

# **GreekKeys Unicode 2008**

## **USER'S GUIDE**

by Donald Mastronarde

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Donald Mastronarde, January 2008

ADDENDUM May 2008: A key potential incompatibility of Mac and Windows input (diaeresis plus accent on iota or upsilon) is no longer a problem thanks to a suggestion from Joop Jagers.

## Table of Contents

<b>Part I: Introduction</b> .....	1
1. What Is Greekkeys Unicode 2008?.....	1
2. What Is Unicode?.....	1
2.A. Unicode.....	1
2.B. The Problem of Keyboarding.....	2
2.C. The Problem of Precomposed Vs. Decomposed.....	2
2. D. The Problem of Duplicate Code Points .....	3
3. System Requirements and Contents of Package.....	4
3.A. System Requirements .....	4
3.B. Contents of the GreekKeys 2008 Package .....	4
4. Archiving The GreekKeys 2008 Files .....	5
<b>Part II: GreekKeys 2008 For Mac OS X</b> .....	6
5. Installation And Activation of GreekKeys Unicode (Mac OS X) .....	6
5.A. If You Are Upgrading from the GreekKeys 2005 Version .....	6
5.B. Running The Installer .....	6
5.C. Activation of GreekKeys Unicode Input .....	7
5.D. Font Installation .....	9
6. Typing with GreekKeys Unicode Input (Mac OS X) .....	10
6.A. Introduction.....	10
6.B. Deadkeys: Combining Elements to be Typed before the Vowel .....	10
6.C. Additional Diacritics and Special Characters .....	11
6.D. Using the Character Palette or Unicode Hex Input.....	13
6.E. Using the Keyboard Viewer .....	14
6.F. If You Are in Transition from Traditional GreekKeys .....	15
7. For Advanced Users Only: Decomposed Inputs for Mac Os X .....	16
8. Traditional GreekKeys In Mac Os X (Deprecated) .....	17
9. Working with Unicode Input in Mac Os X .....	18
10. Converting from Traditional GreekKeys to Unicode.....	20
11. GreekKeys Symbol Input for Mac Os X.....	22
12. Compatibility With OS X Applications .....	22
<b>Part III: GreekKeys 2008 for Windows</b> .....	23
13. Installation and Activation of GreekKeys Unicode (Windows).....	23
13.A. If You Are Upgrading from a Testing Version of GKU for Windows .....	23
13.B. Running the Installer.....	23
13.C. Activation Of GKU Windows Keyboard.....	23
13.D. Font Installation.....	27
14. Typing with GreekKeys Unicode Keyboard (Windows) .....	28
14.A. Introduction.....	28
14.B. Plain Greek Characters .....	28
14.C. Diacritics And Special Characters.....	28
15. Deadkey Method (Press Key before the Letter to be Modified) .....	29
16. What Cannot Be Entered with the Deadkey Method Alone.....	30

17. Other Characters Accessible from the GKU Windows Keyboard .....	30
18. For Advanced Users Only: Combining Diacritic Method (Press Key after the Letter to be Modified).....	32
19. The GreekKeys Symbol Keyboards For Windows.....	35
20. Typing in Windows with More than One Greek Keyboard .....	36
21. Additional Ways to Input Unicode in Windows.....	37
<b>Part IV: Fonts</b> .....	39
22. The APA GreekKeys Unicode Fonts .....	39
22.A. The Four Unicode Fonts of GreekKeys 2008 .....	39
22.B. Smart Font Features .....	41
22.C. How to Make OpenType Ligatures Appear in Word 2008 for Mac OS X.....	42
<b>Appendix I: Traditional OS 9 GreekKeys (Deprecated)</b> .....	44
<b>Appendix II: Private Use Area Code Points in APA Unicode Fonts</b> .....	45
<b>Appendix III: Compatibility Issues and Workarounds</b> .....	53
A. RTF vs. DOC Format .....	53
B. Using Precomposed Input and Private Use Area .....	53
C. Using GreekKeysConverter .....	54
<b>Appendix IV: Roman Vowels with Macron</b> .....	55

## Part I: Introduction

### 1. What is GreekKeys Unicode 2008?

GreekKeys Unicode 2008 (or, for short, GreekKeys 2008) is the successor product to GreekKeys, a custom keyboard input and font encoding used on the Macintosh since its introduction in the 1980s. GreekKeys was designed by George B. Walsh. After his death, it was donated to the American Philological Association and maintained by Jeffrey Rusten until 2001. Since 2001 GreekKeys has been maintained by Donald Mastronarde, who is the creator of GreekKeys Unicode.

GreekKeys 2008 is a keyboard and font package for polytonic Greek designed for the needs of scholars, teachers, and students. The keyboards input Greek that is encoded in accordance with the Unicode standard (an international standard that makes possible cross-platform compatibility in the display and printing of multilingual texts), and the fonts contain the accepted Unicode characters for polytonic Greek as well as many other characters needed by scholars, teachers, and students of the ancient Greek world. Users of the traditional GreekKeys Universal keyboard will find the arrangement to be the same in GreekKeys Unicode. New users will be able to learn the positions of characters and diacritics without difficulty.

GreekKeys 2008 is the successor product to GreekKeys 2005, with the major difference that GreekKeys 2005 was for Macs only, while GreekKeys 2008 contains keyboards for Macs and for Windows PCs.

### 2. What is Unicode?

#### 2.A. UNICODE

Unicode is an international standard for encoding of characters and other symbols used in writing systems and printing throughout the world. The standard is overseen by a consortium, and the major manufacturers of computers and operating systems are cooperating in its implementation. For more information, visit <http://www.unicode.org>. Each character or symbol accepted into the Unicode standard has a unique **code point** or digital identification. This is usually represented in hexadecimal notation, with the hexadecimal digits (0-9 and a-f) preceded by U+. Most characters are in the range represented by four hexadecimal digits (Basic Multilingual Plane = BMP = Plane 0), U+0000 through U+ffff; but some are now in the Supplementary Multilingual Plane (= SMP = Plane 1) with five digits. Thus lowercase alpha is U+03b1, the combination of lowercase alpha with acute accent and iota subscript is U+1fb4, and the Greek acrophonic Attic symbol for one hundred staters is U+10152.

Before widespread support of Unicode, representation of polytonic Greek on computers depended on a number of different and incompatible schemes, depending on the operating system and the software being used. Casual users had great difficulty in moving files containing Greek from one application to another or from one platform to another. This confusion of incompatible and custom encodings can now be avoided. Everyone using personal computers with Mac OS X, Windows, or Linux should abandon or avoid the use of obsolete fonts and keyboards that depend on encodings such as Traditional GreekKeys, SPionic, SuperGreek,

WinGreek, etc. Continued use of such encodings is a detriment to the exchange, dissemination, and long-term survivability of knowledge that all scholars should care about.

As of 2008 only poorly implemented or poorly updated software fails to support Unicode Greek, at least for the regular characters used in polytonic Greek as provided in two blocks of characters defined by Unicode versions 4.1 and 5.0.

While Unicode Greek is a wonderful advance, it is not perfect or free from problems, especially if one needs to push the limits of typography in the more specialized areas of scholarship. First, the initial design of the Greek block was imperfectly conceived. Second, the theory behind Unicode character construction (by the combination of a base character and one or more modifications, such as diacritics) is forward-looking and anticipates developments in fonts, operating systems, and software that are not yet broadly enough or well enough implemented. And this theory also sets high technological requirements on future scholarly fonts, so that it is more difficult for scholars to develop their own advanced fonts, while there is little motivation for the commercial vendors to meet the specialized needs of a relatively small group of users.

## 2.B. THE PROBLEM OF KEYBOARDING

Having a font with the needed characters encoded as Unicode is only half of the battle for users. The other half is having a convenient means to type the needed characters, one that will operate at a systemwide level and thus be available in all modern applications. GreekKeys 2008 provides such a means for Windows as well as for Mac OS X (whereas GreekKeys 2005 was for Mac only). This is an advance, but there will still be some areas of cross-platform discrepancies that the user of specialized characters will need to be aware of.

## 2.C. THE PROBLEM OF PRECOMPOSED VS. DECOMPOSED

Ancient Greek as used by scholars in modern printing and word-processing employs not only the plain letters of the Greek alphabet, but also letters that have been modified by diacritic or editorial marks of various kinds, such as breathing signs, accents, diaeresis, macron or breve symbol, and sublinear dot. Theoretically, if you want an omega with rough breathing, this is represented by two characters: U+03c9 (lowercase omega) and U+0314 (combining rough breathing). A combining character has no width of its own, but places itself in the same space as the previously entered character. Similarly, if you want a dotted lowercase beta, then this needs to be entered as two codepoints, U+03b2 (the beta) and U+0323 (the combining dot below diacritic). Or, if you want alpha with macron and smooth breathing and acute accent, this entails four Unicode characters: U+03b1 (alpha), U+0304 (combining macron), U+0313 (combining smooth breathing), U+0301 (combining acute accent). All of these are examples of composition of a complex character from several code points; such input is called decomposed. If you actually enter these codepoints with many fonts and applications, the result may be unattractive: the breathing might not be centered over the omega; the dot might not be centered under the beta or might intersect the descender; the diacritics over the alpha might overlap or be stacked vertically; in some fonts a diacritic may even appear incorrectly in its own space after the letter.

The solution to this difficulty is the definition of precomposed complex characters in Unicode, as an interim measure until decomposed representation is better supported. Unfortunately, only the first example, omega with rough breathing, is recognized in the Unicode

standard: the code point U+1f61 supplies this precomposed character. For the other two, the choice is between assigning a Private Use Area (PUA) code point to the precomposed character (which entails that there may be conflicts in the code point selected and that most fonts will lack that character anyway) or trying to work with the decomposed input. Currently, maximum cross-platform compatibility and compatibility with users who do not have the very latest software suggests the continued use of PUA code points. But decomposed input can provide good-looking input if used with a modern font that contains additional information about “ligatures” (the substitution of a single well-designed glyph for the combination of two or more code points) and the needed precomposed glyphs.

Because of the differences between Windows and Mac OS X, it has not been possible to make the keyboarding of the more specialized characters completely consistent. Nevertheless, if a Windows user follows the deadkey method with GreekKeys 2008, the input will be identical to what is produced by a Mac user for all the routine polytonic Greek combinations. Only the more complex combinations involving macron and breve plus other diacritics pose problems, since they cannot be handled in the same way in both keyboards. With Windows keyboard, alpha with macron and smooth and acute has to be input as a series of decomposed code points (if you use a font with the needed OpenType feature definitions, such as are found in GreekKeys 2008 Unicode fonts). In Mac OS X, the same combination is entered as a PUA code point (unless you make use of the experimental decomposed input instead of the regular GreekKeys Unicode input). If you are going to work cross-platform with specialized characters, please read Appendix III about compatibility issues and workarounds.

## 2. D. THE PROBLEM OF DUPLICATE CODE POINTS

Because at an early stage the Unicode standard provided only for monotonic Greek and the characters for polytonic Greek were added later, the current standard contains duplication of a number of characters on the now-abandoned assumption that the tonos printed on modern Greek vowels is distinct from the acute accent printed on ancient Greek vowels. (There have in fact been some fonts that make these two accents appear slightly differently.) This is now a deprecated distinction, and it is recommended that the duplicate characters be unified under the code point in the Greek block and that the duplicate code points in Greek Extended not be used. When consistency of typography really matters, it is advisable to avoid the use for Greek of fonts in which there is a visible difference; for instance, an older version of Apple’s Lucida Grande had a significant difference between tonos and acute, the version in 10.4 still had a slight difference, but in 10.5 there is no difference. Many older Microsoft fonts show a difference between tonos and acute, but newer versions do not.

Similarly, punctuation symbols have been unified, so that use of the specifically Greek middle dot and Greek question mark are now deprecated, with the standard code points in the first two blocks of Unicode preferred. In the GreekKeys fonts, the glyphs used for these two code points have always been identical in appearance. The GreekKeys Unicode inputs in GreekKeys 2005 and 2008 both use the recommended codepoints for the accented letters and the semicolon/question mark, but the Greek colon/middle dot was still input as U+0387 in GreekKeys 2005 while it is input as U+00b7 in GreekKeys 2008. Again, the glyphs have the same appearance.

Character	Duplicate Code Point: deprecated	Preferred Code Point
lowercase alpha + acute	1F71	03AC
uppercase alpha + acute	1FBB	0386
lowercase epsilon + acute	1F73	03AD
uppercase epsilon + acute	1FC9	0388
lowercase eta + acute	1F75	03AE
uppercase eta + acute	1FCB	0389
lowercase iota + acute	1F77	03AF
uppercase iota + acute	1FDB	038A
lowercase omicron + acute	1F79	03CC
uppercase omicron + acute	1FF9	038C
lowercase upsilon + acute	1F7B	03CD
uppercase upsilon + acute	1FEB	038E
lowercase omega + acute	1F7D	03CE
uppercase omega + acute	1FFB	038F
lowercase iota + diaeresis + acute	1FD3	0390
lowercase upsilon + diaeresis + acute	1FE3	03B0
Greek question mark (Latin semicolon)	037E	003B
Greek colon or high dot (Latin middle dot)	0387	00B7
Greek combining diaeresis with tonos/acute	0344	0308 + 0301

### 3. System Requirements and Contents of Package

#### 3.A. SYSTEM REQUIREMENTS

The Mac OS X inputs require a computer running 10.3.x or higher and work in Word 2004 or higher and in many other applications.

The Windows keyboards require Windows XP or Windows Vista or Windows 7, although they may work on an unsupported basis in some pre-XP versions of Windows as well.

The GreekKeys Unicode fonts for polytonic Greek work in Word 2004 and higher in Mac OS X and in Word 2003 and higher for Windows (they may work on an unsupported basis in some Windows versions of Word earlier than 2003). OpenType ligature features in the GreekKeys Unicode fonts work in Word 2008 in Mac OS X and in Word 2003 and higher for Windows (they may work on an unsupported basis in some Windows versions of Word earlier than 2003).

#### 3.B. CONTENTS OF THE GREEKKEYS 2008 PACKAGE

Keyboard inputs for Mac OS X:

Folder **GreekKeys Mac Installer** contains the standard Mac OS X installer package named **GreekKeysUnicode2008.mpkg** and a ReadMe document.

Folder **Keyboard Charts Mac** contains PDFs with keyboard charts showing the layout of the various keyboards, including the Unicode code point of the character on each key.

Keyboards for Windows:

Folder **GreekKeys Windows Installers** contains eleven subfolders for individual Microsoft Keyboard Layout Creator installers for nine localized Greek Unicode keyboards and for two keyboards to input special symbols used by Greek scholars.

Folder **Keyboard Charts Windows** contains PDFs with keyboard charts showing the layout of the various keyboards, including the Unicode code point of the character on each key.

Fonts:

Folder **Unicode Fonts** contains four TrueType Unicode fonts (New Athena Unicode, AttikaU, KadmosU, BosporosU) and some files documenting revision history of the fonts and characters present in New Athena Unicode, the most extensive font.

Deprecated Items:

“Deprecated” means that users are advised not to use these items any longer. They are obsolete and suffer from incompatibilities. They are provided in case they are still needed by users with particularly old computers and software that for some reason cannot yet be upgraded.

Folder **Deprecated Non-Unicode Font for Windows** contains the pre-Unicode Windows font Athenian for use in browsers only. This is for the convenience of users with older computers that are unable to run modern browsers that are able to use Unicode fonts for Greek.

Disk image **Deprecated Mac Items.dmg** contains some items that cannot be directly transmitted in the cross-platform ZIP archive used to deliver Greek Keys 2008. Double-click on the dmg file to mount a volume in which you will find two folders. The folder **Non-Unicode Fonts** contains the pre-Unicode GreekKeys fonts for use with Macs only. The folder **Deprecated OS9-Classic Keyboards** contains the old Mac resource files that may be used by anyone who can still run OS 9 or the Classic environment.

Other:

**ArchiveToCDInstructions.pdf** tells you how to create an archive CD on either platform that will be readable on both platforms.

**GreekKeys2008UsersGuide.pdf** provides full instructions on how to install the keyboards and fonts and how to use them and to work around problems.

**QuickStartMac.pdf** and **QuickStartWindows.pdf** provide very brief instructions on how to install the keyboards and fonts.

**GreekKeysLicenses.pdf** sets out the terms of use for purchasers of GreekKeys 2008.

## 4. Archiving the GreekKeys 2008 Files

If you did not purchase GreekKeys 2008 on CD, then please safeguard your downloaded package by burning a copy on a CD (see the document **ArchiveToCDInstructions.pdf**). The CD may then be used for additional installations on Macs or Windows computers (up to the number permitted by your license), repair after disk damage, or setup of a new computer. Do not move any files or folders within the downloaded package, especially within the Windows Installers folders.

