sapling

Installation Manual V4.9

NTP 7000 Series Master Clock

Current as of May 2018

NTP 7000 Master Clock

Table of Contents

□ Mandatory for ALL systems (including GPS)

■ Mandatory only in systems that use GPS time

Important Safety Instructions

VERY IMPORTANT:

KNOW YOUR COMMUNICATION PROTOCOL

This master clock is designed to support multiple communication protocols. To run any clock system properly, the master clock requires the correct wiring format. It is very important that you only follow the wiring instructions appropriate to your system's communication protocol. For example, you should not try to set up an RS485 system by following instructions for a Sync-Wire system. Failure to use the correct wiring and protocols for your system may damage the hardware.

⚠ DANGER

⚡ SHOCK HAZARD
- Keep the electricity to this device turned OFF until the clock installation is complete.
- Do not expose the clock movement to water, or install the clock in a location where it may be exposed to water.

NOTICE
- Do not install the clock outdoors. Damage to the clock if placed outdoors voids the warranty.
- Do not hang objects from the clock or clock mounting parts. The clocks are not designed to support the weight of other objects.
- The clock face and housing may be cleaned with a damp cloth or disinfectant. Test other cleaning products on a small part of the clock housing before attempting to use on the rest of the clock. Avoid bleach and chemicals known to dissolve plastics.

⚠ WARNING

🔥 FIRE HAZARD
- Always follow your national and regional electrical codes or ordinances.
- The AC power circuit for the clock must be attached to a circuit breaker that can be reset by the user.

⚠ PHYSICAL INJURY HAZARD
- If you are standing on an object while installing your clock, make sure that the object can support your weight, and will not sway or move as you stand on it.
- Take precautions to avoid injury by potential safety hazards near the point of installation including (but not limited to) heavy machinery, sharp objects, hot surfaces, or exposed cables carrying an electric current.
- Follow all mounting instructions exactly as stated in this manual. Failure to do so may result in the device falling off the point of installation.
- Packaging materials and mounting items include plastic bags and small pieces, which pose a suffocation hazard to young children.
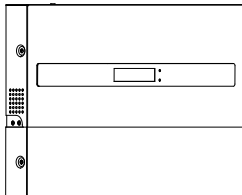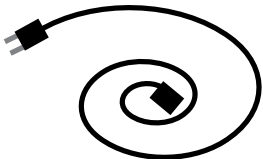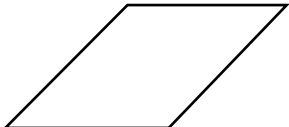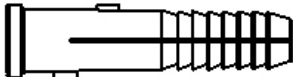
System Preparations

Identify an appropriate location to install the master clock.

The location should be accessible to the installer, and should be easily able to access its time base. This means that:

1) This master clock can receive NTP time from any NTP server over a Local Area Network (LAN) as a standard feature. If NTP is being used as the master clock time source, then the master clock must be installed in a place that allows it to connect to a network router/switch with CAT5 or CAT6 network cables.

2) The master clock may receive GPS time if it was ordered with an optional GPS receiver module. In this case the master clock will include a built in GPS receiver module, a GPS cable, and a GPS dome antenna. The GPS antenna must be installed on the facility's roof. The master clock should be installed so that the GPS cable can reach between master clock and the GPS antenna.

3) If the application requires this master clock to receive time data from a third-party master clock, then this master clock should be installed close enough to the third-party clock that the user can run data wires between both clocks. Research your communication protocol and provide an appropriate wire gauge and length to connect both master clocks.

Installing a Master Clock - Wall Mount

Included in Package

Description	Quantity	Picture
Master Clock	1	
Power Cable (E-PWR-CBL-KIT-1)	1	
Paper Mounting Template (M-23-MTEMP-1)	1	

Included in Mounting Kit (M-SURF-MNT-KIT1)

Description	Quantity	Picture
#10-1.5 Sheet Metal Screw	4	
#10 Wall Anchors	4	

Please Note: A user will also have to provide a Phillips-head screwdriver, a ruler, a level, and a drill capable of creating #10 sized holes into the wall.

Installing a Master Clock - Wall Mount

1) Use a ruler, a level, and the provided template to mark four points on the wall.

16 and 3/8in (41.6cm)

6 and 7/8in (17.5cm)
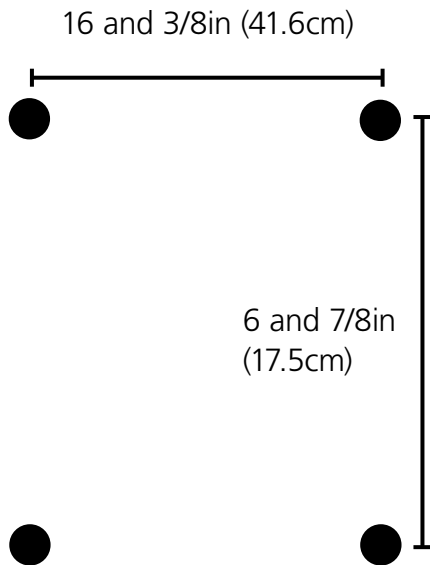
2) Use a drill to drill holes into the wall at the marked locations.
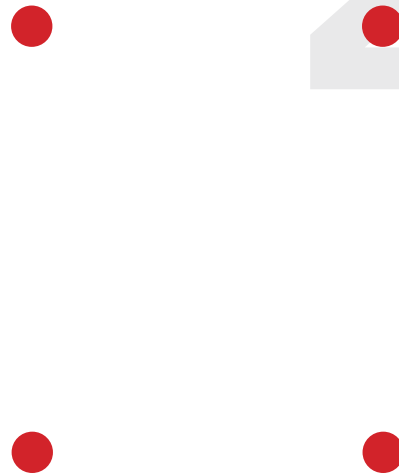
3) Insert the wall anchors into the holes.
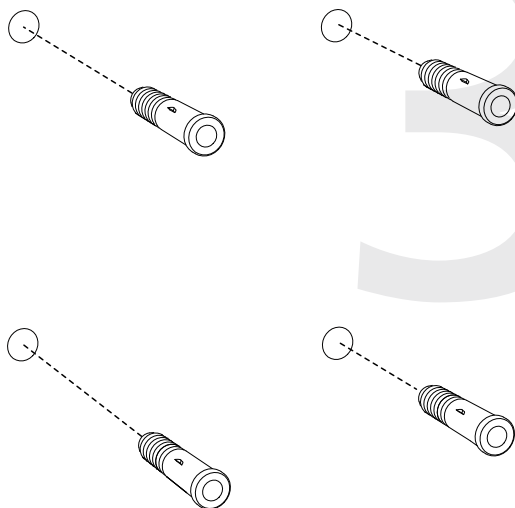
4) Insert the sheet metal screws into the top two wall anchors.
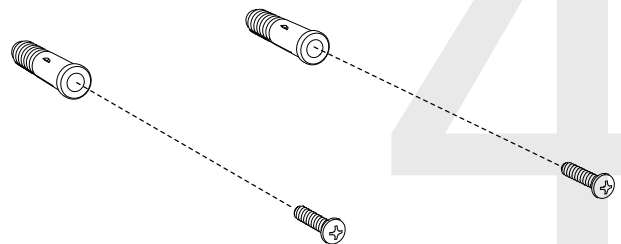
Installing a Master Clock - Wall Mount

5) Unscrew the bottom panel from the clock.
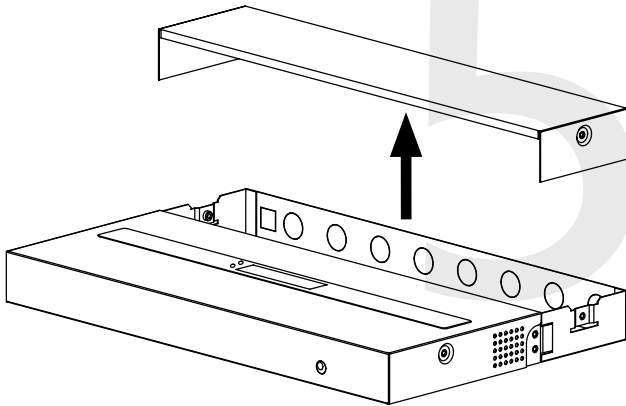
6) Remove the metal punch-outs so that cables can be installed. Thread the cables through the punch-out holes.
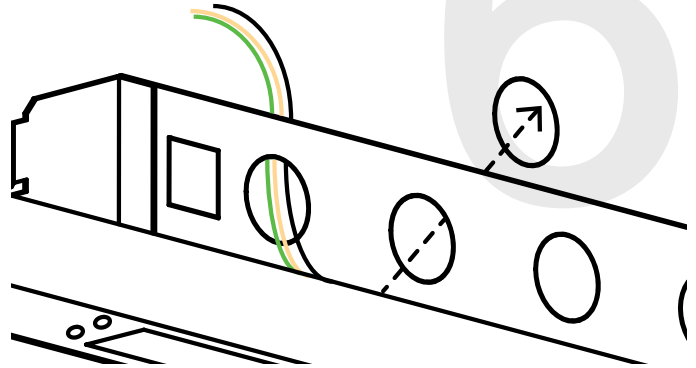
7) Connect the input/output cables to their corresponding sockets. Refer to the sections in this manual labeled "Inputs" and "Outputs" for details on each input and output method.
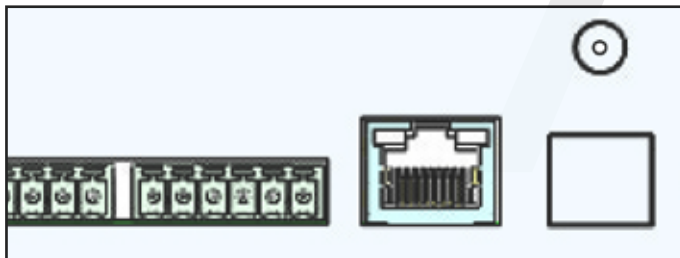
8) Attach the power cables to the appropriate port on the clock.
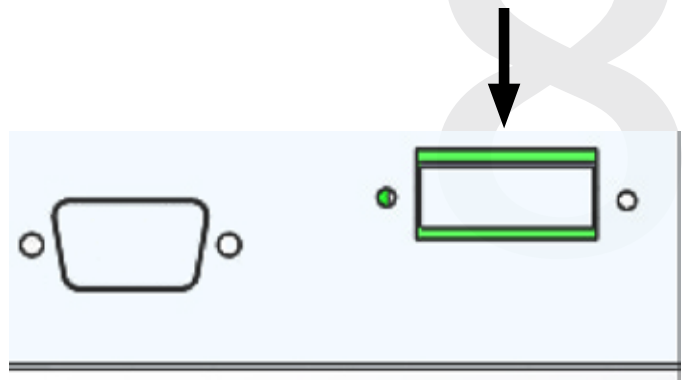
Installing a Master Clock - Wall Mount

9) Hang the master clock on the wall screws. Do this by lining the screws up with the keyhole slots on the bottom of the box, and slipping the slots on top of the screws.
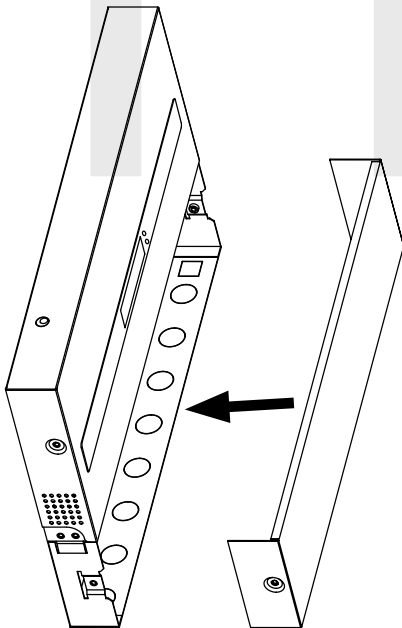
10) Pass the remaining two screws through the holes in the bottom compartment and into the wall anchors.

11) Use a screwdriver to reattach the master clock bottom panel.

12) Power the master clock. If the master clock has been powered, the 7-segment LED screen on the face of the master clock should illuminate.

*REFER TO THE SECTION "BASIC CONFIGURATION - DHCP AND STATIC IP" FOR FURTHER INSTRUCTIONS

The Sapling Company, Inc.
1633 Republic Road
Huntingdon Valley, PA 19006
USA

P. (+1) 215.322.6063
F. (+1) 215.322.8498
www.sapling-inc.com

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Installing a Master Clock - Rack Mount

Included in Package

Description	Quantity	Picture
Master Clock	1	
Power Cable (E-PWR-CBL-KIT-1)	1	

Please Note: A user will also have to provide a Phillips-head screwdriver, a server/network cabinet, and the screws and bolts needed to attach the master clock to the rack.

Installing a Master Clock - Rack Mount

1) Thread any necessary cables through the back of the network cabinet, including the cables for power, inputs, and outputs.
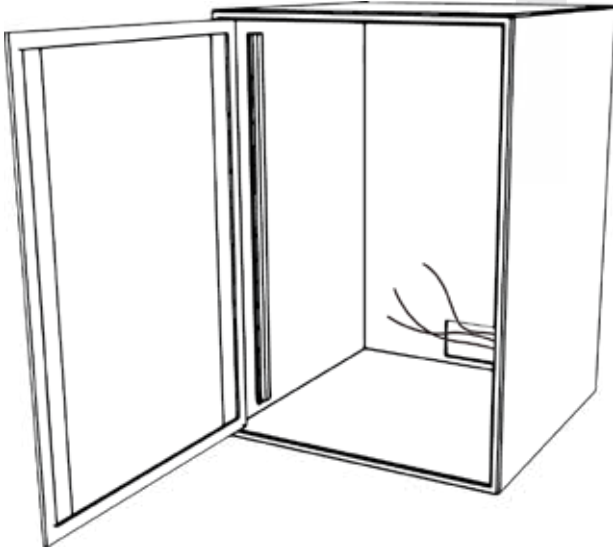
2) Unscrew the back panel from the master clock.
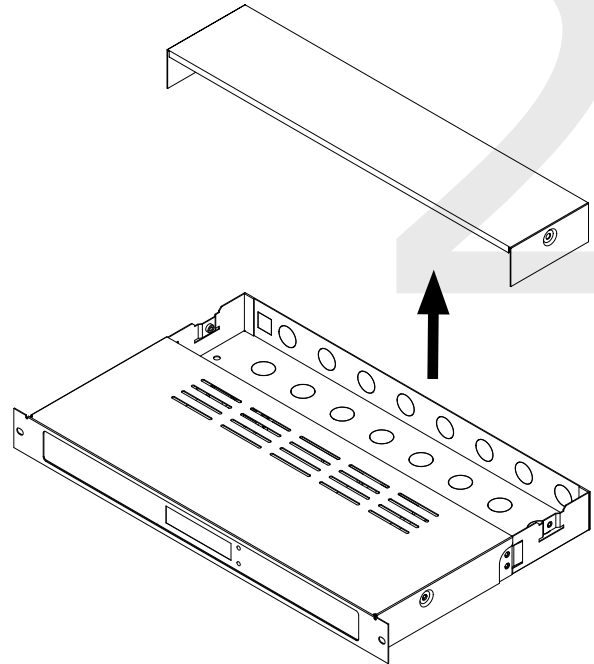
3) Remove the metal punch-outs so that cables can be installed. Thread the cables through the punch-out holes.
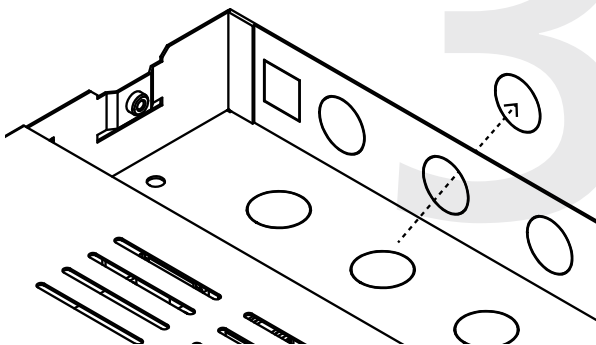
4) Connect the input/output cables to their corresponding sockets. Refer to the sections in this manual labeled "Inputs" and "Outputs" for details on each input and output method.
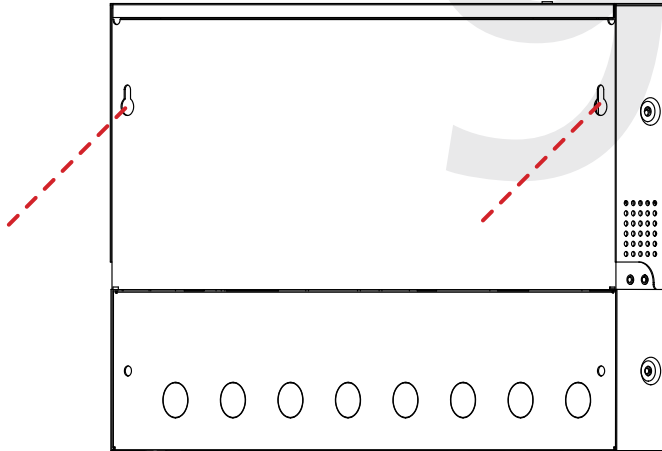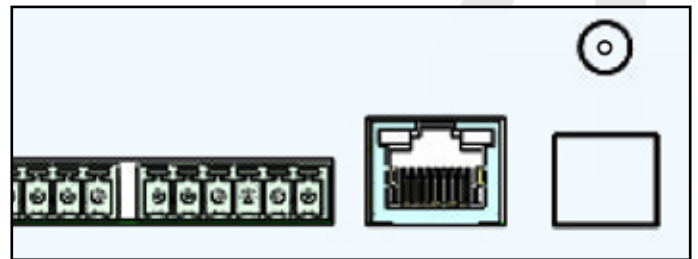
Installing a Master Clock - Rack Mount

