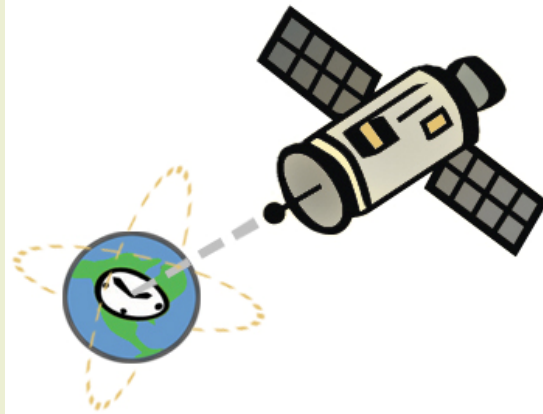# Star Sync®

GPS Time Synchronization

User's Guide
Version 4.1.0

Fall 2007

beagle software
www.beaglesoft.com

Table of Contents

1.0 Introduction

Beagle Software's ClockWatch Star Sync offers the total solution for enterprise-wide time synchronization. ClockWatch Star Sync acquires precise time from GPS satellites and makes the correct time available over the network using the Network Time Protocol (NTP). ClockWatch Star Sync can synchronize client computers typically to +/- 0.02 second. By installing the ClockWatch Star Sync within your network firewall, you can ensure high reliability and security in delivering precise time.

The ClockWatch Star Sync derives time from GPS satellites and automatically tracks up to twelve satellites simultaneously. Time derived from the ClockWatch Star Sync is traceable to NIST (National Institute of Standards and Technology). A simple user interface makes initial setup and use straightforward and effective

> Tip: Help is available anytime by pressing the F1 key

Trademarks
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2.0 Installation

2.1 GPS Antenna Installation

Antenna Considerations

The GPS antenna can be installed indoors or outdoors where an unobstructed view of the sky exists. Rooftops generally make good locations due to clear overhead sky with views to the horizon, allowing the antenna to see and track the maximum number of satellites throughout the day. Installations with obstructed views may prove operational, but may experience reduced reception quality and the inability to simultaneously track the maximum number of satellites. In addition to clear sky coverage, select a site which would not allow the antenna to become buried in drifted or accumulated snow.

Satellite Visibility

The Star Sync low profile antenna must be mounted with a full view of the sky. It can view the sky through a window or my mounted outdoors.

Noise Sources

The antenna should be located at least 3 ft from electromagnetic noise sources such as transmitting antennas.

Cabling

The Star Sync receiver includes a 25 foot serial cable, or 9 foot coaxial cable with the active antenna. If necessary, the serial cable can be extended. The recommended cable type is RS-232. The maximum length between computer and GPS receiver is typically 50 feet. This can be extended if the environment is relatively free of electrical noise and a high quality cable is used. Avoid sharp bends in cabling and avoid routing near AC or current-carrying wiring.

Extension Cable 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: Single or double shielded. Overall braided with drain wire.
- Approval: Underwriters Laboratories (UL).

NOTE on RS-232 Serial Cables: At lower communication speeds, the normal baud rate used in Star 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.

2.2 Connecting GPS Receiver to a Computer

Plug the NMEA type data cable from the GPS into the computer's serial port. The data cable usually 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 that the data cable is connected to. Plug the power connection from the Star Sync receiving unit into the power supply. Plug the power supply into an AC outlet.

2.3 Star Sync Software Installation

1. **From CD:** Place the CD in the drive and allow it to run automatically. If autorun fails, choose the **Start** menu, select the **Run** command and enter ***x:\Setup*** in the Run box (replace '***x***' with CD-ROM drive letter, usually 'D' or 'E'). Follow the instructions from the installation wizard.

2. When asked for the key code, enter code exactly as printed ***on the sticker on the back of the CD envelope***. Enter this code on the registration page of the install wizard.

3. *When installation is complete, Start ClockWatch from the* **Start\Programs\Beagle Software** *program menu.*

4. Go to the **Options** menu, and select **GPS**. Click on the **Setup** tab, and select the correct **GPS Model number** and **COM port** for the GPS receiver.