## Part II: GreekKeys 2008 for Mac OS X

### 5. Installation and Activation of GreekKeys Unicode (Mac OS X)

#### 5.A. IF YOU ARE UPGRADING FROM THE GREEKKEYS 2005 VERSION

1. If you have GreekKeys Unicode from the GreekKeys 2005 package installed on your computer for use by all users (in the top-level Library folder), the installer will overwrite it, and you do not need to do anything before running the 2008 installer.

2. If you have GreekKeys Unicode from the GreekKeys 2005 package installed in your user's Library folder for use only by your own user, you should turn off the input(s) in System Preferences International and remove the file GKUall.bundle (version 2.1 or 2.0) from the Keyboard Layouts folder before running the 2008 installer.

#### 5.B. RUNNING THE INSTALLER

Installation is easily performed by a standard Mac OS X Installer package entitled **GreekKeysUnicode2008.mpkg**. This is located in the folder **GreekKeys Mac Installer**.

1. Save your work in other applications and quit them.
2. Double-click on **GreekKeysUnicode2008.mpkg** to launch the installer and follow the steps as explained on screen.
3. The default location of installation is the startup volume, but you may click on "Change Install Location..." to select another volume if you wish.
4. The default installation is for GreekKeys Unicode inputs only, but you may click on "Customize..." if you wish to install the deprecated Traditional GreekKeys keyboards (for use in OS X) or the experimental GKU decomposed inputs.
5. When the installer reports success, click on "Restart." (Or if you installed on a volume other than your startup volume click on "Close.")
6. After the restart, follow the steps for ACTIVATION, given below.

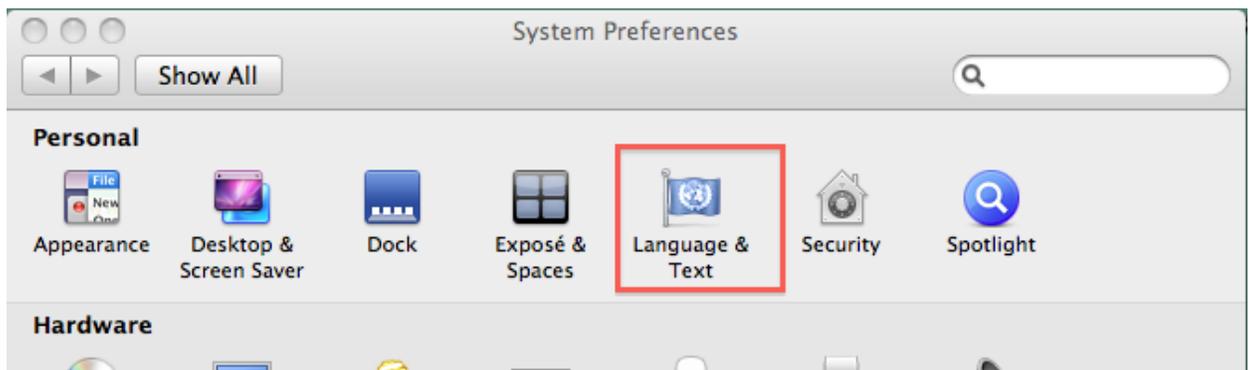
Location of installation: by default, the GreekKeys Unicode inputs are installed in **/Library/Keyboard Layouts** of the selected volume of your Mac and will be available to all users on that volume. If for some reason you wish to restrict the availability of these inputs to a single user, then drag the bundle file(s) out **/Library/Keyboard Layouts** and into **username/Library/Keyboard Layouts**, then log out and log in again.

What is installed: the default installation is named **GKUall.bundle**; the optional installations are named **GKUdcmp1.bundle** and **GKUdcmp2.bundle** and **GKTraditional.bundle**.

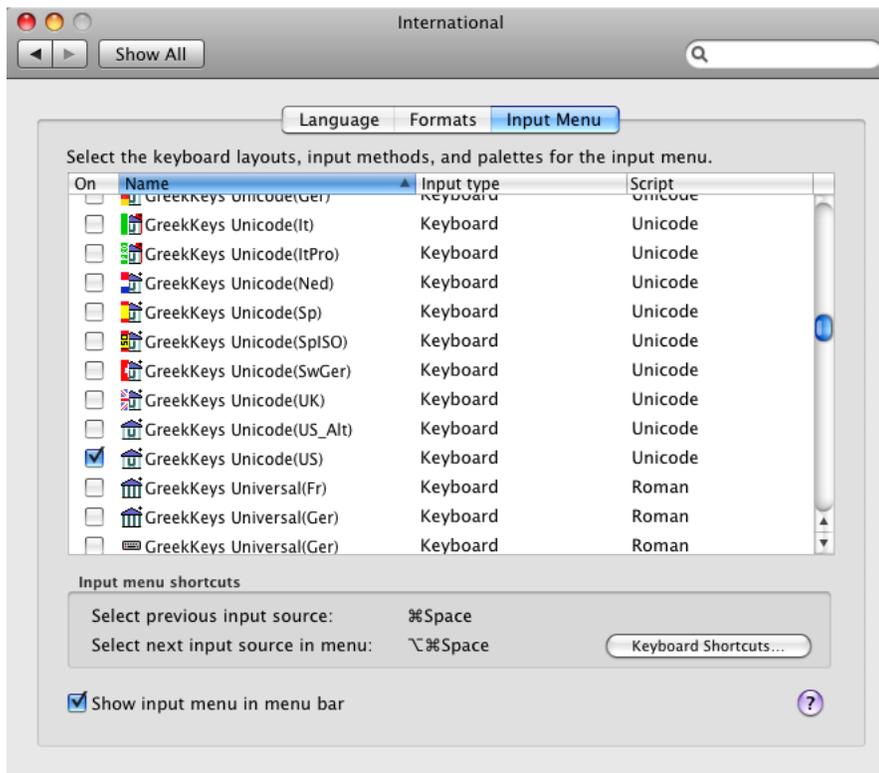
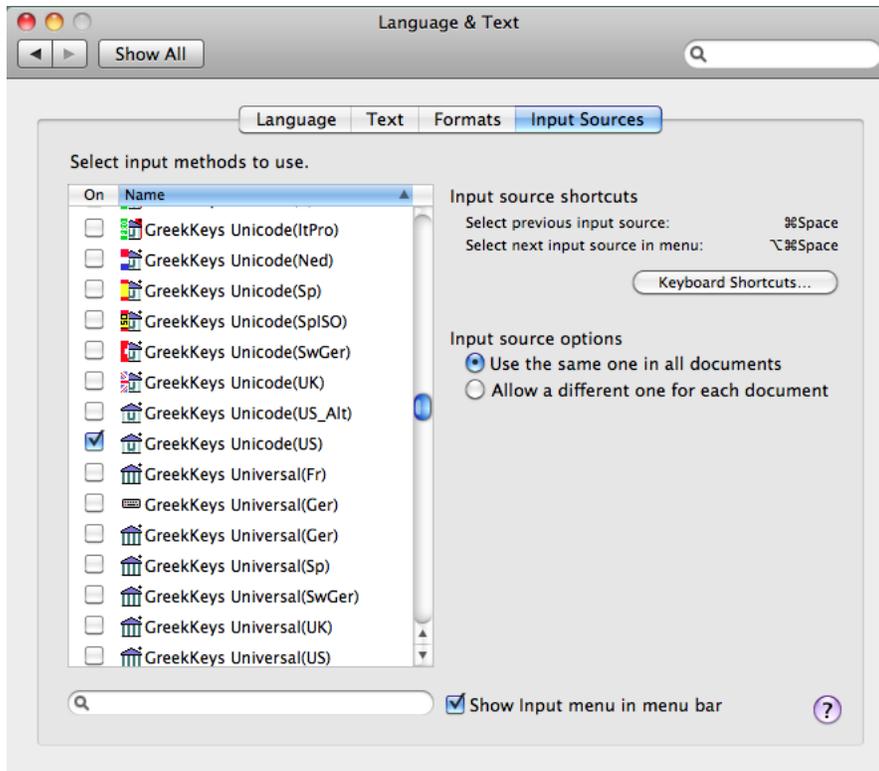
### 5.C. ACTIVATION OF GREEKKEYS UNICODE INPUT

NOTE: if you installed over GreekKeys Unicode from the 2005 release, then the input(s) you previously activated will still be activated, and you may skip this.

1. Be sure you have restarted after running the installer or installing manually.
2. Open System Preferences (from the Dock or under the Apple menu).
3. In the System Preferences window, click on Language & Text (Mac OS 10.6) or International (10.5 and earlier).

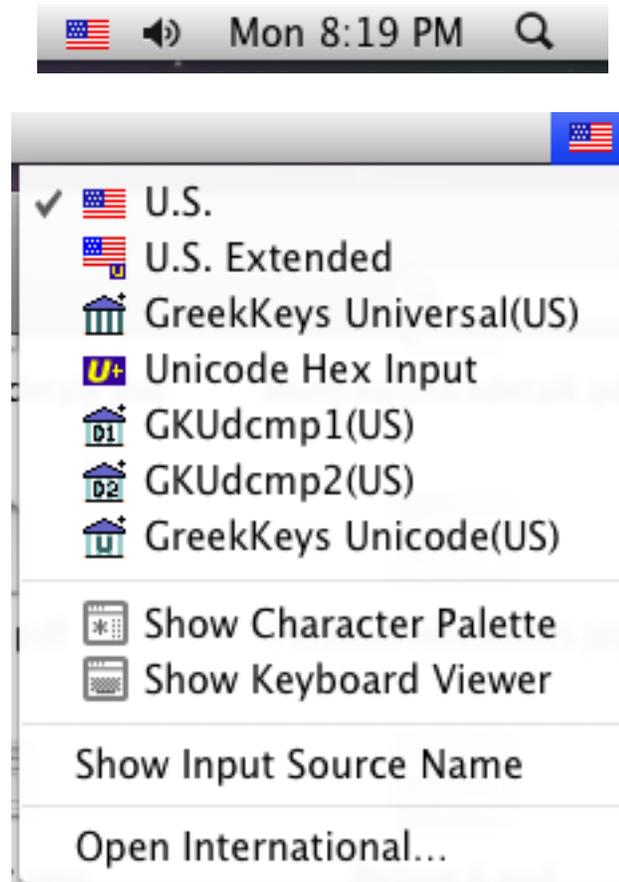


4. Select the Input Sources pane of Language & Text (10.6 or higher) or the Input Menu pane of International (10.5 or earlier).
5. Scroll through the list of inputs and enable the item or items you wish to use by checking the box in front of the name.



6. Make sure that “Show input menu in menu bar” is checked.

7. Close System Preferences. You should now see an input menu among those at the right side of the menubar. If your main language is US English, you will see a US flag, and if you open the menu you will see other choices, such as the Greek temple icon with superimposed U for GreekKeys Unicode(US).



#### 5.D. FONT INSTALLATION

To ensure that all font caches used by the system are updated properly, it is strongly recommended that you install fonts by using the application **FontBook.app** that is present in the **Applications** folder of your OS X Mac.

1. Save all your work in open applications and quit those applications.
2. If you have previously installed earlier versions of New Athena Unicode, AttikaU, BosphorosU, or KadmosU font, open FontBook, select All Fonts in the sidebar, and locate the old font(s). Select an old font and use the dropdown action menu (gear icon) to remove it.

3. Now select either User or Computer in the sidebar of FontBook’s window. If you select User, the new fonts will be available only to the active user. If you select Computer, the fonts will be available to all users of the computer.
4. Use the dropdown action menu (gear icon) to select the command “Add fonts...”
5. Select the folder **Unicode Fonts** in the GreekKeys 2008 package to install all four fonts, or select an individual font within it to install an individual font.

Location of installation: fonts are installed in **/Library/Fonts** if you chose Computer in step 3 or in **username/Library/Fonts** if you chose User in step 3.

What is installed: the names of the font files are **newathu.ttf**, **AttikaU9reg.ttf**, **BosporosU7reg.ttf**, **KadmosU11reg.ttf**, while the names of the fonts themselves in font lists are **New Athena Unicode**, **AttikaU**, **BosporosU**, **KadmosU**.

## 6. TYPING WITH GREEKKEYS UNICODE INPUT (MAC OS X)

### 6.A. INTRODUCTION

Most users will be typing in two languages and scripts, their native modern language and polytonic Greek. You must change the selected input in the Input Menu every time you switch from one script to the other (you do not always have to change the font, but it is often a good idea to do so: see below). It is far more efficient to use a keyboard shortcut to switch inputs than to make the change in the Input Menu with the mouse. For details about the use of the keyboard shortcuts, see the Section 9 below, Working with Unicode Input.

For reference and ease of learning, it may be helpful to print out the keyboard chart for the input you use: these are located in the folder **Keyboard Charts Mac** in the GreekKeys 2008 package.

The plain Greek letters are arranged as on a modern Greek keyboard, except that upsilon is “u” and theta is “y” [but the input with suffix (USalt) maps upsilon to “y” and theta to “u”]. Most other equivalences are obvious, such as alpha at “a” and beta at “b.” The less obvious items are final sigma at “w,” psi at “c,” xi at “j,” and omega at “v.”

The diacritics are arranged across the top row of the keyboard, starting from the key on which the numeral 1 is located. Diacritics are entered as “deadkeys”: that is, they are typed before the vowel to which they belong. They all involve the option key or the option key together with the shift key. On some non-US keyboards, there are additional locations for some deadkey diacritics.

### 6.B. DEADKEYS: COMBINING ELEMENTS TO BE TYPED BEFORE THE VOWEL

option-1	acute (´)
option-2	grave (`)
option-3	circumflex (˘)
option-4	smooth breathing (ˆ)
option-5	rough breathing (ˊ)

option-6	smooth and acute (´)
option-7	rough and acute (´)
option-8	smooth and grave (`)
option-9	rough and grave (`)
option-0	smooth and circumflex (¨)
option-hyphen	rough and circumflex (¨)
option-=	breve (˘)
shift-option-=	macron (¯)
option-shift-1	diaeresis (¨)
option-shift-2	diaeresis with acute (¨´)
option-shift-3	diaeresis with grave (¨`)
option-shift-4	diaeresis with circumflex (¨¨)

NOTE 1: The breathing signs may be used with rho as well as with vowels.

NOTE 2: Multiple deadkeys may be entered before typing the vowel. Thus **option-1** followed by **option-4** followed by **a** produces alpha with smooth and acute (and the same results from **option-4** followed by **option-1** followed by **a**); or **option-5** followed by **shift-option-=** followed by **a** produces alpha with macron and rough breathing (and the same results from **shift-option-=** followed by **option-5** followed by **a**).

## 6.C. ADDITIONAL DIACRITICS AND SPECIAL CHARACTERS

The following are consistent across all the localized versions of the input.

option-a	alpha with iota subscript $\alpha$ [U+1FB3]
option-shift-a	capital alpha with iota adscript $\text{A}\iota$ or with diacritics $\text{A}\iota^1$ adscript [U+1FBC]
option-h	eta with iota subscript $\eta$ [U+1FC3]
option-shift-h	capital eta with iota adscript $\text{H}\iota$ or with diacritics $\text{H}\iota^1$ [U+1FCC]
option-v	omega with iota subscript $\omega$ [U+1FF3]
option-shift-v	capital omega with iota adscript $\text{O}\iota$ or with diacritics $\text{O}\iota^1$ [U+1FFC]
w	final sigma $\varsigma$ [U+03C2]
shift-w	archaic sampi $\xi$ [U+03E1]
option-w	digamma (vau) $\wp$ [U+03DD]
option-shift-w	capital digamma (vau) $\text{F}$ [U+03DC]
option-s	lunate sigma $\sigma$ [U+03F2]
option-shift-s	capital lunate sigma $\text{C}$ [U+03F9]
q	archaic koppa $\phi$ [U+03D9]
shift-q	capital archaic koppa $\text{Q}$ [U+03D8]
option-q	archaic san $\rho$ [U+03FB]
option-shift-q	capital archaic san $\text{M}$ [U+03FA]
option-g	archaic heta $\text{h}$ [U+0371]

---

<sup>1</sup> Different fonts will offer different treatments of iota adscript with capital vowels.

option-shift-g	capital archaic heta $\text{Ϟ}$ [U+0370]
option-k	stigma $\text{Ϛ}$ [U+03DB]
option-j	yot $\text{ϣ}$ [U+03F3]
option-shift-j	capital yot $\text{Ϥ}$ [U+E1A5]
option-shift-k	kai symbol ( $\text{Ϛ}$ ) [U+03D7]
option-t	obelus $\text{Ϝ}$ [U+2020]
< and >	left and right angle brackets $\langle$ and $\rangle$ <sup>2</sup>

The following apply to the US version (the same characters are available in non-US versions, but the key assignments may differ: see the keyboard pictures)

shift-option-u	capital archaic sampi $\text{Ϡ}$ [U+03E0]
option-shift-i	capital stigma $\text{Ϛ}$ [U+03DA]
option-shift-p	modern/numeric Greek koppa $\text{ϙ}$ [U+03DF]
option-shift-o	capital modern/numeric Greek koppa $\text{Ϟ}$ [U+03DE]
apostrophe (single straight quote)	curved apostrophe (right single quote) [U+2019]
option-shift-comma	left half-bracket ( $\text{⌈}$ ) [U+230A]
option-shift-period	right half-bracket ( $\text{⌋}$ ) [U+230B]
option-[	left guillemot ( $\text{«}$ ) [U+00AB]
option-]	right guillemot ( $\text{»}$ ) [U+00BB]
option-shift-[	left double-bracket ( $\text{⌈⌈}$ ) [U+27E6]
option-shift-]	right double-bracket ( $\text{⌋⌋}$ ) [U+27E7]
semicolon	Greek question mark (English semicolon) ( $\text{;}$ ) [U+003B]
shift-semicolon	Greek colon (single mid-line dot) ( $\text{⋮}$ ) [U+00B7]
option-shift-semicolon	Greek dicolon (English colon) ( $\text{:}$ ) [U+003A]
option-n	left single curly quote [U+2018]
option-m	straight apostrophe (straight single quote) [U+0027]
option-'	left double curly quote [U+201C] <sup>3</sup>
option-shift-'	right double curly quote [U+201D]
option-shift-7	metrical longum – (non-combining) [U+2012] <sup>4</sup>
option-shift-8	metrical breve $\text{˘}$ (non-combining) [U+23D1]
option-shift-9	metrical anceps $\text{×}$ [U+00D7]
option-shift-e	metrical catalexis (omission caret) $\text{^}$ [U+EC3D]
option-shift-r	metrical caesura symbol (dotted vertical) $\text{⋮}$ [U+003A]
option-shift-t	metrical inverted breve (brevis in longo) $\text{˘}$ [U+2312]
option-shift-y	metrical period-end (double bar) $\text{  }$ [U+2016]
option-p	$\text{≈}$ [U+2248]
option-\	broken vertical bar $\text{ }$ [U+00A6]
option-shift-hyphen	em dash [U+2014]

<sup>2</sup> These are true brackets, U+27e8 and U+27e9; the mathematical greater than and less than symbols are provided elsewhere on the inputs, or may be entered with a standard roman input.

