

Installation Manual V13

SMA 2000 Series Master Clock



SMA 2000 Master Clock

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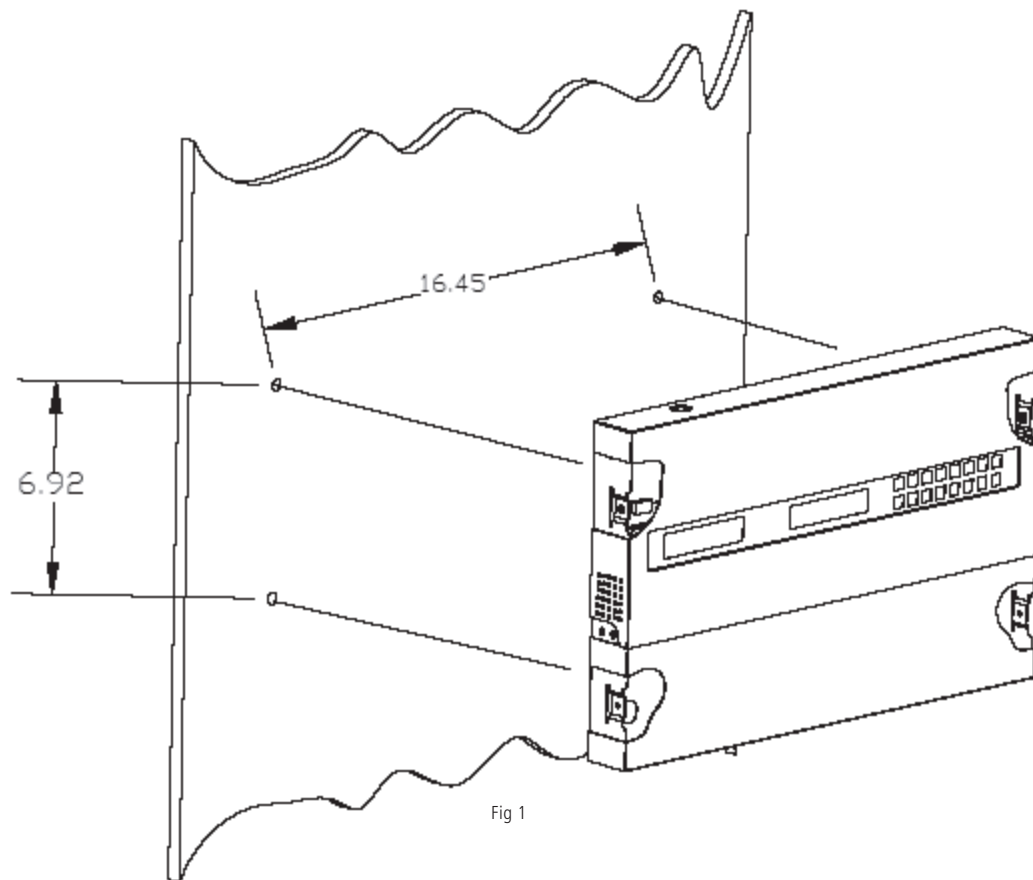
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SMA 2000 Master Clock

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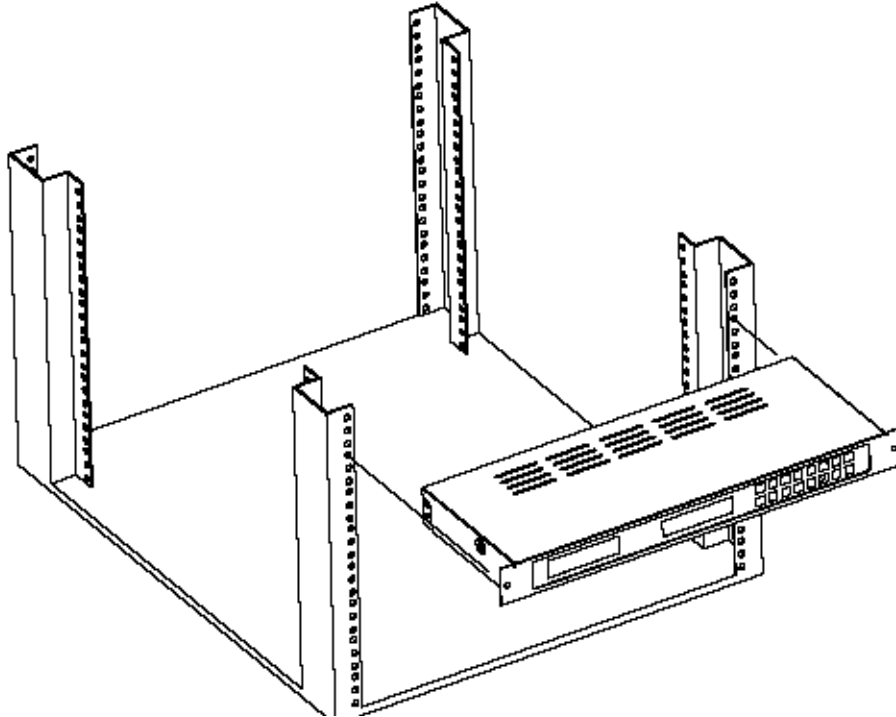
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Wall Mount Installation



1. Place the supplied template on the wall where the master clock is being mounted.
2. Mark the center point of the top right hole. Drill the hole and install the supplied anchor from the mounting kit.
3. Install the screw into the anchor and hang the template from the top right hole.
4. Using a level and the LINE on the supplied template, mark the center of the three remaining holes.
5. Remove the template and drill out the three remaining holes and insert the anchors.
6. Insert the two top screws into the anchors, leaving 1/8" of thread exposed. Unscrew the bottom wiring cover on the master clock.
7. Line up the top keyholes on the back of the master clock with the two top screws. Slide the master clock into the keyholes and then lock it into place.
8. Insert the two remaining bottom screws.
9. Screw the wiring cover back into its original position.

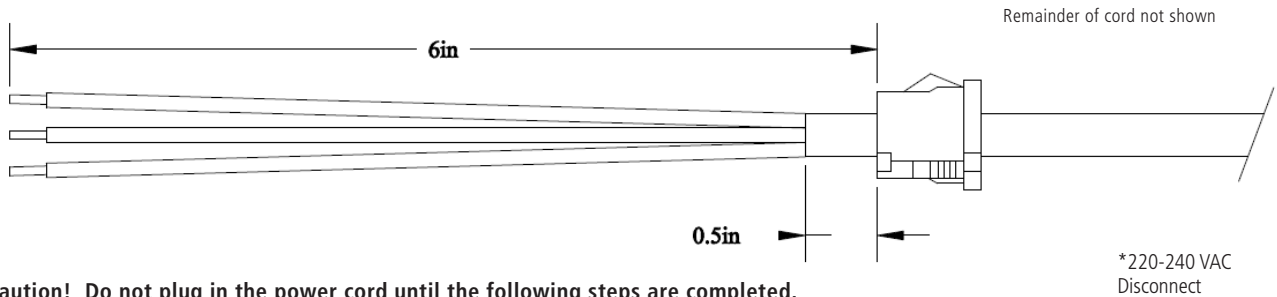
Rack Mount Installation



1. The master clock is 1U in size. Install the threaded nuts in the desired location in the rack rails.
2. Put the nylon washers on the two screws supplied.
3. Line up the master clock with the threaded nut.
4. Insert screws into the threaded nuts and tighten.

Before You Get Started

Installing the Master Clock with the Line Cord Receptacle



Caution! Do not plug in the power cord until the following steps are completed.

1. The square knockout on the wiring chassis must be removed.
2. The Heyco Bushing must be attached to the power cord as shown. Use pliers to push both halves of the bushing together while they lock.
3. Put the wires through the knockout and push the bushing into the metal until it locks tightly into place. The word Heyco on the bushing faces up.
4. Put each wire into the supplied connector and tighten the screws. The wiring label located on the chassis will show where to connect the wires.

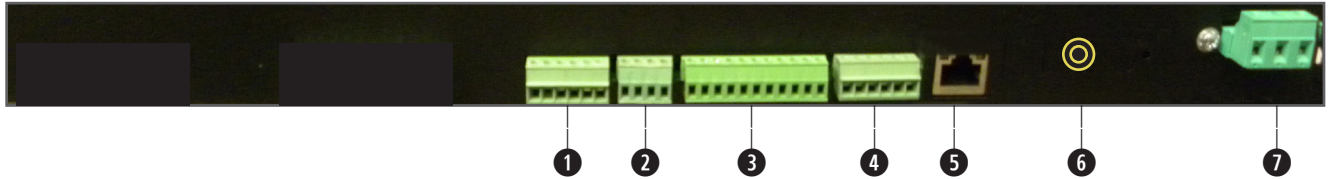
AC Power Wiring using 14 AWG Romex Cable

***Note: For CE Compliant installation, use minimum 0.75mm² cable or approved grounded cordset**

Caution! The AC Power Source must be turned OFF.

1. Remove a round knockout on the wiring chassis, preferably one near the AC Input Connector.
2. Install a standard ½" Romex Bushing and tighten in place.
3. Pass the Romex Cable through the Bushing and clamp in place. Do Not over tighten the screws.
4. Strip back the outside cable sheathing to expose the White, Black and Ground wires.
5. Strip back the insulation on the White and Black wire ¼".
6. Put each wire into the supplied connector and tighten the screws. The wiring label located on the wiring chassis indicates where to connect the wires.

Rear View of Unit

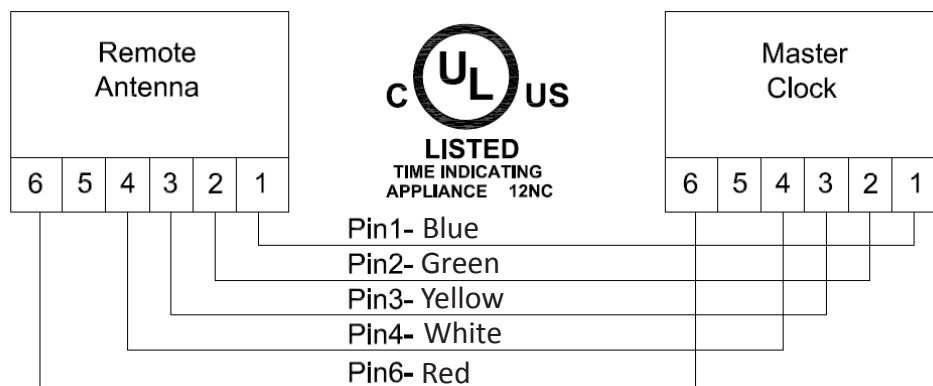


- 1 **Clock 1 & 2 Sync-Wire Outputs** This terminal block is where connections would be landed for Clock 1 and Clock 2 sync-wire communication relay outputs.
- 2 **RS485 Input/Output** This terminal block is where connections would be landed for RS485 communication to and from other Sapling systems.
- 3 **Inputs** This terminal block is where connections would be landed to use the SMA as a slave clock when being controlled by another system.
- 4 **Remote RF Antenna (Rack Mount only)** This terminal block is where the connection to an external RF antenna would terminate.
- 5 **Ethernet** This RJ45 jack is used for connecting the master clock to a network for programming and/or timekeeping capabilities.
- 6 **GPS Connector** This GPS connector is where the antenna for the GPS gets mounted to (GPS option only).
- 7 **Power Input** This power outlet is used to power up the SMA master clock.

NOTE: This device contains a lithium battery. Replace Battery With Varta, Part No. CR2032 Only. Use Of Another Battery May Present A Risk Of Fire Or Explosion. Batteries can be obtained and should be installed by the manufacturer.

WARNING: Battery May Explode If Mistreated. Do Not Recharge, Disassemble Or Dispose Of In Fire.

