

TIMEWiSE™ WiFi Smart Clocks

User's Manual



TIMEWiSE™ User Guide

WiFi Enabled Smart Clocks
Revision D

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1. Introduction

National Time’s TIMEWiSE™ line of WiFi-enabled clocks provides accurate time for your facility, utilizing standard WiFi network technology.

2. Support

Installation of TIMEWiSE™ devices should be straightforward for an information technology professional. However, should some problem arise, please contact National Time & Signal technical support for assistance:

Mail:

National Time and Signal Corporation
28045 Oakland Oaks Ct.
Wixom, MI 48393-3342

Phone:

(248) 380-6264

Fax:

(248) 380-6268

Email:

support@natsco.net

3. System Requirements

Network Security Modes

The TIMEWiSE™ module support the following network security modes:

1. Open network
2. WEP
3. WPA-TKIP
4. WPA2-AES

Network Ports

The clocks use standard SNTP on UDP port 123 to communicate with their time server. This port should be opened on your firewall to allow for Internet time. UDP port 8105 is also used on the local network, but does not need to be opened on your external firewall.

To scan for clocks using the TIMEWiSEConfig, you must have UDP broadcasts enabled on your WiFi network. In addition, scanning from a laptop on the WiFi network will require WiFi-to-WiFi communication to be enabled. See your WiFi network administrator to verify that these are allowed on your network.

4. Setup Overview

To get your TIMEWiSE™ modules online and connected to your network, there are several methods that can be used. Which is best for you will depend on how many clocks you have and how you want to use them, as well as on what kind of WiFi networks are available in your facility.

Setup for Open Networks

If you have an open WiFi network available, the clocks will connect to it by default. From there they will automatically seek out the pool.ntp.org timeserver. As long as there isn't a firewall or captive portal blocking access to the Internet, this method will work out of the box. **WARNING:** if there is more than one open WiFi network in your facility, you should configure the clocks to use a specific custom network instead. Otherwise they will attach to whichever open network has more signal strength in the area of the clock, and that network might not be the one you want.

Setup for TIMEWiSE™ Network

The TIMEWiSE™ modules have preset TIMEWiSE™ WPA and WPA2 networks that can be used in environments that support multiple SSIDs. The modes require no configuration, and are an easy way to configure the clocks with some security. To use this network type, you will just select the appropriate mode using the mode button. See section "Network Modes".

Setup for Custom Networks

If you are using a secure network or a specific open network, you will need to configure the clocks to use that specific network. This will involve getting the network name, security type,

and password information into each clock. To do this, you will first use an open network, TIMEWISE™ network, or ad-hoc network to connect to the clock and enter the custom network information. The *best* method is to contact National Time before the modules are shipped; we can factory-configure the clocks for you, saving you from needing to do any field settings.

5. The TIMEWISE™ Module

The TIMEWISE™ WiFi module has two ports that allow connections of different clock types depending on the application. Analog clocks and four or six-digit digital clocks may be connected. The network setup is the same regardless of the attached clock type.

The Front Display

The TIMEWISE™ module has green lights and two buttons to aid in configuration and diagnostics.

SIGNAL Light: Blinks the current signal strength. One blink indicates weak signal, while five blinks means strong signal. There is a quarter-second between blinks and a full second off before the start of a new sequence.

STATUS Light: Blinks the current status of the module. See table below.

MODE Button: Changes the WiFi network mode. See section “Network Modes”.

RESET Button: Resets the module. When reset, the lights will go solid for a few seconds and then the TIMEWISE™ module will attempt to join a network and acquire a network address. As it goes through the connection process, you will see the blinks on the *STATUS* light progress from one to five blinks according to the status code table below. It will try to acquire network time immediately. At the end of the reset, you will see five blinks on the *STATUS* light if everything is working.



Module Status Codes

Blinks	Status
1	Hardware Failure – Contact National Time tech support.
2	No WiFi Network Available – Check network settings and mode selection. Ensure that a wifi network with good signal strength is present.
3	No IP Address – Ensure that the network password and security mode is correct and that you are connecting to the right network.
4	Time Server Unavailable – Wait for a few minutes to see if the server becomes available. Ensure that UDP port 123 is open on your network’s firewall.
5	System OK

TIMEWiSE™ Module Connections

Connect *TIMEWiSE™* module to power using the included transformer. The green *signal* and *status* lights will activate solid for a few seconds. Up to two clocks can then be connected to the module using the included phone cables.

6. Network Modes

The TIMEWiSE™ module supports several different WiFi network types, including open access, WEP, WPA-TKIP, and WPA2-AES PSK. Before proceeding, please be sure you know which mode your WiFi network is using.

Selecting a Network Mode

Press the MODE button once. The *status* and *signal* lights will blink the current WiFi mode. These different modes present multiple options for connecting to your WiFi network.

To change the mode, press the *mode* button on the TIMEWiSE™ module again. Both lights will blink the code of the new mode in tandem. To save the new mode and restart the module, press the *reset* button while the lights are blinking together. If you do not press the reset button, the change will be canceled after a few seconds and the device will return to its previous mode.

Network Mode	Details
Mode 1: Any Open Network	The module will connect to the strongest available open network. If you have an open network in your building this is the fastest way to get your module connected.
Mode 2: Ad-Hoc	When in ad-hoc mode, the TIMEWiSE™ module creates its own network with the SSID "TIMEWiSE <i>nnn</i> ", where <i>nnn</i> is the serial number printed on the front of the module. To connect via the Ad-Hoc, first place the device in Ad-Hoc mode and wait a minute. Then use a laptop to find the TIMEWiSE <i>nnn</i> wifi network and connect to that network. Once connected, you can browse to http://192.168.3.1 to configure your device with a custom network or to change the time. <i>natsco</i> is the default password for the configuration page.
Mode 3: TIMEWiSE™ Network	This option will attempt to connect to the TimeWiseWPA network using WPA-TKIP, or to TimeWiseWPA2 using WPA2-AES. The password for both networks is <i>NatscoClocks</i>
Mode 4: Custom network	This mode uses the configured network settings to connect to a WiFi network using custom SSID and password. The custom settings can be entered from the configuration page using one of the other modes.

