"How could we most efficiently develop a controller? What really was required? These were the immediate problems and the immediate solution was to computerize the control system. A computer could react much faster than a driver could, we figured. It could make instantaneous decisions and could in turn control to an exact degree the expenditure of electricity to the motor," Ramirez recalls.

Next Ramirez and his staff began to investigate the overall automobile. "We couldn't imagine anyone think that would generally improve the car. There were no major dramatic breakthroughs that we could find anywhere. We knew the batteries were out of the question, because we had to stick with what was available to the public." Still, by paying close attention to details and by modifying even the most inconspicuously inefficient components, Ramirez was able to develop a vehicle with improved range of acceleration. One example of these efforts is the bolt that holds the disc brake system together. It was redesigned with a resulting 7% reduction of drag on the brakes. Major changes were also made to the suspension and break systems, as well as in the controller and drive system. In an article on Amectran, *Dallas* magazine in February 1978 quoted Ramirez as saying, "it's 7% here in 4% over here and 9% here in 15% there… And all of these percents together finally mean the difference between other cars having a 50-mile range and our EXAR-1 having a 100 mile range."

In 1974 Amectran was formally organized and registered in Texas as a proprietorship under Ramirez's name. He continued together experts in electronics and automotive design engineering around him, employees of Amectran and as outside consultants. The size of his staff fluctuated over the next six years, growing whenever Amectran's workload needed more hands. Over the years the Amectran organization developed into a highly dedicated staff, precisely tuned in some ways, yet still learning and others. In many ways the essence of Amectran remained Ramirez, whose determination and imagination serve to create the overall atmosphere at the company and to fuse it together.

A Road Block, A Turning Point

1975 was a critical year for Amectran, because it was then that Liz Carmichael arrived in Dallas. Carmichael, alias Jerry Dean Michaels, was

described in the press alternately as a transsexual and a transvestite promoted in Texas and California a three wheeled gasoline powered car called the Dale. California ultimately charge that the car was used to swindle the public by Carmichael, who was found guilty of selling unregistered securities and sent to jail.

Ramirez sensed that Carmichael was a fraud, he recalled, and feared he would be caught up in the public and official reaction to the Dale scheme, should it ever be uncovered. Acting on his suspicions, Ramirez did a little investigating into the Dale, and found that she was making impossible claims about the vehicle. Fearing the backlash, Ramirez had his attorney contact federal and state officials, in order that Amectran could be on record with the government as having nothing to do with the Dale.

Before Carmichael even had arrived in Dallas in early 1975, Ramirez had begun to make a major reevaluation of his project. The Dale, as Carmichael described it, would be large enough to serve as a family automobile, yet would be designed to achieve around 75 mpg in highway driving. Market research conducted by Amectran prior to this time had indicated that the firm would need to produce a car larger than the one then under development. Ramirez accepted the research conclusions that the American public would much rather have a larger car than a small commuter car, despite the insistence of many of Amectran's investors and advisors. "We already had been looking at the fact that the car had to be large," he said. "I remember that I went to the factory foreman and told him to take a Saw-all and just destroyed the Prototypes we had been working on at that time." He also threw away most of the existing blueprints, keeping only the design efficiencies they had discovered which would be applicable to a larger car.

"We spent a heck of a lot of money and a lot of R&D time and everything else to bring us to that stage, but it was all in the wrong direction." Rather than try to modify what they already had done in order to change directions, Ramirez had the company fundamentally start from scratch, so that the new car would be designed as a single, comprehensive unit, and not from pieces of previous vehicles.

Carmichael's appearance in Dallas produce the commotion Ramirez had feared, and in the fallout that followed her unexpected departure from town Amectran had to file Chapter 11 in bankruptcy court. The outcome of all this was that the federal court then gave Amectran 90 days to reorganize. The judge also allowed the firm to issue certificates of indebtedness while operating under Chapter 11 involuntary bankruptcy. Amectran met the deadline and was incorporated August 9, 1976 with more than 300 shareholders at that time the one point 5 million they had invested in Amectran was converted into 15% of the Corporation.

At the same time Amectran was reorganizing under Chapter 11, the company also began working on the first of its larger, reengineered prototypes, applying everything it had learned from the earlier test beds. Thus, when Amectran Inc., now incorporated, finally emerged from federal receivership, it was in much better shape than when the entire fiasco began. The company had eight couple of hundred satisfied shareholders it was reasonably solvent--considering what it had experienced and the capital requirements of its project--and it had never had a complaint registered against it during the receivership. Furthermore, it had completed the first prototype in the series of vehicles which ultimately would lead to the EXAR-1.

The Prototype Stage

The first prototype would come to be known as the Yellow Car. The car, the world's first minivan (see cover of August 1976 issue of Southwest Airlines magazine), had what euphemistically could be called a unique or futuristic body design. The significant thing about it, however, is that it ran and ran well. Amectran began testing the Yellow Car with results the staff found to be incredible. The fiberglass bodied car had a 4,400-lb curb weight, including 24 Trojan batteries weighing 1700 lbs. the car had to doors carried five people, and was slightly shorter than the EXAR-1 ultimately would be. The car had a top speed of 70 mph and can travel 100 miles at a constant 55 mph, according to the Department of Energy's 1977 state-of-the-art report on EVs, which relied on information supplied by Amectran. Amectran

amended the statistics, saying the maximum speed was 100.4 mph and that acceleration from 0 to 55 mph took only 12 seconds.

