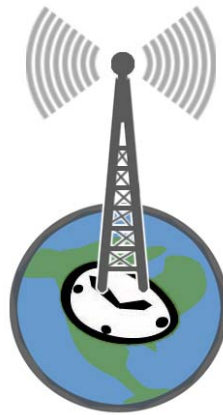


Radio Sync[®]

WWVB Time Synchronization

User's Guide
Version 4.1.4



Winter 2008



beagle software

www.beaglesoft.com

Table of Contents

1.0	Introduction	2
2.0	Quick Start	3
3.0	Hardware Installation	4
4.0	Software Installation	6
5.0	Troubleshooting Radio Sync	15
6.0	Other ClockWatch Options	17
7.0	Obtaining Technical Support	22
8.0	Beagle Software Information	23

1.0 Introduction

Beagle Software's ClockWatch Radio Sync keeps a computer synchronized to the NIST time signal broadcast. Radio Sync derives time from the NIST WWVB 60kHz time signal broadcast from transmitters in Colorado or Hawaii. Time derived from Radio Sync is traceable to NIST (National Institute of Standards and Technology). Reception is limited to most of the continental U.S. (during daylight) and most of North America (while the sun is down).

Radio Sync offers the total solution for enterprise-wide time synchronization solution. Radio Sync acquires precise time from either WWVB broadcast, Internet, or a dial-up time service and can make the correct time available over a local network.

This User's Guide covers installation of the Radio Sync receiver and software and discusses the configuration and use the software with the WWVB receiver.

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2.0 Quick Start

2.1 Hardware Installation and Setup

Unpack

Unpack the receiver, data cable and power supply. Locate the ClockWatch Radio Sync CD-ROM, which has all the installation files you will need.

Position the Receiver

Locate the receiver indoors away from computers and monitors, ideally near a window.

Plug in the Power Supply

Plug the 120 VAC power supply into the wall and the 2.1 mm connector on the lower edge of the receiver. The green LED should light when the receiver is powered and the switch is on.

Connect the Receiver to Computer

Connect the receiver to the computer serial port using the included DB-9 data cable.

2.2 Software Installation and Setup

Install the Radio Sync Software

Insert the CD into the CD drive. The installation wizard will auto-start. On the Welcome window, choose "ClockWatch". This will open a Version window, from which you can choose ClockWatch **Radio Sync**. Accept all default options for the installation wizard, and enter the key code located on the back of the jewel case when requested.

Set Radio Sync to use WWV as Time Source

Run the ClockWatch program. Select **Options** and choose **WWV**. Select the box to **Enable WWV as time base**.

Configure the Receiver in Radio Sync

From the WWV window (Options>WWV), select the Setup button. In this window select the WWV Model (**Radio Sync BS2**) and **press the Reset button**. Select the number of the COM port where the receiver is installed. Press OK to save the settings.

Test the Receiver in Radio Sync

From the WWV window (Options>WWV), select the Test button. Click **Open** and observe the data coming from the receiver. The receiver will take approximately 6-12 hours to validate the time signal. In certain installations this may take overnight. Time signal validation begins when the receiver is powered and is done independently from the Radio Sync

software.

Note the **Sync Status** window on the test screen. This shows the sync status of the receiver since it was last powered on.

- **on last attempt** indicates if the receiver synced on its last attempt
- **last 27 hours** show if the receiver has synced with the WWVB transmitter in the last 27 hours
- **since started** shows if the receiver synced since the receiver was turned on.

Monitor the Receiver from Radio Sync

You can monitor the validation progress and time signal reception from the log window on the main screen of Radio Sync. After validation the window will show the UTC time from the NIST.

Start the Service in Windows (optional)

After Radio Sync verifies that the computer has been synchronized the ClockWatch Service can be started and run to keep the computer synchronized. This service runs whenever the computer is on and the Radio Sync application need only be run to change settings.

3.0 Hardware Installation

3.1 WWV Receiver Installation

Receiver Location

The antenna/receiver unit is designed to be used indoors in a wood frame structure. Operation inside metal buildings or buildings with metal reinforcements may be marginal.

Orientation

The antenna/receiver should be mounted with the long side horizontal. It may be mounted either flat on a table or shelf, or hung vertically on a wall with the connectors on the bottom side.

The antenna/receiver is directional with best reception obtained with the long side perpendicular to Fort Collins, Colorado. Orient the antenna/receiver for maximum readability. After final orientation secure receiver to prevent inadvertent movement (double-stick tape is OK).