5) Attach the power cables to the appropriate port on the master clock.
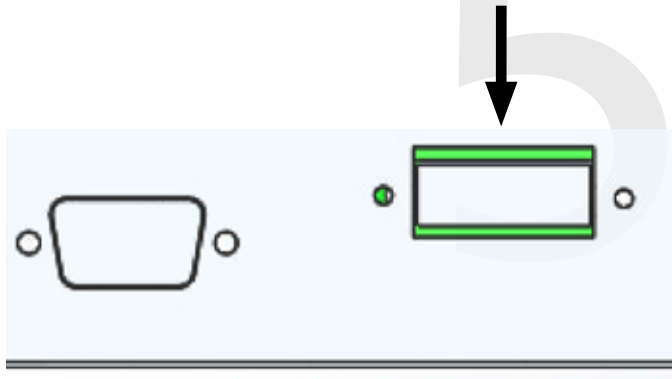
6) Use a screwdriver to reattach the master clock bottom panel.
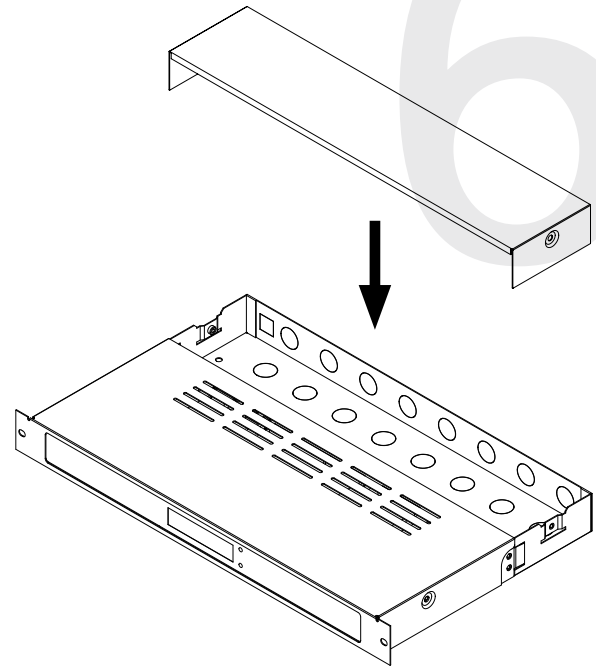
7) Install the master clock in the network rack by inserting screws through the two holes positioned on either side of the master clock.
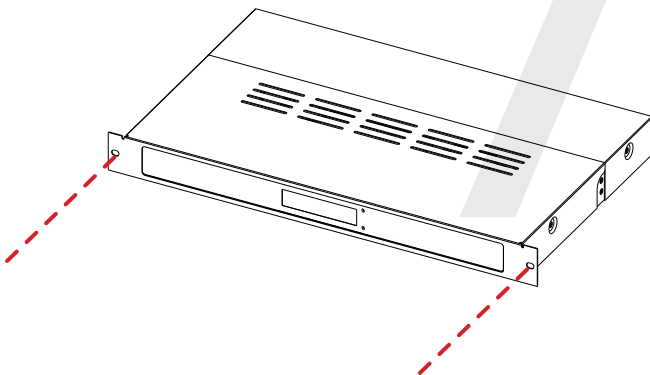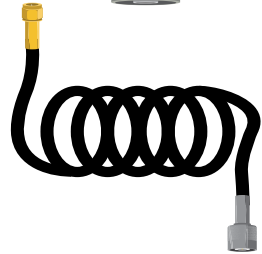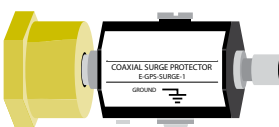
8) Power the master clock. If the master clock has been powered, the 7-segment LED screen on the face of the master clock should illuminate.

*REFER TO THE SECTION "BASIC CONFIGURATION - DHCP AND STATIC IP" FOR FURTHER INSTRUCTIONS

Installing a Master Clock - GPS Antenna (Optional)

Included in Package
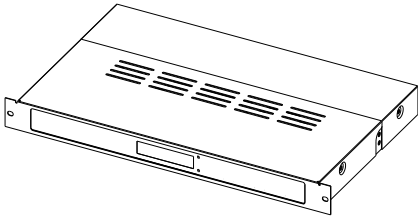
Description	Quantity	Picture
GPS Dome Antenna	1	
GPS Cable	1	
GPS Surge Protector (E-GPS-SURGE-1) Optional accessory	1	

A mounting base and pole must be purchased in order to attach the antenna to a roof. A dedicated base and pole may be ordered from the master clock supplier by requesting part number **M-GPS-MTG-KIT-1.** If the installer wishes to purchase their own parts, the pole should be capable of attaching securely to the base and the antenna, which requires either a 1"-14" thread or a 3/4" pipe thread. The pole and base must also each have a hollow space large enough to allow the GPS cable to pass through both and attach to the antenna.

M-GPS-MTG-KIT-1
(Optional Accessory)
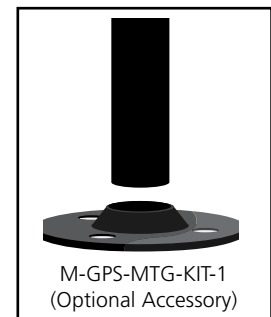
If the mounting base and pole are made of metal, then the user must also provide a grounding cable for the pole. The grounding cable should be 8AWG (8.4mm²) or thicker.

If an optional surge protector is included with the master clock, then the user must provide a second grounding cable. This cable must also be 8AWG or thicker. Failure to install this grounding cable will prevent the surge protector from functioning correctly.

Master clocks with the optional GPS Receiver module installed will include a GPS antenna and GPS cable. The standard cable provided is 75ft (22.9m). A dedicated, longer cable can be ordered through the master clock supplier by requesting the following part numbers:

E-ANT-CBL-150F-1   150ft (45.7m)
E-ANT-CBL-300F-1   300ft (91.4m)

Please note that Sapling can also provide solutions for projects where a GPS cable longer than 300 feet (91.4 meters) is required. For more information, please contact your dealer.Using a GPS cable other than the one provided by your dealer might result in an unreliable time signal. For this reason, *using a different GPS cable than the one provided is strongly discouraged and will void the master clock warranty and support.*

Installing a Master Clock - GPS Antenna (Optional)

Connecting the GPS cable to the master clock is easy: screw that end of the cable into the dedicated port on your master clock.

GPS Cable Connector
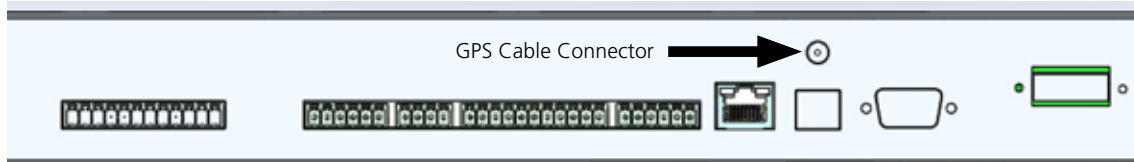
Continue by connecting the GPS Antenna to a roof. When installing the GPS antenna, pick a location where the antenna has a clear line-of-sight to as much of the sky as possible, such as on top of the roof. Avoid locations that are blocked by trees, tall buildings, metal exhaust vents, large rock formations, and canyon walls. Do not mount the device inside, on, or immediately outside of a window, as these locations do not promote reliable signal acquisition.

1) Thread the GPS cable through the mounting bracket and pole.

2) Screw the end of the GPS cable to the connector on the GPS antenna. The assembly should now look like the picture on the right.

3) Insert one end of the pole into the mounting bracket. While holding the base stationary, twist the pole counter clockwise until it is firmly screwed into the base.

4) Insert the other end of the pole into the bottom of the antenna. While holding the pole stationary, twist the antenna counter clockwise until it is firmly screwed onto the pole.

5) If you are using a metal pole, attach a grounding wire to the pole.

6) Attach the completed assembly to the roof.

7) Within 30 minutes, the antenna should acquire a GPS signal.

GPS Antenna

GPS Cable leading to Sapling Master Clock

GPS Mounting Pole
M-GPS-MTG-KIT-1
(Optional Accessory)

GPS Mounting Bracket
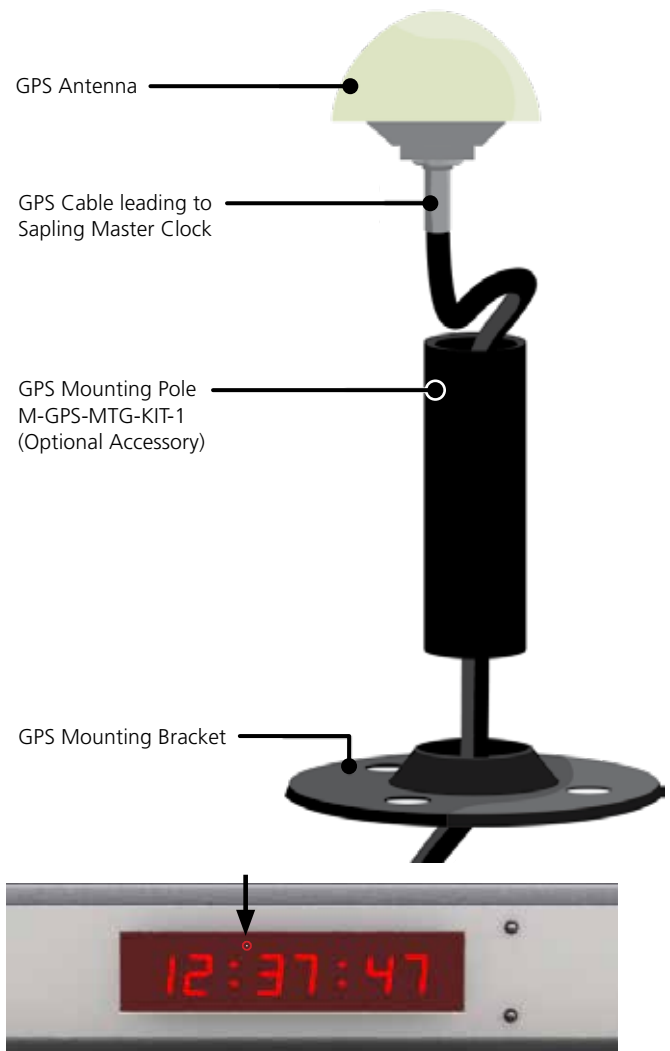
If your master clock is set to receive GPS time data as its primary time input, a loss of GPS time data will cause a red blinking circle to appear above and to the left of the third digit on the LED time display. The circle will blink on and off until the signal is regained, or until a different primary input is set (such as an NTP server). After completing the installation, **make sure that this LED is not blinking.**

Installing a Master Clock - GPS Antenna with Surge Protector (Optional)

Customers are offered the opportunity to purchase a surge protector, which is designed to defend the master clock from a lightening strike to the GPS antenna. The means of connecting the cable to the master clock is identical to a normal installation, but the procedure for connecting the antenna to the cable and mount changes:

1) Notice that the surge protector has a tag which reads COAXIAL SURGE PROTECTOR in the middle, and GROUND at the bottom.

2) Attach the antenna connector to the PROTECTOR side of the surge protector.

3) Thread the GPS cable through the mounting bracket and pole.

4) Screw the end of the GPS cable onto the connector on the COAXIAL side of the surge protector. The assembly should now look like the picture on the right.

5) Use a screwdriver to loosen the GROUND screw. Wrap the exposed end of an 8AWG grounding cable around the shaft of the screw, then tighten the screw again. Make sure that the grounding wire runs from the Surge Protector to the building's grounding system.

6) Attach the pole to the mounting base. Refer to step 3 on the previous page.

7) Insert the pole into the brass cap on the COAXIAL side of the surge protector. While holding the cap stationary, twist the pole clockwise until it is firmly screwed into the cap.

8) If you are using a metal pole, attach a grounding wire to the pole. The grounding wire should be 12AWG or thicker.

9) Attach the completed assembly to the roof. Use a method that will allow the pole to remain upright during severe weather conditions.

10) Attach the other end of the GPS cable to the connector on the master clock if you have not done so already. Refer to the previous page for a diagram.

11) Within 30 minutes, the antenna should acquire a GPS signal.
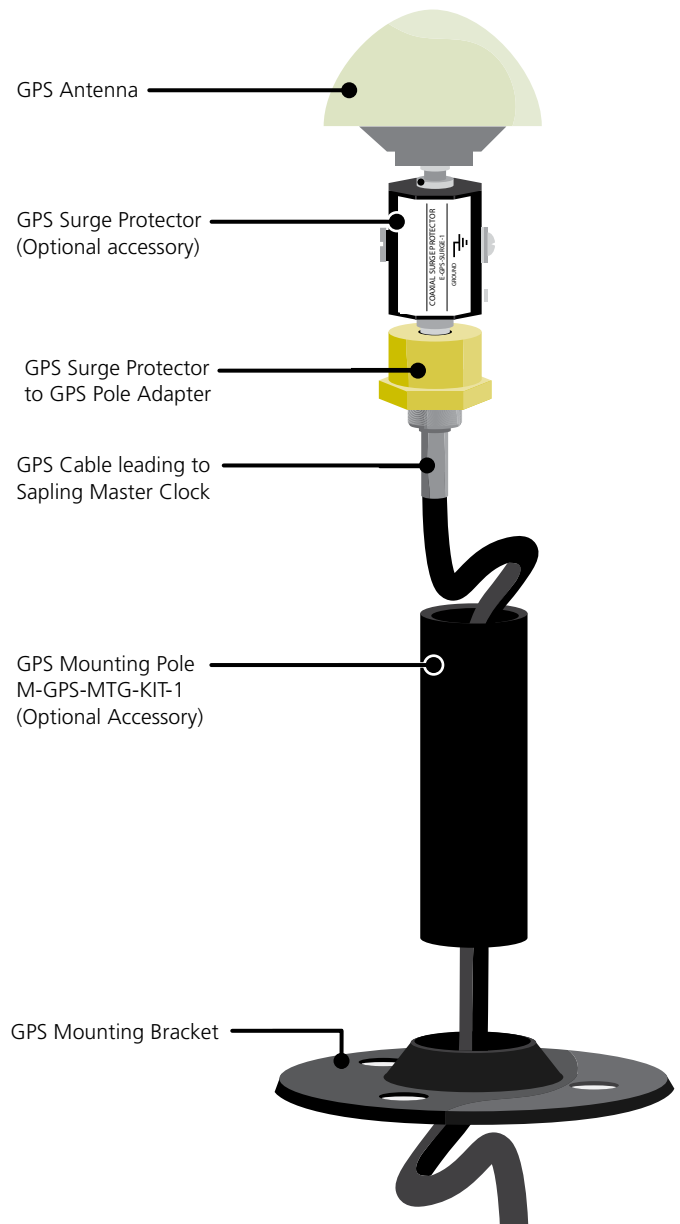
If you wish to purchase a surge protector at a later time, call your regional salesperson and ask for the following part number: **E-GPS-SURGE-1**

GPS Antenna

GPS Surge Protector
(Optional accessory)

GPS Surge Protector
to GPS Pole Adapter

GPS Cable leading to
Sapling Master Clock

GPS Mounting Pole
M-GPS-MTG-KIT-1
(Optional Accessory)

GPS Mounting Bracket

Inputs - NTP Server

The master clock can receive NTP time over a Local Area Network connected to the Internet. To accomplish this, the master clock must be connected to the router by a CAT5 or CAT6 Patch Cable with an RJ45 connector. The Ethernet port on the master clock can be identified using the diagram below.

Firewall Ports 80 and 123 must be open to use the master clock on a network.

The connection between the master clock and the router must be a wired connection. NTP Master Clocks do not include a wireless network card for WiFi routers.

