

# ELECTRIC VEHICLE INDUSTRY ANALYSIS

## 3.1 Quick History of Electric

### Automobiles

Some of the first motorized vehicles in the world were electrically powered, but they were eventually overshadowed and replaced on a large scale basis by gasoline engine powered cars, beginning with the first Ford Model T. The first electric car was built in 1837 by Scotland's Robert Davidson. His vehicle was little more than an electric carriage, and limited in use because of a poor energy system. Electric vehicles reached their peak by 1912, when approximately one third of the world's taxis, delivery vans, buses and cars were powered by electricity.

Electrically powered trains, street cars, and buses provided mass transportation for decades both prior and subsequent to the popularization of internal combustion cars. In North America, it is sometimes easy to forget that most passenger and freight trains in Europe are currently powered by electricity, as are street cars and trolley buses in many countries around the world. Electric trucks have delivered milk in many parts of England for decades. Thus, the concept of electrically powered vehicles is not completely new.

The 1974 Energy crisis and the accompanying escalating gasoline prices focused attention on alternate fuel vehicles in the mid 1970's, and in the 1980's the increasing severity of

air pollution in American cities such as Los Angeles, the San Francisco Bay area, Denver, and Chicago as examples, has refocused attention on non-polluting motorized vehicles. The U.S. Department of the Environment has estimated that over 50% of the pollutants leading to the break-down of the earth's ozone are created by internal combustion engines. Thus, while there are potential economic benefits in the long term for electrically powered vehicles, there are also major environmental issues focusing attention on electric vehicles.

## 3.2 Overview of the Status of Electric

### Vehicle Development in the World

Electric vehicles have been proven practical in many parts of the world, mainly as vans to date, and broader use in pending improved batteries to extend range, and perhaps improved designs to establish electric car acceptance. The EXAR-1 in a report by Magraw/Hill, shows that Amectran's EXAR-1 has all of these elements in place.

Current world electric vehicle production is focused on converted gasoline chassis delivery vans and light trucks, particularly in England, France, and the United States. Prototype converted gas engine chassis cars have been produced by major auto makers in France (the

Peugeot 205, Citroen c15) and Japan (Suzuki, Nissan, Mazda, and Toyota), and converted chassis vans in France, England, Japan, and the U.S.

In England, over 300 Bedford electric vans were produced in 1984/5, and in conjunction with over 70 Dodge Silent Karrier vans and 150 Freight Rover Sherpa, and vehicles from other programs, resulted in a total of over 600 electric vehicles on the road in England. EVS9 Symposium in Toronto, Ontario reported that 471 vehicles remain of this group which collectively have completed 7,500,000 miles of service. Proven propulsion technology is available.

Electric Vehicle Development ("EVDC") in the United States, has successfully developed electric vans for Chrysler, Ford, and GM, and the program is being expanded in 1989. With current battery technology, these vans can travel 65 miles at average speeds of 50 miles per hour. Vans have been apparently selected because of their application as commercial fleet vehicles, and their van format allows the maker a simple conversion from gas to battery power for easy storage and transportation of the battery system. Battery systems are the limiting factor to further range and since trucks normally have a set distance which can be controlled by a use profile their limited market provides the path of least resistance for design and manufacturing. New battery systems are being actively developed which will extend range considerably. A few of these battery types as well as range availability are described as follows:

<u>Battery System</u>	<u>Estimated Available</u>	<u>Mileage Range</u>
Improved lead/acid	1988	75-100 miles
Nickel/iron	1989	110 miles
Sodium/sulfur	1991	150 miles

Expected range improvements will only enhance an already huge market.

