MayaDate®

The Ultimate Mayan Calendric Calculator

User's Manual for Version 4.0

Document revision 4.0A - 11 March 2007

Welcome to the long-delayed new version of MayaDate.
I've incorporated many new features and functions which I hope you'll find useful.
Comments and suggestions via e-mail are welcome.

Contents

Introduction

Main Screen

Memory Screen

Finder Screen

Tutorials

Appendices

This document provides internal hyperlinks for navigation. All of the links should render in blue. Some browsers will not honor this setting. Even if they're black, they should display an underline when the mouse cursor is over the link. Whether blue or black, they may display an underscore at all times.

What it does

MayaDate performs addition and subtraction in the Mayan calendars, and presents the results in a concise and readable format. It's a research tool which gives you unprecedented flexibility in working with the inscriptions.

The Mayan calendar is a complex set of interlocking periods. MayaDate supports all of these, including the 260-day, 360-day, and 365-day "years", plus the 819-day cycle, the 9 lords of the night, and the four colors and directions. MayaDate supports ten full calendric periods, unlike some other programs.

The program operates on both the **Long Count** (**LC**) and the **Calendar Round** (**CR**) simultaneously. These two calendars are linked such that a given **LC** will always correspond to a specific **CR**. However, MayaDate allows you to change this correlation as desired, for investigating different interpretations of the inscriptions.

Calculations follow the natural order of the inscriptions. You start with a **Base Date** in the **Long Count**, then add or subtract a **Distance Number** to get to the next date. The sum or difference becomes the new **Base Date** with a single mouse click. The sequence is repeated for each new phrase in the inscription. Since many phrases express negative distances, MayaDate displays the **LC** and **CR** for both the sum and difference of the **Base date** and **Distance Number**, enabling you to easily identify the appropriate result.

Back to Top

What's new

Major new features in Version 4 include

- A 50-cell Memory where you can store LCs and DNs for later retrieval
- Project support which enables you to store and retrieve entire datasets including Memory
- Enhanced Finder operation
- Auto-save on exit and auto-restore on startup
- Direct keyboard entry of Calendar Rounds

As usual, the new release incorporates various bug fixes and clean-up.

Back to Top

System Requirements

MayaDate runs on Windows XP, 2000, or 98 Second Edition, or on Linux using Wine (not 100% functional). MayaDate has not been tested with Vista, and probably will not run in that environment.

MayaDate has no special requirements beyond those of the operating system.

System configuration

A fast CPU and lots of memory will greatly improve the speed of the Finder. The target configuration for MayaDate uses an AMD Athlon 32 or 64 or Intel Pentium IV CPU running at 1 Gigahertz or more with at least 512 Megabytes of RAM. MayaDate will run properly on machines with much lower performance. The only possible degradation will be in the Finder. You won't see any difference in other functions.

Browser recommendation

I recommend using the Firefox browser for viewing this document. Click here to download it for free.

A screen resolution of at least 1024 x 768 should be used for the program and for viewing this file.

Back to Top

Installing the Program

The CD should auto-run when inserted in any CD or DVD drive. If it doesn't, navigate to the CD or DVD root directory and double-click on SETUP.EXE.

The program installs in \Program Files\MayaDate\. The executable is MayaDate.EXE. You can create a shortcut to that file on your desktop if you wish. It's automatically added to the Start Menu.

You do not have to restart the computer after installation.

Back to Top

Starting and Ending

To start

Double-click on the desktop icon or select from the Start Menu. The program always starts centered on the screen, but can be moved. The buttons in the upper-right can be used to minimize the screen. The screen cannot be resized.

Under most circumstances your previous work will be restored automatically, and you can continue from where you left off. This feature can be disabled when you exit as described below.

To exit

Click on the Exit button in the lower right corner, or press Ctrl+X or Alt+X, or select **Exit** from the **File** menu. When closed in this manner the program saves all of its current information, which will be restored when you next start the program.

If you don't want to save the current information, press Ctrl+W or select this option from the File menu. This exits without overwriting any previously-saved data.

Back to Top

Saving and Restoring Projects

Version 4 of MayaDate introduces the concept of projects. A Project consists of the entire state of the program, including the Memory Screen. A project is saved to a disk file with the extension MDPR. You choose the project base name. I suggest making it something descriptive, but not overly long.

Project files contain a complete snapshot of your work. If you're collaborating with another researcher, you can email these back and forth to coordinate your efforts.

Projects are saved and loaded using options on the File menu, which are described later in the tutorial. There is no limit to the number of projects which can be saved, other than available disk space. The files are about 7K bytes.

Back to Top

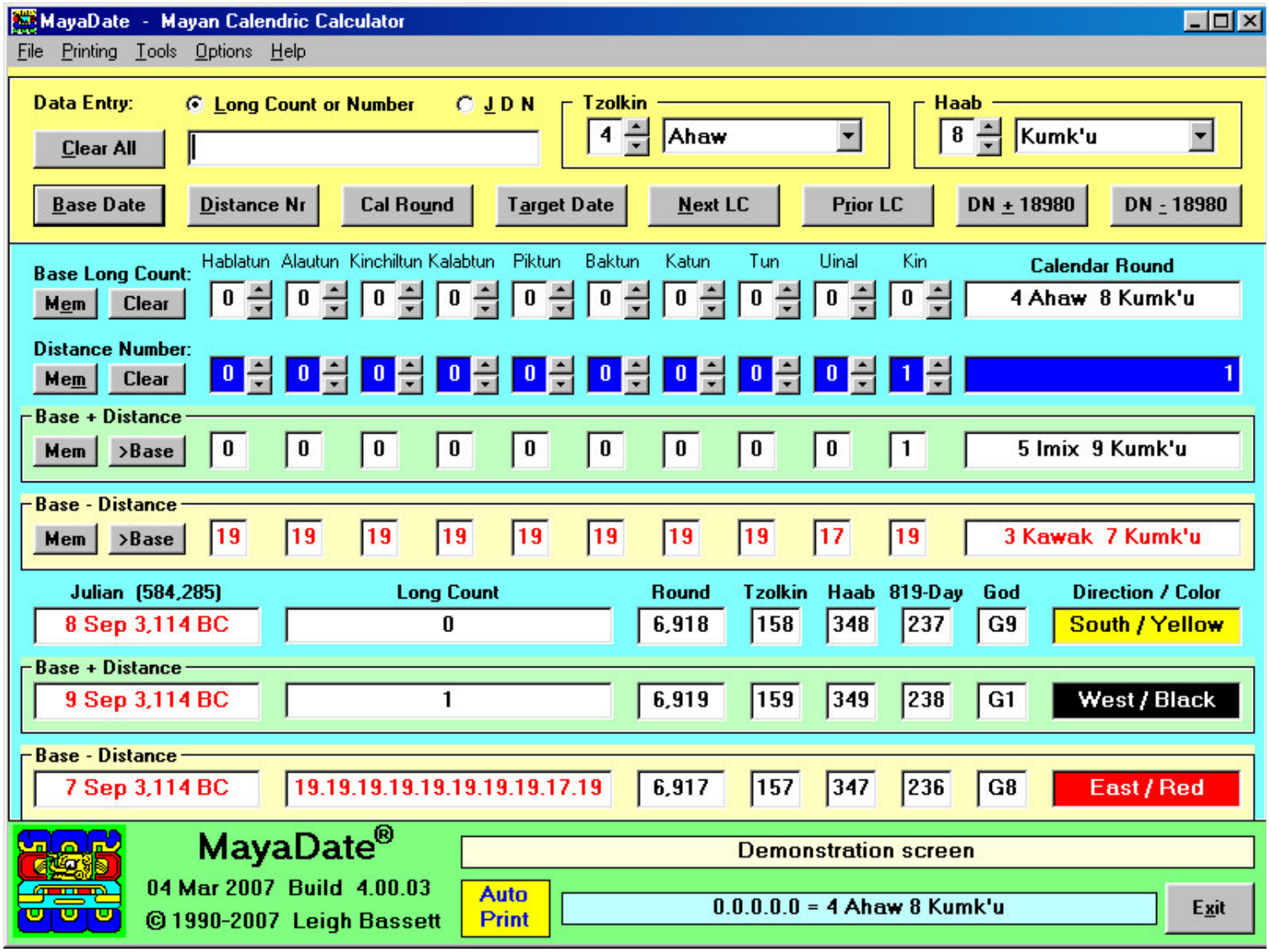
The MayaDate Screens

Most activities use the Main Screen. The Memory Screen and the Finder screen provide supplemental functions. Each of these is described below.