5. Click on the **Test** box, and then in the new window click **Open**. This will test the functionality of the GPS. Note that the initial time fix may take 5-20 minutes. If you are unable to achieve connectivity, see section 4.0.

6. **Enable GPS as a time base,** set the **Sync Time** under GPS options (see Sec. 3.3) . GPS activity will be shown in the log window of the main ClockWatch screen.

Note for Windows 2k/XP/Vista Users: Windows may incorrectly identify the GPS receiver as a 'Microsoft Serial BallPoint' mouse. If asked do not install the "Serial Ball Point mouse" when prompted.

3.0 Using the Star Sync Software

3.1 Star Sync GPS Setup

The GPS setup screen can be accessed from the Options>GPS>Setup button from ClockWatch. In most cases only the model number and com port need to be set in a new installation

Note: If using a receiver from Beagle Software you need only select the model and COM port in use. All other settings are set.

Model Number: Choose the model number of the GPS connected to the serial port.

- Use *Garmin 16* as the model number if using the dome shaped Star Sync Heavy Duty receiver.

- Use *Garmin 18LVC* as the model number if using the disked shaped Star Sync Standard Duty receiver.

- Use *Garmin 18LVC* as the model number if using the Star Sync stand-alone receiver with external antenna.

- Use *SiRF 901* as the model number is using the portable receiver.

Once selected press the **Reset** button to change the options to the default settings for the selected model. If the GPS is use is not on the list, then enter the settings manually.

Reset button: Resets the options to the default settings in ClockWatch for the GPS model selected. Note that the settings are for ClockWatch only, no settings are changed on the GPS.

Serial Port: Select the number of the serial port (or COM port) connected to the GPS.

Baud Rate: Baud rate in bits per second Enter the baud rate as a number. **Note**: Most NMEA devices use 4800 baud as a data rate.

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

Handshaking

Handshaking refers to the internal communications protocol implemented in the computer hardware by which data is transferred from the communications port to the GPS. For most installations the default settings are adequate.

Tip: First try opening the port without any handshaking settings.

DSR pulse: Determines whether to have Star Sync wait for a pulse on the DSR line before making a time fix. Such pulse per second outputs are options on some GPS receivers such as the Garmin 16-LVS. This feature requires a custom interface cable between the GPS and PC. Contact Beagle Software for more information.

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 GPS 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.

GPS Settings

NMEA Time Type: NMEA message type containing time. This is the identifier that Star Sync uses to find the NMEA string that contains the time.

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 GPS receiver. Set the value high enough so that the clock will not be changed constantly by a small value.

Initialization Strings: the initialization strings are optional strings that are sent to the GPS each time ClockWatch starts and before the first time setting is made. The strings can be used to configure the GPS or modify the NMEA strings that are outputted by the receiver. Both strings are optional.

Buttons

Test:	Opens the GPS 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 GPS settings in ClockWatch and returns to main options screen

3.2 Star Sync GPS Test

ClockWatch Star Sync allows you to test to see if the program is able to communicate with a GPS receiver's data port through the computer's serial port. Use the setup screen to specify the GPS model and serial port (see section 3.1). After the connection to the GPS is opened, the test screen shows the raw data coming from the GPS, displays the information parsed from the raw data, and shows current satellite activity.

Tip: The GPS Test is useful in verifying that the 1) GPS is working, 2)the cabling is correct, and, 3) the software setup is correct.

Data

Data Window:	When the connection to the GPS is opened, shows the raw data strings output by the GPS.
Send field:	Send a command to the GPS. After connection is made commands can be sent to the GPS to enable/disable options.
Read Delay:	To slow down the test screens sampling rate of the GPS, slide the control to the right.
Type:	NMEA data message type (GSV, RMC, GLL etc) last sent by the GPS.
Time:	Time from the GPS (in UTC).
Date:	Date from the GPS (at UTC).

Lat:	Latitude in degrees N/S.
Long:	Longitude in degrees E/W.
Status:	Current GPS status when connection is open. Status message include "OPENING PORT", "AWAITING FIX", "SATS OK", etc.
Speed:	Speed over land as reported by GPS (in miles per hour).
Alt:	Altitude as reported by GPS (in feet).
Track:	Track made good, Course over ground, degrees true.
Map:	Map the current location over the web (US only). The current location will be shown using the latitude and longitude output by the GPS on US Census maps. Note: an active Internet connection is required to display the current position.

