

Keinert's – Solar Power Graphs

Owner's Manual – for Excel 2007 & Sunny Beam 1.07.06.R Firmware

Version 1.02

www.Keinert.com
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Introduction:

Thank you for purchasing my solar power graphing tool. This tool consists of an Excel 2007 Template (.xltm extension) which contains three Visual Basic macros. These macros were written to read the CSV files created by the SMA Sunny Beam portable device running 1.07.06.R or 1.08.00.R firmware. These macros may work on other Sunny Beam firmware revisions, but this needs to be tested. If in doubt, please send your CSV files to us for testing.

The Sunny Beam device creates a new CSV file each day. Each file contains the power output of the inverter for that single day. The name of each file corresponds to the date that it represents. The format of each filename is the year, followed by the month, and then followed by the day (yy-mm-dd). For example: A filename of 10-07-05.CSV means that this file contains the daily power output data for July 5th, 2010. More information about the structure and contents of these files can be found at the end of this document.

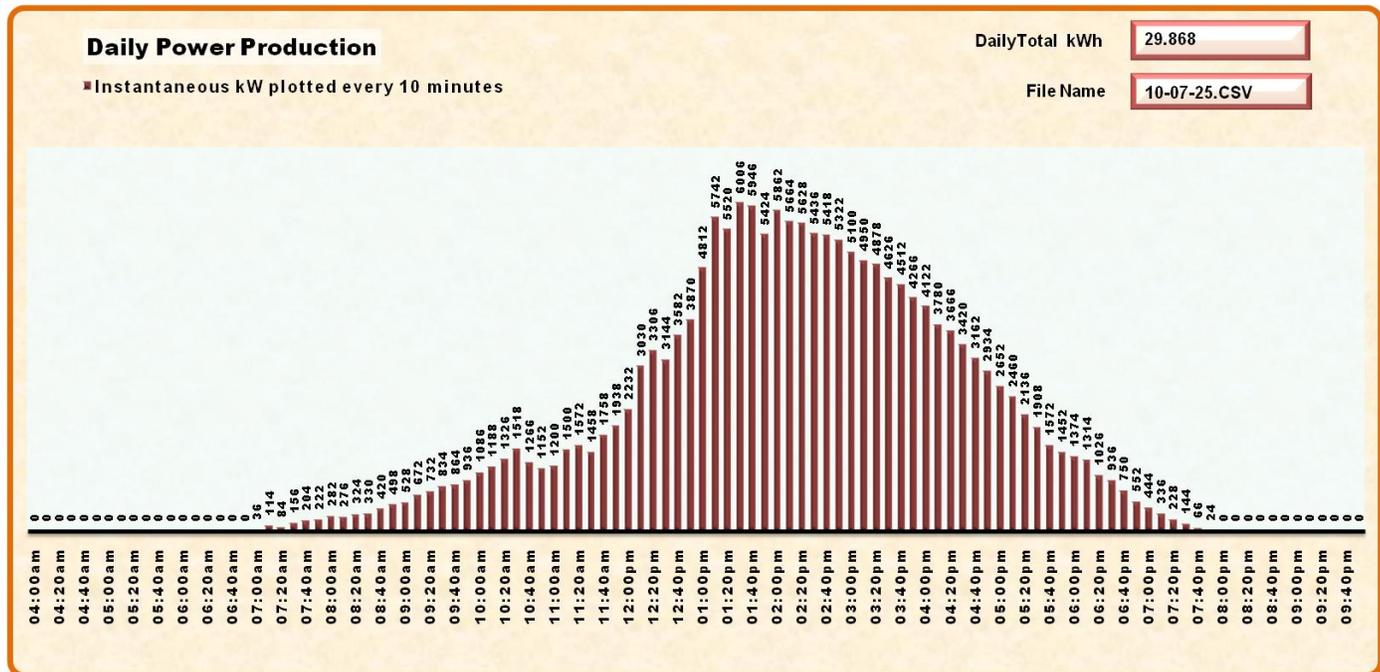
The CSV files must be transferred from the Sunny Beam into a personal computer, where the Excel macros will then be able to access them. It is important to periodically copy the CSV files from the Sunny Beam because they will be overwritten with new files as the Sunny Beam's internal memory fills up. Older CSV files do not stay in the Sunny Beam's memory forever.

When the CSV files are copied to your computer or storage device, they must all be placed into a single folder or directory. When each macro is run, it will ask you to navigate to the folder that contains the CSV files. The macros assume that all of the CSV files needed, will be found in the one folder selected.

The three macros and their associated graphs are described below.