Back to Top

The Main Screen

The main program screen looks like this:

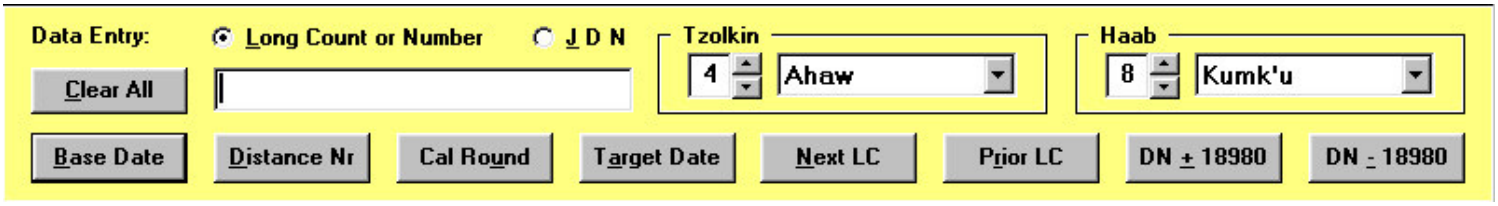


This screen is divided into three areas, identified by background color:

	The yellow area at the top is where you enter data and initiate calculations
	The blue area in the middle displays the calculation results
	The green area at the bottom contains general information

Back to Top

Main Screen – Data Entry Area



Data Entry

Text is entered in the white box at the left. The text cursor should always be visible in the box. If not, click the mouse in the box.
Type the desired information in the box with the following restrictions:

Type of data	Restrictions
Long Count	Dotted decimal notation. Leading zeros are not required.
Distance Number	Decimal integer or dotted decimal notation. Leading zeros are not required.
Julian Day Number	Decimal integer and J D N option must be selected (press Alt+J).
Calendar Round	MUST match spelling exactly, including apostrophes (') and upper / lower case.
Decimal integer	No restrictions, but value must be meaningful in context.

Calendar Round Entry

The two framed areas at the upper right, labeled **Tzolkin** and **Haab** are used to enter the two components of the Calendar Round. The full CR can be typed in the text box as described above, and transferred to the CR area by clicking on the Cal Round button. Or you can select the desired values using the controls next to the display boxes as described below:

The up and down arrows next to the display box increment or decrement the value. The value wraps from minimum to maximum and back as the limits are reached. The **Tzolkin** field can have values from 1 through 13 inclusive. The **Haab** coefficients have values from 0 through 19 inclusive, except for the last month (Wayeb) which is limited to 0 through 4 inclusive.

The down arrow next to the display box opens a selection drop-down box. Click on the desired period name. There's a scroll bar on the right to move through the list.

Controls

The nine control buttons are described below. All buttons initiate a recalculation and update all displayed fields after performing the defined action. All buttons have Alt+key shortcuts as noted.

Data Entry Buttons

Alt+	Caption	Uses data from	Function
C	Clear All	n/a	Clear all displayed fields to zero. Does not affect memory contents.
B	Base Date	Text entry box	Paste the entered value into the Base Date line.
D	Distance Nr	Text entry box	Paste the entered value into the Distance Number line.
U	Cal Round	Text entry box	Paste the entered value into the Tzolkin and Haab fields to the right.

Function Buttons

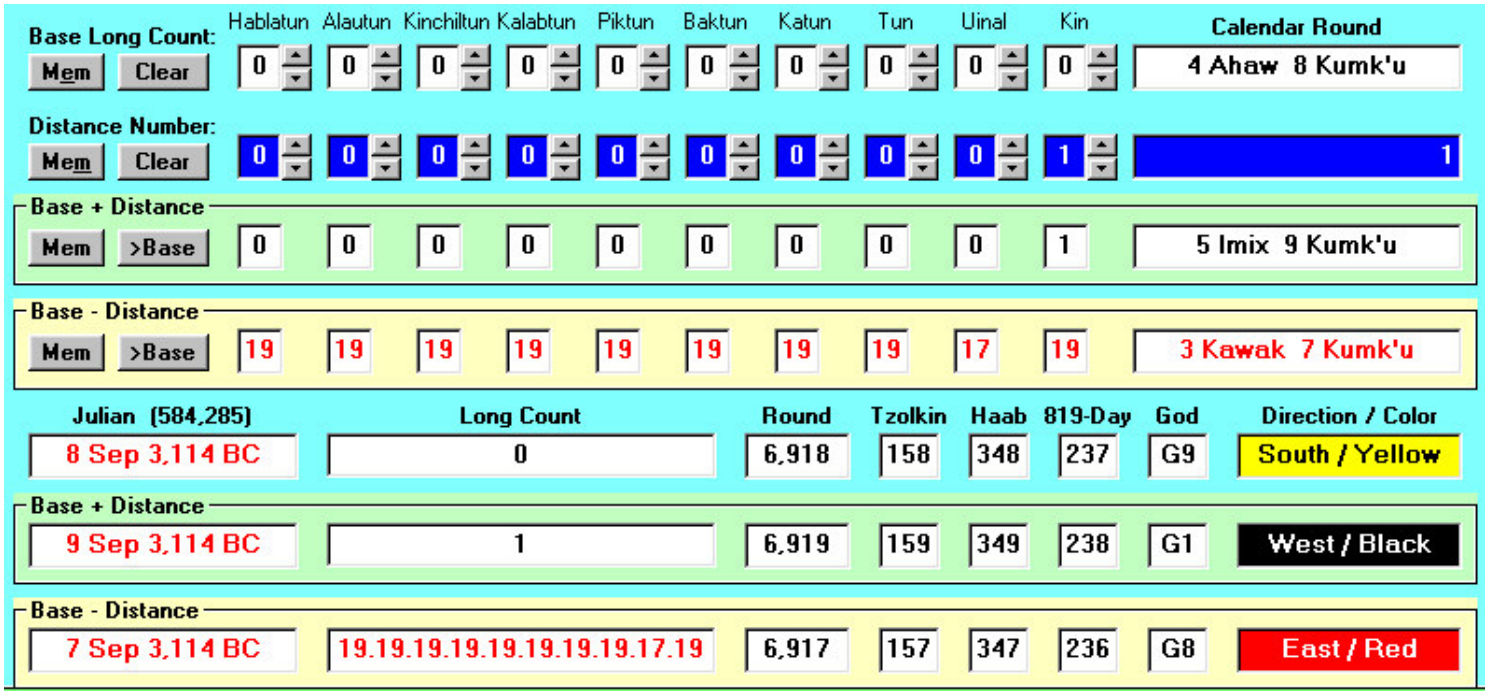
Alt+	Caption	Uses data from	Function (See notes below)
A	Target Date	Text entry box	Calculate the DN required to reach the entered LC from the current Base Date.
N	Next LC	CR entry area	Calculate the DN required to reach the next occurrence of the entered CR.
R	Prior LC	CR entry area	Calculate the DN required to reach the previous occurrence of the entered CR.
+	DN + 18980	n/a	Add 18980 days (52 years) to the current Distance Number.
-	DN - 18980	n/a	Subtract 18980 days (52 years) from the current Distance Number.

Notes

- The DN + and - 52 year functions are cumulative, so you can walk up or down the calendar in 52-year increments. For every increase in the DN, the Base + DN will move forward to a later date, and the Base - DN will move backward to an earlier date.