These performance figures are remarkable for an electric car, especially if five passenger one weighing more than 4, 400 lbs. Furthermore, the car accomplished these performance capabilities using only in 19 hp motor, something that left engineers skeptical of Amectran's claims for the car. Nonetheless, the company made videotapes of the car in action including one of the driver being given a speeding ticket by an unbelieving police officer. Further evidence of the car's abilities is proved by a number of independent authorities, including personnel from some government agencies and representatives of component manufacturers, who have written in the vehicle and attest to its capabilities.

The list of those outside the company that drove in the Yellow Car and other Amectran Prototypes includes former Colorado Congressman Byron L. Johnson; regional Department of Energy and environmental protection agency personnel; and Margaret E. Matta, the project officer at the Commerce Department's office of minority business enterprise. Others include Goodyear, AT&T, General Electric, and LTV-Vought employees, and a number of Dallas radio and television personalities. An official from American motors said he "was amazed at the pick-up and passing ability" of the Amectran car he wrote in, while J. D. Gilmore of LTV-Vought said, "I rode in Ramirez's car. The prototype does what he claims it will do." Ramirez also tells of taking GE officials for test drives in his car, outfitted with an experimental controller and GE motor. After driving the car at high speeds for some time, Ramirez let the GE people inspect the motor. Friction normally would have caused the motor to heat up, and the GE experts expected to find a motor that would be too hot to touch because of the high speeds at which the car had been driven. The motor was surprisingly cool, Ramirez recalled, because the prototype vehicle had been designed to be so efficient.

The Yellow Car was followed in 1977 with the development of the S/T prototype, which was designed to convert easily from a mid-sized hatchback sedan to a small pickup truck. Ramirez eschews the doctrine that an electric car must be designed "from the ground up," or entirely from scratch with all its overall performance and intended mission in mind, in order for it to be efficient and marketable. Nonetheless, the S/T prototype was constructed using AMC pacer body parts and components in an effort to interest American motors in investing or assisting Amectran's development program in some way. No agreement was reached between the two companies, however, despite apparently keen interest on the part of AMC.

The white S/T prototype still is used by Amectran, which shuttles visitors from the Dallas airport to the Amectran offices in it at high speeds. The Automobile's maximum speed is 85 mph, and it has a highway range of 75-100 miles per charge, according to Ramirez.

All of the time Amectran was working on its design and perfecting its vehicle, it was in close contact with component manufacturers. In fact, much of the engineering work on the Amectran Prototypes was done by a variety of local and national firms. General Electric, for example, modified its motors to Amectran's specifications, working closely with the Amectran staff in optimizing the motor design. Similarly, Goodyear worked with Amectran in developing a low rolling resistance tire suitable for EVs and the Airheart Products Division of Hurst Performance provided technical assistance with the brake system. It was in this way, for example, that Amectran determine what the most efficient tire size for an EV the size of the EXAR-1 would be, discovering that a large low-profile tire would provide the lowest rolling resistance. Hurst Airheart helped Amectran discover the efficiency of floating the disc brake calipers, which significantly reduces the drag created by this particular component.

This process of repeated testing and consultation with specialists led Amectran to develop its efficient vehicle design. For example, the Yellow Car used electronic motor controls. Despite the car's good performance, Amectran's staff found reasons not to use such a system in later cars. The S/T initially had a five-speed manual transmission. This, too, had distinct advantages, but later research convinced the staff that the production car should use a six-speed transmission

in conjunction with an electronic controller and a microcomputer. Through experimentation and testing like this--which also eliminated torque converters, dual motors, chain drives, motors on all four wheels, and several types of transmissions as unsuitable— Amectran has "implemented in US innovations of high technology," Ramirez explains.

Some of the innovations which Amectran has made in its vehicles broke new ground in EV design. For example, Amectran was the first company to turn to 20-inch tires, as mentioned earlier, in order to reduce rolling resistance of the vehicle and improve its range. Since Amectran with Goodyear, demonstrated the advantages of using large tires, several of the EV makers have turned to larger tire sizes. With similar Foresight, Ramirez noted, Amectran was the first EV manufactured to design its power train so that the regenerative braking system doubles as the battery charger, a design innovation several manufacturers now are adopting.

Amectran also has taken the lead with several other improvements on standard automobile components. The company improved the energy efficiency of its drivetrain by going to a special rear suspension system. Amectran had kept as low a profile as possible until 1977. The company then began making contacts with officials In the Energy Research and Development Agency, hoping that that office, searching for solutions to the U.S.'s growing problems with oil, would be interested in helping Amectran enter production. The company has established good relations with the Department of Transportation and such agencies as the Commerce Department's Office of Minority Business Enterprise, but has had difficulties with some of the government personnel and officials in service organizations that are more closely involved in the push to create a market for electric vehicles. Former Sec. of transportation Brock Adams, for example, testified before a 1979 Senate Commerce, Science and Transportation hearing that his department found Amectran's project fruitful, saying it ought to be pursued. Sec. of commerce Juanita Kreps invited Amectran to represent the electric automobile industry at and automobile industry meeting arranged by commerce that same year.

One of the unusual aspects of Amectran and Ed Ramirez is that both either win friends and admirers, or they make hard and fast enemies. Those companies and government officials that have had close contact with Amectran are remarkably impressed with the company, its resilience, and its capabilities. Many of the detractors belong to a group of people who for various reasons have remained aloof and removed from the company, never examining in detail the company's prototype vehicles.