Installing the Remote Antenna

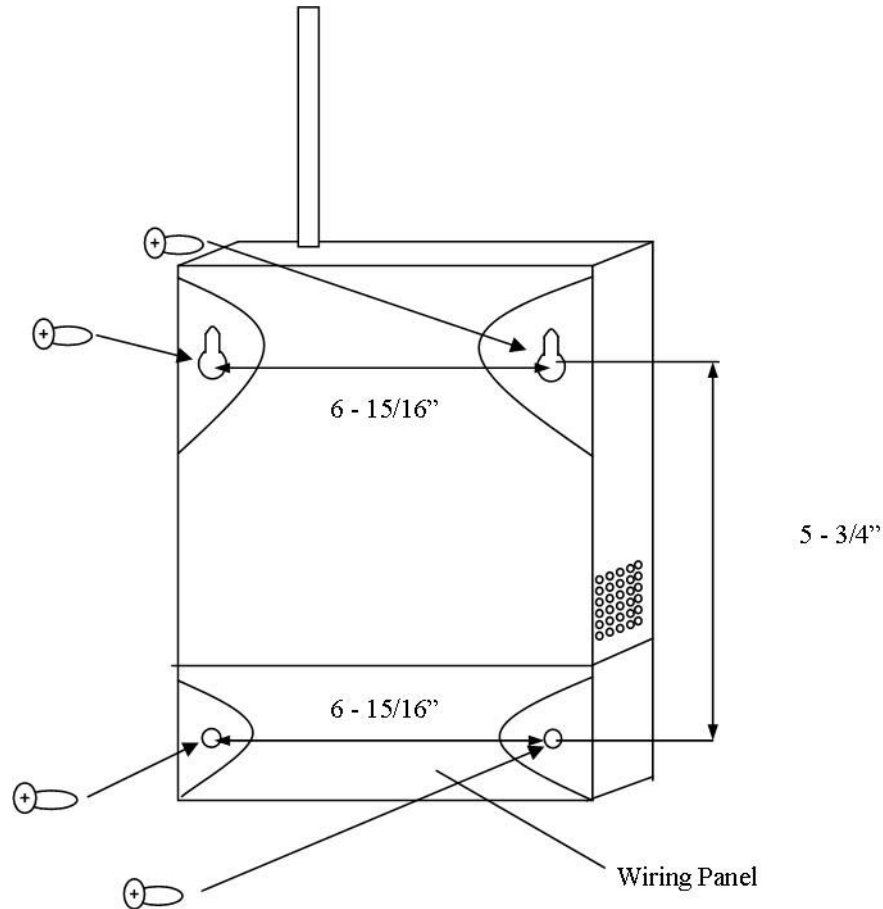


Connect the Remote Antenna to the Master Clock using the supplied 25 foot, 5 conductor 18 AWG cable. Use the wiring diagram and colors as shown above.

Strip the insulation back 1/4 inch on each wire. Use a bushing in the wiring chassis to pass the cable through and secure it, then insert wires into the conductor and tighten the screws.

For all input and output wiring use copper conductors only tightening torque for terminal block screws is 31 to 35 in/oz.

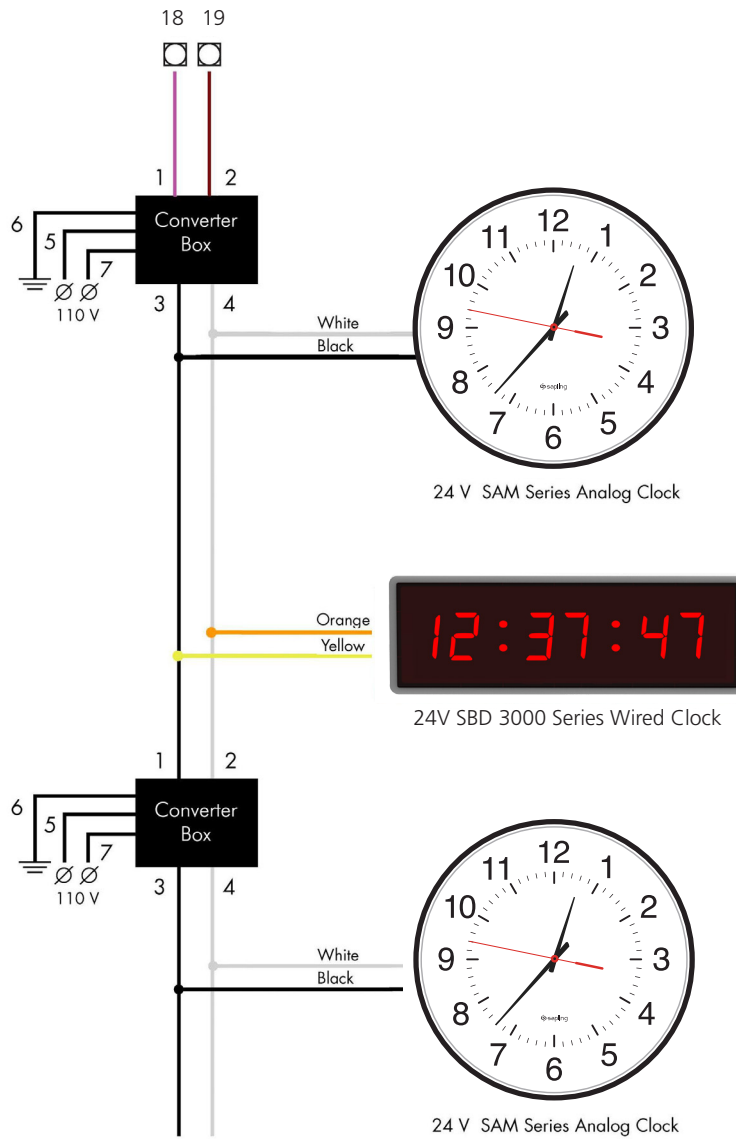
Remote Antenna Mounting Instructions



1. Remove the cover of the wiring panel.
2. Mark the four drilling points on the wall based on the drawing above.
3. Drill the holes for the anchors supplied in the mounting kit at the designated markings from step 1.
4. Install the four anchors in the holes that were just drilled.
5. Install the first two screws in the top holes leaving 1/8" of the thread exposed.
6. Line up the top key slots over the screws and lock the master clock into place.
7. Install the bottom screws through the wiring access panel and tighten into place.
8. After all wiring is complete, re-install the wiring panel cover.

