UMTA's Paratransit Vehicle Project

Wilhelm Raithel, Urban Mass Transportation Administration, U.S. Department of Transportation

The Paratransit Vehicle Project was undertaken to produce a design for an improved paratransit vehicle that would be accessible to wheelchair passengers. Two steam-powered vehicles are currently being tested to evaluate their performance characteristics and suitability for taxicab service.

During the last 10 to 20 years we have witnessed a trend in the design of passenger cars whereby they became lower, sleeker, and perhaps more appealing to the eye, with the result that they also have become difficult to get in and out of, particularly from a sidewalk of above-average elevation. Since the greater part of a taxicab fleet consists of passenger cars, the trend has affected taxicabs. This makes the average taxicab one of the few commercial vehicles that is not especially designed for its purpose, an important aspect of which is easy and quick entry and exit of the passengers. If we consider the more than 13 million elderly and handicapped persons in the United States, this situation becomes a matter of concern. This concern found its expression in the Congressional Appropriations Committee's report of June 15, 1973, in which funds were provided "for the development of an improved, efficient, quiet, nonpolluting taxi." This became the start of the Paratransit Vehicle Project.

We referred to it as a paratransit vehicle because we wanted to cover the requirements of the broad part of the paratransit spectrum that includes the taxicab sector and extends beyond it in several respects, particularly in regard to use by the handicapped and shared-ride service. We hoped it would even cover a part of the dial-a-ride requirements. Our primary design objective was to make the vehicle accessible to a wheelchair passenger while he or she is seated in the wheelchair. In addition to the wheelchair passenger, the vehicle should have the capacity to carry two other passengers comfortably. As it turned out, the prototypes will be able to carry three additional passengers instead of the two we asked for. The wheelchair access is provided by a ramp that is extended immediately after the door opens. The operation of door and ramp is power actuated and controlled by pushbuttons in the driver's compartment. This makes it possible for wheelchair passengers who are able to board without assistance to do so if they so desire. This design we called configuration A. Since vehicle cost is strongly influenced by production rates, we wanted to make use of the same body design for another configuration. Configuration B should be able to carry five passengers in somewhat less comfort and without a wheelchair. The intent was to provide a wider use for the basic vehicle and thereby provide a larger market, resulting in a lower production cost for both configurations. Configuration A, which we actually contracted for as the more difficult one, was to be easily convertible into configuration B and back.

These were the broad objectives regarding passenger accommodation and accessibility. In generating the details of the vehicle specifications, we relied heavily on work done by others—the Pratt Institute's work on the urban taxi, which had been going on for a number of years; the work of the New York Taxi and Limousine Commission and its consultant, Ron Adams; and information from the Museum of Modern Art in New York City, which had pulled together data from these and other sources for the vehicles to be displayed in their City Taxi Exhibition in 1976. Without this help we would not have been able to get going with our procurement as fast as we did.

In considering the terms "efficient, quiet, nonpolluting" in the committee's report, we made "nonpolluting" the key issue, reflecting the environmental concerns of that period. Since total absence of pollution was (and still is) beyond the limits of technology as a practical matter, we specified that the vehicles had to meet the emission requirements initially mandated for 1977 and now postponed to 1978—carbon monoxide = 2.1 g/km, hydrocarbons = 0.25 g/km, and oxides of nitrogen = 0.25 g/kg. We realized that this was a very demanding requirement and were willing to accept reasonable levels of fuel efficiency and noise with these constraints.

In May 1974 we requested proposals and in March 1975 we awarded two contracts, one to AMF Advanced Systems Lab in Santa Barbara and the other to Steam Power Systems (SPS) in San Diego. Both companies proposed the use of steam engines in order to meet the stringent emission requirements. SPS offered an improved version of the engine it had developed for the California Clean Car Project and AMF offered an im-

proved version of the engine that Jay Carter Enterprises had developed and installed in a Volkswagen Squareback. Both were to be delivered to the Urban Mass Transportation Administration (UMTA) by 1976. Their expected characteristics are shown below.

Characteristic	AMF	SPS
Curb weight, kg	1450.0	1450.0
Length, cm	463.0	437.0
Width, cm	183.0	183.0
Height, cm	178.0	224.0
Floor level above road surface, cm	29.0	29.0
Acceleration (0-72 km/h), s	11.5	11.0
Turn diameter, m	10.7	10.7
Fuel consumption, km/liter	7.0	4.3

On June 17, 1976, the City Taxi Exhibition opened at the Museum of Modern Art in New York. The museum's Architecture and Design Department organized this exhibition to serve as a focal point and forum for innovation in urban taxi design. One of the cosponsors of the exhibition was the International Taxicab Association. Our two vehicles were displayed there as the only entries from the United States.

After the exhibition ended, the two vehicles were to be taken over by the Transportation Systems Center of the Department of Transportation and subjected to a series of tests to determine and evaluate their performance characteristics. We have asked the International Taxicab Association to assess the suitability of the vehicles for taxicab service and they have expressed their willingness to do so. Our plans will depend a good deal on this assessment as well as on the response of the user community and the motor-vehicle industry. Also, we have asked the two contractors to study what could be done to reduce the cost of the cars in production. As they now are, these two vehicles are not ready to go into production without redesign. This is beyond the scope of the present contracts.

In essence, the present phase has established the feasibility and practicality of three issues.

1. Space utilization. A vehicle of subcompact size can be designed to accommodate four passengers (one of them in a wheelchair) in comfort.
2. Accessibility. A wheelchair passenger can board the vehicle without assistance, if he or she so desires.
3. Emissions. Such a vehicle can meet the most stringent emission standards without the use of catalytic mufflers and at fuel-consumption rates equal to that of the average 1975 gasoline engine.

The impact of emission standards on the vehicle's design depends on what emission standards will become mandatory in the future. But even if future emission standards no longer require steam engines, I am sure the demonstrated space utilization and accessibility are of interest to a great many people, particularly but not only the 13 million elderly and handicapped in this country who find it difficult or impossible to use currently available mass transportation services and for whom today's standard-model taxicab is not the ideal solution either. More than 7 million of these elderly and handicapped persons are estimated to live in urban areas. To put these numbers in perspective and to provide an appreciation of the size of the potential transportation market, it seems useful to remember that this is about the same number of people in the United States who use urban buses on an average weekday. This does not include such people as those with baby carriages and shopping carts whose transportation problem is not unlike that of the elderly and handicapped.

Vehicles of the type and capability discussed here would be useful in general taxicab service, but particularly in providing a new dimension of mobility to the elderly and handicapped and other people who find it difficult or impossible to use available transportation systems. It could provide door-to-door service, feeder service for regular mass transit, trips for health care, trips for shopping, and so forth. It is difficult to assess the level of demand for these services. But the probability is high that, once this new degree of mobility is offered, a large number of people who now do not have adequate mobility will want to make use of these services. UMTA's Paratransit Vehicle Project is designed to generate a type of vehicle tailor-made for the purpose.