<sup>3</sup> Since GreekKeys Unicode is compatible with “smart quotes” automation in word processors, it is easiest to turn on “smart quotes” and just use the straight double quote key.

<sup>4</sup> A fuller collection of metrical symbols is included in GreekKeys Symbol input.

option-shift-\

en dash [U+2013]

Three items are to be typed after the character to which they apply:

option-period

sublinear dot<sup>5</sup> (αβ̇) [U+0323]

option-y

overline above previous letter [U+0305]

option-i

iota subscript (alternative method)<sup>6</sup> ( , α η ϖ)  
[U+0345]

#### 6.D. USING THE CHARACTER VIEWER (PALETTE) OR UNICODE HEX INPUT

The Character Viewer (10.6 or later) or Character Palette (10.5 or earlier) can be activated in System Preferences: Language & Text: Input Sources (in 10.6 there is one setting that enables both the Character Viewer and the Keyboard Viewer) or System Preferences: International: Input Menu. It can then be displayed by selecting the item (mouse only) on the Input menu in the menu bar. See the illustration on the next page.

If you know the Unicode code point for a character or symbol you want that is not directly accessible from the GreekKeys Unicode input, you can locate it there by searching for that string and (in most cases) insert it in a document. You can also search by part of the character's name, if you know how it is described in Unicode.

Another way to enter a character when you know the Unicode code point is to use the Unicode Hex input that comes with OS X. Activate this input in System Preferences: Language & Text: Input Sources or System Preferences: International: Input Menu. To use it in a document, change to Unicode Hex in the input menu, and then hold down the option key while typing the four hexadecimal digits of any BMP code point. (You cannot enter SMP (five-digit) code points with Unicode Hex.)<sup>7</sup> When you do not use the option key, Unicode Hex behaves like a US English input.

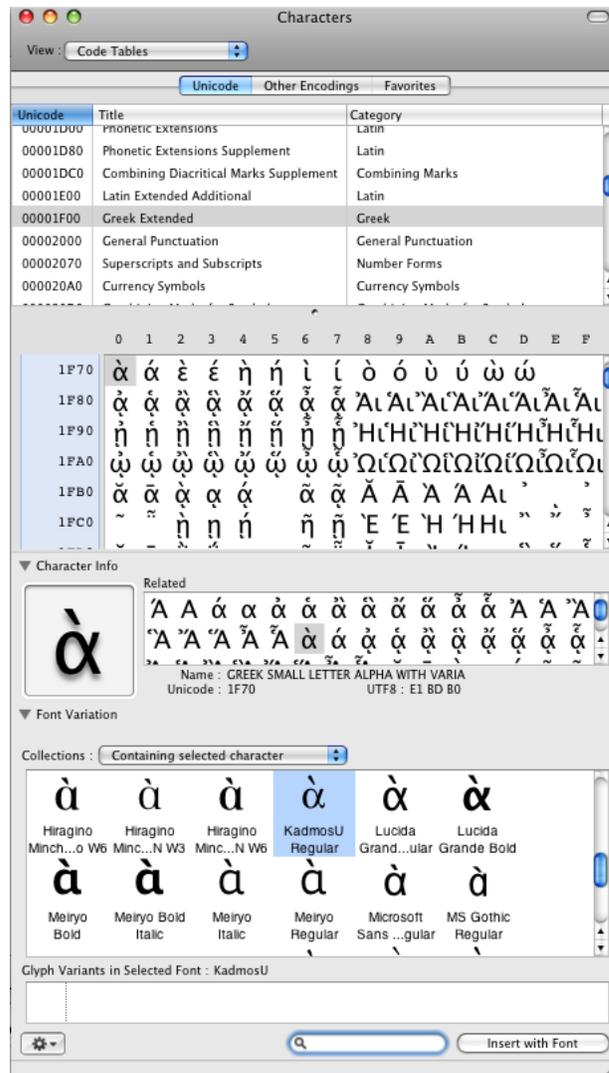
For a complete list of characters in New Athena Unicode font, see the document **NAUcmap3\_61.pdf** in the folder **Unicode Fonts**. If an updated version of this font is made available on the GreekKeys support site, a revised document with a similar name will be available there too.

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<sup>5</sup> Positioning of the dot or overscore may not be ideal in some programs. TextEdit uses a rendering engine in which the underdot is perfectly centered and placed at a consistent distance below the lowest point of the character, and the overscore is well placed above the letter. Unfortunately, other programs use rendering engines which place the dot or overscore “literally” so that it may not be centered and may overlap a descender or ascender. The GreekKeys fonts have precomposed dotted characters that are available in applications that process OpenType ligatures (see pp. 40-41 below).

<sup>6</sup> This method of inputting iota subscript is present for consistency with some other forms of Greek keyboard, but is not recommended. Better results will always be obtained by using option-a, option-h, and option-v). The option-i method will, however, work well with the fonts that contain the needed ligature definitions.

<sup>7</sup> There is a program available that will handle five-digit code points; UnicodeChecker, <http://earthlingsoft.net/UnicodeChecker/index.html> (donation-ware).



## 6.E. USING THE KEYBOARD VIEWER

In OS 10.3 and higher, the Keyboard Viewer palette is the replacement for the old Key Caps function. This palette can be activated (for 10.6 and later) in System Preferences: Language & Text: Input Sources (for 10.6: there is one setting that enables both the Character Viewer and the Keyboard Viewer) or (for 10.5 and earlier) System Preferences: International: Input Menu. It can then be displayed by selecting the item (mouse only) in the Input menu in the menu bar. See the illustration on the next page. The palette rides above the window of your frontmost application. Set the input with the Input menu. Under 10.3 and 10.4 the Keyboard Viewer had the excellent feature of also allowing you to select the font; this useful capability was removed in 10.5 and later. You can see the pattern of keys and click on a key to type it in the frontmost application window. With GreekKeys 2008 (as opposed to GreekKeys 2005), Keyboard Viewer does show (with orange background) the deadkeys for GreekKeys Unicode input.



**KNOWN LIMITATION:** in 10.5 and later, since the user can no longer set the font of the Keyboard Viewer display, Keyboard Viewer cannot display a few Private Use Area characters or ligatures on the keyboard. In 10.4 or 10.3 you can see all the characters if you set the font to New Athena Unicode.

## 6.F. IF YOU ARE IN TRANSITION FROM TRADITIONAL GREEKKEYS

For those who have used traditional GreekKeys, there are a few differences to be noted, mostly extensions of previous ways of doing things.

Most important, you have to adjust to changing both the input and the font when switching back and forth between English and Greek. (It is possible to change only the input, but see the caution in the Section 9 below.)

Smooth breathing can be used with lowercase rho, as this is a combination found in some texts and is accepted in Unicode: option-4 followed by rho. The same is available for uppercase rho, but with a Private Use Area code point (or via OpenType ligature for advanced users).

The apostrophe key always produces a curved apostrophe (U+2019), as this is the only form proper in Greek typography. With traditional GreekKeys the apostrophe appeared unattractively as the straight single quote.

Diacritics and capital letters in Unicode form a single precomposed character. In traditional GreekKeys the diacritic and the capital letter occupied separate spaces, and thus could be separated from each other by a line break in some situations. Such separation does not occur in Unicode fonts that use precomposed characters.

Using shift-option with a, h, or v produces precomposed capital with iota adscript (one character, not two). In New Athena Unicode v. 2 and higher, the iota adscript is a normal-sized lowercase iota when a diacritic is also present, but when no diacritic is present the iota is also a capital, as this combination would occur only in “all caps” where diacritics are omitted.

The Unicode standard has shown at different times actual subscripts under capitals and reduced-size iotas beside capitals: if you have reason to use either of those forms, use the Character Viewer (Palette) to enter them, as they are present as alternatives in New Athena Unicode v. 2.0 and higher. Use the Glyph view and set the font and scroll through the collection to locate them. They are defined as alternative forms in OpenType, but few programs exploit this typography option and allow the user to select which variant to use consistently.

## 7. For Advanced Users Only: Decomposed Inputs for Mac OS X

Optional choices in the OS X Installer for GreekKeys 2008 provide for the installation of two additional sets of GreekKeys Unicode inputs. The standard GreekKeys Unicode inputs behave the same as GreekKeys 2005 inputs and enter the Private Use Area (PUA) code points for specialized combinations not recognized in the Unicode standard. By contrast, the inputs with “dcmp1” in their name (in the bundle **GKUdcmp1.bundle**) eschew the use of PUA code points and instead enter the decomposed Unicode codepoints that represent specialized combinations (such as epsilon with circumflex or alpha with macron and acute); the standard precomposed Greek characters of the Greek Extended block are still used in these inputs. Therefore, these inputs are suitable for anyone who has a particular need to avoid the PUA code points which are valid in only a limited set of fonts. On the other hand, users of dcmp1 inputs need to be aware that the text so entered may not appear well in many applications, since support for OpenType ligatures is not yet very broad.

Even more experimental are the inputs which have “dcmp2” in their name (in the bundle **GKUdcmp2.bundle**). These eschew not only the PUA code points, but the precomposed code points of Greek Extended. All combinations are entered with the plain characters of the Greek block followed by combining diacritics. In this type of input the order of precedence adopted for multiple combining characters that follow the Greek letter is: (1) macron (U+0304) or breve (U+0306), if any; (2) breathing sign (U+313 smooth, U+0314 rough), if any; (3) accent (U+0301 acute, U+0300 grave, U+0342 circumflex), if any; (4) iota subscript (U+0345), if present. These inputs are suitable for anyone experimenting with completely decomposed Greek input, in anticipation of the (probably still long-distant) day when the Greek Extended block will be deprecated.

It is hoped that at the same time as the release of GreekKeys 2008 an expanded version of Lucius Hartmann's shareware application GreekKeysConverter (see Section 10 below) will be available to convert from use of PUA to partially or fully decomposed Unicode, and vice versa.

## 8. Traditional GreekKeys in Mac OS X (Deprecated)

Another optional installation provided by the GreekKeys 2008 Mac OS X Installer provides the traditional GreekKeys keyboard resources for use with pre-Unicode GreekKeys-encoded fonts. These are no longer supported (except for the maintenance of the old online FAQ), they are not guaranteed to work completely in OS X applications, and no one should be using these inputs to create any new documents. They are present as a possible help for those with legacy files containing GreekKeys-encoded Greek that for some reason cannot readily be converted to Unicode Greek.

The traditional, non-Unicode GreekKeys fonts are available in the folder **Deprecated Non-Unicode Fonts** for those who need them for legacy files. These fonts are for Mac OS only, except that there is an old version of Athenian that can be installed in Windows for use in older browsers on old pages that use GreekKeys-encoded Greek (see the folder **Windows Browser Font Athenian**, containing **athwin.exe**). This Windows version cannot be used for typing word-processing documents or for exchange of files with Mac users.

The Mac fonts were revised to include an additional instance of the character omega with smooth and acute, which is input by using the **backslash** key. This is necessary (instead of typing **option-6** followed by **v**) in Word 2004 and other recent applications that reserve the former code for omega with smooth and acute to represent the non-breaking space.

The fonts included are Athenian (now replaced by New Athena Unicode), Attika (now replaced by AttikaU), Kadmos (now replaced by KadmosU), Bosporos (now replaced by BosporosU), SymbolAthenian (now replaced by the Unicode symbols accessible from the GreekKeys Symbol input), and Classical (a Roman font that provided vowels with macrons in a custom encoding: see Appendix IV for various ways to input the Unicode versions of vowels with macrons).

To ensure that all font caches used by the system are updated properly, it is strongly recommended that you install these fonts by using the application **FontBook.app** that is present in the **Applications** folder of your OS X Mac.

1. Save all your work in open applications and quit those applications.
2. If you have previously installed earlier versions of Athenian, Attika, Symbol Athenian, Classical, Bosporos, or Kadmos font [in general, this means versions older than 2004), open FontBook, select All Fonts in the sidebar, and locate the old font(s). Select an old font and use the dropdown action menu (gear icon) to remove it.
3. Now select either User or Computer in the sidebar of FontBook's window. If you select User, the new fonts will be available only to the active user. If you select Computer, the fonts will be available to all users of the computer.

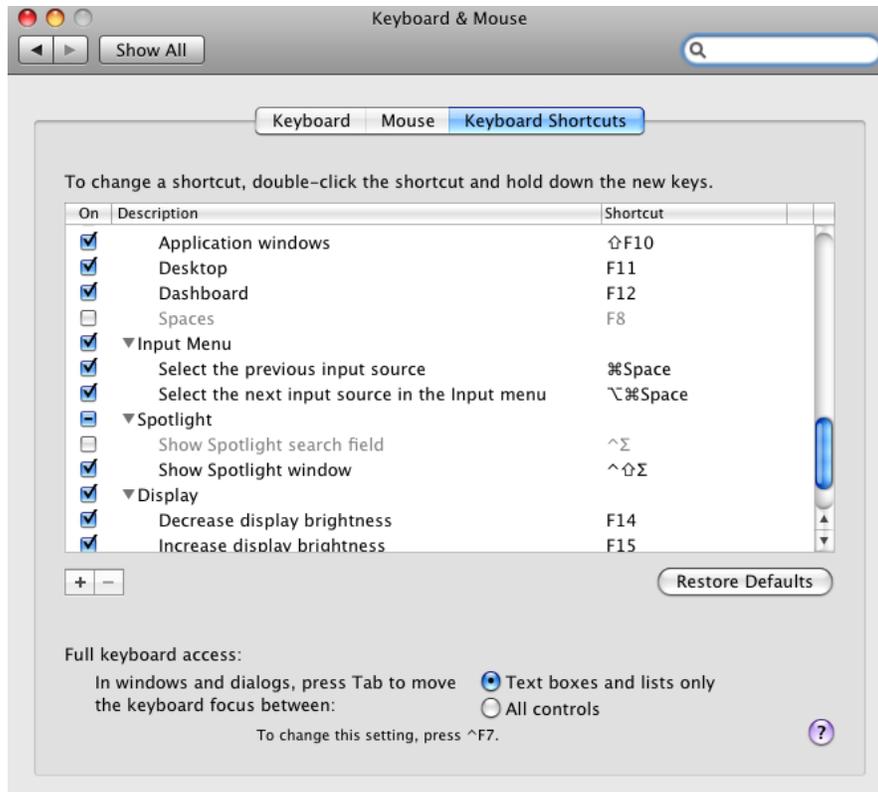
4. Use the dropdown action menu (gear icon) to select the command “Add fonts...”
5. Navigate to and within the folder **Deprecated Non-Unicode Fonts** in the GreekKeys 2008 package to locate the fonts you want. Do not install both the TrueType and the PostScript version of the same font, but only one or the other. If you install a PostScript font, you should choose only the font with suffix .suit or suffix .bmap (the printer font file without a suffix will be installed automatically with the file that has a suffix).

## 9. Working with Unicode input in Mac OS X

While the keyboard locations of the diacritics have remained the same from GreekKeys Universal input to the new GreekKeys Unicode input, users who have been comfortably typing a mixture of English and Greek under the older system will have to make a few adjustments in working with Unicode input.

