SIMREX Corporation

SIMSYNC

Instruction Manual

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

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SIMREX Corporation

Your Trusted Wireless Solution Provider
www.simrex.com

Traffic Control Synchronization System
SIMSYNC Manual rev 15.0
Firmware v2.5k

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 Saving 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).

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

PWR LED	Indicates voltage at the output of the internal 5V regulator. This power is used for the GPS as well as the SimSync controller.
GPS LED	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.

SYNC LED	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. NOTE: See the command section for 'J - Inv Relay' for additional information on this LED indicator.

The relay on SimSync units will be transitioned when a message is sent to the Traffic Controller. This click is audible.

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

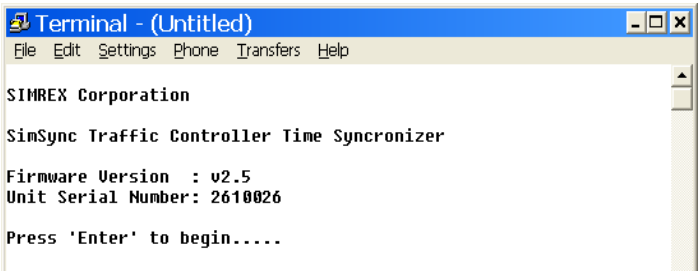
more than 1 to 2 weeks, it can take as long as 12.5 minutes to produce valid GPS time and date. The 12.5 minute delay is not a limitation of the SimSync, but rather the GPS ALMANAC message structure that is broadcast by GPS satellites every 12.5 minutes.

Configuration

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

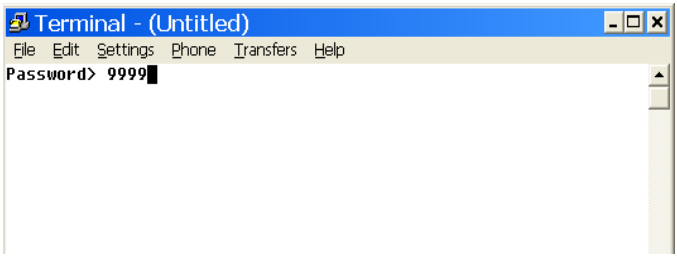
The configuration port settings on the SimSync default to 9,600 baud, 8 data bits, no parity, 1 stop bit, or more commonly seen as 9600,8,N,1. After setting up the terminal program, apply power to the SimSync. The LED on the front panel labeled PWR indicates that DC power is successfully making it to 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.



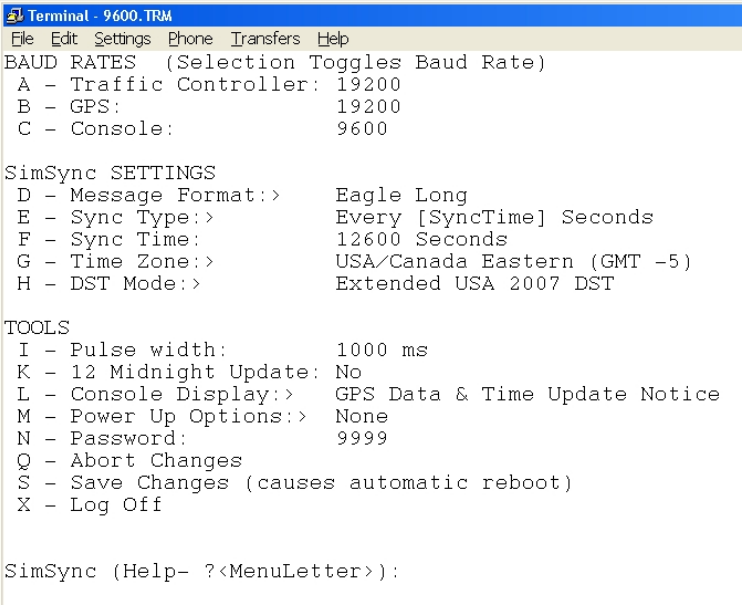
This screen lists the product name, interval firmware version, the unit serial number, and also reports if a boot-up option is selected. If you need to update the firmware for any reason, ALWAYS verify the unit serial number from this screen, as field updates for Simrex products are serial number specific.

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 alpha-numeric 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.



(Note: Menu selections above that a '>' following its name indicates that a sub-menu will be shown when this selection is made.)

Some help is available at the main menu screen. Enter a ? followed by the menu letter for a brief description of that particular setting.

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, the 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.

```
SimSync SETTINGS
 D - Message Format:>    Eagle Long
 E - Sync Type:>         Every [SyncTime] Seconds
 F - Sync Time:          5 Seconds
 G - Time Zone:>         USA/Canada Eastern (GMT -5)
 H - DST Mode:>          Extended USA 2007 DST
```

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 Short

       1 - Eagle Long Message
       2 - Eagle Short Message
       3 - AB3418 Compliant
       4 - NTCIP/PMPP Compliant
       5 - Peek MIZBAT
       6 - GPRMC Pass-through

       X - Cancel Protocol Selection

 Please Select a Message Protocol:
```

If 'NTCIP/PMPP Compliant' is chosen, after making that choice, you will be given the opportunity to change the community name and the controller ID.

