## The Spectracom NetClock Wireless Clocks

 are cost-effective facilities clocks that display synchronized time across a campus, within a structure, or in a variety of other installations. A Wireless Clock System comprises one or more analog or digital display clocks, wireless transceivers, repeaters (where required), and NetClock time server(s).Once connected to a synchronized time source, the NetClock Wireless Clock System transceiver transmits a signal to correct and synchronize the time shown on the individual display clocks. Spectracom Wireless Clocks synchronized in this manner should not be set individually for this reason.

## TABLE OF CONTENTS

INVENTORY AND INSPECTION ..... 1-1
INSTALLATION ..... 2-2
2.1 Install the Transceiver ..... 2-2
2.1.1 ..... 2.1.2 ..... 2-2
Connect Transceiver Power. ..... 2-2
Make Necessary Connections ..... 2-3
Configuring the Transceiver. ..... 2-3
Configuring the Transceiver from the LED Display ..... 2-3
Configuring the Transceiver from the Web UI ..... 2-5
If Your Network Does Not Support DHCP ..... 2-5
Web UI Configuration ..... 2-5
Installing Antennas and Repeaters ..... 2-6
Installing Digital Display Clock(s) ..... 2-6
Synchronizing to the Transceiver ..... 2-4
Installing Analog Display Clock(s) ..... 2-4
Synchronizing to the Transceiver ..... 2-4
Conserving Battery Power ..... 2-4
Manually Transmitting and Receiving ..... 2-4
Testing the Distance Between Clocks Used as Repeaters ..... 2-4
3.1 Configuring Six-Digit Clocks Individually3-4
TROUBLESHOOTING ..... 4-6
4.1 Transceiver Troubleshooting Tips ..... 4-6
Transceiver Will Not Synchronize to External Timing Reference ..... 4-6
Transceiver Does Not Power Up. ..... 4-6
4.2 ..... 4.2.1
Clock Troubleshooting Tips ..... 4-6
Digital Clock Does Not Receive Signal (Colon Blinking) ..... 4-6
Digital Clock Does Not Power Up ..... 4-6
Analog Clock Hands Do Not Move After Power-Up ..... 4-6
Analog Clock Does Not Receive Signal ..... 4-6
Analog Clock Displays Incorrect Time ..... 4-7
Desire to Verify Analog Clock Signal Quality ..... 4-7
Signal to Desired Clock Location Receives is Marginal. ..... 4-7
Distance Between Clocks is Too Great ..... 4-7
Analog Diagnostic 1 ..... 4-7
Analog Diagnostic 2 ..... 4-7
Analog Diagnostic 3 ..... 4-74.2.2
LIST OF FIGURES
Figure 2-1: Line Cord Receptacle Installation ..... 2-2
Figure 2-2: Rack-Mounting the Transceiver ..... 2-2
Figure 2-3: Transceiver Connections ..... 2-3
Figure 2-4: Login Screen ..... 2-5
Figure 2-5: Successful Login ..... 2-5
Figure 2-6: Technician-Level Menu ..... 2-6
Figure 2-7: Populating IP Address Fields ..... 2-6
Figure 2-8: Repeater Installation ..... 2-6
Figure 2-9: Mounting Digital Display Clocks ..... 2-4
Figure 2-10: Digital Display Clock Wiring (4-Digit Typical) ..... 2-4
Figure 2-11: Digital Display Clock Wiring (6-Digit Units) ..... 2-4
Figure 2-12: Double-mounting Digital Display Clocks. ..... 2-5
Figure 2-13: Mounting Analog Display Clocks ..... 2-4
Figure 2-14: Analog Display Clock Wiring, LEDs, and Switches ..... 2-4
Figure 2-15: Double-mounting Analog Display Clocks. ..... 2-4
Figure 3-1: Detailed Wiring for 6-Digit Digital Clocks ..... 3-4

## 1 Inventory and Inspection

Before installing the Wireless Clock System, please verify that all material ordered has been received. If there is a discrepancy, please contact Spectracom Customer Service at US +1.585.321.5800.


NOTE: If equipment is returned to Spectracom, it must be shipped in its original packing material. Save all packaging material for this purpose.

