

**SIMREX Corporation**  
**SIMSYNC**  
Instruction Manual



**Traffic Controller Time/Date  
Synchronization/Coordination System**  
*Firmware Release 2.5*

SIMREX MAN.SIMSYNC, Rev 10.0  
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**SIMREX Corporation**  
*Your Trusted Wireless Solution Provider*  
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# Traffic Control Synchronization System

## SIMSYNC rev 10.0

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### *Introduction*

The *SIMREX Corporation* SimSync is a device used for time synchronization of traffic control devices. It consists of the SimSync controller and a weatherproof/tamperproof GPS receiver. The SimSync controller receives GPS messages from the GPS receiver, reformats the information to your local time zone, automatically adjusting for Daylight Savings Time (DST) and leap years and then sends time information in UTC (or GMT) time to the Traffic Controller at an interval based on your custom settings.

There are six (6) connection points on the SimSync unit:

1. **POWER** (2-pin Phoenix) – positive (inside) and negative (outside) for 9-24VDC input. Optional wall mount or desk mount power adapter is available.
2. **RELAY** (3-pin Phoenix) – normally open, normally closed and common connection points.
3. **GPS** (6-pin RJ-12) – proprietary connection for SIMREX *SIMGPS1-HD-RJ12-5V* GPS antenna.
4. **CONTROLLER** (6-pin RJ-12) - connection to Traffic Controller for normal operation using proprietary controller cable (supplied).
5. **PROGRAM/MONITOR** (6-pin RJ-12) – multi function –
  - a) programming of SimSync controller using proprietary DB9M to RJ-12 cable (See SimSync Commands below).
  - b) monitoring of GPS message strings using proprietary DB9M to RJ-12 cable.
6. **FLASH UPDATE** (6-pin RJ-12) – firmware upgrade using proprietary flash upgrade cable (optional).

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A drilling template is provided for accurate installation of the GPS antenna enclosure to the top of the traffic control box or applicable enclosure. Apply RTV adhesive (provided) between antenna enclosure and traffic control box to prevent leakage. Mounting brackets for the SimSync are also available. After the mechanical installation is complete, make the following connections:

1. Plug the GPS receiver RJ-12 connector into the SimSync controller.
2. Make applicable relay connections, if needed
3. Install controller cable between SimSync RJ-12 and Traffic Controller (see connection list below)
4. Install power connection.

### ***LED Indicators***

<b>PWR LED</b>	Indicates voltage at the output of the internal 5V regulator. This power is used for the GPS as well as the SimSync controller.
<b>GPS LED</b>	Indicates the presence of GPS data sent to the SimSync controller. A flash occurs every time there is a message. This should be once per second. A short flash of 100 ms indicates data that does not have a valid time and or date and is thus not used by the SimSync to synchronize its own Real Time Clock. A long flash of 500 ms (50% duty cycle on the LED as it is flashing once per sec) indicates that valid time and date are sent from GPS to SimSync.

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<b>SYNC LED</b>	Indicates that data is sent from SimSync to Traffic Controller. If the unit has been just powered up, no message is sent to the Traffic Controller until valid data (time/date) is sent from the GPS to the SimSync Controller so that the SimSync real time clock may be initialized. Once the SimSync real time clock has been initialized, the SimSync will continue to send date and time to the Controller even if it loses contact with the GPS or if the GPS produces invalid data (signal blockage). During periods of lost GPS signal or invalid data, the SimSync will coast on its own internal clock and update the controller.
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The relay on SimSync units can be heard to click when a message is sent to the Traffic Controller.

***Update Rate***

For testing purposes, any update rate may be used so that correction of a controller may be quickly seen. Five (5) to thirty (30) seconds is common for this. In a permanent installation, it is recommended that an update of only once per day is used. A common practice is to use 4:00 AM.

***Startup***

The SimSync controller will produce and send valid time/date messages to the Traffic Controller in less than 5 minutes if it is powered up in an area that has a good view of the sky AND if it has been powered up with valid GPS data in the last 1 to 2 weeks. If the SimSync controller has been powered down for more than 1 to 2 weeks, it can take as long as 12.5 minutes to produce valid GPS time and date. The 12.5 minute delay is

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not a limitation of the SimSync, but rather the GPS ALMANAC message structure that is broadcast by GPS satellites every 12.5 minutes.