Long-time Mac users may be familiar with two keyboard shortcuts that have traditionally worked for the Keyboard or Input Menu: these were command-spacebar and option-command-spacebar. From 10.4 onward Apple has used these familiar keys as the defaults for invoking Spotlight and left the shortcuts for the Input Menu deactivated. If you are already used to using command-spacebar and option-command-spacebar with the Input Menu, then I recommend changing the Spotlight shortcuts (for instance, to control-spacebar and option-control-spacebar) and activating the familiar ones for the Input Menu. If you are not already habituated to those shortcuts, then you can assign any keys you want. To make adjustments to such keyboard shortcuts, use (10.6 or later) System Preferences: Keyboard: Keyboard or (10.5 or earlier) Shortcuts System Preferences: Keyboard & Mouse: Keyboard Shortcuts.





With Unicode input, you must remember to change the input from GreekKeys Unicode back to US (or French, or German, or whatever) every time you come to the end of a section of Greek font. If you fail to do so, you cannot simply change the font to fix your error, you must retype the mistaken portion. Toggling keyboards is a one-command process. If you have just two inputs activated, or GreekKeys Unicode and your national input are the two you have most recently used, then command-spacebar (or whatever you have assigned to “Select the previous input source” in the Keyboard Shortcuts pane) will alternate between those two. If you have more than two keyboards activated, you may sometimes have to use command-option-spacebar (or whatever you have assigned to “Select the next input source in the Input menu” in the Keyboard Shortcuts pane) repeatedly to move through the sequence of all available inputs. (You may of course instead use the mouse to select the input in the input menu, but this is inefficient in any extensive word-processing.)

Strictly speaking, it is not necessary to change fonts when you transition from Greek to Roman typing or vice versa, if you are using a Unicode font that contains a large range of Roman characters as well as all the Greek characters you need. (The GreekKeys Unicode fonts contain Roman as well as Greek characters, and so do a number of Apple fonts in 10.4 and higher, including Times.) But if you are preparing a work for publication in a journal or by a press, or if your work contains very frequent alternation of Greek and Roman fonts (as in a commentary), it is important to use two different fonts. Many journals and presses will request that the English be in one particular font and the Greek in another particular font, to ensure that they are able to process the file easily through their production software. Global replacement of one or both types of font is very easy in Microsoft Word (and other programs) as long as the Greek and Roman are

in distinct fonts. Similarly, if you will be exchanging your document with a Windows user, it is much safer to have the Greek in a different font, so that a global substitution will be easy.

Another inconvenience of using Unicode inputs is that the operating systems now will change font automatically to supply a requested Unicode character that is not available in the currently selected font. Thus, if you switch to Unicode input but forget to change to the right font, the font may change by itself to one that you do not really want to use, and you will have to pause to repair the mistake. And since some system fonts have the limited set of monotonomic Greek characters only, the system may change fonts again when it encounters a character exclusive to polytonic Greek.

So the easiest setup for typing mixed Roman and Greek with distinct fonts is to create keyboard shortcuts in MS Word for your chosen Roman font and for your chosen Unicode Greek font. (Use the Customize Toolbars/Menus... command under Tools, and click on the Keyboard... button to set up your own commands.) Then you will have a two-command sequence to use at each transition from Roman typing to Greek typing: one for changing the input and one for changing the font. Some users report that they accomplish both commands with a single keyboard shortcut through a third-party program like QuickKeys, but compatibility with GreekKeys 2008 has not been tested and is not guaranteed.

## 10. Converting from Traditional GreekKeys to Unicode

Lucius Hartmann has produced a shareware program called GreekKeysConverter, which provides filters for converting between various pre-Unicode fonts and between those fonts and Unicode. For a modest shareware fee you may register this program and unlock its full potential. Download the program at <http://www.lucius-hartmann.ch/programme/gkconver.php>. Licensed users are also allowed to use the online version of the converter on his web site. Here are the steps to follow for setting up version 5.x for use. (As this documentation is being written, GreekKeysConverter is being revised for compatibility with Word 2008 and with decomposed Unicode. Please consult the GreekKeys online support site for the latest instructions about setting up and using GreekKeysConverter.)

Before opening GreekKeysConverter, save your old Word document in RTF (= Rich Text Format), using that option in the Word Save As... dialog.

1. Open GreekKeysConverter.

NOTE: if at any point in using the converter, a dialog appears asking you to locate the filter folder, you need to navigate to the folder entitled Filter which you should find inside the same folder as GreekKeys Converter. Once you highlight that folder and hit return to close the dialog, you should be able to continue without a problem.

2. Click on Prefs...; click on Fonts and choose the Greek Unicode font you want to use by selecting it from the upper choice popup. You do not need to make any adjustment in the lower choice popup (for Latin font).

3. Still in Prefs..., click on Filter, and first make sure that the path to the Filter folder is indicated (it should be in the same folder as GreekKeysConverter).
4. Still on the Filter pane, use the Filter choice popup to select GreekKeys (Mac), and make sure that “use external editor” is not checked. Then click on “Edit filter...”
5. In the Filter Editor window, click on Fonts and examine the list of traditional GreekKeys fonts. If you do not see the exact name of the GreekKeys-encoded font you use (as it appears, for instance, in the Word font menu), click on the Add... button and select that font from the list; repeat this as necessary if you need to add more GreekKeys-encoded fonts. Note that Bosphoros-Sparta is a different name from, e.g., Bosphoros(Sparta) or Bosphoros-GreekKeys, and you must specify the exact name or the conversion will not work.
6. Still in Prefs..., now click on File and make sure “save as Word document” is selected.
7. Still in Prefs..., in the RTF pane, select the appropriate radio button depending on which version of Word was used to create the RTF file.
8. Still in Prefs..., in the Conversion pane, you may need to experiment with the settings later if the conversion doesn't work completely. If you have a papyrological text with underdots, the first item may need to be checked. The second and third items also should be checked if you are using GreekKeys 2008.
9. After closing Prefs, make sure the direction of change is from GreekKeys(Mac) to Unicode (RTF, Mac).
10. Click Convert... and navigate to select your RTF version as the file you want to convert.
11. After conversion, quit GreekKeysConverter and open your document in Word.

Once you have set the preferences properly, you will be able to convert RTF documents without checking the preferences, unless you start to use a font with a new name or have an RTF document of a different variety or have to delete the file **GreekKeysConverter Prefs** (located in *username/Library/Preferences*) because the program crashes, which is often a sign of a corrupted preference file. Or occasionally you may be asked to locate the Filter folder again.

You can follow similar steps to convert from other non-Unicode encodings to Unicode.

### **If GreekKeysConverter Stops Working**

Occasionally GreekKeysConverter stops working properly, either reporting that an RTF file contains no RTF data or failing to convert the accented characters. When this happens, the following procedure may restore normal operation.

1. Make sure you have handy the registration number you received when you paid for the software.
2. In your home directory, open the folder Library and then the folder Preferences within Library.
3. In Preferences, locate the file named "GreekKeysConverter Prefs" and remove it to the trash.

4. Download a fresh copy of GreekKeysConverter to make sure you have the latest revision.
5. Now follow the steps in the next section to set the preferences and use the converter. You'll need to re-enter your registration number when you first open the new copy of GreekKeysConverter.

## 11. GreekKeys Symbol Input for Mac OS X

Only one version of this input is supplied, and it may be used with US (ANSI) or European (ISO) keyboards. This input has a fuller complement of symbols for creating sophisticated metrical schemes. It also allows direct access to the acrophonic numerals used in epigraphy, which have recently received Unicode code points, and to other symbols for papyrological and editorial use.

Look in the **Keyboard Charts Mac** folder for PDFs showing the layout of this input together with the Unicode code points of the characters.

## 12. Compatibility with OS X Applications

Unicode inputs can be used in OS X applications only if the programs have been properly designed to take advantage of modern operating system features. As of 2008, most applications have been so designed, but there are exceptions. GreekKeys Unicode inputs cannot be used (either at all or fully) in versions of Photoshop earlier than CS3, in Quark XPress 6 (and earlier versions), or in Word X and Internet Explorer 5.x. OpenType font ligature features are not available in Word 2004, but do work in Word 2008. OpenType ligatures do not work in some older versions of Mac browsers Safari and Firefox, but work in the latest versions (but very complex combinations with macron and breve still fail in Safari as of late 2009).

Normally, if Unicode inputs are not supported by an application, such inputs should be dimmed out in the Input Menu and will not be able to be selected when that application is frontmost.

For updated information about compatibility, please consult the GreekKeys online support site.

## Part III: GreekKeys 2008 for Windows

### 13. Installation and Activation of GreekKeys Unicode (Windows)

#### 13.A. IF YOU ARE UPGRADING FROM A TESTING VERSION OF GKU FOR WINDOWS

If you have a testing version of GreekKeys Unicode keyboards already installed, uninstall it EITHER by running the same **setup.exe** file from which you installed it OR by using the Control Panel Add or Remove Programs.

#### 13.B. RUNNING THE INSTALLER

You must have administrative privileges on the computer in order to install and activate this keyboard. If not, the installation will fail, but the installer may not tell you this is the reason. If you have only the downloaded ZIP archive and not a CD, also note that you **MUST EXTRACT** all files from the ZIP archive before running the installer. Do not be misled by the fact that Windows will allow you to look inside the archive and double-click on the installer, for the installation will fail if you do this. The easiest way to extract is to place the ZIP archive in a convenient place, such as the Desktop, right-click on its icon, and select the command “Extract all.” Then you will have a decompressed GreekKeys 2008 folder in the same location.

1. Save your work in open applications and close them.
2. In the GreekKeys 2008 package (downloaded or on CD), the folder entitled **GreekKeys Windows Installers** contains a separate folder for each localized version (us, uk, german, french, italian, spanish, frSwiss, danish, dutch) and for the two symbol keyboards. Open the folder corresponding to the installation you want, and double-click on **setup.exe** in that folder.
3. The MS Installer may give poor feedback about the installation. An initial dialog may come and go so swiftly that you can barely read it. Simply wait patiently until another dialog comes up with a message that the installation was completed successfully. Or, if the keyboard of the same name is already present, a dialog will instead ask whether you want to remove it or repair it (that is, reinstall over it).
4. Restart your computer. (This is the best way to avoid anomalies in the listing of keyboards after an installation.)

#### 13.C. ACTIVATION OF GKU WINDOWS KEYBOARD

With Windows 7 or Windows Vista or Windows XP, the Installer not only installs the keyboard in the required location, but also activates it.

Normally, after a successful installation and restart, the Language menu will be visible if it was not visible before. This menu shows (on a system running in English) a small EN [=English] in a dark blue square background as the leftmost icon among those at the right end of the taskbar. The icon may appear almost right after restart, or it may appear after a while when you open something new, either the Regional and Languages Options control panel or Word.

**KNOWN PROBLEM:** on some Windows systems, the Language bar is not turned on by default, and the installer does not change this setting, so it must be changed manually in the Control Panel. Open Regional and Language Options, pick the Languages tab, click on Details..., and click on the Language Bar... button in the bottom portion of the dialog. Then check “Show the Language bar on the desktop.”

Manual activation may be required in some situations. If there are multiple users on your computer and a user different from the one who installed the GKU keyboard wants to use it, that user will have to follow the steps for manual activation. Similar steps are always required in versions of Windows earlier than XP, in which the GKU keyboards may work on an unsupported basis.

The following uses the terms applicable for XP; some of the terms are slightly different in other versions, but the same sequence of actions applies. The Text Services and Input Languages pane can be opened in one of two ways.

#### EITHER

##### A.

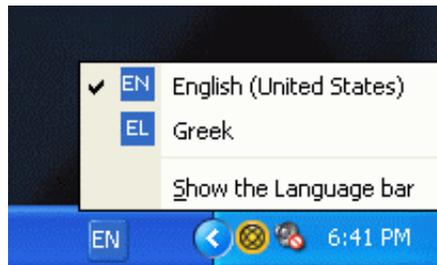
1. Open Control Panels (using the Start menu). [Use the Classic View for quicker results.]
2. Open Regional and Language Options.
3. Click on the Languages tab.
4. Under Text Services and Input Languages click on the button Details... [This Control Panel also gives access to setting keyboard shortcuts for changing the input.]



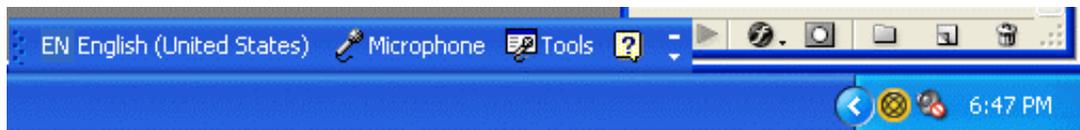
OR

B.

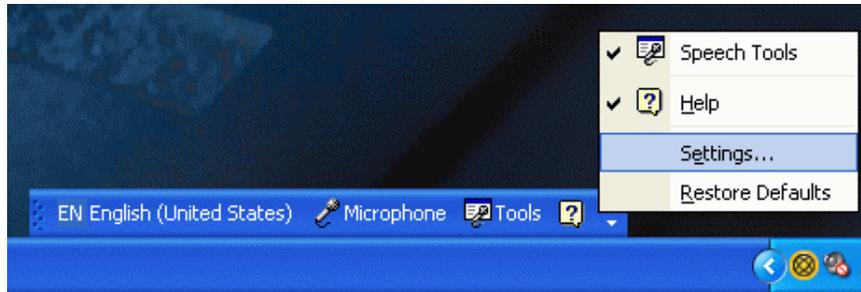
1. If the Language menu is already visible in the taskbar and you see a tiny white triangle for Options, go to step 3. If not, click on the Language menu icon to reveal a menu of options.



2. Select Show Language bar. This toolbar will now appear on the screen, usually at bottom or top. It can be minimized into the taskbar. You will now see a tiny white triangle for Options.



3. Click on the Options triangle and select Settings...



4. This will bring up the Details... display of Text Services and Input Languages.

THEN

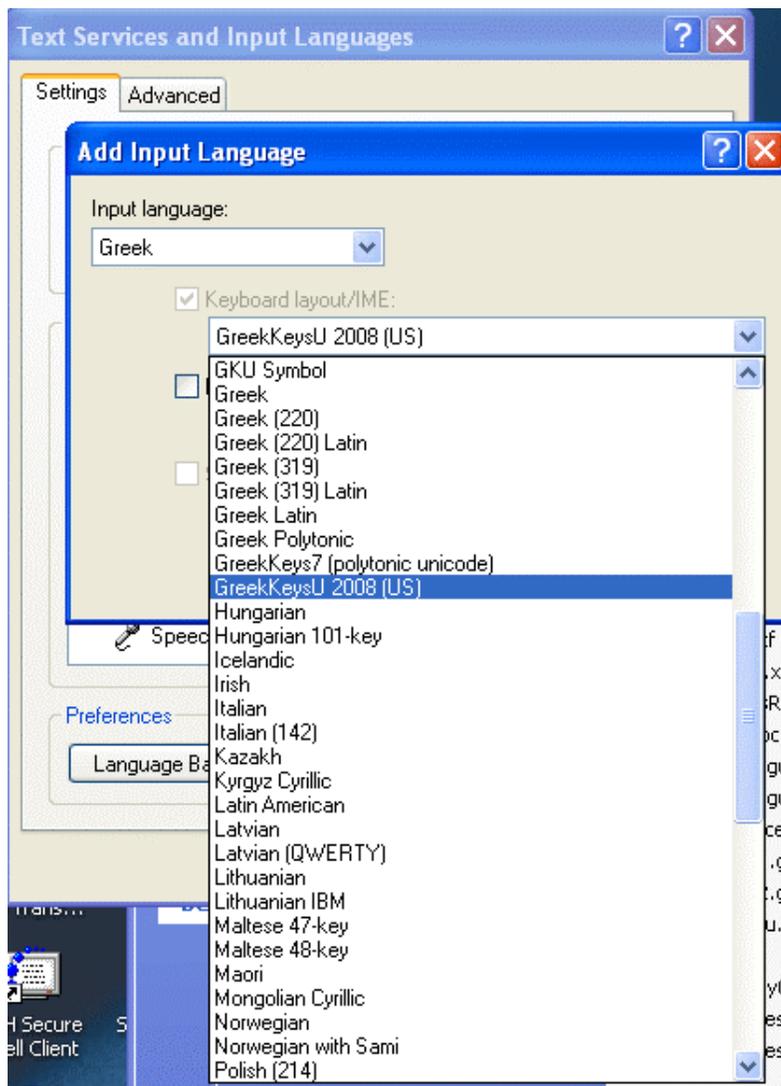
5. On the Text Services and Input Languages detail pane, click on the Add... button in the Installed Services section.



6. On the Add Input Languages pane, choose Greek from the list of options in the top field (Input Languages).

7. Now examine the checkbox next to Keyboard Layout/IME label of the second field. Check this box if it is not already checked.

- Click the arrow at the right of the Keyboard Layout field and scroll in the list of choices revealed. Select the item you installed.