7. Browsing to the Module

Every TIMEWISE™ module has its own internal web page. This web page can be accessed by navigating to the module's IP address or host name.

Navigating by Hostname

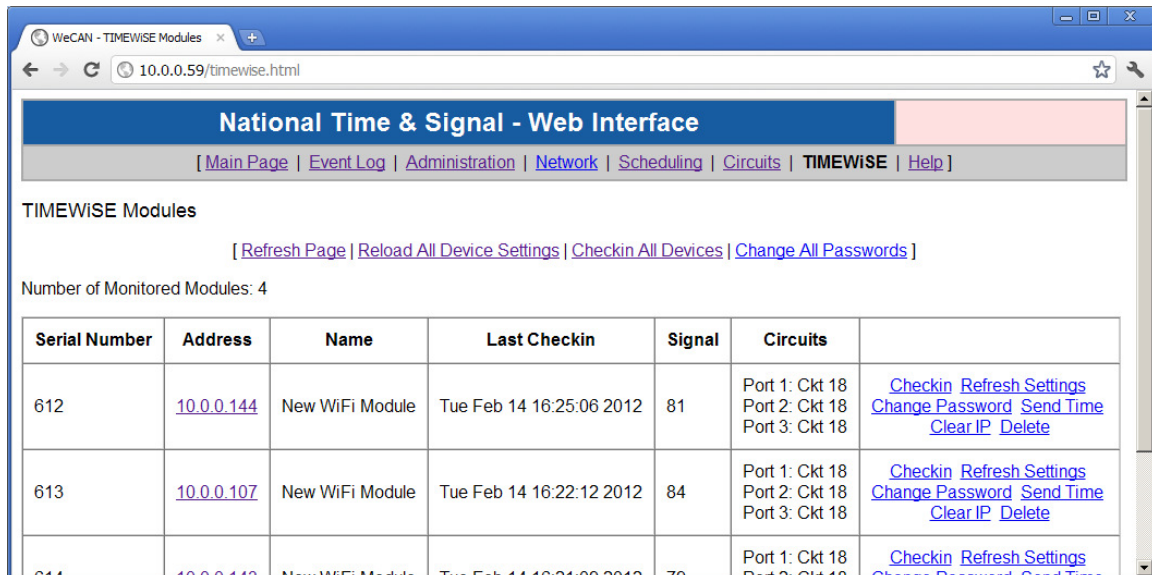
If the network supports it, the TIMEWISE™ module will register a hostname with the server for easy navigation. This host name will be *TIMEWISEnnn*, where *nnn* is the serial number of your module. This can be found printed on the TIMEWISE™ module, and can sometimes be found on the bottom of the attached clock as well. For example, for serial number 162 you would navigate to <http://TIMEWISE162/>

Because some networks do not support this registration, there are several other methods for accessing your device.

Using the WeCAN Master Clock Page

If you have a WeCAN master clock, you can easily navigate to your module by first accessing your master clock's web page (to locate your master clock, see the WeCAN user guide). Once you are on the WeCAN device, you can go to the TIMEWISE™ tab and find your device in the list. From there, click the device's address to open its web page.

Note that this method requires that the module was already set to check-in with the master clock. This can be pre-configured at the factory, or you can use one of the other methods below to perform the initial configuration.



The screenshot shows a web browser window with the address bar displaying "10.0.0.59/timewise.html". The page title is "National Time & Signal - Web Interface". Below the title is a navigation menu with links: [Main Page | Event Log | Administration | Network | Scheduling | Circuits | TIMEWISE | Help]. The main content area is titled "TIMEWISE Modules" and includes a sub-menu: [Refresh Page | Reload All Device Settings | Checkin All Devices | Change All Passwords]. Below this, it states "Number of Monitored Modules: 4". A table lists the modules with columns: Serial Number, Address, Name, Last Checkin, Signal, Circuits, and a set of action links.

Serial Number	Address	Name	Last Checkin	Signal	Circuits	
612	10.0.0.144	New WiFi Module	Tue Feb 14 16:25:06 2012	81	Port 1: Ckt 18 Port 2: Ckt 18 Port 3: Ckt 18	Checkin Refresh Settings Change Password Send Time Clear IP Delete
613	10.0.0.107	New WiFi Module	Tue Feb 14 16:22:12 2012	84	Port 1: Ckt 18 Port 2: Ckt 18 Port 3: Ckt 18	Checkin Refresh Settings Change Password Send Time Clear IP Delete
614	10.0.0.143	New WiFi Module	Tue Feb 14 16:21:00 2012	79	Port 1: Ckt 18 Port 2: Ckt 18 Port 3: Ckt 18	Checkin Refresh Settings Change Password Send Time Clear IP Delete

Figure 1: Finding Modules using the WeCAN Interface

Using the Ad-Hoc Address

If the module is configured to use an ad-hoc network connection, you can connect your notebook computer to the *TIMEWiSEnnn* WiFi network (such as *TIMEWiSE162*), where *nnn* is the serial number of the module. After joining the network, browse to <http://192.168.3.1/> to access the module.

Using the TIMEWiSEConfig Tool

The TIMEWiSEConfig tool can scan the local network segment for TIMEWiSE™ modules. This is the fastest way to locate a large number of modules. To scan, just open the Config tool and click the *Search for Clocks* button on the *Device List* tab. After a few seconds, your module should appear in the device list.