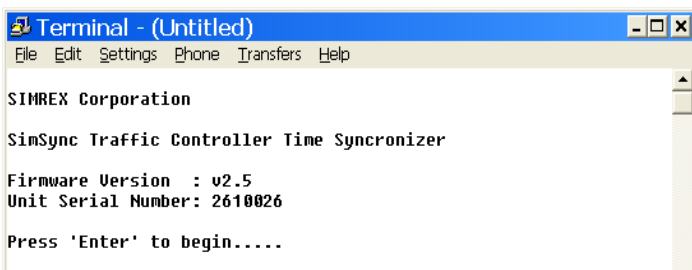
### *Configuration*

Any terminal program can be used to configure the SimSync controller. Windows HyperTerminal, for example, is a common choice.

The configuration port settings on the SimSync default to 9,600 baud, 8 data bits, no parity, 1 stop bit, or more commonly seen as 9600,8,N,1. After setting up the terminal program, apply power to the SimSync. The LED on the front panel labeled PWR indicates that DC power is successfully making it to the controller. There is an LED marked GPS that flashes every time a GPS string is received from the GPS receiver, so you should see this flashing at a 1 second interval. The LED called out as SYNC turn's on when a time update is being sent to the Traffic Controller.

Version 2.5 of the SimSync firmware replaces the bare terminal screen configuration with a menu.

With a terminal program running and the CONFIG port connected, power up the unit. If the terminal program is set up correctly, you will see the screen below.



```
Terminal - (Untitled)
File Edit Settings Phone Transfers Help
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SimSync Traffic Controller Time Synchronizer

Firmware Version : v2.5
Unit Serial Number: 2610026

Press 'Enter' to begin.....
```

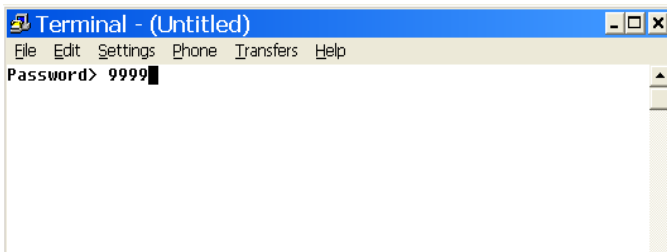
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This screen lists the product name, interval firmware version, the unit serial number, and also reports if a boot-up option is selected. If you need to update the firmware for any reason, ALWAYS verify the unit serial number from this screen, as field updates for Simrex products are serial number specific.

The configuration is password protected. Press 'Enter' to stop data from being displayed on the screen and the "Password>" prompt will appear. If an incorrect password or no password is entered and "Enter" is hit, the screen will revert back to the data display mode.



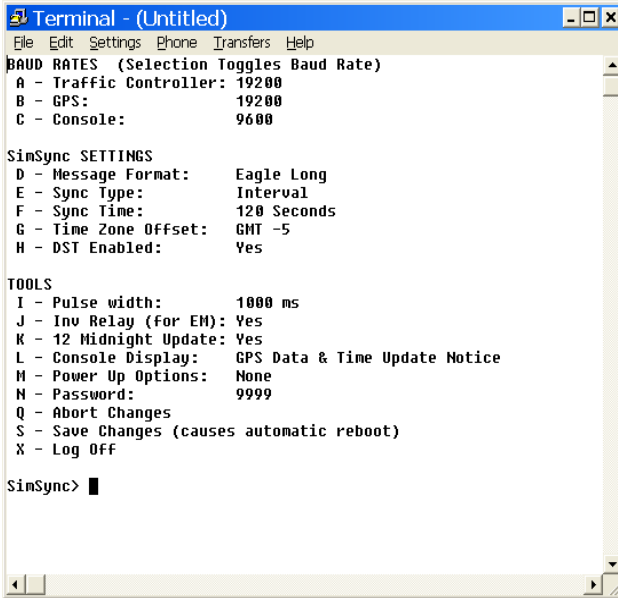
The default password is 9999, press 'Enter'. It is recommended that the password is changed from the default to a custom password of your choice. When setting a new password, it must be between 5 and 20, and only alphanumeric characters are accepted, 0 through 9 and a through z. Additionally, the password is case sensitive.

