

you choose. For instance, in the United States, daylight savings time begins on the first Sunday in April.

- 2. *On a particular day of the week relative to a given date.* Using this option, you specify the first occurrence a certain day of the week that falls “before”, “after”, “on or before” or “on or after” a certain date. So for example, daylight savings time in Great Britain ends on the Sunday immediately after October 22.
- 3. *Exactly on a particular date.* If daylight savings time always changes on a particular date, you can specify that particular month and date.

You select which of these options you will use by selecting from the third pop-up menu in the dialog box. Select “in” to use option 1; select “before”, “after”, “on or before” or “on or after” to use option 2; select “exactly on” to use option 3.

Begin: 1st Sunday after
on or after
before
on or before
exactly on ✓in April at 2:00 AM

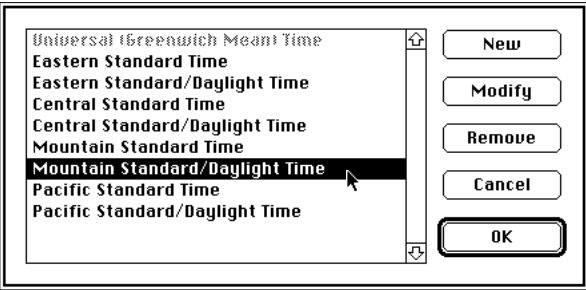
You will notice that if you select “before”, “after”, “on or before” or “on or after”, the first pop-up menu disappears, replaced simply by the word “The”, and a menu for the date appears.

Begin: The Sunday after April 1 at 2:00 AM

If you use select “exactly on”, the day of the week pop-up menu (the second menu) will also disappear, replaced by the

Modifying and deleting time zones

If you want to modify or delete a time zone which is currently in the Network Time list, click on its name in the time zone list dialog box. (The name of the Universal Time zone is gray because you can neither remove nor change the settings for it.)



When you select a time zone in the list, the Modify and Remove buttons become available. Click on Remove, or hit the delete or clear key on your keyboard, to delete the time zone from the list. The time zone will not actually be deleted until you hit the OK button; you can hit Cancel if you make a mistake.

If you want to modify the settings for the time zone, either click the Modify button, or double-click on the name of the time zone. The time zone configuration dialog will appear.

Appendix B: Finding time servers

Network Time requires you to specify a time server. Your best choice is to find a host on your local network which can act as an NTP version 3 server. If there are any UNIX machines on your local network, chances are that one of them can be configured as an NTP server. This section gives you some hints for finding a time server if one is not immediately available on your network.

Configuring a UNIX machine as a time server

Most UNIX machines come equipped to act as time servers already. UNIX generally comes with a program called “inetd” that can perform the old-fashioned UDP Time protocol. Though this is certainly not the preferred mode of operation for Network Time, it can be used. Make sure that your UNIX machine is configured to listen on UDP port 37 for time server requests. Check in the UNIX inetd.conf file. You should find a line like this in that file:

```
time dgram udp wait root internal
```

If the inetd program is running and this line appears in the inetd.conf file, this UNIX machine can be a simple time server.

The better way to go is to configure a UNIX machine as an NTP time server. The author of the NTP specification, David Mills, has a program available that implements the NTP time service for many different UNIX machines. The program, called “xntp”, can be obtained electronically by anonymous FTP from the Internet site “louie.udel.edu” in the directory “/pub/ntp”. For information, you can contact Dr. Mills at:

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ntp.olivetti.com	129.189.134.11 129.189.134.6	Cupertino, CA, USA
ntp.univ-lyon1.fr	134.214.100.25	Lyon, France
ntp0.cornell.edu	192.35.82.50	Ithaca, NY, USA
ntp0.ossi.com	192.240.2.2	Emeryville, CA, USA
ntp1.ossi.com	192.240.2.9	Emeryville, CA, USA
ntp2.ossi.com	192.240.4.50	Emeryville, CA, USA
louie.udel.edu	128.175.1.3	Newark, DE, USA
meevax.meediv.lanl.gov	128.165.196.1	Los Alamos, NM, USA
molecules.ecn.purdue.edu	128.46.129.82	West Lafayette, IN, USA
ntp.cox.smu.edu	129.119.80.126	Dallas, TX, USA
ntp.adelaide.edu.au	129.127.40.3	Adelaide, South Australia
ntp2-0.uni-erlangen.de	131.188.31.1	Erlangen-Nuernberg, Germany
ntp.cso.uiuc.edu	128.174.5.50 128.174.5.3 128.174.5.58	Champaign, IL, USA
salmon.maths.tcd.ie	134.226.81.11	Dublin, Ireland
sundial.columbia.edu	128.59.40.142	New York, NY, USA
tick.cs.unlv.edu	131.216.16.9	Las Vegas, NV, USA
timeserver.cs.umb.edu	158.121.104.2	Boston, MA, USA
timex.cs.columbia.edu	128.59.16.20	New York, NY, USA
tmc.edu	128.249.1.1	Houston, TX, USA
tock.cs.unlv.edu	131.216.18.4	Las Vegas, NV, USA
vtserf.cc.vt.edu	128.173.4.6	Blacksburg, VA, USA
wuarchive.wustl.edu	128.252.135.4	St. Louis, MO, USA
yoyo.aarnet.edu.au	129.127.40.4	Adelaide, South Australia
zeus.tamu.edu	128.194.3.85	College Station, TX, USA

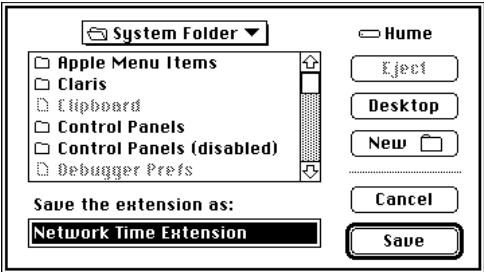
▲ **WARNING** Do NOT use any of the primary (stratum 1) time servers as your time server; always use a secondary (stratum 2) or higher server. The primary servers often have restricted usage rules and are only to be used by major secondary servers that provide the time to numerous hosts. Use of primary servers will degrade their performance and is completely unnecessary for a client. ▲

Appendix C: Creating the Network Time Extension

Often, a network administrator may want to have Network Time installed on a large number of machines. Configuring Network Time on hundreds of Macintosh computers could be a very tedious task, and most of the time the network administrator would prefer if the users of the machine were not able to change the settings, either intentionally or accidentally. To address this, it is possible to make a small Network Time system extension that can be distributed preconfigured to users. To do this, open the Network Time control panel and hold down the option key and the command key on your keyboard at the same time. You will notice that the clock icon in the upper left corner of the control panel window changes into a system extension icon.



If you click on this icon, a dialog box will be presented asking you where to save the new Network Time system extension.



The newly created extension will be preconfigured with all of the settings currently displayed in the Network Time control panel. You can distribute this file to users and have them drag it to their System Folder icon. The Network Time Extension file should be in the System Folder under System 6 and in the Extensions folder under System 7.

Appendix D: Foreign language versions

The Network Time control panel fully supports the Apple WorldScript system so that it may work with foreign language versions of the operating system (see “Appendix E: Technical specifications”). But, in addition to simply supporting the native WorldScript modules on the computer, Network Time is also available in translated foreign language versions, where all of the dialog boxes, error messages, and help balloons are displayed in languages other than English. At the time that this manual was written, eight foreign language versions were being made ready for distribution:

1. Swedish
2. French
3. Dutch
4. Chinese
5. Japanese
6. Spanish
7. Russian
8. German

Other foreign language version may become available in the future. If you are interested in obtaining a foreign language version, they should be available from the same places that the English version is found, or feel free to contact the author of Network Time:

Pete Resnick
1009 North Busey Avenue
Urbana, IL 61801 USA
(217) 337-1905
Internet: resnick@cogsci.uiuc.edu

Appendix E: Technical specifications

This appendix provides technical details of the implementation of Network Time. Some of this information may be useful to network administrators who wish to know how Network Time implements NTP and the TIME protocol. Other information is for those who want to understand in more detail the system resources used by Network Time. There is an accompanying document for programmers who may want to call Network Time from within their own applications called *Network Time: Information for developers* that is also available in the Network Time package.