MASTER CLOCK

CAT5/CAT6 CABLE

NETWORK ROUTER / SWITCH

IN-HOUSE NTP SERVER   OR   MODEM

ONLINE THIRD PARTY NTP SERVER   THE INTERNET
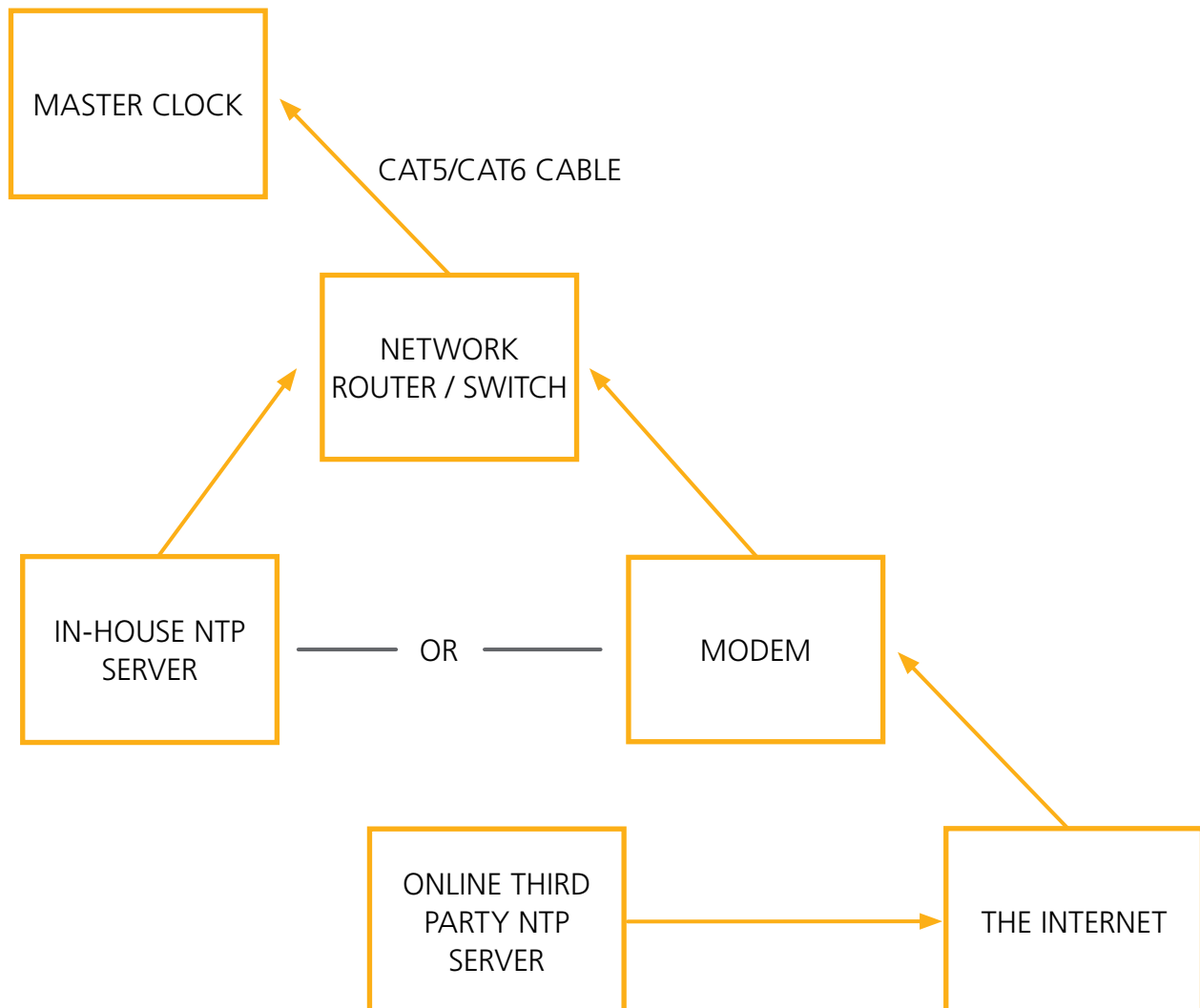
Inputs and Outputs - Sync-Wire

If your master clock is set to receive data through wires from another device as its primary time input, the wires must be attached to the proper ports on the master clock. The diagram below shows the locations and the functions of each port.

27	26	25	24	23	22		17	16	15	14	13	12	11	10	9	8	7
Normally Open	Relay Common	Normally Closed	Normally Open	Normally Common	Normally Closed		AC/DC Common	120VAC Sync	24VAC Sync	Ducane Reset	Dukane Min. Pulse	5VDC Dry Contact	1Rauland Digital	Alarm 12VDC/24VAC	Alarm Common	Commom	+5VDC
Clock 1 Sync Relay			Clock 2 Sync Relay				Sync Inputs									V Out 40ma	

Outputs
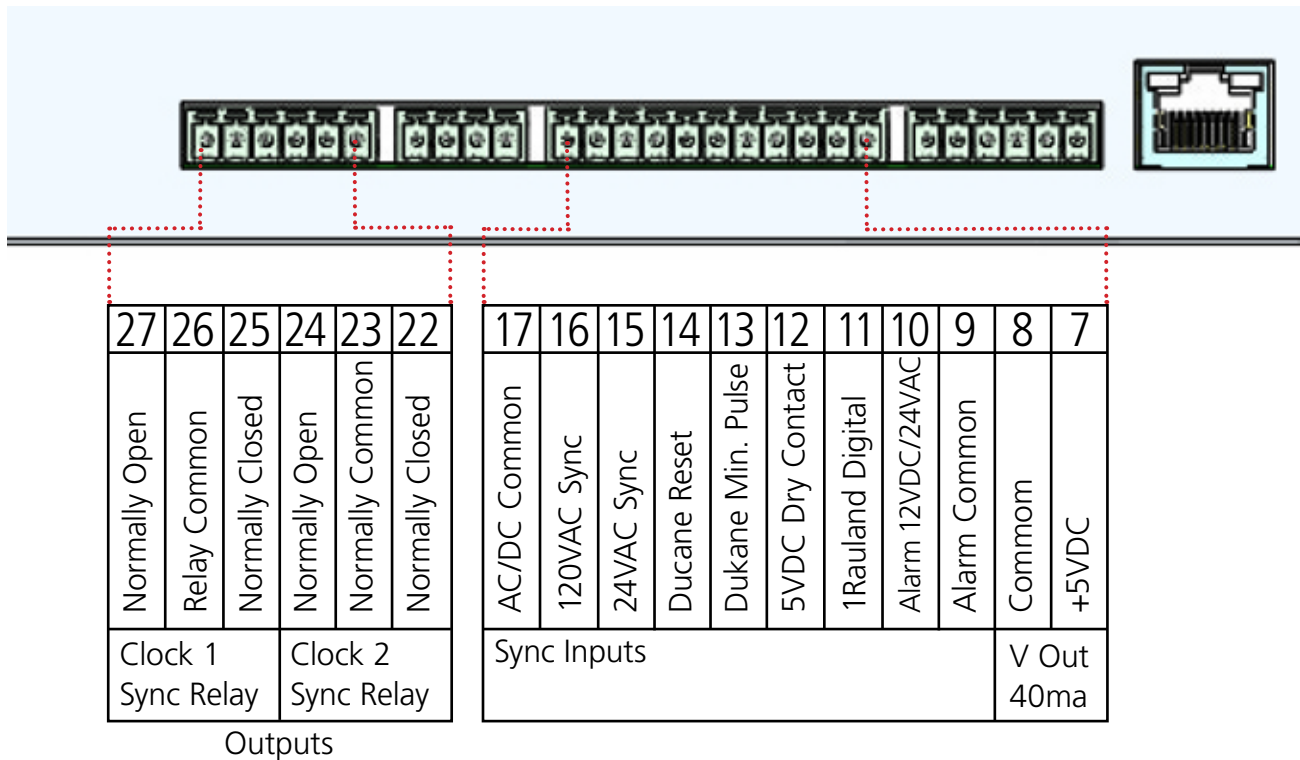
Consult the wiring diagrams on the following pages for information on how to install wiring specific to your synchronization method. Relevant port numbers will be listed with each diagram.

IMPORTANT: Your master clock will only accept input from another device if you command it to do so through the web interface or front panel pushbuttons. For information on how to do this, please see the section labeled **Web Interface - Synchronization**

Inputs - Sync-Wire

59 Minute Correction
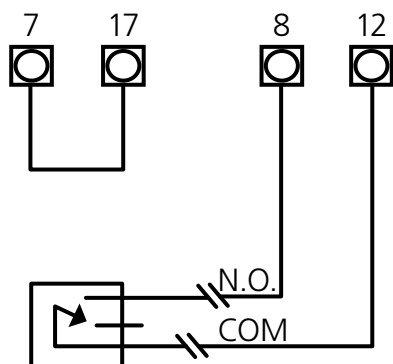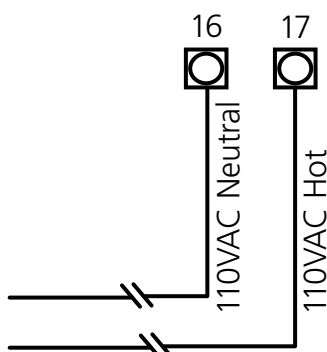
| Dry Contact Closure | 110VAC Interface or 240VAC Interface | 24VAC Interface |
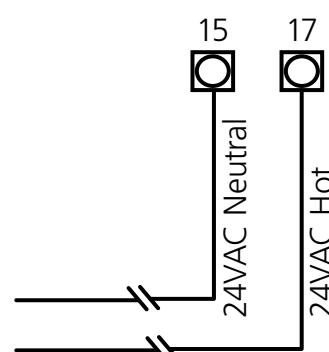
58 Minute Corrections 1–4
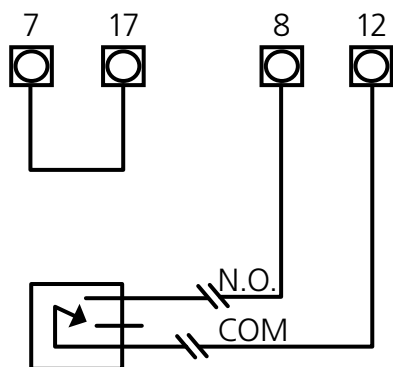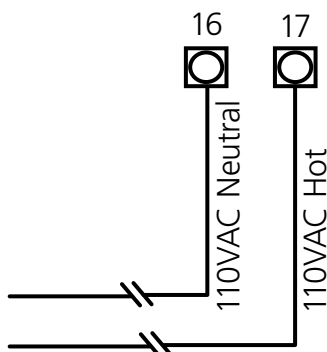
| Dry Contact Closure | 110VAC Interface or 240VAC Interface | 24VAC Interface |
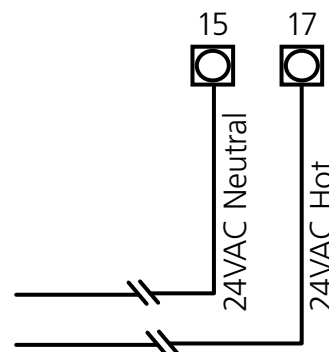
Inputs - Sync-Wire

National Time/Rauland

Dry Contact Closure   110VAC Interface or   24VAC Interface
                             240VAC Interface

| 7 | 17 | 8 | 12 | | 16 | 17 | | 15 | 17 |

N.O.
COM

110VAC Neutral
110VAC Hot

24VAC Neutral
24VAC Hot
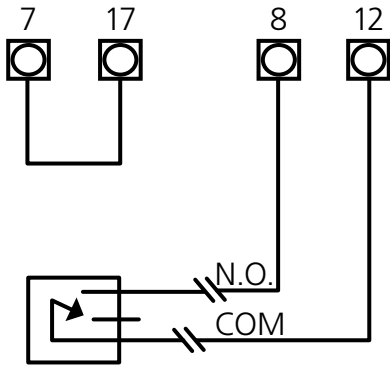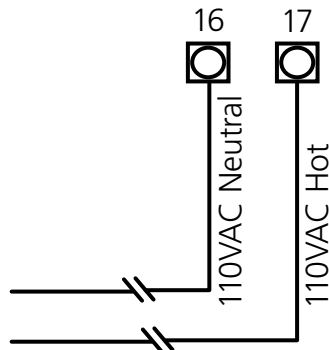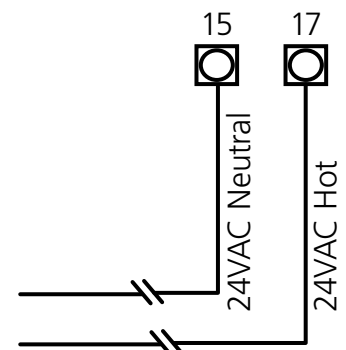
Rauland Digital

Input   Input

| 11 | 17 | | 8 | 24 | 7 | 23 | 22 |

Dig Line
+5V

+5V Out
Dig Out

18
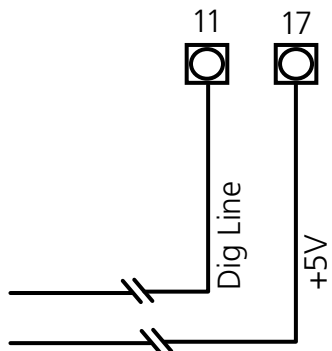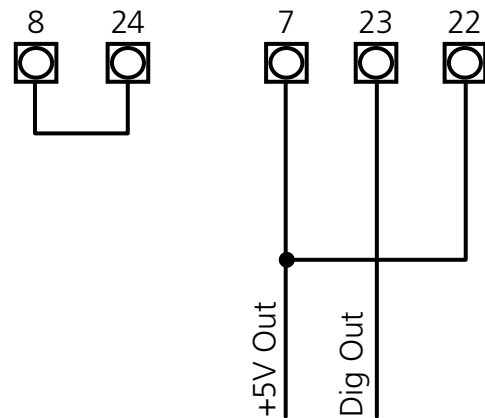
Inputs - Sync-Wire

Dukane Digital

| 7 | 17 | | 14 | 13 | 8 |

Reset

Minute Pulse

Ground
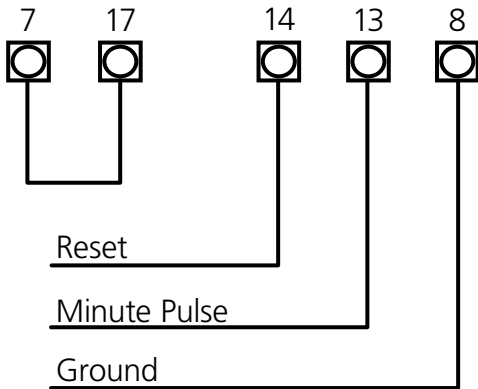
Once a Day Pulse

Dry Contact Closure

| 7 | 17 | | 8 | 12 |

N.O.

COM
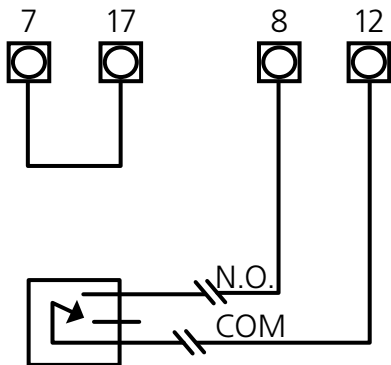
Fire Alarm Interface Installation

The Fire Alarm Interface allows the user to accept a signal from an existing fire alarm. When the relay is activated, the master clock will command all of the compatible secondary digital clocks to display "FirE".

| 7 | 10 | | 8 | 9 |

N.O.

COM
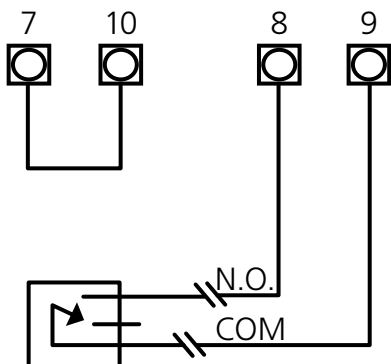
The fire command is distributed to secondary clocks using the 2-wire or RS485 communication protocols.

Outputs - NTP Server

This Master Clock is an NTP server. This means that it can generate NTP or SNTP time data. This time data can then be sent over a wired computer network to any other networked machine that accepts NTP/SNTP time data. Some examples of devices that can accept NTP data from this master clock are DVRs, Voice-over-IP telephones, IP-operated cameras, and desktop computers.

When using this master clock as an NTP server, the Master Clock **MUST BE SET TO A STATIC IP ADDRESS**. A master clock that has been set to DCHP will occasionally refresh its IP address, making it impossible for other devices to consistently receive NTP time data. Refer to the sections of this manual labeled "Basing Configuration - DHCP and Static IP" and "Web Interface - IP Settings" for more information.

IP devices may receive NTP/SNTP time from this master clock through the following procedure:

1) Locate the master clock IP address. There are three methods for doing this:

   a) On the Web Interface, look under the IP Status tab for the field "IP" address.

   b) For NTP 7000 master clocks, press and release both buttons on the front panel simultaneously twice for the first three digits of the IP address. Pressing both buttons again simultaneously will show the next three digits. Repeat for the last two sets of numbers.

2) Enter the master clock IP address as the NTP source for the NTP compatible device. Consult the IP device's manual for information on where to enter the IP address.

3) Confirm that the IP device is receiving NTP data from the master clock by comparing the time on the master clock LED display to the time on the device. Consult the IP device's manual for information on how to view the time on the device.

The wiring diagram on the following page applies to Sync-Wire Systems only

DO NOT USE THE DIAGRAM ON THE FOLLOWING PAGE IF YOUR SYSTEM USES A SYNCHRONIZATION PROTOCOL OTHER THAN SYNC-WIRE

NOTE: The Master Clock Sync-Wire Output is set to distribute time using a Once A Day Pulse at 12:00 AM by default. The protocol can be changed through the Web Interface's Synchronization tab or through Settings 20 and 25 on the LED menu.