Noise Sources

Avoid locating near suspected interference sources such as: lamp dimmers, fluorescent lamps, electronic igniters, CRT monitors, battery chargers, switching power supplies, motors, automobile ignition systems, power lines, nearby radio transmitters. Note: Interference is diminished by the square of the distance (i.e., doubling the distance from the source will reduce its effect by 4).

Broadcast Reception

In some areas of the country the signal may not be available 24 hours a day. In these cases setup and initial reception are usually best done after dark. The unit is designed to keep accurate time during marginal reception periods after time is initially acquired.

3.2 Data Cabling

The recommended cable type is RS-232. Avoid sharp bends in cabling and routing near AC or current carrying wiring.

Serial Cable Length Limits (RS-232)

Table below lists the maximum permissible cable lengths for various protocols at various representative data rates. These lengths are as specified in the EIA RS232C, CCITT V.55 and RS422 interface standards.

Material requirements:

- Conductor size and type: 24 AWG, twisted pair.
- Nominal capacitance: 15.5 picofarads per foot (between conductors of each pair); 27.5 picofarads per foot (from each conductor to shield).
- Nominal DC resistance (each conductor): 24.0 ohms per 1000 feet.
- Nominal DC resistance (shield): 2.35 ohms per 1000 feet.
- Shield type: Overall braided with drain wire.
- Approval: Underwriters Laboratories (UL).

DTE Data Rate [kb/s]	Maximum DTE Cable Lengths [ft]			
	RS232C	V.35	RS449/422	RS530/422
56 or 64	10	4000	4000	4000
224 or 256	N/A	3500	1700	1700
896 or 1024	N/A	1700	350	350

N/A - not applicable (these rates cannot be used for RS232C interface)

NOTE on RS-232 Serial Cables: At lower peripheral speeds of up to 4800 baud, the normal baud rate used in Radio Sync, serial interfaces can usually operate over cables up to 50 feet long. Use of special high quality cable may in some cases allow this limit to be extended to as much as 200 feet.

3.3 Power Supply

- A 5 volt DC power supply maintains power to the receiver. Plug the 2.1 mm power connection plug from the power supply into the jack in the Radio Sync receiver.
- Plug the power supply into a 120 VAC outlet.
- Validation of the time signal with the NIST begins as soon as the receiver is powered.

To reset receiver and force a revalidation: remove power supply and data connection from receiver, then reconnect.

3.4 Connecting Receiver to Computer

- Plug the serial cable from the WWV into the computer's serial port. The data cable has a female DB-9 connector at the end and plugs into an available serial port (usually named COM1 or COM2) on the computer.
- Note the number of the COM port to which the data cable is connected.

4.0 Software Installation

4.1 Radio Sync Software Installation

1. Place the ClockWatch CD-ROM in the drive and wait for the installation wizard to start. If the CD does not start automatically, select "Setup.exe" on the CD root directory.
2. On the second window of the wizard (Group), choose ClockWatch. On the next window (Version), choose ClockWatch Radio Sync. Follow the instructions and select the default options in the installation wizard.
3. When asked for the key code, enter code exactly as printed **on the sticker on the back of the CD envelope**.
4. When installation is complete, Start ClockWatch from the **Start\Programs\Beagle Software** program menu.
5. Select **WWV Model number** and connecting **COM port** for the WWV within ClockWatch **WWV Setup**.
6. **Test** the WWV using the **WWV Test** section within ClockWatch. Note that the initial positional fix may take several minutes.
7. **Enable WWV as a time base**, set the **Sync Time** under WWV options. WWV activity will be shown in the log window of the main ClockWatch screen.