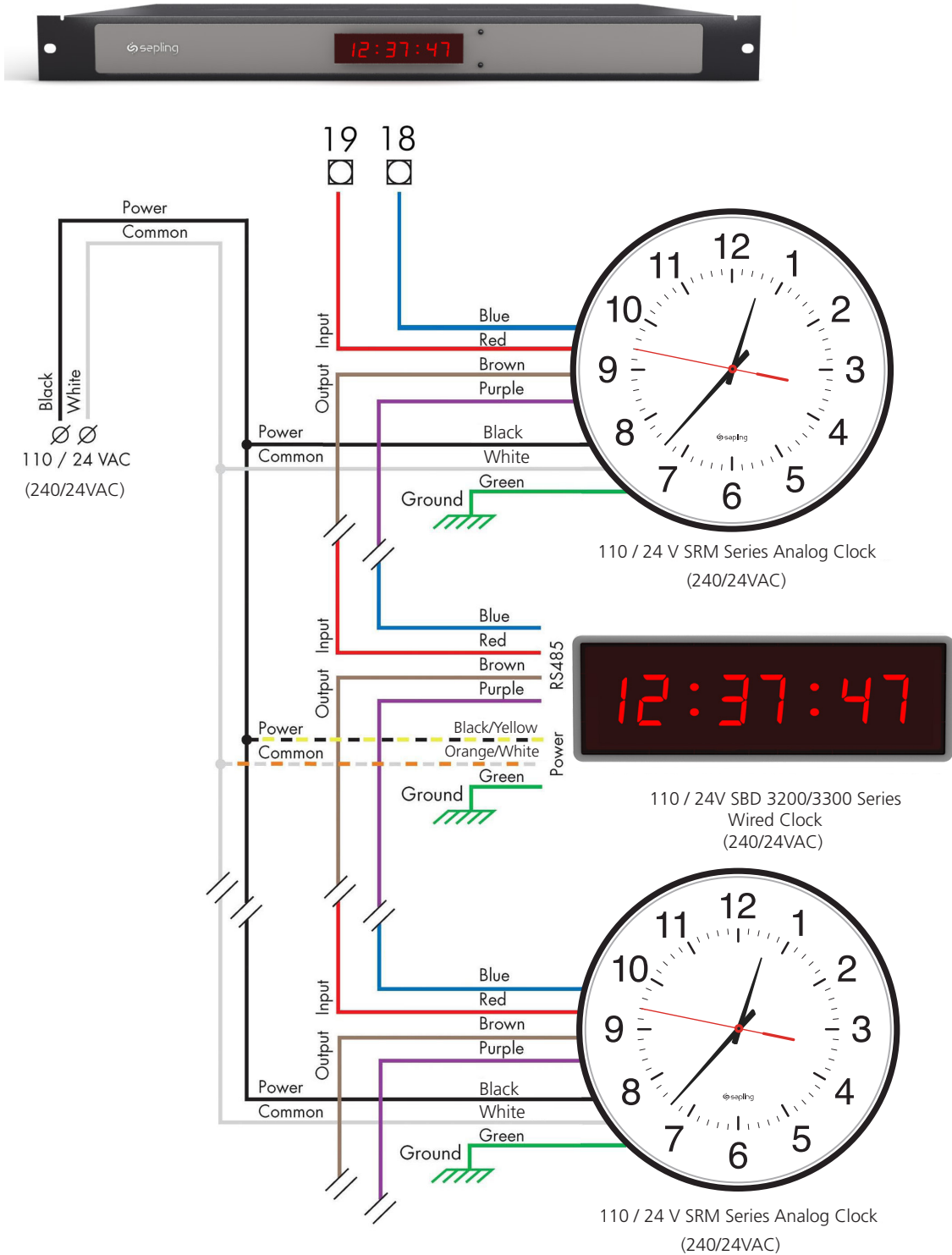
System Connections – Wired Systems

2 Wire Digital Communication System Connection



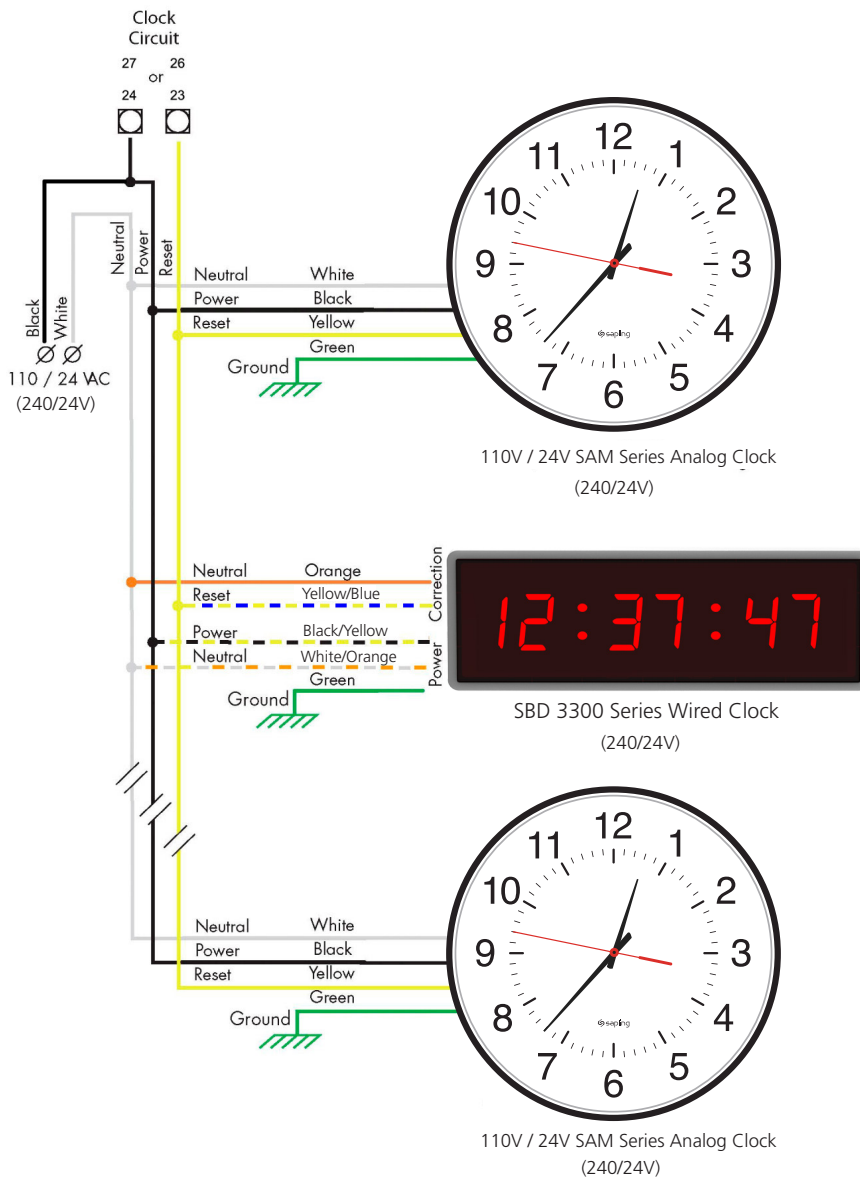
System Connections – Wired Systems

RS485 Communication System Connection



System Connections – Wired Systems

Sync-Wire Communication System Connection



System Connections – Wired Systems

Once-a-day Pulse Using Clock 1 or Clock 2 System Connection



Clock Circuit

27 28
or

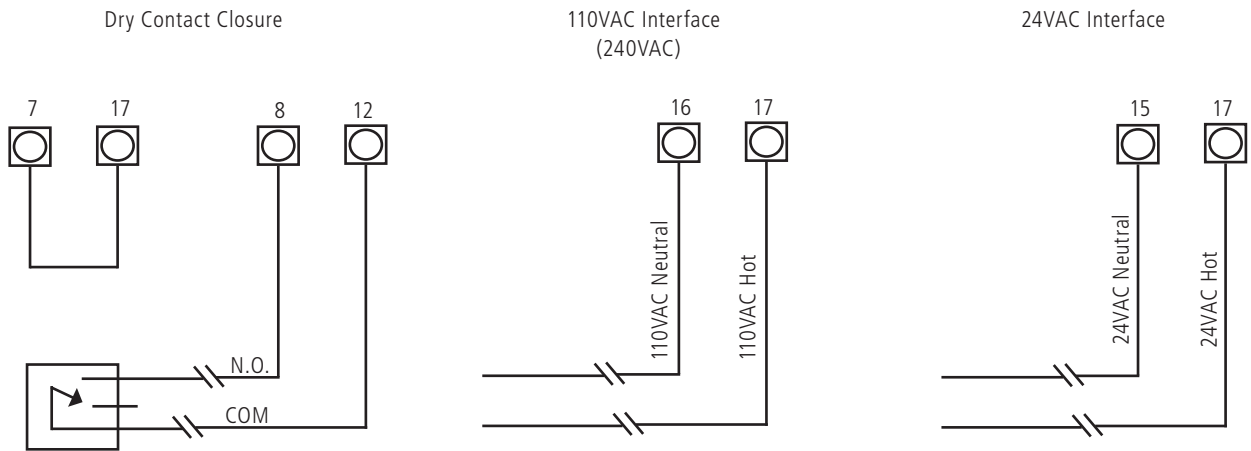
24 23



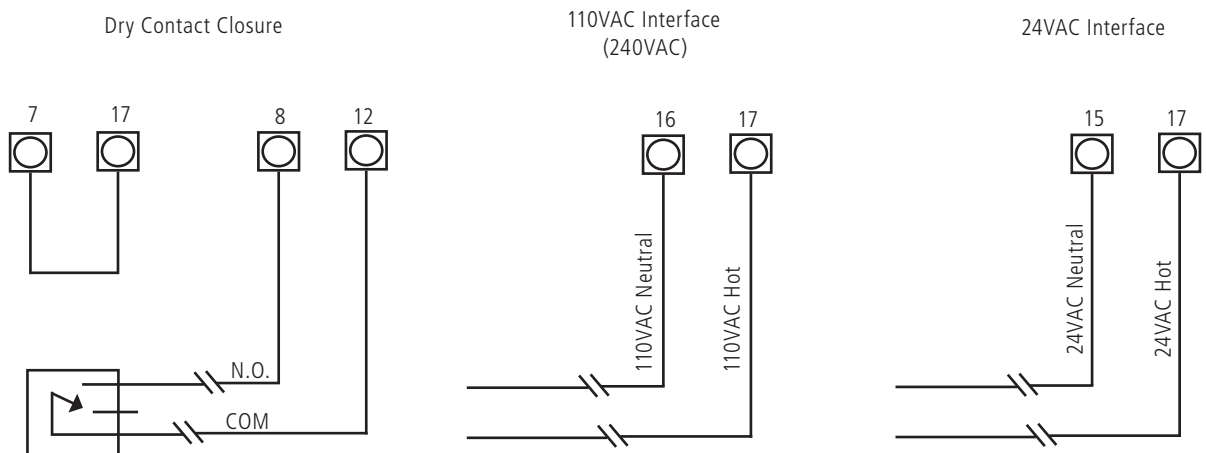
Intercom, paging system, or other device

Inputs – Sync-Wire Inputs Installation

59 Minute Correction

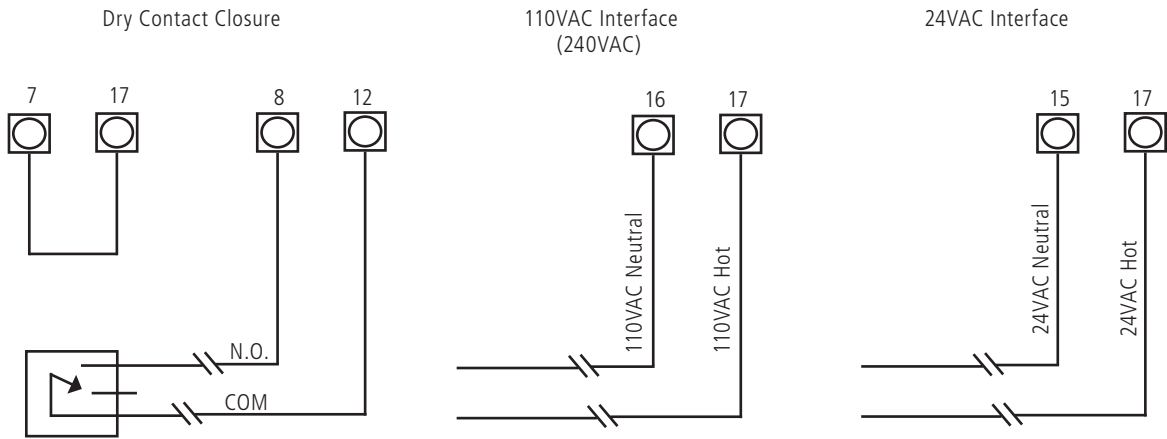


58 Minute Corrections 1-4

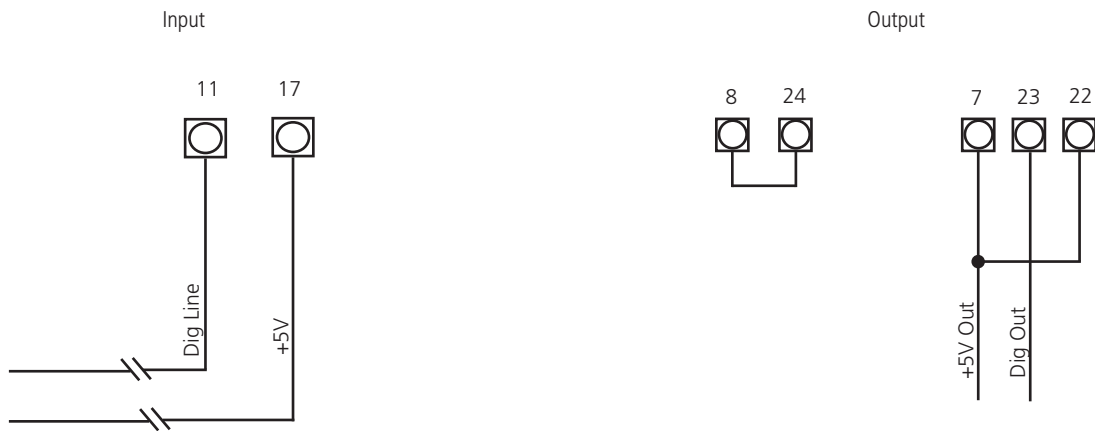


Inputs – Sync-Wire Inputs Installation

National Time/Rauland

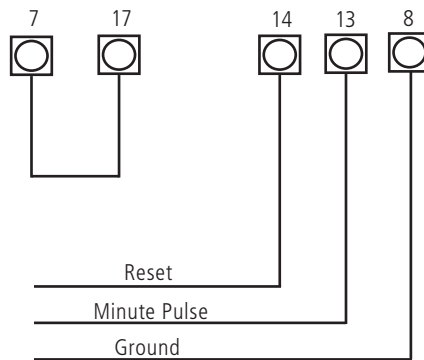


Rauland Digital



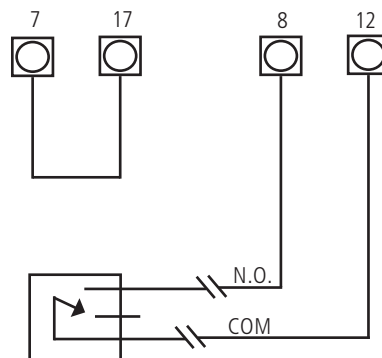
Inputs – Sync-Wire Inputs Installation

Dukane Digital



Once a Day Pulse

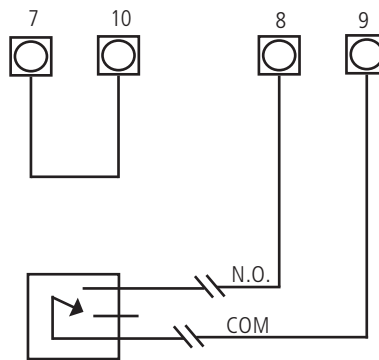
Dry Contact Closure



Fire Alarm Interface Installation / Patch Cable Installation

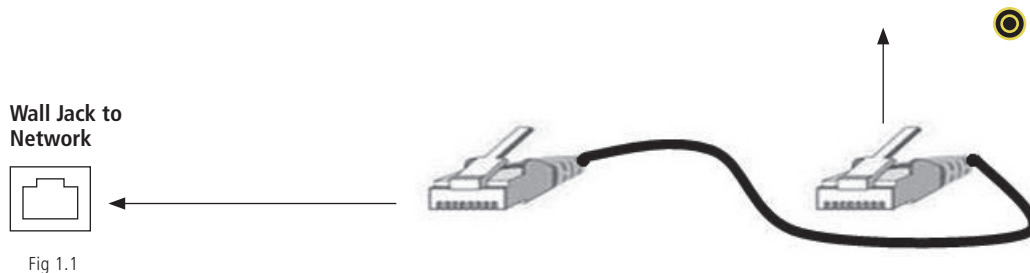
Fire Alarm Interface Installation

The Fire Alarm Interface allows a relay closure to be connected to the SMA master clock that allows the user to interface the existing fire alarm with the Sapling SBD 3000 series digital clocks.



When a relay closure occurs on pins 8 and 9, "FirE" will display on the digital slave clocks connected using RS485 or 2-wire digital communication.

Patch Cable Installation



- 1) Connect a patch cable to the RJ45 port on the SMA Master Clock as shown in Fig 1.1.
- 2) Connect the other end of the patch cable to an Ethernet jack connected to the network.

Inputs – GPS Installation

GPS Antenna Installation

Supplied by Sapling: GPS Dome and a 75 foot (22.8 meters) of RG58 length of RG59 cabling (refer to Figure 1.1). If needed, the following GPS cable is available at an additional cost:

- 150 foot (45.7 meters) Special GPS Cable - Part Number: E-ANT-CBL150F-1
- 300 foot (91.4 meters) Special GPS Cable - Part Number: E-ANT-CBL300F-1

Not supplied by Sapling: Steel or PVC piping with 1"-14" thread or 3/4" pipe thread, teflon tape, mounting plate and hardware for piping (refer to Figure 1.1)

*NOTE: Placement of antenna and height of piping needs to be on the rooftop of the building.

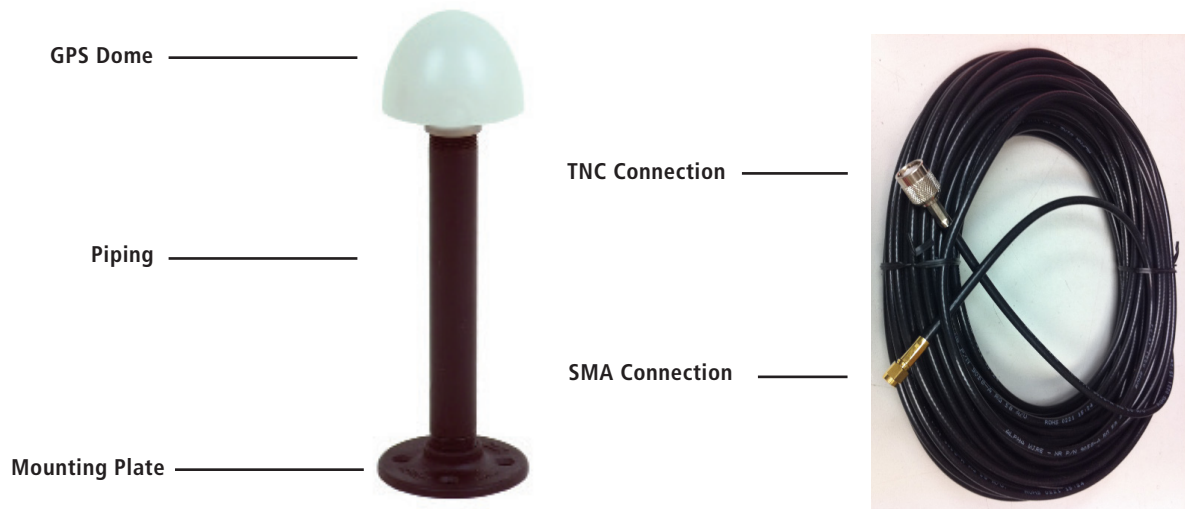
- 1) Route cabling from the room in which the master clock will be located to the roof of the building, allowing the GPS dome (refer to Figure 1.1) to have a full 180 degrees view of the sky
- 2) Run cabling through piping and attach the end of the cabling to the bottom of the GPS dome via TNC connection.
- 3) Screw GPS dome onto the top of the piping. Be careful not to twist the cable. Use teflon tape on the pipe threads to tighten seal and prevent water damage.
- 4) Mount piping to the roof of the building with mounting plate and hardware supplied by the user.
- 5) Connect the RG58 or 59 cabling to the GPS input located on the back of the master clock via SMA connection.