Satellites

Polar View: Shows a map of current satellite activity. North is in the 12 o'clock position, East at 3 o'clock, etc.

List box: List of the currently active satellites

Columns:

ID:	Number in list
Name:	Satellite PRN number
Elev:	Elevation over horizon, degrees, 90 Degree maximum
Azm:	Azimuth, degrees True, 000 to 359
Str: -	Strength, (C/No) 00-99dB, 0 when not tracking

Note: you can sort a list by any column by clicking the column heading.

Open: Opens the connection to the GPS and starts displaying output. Star Sync also writes to a text file with the GPS data output.

Pause: Pause from reading the GPS output

Clear: Clear the GPS data output box on test screen

Close: Close the Star Sync GPS connection and stop writing to the data file.

Show All: Show all NMEA strings. Sends the $PGRMO command to GPS receiver to output all NMEA strings. If your receiver uses a different command sequence then use the **Send** box to send it to the receiver.

Setup: Open the GPS setup screen in Star Sync

Initialize: Send the Initialization strings to the receiver. These are specified in the GPS setup screen

Help: On-line help and troubleshooting

OK: Closes connection, and returns to main options screen

3.3 GPS Options

The GPS Options tab in ClockWatch allows the user to set how often the Computer's clock is updated from the GPS. It can be found from the main Options menu in ClockWatch.

Enable GPS as time base

Checks to use GPS as a time source. This will cause ClockWatch to set the operating system time to the GPS time at the interval specified. Note that when enabled ClockWatch will access the GPS at the interval specified independent of the timeserver settings selected (Manual, Periodic, Auto, etc.)

Refresh time in minutes

Number of minutes between GPS time readings. Updating the operating system clock from the GPS is a good way to stabilize a system with erratic time keeping. Use Internet as a backup when GPS is unavailable

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 external timeserver as a backup when GPS is unavailable

connects to an external timeserver when GPS is unavailable.

- ClockWatch will get the time from an backup external timeserver specified in the settings in the Timeserver tab
- In the Timeserver tab you can choose to use either an Internet based timeserver or contact the NIST directly via modem (Direct Modem).
- Set the warning level under the Clock Settings tab to determine when the backup timeserver should be used.

Setup

Opens the form to setup the GPS connection

Test

Opens the form to manually test the GPS connection.

3.3.3 GPS Time Setting Log
Logging of settings

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

> **To file /Off options:** To turn on/off GPS 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 ClockWatch Star Sync screen.
> **Browse:** To find an existing log file on your computer.
> **View:** To view the GPS time setting log file using Windows Notepad.

Log File Name: Enter the file name (with path) for the GPS settings log. This is the text file where all re-settings of the Operating System clock will be logged. Default value:
C:\Program Files\Beagle Software\ClockWatch\gpslogfile.txt

Sample Log file

```
Synchronization Log          2/4/2003 3:13:58 PM
Date     Time      Difference Accuracy  Status Server
-----    ----      ---------- --------  ------ ------
03-02-04 15:13:58  53.079     52.1      0      GPS 21:13:58 UTC
03-02-04 15:27:04  .845       302.9     0      GPS 21:27:04 UTC
03-02-04 15:31:02  2.138      0.0       14     GPS 21:31:04 UTC
03-02-04 15:36:05  2.225      355.3     0      GPS 21:36:05 UTC
03-02-04 15:40:03  .29        105.3     0      GPS 21:40:03 UTC
03-02-04 15:45:02  -.01       0.0       5      GPS 21:45:02 UTC
03-02-04 16:45:06  2.48       187.5     0      GPS 22:45:06 UTC
03-02-04 16:50:02  -.005      0.0       5      GPS 22:50:02 UTC
03-02-04 16:55:03  .162       23.4      0      GPS 22:55:03 UTC
03-02-04 17:16:02  .067       0.0       4      GPS 23:16:02 UTC
03-02-04 17:17:03  .099       76.4      0      GPS 23:17:03 UTC
03-02-04 17:18:01  -.012      0.0       5      GPS 23:18:01 UTC
03-02-04 17:19:03  .119       85.7      0      GPS 23:19:03 UTC
03-02-04 17:37:03  0          0.0       13     GPS
```

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. Star 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. Star Sync will confirm before making setting.