If the first scan does not find your module, you can scan again. If you still cannot find the module, ensure that your computer is on the same network segment as the module. If the module is on a different segment or UDP broadcasts are disabled, you can use the “scan by IP range” option to scan a different network segment. If the computer is using WiFi to connect, ensure *WiFi-to-WiFi* communication is allowed on your network.

If you cannot find your TIMEWiSE module using the TIMEWiSEConfig tool, you may need to use the MAC Address method discussed below.

Using MAC Addresses

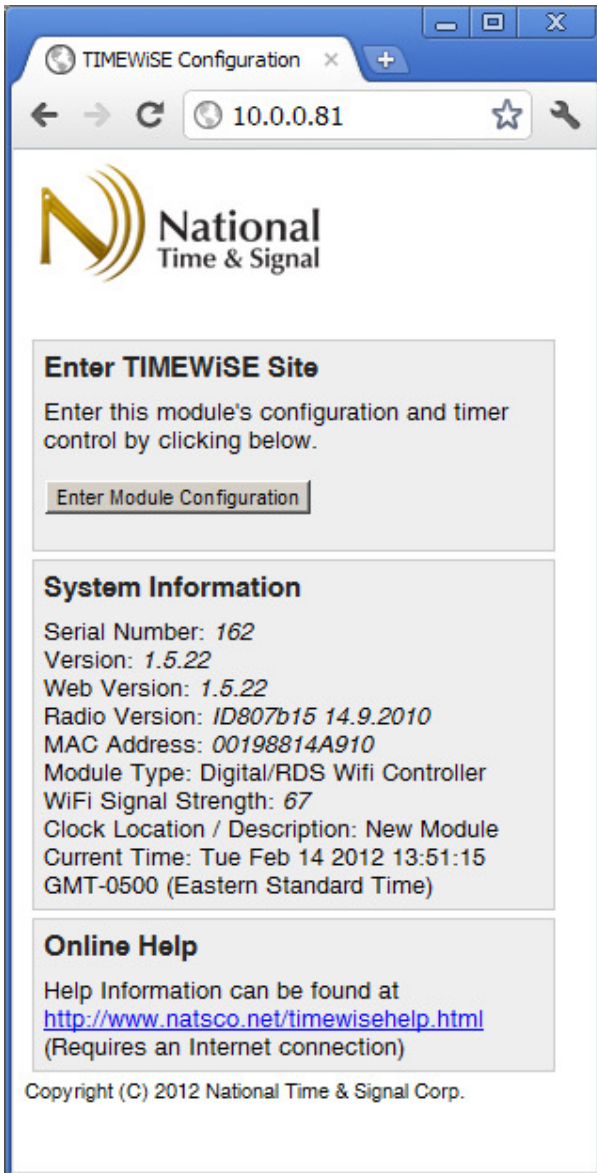
By default, the TIMEWiSE™ modules use DHCP to acquire a dynamic IP address. Therefore, their IP addresses will show up in your DHCP server’s address assignment list. The TIMEWiSE™ modules all have MAC addresses starting with 00:19:88. These entries will point you towards your WiFi modules. Please refer to the documentation of your DHCP server or router for more details on getting the IP assignment list.

8. Entering the Internal Web Page

To enter the TIMEWiSE™ module’s web page, first use the steps in the previous section to find your device on the network. In your web browser’s location bar, enter <http://X.X.X.X>, where X.X.X.X is the module’s IP address found in the previous section.

Once you are on the web page, you will see the information shown below.

Enter Module Configuration Button: Pressing this button will prompt you to enter the system password to access the rest of the website.



Serial Number: Each TIMEWISE™ WiFi module has a unique serial number. This can help you verify that you are accessing the proper module.

Version, Web Version, Radio Version: Firmware version of the TIMEWISE™ module. This information may be helpful for tech support.

MAC Address: The MAC address of the WiFi module.

WiFi Signal Strength: Signal strength of the currently connected network. Below 30 is considered marginal; adjusting the antenna or adding an access point may increase performance.

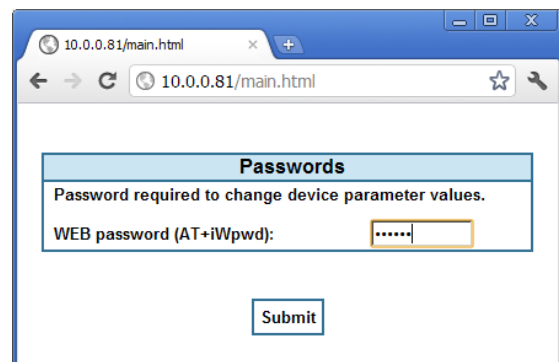
Clock Location: The text “name” of the module. Useful for identifying the proper module.

Current Time: Shows the current time on the TIMEWISE™ module.

Online Help: This link will take you to the online help of National Time’s website. From here you can access this manual and any other information that we have available pertaining to the TIMEWISE™ range of devices.

9. Logging into the Module

After clicking the *Enter Module Configuration* button, you will be prompted to enter a password. The default password is “natsco” but it may be changed from the default using the *Change Password* page.



10. Main Module Overview

The module overview provides some basic module information, as well as links to the various configuration areas of the web interface. It also provides the links to the device control screens.

Clock Location: You may enter a new device name in this field and click *Save* to give the device a new name.

Current Time: Displays the current time on the module. If this time is not correct, you may need to change your timeserver settings. You may also manually enter the time via the *Manually Set Time* link.

Device Controls: Provides control of the attached clock(s).