Back to Top

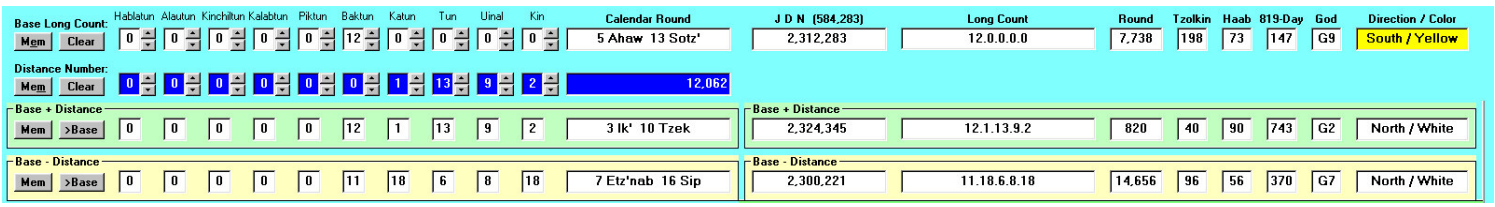
Main Screen – Calculation Area



The Calculation Area in the middle (blue background) consists of four logical rows:

	Base Date has no frame
	Distance Number displays white text on a dark blue background
	Base + Distance has a frame with a light green background
	Base - Distance has a frame with a light tan background

Due to the limited width of the computer display, the three rows which contain the Base Date are split in two. If the screen were wide enough the Calculation Area would look like this:



Displayed fields

The various fields are described below:

- The upper tier.
  - Memory access button
  - Clear button or >Base button
  - Ten calendric periods
  - The full Calendar Round
- The lower tier (three rows containing the Base, Base+DN, and Base-DN).
  - The modern calendar equivalent date or the Julian Day Number
  - The Long Count in dotted decimal notation
  - The zero-based day number within the 18,980-day Calendar Round
  - The zero-based day number within the 260-day Tzolkin
  - The zero-based day number within the 365-day Haab
  - The zero-based day number within the 819-day cycle

- The god of the night, numbered 1 through 9
- The four directions and colors, which are interlocked (North / White is not shown in the example)

The **Calendar Round**, **Tzolkin**, and **Haab** share a common zero date at **2 Ik' 0 Pohp**, for no obvious reason.

Red text

Text is displayed in red rather than black when an arithmetic underflow occurs, i.e. trying to subtract a larger number from a smaller one. This does not indicate an error, and the displayed values are still correct. The red just indicates that the correct value cannot be displayed within the limits of the ten-period display. Dates in the modern calendar appear in red if they are BC (or BCE if you prefer), as shown in the example.

Data Entry

Although this area is not primarily intended for data entry, you do have the ability to change the values of the LC and DN using the spin buttons adjacent to the display boxes.

Note that these buttons propagate carry and borrow across the entire Long Count. If you decrement a field which is zero, the value will increase to maximum and the next higher digit will decrement by one. Similarly, incrementing a value already at maximum will change that period to zero and increment the next higher period by one.

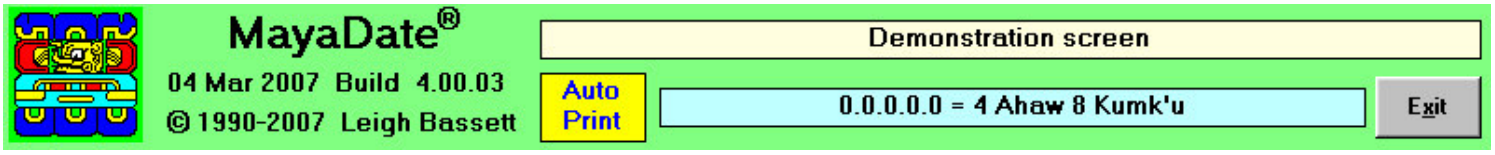
Controls

There are eight control buttons at the left side, divided into three groups:

- **Mem** buttons access the Memory Screen. Two shortcut combinations are available: Alt+E is the Base Date entry; Alt+M is the Distance Number entry. See the Memory section for more information.
- **Clear** buttons clear the LC on that row to zero.
- **>Base** transfers that row's LC to the Base date. (This triggers an Auto-Print event.)

Back to Top

Main Screen – Information Area



Displayed fields

The three fields of interest are:

- A user-generated comment or description in the tan box (Double-click in the box or press Ctrl+E to edit the comment.)
- The current LC / CR correlation in the light blue box
- The Auto-Print call-out is displayed only when the function is enabled.

Controls

The only control in this section is the Exit button. Click on it or press Alt+X or Ctrl+X to exit the program and save the current state. See the discussion of the File Menu options for other exit options.

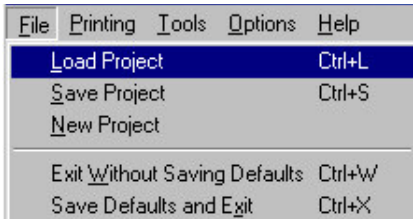
Back to Top

The Main Screen Menus

The menu options work just as in any other windowed environment. Some functions can be invoked using the Control key plus another key. These combinations are shown on the menu to the right when available. Most functions can be invoked using the Alt key plus another, identified by underlining the letter or character in the button legend. A couple of functions require other key combinations as noted.

Back to Top

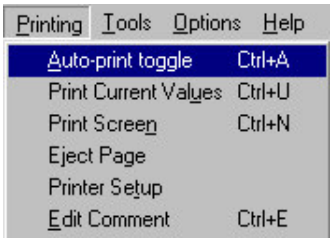
Main Screen - File Menu



Alt+	Ctrl+	Name	Description
L	L	Load Project	Load a project file from disk.
S	S	Save Project	Save a project file to disk.
N		New Project	Clear the workspace including Memory.
W	W	Exit Without Saving Defaults	Terminate execution without saving the current state.
U	U	Save Defaults and Exit	Save the current program state and terminates.

Back to Top

Main Screen - Printing Menu



Alt+	Ctrl+	Name	Description (See notes below)
A	A	Auto-print toggle	Toggle the Auto-Print function on or off.

Alt+	Ctrl+	Name	Description (See notes below)
U	U	Print Current Values	Print the Base LC, the DN, and their sum and difference in text form.
N	N	Print Screen	Prints a graphic image of the entire screen.
J		Eject Page	Flush the print buffer and eject the current page.
T		Printer Setup	Bring up the standard printer setup dialog.
E	E	Edit Comment	Edit the content of the Comment box.

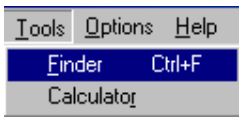
Notes

- Auto-Print - When on, an indicator appears to the right of the copyright notice at the bottom of the screen. When you turn Auto-Print off it issues a page eject to the printer even if nothing has been printed. This is normal.
- Print Screen renders an exact image of the entire program screen, which requires a color graphics printer.

Click these links for detailed explanations: Auto-Print or Print Current Values. Use the browser's Back button to return here.

Back to Top

Main Screen - Tools Menu



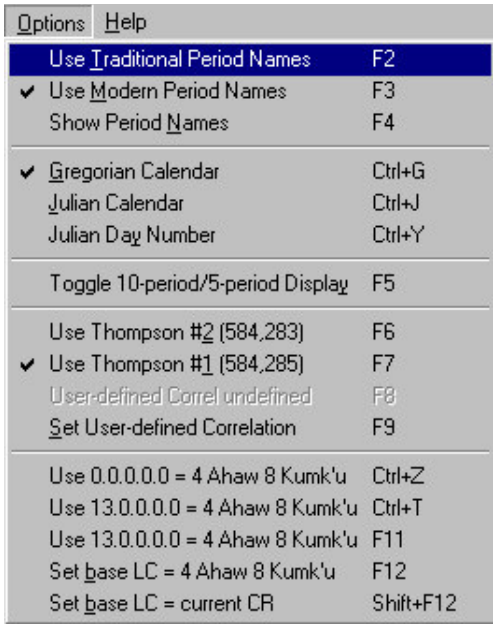
Alt+	Ctrl+	Name	Description (See notes below)
F	F	Finder	Invoke the Finder screen.
R		Calculator	Invokes the standard calculator available on the system, if any.

Notes

- Calculator - The standard system calculator will not have the numeric precision required to calculate the longer intervals in the Mayan calendar.

Back to Top

Main Screen - Options Menu



Alt+	Ctrl+	Name	Description (See notes below)
T	F2	Use Traditional Names	Use traditional spellings for period names.
M	F3	Use Modern names	Use currently-accepted spellings for period names.
N	F4	Show Period Names	Show both spellings for all period names.
G	G	Gregorian Calendar	Display equivalent dates using the Gregorian calendar.
J	J	Julian calendar	Display equivalent dates using the Julian calendar.
Y	Y	Julian Day Numbers	Display equivalent dates as Julian Day Numbers.
	F5	Toggle 10-period/5-period display	Set the display to show all ten periods or only the low five.
2	F6	Use Thompson #2 (584,283)	Sets the J D N/Mayan correlation to 584,283 days.
1	F7	Use Thompson #2 (584,285)	Sets the J D N/Mayan correlation to 584,285 days.
	F8	(User-defined correlation)	Set the J D N/Mayan correlation to a user-defined value.
S	F9	Set User-defined Correlation	Set a J D N/Mayan correlation value (select with F8).
	Z	Use 0.0.0.0.0=4 Ahaw 8 Kumk'u	Set the LC/CR correlation.
	T	Use 13.0.0.0.0=4 Ahaw 8 Kumk'u	Set the LC/CR correlation.
	F11	(Use ...)	Set the LC/CR correlation to a value entered using Shift-F12.
B	F12	Set base LC = 4 Ahaw 8 Kumk'u	Sets the LC/CR correlation to current base LC = 4 Ahaw 8 Kumk'u.