5 TIME DIFF TOO SMALL — Time difference is too small; time difference was below threshold value to make a setting. No need to set clock.

7 CANT CHANGE CLOCK — Lacks proper permission to change system clock. Try running as administrator.

9 TIME CONVERSION ERROR — Error occurred during time conversion. Verify that the GPS NMEA format is set correctly.

11 COM_PORT_ERROR — Can't open serial (COM) port on GPS.

12 GPS READ_ERROR — Can't read time from GPS or COM port error.

13 WAITNG FOR VALIDATION — Receiver not currently fixed in position. May be due to current satellite positioning relative to receiver, weather conditions or an obstructed antenna. Antenna may be also not connected or not working.

14 TIME CHANGE EXCEEDS AVG — Time difference exceeded 3 sigma value, a rolling average of internal clock accuracy. Star Sync will confirm time change before setting clock.

15 CLOCKS IN SYNC — Clocks in sync, no need to set

16 RECV_IN_SYNC	Receiver is synced to source
17 SYNC_IN_PAST	Sync time is in past
18 SYNC_START	Start sync process
19 TIMEDIFF_NO_SETBACK	Can't set clock back to correct time
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.

Most Star Sync setting log files will contain a combination of 0 (time setting made), 5 (no need to set clock), 4 or 14 (too big a time change—confirm first) and 13 (GPS awaiting fix) status codes.

4.0 Troubleshooting a GPS Working with Star Sync

Problems using ClockWatch Star Sync with a GPS receiver can be broken down into three categories: GPS problems, connection problems and data output compatibility. Connection problems involve the connection of the GPS to the computer and may involve configuration issues. The GPS will generally require a special data cable to connect it to the computer. Data output compatibility may involve monitoring the GPS for valid positional fixes that include UTC time information.

Initial Checks

If possible, independently confirm that the GPS is working and is successful in getting a fix.

- Check the cabling between the GPS and the computer. Check the GPS power supply.

- Test the output from the GPS using the Test GPS screen in Star Sync.

- If using the Stand Alone model, verify the power is switched on, and power LED is lit. The second LED will only blink when there is an active fix.

GPS Receiver Issues

- Check that the GPS has power. Check that the GPS is actively receiving and can fix its location. *The receiver must see at least 3 satellites with signal strength greater than 0 to get a fix*. Time data is sent once the GPS has a fix.

- Some GPS receivers can take 5-20 minutes to establish an initial fix. Reliable time data is output only after the fix is made.

- Proper installation of the GPS or GPS antenna is critical in getting 24/7 time information. Some antenna positions may work for only certain hours of the day.

- The GPS must be NMEA 0183 compatible. NMEA data output must be enabled on the GPS.

Cabling Issues

- Use the data cable provided by Beagle Software or the GPS manufacturer.

- GPS side – check the connection to the GPS.

- PC side – note the COM port in use. Verify it is a working port. Verify the port number in the Options>GPS>Setup screen in Star Sync.

- PC/GPS handshaking – while not usually required, try different PC handshaking options for connecting with GPS.

GPS Data Output Issues

In order to get precise time from the GPS satellites the receiver must first fix its position. Once the position is fixed then the GPS begins to output usable time data. This time data takes the form of a data string streamed out from GPS. The Star Sync software then extracts the time data from the raw GPS data.

To view the raw data output from the GPS:
- Open the GPS Test screen in Star Sync (*Options->GPS->Test*).

- Open a connection to GPS by pressing the 'Open' button. The 'Connect' indicator will turn green. Star Sync will automatically save data output from the GPS for later review.

- Press the 'Show All' button to display all GPS output.

- Verify that the GPS is outputting data – the data list box should show strings of letters and number. You can adjust the rate of scrolling by adjusting the **Read Delay** slider control (to slow output down, move slider to the right).

