



Sun-Pal

Sun-Pal Introduction

Sun-Pal is a CASL-based application for the Palm-Pilot PDA that calculates:

- Position of the sun (actually it shows you where North is), both direction and degrees off the horizon
- Hours of sunlight in the day
- Time of sunrise and sunset (labeled "dawn" and "dusk" on display, [see note](#))
- Position of the sunrise
- Position of the high sun
- Days since the March equinox

Sun-Pal requires a palm-Pilot PDA running OS 2.0 or higher, MathLib, and the CASL runtime.

See the [Background](#) section below for a full explanation of the program, the program it was based on, and other pertinent resources.

How to Install

For users with the CASL Pilot OS 2.0 runtime (CASLrt_pro.prc) and MathLib (MathLib.prc), download [Sun-Pal.prc](#)

For users who need the CASL runtime and/or MathLib, download [Sun-Pal.zip](#)

Those wishing to look at the CASL source code can download [Sun-Pal.csl](#)

Unzip the files into a directory of your choice. Use the Pilot install tool to install Sun-Pal.prc and, if you don't already have them on your Pilot, CASLrt_pro.prc, and MathLib.prc. Hot synch your Pilot and everything will be installed and ready to run.

How to Use

Refer to the [screen clip](#) below. Operation:

1. Use the selector to pick your city and double-click to place your city's latitude in the LAT: text box. If your city is not listed, you should find your latitude (a good source is: www.realestate3d.com/gps/) and stylus it into the LAT: text box. Northern hemisphere latitudes are entered as 0.00 to 90.00 degrees and southern hemisphere latitudes are entered as 0.00 to -90.00 degrees.

2. If daylight savings is enacted where you live, hit the DS button. To turn daylight savings off, hit DS again.
3. If you are finding out information about today, hit the NOW button. This will place the number of days since the March equinox (assumed to be 3/21) and the decimal time since midnight (for example, 10.5 = 10:30 AM) in the text boxes DAYS and TIME. Calculations may be run for days and times other than the current one by entering the data in the appropriate text box.
4. Hit the GO button to run the calculation.
5. The graphics box with the N and E allows you to locate North (N) by pointing the pointer line at the sun, holding the Pilot flat in your hand and seeing where the N points.
6. The graphics box with the line across it allows you to see how far up off the horizon the sun should be by holding the Pilot sideways and sighting the graphic line toward the sun (kind of silly, except when it is cloudy out and you can sight the flat line on the horizon and the angled line will show you where the sun should be).
7. The output console at the bottom prints an abbreviated form of Dave Russin's SUNCALC output, less the energy calculations. This is where you will find days of sunlight, time of sunrise and sunset, and location of the high sun.
8. Finally, the ABOUT button gives a very brief introduction to the program.

Sun-Pal

DS GO

DaySave Now

Days: 310

Time: 15.35

Lat: 42.22

Ann Arbor-MI

Mobile-AL

Latitude: 42.22

Days since March Eqnx: 310

At 15:21 Sun at:

About

DS - Daylight savings button.

NOW - NOW button. Places today's day and time in the DAYS and TIME text boxes. DAYS represents the number of days since the March equinox, TIME is decimal time (0-24 hours, 10.5 = 10:30 AM).

SELECTOR - Lists 57 US cities. Double tapping a city places the city's latitude in the LAT: text box.

GO - Runs the calculation.

DAYS - DAYS text box. Takes number of days since March equinox (3/21), 0-365.

TIME - TIME text box. Takes the decimal time in hours since midnight (0-24 hours, 10.5 = 10:30 AM).

LAT - The latitude of the location you wish to run Sun-Pal for. Automatically filled in by a double tap on the SELECTOR or, optionally, entered manually (within a range of 90.00 to -90.00, with 0 at the equator).

CONSOLE - Output area for results and for ABOUT information.

< - Scrolls console UP.

> - Scrolls console DOWN.

ABOUT - Places program information in the CONSOLE.