Unpack the equipment and inspect it for damage. If any equipment has been damaged in transit, please contact Spectracom Customer Service at US +1.585.321.5800.

NOTE: The Wireless Clock System is not field-serviceable. If you experience any problems with your display clocks, repeaters, or transceivers, these components must be shipped to Spectracom for service. Please contact Spectracom at US +1.585 .321 .5800 before returning any equipment and always ship the equipment in its original packaging material.

NOTE: The range of the transceiver in unobstructed space is approximately 2,000 meters; the range of the low-power variant may be considerably less.

NOTE: 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 commercial 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. FCC recommends a distance of 10 cm from the clock to constant human physical exposure.

## 2 Installation

Installing the Wireless Clock System consists of these steps:

1. Physically install the Clock Controller (transceiver) in your equipment rack (Figure 2-1). Make all necessary connections as shown in Figure 2-3.
2. Configure the transceiver at the unit or through the Web User Interface. This includes configuring any external timing references, such as NetClocks, to which the unit is connected, either through Ethernet or through RS-485.
3. Install display clock(s) and synchronize the clock(s) to the transceiver signal.

### 2.1 Install the Transceiver

The transceiver may be installed according to three possible facilities scenarios:

Scenario 1: The transceiver has sufficient coverage for the entire campus or structure. This means the system does not depend on the display clocks for transmission.

Scenario 2:
In order to cover the entire campus or structure, the display clocks (running on batteries) are used as transceivers/repeaters to augment the transceiver unit.

Scenario 3: In order to cover the entire campus or structure, the display clocks (running on $110 \mathrm{~V}, 220 \mathrm{~V}$, or 24 V power) are used as transceivers/repeaters to augment the transceiver unit.

NOTE: Spectracom highly recommends installing the transceiver before installing the display clocks. After installing the transceiver, begin installing the clocks nearest to the transceiver. Continue installing clocks, working from the transceiver as the central point, until all clocks have been installed and have corrected for the transceiver's transmitted time.

NOTE: A repeater is available from Spectracom. The repeater receives and rebroadcasts a stronger wireless signal, making it useful for bridging gaps between clocks.

### 2.1.1 Connect Transceiver Power

Remove the rear cover. Prepare the power cord (Figure 2-1). Installation personnel will need to punch out the appropriate access hole in the transceiver chassis in order to make the connection.


## WARNING

Spectracom recommends the power supply be connected by qualified personnel only. Installation of the power cord by unqualified personnel may cause injury or death and will void the Spectracom product warranty.

### 2.1.2 Mount the Transceiver

Mount the transceiver in your equipment rack using the Nylon washers, the screws, and the threaded nuts supplied (Figure 2-2). You may wish to make connections first. (A wall mount version of the transceiver is also available. Drill and install as appropriate using the equipment provided.)

1. Remove the rear cover of the chassis and punch out the square knockout.
2. Strip the power cord wires and prepare the plastic bushing used with the power cord.
3. Use pliers to install the bushing, lettering facing up, roughly one inch from the end of the power cord insulation.
4. Connect the power wires according to the wiring diagram found inside the transceiver chassis. The plastic bushing snaps into place from the outside.


Figure 2-1: Line Cord Receptacle Installation


Figure 2-2: Rack-Mounting the Transceiver


Figure 2-3: Transceiver Connections

### 2.1.3 Make Necessary Connections

1. Make all connections as shown in Figure 2-3 and according to the wiring and connection diagrams found inside the transceiver chassis. Do not forget to connect the transceiver's remote RF antenna
(right). This is must be wired from the transceiver to the repeatersized box provided. The small whip antenna also provided must be screwed into place in the repeater-sized box. Replace the transceiver cover and apply power.


### 2.2 Configuring the Transceiver

After the transceiver is installed, it must be configured. This can be done at the transceiver using its built-in LED display with the "Set Hour" and "Set Minute" buttons, or it may be done through your network using the transceiver's Web User Interface (Web UI).

NOTE: Configuring the transceiver through the Web UI requires that the unit be assigned an IP address so it can be accessed through the network. If your network is not running DHCP or the transceiver cannot acquire an IP address when connected, you must assign a static IP address to the transceiver.