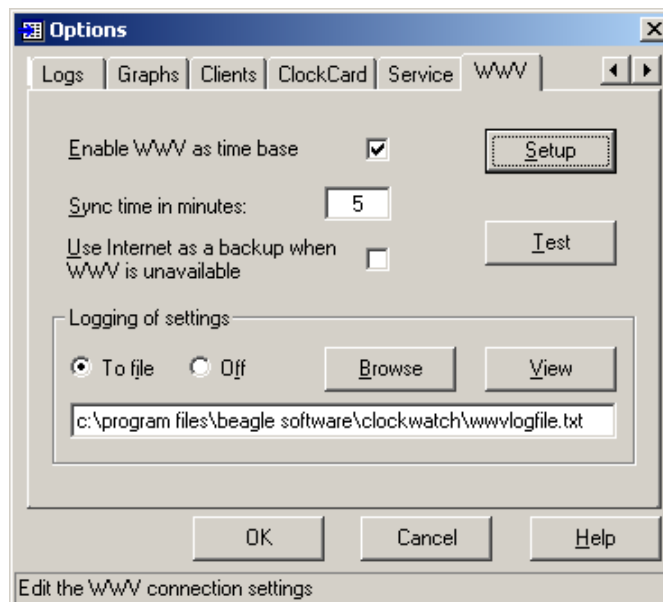
4.2 Radio Sync Options

The WWV options tab (Options>WWV) in Radio Sync allows the user to set run-time options, such as how often the Operating System time clock is updated from the WWV broadcast receiver. This window is shown on the top of page 8 in this manual.

Enable WWV as time base

Check to use WWV receiver as a time source. This will cause Radio Sync to set the operating system time to the WWV time at the interval specified.

Note that when enabled Radio Sync will access the WWV at the interval specified independent of the timeserver settings selected (Manual, Periodic, Auto, etc.).



Sync time in minutes

Set how often you want Radio Sync to check the time on the receiver.

Don't Ever Set the Clock Back

When checked it will allow the computer clock to be set ahead but never back in time. Intended to accommodate certain applications that rely on a precise chronological order, such as video monitoring or certain database transactions. It should be noted that the vast majority of computer clocks run slow and not fast, making the exercising of this option infrequent.

Use Internet as a backup when WWV is unavailable

Connect to an Internet timeserver when WWV is unavailable. Radio Sync will get the time from an backup external timeserver using the settings in

the Timeserver tab for which timeserver to use and how to connect to it. Use the warning settings to determine when the backup timeserver should be contacted.

Setup

Opens the form to setup the WWV connection.

Test

Opens the form to manually test the WWV connection.

Logging of settings

Logging allows you to create a permanent record of all time settings made through the WWV.

To file / Off options

To turn on/off WWV logging. When selected, the logging of time settings is to the named file. The log shows the results of each reading, regardless if the clock is changed or not. When logging is enabled, the status of each attempt is also shown in the timeserver log window (bottom of 3 windows) on the main Radio Sync screen.

Browse

To find an existing log file on your computer.

View

To view the WWV time setting log file using Windows Notepad.

Log File Name

Enter the file name (with path) for the WWV settings log. This is the text file where all re-settings of the Operating System clock will be logged. You can view the log from Options>WWV>View.

Default location:

C:\Program Files\Beagle Software\ClockWatch\WWVlogfile.txt

Sample Log file:

```
Synchronization Log 12/2/2002 10:01:06 AM
Date Time Difference Accuracy Status Server
-----
02-12-02 10:20:01 -.008 0.0 12 WWV
02-12-02 10:22:02 -.012 0.0 13 R5 M?00 2000 000UTC? 00:00 02
02-12-02 10:23:02 -.048 0.0 5 R4 MC00Y2002 336UTCS 16:23:02
02-12-02 10:24:02 -.004 0.0 5 R4 MC00Y2002 336UTCS 16:24:02
02-12-02 10:25:02 -.010 0.0 5 R5 MC00Y2002 336UTCS 16:25:02
02-12-02 10:26:02 -.077 1.7 0 R5 ?C00Y2002 336UTCS 16:26:02
```

The first line is the title and includes the date and time the log was first used. The second line contains the column headers:

- Date** The date the setting was made (yy-mm-dd).
- Time** The local time the setting was made (hh:mm:ss).
- Difference** The difference in the local time from the adjusted WWV time.

Accuracy The rate of clock drift in time in terms of seconds per day.
Status Setting results. For an explanation of codes see below.
Server 'WWV' or the actual setting string from the receiver.