Setting Master Clock to GPS Mode

Programming through the SMA 2000 push buttons - Refer to page 22 for setting your master clock's time source to GPS from the LCD display.

Programming through the Web Interface - Refer to page 32 for setting your master clock's time source to GPS from the web interface.

Fig 1.1



User Level Programming

Setting the Time from the LED Display

To set the time, press the top button to change the hour and/or the bottom button the set the minute.

See Fig 2.1.

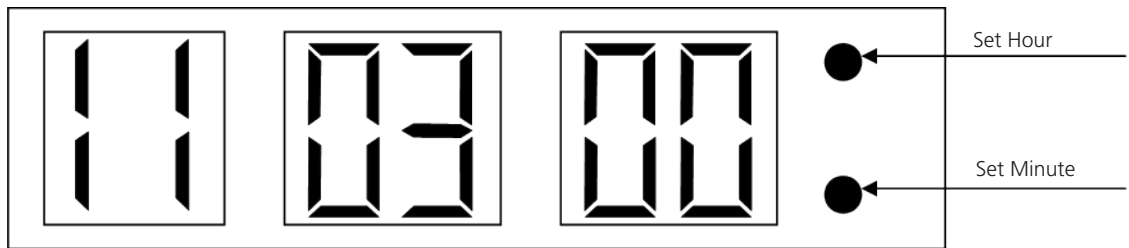
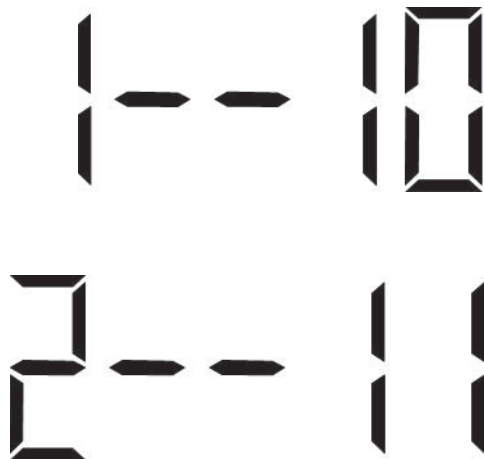


Fig 2.1

Programming the SMA 2000

To enter programming mode, press both the top and bottom button together simultaneously. The top button advances through the options while the bottom button changes the option.

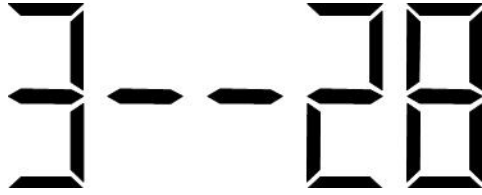


Option 1 - Set Year:

Use the bottom button to scroll from "10-99" on the display and set the year.

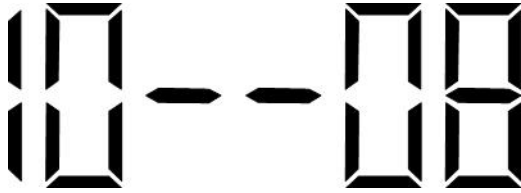
Option 2 - Set Month:

Use the bottom button to scroll between "01-12".



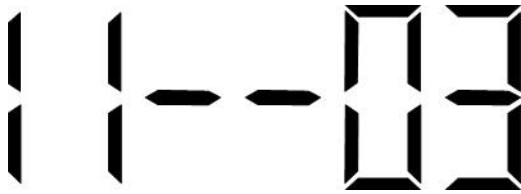
Option 3 - Set Day:

Use the bottom button to scroll between "01-31".



Option 10 - Technical Mode:

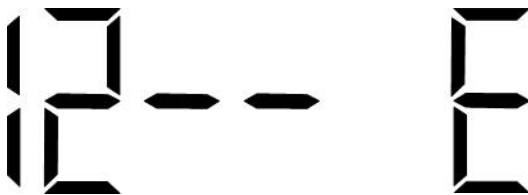
If technical mode is desired, press the bottom button until "08" is reached. Setting option 10 to "08" will allow the user access to options 11-13 when the top button is pressed. Any other value will go directly to option "20" when the top button is pressed.



Option 11 - RS485 Data Rate:

Press the bottom button to scroll between "01-12".

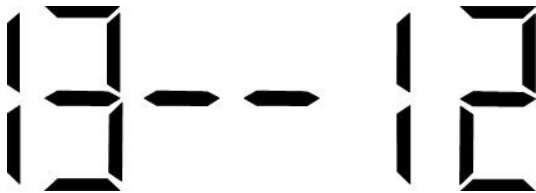
- | | |
|---|---|
| 01 - Data is transmitted every second | 07 - Data is transmitted every 2 minutes |
| 02 - Data is transmitted every 5 seconds | 08 - Data is transmitted every 5 minutes |
| 03 - Data is transmitted every 10 seconds | 09 - Data is transmitted every 10 minutes |
| 04 - Data is transmitted every 15 seconds | 10 - Data is transmitted every 15 minutes |
| 05 - Data is transmitted every 30 seconds | 11 - Data is transmitted every 30 minutes |
| 06 - Data is transmitted every minute | 12 - Data is transmitted every hour |



Option 12 - Daylight Savings Time:

Press the bottom button to scroll between "d" or "E".

"d" will disable this option.
 "E" will enable this option.



Option 13 - 12/24 Hour Mode:

Press the bottom button to scroll between "12" and "24".

20--7

Option 20 - Programming the Clock #1 Circuit:

Press the bottom button to scroll through "1", "2", "3", "4", "5", "6", "7", "8" & "9". Please refer to relay selection mode on page 24.

21--14

Option 21 - Once a Day Pulse - Set Hour:

This option is only available if "8" is selected in option 20 for once a day pulse. Press the bottom button to scroll through "00-23".

22--00

Option 22 - Once a Day Pulse - Set Minutes:

This option is only available if "8" is selected in option 20 for once a day pulse. Press the bottom button to scroll through "00-59".

23--30

Option 23 - Once a Day Pulse - Set Seconds:

This option is only available if "8" is selected in option 20 for once a day pulse. Press the bottom button to scroll through "00-59".

24--05

Option 24 - Once a Day Pulse - Set Duration (in seconds):

This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-99".

25--1

Option 25 - Programming the Clock #2 Circuit:

Press the bottom button to scroll through "1", "2", "3", "4", "5", "6", "7", "8" & "9". Please refer to relay selection mode on page 24.

26--14

Option 26 - Once a Day Pulse - Set Hour:

This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-23".

27--00

Option 27 - Once a Day Pulse - Set Minutes:

This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-59".

28--30

Option 28 - Once a Day Pulse - Set Seconds:

This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-59".

29--05

Option 29 - Once a Day Pulse - Set Duration (in seconds):

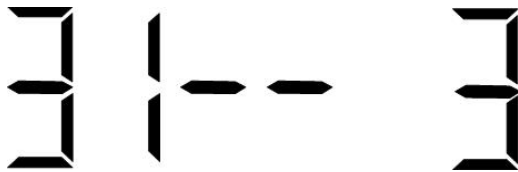
This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-99".



Option 30 - Set the Primary Input:

Press the bottom button to scroll between "1-13" to select the input.

- | | |
|-------------------------------|---|
| 00 - Real Time Clock | 08 - Dukane |
| 01 - SNTP | 09 - Rauland Digital |
| 02 - 59 Minute Correction | 10 - Wireless Repeater |
| 03 - 58 Minute Correction (1) | 11 - Once a Day Pulse* |
| 04 - 58 Minute Correction (2) | 12 - GPS |
| 05 - 58 Minute Correction (3) | 13 - RS485 |
| 06 - 58 Minute Correction (4) | |
| 07 - National Time/Rauland | * - Selecting this allows access to options 34-36 |



Option 31 - Set the Secondary Input:

This option is only available if "8" is selected in option 25 for once a day pulse. Press the bottom button to scroll through "00-23".

- | | |
|-------------------------------|---|
| 00 - Real Time Clock | 08 - Dukane |
| 01 - SNTP | 09 - Rauland Digital |
| 02 - 59 Minute Correction | 10 - Wireless Repeater |
| 03 - 58 Minute Correction (1) | 11 - Once a Day Pulse* |
| 04 - 58 Minute Correction (2) | 12 - GPS |
| 05 - 58 Minute Correction (3) | 13 - RS485 |
| 06 - 58 Minute Correction (4) | |
| 07 - National Time/Rauland | * - Selecting this allows access to options 34-36 |



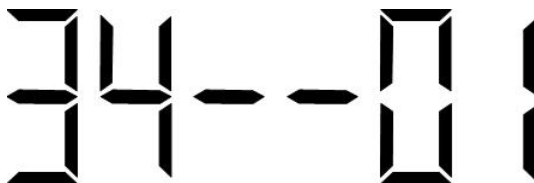
Option 32 - Setting the Time Zone Offset:

Press the bottom button to scroll through "-12 to 12". See Fig 4.1 on page 29 for examples of common offsets.



Option 33 - Set the Bias Seconds + 7500 seconds to - 999 seconds:

This option allows the user to set the bias seconds which allows the user to adjust the input's time plus 7500 seconds or minus 999 seconds. Press the bottom button to scroll through "0000 - 7500".



Option 34 - Once a Day Pulse Input- Set Hour

This option is only available when option 30 or 31 is set to 11. Press the bottom button to scroll through "00-23".

35--30

Option 35 - Once a Day Pulse Input - Set Minutes

This option is only available when option 30 or 31 is set to 11. Press the bottom button to scroll through "00-59".

36--00

Option 36 - Once a Day Pulse - Set Seconds

This option is only available when option 30 or 31 is set to 11. Press the bottom button to scroll through "00-59".

40--76

Option 40 - Last Time the Clock Received an Input Signal (in hours)

The display will be between 00 - 99. This option is read only. It cannot be modified.

44--01

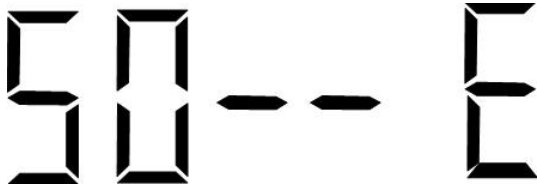
Option 44 - Displays Status of Internet Connection:

A "01" will appear on the right side if the master is receiving an Internet Connection. A "00" will appear on the right side if it is not receiving an Internet Connection. This option is a read-only option.

45--01

Option 45 - Crossover/Static IP option

If the right side says "off", DHCP is being used, if the user presses the bottom button, the display will change to "cr" which means crossover mode. In cross over mode, DHCP is turned off and the IP address is fixed at 192.168.0.123. Depressing the top button advances to the next menu item. Warning, after making a change, you must wait 20 seconds and power cycle for this change to take effect. Note that the PC directly connecting with this needs to be set for a fixed IP address which is not 192.168.0.123. For changing the IP address to a static IP, it must be done from the web interface. Please see page 26 for details.



Option 50 - Entering Diagnostic Mode

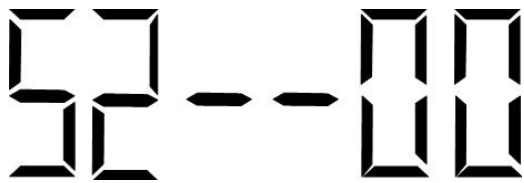
Press the bottom button to scroll between "E - d". Setting the option to "E" will enable the option and will enter diagnostic mode. Setting the option to "d" will disable the option and upon depressing the top button, the clock will return to the time.



Option 51 - Sends Diagnostic to Slave Clock

Pressing the bottom button will scroll from "1-5 and 9".