Daily Power:

This macro will read a single CSV file, copy the file's performance data and paste that data into the Daily Power spreadsheet. The Chart titled "Daily Power Production" is preconfigured to find the data once it is imported into the spreadsheet. The data is plotted in ten minute intervals. The original CSV file contains entries for a full twenty-four hours, starting at 12:00am and ending at 11:50pm. Plotting all of these entries would make the graph very wide and harder to display. Since inverters only produce power during daylight hours, this graph is shortened to only plot entries from 4:00am to 10:00pm.



The number at the top of each plotted bar is the instantaneous output power in Watts that the inverter was generating during that ten minute interval. The upper right hand corner of the chart displays the total kilowatt-hours generated on that day, and the filename of the CSV file that was used to create the graph.

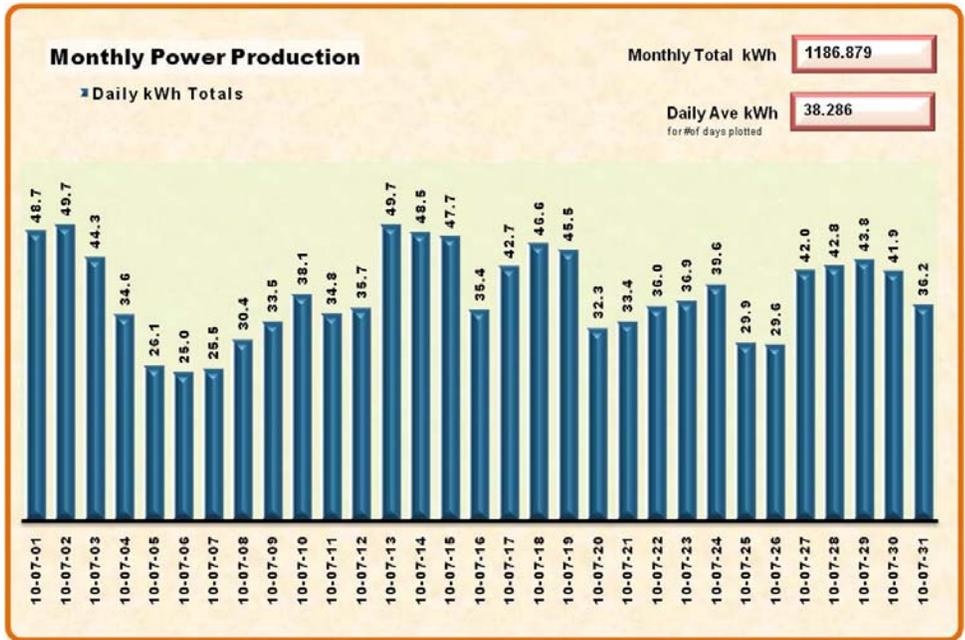
Monthly Power:

This macro will read between one and thirty-one CSV files selected by the user. It copies each file's total daily power value and pastes these values into the Monthly Power spreadsheet. Each plotted bar on the graph represents the total kilowatt-hours produced for a single day. When this macro is run, the user is asked for the first day to plot on the graph. Then, the user is asked for the number of consecutive days to include on the graph. In selecting the number of days to plot, the user can create a graph for a single week, for a full month, or for any number of consecutive days, up to thirty-one days maximum.

If a full month is desired, the user must select the CSV file for first day of the desired month. Then the user must input the correct number of days contained in that month. This macro does not automatically calculate the last day of the month. Don't forget to enter 29 days for February during leap years.

The number at the top of each plotted bar is the total kilowatt-hours produced by the inverter for that day. The upper right hand

corner of the chart displays the total kilowatt-hours generated and the daily average kilowatt-hours generated for the number of days selected. For example: If the chart is only plotting seven days worth of data, then the "Monthly Total kWh" and the "Daily Ave kWh" values are for those seven days only. If any CSV files are missing in the range of days selected, those days will plot as "0 kWh" but they will be counted when calculating the "Daily Ave kWh" value.



Yearly Power:

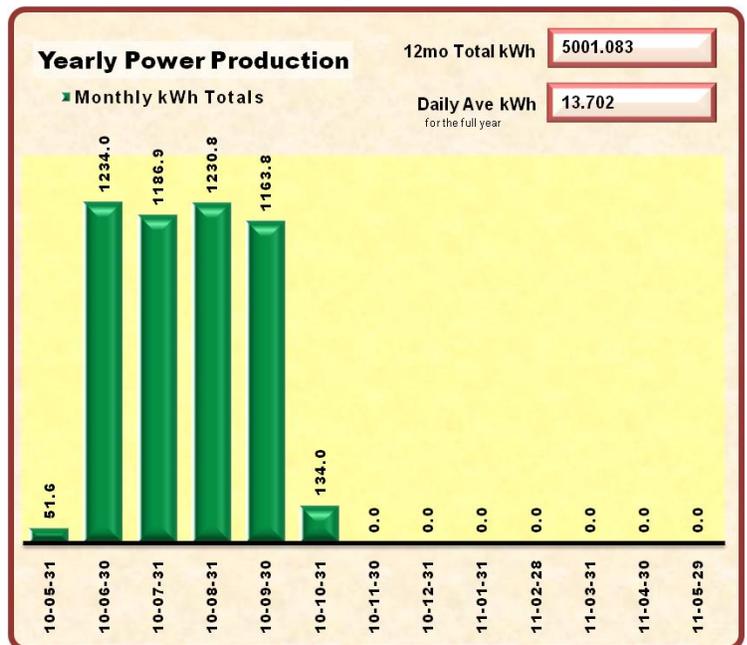
This macro will read one consecutive year's worth of CSV files starting at the first day selected by the user. It copies each file's total daily power value and pastes these values into the Yearly Power spreadsheet. Leap years are automatically accounted for, so the number of CSV files read will be either 365 during normal years, or 366 during leap years. If any daily CSV files are missing, these dates will be ignored by the macro. After all data is imported into the template, the macro then determines where each month starts and ends. It uses this information to calculate the total monthly kilowatt-hours produced by the inverter. Each plotted bar on the graph represents the total kilowatt-hours produced for a single month.

When the macro is run, the user is asked for the first day to plot on the graph. If the CSV file chosen is the first day of a month, then exactly twelve bars will be plotted, one bar for each month.

If the user selects a date that is not the first day of a month, then thirteen bars will be plotted so that the graph will still show one full year's worth of data.

The number at the top of each plotted bar is the total kilowatt-hours produced by the inverter for that month.

The upper right hand corner of the chart displays the total kilowatt-hours generated, and the daily average kilowatt-hours generated for the entire year. If CSV files are missing, the "Daily Ave kWh" value is still calculated for one full year.

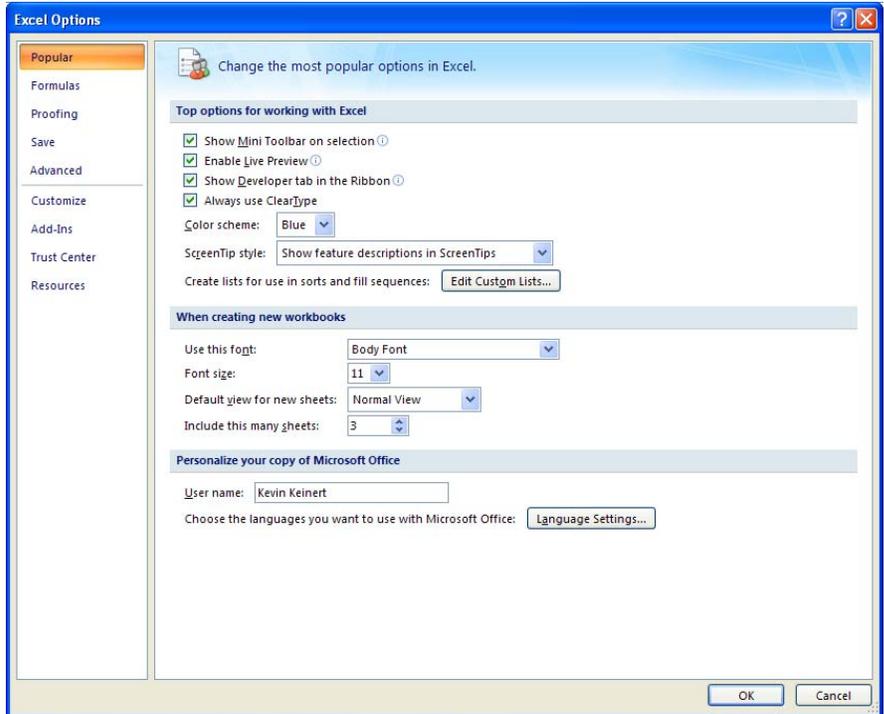


Setting Up Excel 2007:

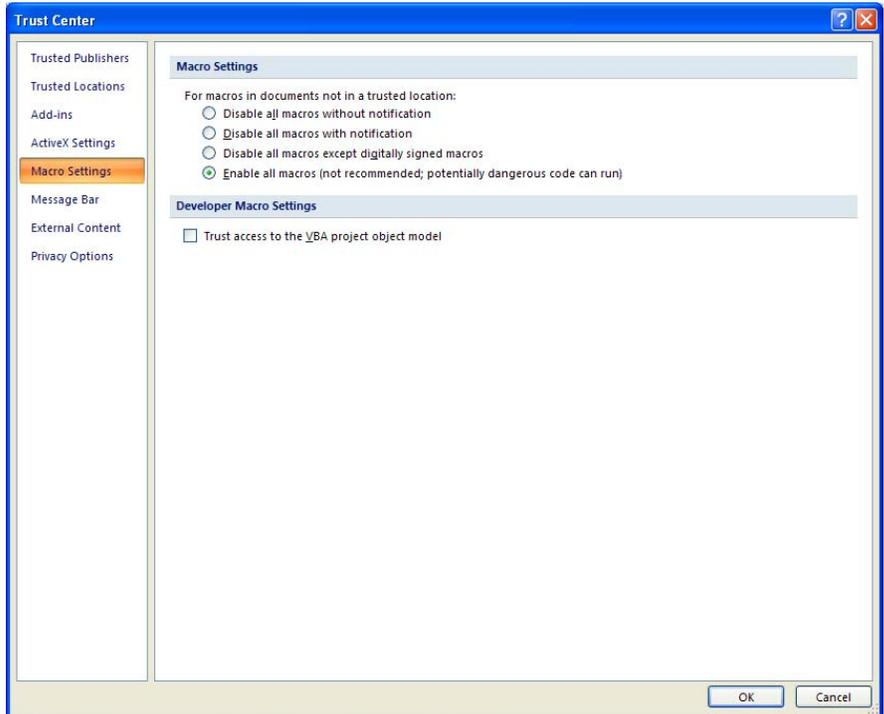
These macros have been written for Excel 2007. In order to use them, macros must be enabled in the "Trust Center", and you must have the "Developer" tab displayed above the Excel "Ribbon."

To Enable Macros and the Developer Tab:

- 1) Click on the **Microsoft Office Button** and then click on **Excel Options** which is located at the very bottom of the open window.
- 2) Click **Popular** on the left side (it should already be highlighted), and then click on the box for **Show Developer tab in the Ribbon**. See the window immediately to the right of this text for an example.



- 3) Next, click **Trust Center** on the left side, then click on **Trust Center Settings**, and then click **Macro Settings**.
- 4) Select the box that says: **Enable all macros (not recommended, potentially dangerous code can run)**.
- 5) Click the **OK** button in both windows to close them and save their settings.



Copying CSV Files to Your PC:

The Sunny Beam device comes with instructions that explain how to download CSV files to your computer. The instructions will include steps for connecting the supplied USB cable from the Sunny Beam to your PC. Windows should automatically detect when the Sunny Beam is connected to your PC. Follow the Sunny Beam instructions and place all CSV files in the same directory (also called a "Folder" by Microsoft) on your PC. Files can be placed anywhere in your computer or on a removable storage device.

Running the Macros:

Now that Excel has been properly configured (see "**Setting Up Excel 2007**" above) and your CSV files are stored in a convenient directory, the Macro Template is ready to generate graphs. Use the following procedure to run any of the three macros:

- 1) Click on the **Developer** tab, and then click on **Macros**. The Macro window will open.
- 2) Launch the desired macro by clicking on it, then click the **Run** button.
- 3) The corresponding spreadsheet will become active, the sample graph and data on that sheet will be cleared, and then an Information Window will pop up.
- 4) Read the pop-up information window and click the OK button.
- 5) The CSV files will be read into the spreadsheet and the graph will be generated.
- 6) The graphs are not locked, they can be resized or accept format changes as desired. Information on working with Excel graphs can be found in Microsoft's documentation. These graphs do require that all data be found in specific cells on each spreadsheet. Therefore, use caution if changing any of the data displayed on the spreadsheets, as this could adversely affect the graphs.

Saving your Graphs:

The original Excel file that contains the macros is a "template." Therefore, when you save a spreadsheet after creating graphs, Excel will automatically attempt to save the file with a new filename, to prevent overwriting of the original template.

To save your newly created spreadsheets, click on the "Save" Icon or click the Microsoft Office Button and select "Save" or "Save As." When the action to save your file is initiated, Excel will automatically open a "Save As" dialog box and slightly modify the filename so the new file is not saved back to the original macro template. At this point, the file can be changed to any convenient file naming convention and saved to the desired directory.

Conclusion:

I hope you find these macros easy to use and that they generate quality graphs which suit your needs. If you have any comments or suggestions for improvements, please contact me through my website at www.Keinert.com

And finally, if you know other Sunny Beam owners who might benefit from these macros, please pass my contact information along to them. I do ask one favor however; please do not share the macro template with anyone. I am a small-time programmer who spent many hours in an attempt to produce the best possible graphs that I could. Future upgrades and support of these macros will only be possible if I am able to generate a profit by future sales.

Thanks for your business and have a great day!

Sincerely,

Kevin R. Keinert

CSV File Data Structure:

The following screen shots show the very beginning and very end of one CSV file that these macros can read. Cells A8 - A151 must contain the time of day only (no date). Cells B8 - B151 must contain the instantaneous output power from the inverter (not the cumulative total power). Cell B154 must contain the daily total power, and cell B155 must contain the cumulative total power that the inverter has produced, since it was first installed.