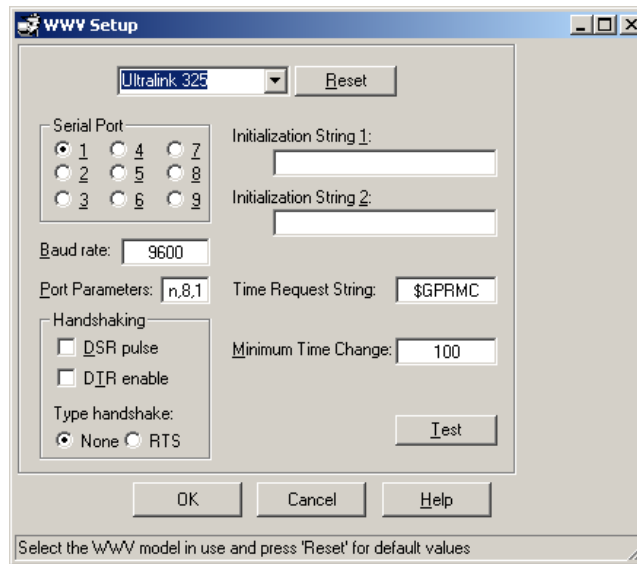
Log Setting Status Codes

0	SETTING_OK	Clock setting made.
1	DATE TIME ERROR	Date/time is invalid: date or time invalid.
2	TIME_ZONE ERROR	Time zone is missing: Time Zone error.
3	DATE DIFFERENCE	Dates don't match: date match error. Radio Sync will attempt to reset clocks that in two separate steps (date then time).
4	TIME DIFF TOO LARGE	Time difference was too great, time difference exceeds maximum allowable to make a setting. Radio Sync will confirm before making setting.
5	TIME DIFF TOO SMALL	Time difference is too small; time difference was too small to make a setting. No need to set clock.
9	TIME CONVERSION ERROR	Error occurred during time conversion. Verify that the timeserver format is set correctly.
11	COM_PORT_ERROR	Can't open serial (COM) port on WWV.
12	WWV_READ_ERROR	Can't read time from WWV or COM port error.
13	WWV NOT YET VALIDATED	Receiver not yet validated with NIST
14	TIME CHANGE EXCEEDS AVG	Time difference exceeded 3 sigma value, Radio Sync will confirm value before setting clock.
15	CLOCKS_IN_SYNC	Clocks in sync, no need to set
16	RECV_IN_SYNC	WWVB receiver is in sync with source
17	SYNC_IN_PAST	Sync time is in past , retrying
18	SYNC_START	Start sync process
19	TIMEDIFF_NO_SETBACK	Can't set clock back to correct time.
20	BAD DATE TIME FORMAT	Incompatible regional date/time format.
33	INCOMPATIBLE SERVER	Timeserver protocol setting was incompatible.
99	UNKNOWN_FORMAT	Unknown time server format.
100	SERVER_ERROR	Timeserver not currently available: Internal timeserver error.
200	PARSE_ERROR	Parsing return failed: format setting was

wrong or time string was corrupt.

4.3 Receiver Setup in Radio Sync

The WWV setup screen can be accessed by choosing Options>WWV, then selecting the Setup button. In most cases only the model number and com port need to be set in a new installation.



Model Number

Choose the model number of the WWV connected to the serial port. When using the Radio Sync receiver, select “Radio Sync BS1” Once selected press the **Reset** button to change the options to the default settings for the selected model. If the WWV in use is not on the list, then enter the settings manually.

Reset

Resets the options to the default settings in Radio Sync for the WWV receiver selected. Note that the settings are for Radio Sync only; no settings are changed on the WWV.

Serial Port

Select the number of the serial port (or COM port) connected to the WWV.

Baud Rate

Baud rate connection with WWV receiver in bits per second (use 9600). Enter the baud rate as a number.

Port Parameters

WWV communication port parameters: parity, data bits, stop bits (default: n,8,1). This must match the data port on the WWV.

Handshaking

Handshaking refers to the internal communications protocol implemented in the computer hardware by which data is transferred from the communications port to the WWV receiver. **Tip:** First try opening the port without any handshaking settings.

DSR pulse: Determines whether to have Radio Sync wait for a pulse on the DSR line before making a time fix. This feature must be implemented in the hardware interface.

DTR Enable: Determines whether to enable the Data Terminal Ready (DTR) line during communications. Typically, the Data Terminal Ready signal is sent by a computer to the WWV to indicate that the computer is ready to accept incoming transmission.

Handshaking Type: A handshaking protocol is used so data is not lost when it arrives at the communications port.

None: No handshaking.

RTS: RTS/CTS (Request To Send/Clear To Send) handshaking.

Initialization Strings

The initialization strings are optional commands that are sent to the WWV each time ClockWatch starts and before the first time setting is made. The command strings can be used to configure the WWV Both strings are optional.

Use strong validation rules

When checked, applies more stringent rules for qualifying time setting changes such as using multiple validation steps and making smaller, incremental time changes.

Time Request String

Character or string to send to WWV receiver to get time string.