- Click Apply and then OK to close the pane.

### 13.D. FONT INSTALLATION

You must have administrative privileges to install or remove fonts. If you do not have such privileges, adding Fonts will fail, but you may not receive feedback telling you this is the reason for the failure.

In Windows 7 (and perhaps in Vista) you can simply right-click on a font's icon and select the command "Install font." The following more elaborate method uses the Control Panel.

- Save all your work in open applications and exit those applications.
- Open the Control Panel Fonts.

3. If you have previously installed earlier versions of New Athena Unicode, AttikaU, BosporosU, or KadmosU font, remove them. Select them in the Fonts window and then (in XP) select the Delete command under the File menu, or (in Vista or XP) right-click and select Delete from the menu.  
NOTE: if you are told that the font cannot be removed or if it continues to be present in the Fonts Window, this probably means the system thinks the font is still in use. Restart your computer and then open the Fonts Control Panel and try again before running any other program.
4. Now, in XP, select Install New Font... under the File menu; or in Vista, right-click in the Fonts window and select Install New Font... from the menu.
5. In the Add Fonts window, navigate to the folder Unicode Fonts in the GreekKeys 2008 package.
6. When the names of the fonts in this folder appear in the upper field, click on Select All and then OK (or select particular fonts if you do not want to install all).

## 14. TYPING WITH GREEKKEYS UNICODE KEYBOARD (WINDOWS)

### 14.A. INTRODUCTION

Most users will be typing in two languages and scripts, their native modern language and polytonic Greek. You must change the selected language in the Language Menu every time you switch from one script to the other (you do not always have to change the font, but it is often a good idea to do so: see below). It is far more efficient to use a keyboard shortcut to switch keyboards than to make the change in the Language Menu with the mouse. For details about the use of the keyboard shortcuts, see below.

For reference and ease of learning, it may be helpful to print out the keyboard chart for the input you use: these are located in the folder **Keyboard Charts Windows** in the GreekKeys 2008 package.

### 14.B. PLAIN GREEK CHARACTERS

The plain Greek letters are arranged as on a modern Greek keyboard, except that upsilon is “u” and theta is “y.” Most other equivalences are obvious, such as alpha at “a” and beta at “b.” The less obvious items are final sigma at “w,” psi at “c,” xi at “j,” and omega at “v.”

### 14.C. DIACRITICS AND SPECIAL CHARACTERS

The GKU keyboards for Windows actually allow two styles of input for letters with diacritics: by deadkey typed before the vowel or rho to invoke the modified letter instead of the plain letter; or by combining diacritic typed after a plain vowel or rho. The resulting input to the file is different in the two cases. The first method produces input for precomposed characters that is far more reliable and far less likely to produce problems when a file is shared across platforms

or some Greek text is copied into other programs. Thus, **THE DEADKEY METHOD IS STRONGLY RECOMMENDED.**

The second method is for advanced users with particular needs for special characters or decomposed input. It is discussed separately below. It may not work consistently in all possible configurations of Windows systems.

## 15. Deadkey Method (Press Key before the Letter to be Modified)

The deadkey method uses the 12 keys on the top row from the numeral 1 to the rightmost key (equal sign on US keyboard). These are the same keys with the same ordering of diacritics as are used in the Mac OS X version. Unlike the Mac OS X version, the deadkeys in Windows (except for combining diaeresis) are not invoked by a modifier key, but either by the unshifted key or the shifted key. If you need, in the midst of your Greek, the character that is actually shown on the key, then type the key followed by space to obtain it. For example typing **1** then **space** inputs **1**, or typing **shift-9** then **space** inputs **left parenthesis**.

*The following work with all vowels (and breathings work with rho as well):*

1	acute ( ´ )
2	grave ( ` )
3	circumflex ( ~ )
4	smooth breathing ( ˘ )
5	rough breathing ( ˘̣ )
6	smooth and acute ( ˘´ )
7	rough and acute ( ˘̣´ )
8	smooth and grave ( ˘` )
9	rough and grave ( ˘̣` )
0	smooth and circumflex ( ˘~ )
hyphen*	rough and circumflex ( ˘̣~ )

\*or the eleventh key, which may not be **hyphen** on non-US keyboards

*The following works with the vowels alpha, epsilon, iota, omicron, upsilon:*

equal**	breve
---------	-------

\*\*or the twelfth key, which may not be **equal** on non-US keyboards

NOTE: press spacebar (or any character that would not take a diacritic) after any of the above deadkeys to input what is shown on the key (numbers 0-9, hyphen, equal).

*The following work with alpha, eta, and omega, and (except the first 3) with their capital forms:*

shift-1	iota subscript and acute ( ῑ ) [or diaeresis acute with iota or upsilon]
shift-2	iota subscript and grave ( ῑ̀ ) [or diaeresis grave with iota or upsilon]
shift-3	iota subscript and circumflex ( ῑ̃ ) [or diaeresis circumflex with iota or upsilon]

shift-4	iota subscript and smooth breathing ( $\iota$ )
shift-5	iota subscript and rough breathing ( $\iota$ )
shift-6	iota subscript and smooth and acute ( $\iota$ )
shift-7	iota subscript and rough and acute ( $\iota$ )
shift-8	iota subscript and smooth and grave ( $\iota$ )
shift-9	iota subscript and rough and grave ( $\iota$ )
shift-0	iota subscript and smooth and circumflex ( $\iota$ )
shift-hyphen*	iota subscript and rough and circumflex ( $\iota$ )

\*or the eleventh key, which may not be **hyphen** on non-US keyboards

*The following works with the vowels alpha, epsilon, iota, omicron, upsilon:*

shift-equal**	macron
---------------	--------

\*\*or the twelfth key, which may not be **equal** on non-US keyboards

NOTE: press spacebar (or any character that would not take a diacritic) after any of the above deadkeys to input what is shown on the key (punctuation and symbols).

*The following works with iota and upsilon:*

altgr-u***	diaeresis
------------	-----------

\*\*\*“altgr” refers to the right ALT key; see Section 18 for an explanation

#### KNOWN LIMITATION AND WORKAROUND

If the deadkey function of the top row of keys seems not to be working and you see results like 3α or 9ω, you need to slow down the repeat speed of your keyboard, or learn to tap the deadkey very lightly and quickly. You are seeing the number because the keypress is being interpreted as a repeated entry of the same key. Use the Keyboard Control Panel, and on the Speed pane adjust the “Repeat delay” setting.

## 16. What Cannot Be Entered with the Deadkey Method Alone

1. Alpha, iota, and upsilon with either breve or macron plus one or more additional diacritics, and epsilon and omicron with macron plus one or more diacritics: see Section 18 with instructions for advanced users. Or for maximum compatibility, enter these as PUA characters using one of the alternative methods discussed in Section 21 below.

2. Sublinear dot [U+0323]: type altgr-period after the letter to be dotted.

## 17. Other Characters Accessible from the GKU Windows Keyboard

The following assignments apply to the US version of the keyboard. Many of them are the same for the various European keyboards, but please refer to the layouts in the folder **Keyboard Charts Windows** for precise information.

altgr-a	alpha with iota subscript $\alpha$ [U+1FB3]
altgr-shift-a	capital alpha with iota adscript $\text{A}\iota$ or with diacritics [U+1FBC]
altgr-h	eta with iota subscript $\eta$ [U+1FC3]
altgr-shift-h	capital eta with iota adscript $\text{H}\iota$ or with diacritics $\text{H}\iota$ [U+1FCC]
altgr-v	omega with iota subscript $\omega$ [U+1FF3]
altgr-shift-v	capital omega with iota adscript $\text{\O}\iota$ or with diacritics $\text{\O}\iota$ [U+1FFC]
w	final sigma $\varsigma$ [U+03C2]
shift-w	capital archaic sampi $\lambda$ [U+03E0]
altgr-w	digamma (vau) $\wp$ [U+03DD]
altgr-shift-w	capital digamma (vau) $\text{F}$ [U+03DC]
altgr-s	lunate sigma $\sigma$ [U+03F2]
altgr-shift-s	capital lunate sigma $\text{C}$ [U+03F9]
q	archaic koppa $\phi$ [U+03D9]
shift-q	capital archaic koppa $\text{\O}$ [U+03D8]
altgr-q	archaic san $\text{N}$ [U+03FB]
altgr-shift-q	capital archaic san $\text{M}$ [U+03FA]
altgr-y	archaic heta $\text{H}$ [U+0371]
altgr-shift-y	capital archaic heta $\text{H}$ [U+0370]
shift-w	capital archaic sampi $\lambda$ [U+03E0]
altgr-w	archaic sampi $\lambda$ [U+03E1]
altgr-k	stigma $\varsigma$ [U+03DB]
altgr-shift-k	capital stigma $\text{C}$ [U+03DA]
altgr-z	modern/numeric Greek koppa $\zeta$ [U+03DF]
altgr-shift-z	capital modern/numeric Greek koppa $\text{C}$ [U+03DE]
altgr-j	yot $\text{J}$ [U+03F3]
altgr-shift-j	capital yot $\text{J}$ [U+E1A5]
altgr-shift-d	metrical longum (non-combining) [U+2012] <sup>8</sup>
altgr-shift-f	metrical breve (non-combining) [U+23D1]
altgr-shift-g	metrical anceps $\times$ [U+00D7]
altgr-shift-l	metrical period-end (double bar) $\parallel$ [U+2016]
altgr-shift-e	metrical catalexis (omission caret) $\wedge$ [U+0020,U+0020,U+032D]
altgr-shift-r	metrical caesura symbol (dotted vertical) $\text{:}$ [U+003A]
altgr-shift-t	metrical inverted breve (brevis in longo) $\text{^}$ [U+2312]
altgr-t	obelus $\dagger$ [U+2020]

<sup>8</sup> A fuller collection of metrical symbols is included in the GKU metrical and papyrological symbols keyboard.

altgr-[	left guillemot («) [U+00AB]
altgr-]	right guillemot (») [U+00BB]
altgr-shift-[	left double-bracket [ [U+27E6]
altgr-shift-]	right double-bracket ] [U+27E7]
altgr-shift-n	left lower half-bracket [ [U+230A]
altgr-shift-m	right lower half-bracket ] [U+230B]
altgr-backslash	emdash — [U+2014]
altgr-slash	endash – [U+2013]
semicolon	Greek question mark (English semicolon) ; [U+003B]
shift-semicolon	Greek colon (single mid-line dot) · [U+00B7]
altgr-shift-semicolon	Greek dicolon (English colon) (:) [U+003A]
altgr-n	left single curly quote [U+2018] <sup>9</sup>
altgr-m	straight apostrophe (straight single quote) [U+0027]
altgr-apostrophe	left double curly quote [U+201C] <sup>10</sup>
altgr-shift-apostrophe	right double curly quote [U+201D]
shift-comma	left editorial angle bracket [U+27E8]
shift-period	right editorial angle bracket [U+27E9]
altgr-shift-comma	less-than [mathematical symbol U+003C]
altgr-shift-period	greater-than [mathematical symbol U+003E]

## 18. For Advanced Users Only: Combining Diacritic Method (Press Key after the Letter to be Modified)

### IMPORTANT: WHAT DOES ALTGR MEAN?

In the key combinations listed below for combining letters (and for the deadkey for diaeresis mentioned in the previous section), the term “altgr” is a traditional name (from “ALT graphic”) for the righthand ALT key on a Windows keyboard. The lefthand ALT key and the righthand ALT key do not behave the same on a Windows keyboard, and if you try to use the lefthand ALT key for a complex keyboard, it will not work. Theoretically, the righthand ALT is equivalent to CONTROL + (lefthand) ALT; but in reality this is not always true.

The combining diacritic method works effectively if OpenType ligature definitions are present in the font and if the application in use has been written to make use of these OpenType features: in this case, the program knows to combine the separate code points and display a precomposed glyph defined for that combination. This method does not work if the font fails to contain the needed definitions or if the application uses a text engine that ignores such OpenType instructions. Most of the OpenType ligatures work in MS Word 2003 and later for Windows and

<sup>9</sup> The curly apostrophe or right single curly quote [U+2019] is the recommended form for apostrophe and is entered with the apostrophe key.

<sup>10</sup> Since GreekKeys Unicode is compatible with “smart quotes” automation in word processors, it is easiest to turn on “smart quotes” and just use the straight double quote key. A few of the non-US keyboards also include the German style double quotation marks, U+201E and U+201F.

in OpenOffice Writer (latest version available for download at [OpenOffice.org](http://OpenOffice.org)), but even these programs fail with the ligatures for epsilon and omicron with macron plus other diacritics. Moreover, other inconsistencies have been noted from system to system, since Windows software comes in so many variations. Cross-platform incompatibilities of decomposed input and the unevenness of support in common fonts and applications compel caution in using this format at this time. In general, it should be used only where unavoidable or by a very advanced user who is fully aware of the issues involved.

In the following cases, you type the combining diacritic after entering the vowel. You can type more than one combining diacritic after a vowel, but it is important to type the breathing first and then the accent, if both are to be added. (In decomposed input the order of precedence to be followed for multiple combining characters that follow the Greek letter is: (1) macron (U+0304) or breve (U+0306), if any; (2) breathing sign (U+0313 smooth, U+0314 rough), if any; (3) accent (U+0301 acute, U+0300 grave, U+0342 circumflex), if any; (4) iota subscript (U+0345), if present.) In an application that processes OpenType ligatures and with a font that contains the proper instructions, you can use these with a simple vowel or with a modified vowel you have already entered by the deadkey method. That is, you can add breathing and/or accent to a plain alpha, or you can add an accent to an iota with diaeresis, or a breathing and/or accent to upsilon with macron, or an iota subscript to an eta with rough and circumflex.

altgr-1	combining acute [U+0301]
altgr-2	combining grave [U+0300]
altgr-3	combining circumflex [U+0342]
altgr-4	combining smooth [U+0313]
altgr-5	combining rough [U+0314]
altgr-i	combining iota subscript [U+0313]
altgr-period	combining underdot [U+0323]
altgr-shift-backslash	combining long overstroke [U+0305]

EXAMPLE 1: to enter upsilon with diaeresis and grave accent, there are two alternatives: (1) type **shift-2** followed by **u** (see p. 29 above); (2) input the diaeresis by pressing **altgr-u** [deadkey] followed by **u** [upsilon with diaeresis appears on screen], then press **altgr-2** to add the combining grave. A precomposed letter should appear if your selected font contains Unicode code point U+1FE2 and the needed OpenType ligature is supported by the font and the application.

EXAMPLE 2: to enter alpha with smooth and acute and iota subscript, there are two alternatives: (1) **shift-6** followed by **a**; (2) **6** followed by **a** followed by **altgr-i**.

EXAMPLE 3: to enter iota with macron and smooth and acute, first press **shift-equal**, then **i** [iota with macron appears on screen], then **altgr-4** [breathing appears centered over the macron], then **altgr-1** [accent appears beside breathing, and the combination is now centered]. A precomposed letter should appear if your selected font contains that precomposed glyph encoded in the Unicode Private Use Area and the needed OpenType ligature is supported by the font and the application. If the breathing and accent intersect each other or the macron, this means either

that your font does not contain the needed precomposed character or the needed ligature definition or that the application you are using doesn't support this feature.

#### KNOWN LIMITATIONS AND WORKAROUNDS

1. Complex compositions will not look good unless the application you are using supports OpenType ligature features.
2. The combinations with epsilon and upsilon plus macron or breve and diacritics do not work in Word 2003, although the same combinations work with alpha, iota, and upsilon. As far as I can determine, this has something to do with obscurities or imperfections of OpenType implementation. (The OpenType definitions in the APA fonts have been proved to be accurate and operating by testing them in Mellel for Mac OS X, which has better OpenType support than major vendors' applications costing 10 to 20 times more. Moreover, the epsilon and omicron combinations also appear correctly in Internet Explorer 7 and Safari for Windows.)
3. If you have "automatic smart quotes" enabled, then the straight double quote [U+0022] (shift-apostrophe) may not appear as what you actually want. If you are not seeing the correct curly quotes automatically, then to insert curly quotes in your Greek manually, use **altgr-apostrophe** for left double quote and **altgr-shift-apostrophe** for right double quote. If you really want to see the straight double quote, then turn off the automatic smart quotes feature: pick Autoformat... from the Format menu, click on Options..., and in the AutoCorrect dialogue turn off the smart quotes option twice, once in the AutoFormat tab and once in the AutoFormat As You Type tab.
4. MS Word for Windows has a great many unnecessary predefined keyboard commands for various formatting actions. You may find it necessary or desirable to disable a number of these so that they do not interfere with Greek input or produce surprising actions if you accidentally hit the wrong key together with the altgr key. Here are the steps for doing so:

##### **Word 2003**

1. Select Customize... under the Tools menu.
2. Click on the Keyboard... button in the dialog.
3. Select the Commands tab and the listing for All Commands.
4. Find the command for which you want to make a change (three examples that caused annoyance during development work were InsertEndnoteNow and InsertFootnoteNow and ViewOutline).
5. Select the keyboard command under Current Keys.
6. Click on Remove and then Close.