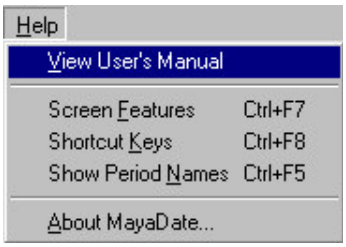
Alt+	Ctrl+	Name	Description (See notes below)
	*	Set base LC = current CR	Sets the LC/CR correlation to current base LC = current CR.

Notes

- The current state of some options is indicated by a check mark in the left margin.
- Spellings - Two versions of period names are in common use. Select whichever you prefer.
- Modern calendars - Select either the Gregorian or Julian calendar for date displays. You can also display Julian Day Numbers without modern equivalents.
- Display Format - Some people prefer to see only the low five periods.
- LC/J D N Correlation - Correlating LC dates with the Julian Day Number series is of importance when studying astronomical events. The two most common correlations are built into the program and can be toggled at will. You can define any other desired correlation value and select it along with the others using the function keys.
- LC/CR Correlation - This sets the correlation of the Long Count with the Calendar Round. There is much discussion about this subject, and this is not the place to debate the issue. You can select either of two standard interpretations, or generate any other at will.
- To set the current base LC with the current CR as displayed in the upper right Tzolkin/Haab section, press Shift+F12. This key sequence won't fit in the table.

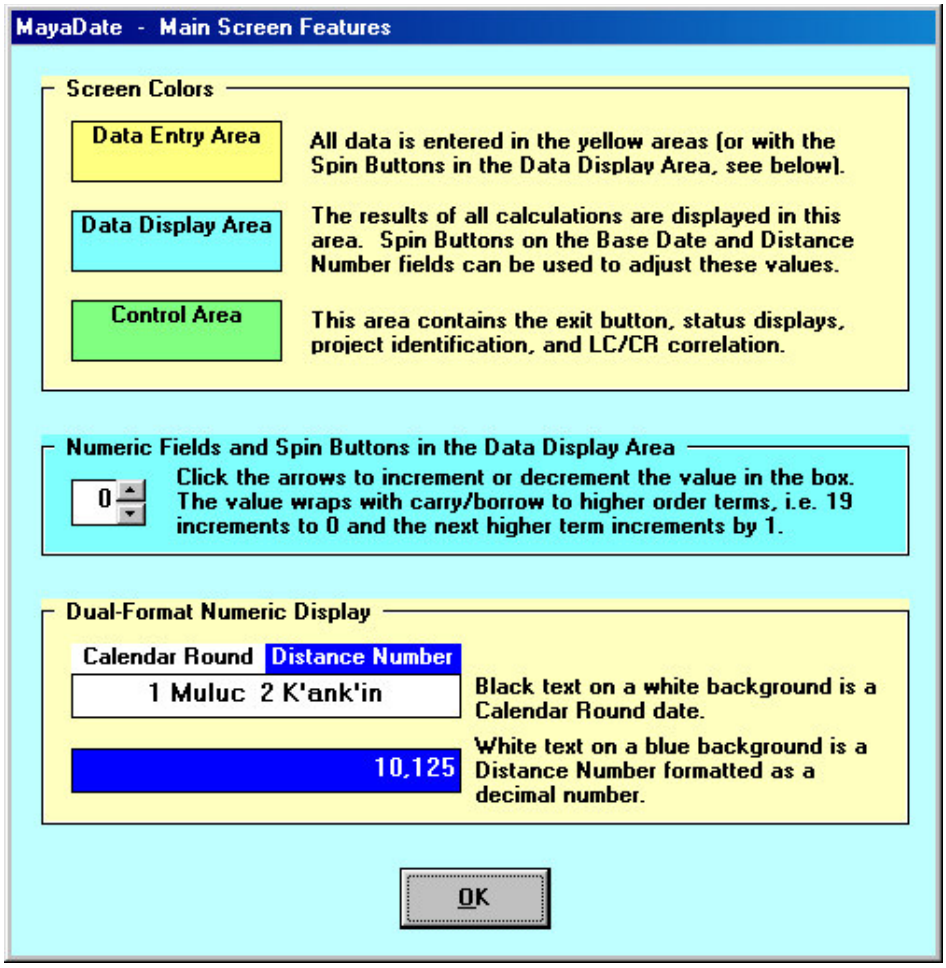
Back to Top

Main Screen - Help Menu

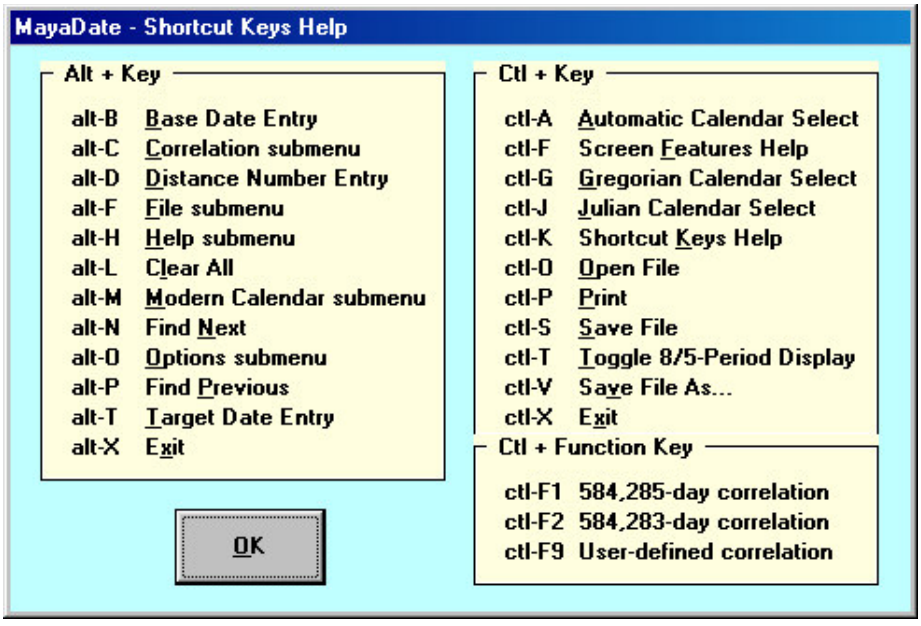


The View User's Manual selection brings up a dialog which lets you view this help document as a stand-alone presentation (e-book) or as an HTML document in your browser. Select the browser option if you want a hard copy.