Minimum Time Change

Enter the number of milliseconds for the smallest time change the clock will be set for. This value should be set slightly above the accuracy of the WWV receiver. Set the value high enough so that the clock will not be changed constantly by a small value.

Buttons

Test: Opens the WWV test screen, useful for verifying settings.

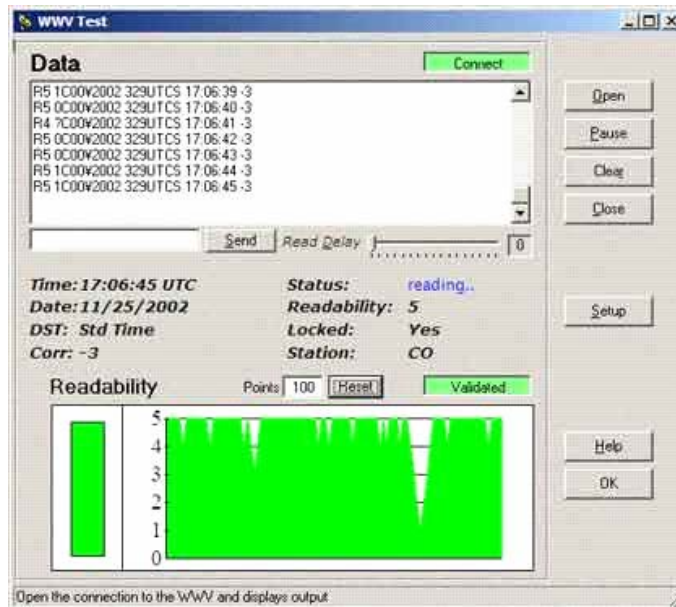
Help: On-line help and troubleshooting.

Cancel: Return to main option page – no settings are saved.

OK: Closes port, saves WWV settings in ClockWatch and returns to main options screen.

4.4 Testing Receiver in Radio Sync

The Radio Sync test screen lets you to test to see if the program is connected to the WWV receiver through the computer's serial port and if it is able to communicate thru the data port. After the connection to the WWV is opened, the test screen shows the raw data coming from the WWV, displays the information parsed from the raw data, including the date and time, and shows current signal readability.



Data

When the connection to the WWV is opened shows the raw data strings output by the receiver.

Send

Send a command to the WWV. After connection is made commands can be sent to the WWV to query for settings.

Read Delay

To slow down the test screens sampling rate of the WWV, slide the control to the right.

Time

Time from the WWV (in UTC), or if not yet validated, shows the elapsed time the receiver has been working to validate the time source.

Date

Date from the WWV (at UTC). Shows “2000 000” when not validated.

DST

Shows current daylight saving time status in the USA. Displays “Std time” if DST is not in effect, “In effect” if DST is currently in effect. **Note:** This value is broadcast by the NIST and does not reflect local DST customs.

Corr

UT1 correction (+/- 0.1 second increments). Correction (in tenths of a second) from sidereal time. Of interest to astronomers.

Status

Current WWV status when connection is open. Status message include “OPENING PORT”, “AWAITING VALIDATION”, “reading”, etc.

Readability

Signal readability from 1 to 5 (1 is unreadable, 5 is good). Readability is the best indication of relative signal strength.

Locked

Indicates if receiver is currently phase locked to WWVB or blank if unlocked (indicating poor reception).

Station

Currently receiving from broadcast from Colorado (CO) or Hawaii transmitters.

Points

Number of readability points to show in chart (range of 1-3800).

Reset

Press to change the number of points shown in graph.

Readability

Chart showing a map of current readability (1 is unreadable, 5 is excellent). Shows Green when validated, red when validating.

Y Axis: Readability (1-5 scale)

X Axis: Successive readings over time

Buttons

Open: Opens the connection to the WWV and stars displaying output

Pause: Pause from reading the WWV output

Clear: Clear the WWV output box on test screen

Close: Close the Radio Sync test connection

Setup: Open the WWV setup screen in Radio Sync

Help: On-line help and troubleshooting

OK: Closes connection, and returns to main options screen

5.0 Troubleshooting Radio Sync

Problems with using ClockWatch Radio Sync with a WWV receiver can be broken down into three categories:

- WWV reception problems,
- Cabling, and/or
- Serial port configuration.

WWV reception problems could be due to antenna reception or atmospheric problems. Connection problems involve the connection of the WWV to the computer which may be resolved with proper setup. The WWV requires a straight through data cable to connect it to the computer.