For example, *Electric Vehicle News*, a quarterly magazine that reports on electric road transportation, until 1980 never listed Amectran in its annual directory of EV manufacturers, even though it was aware of the company's existence and includes in its directories other companies that only have preproduction prototypes, firms with experimental vehicles not intended for production, and other firms that cannot be reached at the address provided by the directory.

In fact, says Ramirez, he once spent a week in Connecticut, where *Electric Vehicle News* has its office, trying unsuccessfully to establish contact with the magazine's publisher. The magazine has never printed any articles on Amectran or its automobiles. Similarly, although Ramirez says he has sent vast quantities of literature on Amectran and its vehicles to the electric vehicle counsel, this EV industry Association reports that it has nothing on file about the company. The magazine and counsel both exist to promote electric vehicles, Ramirez points out, but both have failed to give any recognition to Amectran.

Amectran also has had a disastrous relationship with the Department of Energy's Electric and Hybrid Vehicle Project. The staff at DOE, which has had serious problems in its first years of existence with accusations of sloppy execution of duties and dubious contracts let to corporations, is extremely cautious about endorsing individual companies, especially ones as controversial as Amectran. When asked about the company, personnel in DOE's central EV project office usually reply that they have not seen the company's prototypes, that they feel reluctant to accept offhand some of the company's claims, and that the company is unwilling to let them test its vehicles without paying for the privilege of testing

them. Ramirez responds to this by saying that regional DOE personnel have ridden in his vehicle. Furthermore, he says, individuals in the DOE EV office have gone beyond these statements, actually warning government officials and others who inquire about the firm to avoid becoming connected with the operation for fear of some scandal. “We have a legitimate product that does things like nothing anyone else has,” he says, “and we can demonstrate accordingly. I think they (DOE personnel) should at least accord us the common-sense consideration of looking at our project properly.”

Ramirez also remains irked that the department passed him by in awarding for grants to small businesses for the development of improved electric vehicles capable of production now. That program, called the “2 x 4” program because it required delivery of two vehicles for testing from each of the four companies ultimately chosen, was the E/HV project offices first significant journey into the world of small EV manufacturers. Several manufacturers who were passed over in the selection process complained about the DOE’s procedures, and the department was severely criticized for the way the program was handled. One of the major points of criticism was that one of the firm’s winning a contract in the program had only been incorporated a few days before submitting the bid. Ramirez, as is his habit, submitted a thick, highly detailed proposal to participate in the 2 x 4 program. “Their attitude was that we could not substantiate the operation of our prototype,” Ramirez says in retrospect. “Now, it seems rather strange to me that they said we could not substantiate the operation of a prototype that we already had running and were willing to demonstrate to them--it seems rather strange that the people who got the contract included a company that had been in business only nine days and had never even built a prototype. I’m curious to know how they substantiated their claims without having any physical device to show the DOE.”

Ramirez and Amectran have had other problems in dealing with large organizations, and they all really boil down to the lack of credibility. Part of this credibility gap stems from the numerous delays the company has had. Even so, entrepreneurs with much larger capital reserves than Ramirez have encountered similar setbacks and launching such massive manufacturing ventures. Most of the delays Amectran experienced in finishing its prototype and bringing it to the U.S. centered around the company’s capital needs. The further delays did not help the firm’s credibility with potential investors and creditors, thus creating a tautologous “cart before the horse” situation.

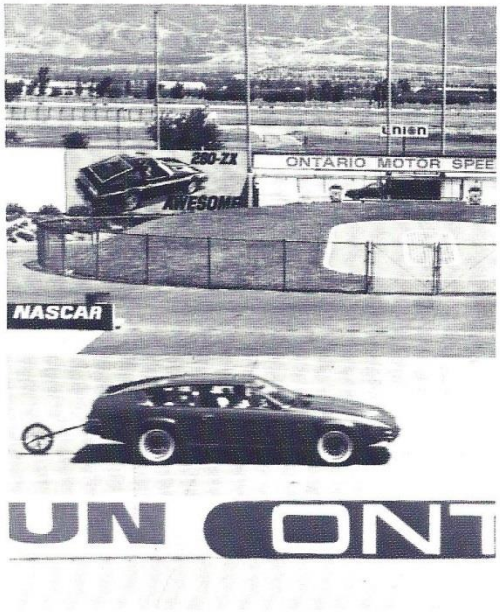
These problems mostly seem solve now, Ramirez said answering questions about the firm’s reliability thusly: “all you really need to know (about the durability of Amectran) is that the company has survived for years and that it has the world’s only ‘real’ electric automobile. That should preclude anything else that could possibly be said. Around 95% of the new businesses in this country fail in five years, even when there properly funded. Here’s an operation that certainly has never been properly funded, yet it’s been able to survive.

Ramirez had planned initially to commercialize the Yellow Car as the first EXAR-1. On a fund-raising and information-gathering tour of Europe in early 1977 he changed his mind, however, realizing that the Yellow Car, which he had designed himself, was not right for the market. He immediately began to seek a more salable body, and quickly commissioned Pietro Frua, one of Italy’s premier auto designers, to modify body which he had previously had designed for BMW. The German auto manufacturer had decided the body was too racy for the company’s conservative image and had elected not to produce the car.