Background

Sun-Pal is a port of SUNCALC, originally written by Dave Rusin, rusin@math.niu.edu, on 4/10/94. SunCalc and its documentation are found at: www.math.niu.edu/~rusin/uses-math/position.sun. It was written in UBasic, a neat BASIC variation well suited for mathematical calculations created by Yuji Kida (kida@ax251.rikkyo.ac.jp). UBasic is found at: <http://archives.math.utk.edu/software/msdos/number.theory/ubasic/.html>. Dave's program was released to the public domain, and Sun-Pal is also released as freeware. There is NO WARRANTY and accuracy is not known. Source code may be used in other freeware projects. Dave Rusin's UBasic code was "de-goto'd" and made into CASL functions. The original BASIC line number ranges are found in the comments at the start of each function. Portions of this code are Copyright (C) February 1998, Dave Fischer, dfischer@provide.net. SUN-PAL; V0.10; 2/1/98.

CASL is a neat language to work in for the Palm Pilot and more information can be found at www.caslsoft.com. Frank O'Brien has an interesting set of CASL programs and source code available on http://home.att.net/~dianfrank/casl_page.htm. Surprisingly enough, Frank mentions Dave Rusin's homepage in reference to Dave's coding of musical notes. Rick Huebner should be thanked for his [MathLib](#) (see note at bottom of page), which gives

CASL a wealth of math functions not found in the core language (and quite difficult to code using numerical methods). Rick has a neat Pilot application called MathPad, which is a great tool for anyone wishing to create mathematical models on the Pilot. And, like everyone else doing development for the Pilot, I owe a thanks to Greg Hewgill for his Copilot Pilot simulator (more information at: <http://ofb.net/~heath/pilot/copilot/history.html>).

For further information on the math behind SUNCALC, you should visit Dave Rusin's site at: www.math.niu.edu/~rusin/uses-math/position.sun. This site contains much debate about various small errors that can creep up in Dave's model (which I've not attempted to address in Sun-Pal). One note is the use of dawn and dusk to describe sunrise and sunset. Strictly speaking, they are not the same; dawn occurs earlier than sunrise and dusk occurs later than sunset. A reviewer of SUNCALC gives the formal definition of dawn and dusk, which is documented at Dave's site. I've maintained Dave's usage because it fits the Pilot screen limits better. Note that I've only tested this Sun-Pal at my latitude (42.22) and only at times in January and February, however, Sun-Pal produces the same results as SUNCALC for a range of inputs. Dave Rusin made these comments when I told him about Sun-Pal: "You should be aware that since I neglected the eccentricity of the Earth's orbit, the moment I call "noon" (=when the sun is highest overhead) is not 12:00 on the clock, nor is it even quite correct to compute "noon" based on your angular distance west of Greenwich -- the moment of "noon" at a given location will drift about half an hour across the year. I recently included a few notes and pointers at my SUNCALC page which can help account for such corrections, if you're inclined to go for the extra accuracy. (One of these days I'll update my own files there.)"

Leap-year calculations are discussed at: <http://qa.pica.army.mil/~jferree/leapyear.html>.

Thomas Jewer has written a compass shareware program for the Pilot that is highly accurate and adjusts in real time-- go to: <http://userpage.fu-berlin.de/~unitex/tjhome.htm> and see SUNCOMP.N.ZIP and SUNCOMP3.ZIP. Also, Ed Wilborne has created some Astronomy Software for the PalmPilot that is found at: <http://www3.gamewood.net/mew3/pilot/astronomy/>. Ed also has a CASL shareware program called Sun! on his page that looks quite good, check it out.

Mathlib note: MathLib is a free shared library that can be used by any OS 2.0 Pilot program that needs IEEE 754 double precision math functions. It's distributed under the terms of the GNU General Public License, and is freely available with full source code and documentation at the [MathLib Information web page](#). It's not a part of the MathPad program, and you're not paying anything for its use; a copy is simply included in this archive for your convenience.

Revision History

V0.10 - 2/1/98 - Initial release.

V1.00 - 3/20/98 - Fixed March equinox code. Added Philadelphia to selector.

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