- 01 - Protocol Verification
- 02 - Comprehensive Test
- 03 - Manufacturer's Default
- 04 - Combination of 02 & 03 (button must be pressed on SAM)
- 05 - Combination of 02 & 03 (no need to press button on SAM)
- 09 - Overrides the Previous Diagnostic and Goes Back to the Time



Option 52 - Set Duration (in minutes) that the Results of the Diagnostic will be Viewable on the Clock

Pressing the bottom button will scroll from "00-60". Pressing the top button will go back to the displayed time.

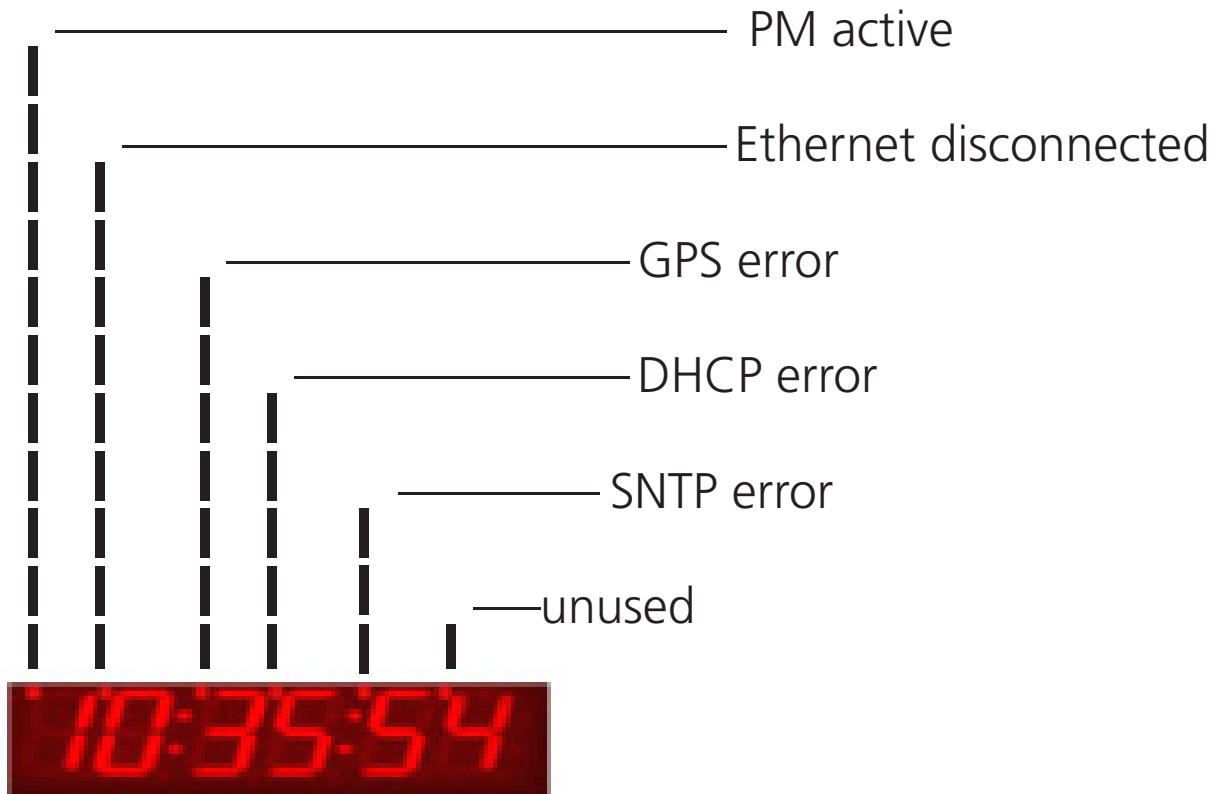
Sync-Wire Communication – Protocol Definitions

- 1 - 58th minute (1)** The hourly correction for 55 seconds every hour from XX:58:05 to XX:59:00. The daily correction (5 a.m. & 5 p.m.) is ten correction cycles sent to the relay (each for 95 seconds) beginning at 5:05:00, 5:07:00, 5:09:00, 5:11:00, 5:13:00, 5:15:00, 5:17:00, 5:19:00, 5:21:00, and 5:23:00.
- 2 - 58th minute (2)** The hourly correction for 60 seconds every hour from XX:58:00 to XX:59:00. The daily correction (5 a.m. & 5 p.m.) is twelve correction cycles sent to the relay (each for 65 seconds on and 25 seconds off) beginning at 5:05:00 to 5:22:35.
- 3 - 58th minute (3)** The hourly correction for 60 seconds every hour from XX:58:00 to XX:59:00. The daily correction (5 a.m. & 5 p.m.) is twelve correction cycles sent to the relay (each for one minute on and two minutes off) beginning at 5:06:00.
- 4 - 58th minute (4)** The hourly correction for 55 seconds every hour from xx:58:05 to XX:59:00. The daily correction (5 a.m. & 5 p.m.) is 12 correction cycles for 55 seconds. The timings will be 05:03:05, 05:07:05, 05:11:05, 05:15:05, 05:19:05, 05:23:05, 05:27:05, 05:31:05, 05:35:05, 05:39:05, 05:43:05 and 05:47:05.
- 5 - 59th minute** The hourly correction for 8 seconds every hour from XX:57:54 to XX:58:02. The daily correction (5 a.m. & 5 p.m.) is a 14 second pulse from 5:57:54 to 5:58:08.
- 6 - National Time & Rauland (1)** The hourly correction is for 25 seconds every hour from XX:00:00 to XX:00:25. The daily correction (6 a.m. & 6 p.m.) is 25 seconds on, 35 seconds off every minute for 24 minutes.
- 7 - National Time & Rauland (2)** The hourly correction is for 25 seconds every hour from XX:00:00 to XX:00:25. The daily correction is a 24 minute pulse from 6:00:25 to 6:24:25 AM and PM.
- 8 - Once a Day Pulse** The Once a Day Pulse allows the user to manually configure when the relay will close and for how long it needs to close.
- 9 - Rauland Digital** The Rauland Digital will reset the clock to 12:00:00AM and advance the clock one minute for every 0.5 seconds that the Dig line is shorted to ground.

Error Codes

Error Codes on LED Display

When one of the following errors occurs, one of the LED lights located above one of the six characters on the LED display will be flashing. See figure below indicating the error each flashing light is associated with.



Web Interface Programming

*Please make sure that ports 123 and 80 in both directions are open on the firewall.

Accessing the Web Interface (when connected via DHCP)

- 1) Plug in a patch cable to the unit, and then into a switch on your network.
- 2) Press the both buttons on the front of the display simultaneously, and then press them simultaneously once more. This puts the clock in the IP address view mode. The display will show the first 3 numbers of the IP address. Press both buttons simultaneously to see the second 3 digit portion of the IP address. Continue the same procedure for the third and fourth portions of the IP address. When finished, pressing both buttons together simultaneously will bring the time back onto the clock.
- 3) Open a web browser such as Internet Explorer or Firefox on a PC that's connected to the network.
- 4) In the address bar, type in the IP address and press Enter. This will access the log-in screen.

Accessing the Web Interface (when using a static IP)

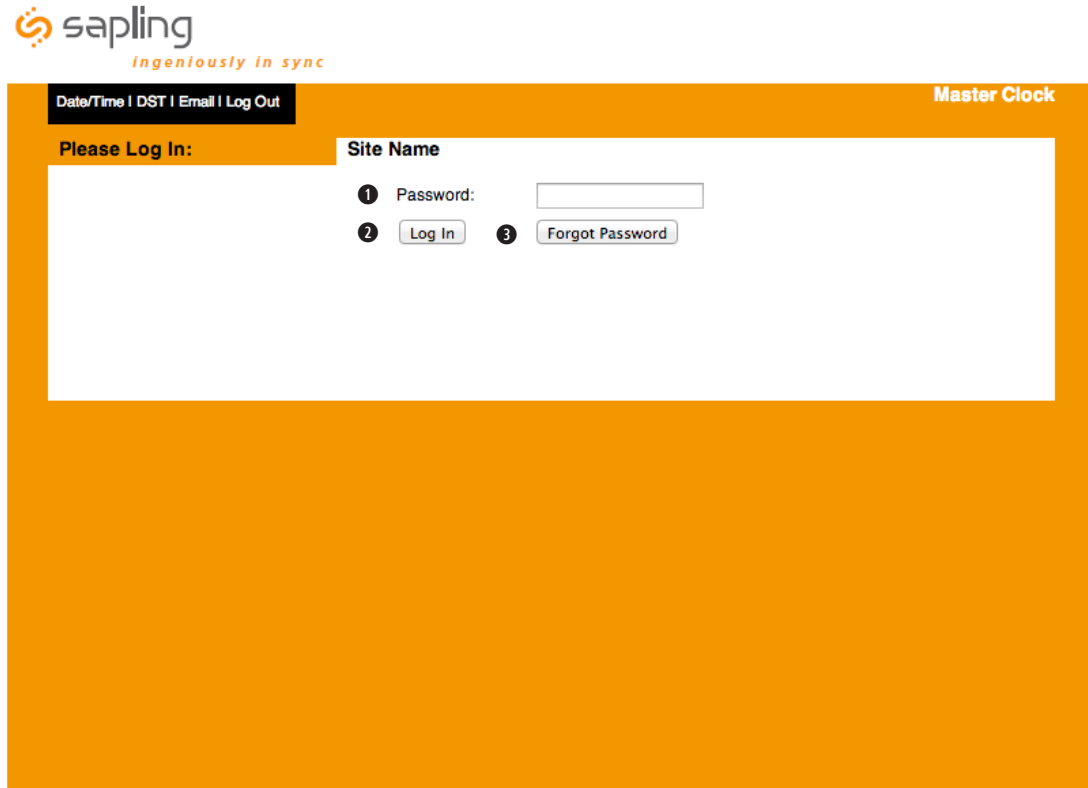
- 1) Plug in a patch cable to the unit, and then into a switch on your network.
- 2) Set option 45 to "cr", as described on page 23.
- 3) Open a web browser such as Internet Explorer or FireFox on a PC that's connected to the network.
- 4) In the address bar, type in 192.168.0.123 and press Enter. This will access the log-in screen.
- 5) Once you are logged in, follow the instructions on page 33 for entering a new IP address.

Accessing the Web Interface (when using a crossover cable)

- 1) Set option 45 to "cr", as described on page 23.
- 2) If you are accessing this on a laptop, turn off any wireless connections.
- 3) Click the "Start" button on the taskbar, then click on "Control Panel".
- 4) Double Click on "Network Connections".
- 5) Click the right mouse button on "Local Area Connection" and click "Properties".
- 6) Scroll to the bottom of the connections list and single click on "Internet Protocol (TCP/IP)".
- 7) Click on "Properties".
- 8) Under the General tab, click the radio button that says "Use the following IP address".
- 9) Enter the IP address of "192.168.0.122".
- 10) Set the subnet mask to "255.255.255.0".
- 11) Click OK to accept the new changes, and then click OK again to exit the Network Connections screen.
- 12) Power cycle the master clock.
- 13) Open a web browser such as Internet Explorer or FireFox on a PC that's connected to the network.
- 14) In the address bar, type in the IP address (192.168.0.123) and press Enter. This will access the log-in screen.