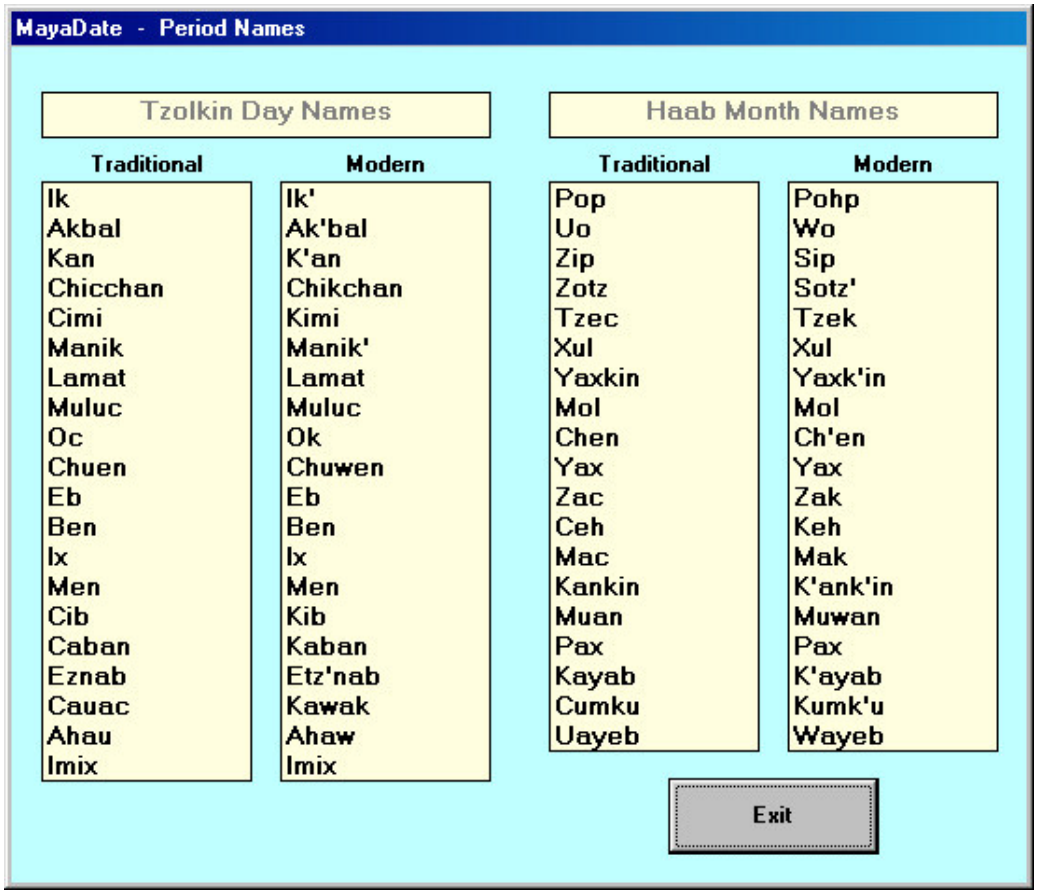
The Screen Features window is accessed with Control+F7:



The Shortcut Keys window is accessed with Control+F8:



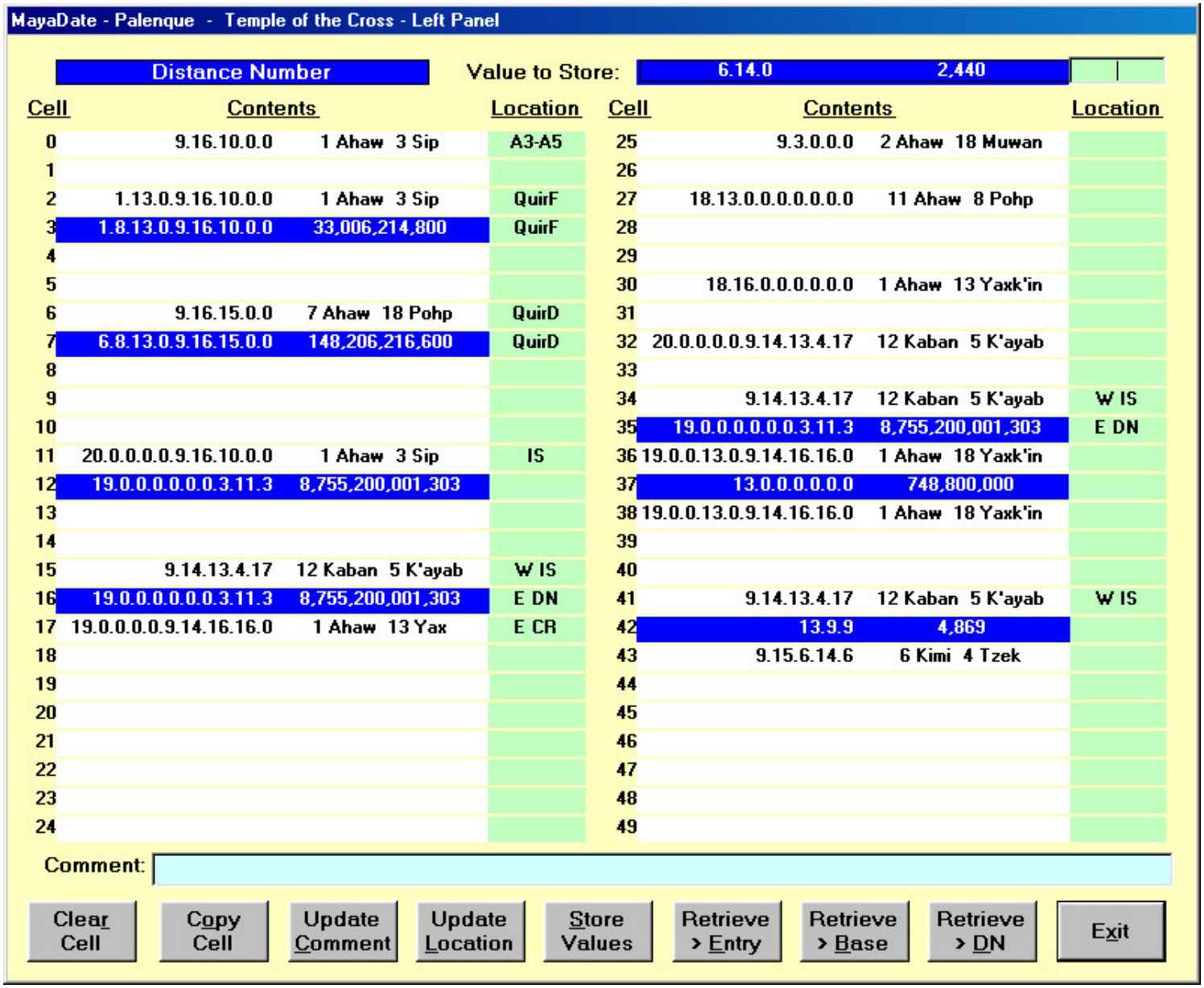
The Period Names window is accessed by pressing Ctrl+F5:



The About screen just shows the program ID. I don't bother to show it here.

Back to Top

The Memory Screen



The Memory Screen is a place to store Long Counts and Distance Numbers. There are 50 memory cells which can hold either type of data in any desired order. **Distance Numbers** are shown as white text on a blue background. Long Counts are shown black on white.

You access the Memory Screen by pressing one of the four **Mem** buttons in the Calculation Area of the Main Screen. The LC and CR (or DN) from that row is transferred to the Memory Screen and appears as the "Value to Store".

The entire content of the Memory is saved and recalled with the Project data.

The content of the Main Screen Comment field appears in the window title bar as a reminder of the data set in use.

Displayed Fields

There are three fields in the top row, of which two are read-only. The third (the green box on the right) is used for data entry, and is described in that section.

- The left-hand field will display the source of the data, based on which button you used to access the

screen. Possible contents are **Base Date**, **Distance Number**, **Base + Distance**, or **Base - Distance**.
- The field following **Value to Store:** shows the value transferred from the Main Screen. If it's a **DN** it will be shown as white on blue, and the right-hand sub-field will show the decimal value. Otherwise the content will be displayed black on white, and the right-hand sub-field will show the modern date or J D N equivalent.

The middle area contains the 50 memory cells. All are identical. There's no difference in what they contain or how they are used. As described above, DNs will display as white text on blue. All other content is black on white. The small green box to the right of each cell is intended to contain the location of the data, but can contain any desired text.

Each cell has an associated comment field. The last display line, above the control buttons, has a long green text box labeled "Comment". Whenever you click on a cell, its comment will be displayed here. The comment also shows in a floating text box if you hover the mouse cursor over a cell without clicking on it.

This line will change to a red box with white text as a warning if you activate the "Copy Cell" function. See the discussion in the Controls section below.

There are two suggested formats for organizing the memory content:

- Alternately entering LCs and DNs, one after the other, filling the first column and continuing in the second.
- Putting each LCs in a cell in the left-hand column and its following DN in the right-hand column.

NOTE: If you change the LC/CR correlation in the main program after storing values in memory, the CR values shown on the Memory Screen will no longer be correct. In all cases the LC is the value retrieved from memory, and the new correct CR correlation will be displayed on the Main Screen.
This will be changed in the next release because I don't like it.

Data Entry

NOTE: It's very iimportant that you click on the desired target cell before entering data or executing any function. There is no "undo" option available. New data will overwrite the previous cell content. The previous data cannot be restored.

When you click on a cell to select it, the content of its Location and Comment fields are transferred to the two data input boxes: the Location to the box at the upper right and the Comment to the box above the buttons. This data will overwrite any data which you may have typed before selecting the cell.

After selecting the target cell, type any desired information into the Location and Comment fields. Then click on the Store button to save the entry. If the data is a negative Distance Number, you can prefix the Location text with a minus sign to remind yourself of that fact.