System resources

Network Time tries to use as few system resources as possible. When the control panel is closed and Network Time is simply waiting for the next time to set the clock, the program uses only 15K of system heap RAM. The following is a list of approximate system resource usage of the different parts of Network Time:

<i>Memory use:</i>		
Control panel interface		15K
Time zone configuration		15K
Main time setting program		15K
<i>Disk use:</i>		
Control panel file		110K
Preferences file		4K
Extension-only file		40K

Protocol implementation

Network Time implements time setting using the *Network Time Protocol, version 3*, described in RFC 1305 written by David Mills, and the *Time Protocol*, described in RFC 868 written by John Postel and Ken Harrenstein.

or extension portion of Network Time as it is opened. The resource fork of the file contains configuration information, the time at which the clock was last set, and the version of Network Time that created it. The device driver portion of Network Time is the only thing that changes information in the resources of the preferences file after it is created. The data fork of the preferences file contains the database of time zone information which is used only by the control panel. Changes to the configuration and to the time zones are only stored in the preferences file; no changes are ever made to the control panel or extensions files themselves.

When the Network Time Extension version is used, the configuration information is re-written each time the machine is restarted.

System 7 and WorldScript compatibility

Network Time implements many of the new features available in System 7 and conforms to the Macintosh WorldScript guidelines for international software:

1. Balloon help is available for the entire control panel interface including the time zone configuration.
2. System 7 color icons are used for all files.
3. Once created, the Network Time Preferences file can be replaced by a System 7 alias file which points to the actual Network Time Preferences file.
4. Newer System 7 ToolBox routines are used internally whenever possible (e.g. the Alias Manager routines, the newer File Manager routines, the System 7 pop-up menu, etc.)
5. All dates and times are displayed in the localized system format, including those displayed in menu format in the time zone configuration dialog.

Acknowledgements

There are far more people to thank than I will ever be able to list here. The folks mentioned in the about box in the Network Time control panel contributed to the development effort in some special way; they were involved in teaching me to program on the Macintosh, providing vital resources, and in some cases actually contributing code to my effort. Their help was invaluable. The largest chunk of programming support throughout this effort was clearly from all of the people I have met through the Usenet network news groups on the Internet, including programmers from all over the world and at Apple. My debt to them is huge. But here I want to list all of the people who were involved in the testing of Network Time 2.0 and to those who contributed their time and effort producing foreign language versions of the program. Without these people, I would never have anything to show for the effort. Thanks to all of them!!

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Christophe Meessen	Kirk Bertsche	Cameron Owen	Jean-Pierre Kuypers
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Jim Kateley	Tom Maufer	David C. Kovar	Robert Beckett
Mohamed Ellozy	Ken Rosenberry	Dave Umbaugh	Anders Sundin
Bob Snyder	Erik Reuter	Russell K. Hobbie	Wenling Li
John Starta	Geert Jan de Groot	Shawn Segur	Charley Kline
John Parr	Gavin Eadie	Eduardo Kaftanski	Igor Livshits
Gordon C. Spoelhof	John Wieronski	Derek R. Price	
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Erwin Deffur	Kevin Miller	André Pirad	
Bob Esposito	Jens Madsen	Debbie Fligor	
Anders Sundin	Christine Gressley	Greg Murphy	
	Charley Kline	Rob Chandhok	
	Rees Roberts	Arman Dolikian	

Shareware information

Network Time is shareware. The shareware system was created so that software could be made available inexpensively and conveniently yet still allow programmers to get some compensation for their products. Network Time is available on many publicly accessible bulletin board systems so that you can have a chance to try it out and see if it suits your needs. In return, it is *your responsibility* to pay for it if you decide to use Network Time.

The cost of Network Time is a one-time fee of U.S. \$5 for every copy of Network Time that you use. For large sites, Network Time is available at a volume discount of U.S. \$100 for every 100 copies. If you have a much larger site where the latter discount would be too costly, or where the number of computers that the program will be used on is too difficult to determine, site-license agreements may be made, but the preferred method is \$100 per 100 copies.

Please send U.S. \$5 per copy (or U.S. \$100 per 100 copies), along with any questions or comments to:

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You may also call (217) 337-1905, or write via electronic mail over the Internet to resnick@cogsci.uiuc.edu.

Purchase orders will be gladly accepted.

Printed versions of this manual are available for an addition charge of U.S. \$5