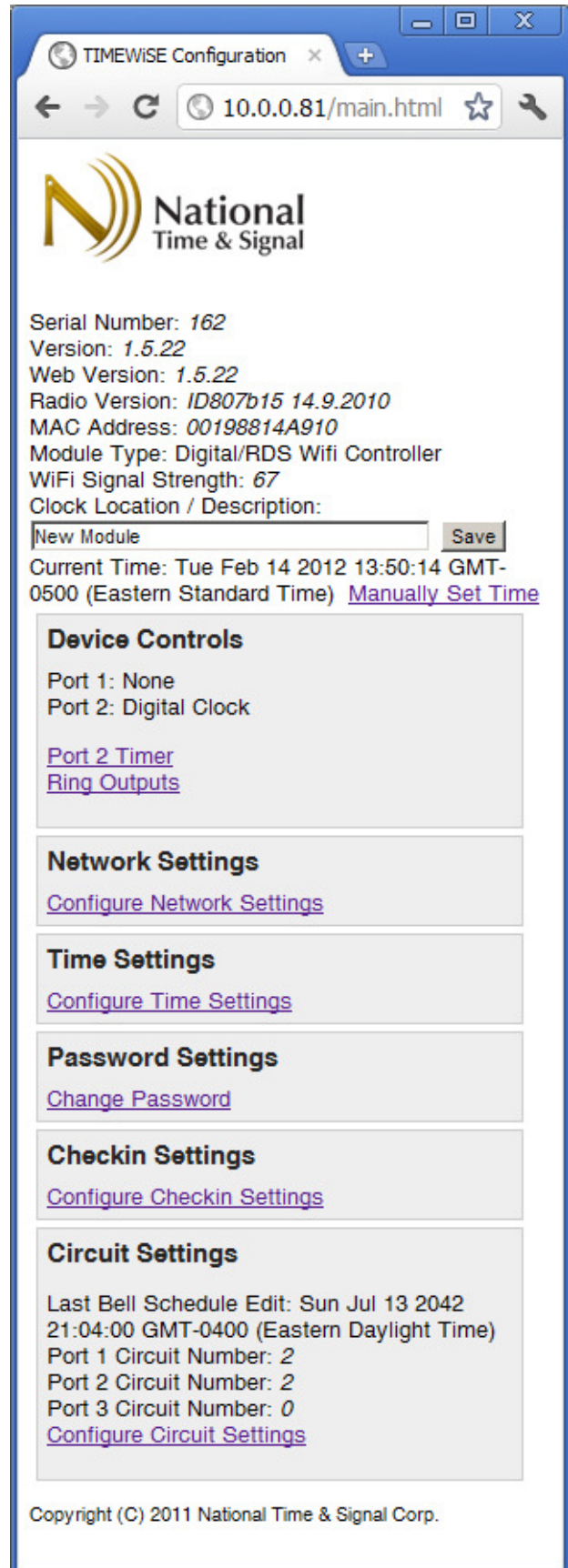
Network Settings: Configure WiFi networks and IP settings here.

Time Settings: Configure time server, time zone, and daylight saving time rules here.

Password Settings: Change your password using this page.

Checkin Settings: The TIMEWISE™ module can be configured to check-in and synchronize with a WeCAN-enabled master clock. Configure those settings here.

Circuit Settings: These settings allow configuration of the TIMEWISE™ module's ports to output bell events according to circuit numbers.



The screenshot displays the 'TIMEWISE Configuration' web interface in a browser window. The address bar shows '10.0.0.81/main.html'. The page features the 'National Time & Signal' logo and the following information:

- Serial Number: 162
- Version: 1.5.22
- Web Version: 1.5.22
- Radio Version: ID807b15 14.9.2010
- MAC Address: 00198814A910
- Module Type: Digital/RDS Wifi Controller
- WiFi Signal Strength: 67
- Clock Location / Description:
- Current Time: Tue Feb 14 2012 13:50:14 GMT-0500 (Eastern Standard Time) [Manually Set Time](#)

The interface includes several configuration sections, each with a title and a link:

- Device Controls:** Port 1: None, Port 2: Digital Clock. Links: [Port 2 Timer](#), [Ring Outputs](#)
- Network Settings:** [Configure Network Settings](#)
- Time Settings:** [Configure Time Settings](#)
- Password Settings:** [Change Password](#)
- Checkin Settings:** [Configure Checkin Settings](#)
- Circuit Settings:** Last Bell Schedule Edit: Sun Jul 13 2042 21:04:00 GMT-0400 (Eastern Daylight Time). Port 1 Circuit Number: 2, Port 2 Circuit Number: 2, Port 3 Circuit Number: 0. [Configure Circuit Settings](#)

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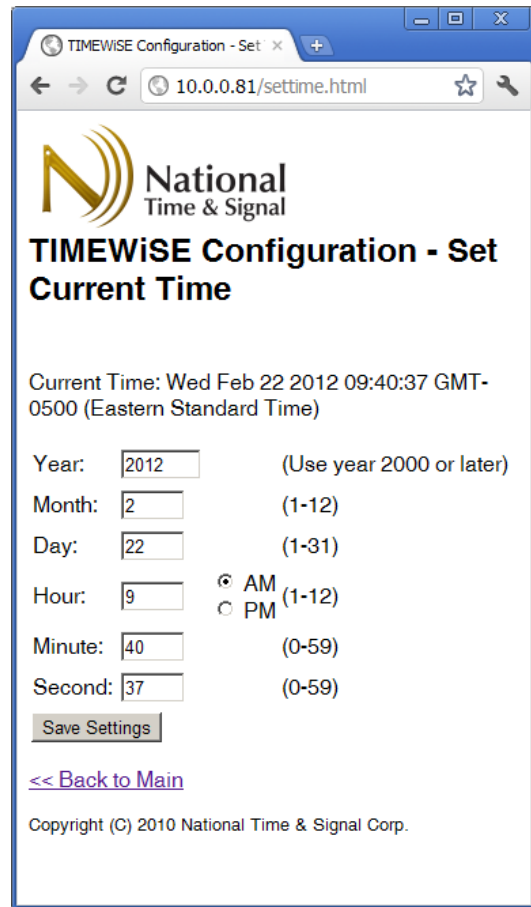
11. Manual Time Setting

Enter the *Manually Set Time* link from the main page. Upon loading, this page will display the current time and date as saved in the TIMEWISE™ module. If this module does not have a valid time source, you can use this screen to temporarily get the module on-time.