Controls

The nine control buttons are described below, divided into two groups: Content Manipulation Buttons and Retrieval and Exit Buttons. All buttons have Alt+key shortcuts as noted.

Content Manipulation Buttons

Alt+	Caption	Function
R	Clear Cell	Clear all data from the selected cell.

Alt+	Caption	Function
O	Copy Cell	Copy the selected cell to a new cell. See instructions below.
C	Update Comment	Paste the entered comment to the selected cell.
L	Update Location	Paste the entered location to the selected cell.
S	Store Values	Paste the data from the Main Screen plus your added location and comment fields to the selected cell.

Retrieval and Exit Buttons

Alt+	Caption	Function
E	Retrieve > Entry	Return and paste the selected data in the data entry box.
B	Retrieve > Base	Return and paste the selected data as the Base Date.
D	Retrieve > DN	Return and paste the selected data as the **Distance Number**.
X	Exit	Return to the Main Screen without changing anything there.

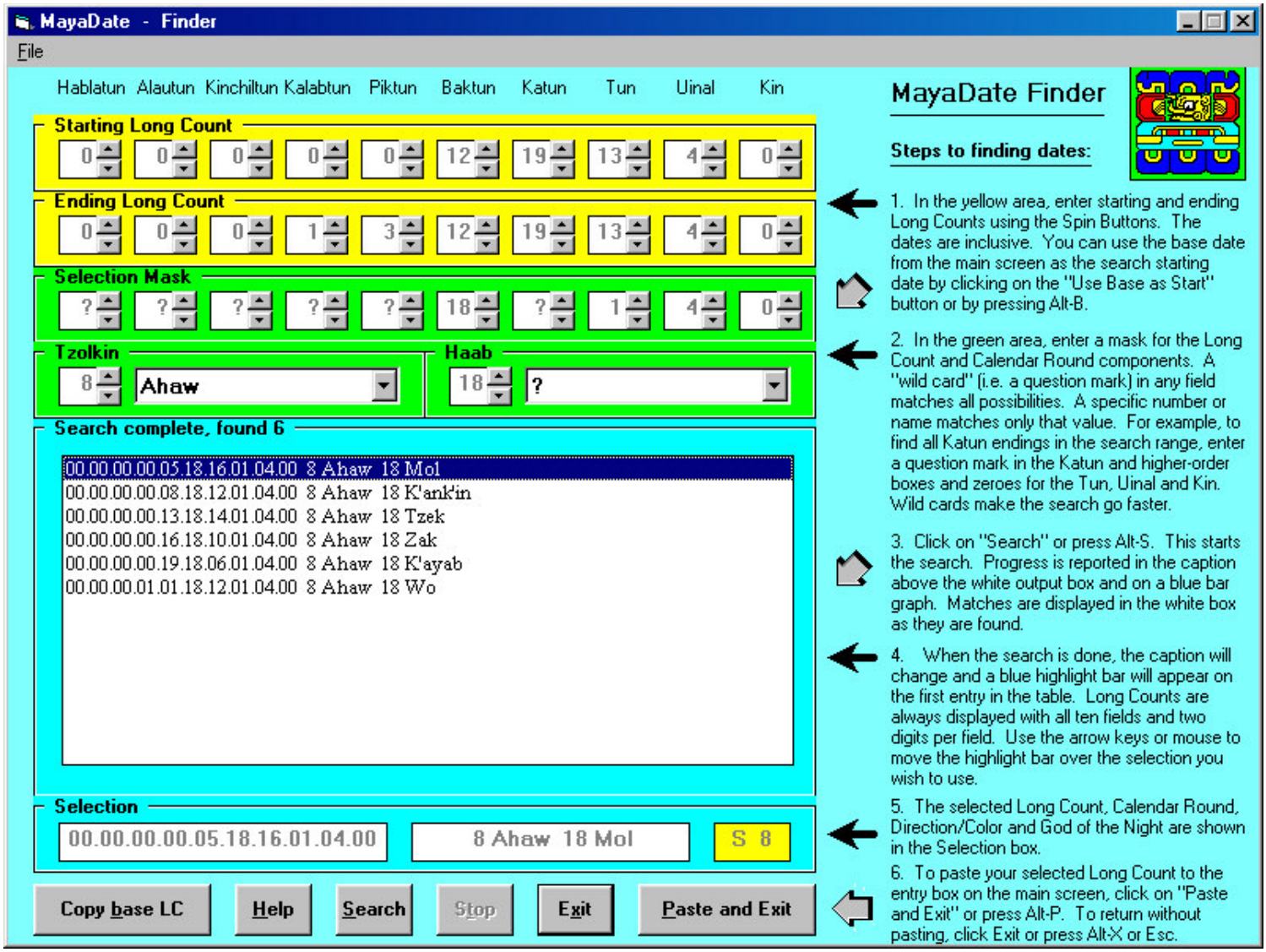
The Copy Cell function requires a sequence of operations:

1. Select the cell to be copied by clicking on it.
2. Click the Copy Cell button. Note the red warning message.
3. Double-click on the target cell.
4. If you change your mind, single-click on any cell or on the Exit button to abort the operation.
5. The red warning message disappears.

The timing of the double-click is operating system dependant, and subject to local setup options which are outside the control of the program author. Experimentation may be required to determine the proper timing.

Back to Top

The Finder Screen



The Finder is used to find Long Counts which match a particular pattern or a given Calendar Round, which may be partial or complete. This function is of great value when working with effaced or partial inscriptions.

Full instructions are presented on the page, as shown above. Basic operation is described below.

Displayed Fields

The upper area of the screen (yellow and green backgrounds) is used for entering the search parameters.

The lower area displays the results of the search in two boxes. The large one shows every match, adding a scroll bar if needed. During the search, the frame labeled Selection contains a progress bar.

When the search is completed a highlight bar appears over the first entry in this box. You can move the highlight bar with the up and down arrow keys or with the mouse, using the scroll bar if needed.

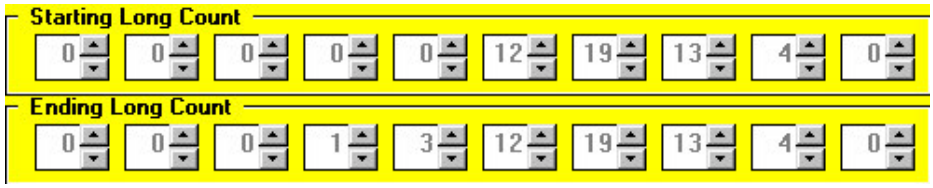
Additional information about the highlighted entry appears in the small box at the right side of the Selection frame. This includes the direction (N, S, E, or W), the color (as the box background),

and the God of the night.

Data Entry

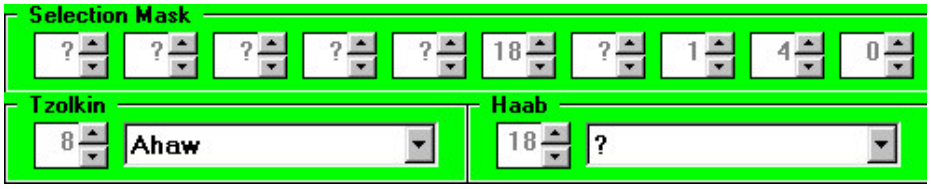
Two sets of data are required to perform a search:

1. The start and end LCs (inclusive values) which define the range to be searched
2. The search target LC and/or CR (full or partial)



The start and end LCs are entered in the two top rows (yellow background). You can copy the Base Date from the Main Screen into both rows by clicking on the **Copy Base LC** button in the lower left corner. This provides a convenient starting point, minimizing the number of mouse clicks required.

Note that on this screen the spin buttons do not propagate to higher-order periods. Wrapping through zero or maximum value only affects that digit.



The two rows in the middle (green background) contain the search target. The upper row is the LC **Selection Mask**. A question mark in a period matches any value in the search results. A specific number matches only that value. For example, if you want only LCs with a **Kin** value of 0, put a 0 in the **Kin** position of the mask.

On the sample screen above, we've constrained four of the LC periods as follows:

- Baktuns = 18
- Tuns = 1
- Uinals = 4
- Kins = 1

The search results will only have LCs which contain all four of these values.

The next row contains masks for the Tzolkin and Haab. As with the LC, a question mark will match any value. Question marks can appear in all, some, or none of the four terms.

Controls

The Finder Screen has six control buttons as described below. All buttons have Alt+key shortcuts as noted.