5.1 Initial Steps to Troubleshoot

- Check the cabling between the WWV and the computer.
- Use the Test WWV screen in Radio Sync confirm that the WWV is working and is getting a readable signal. When communicating with the receiver you will see the command being sent on the top of the Test Screen and the data received from the receiver in the status line on the bottom of the Test Screen.

WWV Issues

- Check that the WWV has power and is actively receiving.
- WWV receivers can take 6 to 12 hours to initially validate a time signal. Reliable time data is output only after the time signal is validated.
- Try running the receiver overnight and then check the “Sync Status” on the test screen to see if the receiver synced overnight.
- Proper installation of the WWV antenna is critical in getting 24/7 time information. Some antenna positions may work for only certain hours of the day. See reception problems below.

Cabling Issues

- WWV side – check the cable connection to the WWV.
- PC side – note the COM port in use. Verify it is a working serial port. Verify the com port number in the Options>WWV>Setup screen in Radio Sync. Try a different serial port if the no data can be read.

Data Output Issues

To get the time from the broadcast, the WWV must first validate the time signal. To view the raw data output from the WWV:

- First check the setup to see that the WWV model and serial port are correct (**Options>WWV>Setup**).

- Open the WWV Test screen in Radio Sync (**Options>WWV>Test**).
- Open a connection with the WWV. Radio sync creates an output file (wwwout.txt) that will save data output from the WWV for later review.
- Verify that the WWV is outputting data – the data list box should show strings of letters and number.
- Observe the type of strings of data output. Note the readability of the signal. If readability is consistently below 3 then the WWV receiver will have difficulty validating the time signal in its current position. Try moving the WWV receiver to a different position noting the change in readability.
- Initial validation can take 1 to 3 hours, and will perform better after dark.
- Once the WWV is validated then the Test screen will show the current time and date.

5.2 WWV Receiver Reception Problems

My receiver isn't working

- During daylight hours readability will often be 0. This is normal.
- Try rotating it 90 degrees. The antennas are directional and you might be able to improve the signal strength (readability) by turning the antenna.
- Place the WWV receiver along a wall or near a window that faces Fort Collins, CO.
- Locate the WWV receiver at least 1 or 2 meters away from any computer monitors, which can cause interference (some monitors have a scan frequency at or near the WWVB carrier frequency of 60 kHz).

My clock is off by one or more hours

- Remember, minutes and seconds are the same in all time zones, only hours are different. If your clock is off by one or more hours, it probably has to do with a time zone setting. Make sure you have properly selected your time zone in the Windows Date/Time control panel.
- If you live in an area that does not observe Daylight Savings Time (AZ, HI, parts of IN), make sure that DST is disabled in Windows.

The clock is off by a few minutes or seconds

This can be due to a number of different problems:

- Reception Problems - If your clock isn't currently receiving the signal, the time will "drift" and gradually get further and further from the correct time. Remember, if the signal isn't being received, your receiver isn't radio-controlled any longer, it's just a regular quartz

clock. Reviewing the setting log will show the time setting and reception history.

- Checking your clock - There is no need to check a properly working WWVB receiver. However, you might want to check it if you suspect you have a problem. You can check your clock by using Internet time setting option in Radio Sync.

We switched to Daylight Saving Time, and my clock didn't change

- This is probably due to a reception problem. Your clock or receiver hasn't received the signal recently, so it didn't know about the time change.

The clock switched to Daylight Saving Time, but we don't observe DST where I live

- Uncheck the "Automatically adjust clock for daylight saving changes" under the time zone tab of the Windows Date/Time control panel applet.

6.0 Other ClockWatch Options

This section offers a brief guide to understanding the Options available in ClockWatch. A complete ClockWatch guide is available for PDF download at <http://www.beaglesoft.com/Manual/CWcliServerGde.pdf>

6.1 Settings

Use this window to establish how you want to sync time using the Internet.

- Manual:** On-demand settings, useful when you want to manually make a single setting.
- Once:** Single-time setting at a future specified time.
- Daily:** Once-daily setting at the same time every day.
- Periodic:** Schedule settings at specific, fixed timed intervals.
- Auto:** Settings made automatically by ClockWatch when the clock is outside of a designated range of accuracy. This is best used when time drift is relatively constant.

Check time at startup: When enabled, ClockWatch will automatically start and run a time setting upon startup.

Check time once and then exit: When enabled, ClockWatch will check the time once using the Internet and then exit.