- Observe the type of strings coming out of the GPS.
  When the GPS is first turned on the strings will be of the GSV (satellites in view) type. This means that the GPS is in the process of finding 3 or more satellites it can use to fix the current position. If the GSV type is the only output after a long period of time (more than 10 minutes) then the GPS receiver is unable to get a fix in its current position. Try moving the GPS or antenna to a different position.

- Wait for the GPS to fix the position.
  Once the GPS has a fix then the Test screen will show the current time and position. The satellite button color will change from red to black when the receiver is fixed.

- Verify the Time Message strings.
  Look for the GPRMC strings coming out of the GPS. It is important to verify that the NMEA time type message specified in the Setup screen is actually being output by the GPS. If Star Sync cannot find this specific message type in the output then Star Sync will not read the time.

If no data output from GPS is visible in the GPS test screen, check:
- Software setup been done correctly for the GPS (Options->GPS->Setup)
- GPS is plugged into to the correct serial port (check COM port).
- Power supply is connected to GPS.
- Model number is correct (select model and press 'Reset')
- Port parameters such as baud rate are correct

Windows NT/2000/XP/2003/Vista Users:

Windows may incorrectly identify the GPS receiver as a 'Microsoft Serial' or 'Microsoft Serial BallPoint' mouse. If this happens Windows may then install software that inhibits communication with the GPS or which causes the mouse or cursor to act erratically. You can check for this by looking in the Windows Device manager and checking if a second "BallPoint" or "Serial Mouse" is assigned to the same COM port that the GPS uses. If it is installed on the same port then disable that mouse in the Device Manager.

5.0 Wiring and Configuring the Bare Wired GPS Receiver with Star Sync

This section is a reference for users who have purchased the GPS receiver with bare wire leads directly from Beagle Software or wish to construct a custom cable to attach a GPS receiver to the computer.

RJ-45 Contact View
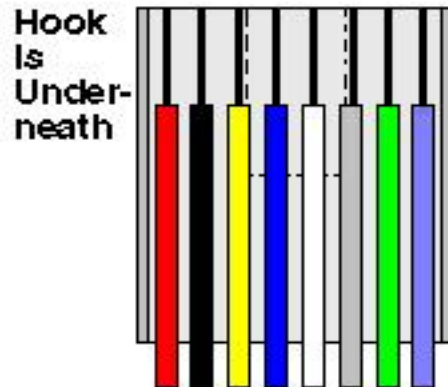
RJ-45 Wiring for GPS 16

Pin	Wire Color	Name
1	Red	Power
2	Black	Ground
3	Yellow	On/Off
4	Blue	Data In
5	White	Date Out
6	Gray	Pulse
7	Green	Not used
8	Violet	Not used

RJ-45 Wiring for GPS 18

| Pin	Wire Color	Name
1	Red	Power
2	Black	Ground
3		Not used
4	Green	Data In
5	White	Data Out
6	Yellow	Pulse
7		Not used
8		Not used

6.0 Hardware Interface

7.0 Mounting Options

The Garmin GPS 16-LVS and 18-LVS are complete GPS receivers including antennas in uniquely styled waterproof packages.   The Stand Alone GPS is meant for indoor use only.
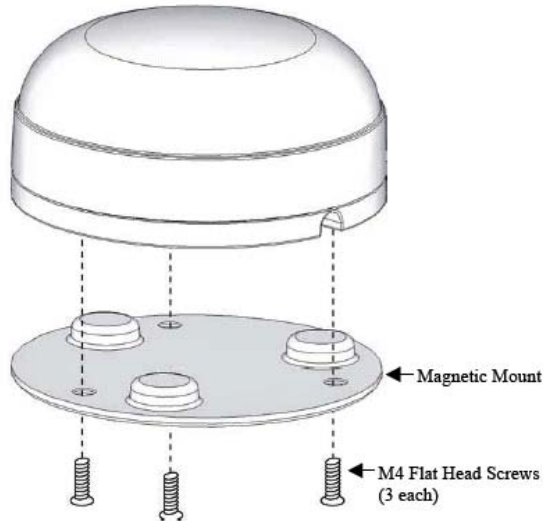
Heavy Duty (GPS 16) Mounting