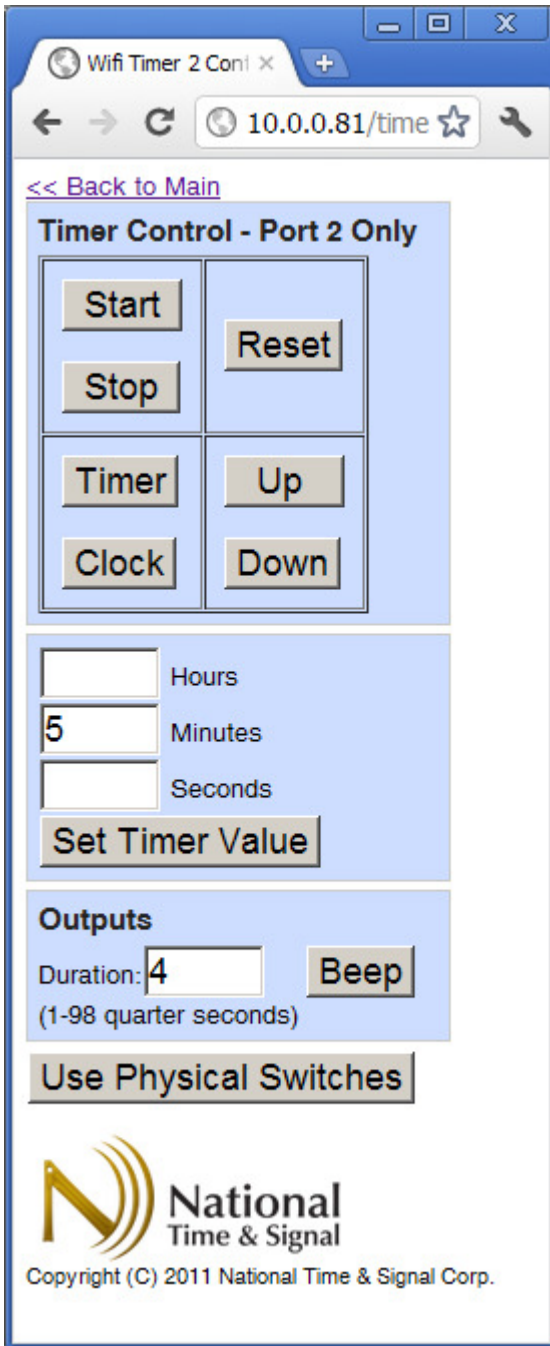
All time values are in local time.

All of the fields should be filled out before you press the *Save Settings* button. Once the settings have been saved, the TIMEWISE™ module will output the time to its clocks. Note that it may take up to 20 seconds for the time to show on the display.

Note: On older versions of the TIMEWISE™ module, the month indicator said 0-11. However, the values 1-12 are what should actually be used.



The screenshot shows a web browser window titled "TIMEWISE Configuration - Set" with the address bar displaying "10.0.0.81/settime.html". The page features the National Time & Signal logo and the heading "TIMEWISE Configuration - Set Current Time". Below the heading, the current time is displayed as "Wed Feb 22 2012 09:40:37 GMT-0500 (Eastern Standard Time)". The form includes input fields for Year (2012), Month (2), Day (22), Hour (9), Minute (40), and Second (37). The AM/PM selector is set to AM. A "Save Settings" button is located below the form. At the bottom, there is a link for "<< Back to Main" and a copyright notice: "Copyright (C) 2010 National Time & Signal Corp."



12. Timer Control

If the TIMEWISE™ module is connected to digital clocks, the timer control pages will be available from the main screen. You can control the clock on each port individually, or control both clocks simultaneously.

To use the timer, follow these steps:

- 1) Press *Timer* to enter timer mode.
- 2) Use the other buttons to control timer.
- 3) When you're done using the timer, press *Clock* to return to normal clock display. The timer will continue running in the background if it was not stopped. If it is counting down, it will beep when the countdown is complete.

Start/Stop: Starts or stops the timer.

Reset: Stops and clears the timer. If in count-up mode, resets to zero. If counting down, resets to the last value entered with *Set Timer Value*.

Timer/Clock: Switch between timer and clock modes.

Up/Down: Puts the clock into count-up or count-down modes.

Set Timer Value: Sets the value on the timer. This will not stop the timer if it is already running. This value will also be used next time a count-down is started.

Beep: Beeps the clock in quarter-second

intervals. A value of four will beep for one second.

Use Physical Switches: A physical timer control module may be connected to the clock. These physical switches allow for control without going through the web interface. This button tells the clock to use the physical inputs for timer control instead of the web page. Any command entered via the web interface will re-take control from the physical switches.

13. Network Settings

The network settings page can be accessed via the main page. In this section, you can configure how the TIMEWiSE™ module will connect to your WiFi network.

You may specify up to two custom networks. If custom network 1 is unavailable, the TIMEWiSE™ module will attempt to use custom network 2 instead. This can be particularly useful when changing SSID or password information; the old information can be left in custom network 1 while access points are being changed to the information in custom network 2.

Note that either custom network 1 or custom 2 can be set to all blanks to indicate that it will not be used. Both can be set to all blanks if a different network (such as any open network) is selected.

For more information about the network modes, see section “Network Modes”.