Web Interface Programming

Log In

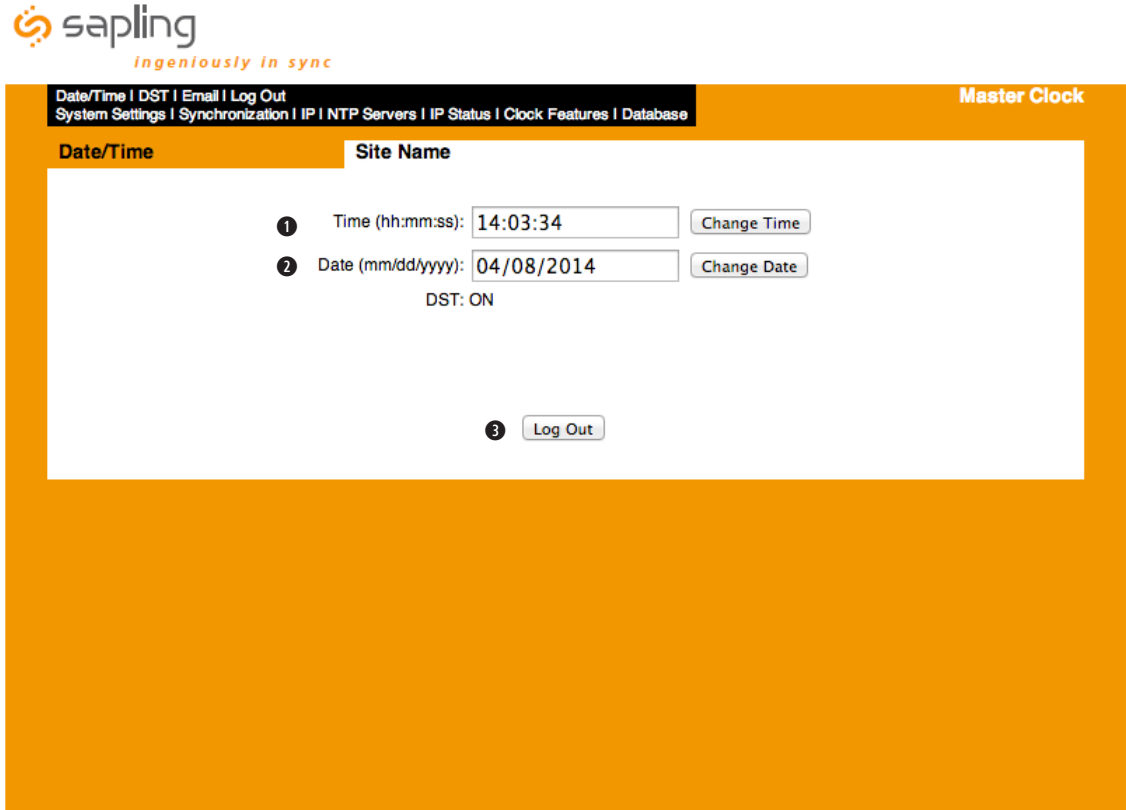


- 1 Password** There are two levels of passwords that will enable the user to access features. The first level is the user level programming that includes features like setting the time, date, adding and editing events and schedule changes. The default password for the user level is 1111. It can be changed in the technician level. The technician level password is 6063 and gives you full access to all of the enabled features of the master clock.
- 2 Log In** This button, when pressed, will attempt to log in to the master clock with the password that was entered in the field above.
- 3 Forgot Password** This button, when pressed, will direct you to the tech support phone number.

After five minutes of inactivity once logged in, the master clock will automatically log the user out.

Web Interface Programming

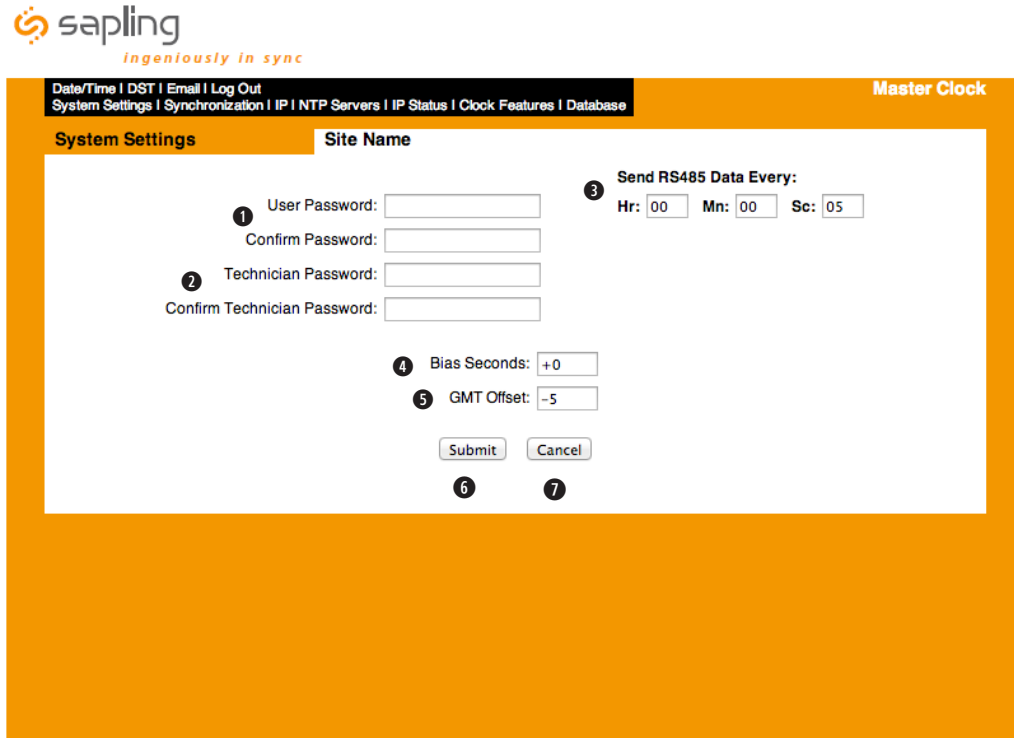
Date/Time



- 1 Time** This field is where the current time is displayed. The time can be edited by clicking within the field, and typing in the desired time. The time must be entered in 24 hour format (HH:MM:SS). After typing in the desired time, click the Submit button to set the time on the unit (if there is no input connected).
- 2 Date** This field is where the current date is displayed. The date can be edited by clicking within the field, and typing in the desired date. The date must be entered in mm/dd/yyyy format. After typing in the desired time, click the Submit button to set the date on the unit (if there is no input connected).
- 3 Log Out** This button, when pressed, will log the user out of the browser interface.

Web Interface Programming

System Settings



- ❶ **User Password** This field allows the user to enter a new password for the user level programming. The password must be entered once in the User Password field and once in the Confirm Password field in order to be changed. The default is 1111.
- ❷ **Technician Password** This field allows the user to enter a new password for the technician level programming. The password must be entered once in the Technician Password field and once in the Confirm Technician Password field in order to be changed. The default Technician password is 6063.
- ❸ **Send RS485 Data Every** These fields allow the user to set how often RS485 will be transmitted from the master clock.
- ❹ **Bias Seconds** This field allows the user to offset how many seconds off, plus or minus, the time will be when receiving an input. This field can range between 0 - 9999 seconds.
- ❺ **GMT Offset** This field sets the positive or negative offset for GMT time. For instance, eastern time zone is a negative five hour offset. See Fig 4.1 for typical offsets.

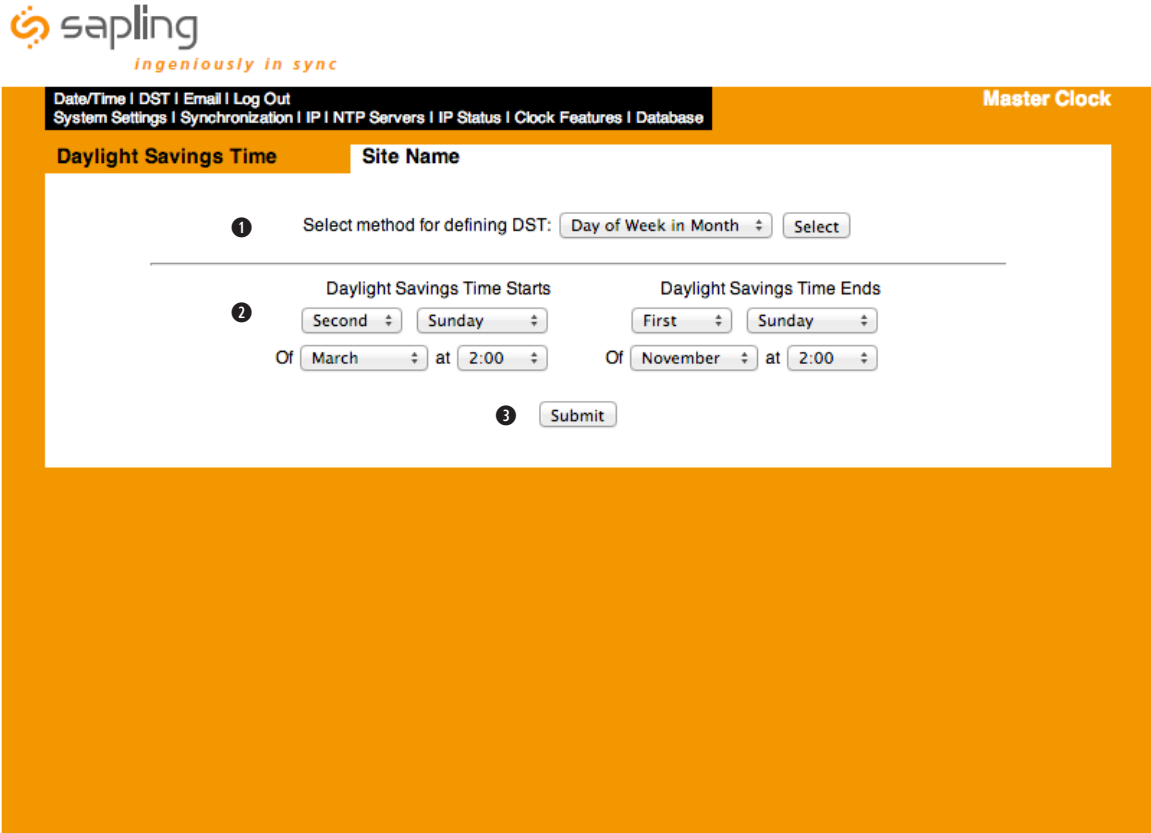
	Time in Greenwich	Local Time	Positive Offset	Negative Offset
Philadelphia (Eastern Standard Time)	12:00 p.m. (Noon)	7:00 a.m.	0	5
Chicago (Central Time)	12:00 p.m. (Noon)	6:00 a.m.	0	6
Denver (Mountain Time)	12:00 p.m. (Noon)	5:00 a.m.	0	7
Los Angeles (Pacific Time)	12:00 p.m. (Noon)	4:00 a.m.	0	8

Fig 4.1

- ❻ **Submit** This button, when pressed, will save any changes made on the page.
- ❼ **Cancel** This button, when pressed, will clear out any fields and not save any data.

Web Interface Programming

DST

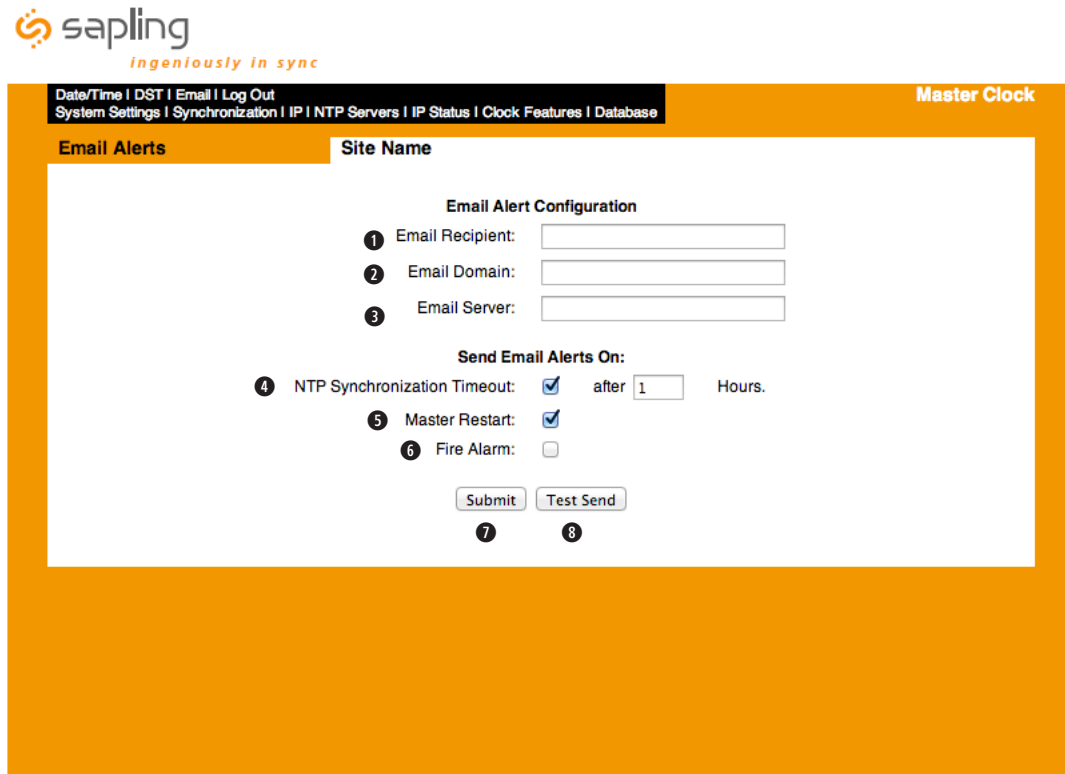


- 1 Daylight Saving Time Selection** This drop down list gives four options for Daylight Saving Time:

 - None - When this option is selected, Daylight Saving Time is not applied at all.
 - By Country - When this option is selected, the Daylight Saving Time can be chosen based on country. i.e. Daylight Saving Time can be selected to follow the DST rules established in the United States
 - Day of Month - When this option is selected, Daylight Saving Time can be chosen based on what date and time it begins and ends. i.e. Daylight Saving Time can begin on March 28 at 2AM and end on November 1st at 2AM.
 - Day of Week in Month - When this option is selected, Daylight Saving Time can be chosen based on what week in what month and what time it begins and ends. i.e. Daylight Saving Time can begin on the second Sunday in March at 2AM and ends on the first Sunday in November at 2AM.
- 2 Configuration Area** This area is where the configuration for Daylight Saving Time takes place. This area changes based on the selections from option 1.
- 3 Submit** This button, when pushed, will save the Daylight Saving Time settings.

