Homework: For Teacher Training, please try to complete the chart below before training day. Trust us, this will help you immensely to understand the material better. Instructions are on the pages that follow.

| Column            | Α             | В                              | C*                    | D                   | Ε                | F                                     |
|-------------------|---------------|--------------------------------|-----------------------|---------------------|------------------|---------------------------------------|
| Table<br>Headings | UTC           | Reserve<br>Battery<br>Capacity | Battery<br>Reserve    | Change              | Rate of Change   | Time to<br>Criticality***             |
| Units             | 24 Hour Clock | %                              | Kilowatts             | Kilowatts           | Kilowatts/ Min   | Minutes                               |
| Calculations      | From Data     | From Data                      | C= B/100 X<br>24.50** | D=<br>C -previous C | E=<br>D/20 (min) | F= (Abs Value of)<br>(C- 12.25****)/E |
|                   | 15:00         | 94                             | 23.02                 | N/A                 | N/A              | N/A                                   |
|                   | 15:20         | 88                             | 21.55                 | -1.47               | -0.07            | 132.86                                |
|                   | 15:40         | 78                             | 19.10                 | -2.45               | -0.12            | 57.08                                 |
|                   | 16:00         | 85                             |                       |                     |                  |                                       |
|                   | 16:20         | 63                             |                       |                     |                  |                                       |
|                   | 16:40         | 66                             |                       |                     |                  |                                       |
|                   | 17:00         | 59                             |                       |                     |                  |                                       |
|                   | 17:20         |                                |                       |                     |                  |                                       |
|                   | 17:40         |                                |                       |                     |                  |                                       |
|                   | 18:00         |                                |                       |                     |                  |                                       |
|                   | 18:20         |                                |                       |                     |                  |                                       |
|                   | 18:40         |                                |                       |                     |                  |                                       |
|                   | 19:00         |                                |                       |                     |                  |                                       |
|                   | 19:20         |                                |                       |                     |                  |                                       |
|                   | 19:40         |                                |                       |                     |                  |                                       |

## **Power Team - Battery Reserve Data Tracking Table**

Note that this value may be used in the Power Systems Calculator

\* Graph this column.

\*\* <u>Total Battery Capacity</u> – On any given day, the battery capacity is dependent on the number of solar arrays connected to the main frame. The value on February 14, 2001 is 24.50 kilowatts.

\*\*\* Remember, if the Battery Reserve is above 12.25 and the Rate of Change is positive, then Time to Crit does not apply. Also if the Battery Reserve is below 12.25 and the Rate of Change is negative then Time to Crit does not apply.

\*\*\*\* <u>Critical Battery Capacity</u> – The station will be in a critical stage if power levels drop below 50% of the total battery capacity. The number is 50% of the Battery Capacity Start Value, or 12.25 kilowatts. Homework: For Teacher Training, please try to complete the chart below before training day. Trust us, this will help you immensely to understand the material better. Instructions are on the pages that follow.

| Column            | А                | В                            | С                    | D*                                 | Е                                  | F                                   | G   |
|-------------------|------------------|------------------------------|----------------------|------------------------------------|------------------------------------|-------------------------------------|---|
| Table<br>Headings | UTC              | Solar<br>Array<br>Efficiency | Power<br>Generation  | Current<br>Power<br>Load           | Rate of<br>Charging or<br>Draining | Charging or<br>Draining             | New Time to Criticality***  |
| Units             | 24 Hour<br>Clock | %                            | Kilowatts/<br>Hour   | Kilowatts/<br>Hour                 | Kilowatts/<br>Hour                 |                                     | Hours   |
| Calculations      | From Data        | From Data                    | C=B/100 X<br>24.50** | See Power<br>Systems<br>Calculator | E = C-D                            | Pos # = Charging<br>Neg # =Draining | G= (Abs Value of)<br><u>Col C from <b>Battery Reserve</b> – 12.25****</u><br>Column E |
|                   | 15:00            | 100                          | 24.49                | 24.49                              | 0.00                               | N/A                                 | N/A   |
|                   | 15:20            | 99                           | 24.25                | 23.00                              | 1.25                               | Charging                            | 7.44  |
|                   | 15:40            | 82                           | 20.08                | 23.00                              | -2.92                              | Draining                            | 2.35  |
|                   | 16:00            | 0                            |                      | 15.00                              |                                    |                                     |   |
|                   | 16:20            | 0                            |                      | 15.00                              |                                    |                                     |   |
|                   | 16:40            | 30                           |                      | 15.00                              |                                    |                                     |   |
|                   | 17:00            | 18                           |                      | 15.00                              |                                    |                                     |   |
|                   | 17:20            |                              |                      |                                    |                                    |                                     |   |
|                   | 17:40            |                              |                      |                                    |                                    |                                     |   |
|                   | 18:00            |                              |                      |                                    |                                    |                                     |   |
|                   | 18:20            |                              |                      |                                    |                                    |                                     |   |
|                   | 18:40            |                              |                      |                                    |                                    |                                     |   |
|                   | 19:00            |                              |                      |                                    |                                    |                                     |   |
|                   | 19:20            |                              |                      |                                    |                                    |                                     |   |
|                   | 19:40            |                              |                      | :                                  |                                    |                                     |   |
|                   |                  |                              |                      |                                    | /                                  |                                     |   |

## Power Team - Solar Array Data Tracking Table

Note that this value may be used in the Power Systems Calculator

Note that this value is determined by using the Power Systems Calculator

\* Graph this column.

\*\*<u>Total Battery Capacity</u> – On any given day, the battery capacity is dependent on the number of solar arrays connected to the main frame. The value on February 14, 2001 is 24.50 kilowatts.

\*\*\*If Column F is "Charging" there is no need to find time to criticality. Put "n/a" in the blank. Remember, if the Battery Reserve is above 12.25 and the Rate of Change is positive, then Time to Crit does not apply. Also if the Battery Reserve is below 12.25 and the Rate of Change is negative then Time to Crit does not apply.

\*\*\*\* Critical Battery Capacity – The station will be in a critical stage if power levels drop below 50% of the total battery capacity. The number is 50% of the Battery Capacity Start Value, or 12.25 kilowatts.

Note: Use the Power Systems Calculator to balance the Power Load (Column D) against the Time to Criticality (Column G). As the load goes down, the time to criticality will go up and vice versa. In general, you should try to adjust the Power Load to stay above 15 kilowatts/hour of consumption. Likewise, you should try to keep the new Time to Criticality to above 0.5 hours (and anything above 1.0 hours is unnecessary).