Outputs - Sync-Wire 115/230VAC

NTP Series Master Clock

Clock Circuit
27   26
24   23

or

27 | 26 | 25 | 24 | 23 | 22   Clock Circuit 1

or*

27 | 26 | 25 | 24 | 23 | 22   Clock Circuit 2

* "or" means one pair of ports or the other. You cannot, for instance, use port 23 for reset and 27 for power, nor can you use 26 for reset and 24 for power. You must use the pair **24 AND 23** or the pair **26 AND 27**

Black   White   Neutral   Power   Reset

115VAC or 230VAC

Neutral	White
Power	Black
Reset	Yellow
	Green
Ground	

115/230VAC SAM Series Wired Clock

Neutral	J1-1
Reset	J1-2
Power	Black
Neutral	White
	Green
Ground	

Correction   Power

115/230VAC SBD 3300 Series Wired Clock
* Red & Blue Wires are NOT provided by Sapling

Neutral	White
Power	Black
Reset	Yellow
	Green
Ground	

115/230VAC SAM Series Wired Clock

Outputs - Sync-Wire 24VAC

NTP Series Master Clock

Clock Circuit
27   26
or
24   23

24VAC

or*

27 26 25 24 23 22 Clock Circuit 1

27 26 25 24 23 22 Clock Circuit 2

* "or" means one pair of ports or the other. You cannot, for instance, use port 23 for reset and 27 for power, nor can you use 26 for reset and 24 for power. You must use the pair **24 AND 23** or the pair **26 AND 27**

Black
White
Neutral
Power
Reset

Neutral   White
Power   Black
Reset   Yellow
Green
Ground

24VAC SAM Series Wired Clock

Neutral   J1-1
Reset   J1-3
Power   Yellow
Neutral   Orange
Green
Ground

Correction
Power

10:00:08

24VAC SBD 3300 Series Wired Clock
* Red & Blue Wires are NOT provided by Sapling

Neutral   White
Power   Black
Reset   Yellow
Green
Ground

24VAC SAM Series Wired Clock

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1633 Republic Road   F. (+1) 215.322.8498
Huntingdon Valley, PA 19006   www.sapling-inc.com
USA

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The wiring diagram on the following page applies to 2-Wire Digital Systems only

DO NOT USE THE DIAGRAM ON THE FOLLOWING PAGE IF YOUR SYSTEM USES A SYNCHRONIZATION PROTOCOL OTHER THAN SAPLING'S 2-WIRE DIGITAL PROTOCOL

Outputs - 2-Wire Digital

NTP Series Master Clock

18 19

Input A   Input B

21 20 19 18

Converter Box

A1/B1/C1   A2/B2/C2

115VAC or
230VAC

White
Black

24V SAM Series Wired Clock

Orange
Yellow

24V SBD 3000 Series Wired Clock

Input A   Input B

Converter Box

A1/B1/C1   A2/B2/C2

115VAC or
230VAC

White
Black

24V SAM Series Wired Clock
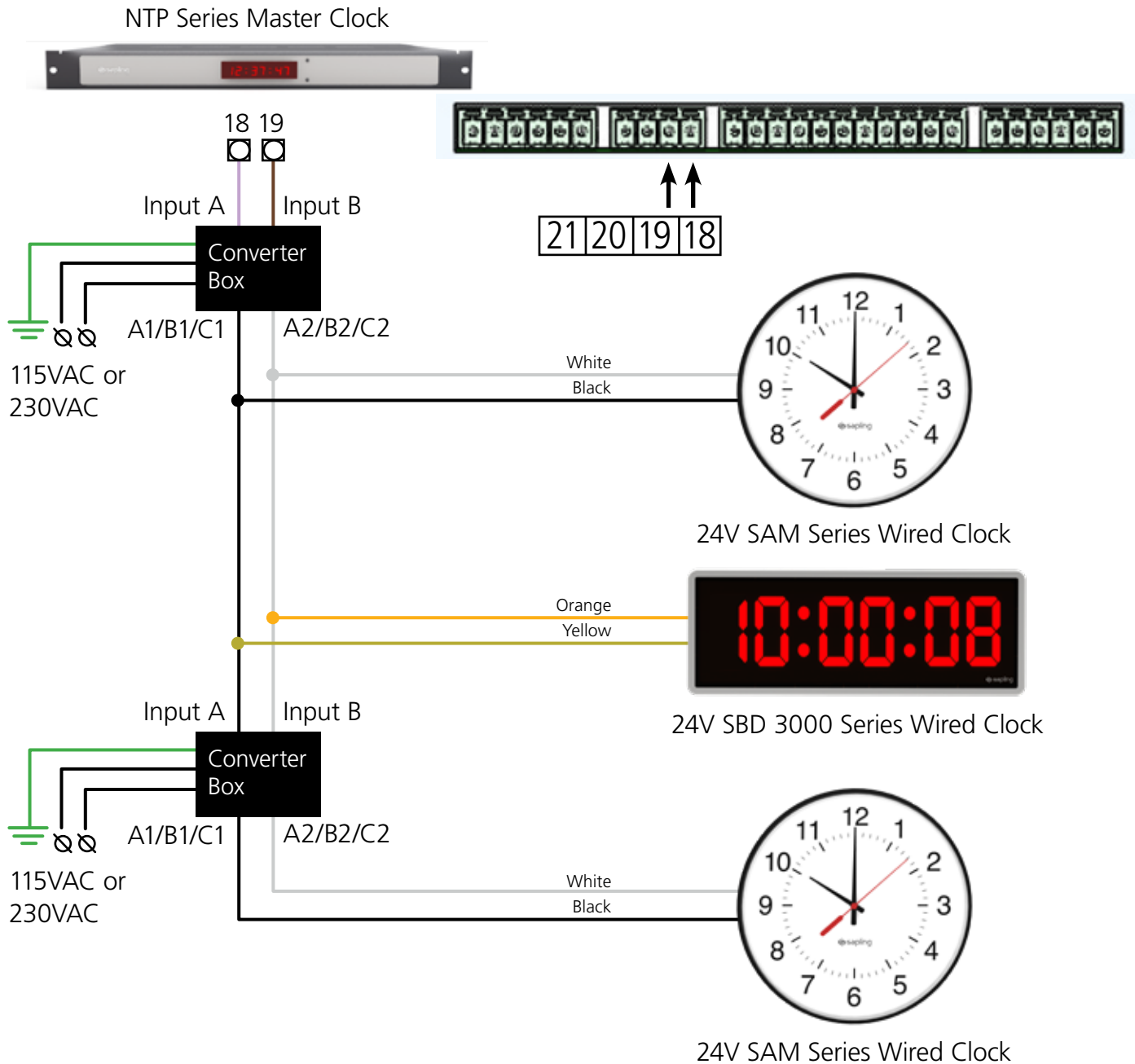
When replacing old converter boxes with new ones, the following values are equivalent:

OLD MODEL

1   2

Converter Box

3   4

115VAC or
230VAC

CURRENT MODEL

Input A   Input B

Converter Box

A1/B1/C1   A2/B2/C2

115VAC or
230VAC

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1633 Republic Road
Huntingdon Valley, PA 19006
USA

P. (+1) 215.322.6063
F. (+1) 215.322.8498
www.sapling-inc.com

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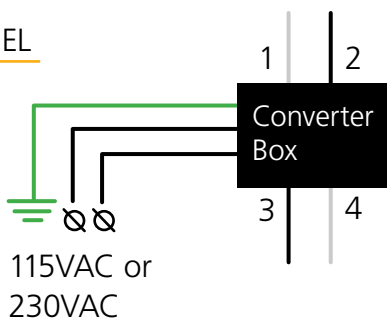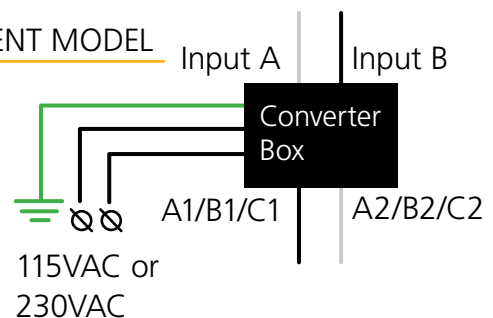
The wiring diagram on the following page applies to RS485 Systems only

DO NOT USE THE DIAGRAM ON THE FOLLOWING PAGE IF YOUR SYSTEM USES A SYNCHRONIZATION PROTOCOL OTHER THAN SAPLING'S PROPRIETARY RS485 PROTOCOL

Outputs - RS485

NTP Series Master Clock

Clock Circuit
19 18

21 20 19 18

Power

Neutral
Power
Reset

Black
White

Ø Ø

24VAC
115VAC
230VAC

Input

Blue
Red

Output

Brown
Purple

Power   Black
Neutral White

Green
Ground

**24/115/230VAC SRM Series
RS485 Clock**

Input

J7-1
J7-2
J7-3
J7-4

RS485

Output

Reset   Black/Yellow
Neutral White/Orange

Green
Ground

Power

10:00:08

SBD 3200/3300 Series Digital Clock

Input

Blue
Red

Output

Brown
Purple

Power   Black
Neutral White

Green
Ground

**24/115/230VAC SRM Series
RS485 Clock**

* Black & White refer to 115/230VAC
Yellow & Orange wires refer to 24VAC

Outputs - Once-a-Day Pulse

SMA Series Master Clock

| 27 | 26 | 25 | 24 | 23 | 22 |

or*

| 27 | 26 | 25 | 24 | 23 | 22 |

Master Clock Circuit

27   26

or

24   23

Black — Power
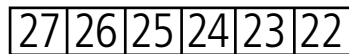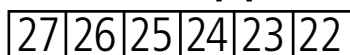
Yellow — Reset
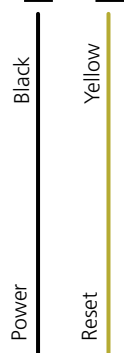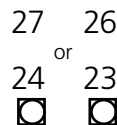
Intercom, paging system, or other device

* "or" means one pair of ports or the other. You cannot, for instance, use port 23 for reset and 27 for power, nor can you use 26 for reset and 24 for power. You must use the pair **24 AND 23** or the pair **26 AND 27**

Basic Configuration - DHCP and Static IP

NOTE: Firewall Ports 80 (TCP) and 123 (UDP) must be open to use the master clock on a network.

The function of this section is to get a new master clock up and running as quickly as possible. This section is mandatory for clock systems that will use a Local Area Network as a distribution system, or NTP/SNTP data as a time source. If your clock system does not require use of your local area network and you do not wish to use the web interface, you may skip this section and continue with the section labeled "Manual Controls".

The master clock is set to DHCP by default. This setting allows the network to automatically assign an IP address to the master clock. This IP address may be discovered by performing **step six** below. It is important to note that this address may change if the network connection is reset.

If you wish to set up the master clock with a crossover cable, then the following series of steps must be followed. You should check with your network administrator and confirm that the computer connecting the master clock has an IP address other than 192.168.0.123, a subnet mask of 255.255.255.0, and a gateway address of 192.168.0.1.

1) Power the master clock.

2) Press the top and bottom buttons simultaneously so that the programming menu appears on the LED display. If you were successful, the minute digits will disappear and be replaced by dashes.

3) Press the top button again so that the left number advances from 44 to 45, then press the bottom button once. The LED display should now look like this:

$$45--cr$$

4) Repeatedly press the top button until the display shows the time again.

5) Unplug the master clock, wait fifteen seconds, and power the master clock again.

6) Confirm the new master clock IP address by pressing and releasing both buttons simultaneously five times. Presses 2 through 5 should display the address on the master clock LED display. Pressing and releasing the both buttons one more time will make the LED display show the time again.

The master clock Web Interface should now be accessible through the IP address 192.168.0.123.

To configure the Web Interface, continue to the section labeled "Basic Configuration--Web Interface"

Basic Configuration - Web Interface

The function of this section is to quickly configure a new master clock by using the master clock's web interface. This instruction set covers NTP and GPS time sources only. For a full list of features available through the web interface, please see the section labeled **Web Interface-Log In**. If you are unable to program the master clock through the web interface, go to the section labeled "Manual Controls" for an alternative programming method. This section continues from "Basic Configuration--DHCP and Static IP." Please complete that section first.

NOTE: Firewall Ports 80 (TCP) and 123 (UDP) must be open to use the master clock on a network.

1) Access the web interface on a web browser (such as Internet Explorer) by entering the master clock IP address into your browsers address bar. The first three numbers of your master clock's IP address can be viewed by pressing and releasing both buttons on the master clock front panel simultaneously. Repeating this action will show the other numbers of the IP address.
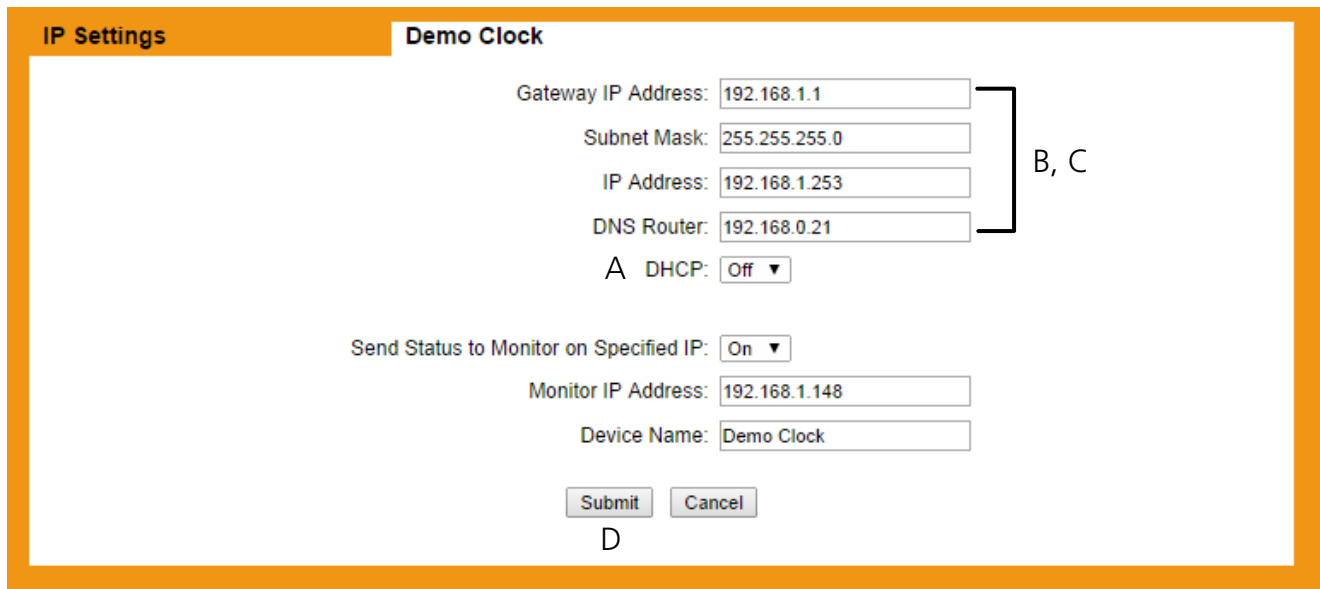
2) Enter the password for the web interface. It should be **6063**. Do not use the keyboard number pad. To submit the password, use your mouse or touchpad to press the Log In button. Pressing the enter/return key on your keyboard does not submit the password. If the password does not work, contact tech support.

Basic Configuration - Web Interface

3) Click on the tab labeled "IP". If you are configuring a static IP address, follow steps 3A-3F. If you are configuring a DHCP address, skip to step 4.

3A) Confirm that the setting "DHCP" is set to OFF.

3B) Enter a new Gateway IP Address, Subnet Mask, IP Address, and DNS Router Address for your master clock.

3C) Have your network administrator confirm that all of the other settings comply with your network.

3D) Press the Submit button.
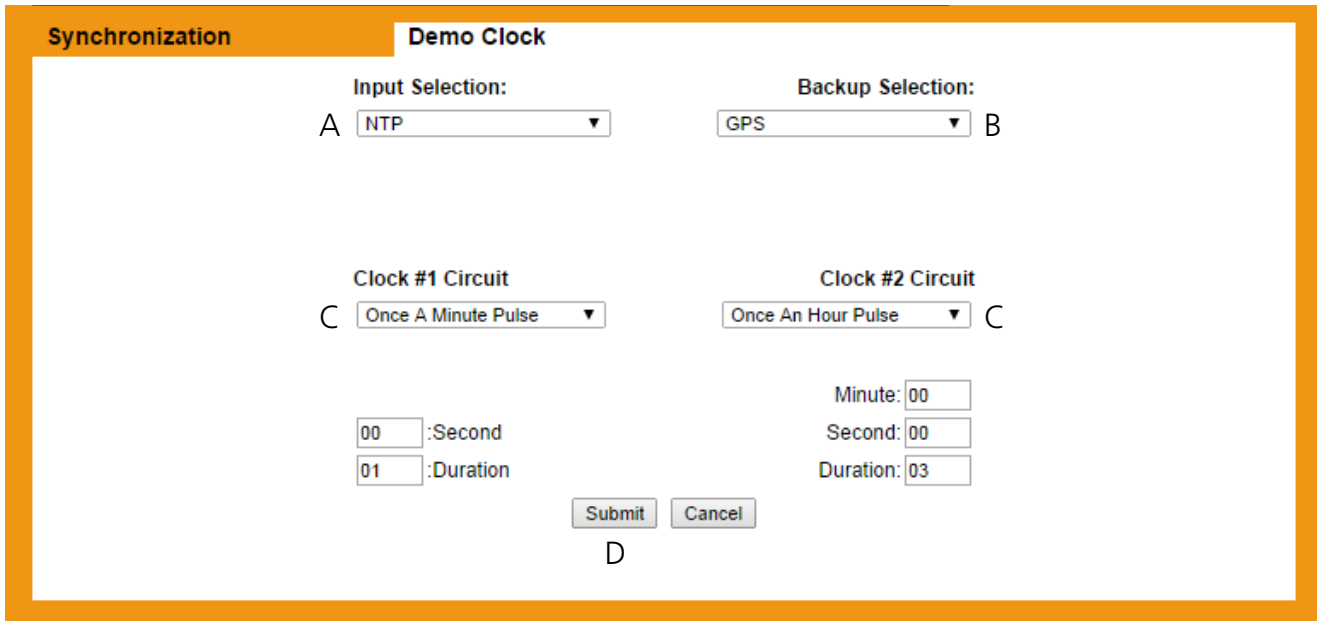
3E) Power down the master clock, wait fifteen seconds, and power it on again.