Frua lengthened the body slightly, to accommodate Amectran’s longer chassis and propulsion system. Frua also made numerous other modifications to the prototypes design. In all, Frua staff worked on the vehicle for nearly three years, ultimately producing a production prototype with a steel body.

The body that Frua has crafted for the EXAR-1, which may be among his final projects before retirement (a retirement he postponed for more than a year in order to work on the vehicle), is elegant and expensive looking. It has classic styling and a sporty air that rivals the best of Ferrari and Lamborghini.

Performance of the EXAR-1, as it is expected to be when deliveries of the car began in mid-1981, will be equally impressive. The maximum speed will be 85 mph, Amectran reports, with acceleration from 0 to 60 mph taking only twelve seconds. The range at 55 mph will be as great as 100 miles per charge *(On July 11, 1980, Federal Court Judge, John C. Ford, ordered that the EXAR-1 be tested, and further ordered that the U.S. Department of Transportation set up the test and have it conducted at the Ontario Motor Speedway in California. The DOT then assigned Dr. Carl C. Clark, Inventor Contact, Office of Passenger Vehicle Research, R&D, National Highway Traffic Safety Administration, to administer the test…the EXAR-1 past all its tests verifying, most importantly, the speed and range claims made by Ramirez since first making the claims in 1974.)*



The car will be sold directly by Amectran on a delivered basis, with the company providing a six year financing plan. The company also will provide all servicing for the EXAR-1s, through the regional facilities it plans to establish nationwide.

Amectran plans to offer no options on the two door EXAR-1, since the company's attitude is that if something is good enough and worthwhile enough to be on its vehicle, it should be standard equipment. Thus, standard equipment includes such items as pile carpeting, a Craig AM/FM/tape deck/CB radio, leather-trimmed bucket seats and air-conditioning.

The batteries will be equipped with a single source itself-watering system. The car will have tinted windows and windshield, mag wheels, a digital clock, and fully computerized, voice controlled instrumentation. Power-assisted steering also will be standard, as will regenerative breaking and disc brakes on all four wheels. The body will be available in black, bronze, blue, green, red, silver, yellow, and white.

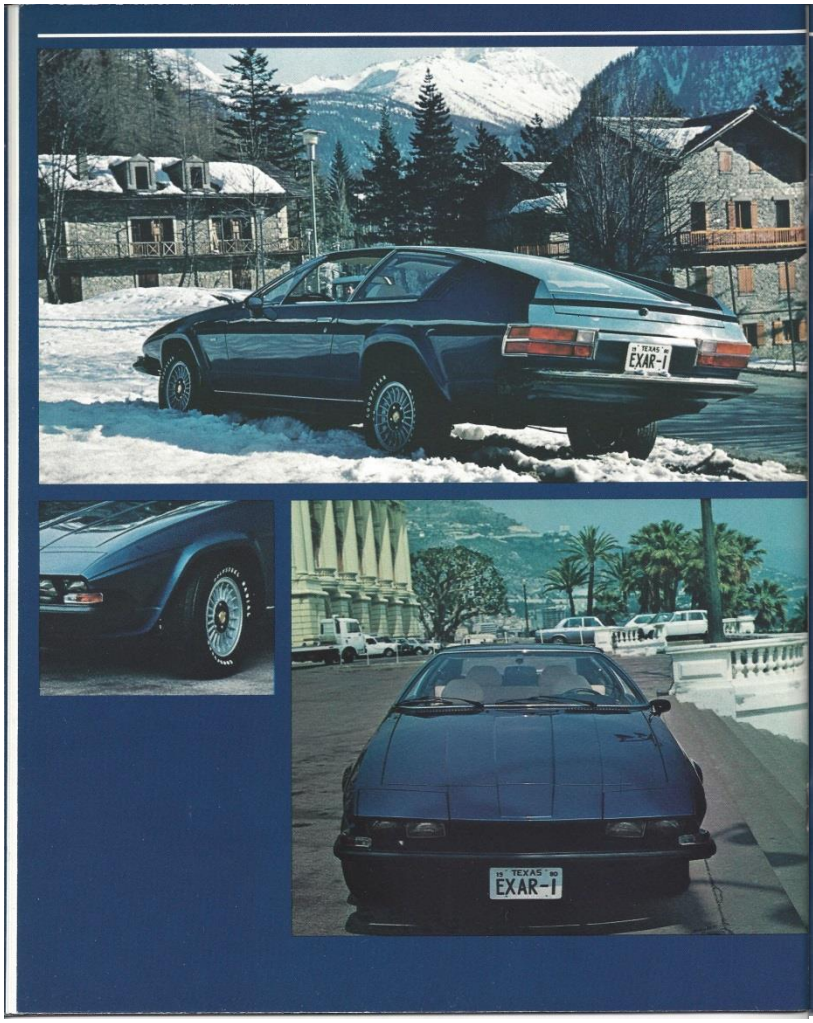
Later versions will have an electric sunroof, although the initial limited production run made the first year may not. A number of changes also are being planned between the prototype and the production model.

The 15-ft. 1-in. body is only 4 inches shorter than the 1979 Cadillac Seville. It is 69 inches wide and 51 inches high. The distance between the ground and the chassis is 6 inches, a typical clearance for an electric passenger car. Total weight of the vehicle, including five passengers or 1,000 lbs. of cargo, is 4000 lbs. The battery propulsion system will use 24 six-volt lead-acid batteries. Amectran is not sure which of several systems it ultimately will use, but is considering Trojan and Magneti Marelli among others. The batteries will be charged by an onboard solid-state charger built by Amectran.