Web Interface Programming

Email Alerts



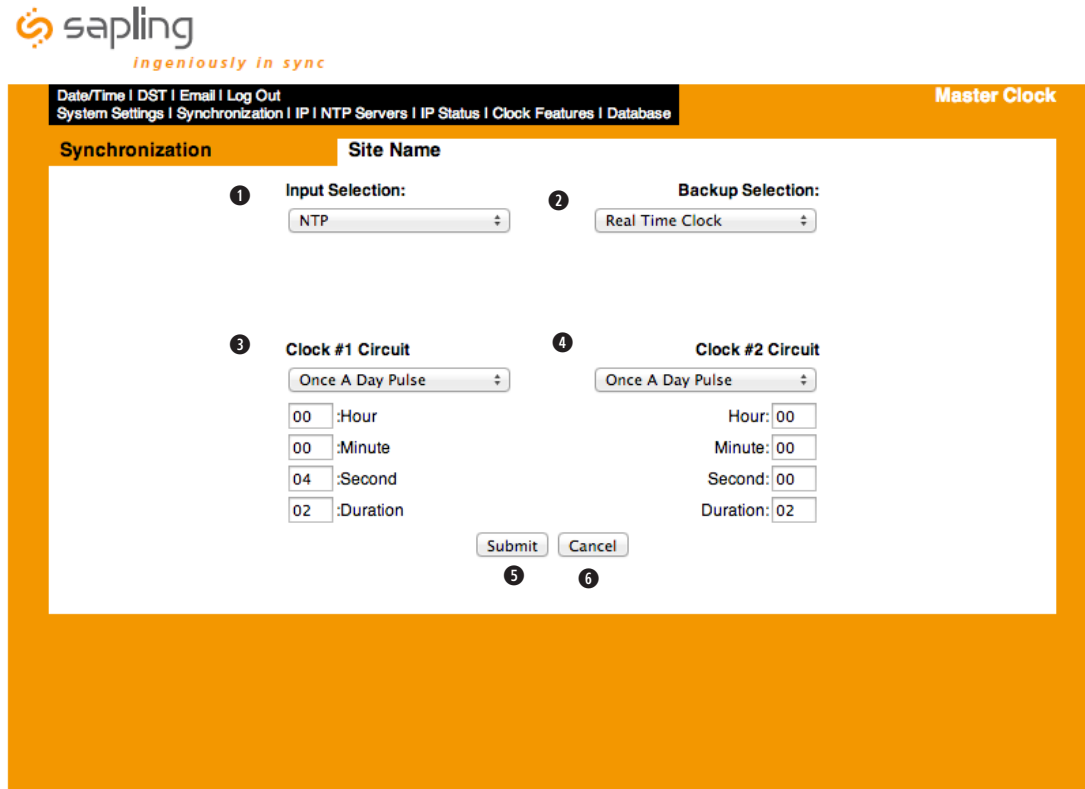
The screenshot shows the 'Email Alerts' configuration page in the Sapling web interface. The page has an orange header with the Sapling logo and navigation links. The main content area is white with an orange border. It contains the following elements:

- Navigation:** Date/Time | DST | Email | Log Out | System Settings | Synchronization | IP | NTP Servers | IP Status | Clock Features | Database
- Page Title:** Master Clock
- Section Header:** Email Alerts
- Form Fields:**
 - 1 Email Recipient: [Text Input]
 - 2 Email Domain: [Text Input]
 - 3 Email Server: [Text Input]
- Send Email Alerts On:**
 - 4 NTP Synchronization Timeout: after [1] Hours.
 - 5 Master Restart:
 - 6 Fire Alarm:
- Buttons:**
 - 7 Submit
 - 8 Test Send

- 1 **Email Recipient** - This field is where the user name of the email recipient will be inserted. Do not enter the domain and suffix. (correct: johnsmith) (incorrect: johnsmith@domain.com)
- 2 **Email Domain** - This field is where the user will enter the domain name of the email server. (i.e. domain.com)
- 3 **Email Server** - This field is where the email server address will be placed. (i.e. server.domain.com)
- 4 **NTP Synchronization Timeout** - When checked, this will send an alert when the clock hasn't received a time synchronization within a predetermined amount of time, which will be selected by the user in the box to the right.
- 5 **Master Restart** - When checked, this will send an alert when the master clock has been restarted (power cycled).
- 6 **Fire Alarm** - When checked, this will send an email when a fire alarm has gone off and alerted the master clock.
- 7 **Submit** - When clicked, this will save all settings created above.
- 8 **Test Send** - When clicked, the user will receive a test email from the master clock.

Web Interface Programming

Synchronization



1 Input Selection This drop-down list allows the user to select which input will control the master clock. The choices are:

- Real Time Clock
- GPS
- NTP
- 59 Minute Sync
- 58 Minute Sync_1
- 58 Minute Sync_2
- 58 Minute Sync_3
- 58 Minute Sync_4
- National Time_Rauland
- Dukane Digital
- Rauland Digital
- Once a Day Pulse
- Wireless Repeater
- RS485

If Once a Day Pulse is selected, then fields for hours, minutes and seconds will appear. Enter the time (in 24 hour mode) that the clock is to go to when a once a day pulse is present. It must be a minimum of a one second pulse.

2 Backup Selection This drop-down list allows the user to select a backup input in case of the loss of the primary input. In order to use the Backup Selection, the following protocols cannot be used as both a primary and secondary input: 59 minute sync, 58 minute 1-4 sync, National Time/Rauland, Dukane Digital, Rauland Digital and once a day Pulse. An example of a configuration would be NTP being the primary input and 58 minute correction being a secondary input. Setting the primary source to 59 minute sync and the secondary source to Dukane digital would be an incorrect configuration.

3 Clock #1 Circuit This drop-down list allows the user to select the sync-wire output for the Clock #1 circuit. The choices are:

- 59 Minute Sync*
- 58 Minute Sync_1*
- 58 Minute Sync_2*
- 58 Minute Sync_3*
- 58 Minute Sync_4*
- National Time_Rauland_1*
- National Time_Rauland_2*
- Once a Day Pulse
- Rauland Digital

4 Clock #2 Circuit This drop-down list allows the user to select the sync-wire output for the Clock #2 circuit. See #3 above for the list of choices.

5 Submit This button, when pressed, will save all of the information to the master clock.

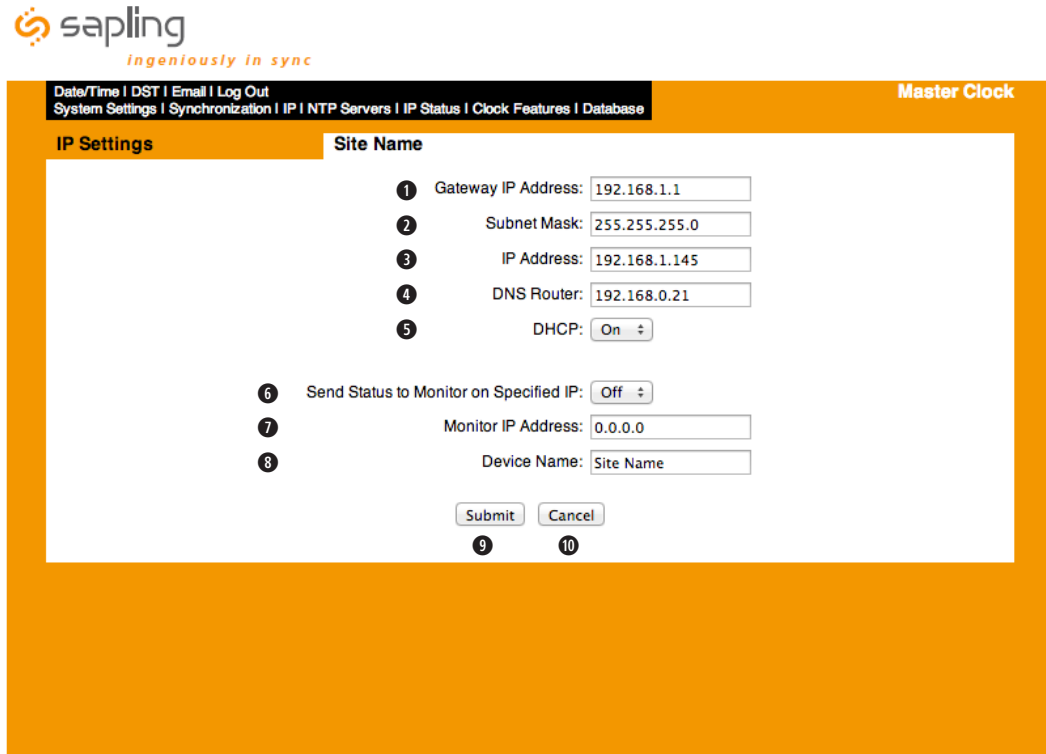
6 Cancel This button, when pressed, will clear out any changes made and will not save any data.

NOTE: GPS is an optional feature and is only valid if the option is purchased.

* See page 24 for protocol definitions

Web Interface Programming

IP Settings



The screenshot shows the 'IP Settings' configuration page in the Sapling web interface. The page is titled 'IP Settings' and 'Site Name'. It contains the following fields and controls:

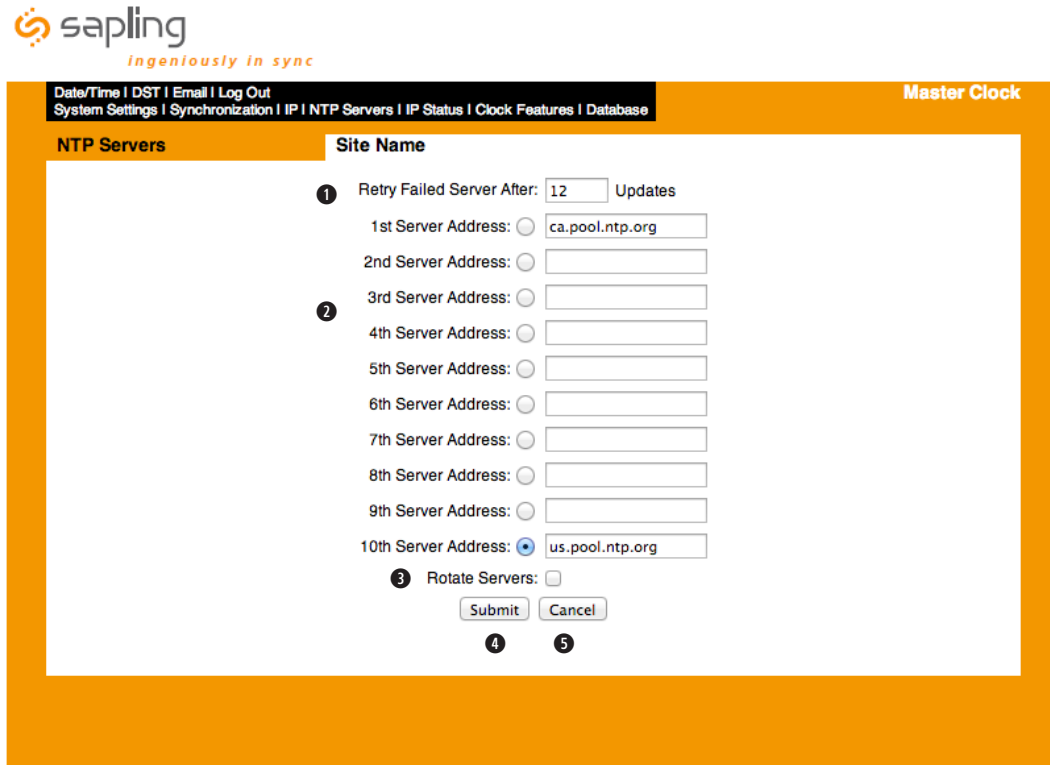
- 1 Gateway IP Address: 192.168.1.1
- 2 Subnet Mask: 255.255.255.0
- 3 IP Address: 192.168.1.145
- 4 DNS Router: 192.168.0.21
- 5 DHCP: On
- 6 Send Status to Monitor on Specified IP: Off
- 7 Monitor IP Address: 0.0.0.0
- 8 Device Name: Site Name
- 9 Submit
- 10 Cancel

- 1 **Gateway IP Address*** This field allows the user to set the Gateway IP address for the master clock.
- 2 **Subnet Mask*** This field allows the user set the Subnet Mask for the master clock.
- 3 **IP Address*** This field allows the user to set the IP address for the device.
- 4 **DNS Router*** This field allows the user to set the DNS Router address. The default address will typically work for most applications, however some modification may be needed for certain networks.
- 5 **DHCP** This drop down list allows the user to turn DHCP on or off. DHCP allows the master clock to look for an IP address on its own if the network has a DHCP server.
- 6 **Send Status to Monitor on Specified IP** This setting allows the clock to send out its data in broadcast mode.
- 7 **Monitor IP Address** - This setting allows for the Monitor IP Address to be set so the monitor program can see the device across a large network.
- 8 **Device Name** This field allows the master clock to be named.
- 9 **Submit** This button, when pressed, will save all of the settings.
- 10 **Cancel** This button, when pressed, will not save any settings.