After successfully entering the password, the main menu screen is shown on the terminal screen.

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```
Terminal - (Untitled)
File Edit Settings Phone Transfers Help
BAUD RATES (Selection Toggles Baud Rate)
A - Traffic Controller: 19200
B - GPS: 19200
C - Console: 9600

SimSync SETTINGS
D - Message Format: Eagle Long
E - Sync Type: Interval
F - Sync Time: 120 Seconds
G - Time Zone Offset: GMT -5
H - DST Enabled: Yes

TOOLS
I - Pulse width: 1000 ms
J - Inv Relay (for EM): Yes
K - 12 Midnight Update: Yes
L - Console Display: GPS Data & Time Update Notice
M - Power Up Options: None
N - Password: 9999
Q - Abort Changes
S - Save Changes (causes automatic reboot)
X - Log Off

SimSync> █
```

### ***BAUD RATES***

Valid baud rates are 1200, 2400, 4800, 19200, 38400, and 57600. Use A, B & C for setting the baud rate for each serial port. The terminal screen above shows the default baud rate settings. To modify them, simply enter the corresponding letter choice, then press 'enter'. Each time A, B, or C is entered, that baud rate will increase to the next speed until it rolls over back to 1200 from 57600.

### ***SimSync SETTINGS***

The next section deals with configuration of the time update message.

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```
SimSync SETTINGS
D - Message Format:   Eagle Long
E - Sync Type:       Interval
F - Sync Time:       30 Seconds
G - Time Zone Offset: GMT -5
H - DST Enabled:     Yes
```

#### D – Message Format

Type 'd' or 'D', and press return. This will bring up the 'Message Format' sub-menu.

```
SimSync SETTINGS
D - Message Format:   Eagle Long
    1 - Eagle Long Message
    2 - Eagle Short Message
    3 - AB3418 Compliant
    X - Cancel Protocol Selection
Please Select a Message Protocol: _
```

Beginning with v2.4 of the SimSync firmware, an AB3418 time update message is available. Select the message protocol required, then press 'Enter'.

#### E & F – Sync Type and Sync Time

The SimSync supports two different update types, either one update per day, or an interval update which will send the time/date updates every 'F' seconds. 'Sync Type' is another toggle setting. Enter 'E' and press 'Enter' to switch back and forth between them.

The Sync Time is a value, in seconds. To update the time/date once an hour, set the Sync Type to Interval and Sync Time to 3600 (3600 seconds in one hour). If the Sync Type is set to 'Once a Day', the Sync Time refers to the number of seconds past midnight to do the time/date sync. For example, to update at 4AM each morning, set the Sync Type to 'Once a Day' and set the Sync Time to 14400 (the number of seconds between 12 midnight and 4 AM).

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### G – Time Zone

The time zone is displayed as an offset from GMT. In the US, the Eastern Time Zone is GMT -5 hours.

The Time Zone setting is now done through a sub-menu. At the prompt, enter 'g' and press return.

You should now see the menu below.

```
SinSync SETTINGS
D - Message Format:   Eagle Long
E - Sync Type:       Interval
F - Sync Time:       30 Seconds
G - Time Zone Offset: GMT -5
  1 - US Eastern (GMT -5)
  2 - US Central (GMT -6)
  3 - US Mountain (GMT -7)
  4 - US Pacific (GMT -8)
  G - Manual (Enter G & GMT Offset)
  X - Cancel GMT Selection
Please Select Timezone Offset: _
```

Select one of the pre-defined Time Zones by entering its corresponding choice and pressing 'Enter'. You could also select 'G' in the sub menu, directly followed by the desired offset. For example, enter 'g-8' then pressing 'Enter' will manually set the time zone to US Pacific time.

Enter 'x' then press 'Enter' to exit the sub-menu without making changes.

### H – DST Enabled

DST stands for Daylight Saving Time. If you are in an area that observes DST, this should be set to 'Yes'. Once again, toggle between 'Yes' and 'No' by typing 'h' and pressing 'Enter'.