"The overall idea of this design," Ramirez says, "is to combine the roominess of a mid-sized automobile, the compactness of an efficient, practical computer vehicle, and the futuristic design and aerodynamic soundness of an expensive sports car."

Central to the advanced technologic nature of the EXAR-1 and its dynamic use of high technology is the microprocessor computer which controls nearly every aspect of the cars operation. The computer onboard the prototype EXAR-1 is used for a variety of tasks, and is capable of handling ten times as many functions as it now does. The major task performed by the microprocessor is to optimize the flow of electricity some of the batteries to the motor. The computer also controls and/or monitors such things as battery water level, motor temperature, And temperature, battery state-of-charge, voltmeter, tachometer, speedometer, and meter, clock, break conditions, and accessories.

Other functions performed by the microprocessor include setting the charging cycle, in order to allow the owner to take advantage of time-of-day utility rates where they exist, and a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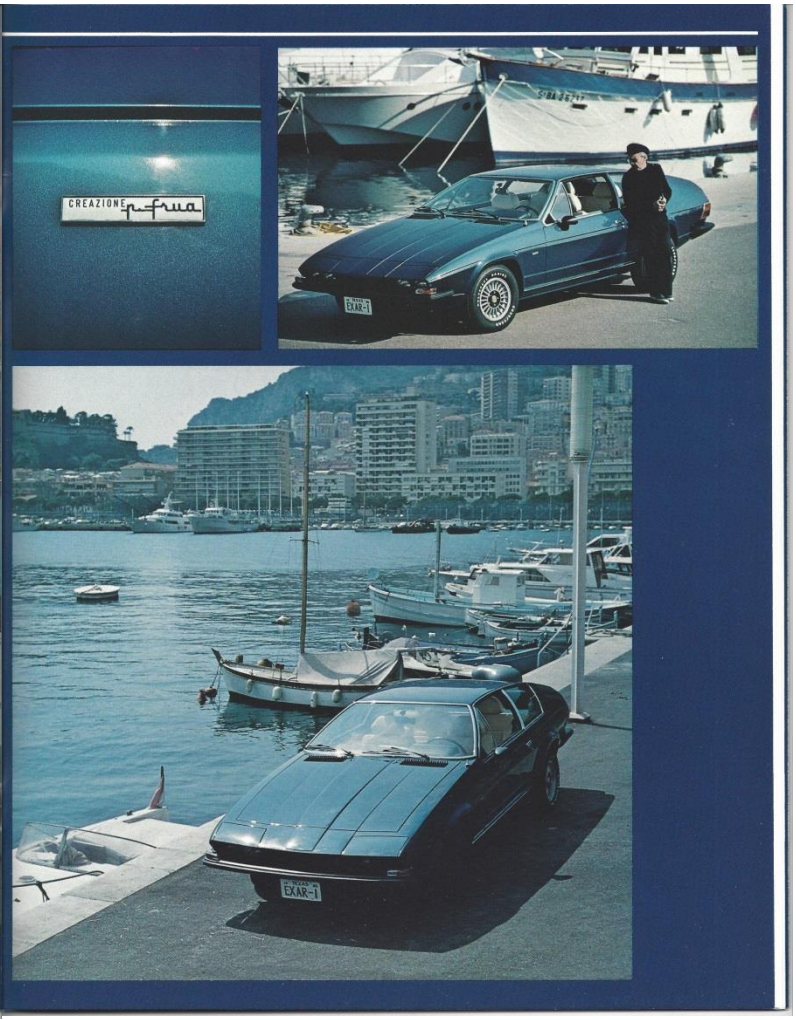
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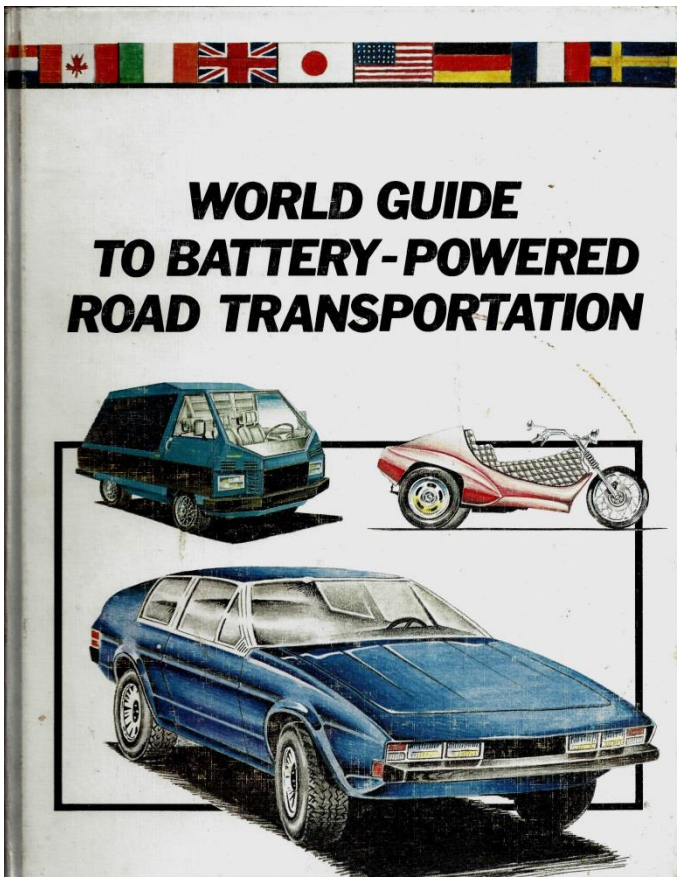
Southwest Airlines Magazine
AUGUST 1979
COULD THIS BE THE ONE?
A Dallas company has unveiled its prototype of an electric car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timer which will automatically start the cabin heater or air-conditioning at a preset time before the driver enters the car so that the passenger compartment will be at a comfortable level.