The Garmin GPS 16 can be flush mounted using M-4 screws or attached via an optional magnetic mount.
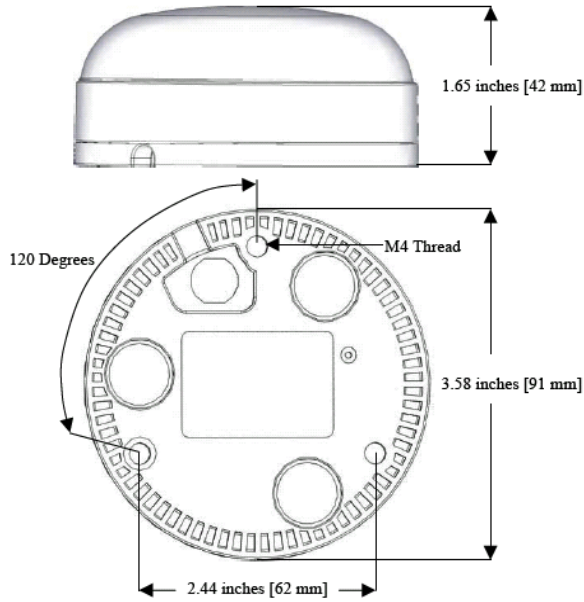
Magnetic Mount

The Garmin 16 magnetic mount provides a firm, removable mounting attachment to any ferrous metal surface.

Standard Duty (GPS 18) Mounting Options

The GPS 18 has a magnetic mount integrated into the case. It also has one M3 threaded hole, approximately 4mm deep for mounting. The underside of the 18 is shown here. The GPS 18 can also be attached via an optional four-hole mounting plate or a suction cup mount.
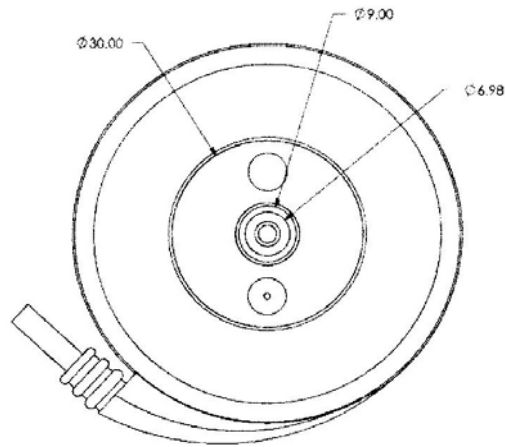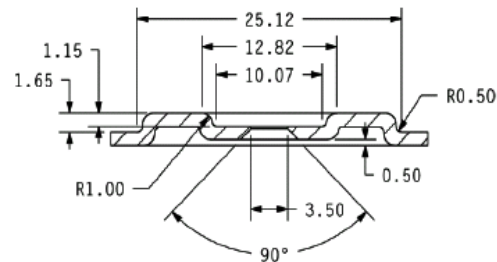
Flush Mount

The surface mount provides 4 holes for surface mounting.
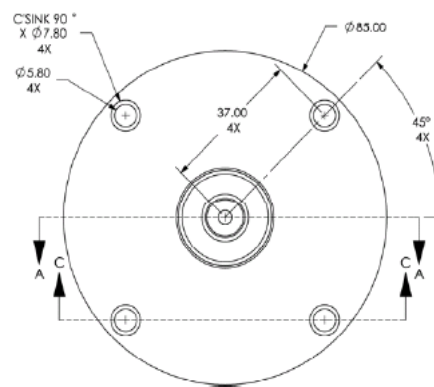
Suction Cup Mount

The suction cup bracket provides a removable mounting surface
attached to the inside of a window or other smooth surface.

8.0 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

8.1 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/Vista machines ClockWatch is started when the local user logs in to Windows. These users should consider using the service.

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

Mode (Win XP/Vista)

> **XP/Vista:** Display screens using the XP/Vista style.

> **Classic:** Display screens using the Windows classic (9x) style.

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.

