The total force (pound), resisting automobile motion—that is, the sum of expressions (3) and (5)—when multiplied by the speed, v, and the appropriate dimensional conversion factors, is close to the total automotive drag power required from the electric motor. This tractive power requirement is then

$$0.00267 \times \{(0.01+5\times10^{-5}\,v)\times W+[0.0083+4.2\times10^{-6}\,(W+150)]\}\times v \ldots \quad (6)$$

where

$$0.00267=\frac{1.467,\ (\text{feet/second})/\text{miles per hour}}{550,\ [(\text{foot-pound})/\text{second}]/\text{HP}}$$

At the top speed of the car, V, the required horsepower in (6), (with V substituted for v) matches the motor deliverable power

$$w/2 \text{ or } 0.02\,W,\ (HP) \ldots \quad (7)$$

assuming the use of 2 pound/horsepower electric motors.

Equating expressions (6) and (7), rearranging terms, and rounding off numbers, gives the equation of the maximum speed, V (miles per hour) to be

$$V^3+\frac{V^2}{(180/W+0.084}+\frac{V}{(0.89/W+4.2\times10^{-4}}=[(0.0012/W)+5.6\times10^{-7}]^{-1} \ldots \quad (8)$$

The real solution of equation (8) is a function of W whose intricacies are beyond the scope of this paper. It is sufficient to state that the solution of (8) varies from $V=89$ miles per hour for $W=2{,}000$ pounds to $V=100$ miles per hour for $W=5{,}000$ pounds, and that $2{,}000<W<5{,}000$ is a reasonable expectation for the future mass-accepted electric cars.

It appears then that matching weight composition and initial performance of gasoline-powered cars, can result in the design of future electric automobiles capable of top speeds of about 90 to 100 miles per hour when allotting 4 percent of the curb weight to the most appropriate electric traction motors. A maximum speed of 100 miles per hour is quite respectable and useful for most driving conditions, particularly when it is available in conjunction with performance that is within 1 or 2 seconds of the competitor vehicle.

The polyphase squirrel-cage induction motor regulated for constant power by a cycle converter is observed here to be the foremost contender for automotive propulsion. It offers several automotive advantages such as being brushless and requiring no commutation, that is, it promises to be almost maintenance-free during an automobile's normal life. Furthermore, its automotive power capability is probably almost linear with its weight, eliminating many restraints on the automotive engineer's choice of number of motors per vehicle. Thus he need not contend with weight differences when considering whether to install only one electric motor (to drive the front wheels), two electric motors (one in front and one in the rear), or four electric motors (each driving a wheel). If the four-motor scheme is selected, the suspension engineer faces two alternatives: attaching each motor to the frame and driving the wheel through an axle with two universal joints, or having the motor integral within the rim of the wheel and