When the driver first inserts is key into the ignition, all that turning the key does is activate, or supply electricity to, the computer pad, located on the instrument panel between the front bucket seats. The computer asked the driver, by way of a two-line, 16-character gas discharge readout, whether he wants instructions or not. If the driver does not need instructions, he presses any button. The computer then flashes six randomly selected digits on the screen, for example 1, 5, 7, 9, 3, and 2. The driver must respond by punching the same six buttons in the same order, thus signaling the computer that the driver is not drunk or otherwise incapacitated. (The special bypass allows the driver to operate the vehicle without passing this test, but it causes the cars lights to flash, warning pedestrians, policeman, and other drivers that something is not quite right with the driver.)

The computer also requests a personal identification number from the driver before it will allow him to operate the car, so that the potential for theft is minimized. Ramirez stressed that this number will be known only by the owner of each car and those with whom he shares his secrets. Amectran will not keep a registry of these numbers, so that the only way to operate a particular EXAR-1 should the number be lost or forgotten will be to replace the entire electronics system of the car. In this way, the company has created a nearly theft-proof car, Ramirez said, completely oblivious to the possibility of simply hot-wiring the car.

Once the driver has repeated the six consecutive numbers and has keyed in his personal ID number, he is ready to drive. First, however, he may wish to check his messages, for the computer also will store memos and important dates for the driver. The most obvious uses for this function, Ramirez explains is that the owner may keep and appointments calendar and a list of when such things as insurance payments are due. The messages are only accessible when the car is not in motion, however, since Amectran wants to avoid any accidents that could be caused by drivers who are reading their memos rather than paying attention to the road. (In 1994 Amectran upgraded its voice control system to operate in English and Chinese to demonstrate to visitors from the People's Republic of China [PRC] voice control of radio, lights, windows, door locks, sunroof, turn indicators, and computer. The PRC invited Ramirez and his attorney, as guests of the People's Republic of China, to discuss a licensing agreement. This visit concluded with a $180 million contract to license the PRC to manufacture EXAR-1s in the PRC. Before Ramirez could deliver the prototype for the PRC the U. S. government confiscated the car and destroyed it…and Ramirez was back in court.)

At speeds of less than 27 mph the EXAR-1 emits a low-frequency sound which warns pedestrians that the car is moving (in 2013, the federal government passed a law that all future electric automobiles must produce a noise to warn pedestrians…only one company, manufacturing electric cars, instituted this feature in 2012, prior to the requirements of the law…37 years after Ramirez had demonstrated this feature, as a necessary warning for electric automobile safety.) Amectran did this on purpose, knowing that one danger with electric vehicles is that they are too quiet. In late 1979 and environmental impact study of EVs by the Department of Energy concluded that EVs would create a safety hazard because of this quietness. The study suggested that manufactures could install low-speed automobile warning devices to increase pedestrian awareness of EVs' presence— something Amectran had planned to do as early as 1976.

The EXAR-1 comes with disk brakes on *all* four wheels. The chassis is formed of 4130 chromalloy steel and incorporates rollbar principles.

The electronic controller that will be used in the final production model will be, Ramirez says, "the best that we can garner from whomever we finally decide will be our supplier." The company is examining transistorized controllers as well as the more common SCR chopper controls and microprocessors.

The four-speed manual transmission will be operated by the driver via a T-bar or similar gearshift handle using a standard "H" gear location pattern. The clutch in the prototype is a standard pedal unit, but in the production version there will

be no clutch, with gearshift being controlled through a solenoid located in the T-bar handle, so that to shift gears the driver simply will press the clutch button on the T-bar and shift. Ramirez believes that this system for shifting gears should prove to be a smooth and easy method the driver simply will have to let up put pressure on the accelerator pedal when shifting, as do drivers with normal manual transmissions, because the electronic control system will coordinate the shift. Incidentally, the computer readout will warn the driver whenever he is not operating in the optimal gear, suggesting the driver shift to the best gear for the particular speed being driven at the time.

Unlike with traditional manual transmissions, the individual speeds in the EXAR-1 each has its own function: *First gear* is used for bumper-to-bumper driving, when the traffic is crawling along; *Second gear* is for neighborhood driving up to 40 mph; *Third gear* is for mixed city and Highway driving up to 60 mph; *Fourth gear* is for Highway driving from 60 mph to 85 mph.