Force all time settings: When enabled, ClockWatch will force a time setting every time the clock is checked. This overrides the "time setting too small. No setting made" result.

Warn me when time has not been checked every...: ClockWatch will monitor the last time a time check was made. If the last check exceeds the interval limit selected, then a warning will be shown in the Log Window and in the system tray icon.

Send Email Warning

Enables email notification for clock check warnings (see above). When first checked opens up Email notification setup.

Usage Notes

- On Windows 9xMe machines ClockWatch starts on system boot-up.
- On Windows NT/2000/XP/2003 machines ClockWatch is started when the local user logs in to Windows.
- Windows NT/2000/XP/2003/Vista users should consider using the service.

6.2 Display

The Display window allows you to customize the options for time display and format. You can also set ClockWatch to startup automatically.

Startup Automatically—Configuring for Auto Startup

ClockWatch can be operated in an unattended mode from the System Tray. When this option is checked, ClockWatch automatically loads and operates in whichever mode it was last configured and then runs in the background. The ClockWatch icon will be available in the System Tray after ClockWatch is loaded. When you use “Startup Automatically” with the ClockWatch service running, the ClockWatch system tray monitor applet will be started instead of the full ClockWatch application when you first log in. This applet monitors time setting status and shows seconds in the system tray.

6.3 Timeserver

The Timeserver window offers a choice for the Internet timeserver used and type of connection you are using. If an Internet connection is not available, you can call the NIST directly using the computer’s modem.

Connection Frame options

Internet/LAN: Communicates directly to the specified timeserver over the Internet, using the protocol and port specified.

Internet/Dial-up: Will first dial your ISP to make a connection to the Internet and then sync the clock using the timeserver specified. For configuration options click **Setup**.

Internet Connection Setup

Click the **Setup** button to configure how ClockWatch will make connection

with the Internet. ClockWatch offers several connection options:

Manual Connection: If you establish the connection to the Internet manually, or you normally are connected to the Internet over a LAN or on demand methods such as DSL or cable modems, you should choose the manual connection option.

Have ClockWatch wait for Internet connection: Use this option if you want ClockWatch to wait for the next time you make a connection to the Internet.

Have ClockWatch Automatically Dial my ISP: You can have ClockWatch dial your ISP to make an Internet connection when needed.

Direct modem connection: When selected, uses the modem to call the NIST directly and sync up time signals over the phone line.

Source Frame options

Address of timeserver: Shows the name of the timeserver currently in use. This can be changed by clicking the **Directory** button and choosing another timeserver.

Timeserver Directory: The Timeserver Directory screen allows you to choose a timeserver. You can also test, edit or add timeservers.

Timeserver Test: The timeserver test lets you check both the connection and the capability of local or remote timeservers. Compatibility and connection problems can be diagnosed using the built-in 8 point connection test.

6.4 Logs

The Clock Setting log provides a record of all the settings made by ClockWatch. Once a log file is specified, ClockWatch will add data to the log file each time the program is activated and a setting is made.

Interpreting the ClockWatch Log

This section explains how to interpret the ClockWatch log. If logging is enabled in the **Options>Logs** tab, this log is updated each time a setting is made.

A sample of the log is:

```
Synchronization Log                9/14/98 11:43:12 AM
Date      Time      Difference Accuracy  Status  Server
-----
98-09-14 11:42:37    2         10.0      5      time-a.nist.gov
98-09-14 11:52:28    0          0.0      5      time-a.nist.gov
```

The first 2 lines show the title and the date and time the log was first used. The data definitions are:

Date: The date the setting was made.

Time: The local time the setting was made.

Difference: The difference (in seconds) in the local time from the adjusted timeserver time. May be a positive or negative number.

Accuracy: The rate of clock drift in time in terms of seconds per day.

Status: The results of the setting. See Status Result Codes, below.

Server: The name of the timeserver used to make the setting. Direct modem connections will show the phone number dialed.

Setting Status Result Codes

The status result code, found in the Clock Setting log, shows the result of a time setting attempt. Result codes are in section 4.2.

Action Log

The Action Log is a summary view of all current time setting activity. Data is displayed in a list on the main screen and actions are added as they occur. Entries include the origination of the action and the result. Upon starting, the list shows the five most recent events (if available). After the program closes, the action detail can be found in the individual logs.

Columns:

Date: Identifying source icon and date and time in yy-mm-dd hh:nn:ss format.

Source: Internet time setting, ClockCard setting (Option), BIOS clock setting, WWVB time settings, client time requests and clock locking activity are all included in the log.