```
SimSync SETTINGS
 D - Message Format:>    NTCIP/PMPP Compliant

       Community Name [public]:
```

The current Community Name is shown enclosed in square brackets. Press <enter> to keep the existing name, or type in a new Community Name and press <enter>.

```
SimSync SETTINGS
 D - Message Format:>    NTCIP/PMPP Compliant   [public:5]

       Community Name [public]:

        Controller ID [5]:
```

After entering the Community Name, you can enter the Controller ID also. Again, the current ID is shown in square brackets before the prompt.

There are also extra screens if Peek MIZBAT protocol is chosen. These settings are typically left at default, as the SimSync would typically be used at a remote controller that doesn't have a master controller connected to it.

```
SimSync SETTINGS
 D - Message Format:>    Peek MIZBAT

           Central ID [1]:
```

```
SimSync SETTINGS
 D - Message Format:>    Peek MIZBAT

           Central ID [1]: 1

            Master ID [1]: 
```

With firmware version 2.5K, another format was added, "GPRMC Pass-Through".

Selecting this will make the SimSync output the GPS GPRMC$ time message directly to the controller each second. This option is selected when the traffic controller's firmware will accept a GPS string directly, rather than having to format the time data in a specific protocol.

After selecting "GPRMC Pass-Through", you are presented with this screen.

```
SimSync SETTINGS
 D - Message Format:>    GPRMC Pass-through

  This is a special mode where the SimSync will just
  pass-through the GPRMC data from the GPS receiver to
  the controller.

  The contact closure function will still continue
  to operate based upon the relevant settings.


 Press <enter> to continue.
```

This is telling us that while the SimSync is doing nothing more than forwarding the GPS RMC string directly to the controller, the relay functionality is still present, and can be configured to trigger at a desired time(s), using the standard settings for the update type and frequency.

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.

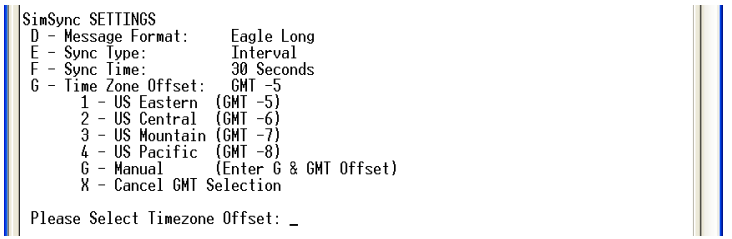
The Sync Time is a value, in seconds. To update the time/date once an hour, set the Sync Type to Interval and Sync Time to 3600 (3600 seconds in one hour). If the Sync Type is set to 'Once a Day', the Sync Time refers to the number of seconds past midnight to do the time/date sync. For example, to update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

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.



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 Mode

DST stands for Daylight Saving Time

```
G - Time Zone:>          USA/Canada Eastern (GMT -5)
H - DST Mode:>           Extended USA 2007 DST

      0 - None
      1 - Standard DST (USA pre-2007)
      2 - Extended USA 2007
      3 - Manual

      x - Exit DST Selection

Please Select Daylight Saving Time option:
```

The default setting will be 'Extended USA 2007'. This indicates that the dates and times of the changes will conform to the new dates as established by the US government beginning in 2007. The one-hour 'spring forward' is now to be the third Sunday in March, and 'falling back' an hour has been moved to the first Sunday in November.

Since this change may not be permanent, there is also a choice to set it for 'Standard DST' which is the dates used prior to 2007 in the USA.

There are two other choices now as well, 'Manual' and 'Absolute Date', just in case your locality uses

something other than the 'Standard' or 'USA2007' DST dates.

These two choices will allow you to set the DST dates to any date, or date code as required. In this context, an 'Any Date', is just that, a date, March 30th, October 31st. A 'Date Code' refers to setting a date that is not an absolute date, but a varying date, such as 'the 3rd Sunday in March'.
Most end-users will only need to set 'Standard' or 'USA2007' DST dates. If you must set some other date, enter manual entry mode by entering 'H' <cr> to bring up the DST sub-menu as shown on the previous page, choose option 3, and press return.

You will see the screen below, showing the current start and end 'codes' for DST.

```
H - DST Mode:>          Manual Entry...

