Wheelchair Batteries: Driving Cycles and Testing
By James J. Kauzlarich, Ph.D.

Dr. Kauzlarich (with Graduate Research Assistants Vernon Ulrich, Mark Bresler, and Ted Bruning) had originally produced a rather scholarly engineering paper of considerable value to those involved in the design, evaluation, and specifying of power wheelchairs. In the course of adapting the paper for a broader readership within the rehabilitation community, Dr. Kauzlarich devised a table that added dollars-and-cents values to other major battery-type characteristics. We had intended to pull out the original, simpler, table and insert the latter version. ...but that step was lost in the final days of getting the issue to the printer. The table above (Lead-acid battery characteristics) is the way "Table 1" on page 39 of Volume 20, No. 1, was intended to look.

Elsewhere in Dr. Kauzlarich's paper, on page 41, an error appeared in Equation [7]: the dash that should have appeared over the "P" (immediately following "equals" symbol) was omitted. The correct form of Equation [7] appears below:

\[ P_3n_3T_3 + P_2n_2T_2 + P_1n_1T_1 = \hat{P}T \]

TABLE 1
Battery characteristics

<table>
<thead>
<tr>
<th>Life</th>
<th>Energy</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% depth of discharge</td>
<td>20 hour rate</td>
<td>1982</td>
</tr>
<tr>
<td>27 degrees C</td>
<td>27 degrees C</td>
<td>$/cycle</td>
</tr>
<tr>
<td>Charge/discharge cycles</td>
<td>Watt-hour/kg</td>
<td></td>
</tr>
</tbody>
</table>

A. Lead-acid

1. Automotive
   150–250
   26–49
   .48

2. Deep-discharge wet cell (golf cart)
   300–500
   26–35
   .24

3. Gel cell, deep-discharge
   100–300
   30–37
   .80

B. Nickel-cadmium
   500–1000
   13–18
   .72

C. Nickel-zinc
   300–400
   44–66
   .38

*estimated

By Andrew Y. J. Szeto, Ph.D., and Roger N. White, M.S.

The definitions printed inside the box rules for Figure 5 and Figure 6 were inadvertently switched during assembly; the same figures, correctly assembled, are presented (page 102).

On page 50, Equation [3] lacks a denominator. The equation should look like this:

\[ d_1 = \frac{F_{sc}(101.6)}{48.3} \]

On page 56, in Table 6, the right-hand array of time data should have been bracketed below "20.4-cm-high curb". The number shown was 20.2.
FIGURE 5
The center of gravity platform used to determine the horizontal position of overall CG. (Note: This schematic drawing has not been drawn to scale).

\[ d_i = \text{distance from CG to rear axles (cm)}. \]
\[ W = \text{weight of occupied machine}. \]
\[ F_{sc} = \text{force measured on scale}. \]

\[ \Sigma M = 0 \rightarrow F_{sc} (101.6) = W(d_i + 48.3) \]
\[ d_i = \frac{F_{sc}(101.6)}{W} - 48.3 \]

FIGURE 6.
The static forward tipover angle. The chair will be on the verge of tipping forward when the incline angle is equal to \( \Theta_f \).