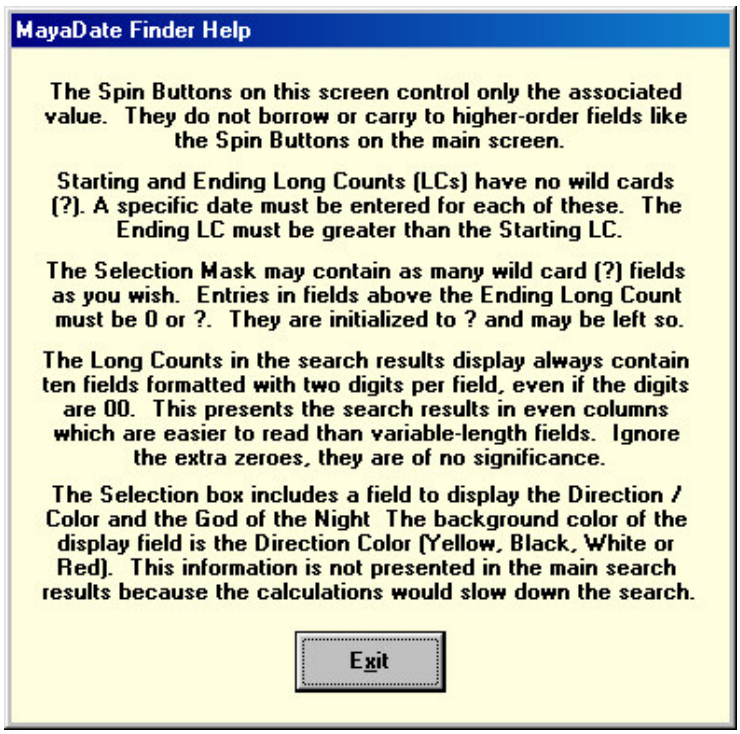
Alt+	Caption	Function (See notes below)
B	Copy base LC	Copy the base LC from the Main Screen to both the start and end LC.

Alt+	Caption	Function (See notes below)
H	Help	Bring up a brief help screen as shown below.
S	Search	Start the search.
T	Stop	Interrupt the search. Only available while search is active.
X	Exit	Exit making no changes to the Main Screen. (The ESC key also exits.)
P	Paste and Exit	Exit and paste the selected data to the data entry box on the Main Screen.

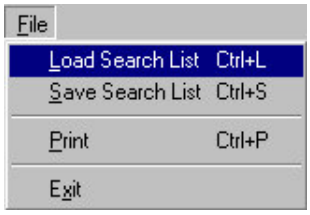
Notes

- All controls except Stop are available except while a search is in progress.
- Only the Stop function is available during a search. If you stop a search, all results up to that point are available. However, if you restart, those results will be discarded and a new search will begin.
- Information on the Finder Screen is persistent. You can exit the screen, then return to find it in the same state. However, this information is not retained through a program exit and restart.

The Finder Help screen:



Finder Screen - File Menu



The File menu provides the following options:

Alt+	Ctrl+	Name	Description (See notes below)
L	L	Load Search List	Load the search parameters from disk.
S	S	Save Search List	Save the search parameters to disk with an MDFI extension.
P	P	Print	Print the search results.
X	X	Exit	Return to Main Screen. (same as Exit button)

Notes

- The Load and Save functions operate only on the contents of the Search results box. The search parameters are not saved nor restored.

Back to Top

Tutorial - General Concepts

Positional arithmetic

The base of the Mayan arithmetic system is 20, rather than 10 which we use. A single Mayan digit can express any value from 0 through 19 inclusive. For multi-digit numbers, the lowest digit appears on the right, with higher-order digits to the left, just as in our decimal system. (This is our modern convention. Exceptions appear in the actual inscriptions, where associated period or unit glyphs eliminate ambiguity.)

The right-most digit can hold values from 0 to 19. If you have 19 and add 1, the right-most digit returns to zero and the next higher digit increments to 1. So each unit in that position must have a value of 20. In similar fashion, higher digits have values of **400, 8,000, 160,000,** etc. The value of one unit in the tenth position is **460,800,000,000.**

Notational conventions

We have a problem writing Mayan numbers because we have no way to express the higher values of a digit, from 10 through 19. Our solution to the problem is to use a two-digit decimal number from 0 to 19 for each Mayan digit. We separate adjacent numbers with periods for clarity.

For example, a two-digit Mayan number might have a decimal value of 36. The lower digit would be 16 (=36-20), while the upper digit would be 1. We would write this number as **1.16** with a period separating the two decimal values.

A leading zero on values less than 10 is optional but desirable. So **1.16** and **01.16** mean the same thing. In keeping with standard practice, all **LC**s in this document will use the leading zero convention, and will be presented as five Mayan digits, thus: **01.02.03.04.05** with appropriate values.

Back to Top

Tutorial - Calendric periods

The Mayan calendar consists of several independent major and minor periods, all running concurrently. We have the same situation in our modern world, with the Gregorian, Chinese,

Jewish, and other calendars all advancing in lock step. We're generally not as aware of this situation as the Maya were.

The Long Count

Definition: The **Long Count** is the number of days which have elapsed from some date in antiquity, continuing into the far future.

The preceding comments apply directly to the expression of dates in the **Long Count**. The **LC** is just a number expressed in standard form. The least-significant digit equals one day (a **Kin** in Maya), the next higher digit equals 20 days (a **Uinal**), etc.

However, the Maya threw us a curve, just so we wouldn't get too cockey. Each Mayan digit in the **LC** can have a value from 0 through 19 **with one exception**. The second digit from the right only goes from 0 to 17. The two low-order digits can have values from **00.00** through **17.19** inclusive. So the **LC** date following **00.00.00.17.19** is **00.00.01.00.00**

Limiting the number of **Uinal**s to 18 divides the **LC** into "years" of 360 days (18 months of 20 days). This is one of several fundamental periods of the Mayan calendar. The 360-day year is named the **Tun**. Thus an **LC** of **00.00.01.00.00** equals 360 days, **00.00.02.00.00** equals 720 days (2 times 360), and **00.01.00.00.00** equals 7200 days (20 times 360).

[nb. We have exactly the same numeration in use today, known as the Julian Day Number. This is a linear day count with an origin in the year 4713 BC.]

Distance Numbers

Definition: A **Distance Number** is an absolute count of days.

The **DN** is expressed in exactly the same form as the **LC**, including the limit of 18 periods for the second unit. Thus, **LC**s and **DN**s can be added and subtracted like any other numbers.

The Calendar Round

Definition: The **Calendar Round** is a period of 18,980 days (52 years of 365 days) which is created by the junction of two separate calendars, the **Tzolkin** and the **Haab**, running concurrently.

Definition: The **Tzolkin** is a 260-day period consisting of 13 months of 20 days each.

Definition: The **Haab** is a 365-day period consisting of 18 months of 20 days plus one month of 5 days.

The number of possible combinations of these two calendars is 260 * 365 = 94,900. Dividing out the common factor of 5 yields a period length of 18,980 days, or 52 365-day years. This value is very important because it represents the ambiguity of the **CR** dates expressed in the inscriptions when no **LC** is present.

Back to Top

Tutorial - Main Screen Operations

The vast majority of operations on the Main Screen follow a five-step sequence:

1. Enter the **Base Date**
2. Enter the **Distance Number**
3. Determine whether the sum or difference is desired
4. Click on the appropriate **>Base** button
5. Repeat from step 2 as often as necessary

If Auto-Print is enabled, step 4 will initiate an Auto-Print event.

Other functions available from this screen include:

- Invoke the Memory Screen by clicking on any of the four **Mem** buttons.
- Invoke the Finder Screen by pressing **Ctrl+F**.

Back to Top

Auto-Print

The Auto-Print function is used to record the sequence of calculations in a format similar to that of the original inscriptions. Unlike the Print Screen function, Auto-Print does not require a graphic-capable printer. All output is text.

Each time you click either of the >Base buttons at the left end of the sum and difference rows, you initiate an Auto-Print event. This causes the current base date, the distance number, and the sum or difference thereof, to be printed.