**Word 2007**

1. Click on the Office icon (circular icon at top left) to reveal the menu, and use the Word Options button at the bottom.
2. In the new window that opens, click on Customize in the sidebar.
3. At the bottom left of the main pane, click on Customize... next to the label Keyboard Shortcuts.
4. Select the listing for All Commands.
5. Find the command for which you want to make a change (three examples that caused annoyance during development work were InsertEndnoteNow and InsertFootnoteNow and ViewOutline).
6. Select the keyboard command under Current Keys.
7. Click on Remove and then Close.

If you do not know which command is causing the annoyance, but know which key combination is troublesome, then use the same dialog to try to assign the troublesome key combination to another command. You should get a message telling you the combination is already assigned to a particular command. Cancel your attempt, and then go to the command specified as already using the troublesome combination and try to remove that keyboard shortcut. There are some commands, however, that Word will not allow you to change or remove.

5. In a test of a version of Word 2007 in XP, the altgr-1 and altgr-2 combining character commands for acute and grave did not work. The same commands worked with Word 2007 in Vista. The workaround for such a failure is to use the ALT-x technique instead for combining acute or grave (Section 21 below).

## 19. The GreekKeys Symbol Keyboards for Windows

Two symbol keyboards are available for installation in the folder **GreekKeys Windows Installers**. The installed keyboards have the names GK Epigr. Symbols and GK Metrical Papyr. Symbols. They are Greek keyboards and thus appear as subchoices of the EL setting of the Language menu.

Many of the symbols entered by these keyboards are not in standard system fonts, even the default fonts that are supposed to cover a very wide range of Unicode characters. They are present in New Athena Unicode font.

Metrical symbols are intended for the layout of metrical schemes and scansions on a line of their own. These are not the combining characters placed over vowels. Some of the most common metrical symbols are already available in the GreekKeysU 2008 keyboards, but if you need a more complete set, with combinations like long over short or short over long or extended long over two shorts, then the GK Metrical Papyr. Symbols keyboard is needed. Some

papyrological and editorial symbols accepted in Unicode are on the shifted keys of this keyboard.

Both the ancient Greek acrophonic numerals and ancient Greek papyrological numbers are encoded in Unicode 5.0 in a block in the five-digit area of Unicode (SMP) at U+10140 to U+1018A, which may not be accessible in older applications. These symbols are placed on the “GK Epigr. Symbols” keyboard in the order they appear in the Unicode standard.

Consult the keyboard charts for these two keyboards (in the **Keyboard Charts Windows** folder) to see the layout and the code points of the symbols available on these keyboards.

#### KNOWN LIMITATION AND WORKAROUND

Because of poor software design, some versions of Windows do not keep track of what Unicode code points are actually available in installed fonts and are not designed to be open-ended so as to accept new code points gracefully. Instead, the system and applications rely on a limited table of Unicode 4.0 BMP code points. When a code point from Unicode 4.1 or 5.0 or later is encountered, or when a code point from the SMP (a five-digit code point) is entered, you will often find that a Windows application shifts from the chosen font (New Athena Unicode, which contains the desired character) to a default font (Arial or Tahoma, which do not). Usually you can select the empty boxes of these default fonts and change the font back to the New Athena Unicode to see what you want to see. But both the occurrence of this unwanted font-change and the correction of it are not consistent across systems.

The change is especially likely to occur with the first character of a new paragraph or when typing a pipeline character (that is, one recently approved and intended for Unicode 5.1 or 6.0). One workaround is to type a superfluous standard Greek character like alpha before typing the troublesome one(s). You then need to go back and remove the superfluous character. Sometimes quitting Word and reopening it helps.

## 20. Typing in Windows with More than One Greek Keyboard

If you install one or both of the symbol keyboards in addition to a version of the GreekKeysU2008 keyboard, then when you switch the language from EN (for English input) [or another two-letter code for whichever modern language you use] to EL (for Elliniki), there will be more than one Greek keyboard available. A small keyboard icon will appear to the right of the EL icon. The name of the current Greek keyboard will not be shown in the Language menu, but is visible if you show the Language bar.



If you simply change to EL, then whichever Greek keyboard was last in use will be the selected keyboard. You can use the Language menu or Language bar to select a different Greek keyboard by holding the mouse down on the small keyboard icon. You can also toggle keyboards within the same language by using a keyboard shortcut. Windows allows two possible settings for keyboard shortcuts. If you set left ALT + shift as the shortcut for changing the language (EN to EL or back), then control + shift will cycle in order through the keyboards of the current language. You won't see the name of the keyboard currently active unless you make the Language Bar appear separately from the taskbar. Alternatively, if you set the language-changing shortcut to control + shift, then the keyboard-changing shortcut will be left ALT + shift. You can choose between these two alternative settings: open Regional and Language Options, pick the Languages tab, click on Details..., and click on the Key Settings... button in the bottom portion of the dialog.

## 21. Additional Ways to Input Unicode in Windows

(1) In MS Word (from at least the 2002 version forward) you can enter any character for which you know the Unicode hex code point by entering the four or five hexadecimal digits and then pressing ALT-x. The digits will then convert to the character you want. Of course, you need to know the code point to do this.

(2) There is a System Tool (Programs:Accessories:System Tools) called Character Map. This is a small application displaying the characters in a font in Unicode code point order. First set the font, and then select a character, and click the Copy button so that you can paste it into a document of your choice. If you know the code point, you can enable Advanced View and enter the code point to locate the character in the table. Character Map has limitations: SMP (five-digit) code points are not available for selection under either XP or Vista; under XP this utility shows only the BMP (four-digit) code points that were present in Unicode 4.0, and ignores Unicode 4.1 and 5.0 and pipeline characters that may actually be present in the font; under Vista, however, it shows all BMP code points present in the selected font, including pipeline characters.

(3) Both Word and OpenOffice Writer have menu commands for inserting unusual characters.

OpenOffice has the superior functionality (tested January 2008 with version 2.3.1). The command is under the Insert menu and is called Special Characters.... Set the font to New Athena Unicode. The table of characters in OpenOffice will then show all the BMP and SMP code points present in the font. Click on as many characters as you want and the string of characters will be shown at the bottom of the window; when you click OK, the string is inserted in the document and the Special Characters window closes. [This is not consistent: on one of the two XP machines I tested the window showed the presence of SMP code points but only with empty squares in place of the actual characters, and if these are inserted in the document, the squares cannot be changed by changing the font. With Vista there is perhaps no problem.]

In Word the command is Symbol... under the Insert menu. With Word 2003 under XP, this command has the same limitation to the ranges of BMP characters present in Unicode 4.0 as the Windows Character Map (but under Vista this will show later additions that are within those 4.0 blocks, such as archaic heta). Thus, Coptic, for instance, is not visible. There is, however, a field in which you can enter a BMP code point for the characters that are not displayed, and it will then temporarily show the character in the first position in the table (not in its Unicode order), and it is thus possible to insert it into the document. In Word 2003 the Insert Symbol... command cannot deal with SMP characters. In Word 2007, however, Insert Symbol... does show all the characters present in the font, at least on one computer running XP. Because of the inconsistency of various versions of Windows and Word, some users may encounter results different from those described here.

## Part IV: Fonts

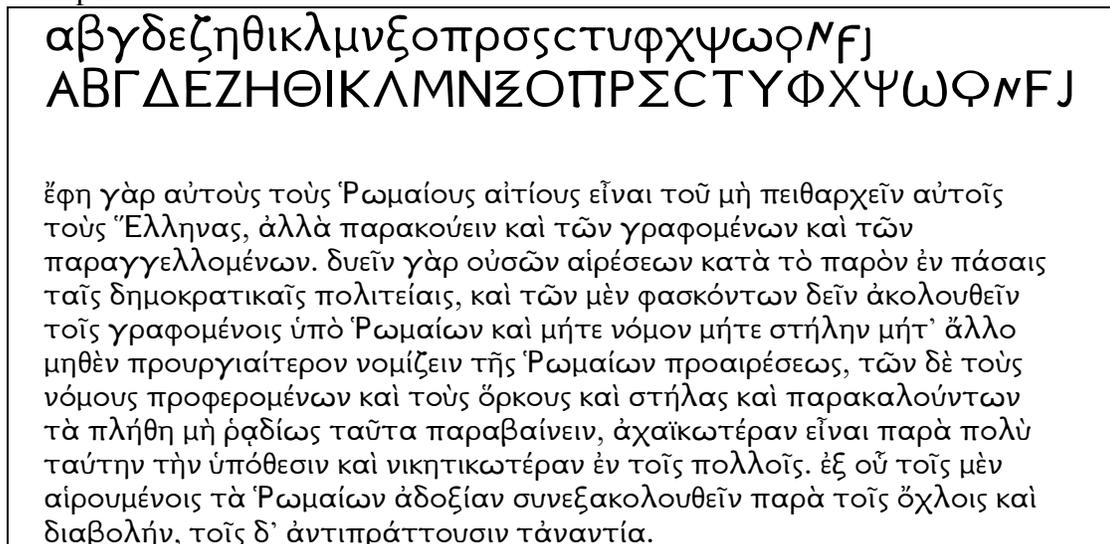
### 22. The APA GreekKeys Unicode Fonts

#### 22.A. THE FOUR UNICODE FONTS OF GREEKKEYS 2008

**New Athena Unicode** is the most extensive font, since it contains all the characters of the other three fonts plus additional more specialized items from Unicode 5.0 and beyond: the Coptic block (U+2C80 etc.) , the Ancient Greek Numbers block (U+10140 etc.), the Old Italic block (U+10300 etc.), Ancient Greek Musical Notation block (U+1D200 etc.), and a few others. For a full listing of the codepoints contained in the font, please see the text file **NAUcmap3\_61.pdf** present in the folder **Unicode Fonts** and also posted at the GreekKeys support site. New Athena Unicode is made freely available to all, and users are advised to check the support site from time to time for updated versions.

New Athena Unicode is an expansion of the APA GreekKeys non-Unicode font Athenian. Athenian was designed by Jeffrey Rusten, based on various Greek upright fonts illustrated in Victor Scholderer, *Greek Printing Types 1465-1927* (London 1927): that of Nicolaus Jenson (1472, plate 7), the Complutum Greek Testament (ca. 1510), Robert Proctor’s “Otter” (1910, plate 59) and Victor Scholderer’s “New Hellenic” (1927, plate 58). Rusten produced Athena Unicode as a first experiment with Unicode fonts, and Ralph Hancock made additions and corrections. In 2002 Donald Mastronarde began expansion and enhancements of the font, renaming it New Athena Unicode. For details about the stages of development, see the document **AboutNAUfont\_v3\_61.pdf** contained in the **Unicode Fonts** folder (an updated version of that document is created with each updated version of the font posted online).

Sample:



The three remaining APA fonts are licensed to purchasers of GreekKeys 2008. The correction history of these fonts is contained in the document **APAFontsRevisionHistory.pdf** found in the **Unicode Fonts** folder of GreekKeys 2008.

**AttikaU** font is an expansion of the APA GreekKeys non-Unicode font Attika. Attika was designed by George B. Walsh in 1986, in tribute to the font “Attika” designed in 1953 by the renowned typographer Hermann Zapf. The Unicode version was produced by Donald Mastronarde.

Sample:

<p>αβγδεζηθικλμνξοπρσςττυφχψωφμϕj          ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠΡΣΣΤΥΦΧΨΩΦμϕJ</p> <p>ἔφη γὰρ αὐτοὺς τοὺς Ῥωμαίους αἰτίους εἶναι τοῦ μὴ πειθαρχεῖν αὐτοῖς τοὺς Ἕλληνας, ἀλλὰ παρακούειν καὶ τῶν γραφομένων καὶ τῶν παραγγελλομένων. δεῦν γὰρ οὐσῶν αἰρέσεων κατὰ τὸ παρὸν ἐν πάσαις ταῖς δημοκρατικαῖς πολιτείαις, καὶ τῶν μὲν φασκόντων δεῖν ἀκολουθεῖν τοῖς γραφομένοις ὑπὸ Ῥωμαίων καὶ μῆτε νόμον μῆτε στήλην μῆτ' ἄλλο μηθὲν προυργιαίτερον νομίζειν τῆς Ῥωμαίων προαιρέσεως, τῶν δὲ τοὺς νόμους προφερομένων καὶ τοὺς ὅρκους καὶ στήλας καὶ παρακαλούντων τὰ πλήθη μὴ ῥαδίως ταῦτα παραβαίνειν, ἀχαϊκωτέραν εἶναι παρὰ πολὺ ταύτην τὴν ὑπόθεσιν καὶ νικητικωτέραν ἐν τοῖς πολλοῖς. ἐξ οὗ τοῖς μὲν αἰρουμένοις τὰ Ῥωμαίων ἀδοξίαν συνεξακολουθεῖν παρὰ τοῖς ὄχλοις καὶ διαβολήν, τοῖς δ' ἀντιπράττουσιν τάναντία.</p>
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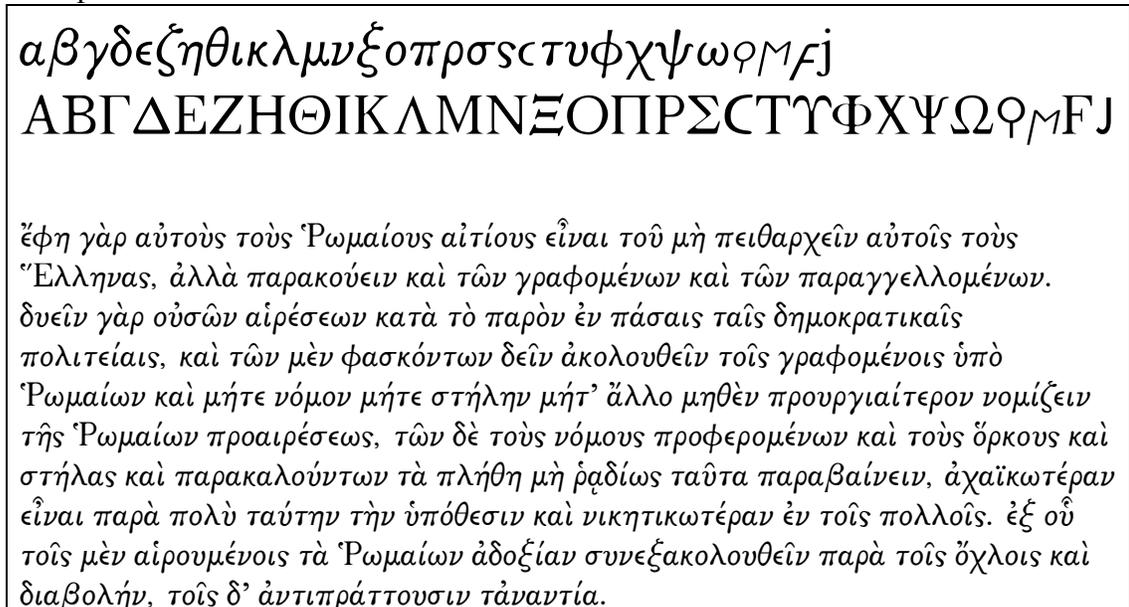
**KadmosU** font is an expansion of the non-Unicode GreekKeys-encoded font Kadmos designed by Marc Cogan of Allotype Typographics, who donated the font to the APA in 2004. The Unicode version was produced by Donald Mastronarde.

Sample:

<p>αβγδεζηθικλμνξοπρσςττυφχψωφμϕj          ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠΡΣΣΤΥΦΧΨΩΦμϕJ</p> <p>ἔφη γὰρ αὐτοὺς τοὺς Ῥωμαίους αἰτίους εἶναι τοῦ μὴ πειθαρχεῖν αὐτοῖς τοὺς Ἕλληνας, ἀλλὰ παρακούειν καὶ τῶν γραφομένων καὶ τῶν παραγγελλομένων. δεῦν γὰρ οὐσῶν αἰρέσεων κατὰ τὸ παρὸν ἐν πάσαις ταῖς δημοκρατικαῖς πολιτείαις, καὶ τῶν μὲν φασκόντων δεῖν ἀκολουθεῖν τοῖς γραφομένοις ὑπὸ Ῥωμαίων καὶ μῆτε νόμον μῆτε στήλην μῆτ' ἄλλο μηθὲν προυργιαίτερον νομίζειν τῆς Ῥωμαίων προαιρέσεως, τῶν δὲ τοὺς νόμους προφερομένων καὶ τοὺς ὅρκους καὶ στήλας καὶ παρακαλούντων τὰ πλήθη μὴ ῥαδίως ταῦτα παραβαίνειν, ἀχαϊκωτέραν εἶναι παρὰ πολὺ ταύτην τὴν ὑπόθεσιν καὶ νικητικωτέραν ἐν τοῖς πολλοῖς. ἐξ οὗ τοῖς μὲν αἰρουμένοις τὰ Ῥωμαίων ἀδοξίαν συνεξακολουθεῖν παρὰ τοῖς ὄχλοις καὶ διαβολήν, τοῖς δ' ἀντιπράττουσιν τάναντία.</p>
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**BosporosU** font is an expansion of the non-Unicode GreekKeys-encoded font Bosporos designed by Marc Cogan of Allotype Typographics, who donated the font to the APA in 2004. The Unicode version was produced by Donald Mastronarde.