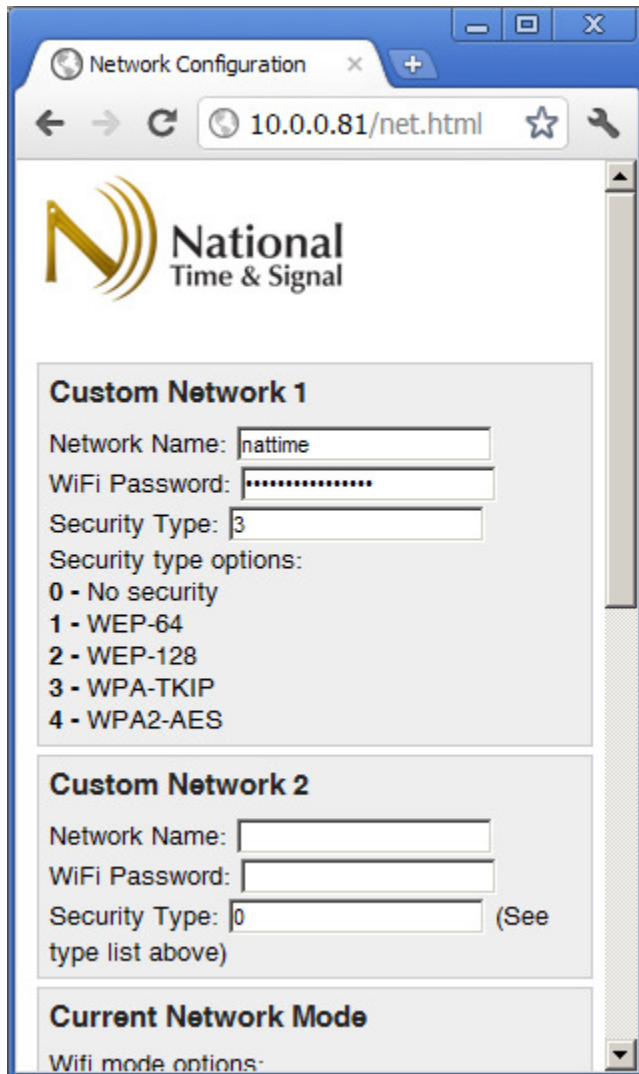
Custom Network Settings

Network Name: SSID of the custom network.

WiFi Password: Password or key for the custom network. Passwords for WEP networks must be given in hexadecimal.

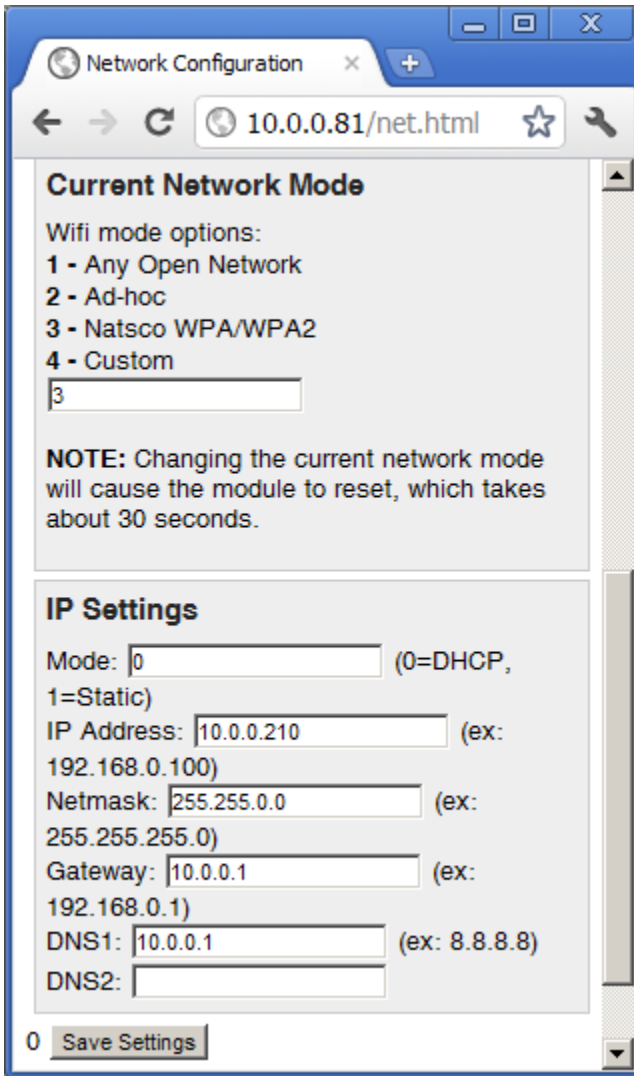
Security Type: Encryption mode for the custom network. As indicated on the page, a “0” in this field indicates no security (open network), while 1-4 indicate the various encryption types available.

Current Network Mode: Selects the current network mode. In this example, the “Natsco WPA/WPA2” TIMEWiSE™ network is selected. The default is “1-Any Open Network”, but can pre-configured at the factory for convenience.



The screenshot shows a web browser window titled "Network Configuration" with the address bar displaying "10.0.0.81/net.html". The page features the National Time & Signal logo at the top. Below the logo, there are three main sections:

- Custom Network 1:** Includes input fields for "Network Name" (containing "nattime"), "WiFi Password" (masked with dots), and "Security Type" (set to "3"). Below these is a list of "Security type options": 0 - No security, 1 - WEP-64, 2 - WEP-128, 3 - WPA-TKIP, and 4 - WPA2-AES.
- Custom Network 2:** Includes input fields for "Network Name", "WiFi Password", and "Security Type" (set to "0"). A note next to the Security Type field says "(See type list above)".
- Current Network Mode:** A dropdown menu with the text "Wifi mode options:" visible below it.



IP Settings

Dynamic/DHCP addressing is suggested for most applications. However, static addressing is available.