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#### *TOOLS -*

```
TOOLS
I - Pulse width:      1000 ms
J - Inv Relay (for EM): Yes
K - 12 Midnight Update: Yes
L - Console Display:  GPS Data & Time Update Notice
M - Power Up Options:  None
N - Password:        9999
Q - Abort Changes
S - Save Changes (causes automatic reboot)
X - Log Off

SimSync> █
```

#### I – Pulse Width

The Pulse Width setting indicates how long the internal relay contacts should be energized when an update is sent to the Eagle Traffic Controller.

The SimSync unit features a set of relay contacts that trigger at each update. On the rear of the unit, there is a 3 pin terminal block for this that connects directly to the contacts of an internal relay. From left to right, the connections are labeled N.O., COM., and N.C., which stand for 'normally open', 'normally closed', and 'common'. At the time the update is triggered, the relay fires also and the N.O. and COM. contacts are connected, and the N.C. to COM. Connection is opened.

If the Pulse Width is set to 500 ms, when an update occurs, the relay will be energized for 500 ms. Valid entries are 10 ms to 10,000 ms.

#### J – Inv Relay (for EM)

This menu entry will allow you to invert the contact on the relay. This may be needed if the SimSync is being connected to an electro-mechanical traffic controller.

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This will make the normally open contacts normally closed, and visa-versa. Be aware of this when installing the unit. What this really affects is whether or not the relay is normally energized, or not energized. Assess the ramifications of a power failure, and the state of the controller update control when power is restored to see if this option is required.

Note: Enabling this also inverts the state of the 'Sync' LED. The 'Sync' LED is typically off, and then turns on when an update occurs and stays on for the duration of the 'pulse' setting. When the relay is inverted, the 'Sync' LED will typically be on and then turn off during the update cycle.

#### K – Midnight Update

This option is used to enable or disable a time update at midnight. When the update is set to 'Interval', an update takes place at midnight, regardless of whether or not midnight lands on the 'interval' count. This option has no effect when the update type is set to 'Once-a-Day'.

#### L – Console Display

This section refers to what is seen on the console port during normal unit operation.

```
TOOLS
I - Pulse width:      1000 ms
J - Inv Relay (for EM): Yes
K - 12 Midnight Update: Yes
L - Console Display:  GPS Data & Time Update Notice
  0 - None
  1 - GPS Data
  2 - GPS Data & Time Update Notice
  X - Cancel Console Display Selection

Please Select a Display Option: █
```

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None – There will be no output to the console port during normal operation.

GPS Data - Selecting this option will show each GPS string received from the GPS antenna on the console port during normal operation.

GPS Data & Time Update Notification – having this option selected will have the console screen showing each GPS message and will notify you when a time update is sent to the controller.

#### M – Power Up Options

This option allows you to set an action upon unit Power-Up. Enter 'M' and press return to bring up the sub-menu.

```
TOOLS
I - Pulse width:          1000 ms
J - Inv Relay (for EM):  Yes
K - 12 Midnight Update:  Yes
L - Console Display:     GPS Data & Time Update Notice
M - Power Up Options:    None
  0 - None
  1 - 15 Minute Auto Update
  2 - 15 Minute Contact Hold
  X - Cancel Boot Option Selection

Please Select a Boot Option: █
```

1 - When '15 Minute Auto Update' is selected, the SimSync will send a time update message 15 minutes after power is applied. It will only send the update message if there is valid data coming from the GPS. If for some reason the GPS receiver is not locked at that time, no message will be sent. This is useful when the unit is set to update 'Once-a-Day' or has a long time set between updates when in 'Interval' mode. If there is a power failure, an update may be missed. Fifteen minutes after the power comes back on line, that update will be sent and synchronization will occur.

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2 – If the '15 Minute Contact Hold' is selected, the relay will be triggered and stay that way for the first 15 minutes of operation.

If either of these options is set, when the unit is powered up there will be a line in the sign-on message indicating the set option.