Despite all of the expensive items being included as standard equipment; the expensive, stylish body; and the low (compared to Detroit figures) production volume, Amectran will be selling its cars initially for approximately $7, 000 each (in 1980 dollars, less the US government rebate for purchasing an electric vehicle). This can be accomplished, Ramirez explains, by producing the vehicles in medium-sized plants designed to turn out specific numbers of vehicles each year and by marketing the vehicles directly, thus avoiding much of the added costs of traditional automotive industry marketing techniques, one of which is the dealer markup typically 18-30%.

The regional manufacturing plants basically would be assembly plants for components made elsewhere. The bodies would be manufactured and completed at each plant, however. The tentative sites for the fifteen plants are Berkeley, Phoenix, Denver, Dallas, Oklahoma City, Chicago, Cincinnati, St. Louis, New Orleans, New York, Washington, Atlanta, Miami, Philadelphia, and Boston.

Each factory would be able to meet its own expenses, including debt service on capital cost by producing only 25% of its designed one shift capacity or 1, 250 cars per year. Amectran also expects to keep costs down initially by buying key components at OEM (original equipment manufacturer) quantity prices. Ramirez says a number of potential vendors already have agreed informally to those kinds of price breaks in order to encourage Amectran to produce the car. Thus Amectran would overcome the price/volume relationship in component acquisition that is preventing other electric vehicle manufacturers from expanding their production and sales of two any significant level: the fact that components cost significantly more in small quantities than they do in large lots.

A major potential vendor confirms Amectran's projected component cost estimates. "He's talking about the finest electrical system we know how to build in quantities no one has considered before," John Tucker, director General Electric's EV systems operations said in 1978. "Those quantities, the price of the vehicle will be less than that for a comparable ICE. If his numbers pan out, his prices are realistic."

For example, if Amectran or any other company were to order 75,000 19-hp motors with the prospects of even greater orders later, the vendor most likely would decide to build an integrated motor manufacturing plant dedicated to producing that type and size of motor. Once a component manufacturer did this, the cost per unit of the motor would plummet, not only for the original customer but for all firms which would order that motor subsequently. Now that the EXAR-1 has arrived in the U.S., Ramirez is banking on his expectations that the design—coupled with its peppy acceleration, high-speed, and low price—will cause the car to sell itself. While some have expressed doubts—no matter how unfounded—about the car, few people are really skeptical about the car's marketability. Tests in mid--July by independent engineers have shown the EXAR-1 does more than what Amectran had promised.

Fred C. Allvine, marketing professor at Georgia Institute of technology, is one of those who has studied Ramirez's plans, Ramirez was invited to give a presentation on his vehicle and the Amectran marketing concept in 1977 to one of Allvine's business classes. If the car is only one-half as good as Ramirez says his tests indicate, Allvine said, the marketing opportunities are outstanding. A manager for one of Amectran's potential

component suppliers called the body "super," adding that "kids are going to buy it to convert it to gasoline" power.

In order to spread the gospel of Amectran's offer of freedom from the slavery of the gasoline pump, Ramirez and his staff plan and 8-month, 15-city tour for the car. The tour would be coordinated with a series of television advertisements centering on the theme that after the EXAR-1, "everything else is obsolete." Print ad simultaneously would stress that the EXAR-1 has only a few hundred parts, as opposed to several thousand in conventional cars. The last number of parts to break, the less maintenance time and money spent, the ads will say.

The Amectran tour, scheduled to begin in the second half of 1980, would take the car through the 15 cities in which the company ultimately hopes to establish manufacturing, sales, and service facilities. The exhibit would spend five days at a central exhibition hall in each city. It's emphasis will be heavily on the fact that the EXAR-1 meets the public's transportation needs, is reliable, efficient, almost maintenance free, and pays for itself in a short time. The central message will be that the EXAR-1 makes sense ecologically because it does not pollute, make noise, or use petroleum.

Ramirez initially expect to secure a minimum of 5,000 orders per month (at the 1980 Chicago Automobile Show, Amectran received 22,000 orders each with a deposit of $1000…in two days). Each order would be accompanied by a $400 deposit into an escrow account, which the depositor could retrieve at any time. Amectran would be entitled to the interest, which at 10% would be $200,000 per year or more than $16,000 per month for every 5,000 orders. The company would apply this money— to preparing for and entering production: building up parts inventories, constructing the first plants, and developing markets.

The only government assistance Amectran is seeking is loan guarantees, under which the government would guarantee the lending facilities reimbursement should the loan recipient— in this case Amectran— default on payment. "We're not asking for charity," Rameriz says of his plans to use his initial capital as seed money to leverage loan guarantees from various government agencies, including the Department of Commerce, and the Agriculture Department's Farm Home Administration. "We just want to get started on our own. We don't want to be subsidized by the federal government."

The New Dream

thus Amectran finds itself poised to begin production, ready to become the premier company in an entirely new industry. One of Ramirez's greatest dreams: the development of a safe, ecologic, affordable, and competitive electric passenger car, is on the verge of being fulfilled. The story is not over, however, for one dream quickly gives birth to another. As Amectran reaches its goal of creating the EXAR-1, it begins another: the development of a major viable electric automobile industry in the U.S.