Mode: 0 for dynamic addressing (default) or 1 for static addressing. The fields below only apply for static mode.

IP Address/Netmask/Gateway/DNS:

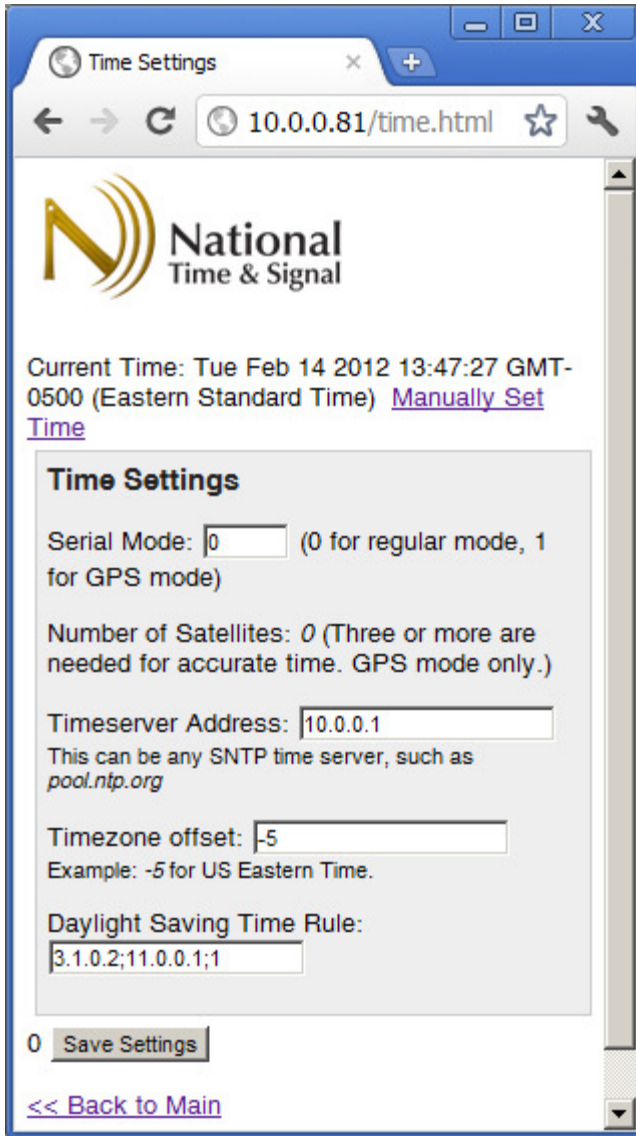
These settings must be provided by your network administrator if you are using static mode.

Saving Network Settings

When the new network settings have been entered, press *Save Settings* at the bottom of the page to commit the new configuration. Be sure all of the settings are correct before saving, or you may need to use ad-hoc mode to get back to known settings.

It may take one or two minutes for the module to rejoin the network with the new settings. If the network has changed, the address may be

reassigned, so you may need to access the module at a different address than was originally used. See section "Browsing to the Module" for details on finding the module at its new address.



14. Time Settings

The *Time Settings* page allows configuration of time source and time zone information.

Serial Mode: This should be left at the default of *0* for most installations. A value of *1* allows for a GPS receiver to be connected to port 1.

Timeserver Address: Defaults to *pool.ntp.org*, a group of public time servers synchronized to NIST atomic time. In the example to the left, a local time server IP of *10.0.0.1* was added. The accuracy of the clock time depends on the quality of the time server.

If the TIMEWISE™ module is configured with a WeCAN-enabled master clock as its check-in server, the timeserver field should be left blank.

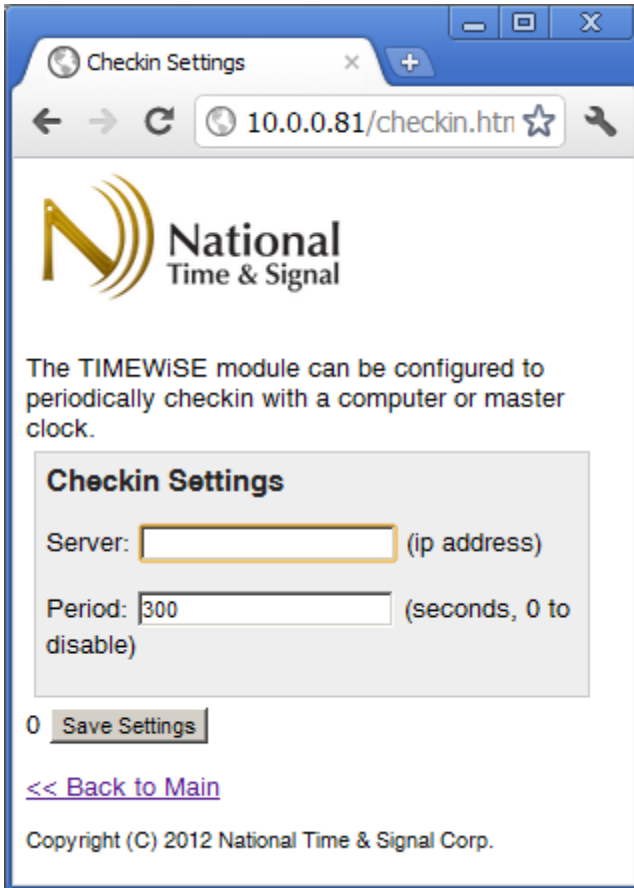
Timezone Offset: The number of hours to offset from UTC. The Continental US Offsets are listed below:

Time Zone	Offset
US Eastern	-5
US Central	-6
US Mountain	-7
US Pacific	-8

Daylight Saving Time Rule: The DST rule determines when and if daylight saving time will be observed on the clock. To enable the standard United States DST rule, put “3.1.0.2;11.0.0.1;1” into the box (this is the default). This will set the clock forward one hour at 2:00AM on the second Sunday of March, and set it back one hour at 2:00AM on the first Sunday of November.