Sample:



For legibility of the accents, the APA fonts have characters that extend vertically up and down farther than most fonts. In some cases, tops or bottoms of characters may appear cut off on the computer screen, although they will print completely. If this happens, it is a good idea to adjust the paragraph formatting entry for line spacing. In Microsoft Word, for instance, instead of using the setting “single” use the setting “at least” and make the line high 2 or 3 points greater than the font size you are using. That is, if you are typing in 12-point BosporosU, set the line spacing to at least 14 or 15 points; or if you are typing in 14-point KadmosU, set the line spacing to at least 16 or 17 points.

May 2008 revision: all the fonts now contain precomposed glyphs for dotted Greek letters. In OpenType savvy applications (and with ligatures turned on, if necessary), typing the combining dot below (U+0323) after a Greek character will invoke the ligature, providing optimal placement of the underdot. For display of dots on the screen, you may need to add a few points of space below each line with the Format Paragraph command in MS Word.

## 22.B. SMART FONT FEATURES

All the APA GreekKeys Unicode fonts contain smart font features defined in accordance with the OpenType standard. Two types of features are included.

The “liga” (ligature) feature gives rules for replacing various sequences of decomposed code points for separate glyphs with a single glyph (even though the underlying data will still contain the separate glyphs. For example, the sequence U+03b1, U+0306, U+0313, U+0301 (alpha, combining breve, combining smooth breathing, combining acute accent), which without a substitution would appear as a jumble of diacritics poorly placed or overlapping on top of small

alpha, is defined to be represented by a single precomposed glyph in which the combining elements are correctly placed. But the four codepoints are still in the textual data, and if you use the delete/backspace key repeatedly, then the glyph will first be replaced by alpha with breve and smooth, then by alpha with breve, then by alpha, and finally will be completely deleted. In contrast, if you input the same precomposed glyph using the PUA code point U+EB0C, then a single use of the delete key will remove the glyph. Most applications either read the OpenType ligature instructions or don't. Thus if you use the decomposed input in the Mac OS applications TextEdit, Mellel, NeoOffice, InDesign, and some others, or in the Windows applications Word 2003 (or later), OpenOffice Writer, InDesign, Internet Explorer 7, Safari for Windows, Firefox 3 and higher, and some others, the ligatures simply work. If you use them in Word 2004 for Mac OS X, they do not work. If you use them in Word 2008 for Mac OS X, they work only after you enable the use of ligatures in a specific document (the application-wide setting is such that ligatures are off by default). Ligatures do not work in Firefox browsers earlier than version 3. Most ligatures work in Safari 3 or 4 for Mac OS X, but not those with macron or breve plus diacritics.

The “aalt” (access all alternatives) feature gives rules for allowing a choice among the various treatments of capital vowels with adscript/subscript iota in the fonts. The fonts present by default the type of glyphs with a full-size small iota adjacent to a capital vowel (or a capital iota adjacent to a capital vowel in the form without any diacritic). An application could provide access to a typography palette in which you can change this default to one of the other choices (capital vowel with subscript or capital vowel with adscript iota of reduced size), but I am unaware of any that do so for the OpenType version of this choice.

Earlier versions of the APA Unicode fonts contain a duplication of the OpenType definitions in the competing smart font feature language of Apple Advanced Typography (AAT). Since the AAT ligatures for epsilon and omicron with macron and two diacritics consistently fail in AAT and since the presence of the AAT features prevents applications from making use of the OpenType features (which have no such failings in the OS X applications that can read them), the fonts released with GreekKeys 2008 contain only OpenType features and no AAT features. The OpenType features are used correctly by TextEdit, NeoOffice, and Word 2008 because the AAT features have been omitted. Any user who has a particular need for a font with the AAT features added may contact Donald Mastronarde.

## 22.C. HOW TO MAKE OPENTYPE LIGATURES APPEAR IN WORD 2008 FOR MAC OS X

By default, Word 2008 does not pay any attention to OpenType ligatures that may be defined in a font. You must turn this feature on for each document in which you want it to work.

The easiest and most accessible way to turn ligatures on in a document is to open the Font format panel (command-d, or Font... under the Format command). There you will see a section labelled Advanced with a checkbox for “Enable all ligatures in document.”

If you search for “ligature” in Word Help, you will not be told of this easy way, but of a more concealed method. The other switch for ligatures is in the formatting palette, but it is not visible to the user unless the user selects the Publishing Layout View. Once you select that view and enable the feature, then you can return to the view you were using before.

A third way to have ready access to this switch is to place the command on a visible toolbar, as follows:

1. Under the View menu select Customize toolbars and menus...
2. Select All Commands under Categories.
3. Scroll in the Commands list to LigatureDocument
4. Drag that item to a toolbar that you regularly keep visible.

## Appendix I: Traditional OS 9 GreekKeys (Deprecated)

For the convenience of Mac users who have been using GreekKeys for a long time and who still have the capability of running OS 9 applications in an emulation mode or in Classic (with PPC Macs running OS 10.4 or earlier), the GreekKeys 2008 package also contains the deprecated elements needed for Traditional GreekKeys in the pre-OS X environment. This is now unsupported software, and if you use it, it is assumed that you are familiar with its features and that you understand that no claim is made that it will work completely or even partially on modern Macs.

Both the keyboard resources and fonts are supplied in a Disk Image file located in the download or on the CD. Double-click on **Deprecated Mac Items.dmg** to mount the volume containing the two needed folders.

**OS 9 keyboard resources:** these resources (lacking the .rsrc suffix needed in OS X) are found in the folder **Deprecated OS9-Classic Keyboards**. Drag a copy of the resource you want to use into the **Appearance** folder inside the (OS 9) **System Folder**. Restart or relaunch Classic, and activate the keyboard using the Keyboards Control Panel (under the multi-colored Apple menu).

**Fonts:** drag copies of the desired fonts from the folder **Deprecated Non-Unicode Fonts** into the **Fonts** folder inside the (OS 9) **System Folder**. Relaunch any OS 9 application in which you want the fonts to be available.

## Appendix II: Private Use Area Code Points in APA Unicode Fonts

A consortium of scholarly font producers who work with Unicode polytonic Greek has agreed to use the same Private Use Area (PUA) code points to refer to special characters that are not recognized by Unicode (and most of which are not likely ever to receive official Unicode code points). See the proposal document written by Juan-José Marcos that is downloadable from the GreekKeys support site. In addition to the APA Unicode fonts, this convention is followed in the fonts of Ralph Hancock's Antioch package, in Juan-José Marcos' ALPHABETUM, and in David Perry's Cardo. Because of this agreement, users should be able to shift between the various fonts that comply with this convention. System fonts and commercial fonts will not contain these characters and may contain conflicting characters that use the same PUA code points. Users should be aware that documents containing these PUA characters may not be completely readable for other users who lack a necessary font or for publishers.

Here are two tables, the first with the characters grouped alphabetically by base character, the second with the same data ordered instead by PUA code point. If the character name is capitalized, the reference is to the capital letter.

<b>description</b>	<b>decomposed Unicode</b>	<b>alternative ( full decomposition</b>	<b>PUA code point adopted</b>
alpha with breve and acute	1fb0 0301	03b1 0306 0301	eb0a
alpha with breve and grave	1fb0 0300	03b1 0306 0300	eaf8
alpha with breve and rough	1fb0 0314	03b1 0306 0314	eb0b
alpha with breve and rough acute	1fb0 0314 0301	03b1 0306 0314 0301	eafb
alpha with breve and rough grave	1fb0 0314 0300	03b1 0306 0314 0300	eafc
alpha with breve and smooth	1fb0 0313	03b1 0306 0313	eaf9
alpha with breve and smooth acute	1fb0 0313 0301	03b1 0306 0313 0301	eb0c
alpha with breve and smooth grave	1fb0 0313 0300	03b1 0306 0313 0300	eafa
alpha with macron and acute	1fb1 0301	03b1 0304 0301	eb00
alpha with macron and circumflex	1fb1 0342	03b1 0304 0342	eaf2
alpha with macron and grave	1fb1 0300	03b1 0304 0300	eaf0
alpha with macron and rough	1fb1 0314	03b1 0304 0314	eb05
alpha with macron and rough acute	1fb1 0314 0301	03b1 0304 0314 0301	eb09
alpha with macron and rough circumflex	1fb1 0314 0342	03b1 0304 0314 0342	eaf6
alpha with macron and rough grave	1fb1 0314 0300	03b1 0304 0314 0300	eaf4
alpha with macron and smooth	1fb1 0313	03b1 0304 0313	eb04
alpha with macron and smooth acute	1fb1 0313 0301	03b1 0304 0313 0301	eb07
alpha with macron and smooth circumflex	1fb1 0313 0342	03b1 0304 0313 0342	eaf5
alpha with macron and smooth grave	1fb1 0313 0300	03b1 0304 0313 0300	eaf3
epsilon with breve	03b5 0306		e1a9
Epsilon with breve	0395 0306		e1bf
epsilon with circumflex	03b5 0342		e1b0
epsilon with macron	03b5 0304		e1b3
Epsilon with macron	0395 0304		e1be
epsilon with macron and acute	03b5 0304 0301		e1b4
epsilon with macron and circumflex	03b5 0304 0342		eb27

<b>description</b>	<b>decomposed Unicode</b>	<b>alternative ( full) decomposition</b>	<b>PUA code point adopted</b>
epsilon with macron and grave	03b5 0304 0300		e1b5
epsilon with macron and rough	03b5 0304 0314		e1b7
epsilon with macron and rough circumflex	03b5 0304 0314 0342		eb21
epsilon with macron and rough grave	03b5 0304 0314 0300		e1b9
epsilon with macron and smooth	03b5 0304 0313		e1b6
epsilon with macron and smooth acute	03b5 0304 0313 0301		e1ba
epsilon with macron and smooth circumflex	03b5 0304 0313 0342		eb20
epsilon with macron and smooth grave	03b5 0304 0313 0300		e1b8
epsilon with macron rough acute	03b5 0304 0314 0301		e1bb
epsilon with rough circumflex	03b5 0314 0342		e1b2
Epsilon with rough circumflex	0395 0314 0342		e1bd
epsilon with smooth circumflex	03b5 0313 0342		e1b1
Epsilon with smooth circumflex	0395 0313 0342		e1bc
iota with breve and acute	1fd0 0301	03b9 0306 0301	eb40
iota with breve and grave	1fd0 0300	03b9 0306 0300	eb44
iota with breve and rough	1fd0 0314	03b9 0306 0314	eb43
iota with breve and rough acute	1fd0 0314 0301	03b9 0306 0314 0301	eb47
iota with breve and rough grave	1fd0 0314 0300	03b9 0306 0314 0300	eb48
iota with breve and smooth	1fd0 0313	03b9 0306 0313	eb41
iota with breve and smooth acute	1fd0 0313 0301	03b9 0306 0313 0301	eb42
iota with breve and smooth grave	1fd0 0313 0300	03b9 0306 0313 0300	eb45
iota with macron and acute	1fd1 0301	03b9 0304 0301	eb39
iota with macron and circumflex	1fd1 0342	03b9 0304 0342	eb36
iota with macron and grave	1fd1 0300	03b9 0304 0300	eb38
iota with macron and rough	1fd1 0314	03b9 0304 0314	eb3e
iota with macron and rough acute	1fd1 0314 0301	03b9 0304 0314 0301	eb3f
iota with macron and rough circumflex	1fd1 0314 0342	03b9 0304 0314 0342	eb58
iota with macron and rough grave	1fd1 0314 0300	03b9 0304 0314 0300	eb55
iota with macron and smooth	1fd1 0313	03b9 0304 0313	eb3c
iota with macron and smooth acute	1fd1 0313 0301	03b9 0304 0313 0301	eb3d
iota with macron and smooth circumflex	1fd1 0313 0342	03b9 0304 0313 0342	eb57
iota with macron and smooth grave	1fd1 0313 0300	03b9 0304 0313 0300	eb54
omicron with breve	03bf 0306		e1aa
Omicron with breve	039f 0306		e1cf
omicron with circumflex	03bf 0342		e1c0
omicron with macron	03bf 0304		e1c3
Omicron with macron	039f 0304		e1ce
omicron with macron and acute	03bf 0304 0301		e1c4
omicron with macron and circumflex	03bf 0304 0342		eb5a
omicron with macron and grave	03bf 0304 0300		e1c5
omicron with macron and rough	03bf 0304 0314		e1c7
omicron with macron and rough acute	03bf 0304 0314 0301		e1cb
omicron with macron and rough circumflex	03bf 0304 0314 0342		eb5c
omicron with macron and rough grave	03bf 0304 0314 0300		e1c9
omicron with macron and smooth	03bf 0304 0313		e1c6

description	decomposed Unicode	alternative ( full) decomposition	PUA code point adopted
omicron with macron and smooth acute	03bf 0304 0313 0301		e1ca
omicron with macron and smooth circumflex	03bf 0304 0313 0342		eb5b
omicron with macron and smooth grave	03bf 0304 0313 0300		e1c8
Omicron with rough circumflex	039f 0314 0342		e1cd
omicron with rough circumflex	03bf 0314 0342		e1c2
Omicron with smooth circumflex	039f 0313 0342		e1cc
omicron with smooth circumflex	03bf 0313 0342		e1c1
Rho with smooth	03a1 0313		e1ab
upsilon with breve and acute	1fe0 0301	03c5 0306 0301	eb81
upsilon with breve and grave	1fe0 0300	03c5 0306 0300	eb83
upsilon with breve and rough	1fe0 0314	03c5 0306 0314	eb82
upsilon with breve and rough acute	1fe0 0314 0301	03c5 0306 0314 0301	eb89
upsilon with breve and rough grave	1fe0 0314 0300	03c5 0306 0314 0300	eb8a
upsilon with breve and smooth	1fe0 0313	03c5 0306 0313	eb84
upsilon with breve and smooth acute	1fe0 0313 0301	03c5 0306 0313 0301	eb85
upsilon with breve and smooth grave	1fe0 0313 0300	03c5 0306 0313 0300	eb88
upsilon with macron and acute	1fe1 0301	03c5 0304 0301	eb7a
upsilon with macron and circumflex	1fe1 0342	03c5 0304 0342	eb70
upsilon with macron and grave	1fe1 0300	03c5 0304 0300	eb6f
upsilon with macron and rough	1fe1 0314	03c5 0304 0314	eb7e
upsilon with macron and rough acute	1fe1 0314 0301	03c5 0304 0314 0301	eb80
upsilon with macron and rough circumflex	1fe1 0314 0342	03c5 0304 0314 0342	eb78
upsilon with macron and rough grave	1fe1 0314 0300	03c5 0304 0314 0300	eb75
upsilon with macron and smooth	1fe1 0313	03c5 0304 0313	eb7d
upsilon with macron and smooth acute	1fe1 0313 0301	03c5 0304 0313 0301	eb7f
upsilon with macron and smooth circumflex	1fe1 0313 0342	03c5 0304 0313 0342	eb77
upsilon with macron and smooth grave	1fe1 0313 0300	03c5 0304 0313 0300	eb71
Upsilon with smooth	03a5 0313		e1ac
Upsilon with smooth acute	03a5 0313 0301		e1ae
Upsilon with smooth circumflex	03a5 0313 0342		e1af
Upsilon with smooth grave	03a5 0313 0300		e1ad

**By code point:**

description	decomposed Unicode	alternative ( full) decomposition	PUA code point adopted
epsilon with breve	03b5 0306		e1a9
omicron with breve	03bf 0306		e1aa
Rho with smooth	03a1 0313		e1ab
Upsilon with smooth	03a5 0313		e1ac
Upsilon with smooth grave	03a5 0313 0300		e1ad
Upsilon with smooth acute	03a5 0313 0301		e1ae
Upsilon with smooth circumflex	03a5 0313 0342		e1af
epsilon with circumflex	03b5 0342		e1b0
epsilon with smooth circumflex	03b5 0313 0342		e1b1
epsilon with rough circumflex	03b5 0314 0342		e1b2