3F) Access the master clock at the new IP address. If you forgot the new address, repeat step 1 on the previous page.

Basic Configuration - Web Interface

4) Click on the tab labeled **Synchronization**.

4A) Select your primary input for time data from the drop-down menu on the upper left.

4B) Select your backup input for time data from the drop-down menu on the upper right.
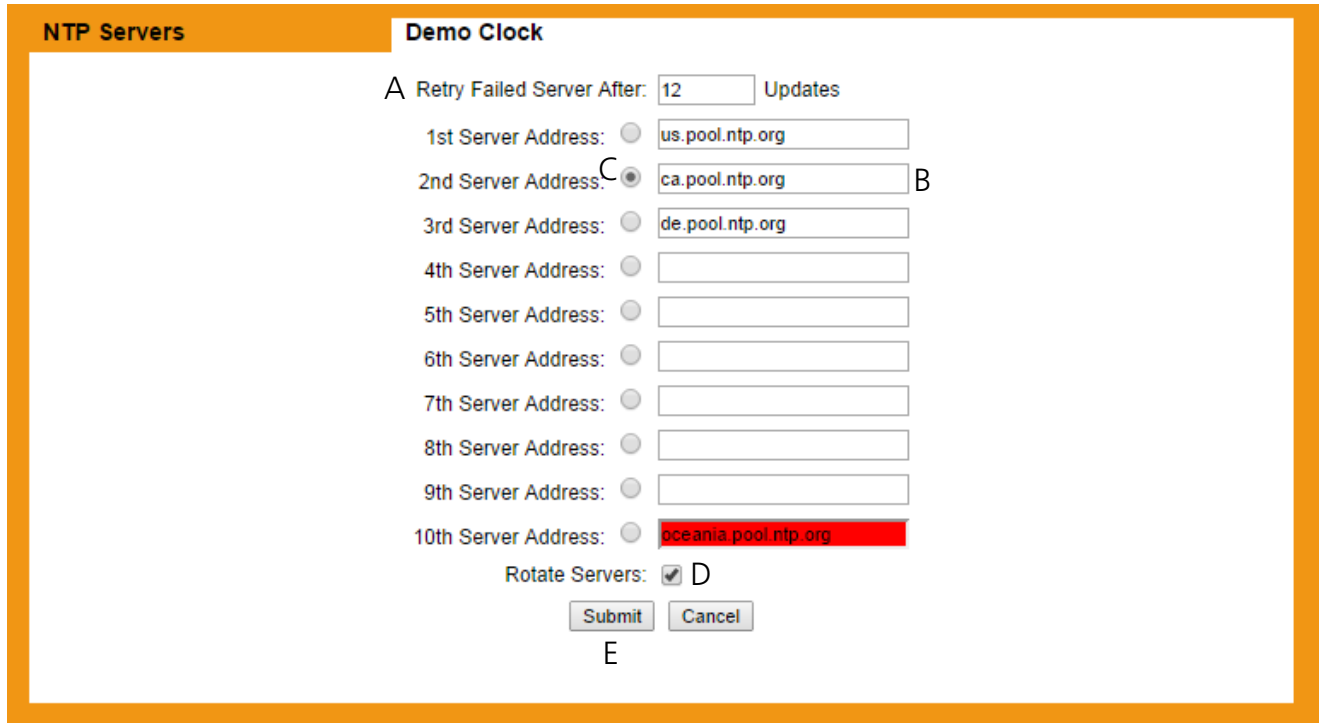
4C) If you are using a sync-wire system as an **output**, select the synchronization method from the drop down menus for each clock circuit. Add additional timing data if your system requires it.

4D) Press the Submit button.

Basic Configuration - Web Interface

5) Click on the tab labeled **NTP Servers**. If you are using NTP as your synchronization source, perform steps 5A-5E. Otherwise, skip to step 6.

5A) For "Retry failed server after ____ updates", enter a number of your choice into the blank.

IF YOU ARE USING AN IN-HOUSE NTP SERVER OR A SINGLE THIRD-PARTY NTP SERVER AS A TIME DATA SOURCE, FOLLOW 5B-5E. OTHERWISE, SKIP TO 5E
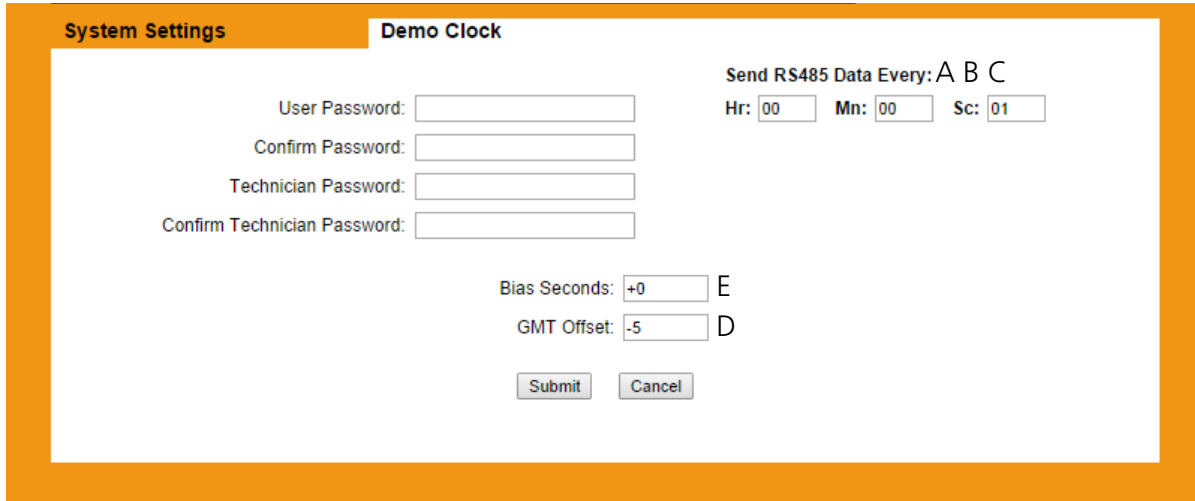
5B) The master clock comes pre-programmed with the IP addresses of ten public (third-party), web-based NTP servers. Use your mouse to select one of the existing NTP server IP addresses, then press the delete key on your keyboard. Enter the IP address of the in-house or third-party NTP server into the empty text box.

5C) Click on the circle next to the in-house NTP server or third party NTP server address to select it.

5D) Click on the box next to "Rotate servers". If done correctly, the tick mark in the box disappears. In this mode, the master clock will receive time from the selected NTP server, and will only attempt to contact the other NTP servers on the list if coomunication with the selected server fails.

5E) Press the submit button.

Basic Configuration - Web Interface

6) The following configurations are done in the **System Settings** tab in the master clock:

6A) ***When installing a 2-Wire Clock System** the master clock is set to send RS485 time data to the converter box once every second as standard. This time data rate sent from the master clock to the converter box can be changed (if needed) by clicking on **System Settings** and changing the "Send RS485" to another value.

6B) ***When installing an RS485 Clock System** the master clock is set to send RS485 time data directly to the secondary clocks in the system once every second as standard. This time data rate sent from the master clock to the secondary clocks can be changed (if needed) by clicking on **System Settings** and changing the "Send RS485" to another value.

6C) **GMT Time Offset** - The master clock is set to receive GMT (Greenwich Mean Time) also known as UTC (Coordinated Universal TIme) from an NTP Server (standard) or from a GPS (optional). In order to have the master clock send the correct local time to the secondary clocks in the system (at the geographical location of where the clock system is installed), the GMT offset for your time zone must be set. In order to do that you will need to know the correct GMT offset for your location, for example: New York is -5 (hours offset from GMT), London is 0 (Hours) and Tokyo is +10 (Hours). This is done in the **System Settings** tab of the master clock web interface in the "GMT Offset" field.

6D) In some scenarios, there may be a need to adjust the time displayed by the master clock. If your application requires such an offset, enter a value (in seconds) into the **'Bias seconds'** field of the needed offset. Keep in mind that an offset that is greater than 3600 seconds (1 hour) can be more easily set by adjusting the GMT offset field.

*Please refer to specific product manuals for more information.

Manual Controls

The purpose of this section is to get a new master clock up and running using the manual controls on the front of the master clock. If you would prefer to program the master clock through the convenience of the web interface, go to the section labeled "Basic Configuration--Web Interface"for an alternate programming method. This section continues from "Basic Configuration--DHCP and Static IP." Please complete that section first before proceeding with the items below.

This master clock should be set to receive accurate time through an NTP server as a standard feature, or from a GPS receiver as an optional feature. The master clock can also act as a stand-alone master clock, meaning that it will not receive accurate time and update its time data on a regular basis. Although **we always recommend that the Master Clock receive time data from an accurate time source**, if there is a need for the master clock to act as a standalone device, the Master Clock's internal real-time clock should be set manually. This can be done by pressing the top button to advance the hour, and the bottom button to advance the minute.

Top Button (Hour)

Bottom Button (Minute)

For all other settings, press and release both buttons simultaneously. To return the LED display to showing the time, repeatedly press the top button until all of the setting codes have been cycled through. The last code should be 52--00.

The numbers shown on the left are examples. Going down the list and entering every one of the examples exactly as shown will cause the master clock to malfunction or use incorrect data. Program your clock setting based off of the instructions in the description on the right.

Setting 1 - Set Year

Use the bottom button to scroll from 00 through 99. This permits the user to select a year from 2000 to 2099.

Setting 2 - Set Month

Use the bottom button to scroll from 01 through 12. This permits the user to select a month from January (01) to December (12).

Manual Controls

The numbers shown on the left are examples. Going down the list and entering every one of the examples exactly as shown will cause the master clock to malfunction or use incorrect data. Program your clock setting based off of the instructions in the description on the right.

3--28

Setting 3 - Set Day of the Month

Use the bottom button to scroll from 01 through 31. This permits the user to select a day from the 1st of the month to the 31st of the month.

10--08

Setting 10 - Technical Mode

If the bottom button is used to scroll to option 08. Once Option 8 is selected, settings 11, 12, and 13 will become accessible.

11--03

Setting 11 - RS485 Data Rate

Use the bottom button to scroll from 01 through 12. Each digit corresponds to a data rate:

1 - Every second	7 - Every 2 minutes
2 - Every 5 seconds	8 - Every 5 minutes
3 - Every 10 seconds	9 - Every 10 minutes
4 - Every 15 seconds	10 - Every 15 minutes
5 - Every 30 seconds	11 - Every 30 minutes
6 - Every minute	12 - Every hour

12-- E

Setting 12 - Daylight Saving Time

Press the bottom button to switch between "d' or "E"
"d" disables Daylight Saving Time
"E" enables Daylight Saving Time

13--12

Setting 13 - 12/24 Hour Mode

Press the bottom button to switch between 12 and 24.
12 causes the master clock to display time in 12 Hour mode.
24 causes the master clock to display time in 24 Hour mode.

20-- 7

Setting 20 - Programming Clock Circuit #1 **(Output)**

Press the bottom button to scroll from 1 to 9. These numbers correspond to different protocols, specifically:

Manual Controls

The numbers shown on the left are examples. Going down the list and entering every one of the examples exactly as shown will cause the master clock to malfunction or use incorrect data. Program your clock setting based off of the instructions in the description on the right.

`20-- 7`

Setting 20 - Programming Clock Circuit #1 **(Output)**

Press the bottom button to scroll from 1 to 9. These numbers correspond to different protocols, specifically:

1) **58th Minute (1) -** The master clock performs an hourly correction that takes 55 seconds and occurs between XX:58:05 and XX:59:00 of every hour. It also performs two daily corrections: one at 5:00AM and another at 5:00PM. Each daily correction is ten relay cycles, each cycle is 95 seconds long, and the cycles begin at 5:05AM/PM, 5:07, 5:09, 5:11, 5:13, 5:15, 5:17, 5:19, 5:21, and 5:23 respectively.

2) **58th Minute (2) -** The master clock performs an hourly correction that takes 60 seconds and occurs between XX:58:00 and XX:59:00. It also performs two daily corrections: one at 5:00AM and one at 5:00PM. Each daily correction is made of twelve relay cycles, and each cycle consists of 65 seconds on and 25 seconds off

3) **58th Minute (3) -** The master clock performs an hourly correction that takes 60 seconds and occurs between XX:58:00 and XX:59:00. It also performs two daily corrections: one at 5:00AM and one at 5:00PM. Each daily correction is made of twelve relay cycles, and each cycle consists of 60 seconds on and 120 seconds off.

4) **58th Minute (4) -** The master clock performs an hourly correction that takes 55 seconds and occurs between XX:59:05 and XX:59:00. It also performs two daily corrections: one at 5:00AM and one at 5:00PM. Each daily correction is made of twelve relay cycles, each cycle is 55 seconds long, and the cycles begin at 5:03:05AM/PM, 5:07:05, 5:11:05, 5:15:05, 5:19:05, 5:23:05, 5:27:05, 5:31:05, 5:35:05, 5:39:05, 5:43:05, and 5:47:05 respectively.

5) **59th Minute -** The master clock performs an hourly correction that takes 8 seconds and occurs between XX:57:54 and XX:58:02. It also performs two daily corrections: one at 5:00AM and one at 5:00PM. Each daily correction is a single 14 second pulse which lasts from 5:57:54 to 5:58:08.

6) **National time & Rauland (1) -** The master clock performs an hourly correction that takes 25 seconds and occurs between XX:00:00 and XX:00:25. It also performs two daily corrections: one at 6:00AM and one at 6:00PM. Each daily correction is made of twenty four relay cycles consisting of 25 seconds on, followed by 35 seconds off.

7) **National Time & Rauland (2) -** The master clock performs an hourly correction that takes 25 seconds and occurs between XX:00:00 and XX:00:25. It also performs two daily corrections at 6:00:25AM and 6:00:25PM. Each daily correction is a single 24 minute pulse which lasts from 6:00:25AM/PM to 6:24:25.

8) **Once a Day Pulse -** The master clock relay will close at a specific time and for an amount of time decided by the clock circuit settings (Settings 21-24 for circuit 1, or 26-29 for circuit 2).

9) **Once an Hour Pulse -** The master clock relay will close at a specific minute and second of each hour for an amount of time decided by the clock circuit settings (Settings 22-24 for circuit 1, or 27-29 for circuit 2).

10) **Once a Minute Pulse -** The master clock relay will close at a specific second of each minute for an amount of time decided by the clock circuit settings (Settings 23-24 for circuit 1, or 28-29 for circuit 2).

11) **Rauland Digital -** The master clock will reset the secondary clock to 12:00:00AM, then advance the time on the secondary clock by one minute for every 0.5 seconds that the Digital line is shorted to ground.

Setting 20 is set to 8 by default.

Manual Controls

The numbers shown on the left are examples. Going down the list and entering every one of the examples exactly as shown will cause the master clock to malfunction or use incorrect data. Program your clock setting based off of the instructions in the description on the right.

2 1 - - 1 4

Setting 21 - Once a Day Pulse - Clock #1 Circuit - Set Hour

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 23. For example, a value of 13 is the same as 1:00PM. **Set to 0 by default**.

2 2 - - 0 0

Setting 22 - Once a Day Pulse - Clock #1 Circuit - Set Minutes

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59. **Set to 0 by default**.

2 3 - - 3 0

Setting 23 - Once a Day Pulse - Clock #1 Circuit - Set Seconds

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59. **Set to 0 by default**.

2 4 - - 0 5

Setting 24 - Once a Day Pulse - Clock #1 Circuit - Set Pulse Duration

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 99. For example, a value of 98 will set a pulse duration of 1 minute and 38 seconds. **Set to 3 by default**.

2 5 - - 1

Setting 25 - Programming the Clock #2 Circuit **(Output)**

Press the bottom button to scroll from 1 to 9. These numbers correspond to the different protocols listed under Setting 20. **Set to 8 by default**.

2 6 - - 1 4

Setting 26 - Once a Day Pulse - Clock #2 Circuit - Set Hour

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 23. For example, a value of 13 is the same as 1:00PM. **Set to 0 by default**.

2 7 - - 0 0

Setting 27 - Once a Day Pulse - Clock #2 Circuit - Set Minutes

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59. **Set to 0 by default**.

2 8 - - 3 0

Setting 28 - Once a Day Pulse - Clock #2 Circuit - Set Seconds

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59. **Set to 0 by default**.

2 9 - - 0 5

Setting 29 - Once a Day Pulse - Clock #2 Circuit - Set Pulse Duration

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 99. For example, a value of 98 will set a pulse duration of 1 minute and 38 seconds. **Set to 3 by default**.