To disable daylight saving time, enter “0.0.0.0;0.0.0.0;0” for the DST rule. For DST rules in other countries, please contact National Time support.

Save Settings: Saves the time settings. If the timeserver was updated, an immediate SNTP request will be sent. Note that it may take up to 30 seconds for the new time to be reflected on the clock.



15. Checkin Settings

The TIMEWiSE™ module can be configured to check-in with a WeCAN-enabled master clock or the TIMEWiSEConfig tool. This allows your WeCAN master clock or Windows PC to monitor the health of the clocks and receive regular updates when the clock is successfully attached to the network.

Checkin Server: The server IP address with which to check-in. This will be either the WeCAN master clock or the PC running TIMEWiSEConfig.

For more information about the TIMEWiSEConfig tool, please refer to the TIMEWiSEConfig manual.

For more information about WeCAN system programming, please consult the

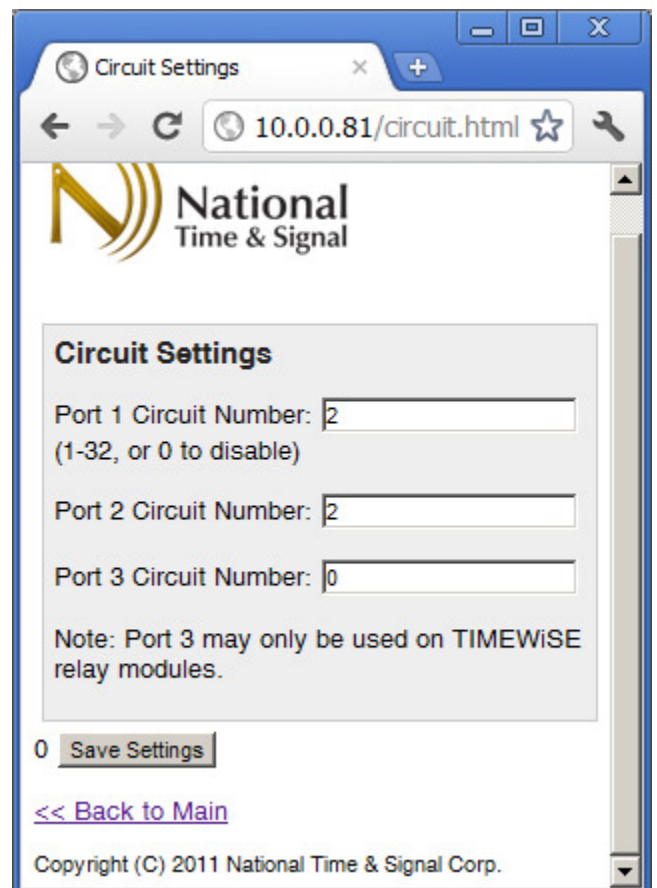
WeCAN user guide. It will detail how the WeCAN master clocks can control bell and countdown events for the TIMEWiSE™ modules, as well as provide supervision and time synchronization.

16. Circuit Settings

The TIMEWiSE™ module has an internal bell scheduler that can activate beepers or start countdowns on the attached digital clocks. It can also receive these commands from a WeCAN-enabled master clock on the network.

To control which clocks activate on a given bell event, each port may be assigned a circuit number from 1 to 32. Bell events that activate that circuit will initiate the ring or countdown on the attached device.

Port 1 is labeled “CLOCK1/CONFIG” on the TIMEWiSE™ module, while port 2 is labeled “CLOCK2”. Port 3 is a special relay port that is only available on the relay module.



17. Appendix A: Special Daylight Saving Time Formats

For the US and Canada, the daylight saving time rule **3.1.0.2;11.0.0.1;1** will enter daylight saving time on the second Sunday of March, leave DST on the first Sunday in February.

For other countries or for specialized uses, a custom daylight saving time rule can be entered. The format of the rule is as follows:

StartMonth.StartWeek.StartDay.StartHour;EndMonth.EndWeek.EndDay.EndHour;Offset

Field	Description
StartMonth	Month to start DST, 1=January, 12=December
StartWeek	Week to start DST. 0=First week of the month, 1=Second week, 2=Third week, ... 5=Last week of the month.
StartDay	Day of the week to start DST. 0=Sunday, 6=Saturday.
StartHour	Hour of the day to start DST. 0-23, where 0=Midnight. If the value is "2", the clocks will jump from 2:00 to 3:00 when DST starts.
EndMonth	Month to end DST
EndWeek	Week to end DST
EndDay	Day to end DST
EndHour	Hour to end DST. This time is <i>before</i> the DST correction, so if the value is "1", the clocks will jump from 2:00 to 1:00 when DST ends.
Offset	Amount of time shift in hours. Usually just "1" to indicate +1 hour.

18. Appendix B: Network Information Worksheet

The following information must be provided to National Time & Signal for us to pre-configure your TIMEWISE™ WiFi clocks. If you have any questions regarding network setup, please contact the support team. Pre-configuring the clocks for your network is highly recommended, and usually makes installation as simple as just hanging the clock on the wall.

WiFi Network Settings

Setting	Selection
Network SSID	
Network Password/Key	
Network Encryption	Please choose one: WEP-64 WEP-128 WPA-TKIP WPA2-AES
Check-In Server	(Only applies to systems with a Master Clock)
SNTP/NTP Time Server	(Default is pool.ntp.org)

We find that DHCP/dynamic IP addressing works best for most facilities, but static IPs can be assigned for each clock as well. If static IPs are desired, please provide the following information:

Setting	Selection
IP Address(es)	
Gateway	
Netmask	
DNS Server	