8.3 Timeserver

The Timeserver window offers a choice for the alternative Internet timeserver used and type of connection you are using. If an Internet connection is not available, you can also 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.

8.4 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              9/14/03 11:43:12 AM
Date       Time       Difference Accuracy   Status Server
-----      ----       ---------- --------   ------ ------
03-09-14 11:42:37  2            10.0        5      time-a.nist.gov
03-09-14 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 3.3.3.

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, GPS time setting, 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/Vista event log. This log captures major time setting activities as well as warnings for when there may be a system or time setting problem.

Syslog: when checked, ClockWatch also writes events to a remote Syslog server. When option first checked, opens up Syslog Setup.

SNMP (Client/Server): when checked, ClockWatch sends events to a SNMP network manager by sending a SNMP trap.

8.5 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.

8.6 Clients

The **Clients** tab is the main point of control for establishing communication with clients when using Star Sync as a timeserver..

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 Star Sync Server.

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.

Client Logs

Two reports are available on client contacts with timeserver, the Client Detail log and the Client Summary log.

Client Detail Log

The Client Detail Log shows the time requests from clients. When enabled the report will show every time a client asks the server for the time. the report shows the date for request (Y-M-D), the time of the request, the time zone used (UTC is GMT), the time on the client (if available), the difference in seconds between the client and the server, and the IP address of the client making the request.

```
Client Log 11/16/2006 2:24:20 PM
Date      Time     Lcl Client Time Difference Client
--------  -------- --- ----------- ---------- ----------
06-11-16 20:24:20 UTC 20:24:25          5      192.168.0.101
06-11-16 20:51:13 UTC 20:51:16          3      192.168.0.102
06-11-16 21:01:24 UTC 21:01:27          0      192.168.0.102
06-11-16 21:11:24 UTC 21:11:29          0      192.168.0.101
```

On/Off

Turn the Client Detail Log on or off.

Log request 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. See more at Event Logging.

File name of client detail log

Contains the full file name and path of the client requests log file (i.e. C:\Program Files\Beagle Software\ClockWatch\ClientLog.txt). This log shows a list of all the clients requesting time from ClockWatch Server.

View
View the client detail log using Windows Notepad.
Browse
Select a new filename or directory for the Client Detail Log

Client Summary Log
Runs the Client Summary report and opens up the log using Windows
Notepad. The summary report shows the total times each client has contacted the
server and the time the last contact was made.

> **Note:** To conserve resources the Client Summary Report is normally stored in
> memory, pressing the View button first writes the report out to the file.

8.7 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.

The BIOS clock is the native PC clock located on the computer's
motherboard that keeps time when the computer is off. Windows gets its
time from the BIOS clock at boot time. While not a precise timekeeper, the
clock on the motherboard is generally more stable than the operating
system clock. ClockWatch allows you synchronize the operating system
clock with the BIOS clock. Computers experiencing significant daily time
loss will find this an effective way to stabilize their clocks between external
time settings.

8.8 System (Windows NT/2000/XP/2003 or Vista)

The System 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.

Application Privilege Level (Windows XP/2003/Vista)
This option shows if you are running ClockWatch as an administrator or as a regular
user. If the application is running with administrative privileges then the application
has complete functionality. Regular users are often not able to set the clock
directly. However then can indirectly set the time by sending the time setting
request to the ClockWatch service, if it is running.

9.0 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
Fax: +1 612-605-7138

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.

Restocking Charges
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.

Governing Law

This agreement shall be governed by the laws of the State of Minnesota, USA.

Limitation of Liability

THIS SOFTWARE AND THE ACCOMPANYING FILES ARE SOLD "AS IS" AND WITHOUT WARRANTIES AS TO PERFORMANCE OF MERCHANTABILITY OR ANY OTHER WARRANTIES WHETHER EXPRESSED OR IMPLIED. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS OFFERED. Good data processing procedure dictates that any program is thoroughly tested before relying on it. The user must assume the entire risk of using the program. ANY LIABILITY OF THE SELLER WILL BE LIMITED EXCLUSIVELY TO PRODUCT REPLACEMENT OR REFUND OF PURCHASE PRICE.

10.0 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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