The Sapling Company, Inc.   P. (+1) 215.322.6063
1633 Republic Road   F. (+1) 215.322.8498
Huntingdon Valley, PA 19006   www.sapling-inc.com
USA

Manual Controls

30--01

Setting 30 - Set the Primary Input

Press the bottom button to scroll from 01 to 13. Each value corresponds to the following inputs:

00 - Real Time Clock

01 - SNTP

02 - 59 Minute Correction

03 - 58 Minute Correction (1)

04 - 58 Minute Correction (2)

05 - 58 Minute Correction (3)

06 - 58 Minute Correction (4)

07 - National Time/Rauland

08 - Dukane

09 - Rauland Digital

10 - Wireless Repeater*

11 - Once a Day Pulse**

12 - GPS

13 - RS485

*This option applies only to clocks with a wireless transmitter and is not used on the NTP 7000 clock.
** Selecting value 11 allows access to Settings 34, 35, and 36.

31--03

Setting 31 - Set the Secondary Input

Press the bottom button to scroll from 00 to 13. Each value corresponds to the inputs listed for Setting 30.

32 -5

Setting 32 - Setting the Time Zone Offset

Press the bottom button to scroll from -12 to 12. Each value corresponds to a time zone relative to Greenwich Mean Time (GMT). For example, New York City sits in a time zone of GMT - 5, so a master clock being set up in New York City should be set to value -5.

330000

Setting 33 - Set a Bias Seconds Value

Press the bottom button to add or remove seconds from the time displayed. The display will scroll from 0 to 7500 (the equivalent of two hours and five minutes) then will scroll from -999 (the equivalent of -16 minutes, 39 seconds) up to 0. The values can be made to scroll faster by holding down the bottom button.

34--01

Setting 34 - Once a Day Pulse - Input - Set Hour

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 23. For example, a value of 13 is the same as 1:00PM.

35--30

Setting 35 - Once a Day Pulse - Input - Set Minutes

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59.

36--00

Setting 36 - Once a Day Pulse - Input - Set Seconds

This setting only appears if "8" was selected under Setting 20. Press the bottom button to scroll from 00 to 59.

Manual Controls

40--76

Setting 40 - Hours Since the Last Input Signal Was Received

This setting is read-only, and will always be a value from 00 to 99. The value represents the number of hours since the master clock received an input signal.

44--01

Setting 44 - Internet Connection Status.

This setting is read-only, and will always display a value of either 00 or 01. If the value is 00, the master clock is not connected to the internet. If the value is 01, the master clock is connected to the Internet.

45--cr

Setting 45 - Crossover Cable

This setting has two values, "OFF" and "cr", which can be switched by pressing the bottom button. If OFF is selected, the master clock is configured to use DHCP or whatever static IP has been set. If "cr" is selected, then the master clock will prepare itself to switch to Crossover mode. To fully switch to Crossover mode, select cr using the bottom button, press the top button to advance to the next Setting, wait 20 seconds, then power-cycle the master clock. When the master clock is powered again, it will be configured to a Static IP of 192.168.0.123.

50-- E

Setting 50 - Enter Secondary Clock Diagnostic Mode (SAM/SRM Only)

Use the bottom button to scroll between values "E" and "d". Value "E" will enable diagnostic mode for SAM/SRM clocks on the system, while value "d" will disable diagnostic mode for SAM/SRM clocks.

51-- 5

Setting 51 - Send Diagnostic to Secondary Clocks (SAM/SRM Only)

Pressing the bottom button will scroll through the values 1, 2, 3, 4, 5, and 9. Each value corresponds to a particular diagnostic. See your secondary clock manual for details on each diagnostic.

01 - Protocol Verification.
02 - Comprehensive Test
03 - Manufacturer's Default
04 - Combination of 02 and 03 (button must be pressed on Sapling SAM clocks)
05 - Combination of 02 and 03 (button does not need to be pressed on secondary clock)
09 - Overrides the previous Diagnostic and commands secondary clocks to resume displaying the time.

52--00

Setting 52 - Viewing Duration for Diagnostic Results (SAM/SRM Only)

Press the bottom button to scroll from 00 to 60. Each value represents the number of minutes that a secondary clock will display the completed diagnostic. For instance, if a value of 30 is selected, then secondary clocks that have been sent a diagnostic command by the master clock will continue to show the results of their diagnostic for 30 minutes.

Pressing the top button one more time will revert the master clock LED display to showing the time. Any altered settings will be saved to the master clock's memory.

Error Lights on LED Display
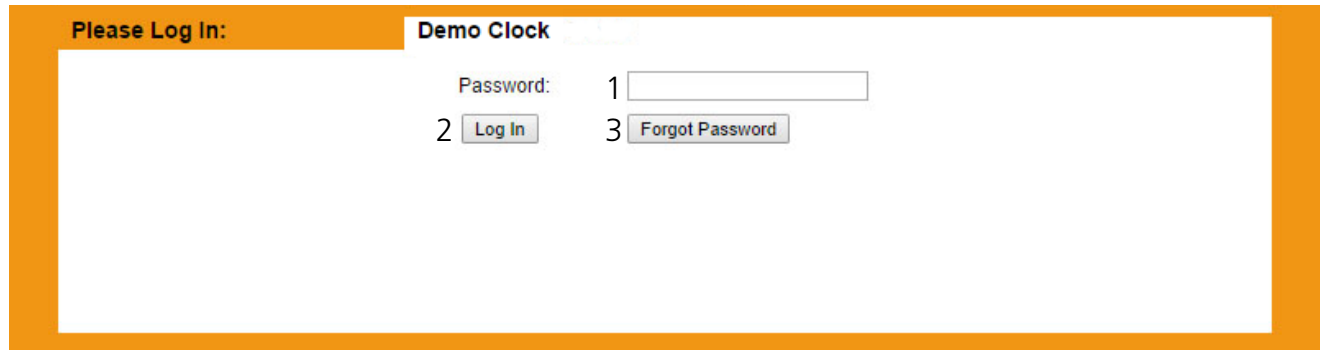
The display on the master clock features a circular LED above and to the left of each digit. These LEDs will activate in the event of an error, or to indicate other information. The LEDs have the following meanings:

PM Light. Activates between 12-Noon and 12-Midnight when in 12-hour display mode.

Ethernet cable is disconnected. Activates only if NTP is selected as an input.

GPS time data is not being received. Activates only if GPS is the primary input.

DHCP connection failed. Activates only if the master clock has been set to receive an IP address from a DHCP server.

The master clock is unable to communicate with the NTP server (unable to receive accurate time). Activates only if NTP data is the primary input.

Not used.

Repeatedly switches on and off if active

Turns on and remains lit if active

Web Interface - Log In

1. Password - There are two levels of passwords that will enable the user to access web interface features. The first level is User level programming, which includes features like setting the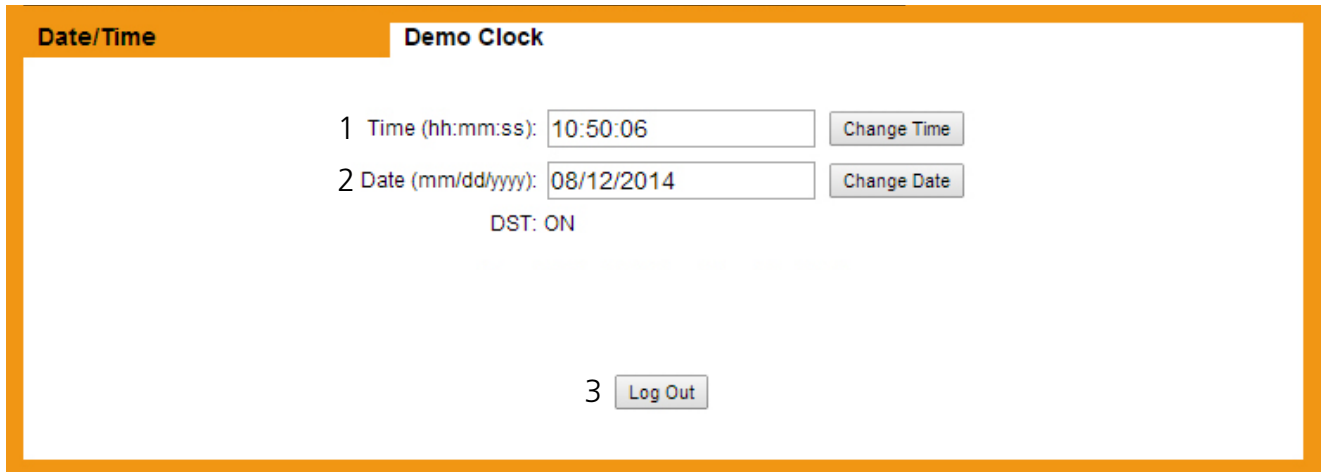 time, setting the date, and adding/editing events and schedule changes. The default password for the user level is 1111. The User level password can be changed from the Technician level. The default Technician level password is 6063 and provides access to all of the enabled features on the master clock.

2. Log In - This button, when pressed, attempts to log into the master clock using the password entered in the password field.

3. Forgot Password - This button, when pressed, directs the user to the tech support phone number.

NOTE: Firewall Ports 80 (TCP) and 123 (UDP) must be open to use the master clock on a network.
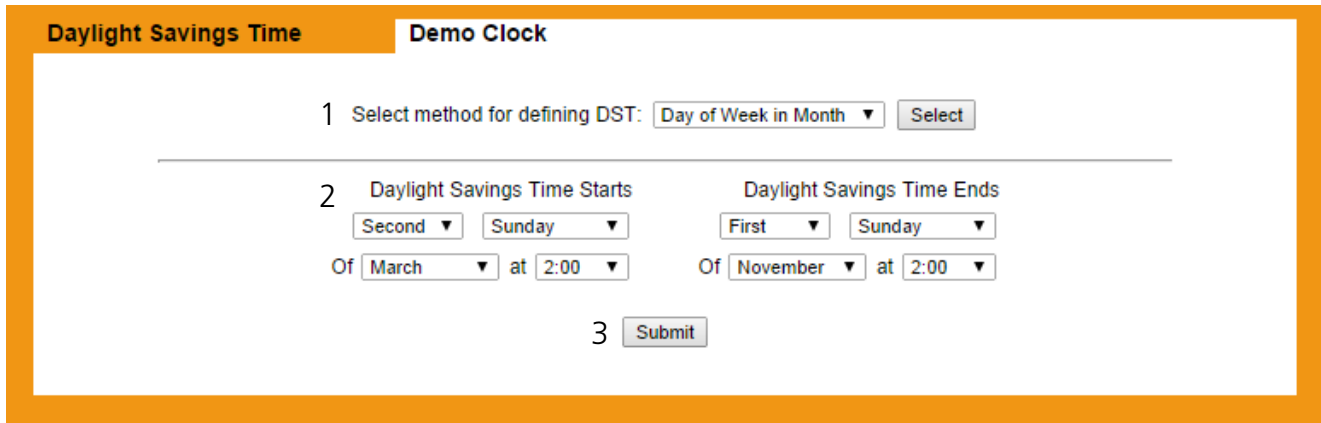
Web Interface - Date/Time

1. Time - This field is where the current time is displayed. The time data should be received from an NTP server as standard or from a GPS receiver as an optional feature. If needed, the time can be edited manually by clicking within the field, typing the desired time into the field, and pressing the Change Time button. The time must be entered in 24 hour format HH:MM:SS. For example, if you wish to enter a time of 1:00 PM, then it must be entered as 13:00:00). If the master clock is receiving input data from an external source (including SNTP, GPS, or another master clock) then the external source overrides any changes made to the time.

2. Date - This field is where the current date is displayed. The date should be received from an NTP server as standard or from a GPS receiver as an optional feature. If needed, the date can be edited manually by clicking within the field, typing the desired date into the field, and pressing the Change Date button. The date must be entered in using the format MM/DD/YYYY). If the master clock is receiving input data from an external source (including SNTP, GPS, or another master clock) then the external source will override any changes made to the date.

3. Log Out - When pressed, this button returns the user to the Log In page and prevents the user from entering other tabs until they log in again.

NOTE: The time and date displayed represent the time and date at the time that the page was loaded. To update the display to show the most recent time and date, press the refresh button on your web browser once.

Web Interface - DST (Daylight Saving Time)

1. Daylight Saving Time Selection - This drop down list gives four options for configuring Daylight Saving Time:
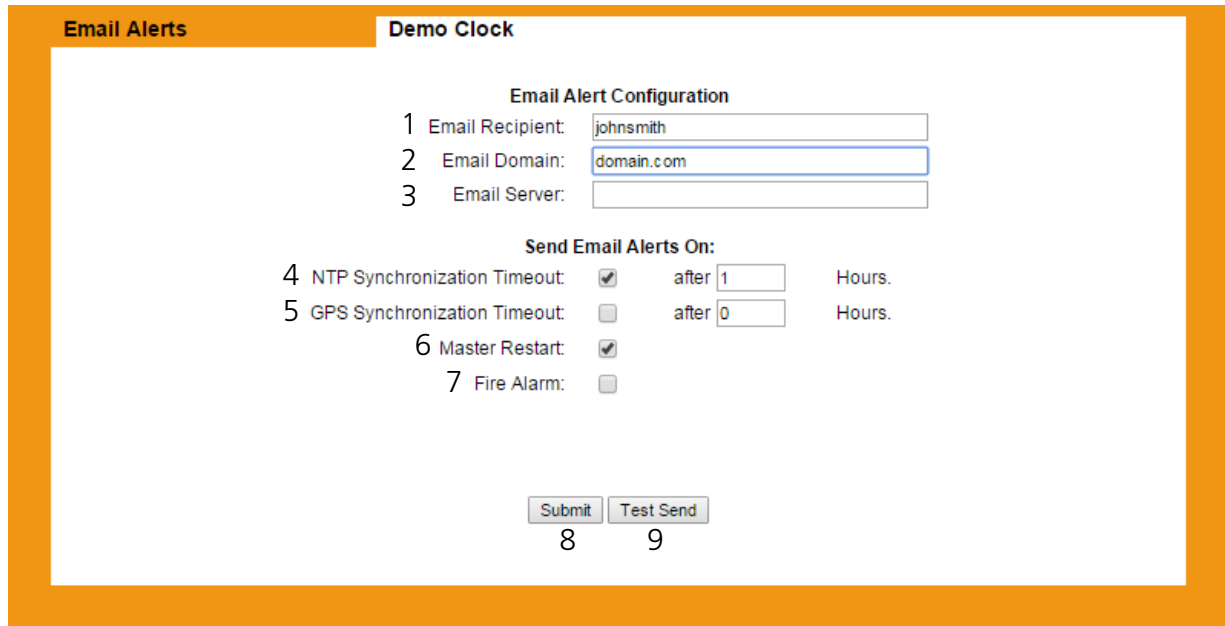
- None - When this option is selected, Daylight Saving Time is not applied.
- By Country - When this option is selected, the Daylight Saving Time can be chosen based on the established DST laws of a country. For instance, if the United States is selected in the Configuration Area, then the master clock will add an hour on the second Sunday in March, and subtract and hour on the first Sunday in November. **This is the default setting. North American Group is the default group. Under these settings, DST begins on the second Sunday in March and ends on the first Sunday in November.**
- Day of Month - When this option is selected, the Daylight Saving Time can be chosen based on the date and time that it begins and ends. For instance, it can be set to begin on March 28th at 2AM and end on Novermber 1 at 2AM.
- Day of the Week in begin on the second Sunday in March at 2AM, and end on the first Sunday in November at 2AM.

The selection is made by selecting the option from the drop-down list, then pressing the "Select" button.

2. Configuration Area - This area contains the submenu for configuring whichever option was selected under "Daylight Saving Time Selection"

3. Submit - This button, when pressed, saves and applies the Daylight Saving Time settings.

The Sapling Company, Inc.
1633 Republic Road
Huntingdon Valley, PA 19006
USA

P. (+1) 215.322.6063
F. (+1) 215.322.8498
www.sapling-inc.com

Web Interface - Email Alerts

1. Email Recipient - This field is where the user name of the e-mail recipient is entered. Do not enter the domain and suffix. If the full address is johnsmith@domain.com, then johnsmith should be entered in this field.

2. Email Domain - This field is where the user enters the domain name of the email recipient. Do not enter the user name or the @. If the full address is johnsmith@domain.com, then domain.com should be entered in this field.

3. Email Server - This field is where the user enters the address of the local outgoing email server for the email recipient. Consult with the network administrator for the email server address. Emails are sent using SMTP.

4. NTP Synchronization Timeout - When the box is checked, the master clock checks the amount of time since the last NTP signal has been received. If the amount of time recorded exceeds the amount of time specified in the box to the right, then the master clock sends an email alert. If this option is selected, the value in the box should be 1 or higher.