# PSA COMMUNICATION

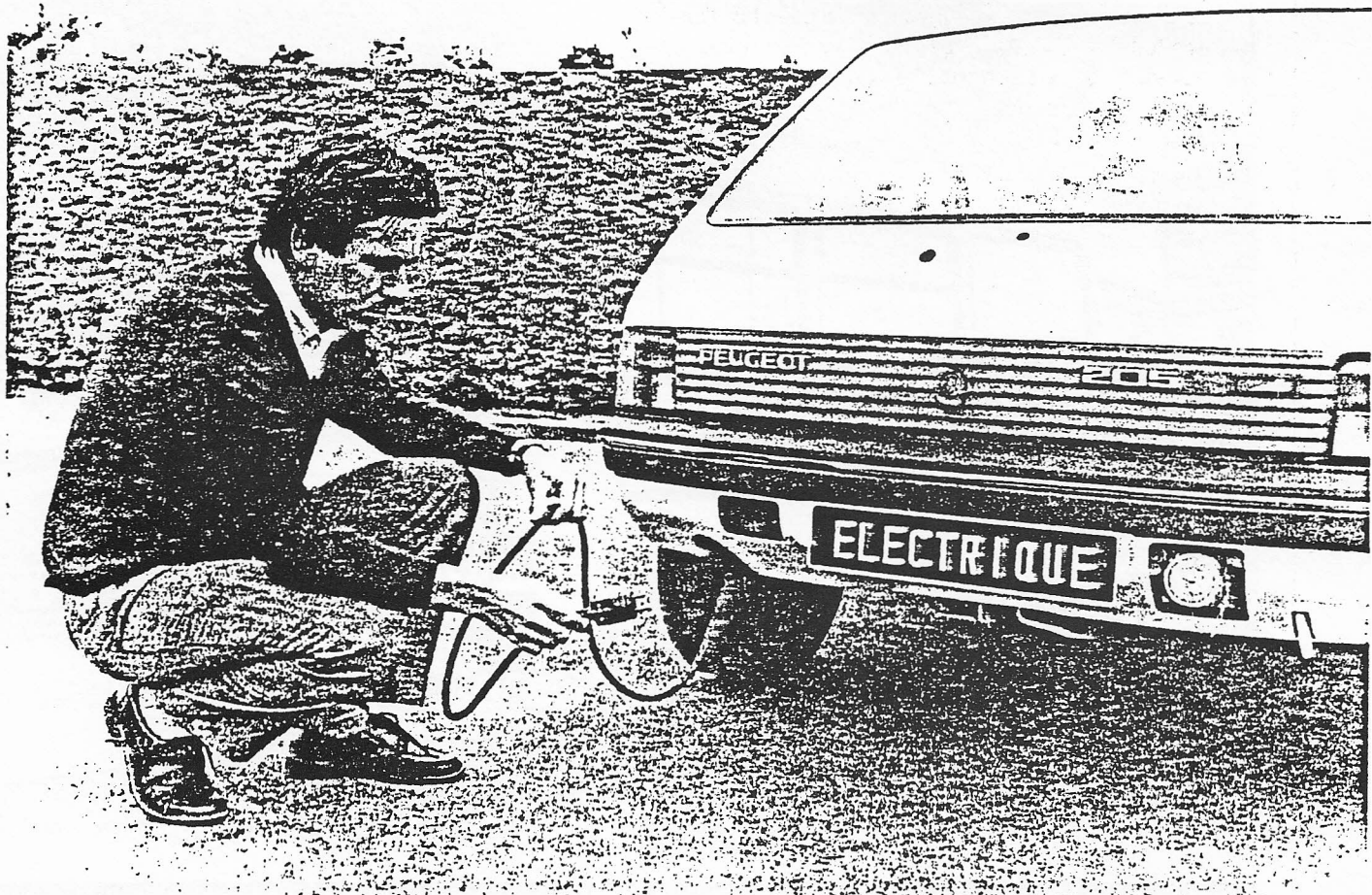
## Fifteen electric Peugeot 205 and Citroën C15 **TO BE TESTED FOR TWO YEARS IN FRANCE AND BELGIUM**

Fifteen electric Peugeot 205 and Citroën C15 will shortly start two years of operational testing in France and Belgium.

This will mark the start of the second stage in the PSA Scientific Research Department electric vehicle development programme. Fifteen Peugeot 205 and Citroën C15 will undergo two years of real life testing on selected sites. This demonstration will serve as a "proof test" of the new concepts developed specifically for these electric vehicles.

### **La Rochelle, Brussels and Antwerp**

Assisted by the EEC and in collaboration with Electricité de France, the La Rochelle town council and the Société de Production in Brussels. PSA will provide fifteen electric cars (Peugeot 205 and Citroën C15) to its partners'



# PSA COMMUNICATION

## PEUGEOT 18-20 SEAT ELECTRIC MINIBUS

Simplified electronic means of propulsion.

The electric power unit consists of:

- an electric drive motor

- a standard vehicle gearbox  
- an integrated electromechanical and electronic assembly.

### A - ADVANTAGES

- simplicity : few high-energy

electronic components

- reliability : use of many standard automobile parts

- maintenance simplified by the use of industrially available material.