The printout looks like this:

```
Output of MayaDate 4.00.03 (04 Mar 2007), printed 08 Mar 2007 5:03 PM

Demonstration screen

LC/CR Correlation: 0.0.0.0.0 = 4 Ahaw 8 Kumk'u

 ---------- Current Calculations (AutoPrint Mode) ----------

                                0    4 Ahaw  8 Kumk'u          8 Sep 3,114 BC
                  11. 0. 0. 0. 0 +
   ----------------------------
                  11. 0. 0. 0. 0 =  6 Ahaw  8 Mak            11 Jun 1,224 AD
                  11. 0. 0. 0. 0 +
   ----------------------------
                1. 2. 0. 0. 0. 0 =  8 Ahaw  8 Mol            13 Mar 5,561 AD
                  11. 0. 0. 0. 0 +
   ----------------------------
                1.13. 0. 0. 0. 0 =  10 Ahaw  8 Sip           14 Dec 9,897 AD
```

The two lines above "Current Calculations" are taken from the Information area of the Main Screen, as described previously.

Back to Top

Print Current Values

The Print Current Values function is used to record the current calculations in a concise format. Unlike the Print Screen function, Print Current Values does not require a graphic-capable printer. All output is text.

The printout looks like this:

```
Output of MayaDate 4.00.03 (04 Mar 2007), printed 08 Mar 2007 6:09 PM

Demonstration screen

LC/CR Correlation: 0.0.0.0.0 = 4 Ahaw 8 Kumk'u

--- Distance Number Calculations ------------------- (Julian 584,285)

Sum:
                              0    4 Ahaw  8 Kumk'u         8 Sep 3,114 BC
                              1 +
   ----------------------------
                              1 =  5 Imix  9 Kumk'u         9 Sep 3,114 BC


Difference:
                              0    4 Ahaw  8 Kumk'u         8 Sep 3,114 BC
                              1 -
   ----------------------------
   19.19.19.19.19.19.19.19.17.19 =  3 Kawak  7 Kumk'u        7 Sep 3,114 BC
```

The two lines above "Current Calculations" are taken from the Information area of the Main Screen, as described previously.

Back to Top

Tutorial – How Do I...

This section describes methods for performing common tasks.

Note that all CR presentations depend on the LC / CR correlation setting. The displayed values will change if that correlation is changed.

Back to Top

How Do I... Find the CR corresponding to a given LC

- Enter the LC in the text box and click Base Date or press Alt+B.

The LC and its associated CR appear in the top tier of the Calculation Area. The minor periods appear in the lower associated tiers.

Back to Top

How Do I... Find the first CR before or after a given LC

1. Enter the LC in the text box and click Base Date or press Alt+B.
2. Enter the CR in the Tzolkin and Haab entry areas.
3. Click on Next LC or press Alt+N to find the first CR after the LC.
4. Click on Prior LC or press Alt+R to find the first CR before the LC.

The LC and its associated CR appear in the Base + Distance row of the Calculation Area.

You can walk through all possible LCs corresponding to this CR by clicking on DN + 18980 or DN – 18980, which increment or decrement the DN in 52-year intervals. While this works for a few periods, it's inconvenient for analyzing a wide range of dates. For this you should use the Finder (press Ctrl+F).

Back to Top

How Do I... Add and subtract LCs

Since an LC and a DN have exactly the same form

1. Enter one as the Base Date (click on Base Date or press Alt+B).
2. Enter the other one as the Distance Number (Distance Nr or Alt+D).

The sum and difference with their minor periods are displayed in the Base + Distance and Base – Distance rows.

Back to Top

How Do I... Find all LCs for a given CR

This is the purpose of the Finder Screen. It enables you to enter a desired target CR (complete or partial), a range of LCs to be searched, and an LC mask to constrain the values of the LC periods. Refer to the Finder Screen documentation for further information.

Back to Top

How Do I... Find possible CRs for a partial LC

This is the another function of the Finder Screen. Refer to the Finder Screen documentation for further information.

Back to Top

How Do I... Calculate the distance between two CRs

The distance between two CRs is always a constant, regardless of the associated LC (if such exists at all). However, since the CR is a continuous cycle (envision a circle), there are two numbers, one going "clockwise" and one going "counter-clockwise" ("anti-clockwise" for our British friends). MayaDate can calculate both of these.

The LC used for the calculations is completely irrelevant. It can be any value or zero. However, a value greater than 18980 (**00.02.12.13.00** in dotted decimal) will prevent arithmetic underflow and red text. Set the base LC if desired before proceeding.

1. Enter one CR in the Tzolkin and Haab areas.
2. Click on Next LC or press Alt+N.
3. Click on the >Base button at the left end of the Base + Distance row.
4. Enter the other CR in the Tzolkin and Haab areas.
5. Click on Next LC or press Alt+N to calculate one Distance Number.
6. Click on Priot LC or press Alt+R to calculate the other Distance Number

The Distance Number is displayed in the second row of the Calculation Area in both dotted decimal and decimal integer formats.

Back to Top

How Do I... Find the modern date for a Mayan date

The modern calendar date is dislayed on the lower tier for each of the three base date rows, in the left-most column. That column will have a caption of Gregorian, Julian, or J D N depending on which format has been selected in the Options Menu. For the Julian and Gregorian calendars, the correlation constant is displayed in parenthesis.

However, it must be emphasized that these are approximations, and you should not bet the ranch or anything else important on these values. See the Appendix for a discussion of this topic.

If an accurate date is required for determining astronomical events or similar purposes, use the Julian Day Number, which is what MayaDate uses internally. It should agree with other peoples' calculations exactly.

Back to Top

How Do I... Find the minor associations for an LC

The miscellaneous associations are all shown in the Calculation Area for all three rows involving the Base date. No special operations are required to view these periods.

Back to Top

Appendix - Correlating Modern Calendars with the Mayan Calendar

It's not possible to properly correlate our modern Gregorian calendar with the Mayan calendar because our understanding of the Gregorian calendar is wrong.

The Gregorian calendar was devised to bring the date of Easter back to its proper place in the astronomical year. In order to accomplish this, the year of adoption (1582) had only 355 days, with ten days being removed from October. As a result, Thursday October 4th in the Julian calendar was followed immediately by Friday October 15th in the Gregorian. Because of this, attempts to calculate dates spanning centuries by simply multiplying the year length by the number of years will fail.

Following common custom, the Gregorian date calculations in MayaDate do not properly subtract this ten-day interval. As a result, the program agrees with most other calculations, which are uniformly wrong. I chose this approach because I'm tired of answering emails from people who don't understand the Gregorian calendar in the first place.

The Gregorian calendar was adopted by different countries at different times over the next 350 years. So trying to correlate a given Mayan date with a calendar in use elsewhere requires some research. Although the dates of adoption of the Gregorian calendar postdate the Mayan inscriptions in all cases, confusion can arise when trying to work backward from a more modern event to one in contemporary Mayan history, or when trying to project the Mayan calendar forward to today.

Lastly we must deal with the problem of proleptic dates. A proleptic date is one expressed in a calendar before that calendar was created. For example, any date before October of 1582 is proleptic in the Gregorian calendar. Our modern computers are capable of projecting dates backward or forward as far as we may wish. But dates recorded in ancient non-Mayan texts may be expressed in the Julian or Gregorian calendar, according to the practice of the author and the

locale, and cannot be relied upon for astronomical accuracy without further corroboration.

Back to Top

Appendix - Period Names and Spellings

There are two sets of spellings in common use for the 20 Tzolkin day names and the 19 Haab month names. Each of these is shown in the following table. When entering CRs in text form, the spelling must match the chosen lexicon exactly, including apostophes (') and upper or lower case.

Tzolkin Days		Haab Months	
Traditional	**Modern**	**Traditional**	**Modern**
Ik	Ik'	Pop	Pohp
Akbal	Ak'bal	Uo	Wo
Kan	K'an	Zip	Sip
Chicchan	Chikchan	Zotz	Sotz'
Cimi	Kimi	Tzec	Tzek
Manik	Manik'	Xul	Xul
Lamat	Lamat	Yaxkin	Yaxk'in
Muluc	Muluc	Mol	Mol
Oc	Ok	Chen	Ch'en
Chuen	Chuwen	Yax	Yax
Eb	Eb	Zac	Zak
Ben	Ben	Ceh	Keh
Ix	Ix	Mac	Mak
Men	Men	Kankin	K'ank'in
Cib	Kib	Muan	Muwan
Caban	Kaban	Pax	Pax
Eznab	Etz'nab	Kayab	K'ayab
Cauac	Kawak	Cumku	Kumk'u
Ahau	Ahaw	Uayeb	Wayeb
Imix	Imix		

Back to Top