<b>description</b>	<b>decomposed Unicode</b>	<b>alternative ( full) decomposition</b>	<b>PUA code point adopted</b>
epsilon with macron	03b5 0304		e1b3
epsilon with macron and acute	03b5 0304 0301		e1b4
epsilon with macron and grave	03b5 0304 0300		e1b5
epsilon with macron and smooth	03b5 0304 0313		e1b6
epsilon with macron and rough	03b5 0304 0314		e1b7
epsilon with macron and smooth grave	03b5 0304 0313 0300		e1b8
epsilon with macron and rough grave	03b5 0304 0314 0300		e1b9
epsilon with macron and smooth acute	03b5 0304 0313 0301		e1ba
epsilon with macron rough acute	03b5 0304 0314 0301		e1bb
Epsilon with smooth circumflex	0395 0313 0342		e1bc
Epsilon with rough circumflex	0395 0314 0342		e1bd
Epsilon with macron	0395 0304		e1be
Epsilon with breve	0395 0306		e1bf
omicron with circumflex	03bf 0342		e1c0
omicron with smooth circumflex	03bf 0313 0342		e1c1
omicron with rough circumflex	03bf 0314 0342		e1c2
omicron with macron	03bf 0304		e1c3
omicron with macron and acute	03bf 0304 0301		e1c4
omicron with macron and grave	03bf 0304 0300		e1c5
omicron with macron and smooth	03bf 0304 0313		e1c6
omicron with macron and rough	03bf 0304 0314		e1c7
omicron with macron and smooth grave	03bf 0304 0313 0300		e1c8
omicron with macron and rough grave	03bf 0304 0314 0300		e1c9
omicron with macron and smooth acute	03bf 0304 0313 0301		e1ca
omicron with macron and rough acute	03bf 0304 0314 0301		e1cb
Omicron with smooth circumflex	039f 0313 0342		e1cc
Omicron with rough circumflex	039f 0314 0342		e1cd
Omicron with macron	039f 0304		e1ce
Omicron with breve	039f 0306		e1cf
alpha with macron and grave	1fb1 0300	03b1 0304 0300	eaf0
alpha with macron and circumflex	1fb1 0342	03b1 0304 0342	eaf2
alpha with macron and smooth grave	1fb1 0313 0300	03b1 0304 0313 0300	eaf3
alpha with macron and rough grave	1fb1 0314 0300	03b1 0304 0314 0300	eaf4
alpha with macron and smooth circumflex	1fb1 0313 0342	03b1 0304 0313 0342	eaf5
alpha with macron and rough circumflex	1fb1 0314 0342	03b1 0304 0314 0342	eaf6
alpha with breve and grave	1fb0 0300	03b1 0306 0300	eaf8
alpha with breve and smooth	1fb0 0313	03b1 0306 0313	eaf9
alpha with breve and smooth grave	1fb0 0313 0300	03b1 0306 0313 0300	eafa
alpha with breve and rough acute	1fb0 0314 0301	03b1 0306 0314 0301	eafb
alpha with breve and rough grave	1fb0 0314 0300	03b1 0306 0314 0300	eafc
alpha with macron and acute	1fb1 0301	03b1 0304 0301	eb00
alpha with macron and smooth	1fb1 0313	03b1 0304 0313	eb04
alpha with macron and rough	1fb1 0314	03b1 0304 0314	eb05
alpha with macron and smooth acute	1fb1 0313 0301	03b1 0304 0313 0301	eb07
alpha with macron and rough acute	1fb1 0314 0301	03b1 0304 0314 0301	eb09

<b>description</b>	<b>decomposed Unicode</b>	<b>alternative ( full decomposition</b>	<b>PUA code point adopted</b>
alpha with breve and acute	1fb0 0301	03b1 0306 0301	eb0a
alpha with breve and rough	1fb0 0314	03b1 0306 0314	eb0b
alpha with breve and smooth acute	1fb0 0313 0301	03b1 0306 0313 0301	eb0c
epsilon with macron and smooth circumflex	03b5 0304 0313 0342		eb20
epsilon with macron and rough circumflex	03b5 0304 0314 0342		eb21
epsilon with macron and circumflex	03b5 0304 0342		eb27
iota with macron and circumflex	1fd1 0342	03b9 0304 0342	eb36
iota with macron and grave	1fd1 0300	03b9 0304 0300	eb38
iota with macron and acute	1fd1 0301	03b9 0304 0301	eb39
iota with macron and smooth	1fd1 0313	03b9 0304 0313	eb3c
iota with macron and smooth acute	1fd1 0313 0301	03b9 0304 0313 0301	eb3d
iota with macron and rough	1fd1 0314	03b9 0304 0314	eb3e
iota with macron and rough acute	1fd1 0314 0301	03b9 0304 0314 0301	eb3f
iota with breve and acute	1fd0 0301	03b9 0306 0301	eb40
iota with breve and smooth	1fd0 0313	03b9 0306 0313	eb41
iota with breve and smooth acute	1fd0 0313 0301	03b9 0306 0313 0301	eb42
iota with breve and rough	1fd0 0314	03b9 0306 0314	eb43
iota with breve and grave	1fd0 0300	03b9 0306 0300	eb44
iota with breve and smooth grave	1fd0 0313 0300	03b9 0306 0313 0300	eb45
iota with breve and rough acute	1fd0 0314 0301	03b9 0306 0314 0301	eb47
iota with breve and rough grave	1fd0 0314 0300	03b9 0306 0314 0300	eb48
iota with macron and smooth grave	1fd1 0313 0300	03b9 0304 0313 0300	eb54
iota with macron and rough grave	1fd1 0314 0300	03b9 0304 0314 0300	eb55
iota with macron and smooth circumflex	1fd1 0313 0342	03b9 0304 0313 0342	eb57
iota with macron and rough circumflex	1fd1 0314 0342	03b9 0304 0314 0342	eb58
omicron with macron and circumflex	03bf 0304 0342		eb5a
omicron with macron and smooth circumflex	03bf 0304 0313 0342		eb5b
omicron with macron and rough circumflex	03bf 0304 0314 0342		eb5c
upsilon with macron and grave	1fe1 0300	03c5 0304 0300	eb6f
upsilon with macron and circumflex	1fe1 0342	03c5 0304 0342	eb70
upsilon with macron and smooth grave	1fe1 0313 0300	03c5 0304 0313 0300	eb71
upsilon with macron and rough grave	1fe1 0314 0300	03c5 0304 0314 0300	eb75
upsilon with macron and smooth circumflex	1fe1 0313 0342	03c5 0304 0313 0342	eb77
upsilon with macron and rough circumflex	1fe1 0314 0342	03c5 0304 0314 0342	eb78
upsilon with macron and acute	1fe1 0301	03c5 0304 0301	eb7a
upsilon with macron and smooth	1fe1 0313	03c5 0304 0313	eb7d
upsilon with macron and rough	1fe1 0314	03c5 0304 0314	eb7e
upsilon with macron and smooth acute	1fe1 0313 0301	03c5 0304 0313 0301	eb7f
upsilon with macron and rough acute	1fe1 0314 0301	03c5 0304 0314 0301	eb80
upsilon with breve and acute	1fe0 0301	03c5 0306 0301	eb81
upsilon with breve and rough	1fe0 0314	03c5 0306 0314	eb82
upsilon with breve and grave	1fe0 0300	03c5 0306 0300	eb83
upsilon with breve and smooth	1fe0 0313	03c5 0306 0313	eb84
upsilon with breve and smooth acute	1fe0 0313 0301	03c5 0306 0313 0301	eb85
upsilon with breve and smooth grave	1fe0 0313 0300	03c5 0306 0313 0300	eb88

<b>description</b>	<b>decomposed Unicode</b>	<b>alternative ( full) decomposition</b>	<b>PUA code point adopted</b>
upsilon with breve and rough acute	1fe0 0314 0301	03c5 0306 0314 0301	eb89
upsilon with breve and rough grave	1fe0 0314 0300	03c5 0306 0314 0300	eb8a

Other PUA code points (some of which are no longer needed, since the character has now been accepted in the Unicode standard):

<b>description</b>	<b>Unicode code point, if now accepted</b>	<b>PUA code point</b>
Denarius	2733	e198
Drachmai	1017b	e197
etos	10179	e199
h (for use in Greek text)		e19b
iota reversed with tilde below		e1a1
Iota reversed with breve below		e1a0
Kai symbol	03cf	e1a6
Sigma double (capital archaic sampi)	0372	e19c
upsilon reversed with tilde below		e1a3
Upsilon reverse with breve below		e1a2
Yot		e1a5

Additional PUA code points used in New Athena Unicode for the alternative forms of capital vowels with iota and for some metrical symbols, and to support transliteration of Demotic Egyptian (these have not been agreed upon by the consortium that recognizes the code points in the previous lists):

<b>description</b>	<b>PUA code point</b>
capital alpha with reduced iota	EC00
capital alpha with reduced iota and smooth	EC01
capital alpha with reduced iota and rough	EC02
capital alpha with reduced iota and smooth and acute	EC03
capital alpha with reduced iota and rough and acute	EC04
capital alpha with reduced iota and smooth and grave	EC05
capital alpha with reduced iota and rough and grave	EC06
capital alpha with reduced iota and smooth and circumflex	EC07
capital alpha with reduced iota and rough and circumflex	EC08
capital eta with reduced iota	EC09
capital eta with reduced iota and smooth	EC0A
capital eta with reduced iota and rough	EC0B
capital eta with reduced iota and smooth and acute	EC0C
capital eta with reduced iota and rough and acute	EC0D
capital eta with reduced iota and smooth and grave	EC0E
capital eta with reduced iota and rough and grave	EC0F
capital eta with reduced iota and smooth and circumflex	EC10
capital eta with reduced iota and rough and circumflex	EC11

capital omega with reduced iota	EC12
capital omega with reduced iota and smooth	EC13
capital omega with reduced iota and rough	EC14
capital omega with reduced iota and smooth and acute	EC15
capital omega with reduced iota and rough and acute	EC16
capital omega with reduced iota and smooth and grave	EC17
capital omega with reduced iota and rough and grave	EC18
capital omega with reduced iota and smooth and circumflex	EC19
capital omega with reduced iota and rough and circumflex	EC1A
capital alpha with subscript	EC20
capital alpha with subscript and smooth	EC21
capital alpha with subscript and rough	EC22
capital alpha with subscript and smooth and acute	EC23
capital alpha with subscript and rough and acute	EC24
capital alpha with subscript and smooth and grave	EC25
capital alpha with subscript and rough and grave	EC26
capital alpha with subscript and smooth and circumflex	EC27
capital alpha with subscript and rough and circumflex	EC28
capital eta with subscript	EC29
capital eta with subscript and smooth	EC2A
capital eta with subscript and rough	EC2B
capital eta with subscript and smooth and acute	EC2C
capital eta with subscript and rough and acute	EC2D
capital eta with subscript and smooth and grave	EC2E
capital eta with subscript and rough and grave	EC2F
capital eta with subscript and smooth and circumflex	EC30
capital eta with subscript and rough and circumflex	EC31
capital omega with subscript	EC32
capital omega with subscript and smooth	EC33
capital omega with subscript and rough	EC34
capital omega with subscript and smooth and acute	EC35
capital omega with subscript and rough and acute	EC36
capital omega with subscript and smooth and grave	EC37
capital omega with subscript and rough and grave	EC38
capital omega with subscript and smooth and circumflex	EC39
capital omega with subscript and rough and circumflex	EC3A
end of stanza mark = three vertical bars	EC3B (U+007C, U+007C, U+007C)
contracted biceps = two dots over macron	EC3C (U+2012, U+0308)
catalexis caret	EC3D (U+0020, U+0020, U+032D)
aeolic basis = two small circles	EC3E (U+25EF, U+25EF)
alternate capital omega with downward opening	EC3F
capital H with line below for demotic egyptian	EC40
small c with caron and dot below for demotic egyptian	EC41
small Egyptological alef = new U+A723	EC42 (=U+A723)
small Egyptological ain = new U+A725	EC43 (=U+A725)
small i with inverted breve below for demotic egyptian	EC44
small u with inverted breve below for demotic egyptian	EC45

small Egyptological yod	EC46
small h with circumflex below	EC47
capital h with circumflex below	EC48
capital Egyptological yod	EC49
Coptic small letter ua with horizontal through it	EC4A
Coptic small letter iauda with diaeresis	EC4F
Coptic small letter ua with diaeresis	EC50
alternative glyph for papyrological 4 chalkoi	EC51
alternative glyph for drachme	EC52
alternative glyph for etos	EC53
another alternative glyph for eto	EC54

## Appendix III: Compatibility Issues and Workarounds

For the latest information on compatibility issues and workarounds, please consult the page dedicated to compatibility at the GreekKeys support site:

<http://apagreekkeys.org/compatibility.html>

### A. RTF VS. DOC FORMAT

The OpenType ligatures in the GreekKeys fonts transfer correctly from one system to the other in the limited tests performed so far (Jan. 2008). When the Help of MS Word 2008 warns that there is a known problem with ligatures when moving from Mac to Windows, this probably refers to ligatures that depend on AAT features instead of OpenType features. The fonts released with GreekKeys 2008 contain only OpenType features.

When using characters that depend on OpenType ligatures for proper appearance on the screen, the proper format in which to transfer them from Windows to Mac or vice versa is as a Word Document (suffix .doc, the pre-XML format). Files transferred as Rich Text Format contain some oddities.

When you move a Windows .doc to Mac 2008 for Mac OS X, you need to turn on the display of ligatures in the document, which is off by default. See Section 22.C above for instructions how to do this. The epsilon and omicron ligatures that do not appear correctly in Word for Windows do look right in Word 2008 for Mac.

When you move a Mac .doc to Windows, the OpenType ligatures should display correctly without further adjustment. Even the epsilon and omicron combinations display correctly when transferred from Mac to Windows.

### B. USING PRECOMPOSED INPUT AND PRIVATE USE AREA

If you are exchanging documents with people you know are also using GreekKeys Unicode fonts (especially the fullest font, New Athena Unicode) but who may be using Macs or Windows computers and may have various versions of MS Word (2004 or 2008 for Mac OS X, 2003—or perhaps earlier—or 2007 for Windows), then you will have the least difficulty if you use precomposed input and enter complex advanced combinations with the PUA codepoints employed in New Athena Unicode and some other fonts.

### 3. Macron or breve plus diacritics

Problems will occur when moving a Word document from Windows to Word 2004 on a Mac. Since Word 2004 cannot deal with ligatures at all, any ligatures will have a bad appearance on the screen or in printing. If the move is to Word 2008 for Mac, then the Mac user needs to turn on the use of ligatures for the document in order to get the proper display and printing (as described in Section 22.C above). For Mac users who do not own Word 2008, the OpenType ligatures can be seen correctly if the .doc file is opened with TextEdit, imported with Mellel, or opened with NeoOffice (version 2.2.2 with Patch 8 of Jan. 2008 worked; a version prior to Patch 8 did not). Unfortunately, you may lose other aspects of Word document formatting when you do open it with one of these programs.

One solution for this problem with Word 2004 is to use the precomposed PUA code points in the Windows Word document. Again, it was not possible to combine deadkeys so as to allow the GreekKeys keyboards for Windows to input the PUA code points. These have to be entered by an alternative method. For methods to use, see Section 21 above. For the PUA code points for the characters with macron or breve, see Appendix II above.

For Word for Windows itself, there is another solution to the failure of proper display of the combinations involving epsilon or omicron with macron and diacritics. You may use the ALT-x method for the diacritics after you input the omicron or epsilon with macron. For instance, instead of using the GreekKeys Unicode keyboard's **altgr-1** for acute, type in **0301** followed by **ALT-x**. It is illogical that this works differently from the keyboard input (which also inputs U+0301), but it does. Here are the ALT-x sequences to use; always enter the breathing sign, if any, before the accent, if any.

smooth breathing	0313, ALT-x
rough breathing	0314, ALT-x
acute	0301, ALT-x
grave	0300, ALT-x
circumflex	0342, ALT-x

### C. USING GREEKKEYS CONVERTER

The latest versions of GreekKeysConverter add the capability of converting precomposed Unicode to decomposed Unicode, or just precomposed PUA Unicode to decomposed, or vice versa.

## Appendix IV: Roman Vowels with Macron

In the past, many have used customized fonts in order to be able to show long marks on Roman vowels in Latin texts. The traditional GreekKeys font Classical was designed for this purpose.

Such customized fonts should no longer be used, since the Unicode standard provides a definition for the needs combined characters and they are now present in a wide range of system fonts for users of Mac OS X or Windows as well as in the APA GreekKeys Unicode fonts (y with macron is in a somewhat smaller subset of fonts).

characters	Unicode code points
Ā ā Ă ă	U+0100, U+0101, U+0102, U+0102
Ē ē Ĕ ĕ	U+0112, U+0113, U+0114, U+0115
Ī ī Ĭ ĭ	U+012a, U+012b, U+012c, U+012d
Ō ō Ŏ ŏ	U+014c, U+014d, U+014e, U+014f
Ū ū Ŭ ŭ	U+016a, U+016b, U+016c, U+016d
Ȳ ȳ <sup>11</sup>	U+0232, U+0233

To type these combinations directly in Mac OS X, activate the US Extended input and type deadkey option-a for macron (or deadkey option-b for breve) before you type the vowel. Or you can use the Character Palette or Unicode Hex input to enter these characters.

There is no way to type these combination directly in Windows, but they can be inserted with the ALT-x technique in Word or by using the Character Map or by using the Insert Symbol... command in Word or Insert Special Characters... command in OpenOffice Writer (see Section 21 above).

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<sup>11</sup> There are no Unicode code points for y or Y with breve.