     Current DST Start: 2:00 on 3rd Sun in Mar

     Format = hhcdmm  (Use 5 to set the 'Last' occurance)
        Ex. - 023104 = 2 AM on the 3rd Sun in Apr

     Enter New DST Start:
```

The DST date codes are entered using the format you see in the screen above:

hhcdmm –

hh = Hour of change (24 hour clock time)
c = Occurrence of the day (i.e. first or third)
d = # of day of Week (i.e. Sunday = 1)
mm = Number of month

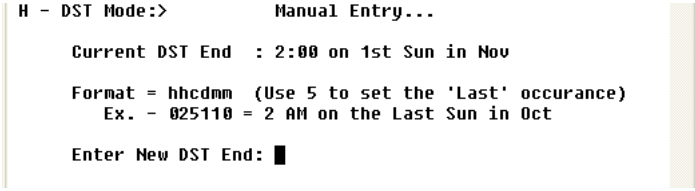
DST start of USA 2007 is at 2AM on the 3rd Sunday in March.

This translates to: 023103 (This can be entered with or without the leading 0.

If the DST date is the 'last' day, as in the 'Last Sunday in October', use 5 for the occurrence count.

The date code to enter for this would be: 025110

After entering the new 'DST Start' date code, press enter and you will be prompted to enter the new 'DST End Date'.



If this was manually being set to the USA2007 DST, the code entered would be: 021111.

021111 = 2AM on the First Sunday in November.

After the new End Date Code is accepted, choose 'x' and press 'Enter' to exit the DST option menu.

TOOLS -

```
TOOLS
 I - Pulse width:         1000 ms
 K - 12 Midnight Update: No
 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 (Help- ?<MenuLetter>):
```

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.

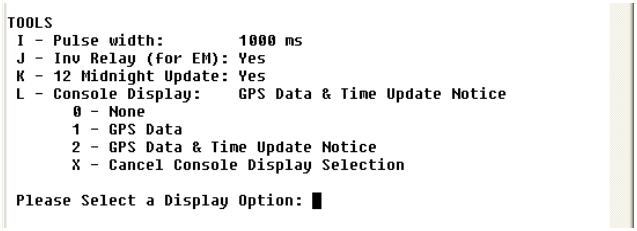
K – Midnight Update

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.



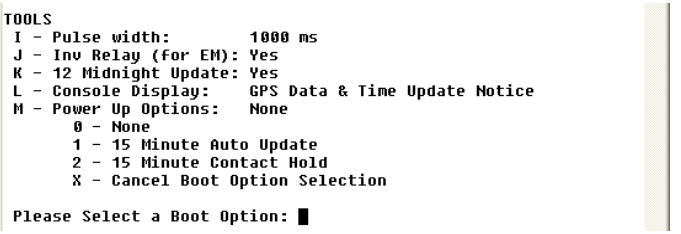
None – There will be no output to the console port during normal operation.

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.



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.

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 'n', 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, nqwerty 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.

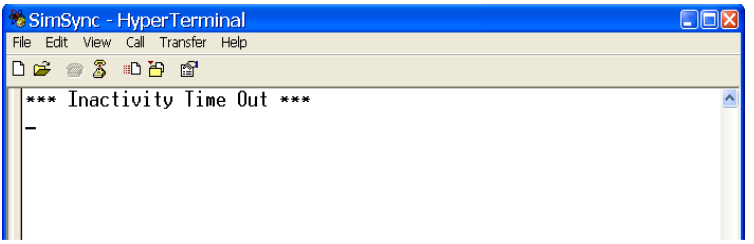
S – Save Changes

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

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.

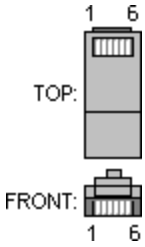
Finally, after 5 minutes without a keystroke, the unit will log itself out and display the screen below.



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

Cables (Controller Specific) –

RJ12 CONNECTOR REFERENCE
PLUG (MALE)



SimSync-to-Eagle Traffic Controller

SimSync (RJ-12)	EAGLE PORT 2 (DB25M)	
6	7 (GND)	
4	3	
5	2	
	5 8 20	Tied Together

SimSync-to-Econolite Traffic Controller

SimSync (RJ-12)	Telemetry Port (DB9M)
6	5 (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.

SimSync-to-2070 Traffic Controller Interface

SimSync (RJ-12)	COMM PORT (DB9M)
6	1 & 5 (GND)
4	2
5	3

Traffic Control Synchronization System
SIMSYNC Manual rev 15.0
Firmware v2.5k

Firmware Version History –

v2.5k (06/24/2013)
- Added GPRMC GPS string pass-through mode

v2.5j (02/26/2013)
- Added MIZBAT protocol message
- Remove DST "Absolute Date" entry

v2.5h (10/15/2010)
- Added editing of additional NTCIP/PMPP parameters
- Added some simple help for the main menu items

v2.5g (05/10/2010)
- Added NTCIP/PMPP Time Update Message selection

v2.5f (03/22/2009)
- Fix DST issue that resulted in wrong start of DST2007 when March 1 falls on a Monday

v2.5e (03/10/2009)
- Optimize hardware initialization routine

v2.5d (07/23/2007)
- Added CPU ID printout to boot up message

v2.5c (07/11/2007)
- Fixed once daily update bug with certain controllers

v2.5b (2/20/2007)
- Added more DST choices.

v2.5a (1/12/2007)

- Added new USA DST dates

v2.5 (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

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 PCs 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

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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