#### N - Password

To change the password to access the unit, enter 'l', followed immediately by the new password. An acceptable password must be between 5 and 20 characters, and only accepts alpha-numeric characters. ('0-9' and 'a-z' and 'A-Z')

Passwords ARE case sensitize.

Example, lqwerty will change the password to 'qwerty'.

#### Q – Abort Changes

Entering this command will cause all settings changes that haven't been saved back to the value they were at the time the configuration menu was entered. This does not exit the menu.

#### S – Save Changes

This will save all of the new configuration data and re-boot the unit.

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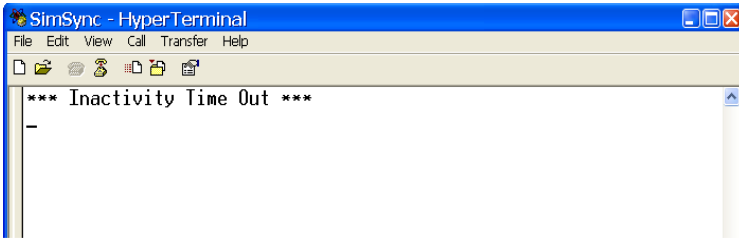
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### X – Logoff

This command simply closes the configuration menu and returns the unit into operational mode. Any settings changes made that were not saved will be lost.

Finally, after 5 minutes without a keystroke, the unit will log itself out and display the screen below.



When this 'Inactivity Time Out' occurs, ANY changes made that were NOT saved are lost.

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***Cables –***

SimSync-to-Eagle Traffic Controller Interface

SimSync (RJ-12)	EAGLE PORT 2 (DB 25)	
6	7 (GND)	
4	3	
5	2	
	5 8 20	Tied Together

SimSync-to-Econolite Traffic Controller

SimSync (RJ-12)	Telemetry Port DB9
6	7 (GND)
4	2
5	3

- Use in Econolite controller requires that the telemetry port has an RS232 card installed.
  
- The SimSync-to-Econolite cable is identical to the SimSync configuration cable.

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***Version History –***

v2.5 (released 10/10/2006)

- Added option to reverse the sense of the relay
- Added option to Enable/Disable the Midnight update while update mode is 'Interval'
- Extended the relay duration range from 10-1000 ms to 10-10,000 ms.
- Changed the '15-Minute Auto-Update' from a main menu item into a sub-menu and added the '15 Minute Contact Hold' option.

v2.4 (released 07/28/06)

- Modified the display on the terminal port during operation mode.
- Added '15-Minute Auto-Update' option

v2.3 (released 07/17/06)

- Added support for generic AB3418 format time update message

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#### *Firmware Upgrade –*

This unit is field upgradeable. The upgrade file is a Windows executable file. An upgrade file must be supplied by SIMREX.

Each unit needs a separate update file, as the process is specific to a particular product AND a particular serial number for that product. Even if you have 2 units of an identical product, they each have a unique serial number, therefore, each require their own respective upgrade files.

After an upgrade file is provided to you by SIMREX, place the file on a drive that can be written to and follow the below instructions on how to accomplish this.

Required: A PC with an RS-232 serial port, the gray DB9-RJ12 adapter labeled Flash Program, an RJ-12 cable, and the upgrade file.

1 - Plug the programming adapter into your PC's serial port, with the RJ12 cable between it and the Flash Upgrade connector on the SimSync.

2 - Power up the unit. The unit needs to be powered up with the programming cable in place to initiate the flashing procedure. (When the unit is successfully booted into programming mode, you can tell by the state of the LED's on the front. Typically, 2 or 3 of the LEDs turn on and stay while in flashing mode.)

3 - Run the flash upgrade executable supplied by SIMREX. This program will access the serial port and do the actual updating itself.

When the Flashing Complete box pops up, it is done.

Unplug the RJ-12 cable from the SimSync and cycle power on

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the unit. Upon re-boot, the new firmware will be active.

NOTE: There is no indication of the progress of the flashing operation. A successful flash will take longer than 20 seconds. If there is some error with the serial port, like it is in use, you will see an error message. If there is no serial port error, but the program returns a Flashing Complete in less than 10 seconds, there has been an issue with communicating with the actual CPU board inside the unit. If this is the case, please contact SIMREX for support.



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