5. GPS Synchronization Timeout - When the box is checked, the master clock tests the internal GPS module to confirm that it is receiving a valid time signal from the GPS antenna. If the module fails the check for an amount of time exceeding the value specified in the box to the right, then the master clock sends an email alert. If this option is selected, the value in the box should be 1 or higher.
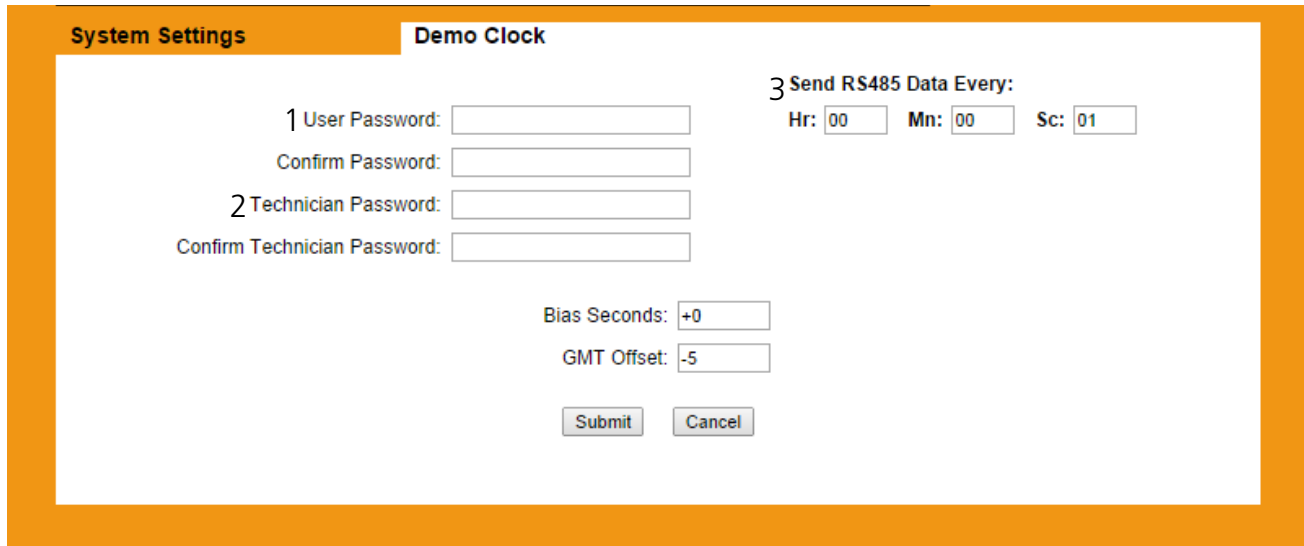
6. Master Restart - When the box is checked, the master clock sends an email alert every time that it is restarted (including after power loss or deactivation by the user).

7. Fire Alarm - When the box is checked, the master clock sends an email whenever the master clock receives a signal that the fire alarm has been activated. The fire alarm must be properly wired to the master clock for this to work. For wiring instructions, refer to the section of this manual labeled "Inputs - Sync-Wire: Fire Alarm Interface Installation.

8. Submit - When the button is clicked on, all of the settings on the page are saved and applied.

9. Test Send - When the button is clicked on, the master clock will send an email to whichever address has been entered. It does NOT save the settings.

Web Interface - System Settings

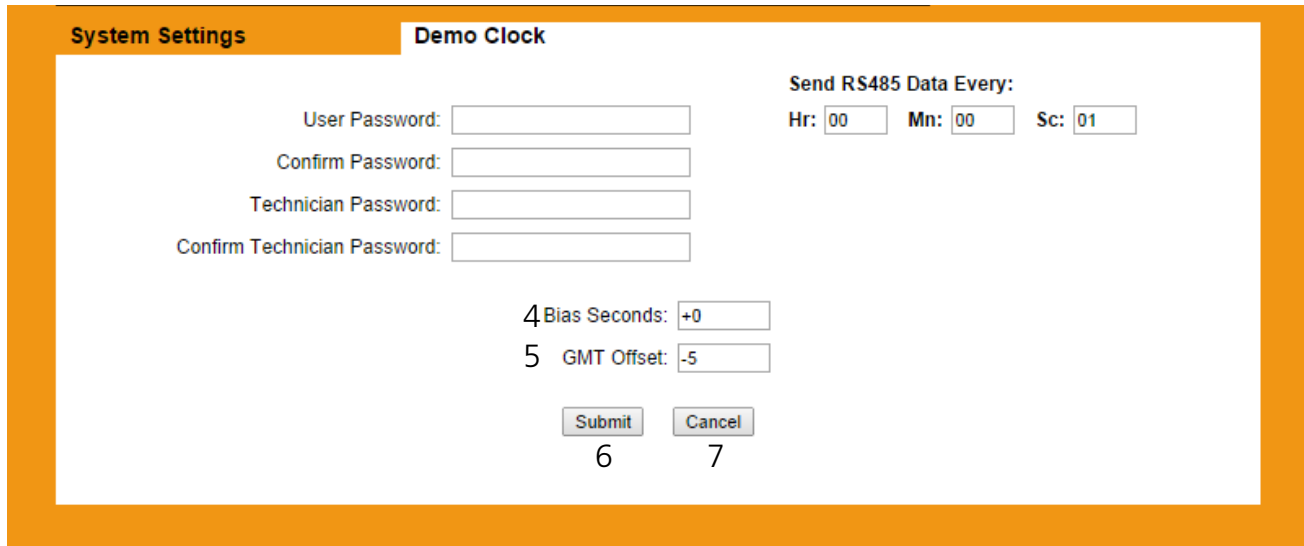**1. User Password -** This field allows the user to enter a new password for user-level programming. Users may view every tab, but cannot change every setting. The password must be entered once in the User Password field and once in the Confirm Password field, otherwise the password will not be changed when the Submit button is pressed. **The password must be at least four characters long, and may only use the numbers 0-9.**

2. Technician Password - This field allows the user to enter a new password for technician-level programming. Technicians may view and change the content on every tab. The password must be entered once in the Technician Password field and once in the Confirm Technician Password field, otherwise the password will not be changed when the Submit button is pressed. **The password must be at least four characters long, and may only use the numbers 0-9.**

3. Send RS485 Data Every - These fields allow the user to enter values for how often RS485 time data will be sent by the master clock.

NOTE: Passwords may only consist of numbers 0 through 9. Do not use any symbols, or characters from languages other than English.

Web Interface - System Settings (Continued)

1. Bias Seconds - This field allows the user to add or subtract seconds from the time being sent to secondary clocks. This is useful for regions that offset their time from GMT by fractions of an hour (Central Australia, India, and Newfoundland, among others). Technicians may enter a value between -9999 and 9999 (equal to 2 hours, 45 minutes, and 49 seconds either way). Some useful values include 900 (15 minutes) 1800 (30 minutes) and 2700 (45 minutes).
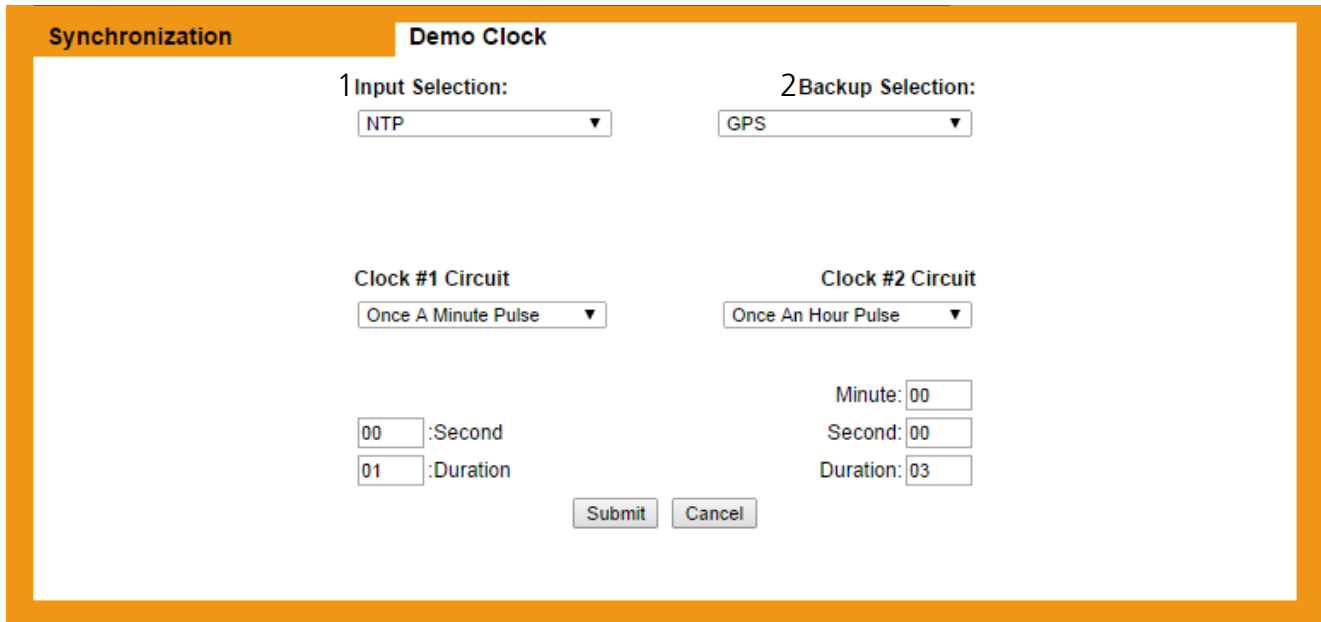
2. GMT Offset - This field sets the time zone relative to Greenwich Mean Time (GMT) also known as Coordinated Universal Time (UTC). Under this system, time zones in Asia, Australia, and most of Africa and Europe have a positive hour offset, while time zones in North and South America have a negative hour offset. Consult the table below for some examples:

LOCATION	LOCAL TIME	OFFSET VALUE
Los Angeles (USA) / Vancouver (Canada)	4:00 AM	-8
Phoenix (USA) / Denver (USA)	5:00 AM	-7
Chicago (USA) / Mexico City (Mexico)	6:00 AM	-6
New York City (USA) / Toronto (Canada)	7:00 AM	-5
São Paulo (Brazil) / Buenos Aires (Argentina)	9:00 AM	-3
Greenwich/London (UK)	12:00 PM	0
Paris (France) / Berlin (Germany)	1:00 PM	1
Dubai (UAE) / Moscow (Russia)	3:00 PM	3
Hong Kong (China)	8:00 PM	8
Tokyo (Japan) / Seoul (South Korea)	9:00 PM	9
Sydney (Australia)	10:00 PM	10

3. Submit - This button, when pressed, saves the proposed schedule change.

4. Cancel - This button, when pressed, clears all of the fields and does not save any information or changes.

Web Interface - Synchronization

1. Input Selection - This drop-down list allows the user to select which service signal the master clock will depend upon for accurate time. The options include:

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

*A GPS module must have been purchased as part of your master clock, otherwise the master clock cannot receive time this way. Even if the user purchases a separate GPS antenna, it will not work without the GPS module.

**If Once a Day Pulse is selected, fields for Hours, Minutes, and Seconds will appear. Enter the time for the pulse and duration in the relevant fields. The pulse must last for longer than one second.

2.Backup Selection - This drop-down list allows the user to select which service the master clock will use as a backup if the primary input fails. If any of the following services are used as the primary input, then none of the following services may be used as the backup:

59 Minute Sync, 58 Minute Sync (any versions), National Time/Rauland, Dukane Digital, Rauland Digital, and Once a Day Pulse.

(Example: If 59 Minute Sync is the Primary Input, Rauland Digital may NOT be used as the backup)

Protocol Definitions are listed in the section "Manual Controls - Setting 20"

Web Interface - Synchronization

3. Clock #1 Circuit - This drop-down list allows the user to select the sync-wire output for master clock Sync-wire Circuit 1. The available output signals are:

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

*If Once a Day/Hour/Minute Pulse is selected, fields for Hours, Minutes, and Seconds will appear as needed. Enter the time for the pulse and duration in the relevant fields. The pulse must last for longer than one second.
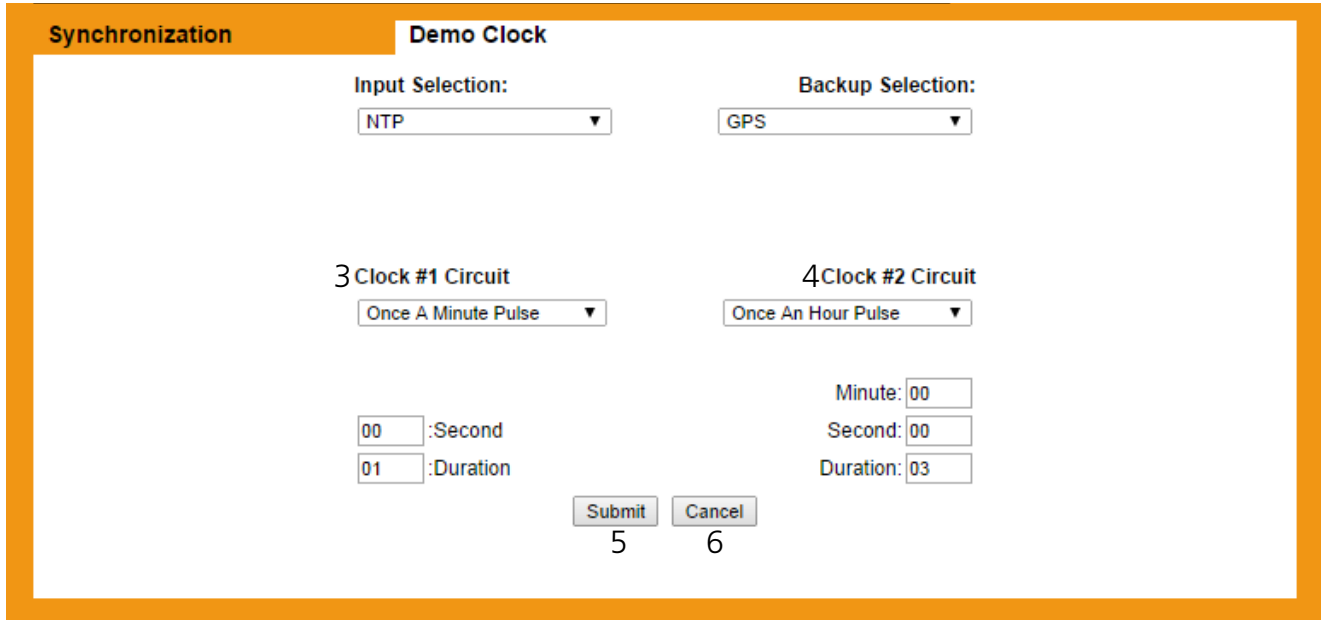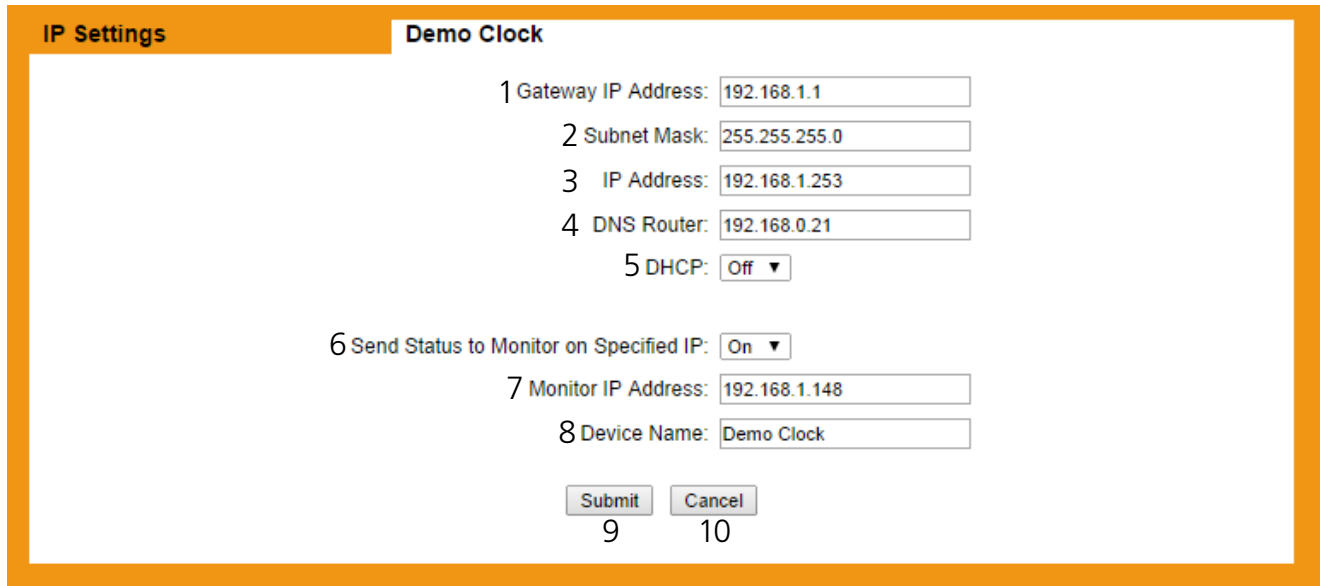
4. Clock #2 Circuit - This drop-down list allows the user to select the sync-wire output for master clock Sync-wire Circuit 2. The available output signals are listed above.