* These settings are overridden by the gateway if DHCP is turned on.

Web Interface Programming

NTP Servers



- ❶ **Retry Failed-Server After** This field allows the user to specify how many times it will attempt to access the time from a server before it moves on to the next one.
- ❷ **Server Addresses** This field allows the user to specify which NTP servers that the master clock will try to acquire time from. Any server that is highlighted in red is not functioning after several tries.
- ❸ **Rotate Servers** This checkbox, when checked, allows the master clock to rotate through all the server addresses for constant time accuracy on a continual basis. There must be two server addresses for this option to work.
- ❹ **Submit** This button, when pressed, will save all of the information to the master clock.
- ❺ **Cancel** This button, when pressed, will clear out any changes made and will not save any data.

Web Interface Programming

IP Status



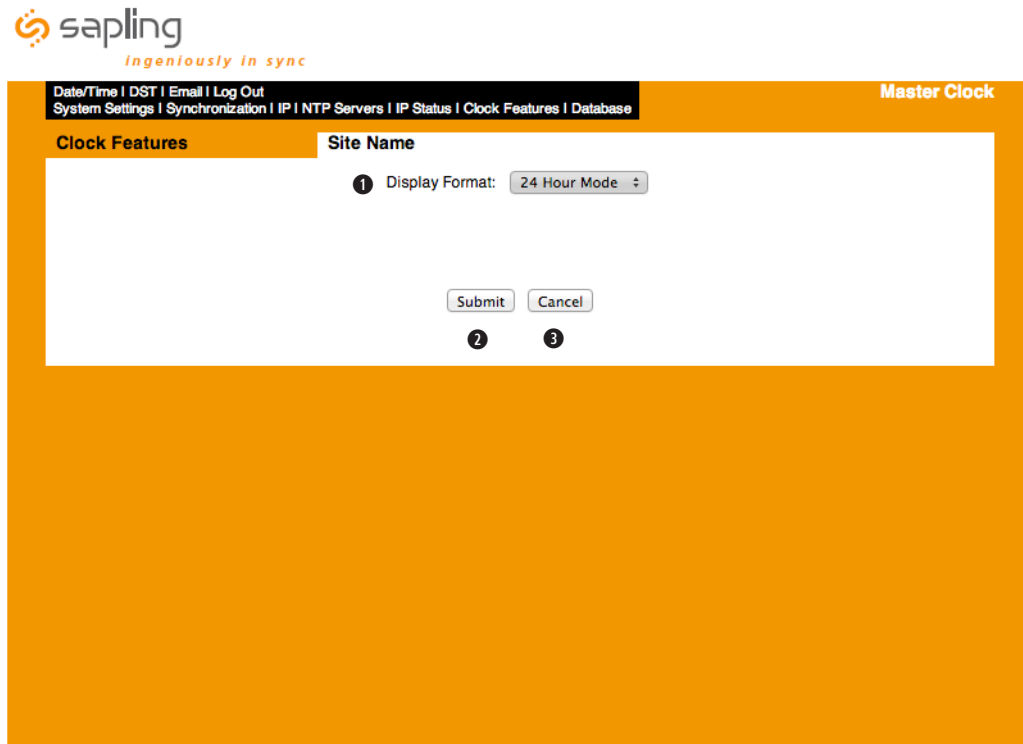
The screenshot shows the Sapling web interface for a Master Clock. At the top, there is a navigation menu with links: Date/Time | DST | Email | Log Out, System Settings | Synchronization | IP | NTP Servers | IP Status | Clock Features | Database. The page title is "IP Status" and "Site Name". The main content area displays the following information:

		Status
1	MAC Address :	00-31-76-80-0F-19
2	IP Address :	192.168.1.145
3	Board Serial Number :	3865
4	Unit Build Date :	Aug 24 2012 09:46:53
5	Code Build Date :	Mar 31 2014 13:49:09
6	SVN Revision :	1982
7	Device Name :	Site Name
8	Paid Provisioned Features :	(Web,0 Zones,GPS,NTP Server,NTP Client,Count Down)

- 1 **MAC Address** This displays the MAC address for the master clock.
- 2 **IP Address** This display the IP address for the master clock.
- 3 **Board Serial Number** The displays the serial number of the board inside master clock.
- 4 **Unit Build Date** This displays the date the unit was built.
- 5 **Code Build Date** This displays the date the software code was built.
- 6 **SVN Revision** This displays the software version number.
- 7 **Device Name** This displays the device name for the master clock.
- 8 **Paid Provisioned Features** This displays the additional features of the master clock.

Web Interface Programming

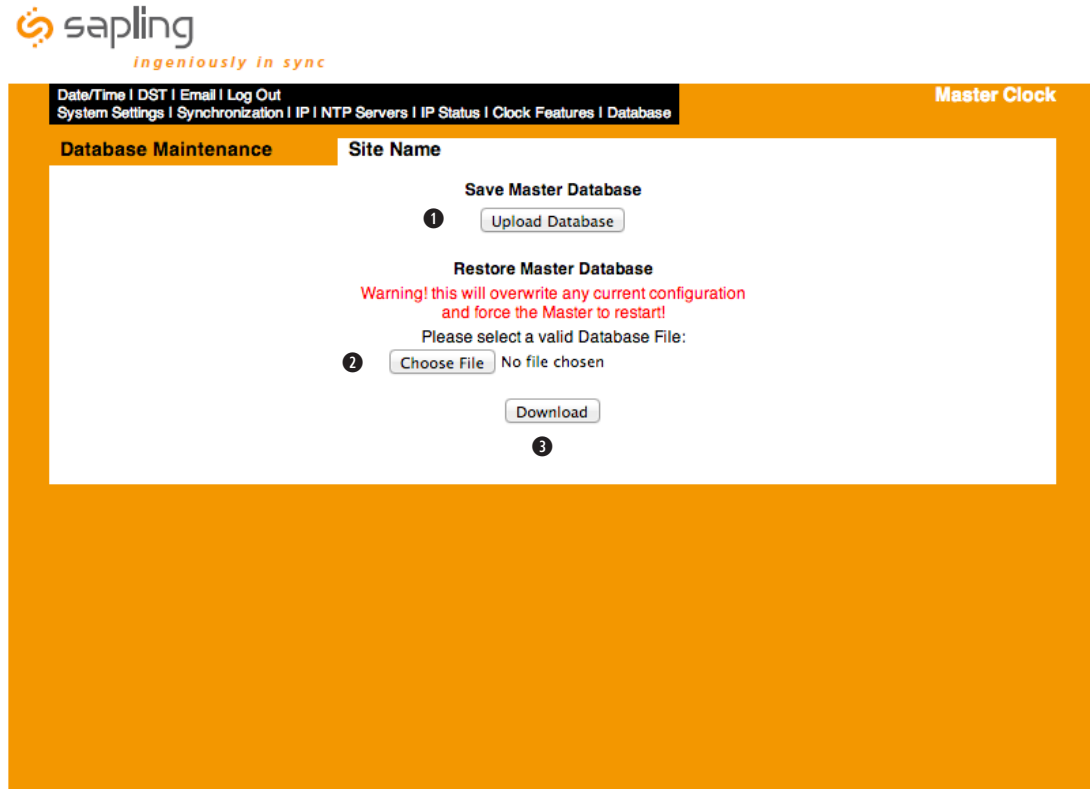
Clock Features



- 1 Display Format** This drop-down list allows the user to select whether they want 12 hour or 24 hour mode to be displayed on the LCD and LED.
- 2 Submit** This button, when pressed, will save all of the information to the master clock.
- 3 Cancel** This button, when pressed, will clear out any changes made and will not save any data.

Web Interface Programming

Database Maintenance



- ❶ **Upload Database** This button, when pressed, will upload the configuration of the master clock, and place it in a file for backup purposes.
- ❷ **Choose File** This button, when pressed, will allow the user to browse for the saved .db file that contains the saved events and schedules.
- ❸ **Download** This button, when pressed, will download the selected file and reset the master clock with those events and schedules already configured.

Support

Frequently Asked Questions

Does this master clock replace all of the existing master clocks made by Sapling?

The SMA Series will act as a direct replacement for the GPS, STR and SSM series master clocks. The SMA can have all the same functionalities of the aforementioned series depending on which options are ordered.

Can I use any (S)NTP server for downloading the time?

Yes, any site that sends out the (S)NTP protocol may be used as an input to the master clock.

What browsers are compatible with the SMA master clock browser?

The SMA browser is compatible with Microsoft Internet Explorer, Mozilla Firefox, Safari, Opera and Chrome.

Can I connect to the web browser through a cross-over cable?

Yes, the SMA can be accessed through a cross-over cable or via a LAN connection.

What are the length options I have with the GPS cable?

When a master clock with the GPS Receiver is selected, it comes with a 75 foot (22.8 meters) GPS Antenna Cable as standard. If needed, the following GPS cable is available at an additional cost:

- 150 foot (45.7 meters) Special GPS Cable - Part Number: E-ANT-CBL150F-1
- 300 foot (91.4 meters) Special GPS Cable - Part Number: E-ANT-CBL300F-1

Is there a Converter option like there was in the SSM and the GPS?

No, the Converter Box should be purchased separately from the unit when using a two wire digital communication system. The part number for the Converter Box is SCB-000-000-1 (110V) and SCB-000-000-2 (230V).

What inputs can the SMA accept?

The SMA can accept an input from a SNTP server, 59 minute correction, four different versions of the 58 minute correction, National Time/Rauland, Dukane digital, Rauland digital, Sapling Wireless Repeater, Once a Day pulse, GPS and Sapling's RS485 protocol.

Support

Troubleshooting

The master clock will not power up. What do I do?

Make sure the power cord is securely connected to the power outlet and to the back of the SMA master clock. Upon being connected to power, the master clock should boot up instantly. There is not an on/off switch.

What do I do if I cannot connect to the browser?

Verify that the IP address your attempting to access is correct. If the IP address is correct, verify that there aren't any provisions in the firewall preventing you from accessing it. If all else fails, try connecting via a cross-over cable.

What do I do if the GPS isn't receiving a signal?

Check the antenna to make sure it is in an unobstructed area that is in complete view of the sky. Also, check to make sure the connections on each end of the cable are securely tightened. Lastly, verify that there are no kinks or breaks in the supplied GPS cable.

My sync-wire system doesn't seem to be getting the correct time. What should I do?

The clock 1 and clock 2 outputs control the sync-wire systems. Verify that the correct system is set for the designated clock circuit. Protocol details are listed on page 24.

Why didn't my SMA change for Daylight Saving Time?

A few things could cause the SMA not to change for Daylight Saving Time. The first item to check is the date to verify if it's correct. If the date is not correct, the clock will not change. If the date is correct, verify that the clock is set for the correct version of Daylight Saving Time. See page 30 for more information.

Compliances



FCC Statement: Information to the user (for U.S. only)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

IC Statement (for Canada only)

This Class B digital apparatus complies with Canadian ICES-003.

CET appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

CE Declaration of Conformity

We, The Sapling Company certify and declare under our sole responsibility that the SMA 2000 conforms with the essential requirements of the EMC Directive 2004/108/EC and LVD 2006/95/EC, based on the following standards applied:

EN 55022: 2006
EN 61000-3-2: 2006
EN 61000-3-3: 1995 /A1: 2001 /A2:2005
EN 55024 : 1998 /A1:2001, A2:2003
EN 60950-1:2006 - Safety Part 1