Note: to show Client/Server activity the "Log as an event" option in the Client Options section must be enabled.

Status: Result of the action.

Time Difference (seconds): If clock was changed shows the number of seconds time setting. For clock locking shows the attempted time change.

Accuracy (sec/day): For clock setting, shows the accuracy in terms of seconds/day.

Tip: You can resort by any column by clicking the column header.

Event Logging

Event logging allows you to write selected action to a text file and/or the NT/2000/XP/2003 event log. This log captures major time setting activities as well as warnings for when there may be a system or time setting problem.

6.5 Graphs

The **Graphs** tab offers options for graph display and data charting of computer clock performance.

Clock Drift: Used to turn Clock Drift graph on/off.

Current Settings: Used to turn Current Settings graph on/off.

Previous Settings: Used to turn Previous Settings graph on/off. This graph

shows the settings made on previous ClockWatch sessions.

Ignore Zero Differences: If checked, displays only the settings when the internal clock was changed. If not selected, shows all settings in the Previous Settings graph.

6.6 Clients

The **Clients** tab is the main point of control for establishing communication with clients.

Listen for Clients: When enabled, ClockWatch listens for time requests on the port specified and responds to time requests from ClockWatch Clients. If client communication is expected then this check box should be checked.

Port Number: ClockWatch listens for time requests from ClockWatch clients on this TCP or UDP port. Specify the port number used to communicate with ClockWatch Clients. The default value is 1001.

Client Protocol: Choose the protocol used to communicate with the time clients. This must be the same protocol and port used by the client in communicating with ClockWatch Radio Sync Server.

View file name of clients...: Runs the Client Request report, opens up log using Windows Notepad. Note: To conserve resources, the report is normally stored in memory; pressing the View button first writes the report out to the file.

File name of client requests log: Contains the full file name and path of the client requests log file. This log shows a list of all the clients requesting time from ClockWatch.

Log as an event: When enabled, this option will log individual client requests in the event log showing the date, time and address of the requesting client.

6.7 Bios Clock (or ClockCard, if installed)

The BIOS Clock Options tab in ClockWatch allows the user to update the Windows operation system clock from the BIOS (hardware) clock. If Beagle Software's ClockCard is installed, this option is renamed to "ClockCard" and the time is updated from the ClockCard clock.

6.8 Service (Windows NT/2000/XP, 2003 or Vista)

The Service option shows status of the ClockWatch Service and allows you to stop and start the service. In Windows, a service is a separate process that runs independently of any application and that is normally active whenever the computer is running.

When enabled, the ClockWatch Service runs whenever the computer is running. It functions identically to the ClockWatch application in checking the clock and keeping the time correctly set.

7.0 Obtaining Technical Support

Web site: www.beaglesoft.com

Consult our web site for the latest updates, technical information and documentation.

E-mail: support@beaglesoft.com

Please be as specific as possible including the program version and the steps to recreate the problem, if possible.

Phone: +1 612-370-1091

Refund Policy

In order to receive a refund on a product for the purchase price, the product must not have been damaged by the customer or by the courier chosen by the customer to return the goods. The product must be returned in complete condition, meaning that all cables, manuals, software, etc., are included. The product must be in as-new or re-saleable condition to qualify for refund. Refunds are not issued for shipping charges.

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Product items returned within 30 days qualify for a full purchase price refund, assuming all qualifications listed above in Refund Policy are met. Items returned after 30 days and before 60 days of purchase will be subject to a minimum 20% restocking charge. Additional charges may apply for damaged or missing parts. Products returned after 60 from the date of purchase, or products that are not returned in as-new or re-saleable condition, do not qualify for refund or credit and will be returned to the customer.

Registered Version

One registered copy of ClockWatch can be installed on a single workstation and used by one or more people.

Limited Warranty

Beagle Software warrants that this product will perform in accordance with the included documentation for a period of 180 days from the date of receipt and that Beagle Software will, at its own discretion, make commercially reasonable efforts to solve any problem issues. This Limited Warranty is void if failure of the software product has resulted from accident, abuse or misapplication.

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8.0 Beagle Software Information

Beagle Software supplies innovative and useful Internet enabled Windows programs that bring the power of the Internet to the desktop of the user.

Beagle Software is located in Minneapolis, Minnesota, just slightly West of the Mississippi River.

Ordering Information

Web: <http://www.beaglesoft.com/OrderForm.htm>

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