5. Submit - This button, when pressed, saves and applies all the selections to the master clock.

6. Cancel - This button, when pressed, clears any changes made and does not save any data.

Protocol Definitions are listed in the section "Manual Controls - Setting 20"

Web Interface - IP Settings

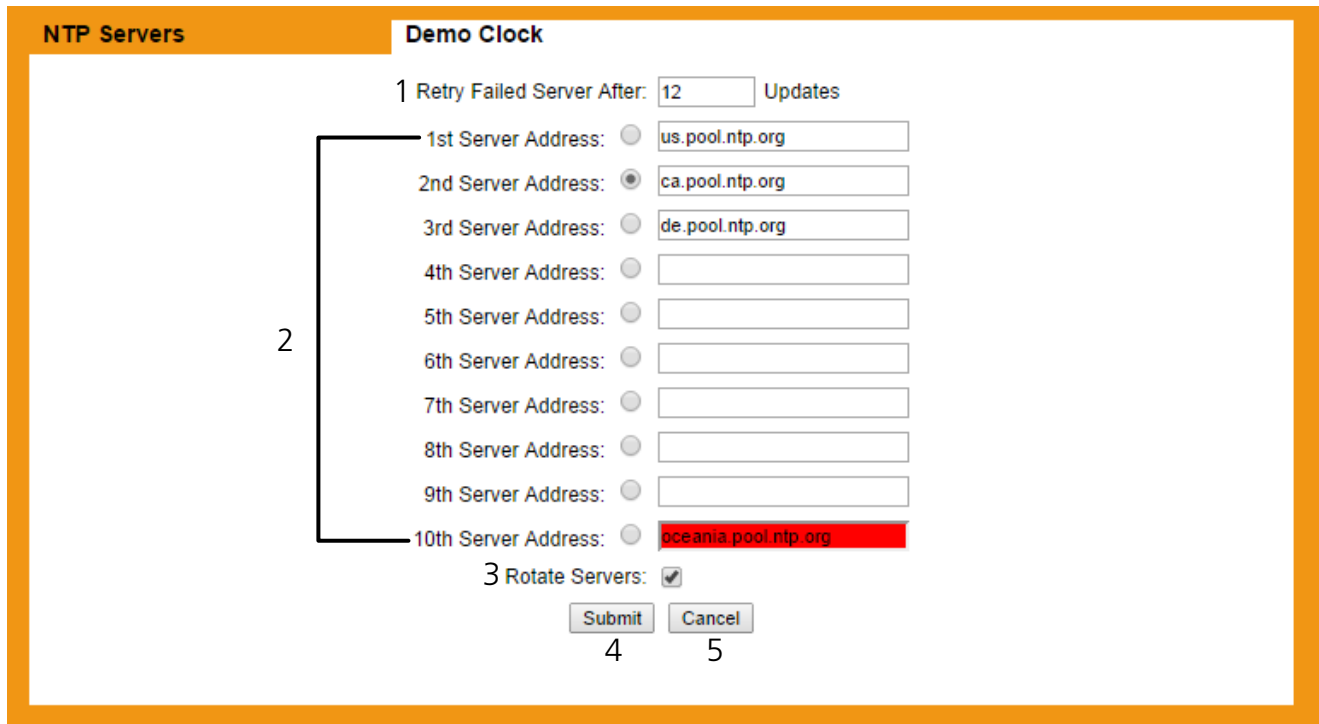**1. Gateway IP Address* -** This field allows the user to set the Gateway IP address for the master clock.

2. Subnet Mask* - This field allows the user to set the Subnet Mask for the master clock.

3. IP Address* - This field allows the user to set an IP address for the master clock. The web interface may also be accessed at this address.

4. DNS Router - This field allows the user to set the IP address for the network's DNS router.

5. DHCP - When set to "on", allows the master clock to request and apply an IP address from a DHCP server.

6. Send Status to Monitor on Specified IP - When set to ON, allows the master clock to talk to the IP Monitor Software at a specific IP address. This is particularly useful for addresses that exist outside of the master clock's subnet. IP Monitors on the same subnet may still access the master clock, regardless of whether this setting is ON or OFF.

7. Monitor IP Address - Allows the user to select the destination address for the unicast mentioned in setting 6.

8. Device Name - This field allows the user to set the name for the master clock. This name will only appear on the Web Interface and IP Monitor Software.

9. Submit - This button, when pressed, saves and applies all of the selections to the master clock.

10. Cancel - This button, when pressed, clears any changes made and does not save any data.

*Setting 5 to ON overrides the entries for the Gateway IP address, Subnet Mask, and IP Address

Web Interface - NTP Servers

1. Retry Failed Server After - Under normal circumstances, if the master clock cannot get NTP time from the selected server on the list, it will attempt to get NTP time through another one of the listed addresses. This field allows the user to decide how many NTP data updates should pass before the master clock retries a failed server address.

2. NTP Server Addresses - These fields allow the user to create a list of servers to be used as sources for NTP time. Each used field should have a URL or IP address for a functioning NTP server. At least one field must be filled for the master clock to acquire NTP time. The master clock already comes pre-programed with ten third-party NTP server IP addresses that will allow the master clock to ping them on a regular basis through a network with access to the internet. A user may change an IP address of an NTP server. If a user has an in-house NTP server, or wishes to use an NTP server other than the ten listed ones, they may select one of the IP addresses, delete it, then enter the IP address of an NTP Server of the user's choice. A user may select which address the master clock should contact first by clicking on the white circle to the left of the desired field. Addresses that fail to return NTP data when queried are highlighted in red.

3. Rotate Servers - When the box is selected, the master clock will attempt to acquire NTP times by rotating between the entered server addresses with each update. In other words, if Server addresses 1-5 have been entered, and the Rotate servers box has been selected, then the master clock will acquire time from the first server address on the first update, the second server on the second update, and so on. Empty fields are not treated as functioning addresses and are skipped. When using an in-house NTP server as a time source, the Rotate Servers box should NOT be selected (empty).

4. Submit - This button, when pressed, saves and applies all the selections to the master clock.

5. Cancel - This button, when pressed, clears any changes made and does not save any data.
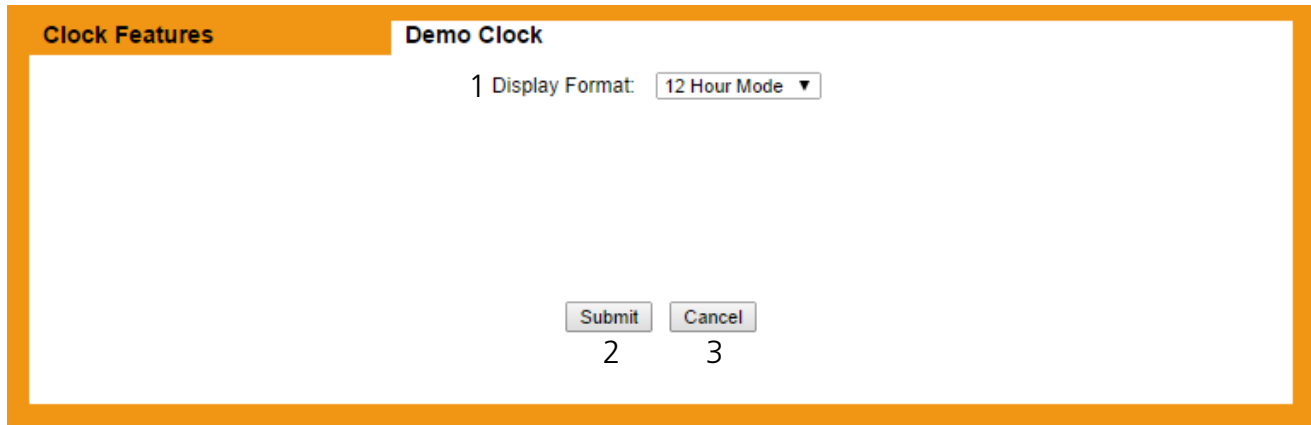
Web Interface - IP Status

NOTE: Everything in this tab reflects settings entered earlier or hard-wired into the master clock. This page is view-only. None of these settings can be changed from this tab.

1. MAC Address - Displays the MAC address for the master clock.

2. IP Address - Displays the IP address for the master clock. This can be changed through the IP Settings tab.

3. Board Serial Number - Displays the serial number for the circuit board inside the master clock

4. Unit Build Date - Displays the assembly date of the master clock.

5. Code Build Date - Displays the finalization date for the master clock software.

6. SVN Revision - Displays the software version number. This is NOT the same as the Code Build Date.

7. Device Name - Displays whichever name the technician has given to the master clock. This can be changed through the IP Settings tab.

8. Paid Provisioned Features - Displays each feature that has been purchased with the master clock.

Web Interface - Clock Features
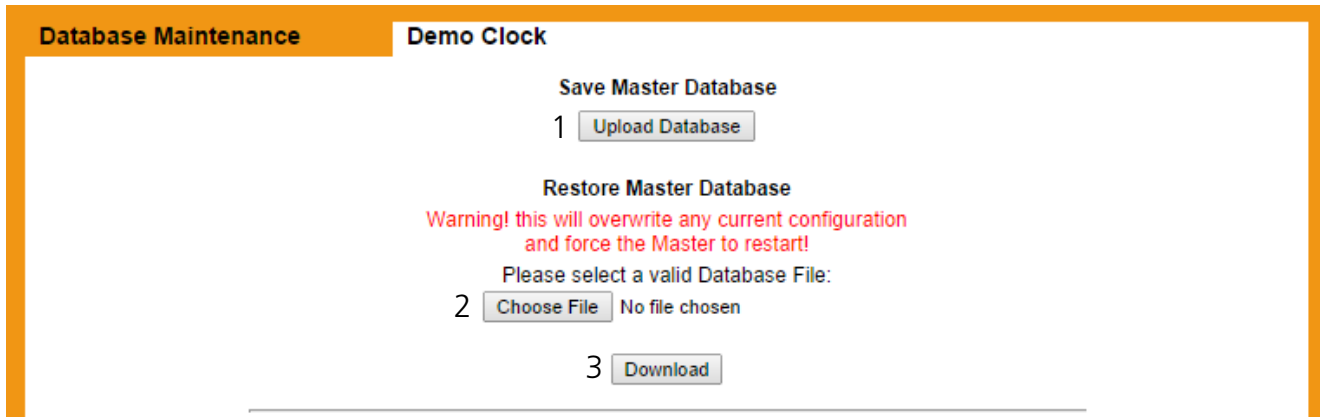
1. Display Format - This drop-down list allows the user to select whether they want the LED display on the master clock to display time in 12 or 24 hour mode. This does not affect the displays of secondary digital clocks.

2. Submit - This button, when pressed, saves and applies all the selections to the master clock.

3. Cancel - This button, when pressed, will clears any changes made and does not save any data.

Web Interface - Database Maintenance

1. Upload Database - Sends the master clock settings, events, and schedules as a file to whichever device is accessing the master clock through the web interface. The file will be labeled "masterclockA.db".

2. Choose File - Allows the user to select a backed-up copy of the master clock for eventual upload to the master clock. This does not upload the file, it only selects the file.

3. Download - Takes whichever file was selected with the Choose File button and applies the settings contained within it to the master clock.

Support - Frequently Asked Questions and Troubleshooting

The master clock is not powering up. What do I do?

Check the connection between the master clock and power source. The power cable should be correctly plugged into the power source and master clock. The power cable should also be correctly wired into the green connector. The connector should also be fully inserted into the port on the master clock (you will hear a clicking noise if it has been inserted correctly). The master clock does not have an on/off switch; it will begin to function the moment it is properly connected to an active power source.

How can I determine that my master clock is showing the correct time?

The easiest way is to compare the time on the master clock to www.time.gov. If the time on your master clock is accurate, it should be within one second of the time demonstrated by the time.gov HTML5 application for your time zone.

Please note that the accuracy of a time source is dependant on its connection with a Stratum 1 NTP server or equivalent hardware. While many NTP servers either are Stratum 1 NTP servers or directly communicate with Stratum 1 NTP servers (or equivalent hardware, such as GPS satellites), it is possible to acquire time from an NTP server that is not properly synchronized to UTC. It is the responsibility of the master clock installer or network administrator to research the reliability of an NTP server before using it as the primary time source for the master clock.

May I use any NTP/SNTP server for downloading time data?

Any NTP or SNTP server that publicly distributes NTP data may be used.

How do I get a longer cable for my GPS antenna?

If a longer GPS cable is needed for the project, a pre-approved cable must be ordered directly from the master clock manufacturer, or through an authorized dealer. These pre-approved cables have been checked for system compatibility, proper functionality, and time signal quality. Using a GPS cable that has not been pre-approved by the manufacturer will void your warranty and may not correctly relay data to the master clock.

The part numbers for longer cables are listed below:

150 feet / 45.7 meters --- E-ANT-CBL150F-1

300 feet / 91.4 meters --- E-ANT-CBL300F-1

If your project requires a cable longer than 300ft/91.4m, please contact your authorized local dealer for more information.

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

First, make sure that the connection between the antenna and master clock is securely tightened at both ends of the cable. Next, confirm that the antenna is situated in a location where it has access to the greatest amount of unobstructed sky. The top of a roof, away from chimneys or air conditioning equipment is usually the best possible location. Pointing the antenna out of a window is not sufficient enough to acquire a signal.

Support - Frequently Asked Questions and Troubleshooting

Does this master clock convert time data to 2-wire 24-volt communication protocol?

No. To convert time data to the 2-wire 24-volt communication protocol, the user must purchase a converter box by ordering part number SCB-100-000-1

My sync-wire secondary clocks do not seem to be getting the time shown on the master clock. What went wrong?

Keep in mind that the clock 1 and clock 2 outputs control the sync-wire systems. Check to be sure that the correct system has been set for the appropriate clock circuit. Check the setting definitions under the section labeled Manual Controls: Setting 20.

What communication protocols (inputs) can this master clock use to receive time data?

NTP, SNTP, 59 minute correction, four different versions of 58 minute correction, National Time/Rauland, Dukane Digital, Rauland Digital, Once a Day Pulse, and an RS485 protocol.

If a GPS module and antenna was ordered with the master clock, it can receive time from GPS satellites.

What do I do if I cannot connect to the master clock web interface?

First, make sure that you are using the master clock's current IP address. To view the master clock IP address, press and release both buttons on the front panel simultaneously twice. This will cause the first three digits of the IP address to appear on the LED display. Pressing and releasing both buttons again simultaneously will show the next three digits. Repeat for the last two sets of numbers.

If the IP address is correct, contact your network administrator and ask them to confirm that there are no provisions in your network firewall that prevent you from accessing the master clock. Firewall Ports 80 and 123 must be open to use the master clock on a network.

If all else fails, connect to the master clock with a cross-over cable.

What web browser should be used for accessing the Web Interface?

The Web interface has been found to function on Internet Explorer, Mozilla Firefox, Safari, Opera, and Chrome. It is accessible on desktop and mobile computers, as long as the device is on the same network as the master clock.

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

Yes. The clock can be accessed with a cross-over cable or over a LAN connection.

Support - Frequently Asked Questions and Troubleshooting

Why isn't the Master Clock appearing on the IP Monitoring Software?

Check the following:

1) Confirm that the computer running the IP Monitoring Software and the Master Clock are on the same subnet.

2) Confirm that Port 1777 (UDP) is not being blocked by the computer running the IP Monitoring Software or by any of the network components (switches and routers) between the computer running the software and the Master Clock.

Why didn't my master clock self-adjust for Daylight Saving Time?

Check the following:

1) Is the master clock showing the correct date? If the master clock is not showing the correct date, then it does not know that it is time to make the Daylight Saving Time adjustment.

2) Is the master clock connected and synchronized with an accurate time source such as a Reliable NTP server or GPS? If the master clock is not properly synchronized, then it may not have received proper time data.

3) Was a Daylight Saving Time configuration properly set through the web interface? If the master clock is not configured to make an adjustment for daylight saving time, then it will not adjust.

Does this master clock replace all previous master clocks made by this manufacturer?

The NTP series of master clocks are designed to replace SMC, GPS, STR, and SSM series master clocks, but requires that the user select the appropriate upgrades (such as GPS) at the time of purchase.

The Sapling Company, Inc.
1633 Republic Road
Huntingdon Valley, PA 19006
USA

P. (+1) 215.322.6063
F. (+1) 215.322.8498
www.sapling-inc.com

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 á la norme NMB-003 du Canada.

CE Declaration of Conformity

We, The Sapling Company certify and declare under our sole responsibility that the NTP 7000 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

Warranty

Sapling Limited Warranty and Disclaimer

The Sapling Company, Inc. warrants only that at the time of delivery and for a period of 24 calendar months after delivery or the period stated in this invoice, if different, the Goods shall be free of defects in workmanship and materials, PROVIDED that this warranty shall not apply:

To damage caused by Buyer's or any third party's act, default or misuse of the Goods or by failure to follow any instructions supplied with the Goods.

Where the Goods have been used in connection with or incorporated into equipment or materials the specification of which has not been approved in writing by The Sapling Company, Inc.;

To Goods which are altered, modified or repaired in any place other than a Sapling Company, Inc. factory or by persons not expressly authorized or approved in writing by The Sapling Company, Inc.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WITH RESPECT TO GOODS DELIVERED UNDER THIS CONTRACT, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The foregoing warranty runs only to Buyer. There are no oral or written promises, representations or warranties collateral to or affecting this contract. Representatives of The Sapling Company, Inc. may have made oral statements about products described in this contract. Such statements do not constitute warranties, shall not be relied on by Buyer and are not part of the contract.

Note: An extended 5 year (60 month) warranty is also available at the time of the system purchase with a surcharge.