

MEMORANDUM

TO Howard Wilson
FROM Alec Brooks, Paul MacCready
DATE June 27, 1988
SUBJECT Electric Vehicle Design Approach
COPIES TO Peter Lissaman

We believe that the design/styling aspects of the electric vehicle project, as presently organized within the GM/Hughes/AV framework, are heading in the wrong direction. We are concerned that if these aspects are not steered onto a new path, the overall vehicle design will be compromised, and we will be unlikely to meet our performance goals.

The goal of our present program is to design, build, and demonstrate the best possible electric vehicle that could be produced in the not-too-distant future. Two of the major drawbacks of previous electric cars have been low driving range and slow acceleration. The current design goals of 120 miles range and 0-60 mph in 8 seconds are better by a factor of two over previous electric vehicles. These goals are very ambitious, and will require a great deal of attention to minimizing the weight and energy consumption of the vehicle.

In addition to the performance goals, it was also desired that car should be designed with production intent, and to account for all of the limitations imposed thereby. This would lend an air of credibility to the demonstration car. Finally, it was decided that the car should be "styled" to the degree possible considering the constraints imposed in order to meet the performance goals. It was for this reason that we approached the Design Staff and the Advanced Concepts Center (ACC). While we have had an enthusiastic response from ACC, we have had a growing feeling that their mission as a "California Design Studio" is fundamentally at odds with the design approach needed at this stage for the electric car.

In order to achieve, or even come close to meeting, our demonstration goal, we must let vehicle design and styling be determined primarily by the functional realities. We expect that the vehicle design that emerges from this approach will be quite attractive to many, but not all, people. We anticipate that a vehicle achieving the functional goals is likely to have true

and lasting beauty, both in its visual appearance and in its simple, elegant, and integrated overall design. Although designed for a very different purpose, the Sunraycer is an example of such a design philosophy. The beauty of the Sunraycer's shape and total design will still be appealing 100 years from now. Elegant engineering design is timeless.

As you know, during the period from June 20 to July 7, AV is undertaking a design effort separate from the work proceeding at ACC. The emphasis of the AV effort has been to design the vehicle focused primarily on the functional requirements, with only minimal consideration of styling. We are very pleased with the results of this effort so far, and invite you to see the ongoing work at our Simi Valley facility on Friday, July 8.

In order to ensure the continued success of the demonstration vehicle project, we recommend that the styling efforts be brought together with the engineering work under one roof, at AeroVironment. The help of the Design Staff and ACC would of course still be needed, but vehicle styling decisions that impact performance should rest with the engineering team. Although we are sure that we will not come up with a 'ugly' car, perhaps it would be appropriate for final "buy-off" of the vehicle concept and appearance to be made by a committee of three; one each from AV, Hughes, and GM (representative of technical staffs or a car group).