Ramirez sees himself as the father of the electric car industry in the U.S. he likens himself to Henry Ford both in achievement and in the difficulties encountered along the way to achieving their individual dreams. In fact, if Amectran succeeds with its plans for the EXAR-1, Ramirez will be the EV equal of Ford. It definitely would be the first electric passenger car to be truly mass-produced in the U.S. in recent history: the next closest capable of doing so apparently is General Motors, which does not intend to market its electric cars to the public until 1984 (General Motors did not introduce their EV1 until 1995, eleven years later. The early announcement by General Motors was a tactic to discourage investors from investing in Amectran, thus instilling the fear in investors that GM would put Amectran out of business--the result, investors in Amectran dried-up forcing Amectran to look for foreign money--the People's Republic of China step in the 1978 Amectran annual report, Ramirez wrote that his intentions were to "make an overall effort to control the electric automobile business for as long as possible." Asked about this recently, Ramirez slipped into his analogical capacity: "Henry Ford control the automobile industry for many years because he was doing a proper job. He was putting a car in everybody's garage. He control that industry despite the fact that there were more expensive cars and better cars and what have you.

Essentially we currently have started the electric automobile industry properly by controlling the industry, and I don't mean forcing cars they don't want down people's throats.

"I mean by making a product and improving on it and continuing to deliver a product that nobody else would deliver. By controlling my own destiny I can now benefit the public. If I am not allowed to control the industry at this point and for as long as I can the product will wind up being prostituted and the same thing that has happened with so many other products will happen with the electric automobile." He explained that often an outstanding product is developed that meet specific needs of society and then, "little by little it starts to deteriorate in order to allow more profit and to build something cheaper. Someone once said that for every product that can be built, someone can build it cheaper— and there will be a buyer for.

"It's going to take somebody with some ideas for what this country stands for and what we were doing years ago, when a man's word meant something, when a man's name went on his product and he was proud to have produced it." Amectran has, and must continue to have as it enters actual production of vehicles, such pride in its workmanship and the quality of its cars, Ramirez continued. Reliability of its products must not become a cynical joke, he said.

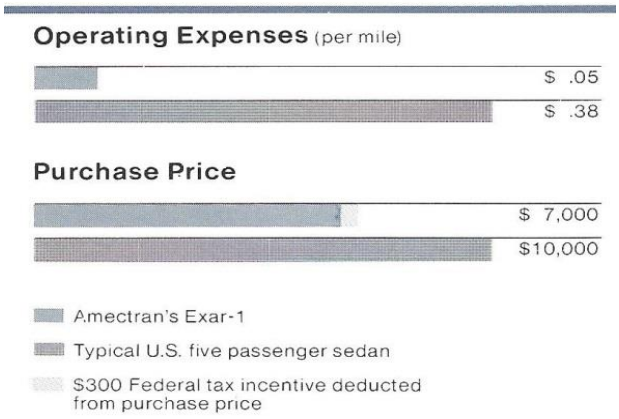
"If this product escapes us, if we don't control it, you will find that electric automobiles will be sold through dealers the same way conventional cars are today, and that raises the price of the car instead of lowering it. You'll find that little by little they're going to build in that planned obsolescence, that they're not going to use everything of the finest quality because they don't have the same principles we do. The Almighty dollar will be Number One again. Producers will lock in their designs and say 'This is good enough and will feed it to the public just for as long as they will take it before we change the basic engineering." (Since this prognostication was made, American Motors has gone out of business; Chrysler is now owned by the Italian firm Fiat; General Motors has gone bankrupt; Ford has hung on by borrowing money, and Toyota has surpassed GM as number one and VW is challenging.)

Numerous entrepreneurs have tried to break into the U.S. automobile business in the past, although none was so revolutionary an idea as an electric car. Still, the example set by the Henry Kaisers and Malcolm Bricklin's (two of those who have tried to establish a new automobile company since World War II) have highlighted obstacles that seem too great to overcome. Among these are the vast capital requirements, the complex parts supply network, and the enormous nationwide sales and service systems necessary to succeed in the automotive industry. The latest try, former General Motors executive John Z. DeLorean, has had his plans delayed several times as he works with a budget of approximately $200 million--far more than the amount with which Amectran intends to operate. Still, these capital-intense characteristics of past efforts at establishing a new automobile company all are largely avoided in the Ramirez plan. The nature of the electric car eliminates the first two to a large extent: EVs relative simplicity reduces both the number of parts and the capital costs by at least a factor of ten. Furthermore, Ramirez is avoiding the sales and service aspect with his plan to sell and service the EXAR-1 directly.

The possibility of Amectran's failure is greatly diminished now that the prototype is finished and its performance has been validated in the marketplace where supporters and detractors alike can see it and be impressed. Of course, it still is possible that Amectran could fail in its efforts to mass produce and market the EXAR-1. Whether the company will succeed, whether the public will energetically take to the EXAR-1 as an alternative to gasoline-powered automobiles, will be determined over the next few years. The prospects for success look bright, however. Recipients of this brochure are among the first people who are helping Ed Ramirez and Amectran make their dreams into reality.

The economic sense of EXAR-1

After 17,630 miles a standard US-built sedan has cost $6,700 in operating expenses— the price of an EXAR-1 minus the federal tax incentive for buying an electric car. The EXAR-1 meanwhile has cost an estimated $880 saving the driver $5,820. This mileage would be reached after 21 months of driving.



After 20,300 miles the savings in operating expenses of the EXAR-1 compared to conventional cars is $6700--the original price of the EXAR-1--less the government incentive. Thus, the EXAR-1 has become free transportation in slightly more than two years. Furthermore, the EXAR-1 would go approximately 134,000 miles before it had cost $6,700 in operating expenses— the same amount a conventional sedan cost in 20,303 miles.