### 2.2.1 Configuring the Transceiver from the LED Display

There are two buttons located on the transceiver next to the LED display. These buttons are "Set Hour" and "Set Minute." To enter the programming mode, which allows you to configure the transceiver, press both the "Set Hour" and "Set Minute" buttons simultaneously.


Once programming mode has been entered, the number "1" will appear in the far left position. Option 1, for example, sets the year, while options 2 and 3 set the month and day. (It is not necessary to change the year, month, or day manually if your transceiver receives an external timing reference from some other source, such as a NetClock.)

Press the top button (the "Set Hour" button) to advance the option until the number displayed matches the numbers described herein (the left-hand numbers). Press the bottom button (the "Set Minute" button to change the option as described, configuring your clocks as required.

NOTE: Do NOT change options that are not listed in these instructions. Changing options unnecessarily may alter the configuration of your transceiver and affect its function. Scroll through options not described herein and change only those options listed (and necessary).

After each option is set as desired, use the top button (the "Set Hour" button) to scroll to the next option you wish to configure. Again, scroll PAST any items not described herein. They do not apply to your Spectracom system and should not be changed.

Option 10: Access Options 12 and 13
Use the bottom button (the "Set Minute" button) to change the option to " 08 " in order to set options 12 and 13. Entering any other value for Option 10 will cause the menu to scroll to option 20 when the "Set Hour" button is pressed again. (You do not need to set option 11.)

8: Access Options 12 and 13


Option 12: Enable or Disable Daylight Saving Time (DST)
Skip option 11 and access option 12. Use the bottom button (the "Set Minute" button) to change the option to 1,2 , or "d."
1: Pre-2007 DST Rule
2: Post-2007 DST Rule
d: Disable DST Rule
Option 13: Set 12- or $\mathbf{2 4 - H o u r ~ M o d e ~}$
Use the bottom button (the "Set Minute" button) to change the option to 12 or 24.
12: 12-Hour Display
24: 24-Hour Display


Option 30: Set the Primary Auxiliary Input
Use the bottom button (the "Set Minute" button) to change the option to 01 or 13. Do NOT use any other available value, for these values may affect the transceiver's operation.
01: SNTP (your network Ethernet connection)
13: RS-485


Option 31: Set the Secondary Auxiliary Input
Use the bottom button (the "Set Minute" button) to change the option to either 01 or 13 . Do NOT use any other available value, for these values may affect the transceiver's operation.
01: SNTP (your network Ethernet connection)
13: RS-485


Option 32: Set Time Zone Offset
Use the bottom button (the "Set Minute" button) to change the option to the number of hours of time zone offset desired. For example, -5 sets the offset to EST. The available offset values range from -12 to 12.


Option 33: Set Input Time Bias
This option allows the user to set a number of seconds to adjust the input time, ranging from 0 to 7500 seconds. (In most cases, it is not necessary to set this value.)


## Option 44: Status, Internet Connectivity

This is a read-only value that indicates whether the unit is connected to the Internet. "01" indicates that an Internet connection is present. "00" indicates that an Internet connection is not available. This option cannot be modified.


Option 45: Set the Unit to its Static IP Address
Use the bottom button (the "Set Minute" button) to change the option to "OFF" or "cr." This allows the user to set the unit to its default static IP address (when DHCP is not available). NOTE: When setting the unit to static IP, wait 20 seconds and then CYCLE POWER.

OFF: Obtain IP Address Using DHCP (Normal Network Mode)
cr: Crossover Mode (unit's IP address fixed to 192.168.0.123)

### 2.2.2 Configuring the Transceiver from the Web UI

The transceiver may be configured through the Web User Interface (Web UI). If your network includes DHCP, the transceiver will acquire an IP address automatically. When the unit is connected to your network and power is applied, determine the IP address as follows:

1. Press the "Set Hour" and "Set Minute" buttons simultaneously and release them. The unit will enter programming mode.
2. Press the "Set Hour" and "Set Minute" buttons simultaneously again and release them. The unit will display "IP 000," where 000 is the first three digits of the IP address it has been assigned. Press and release both buttons simultaneously several times to prompt each of the segments of the IP address to display. When you have finished scrolling through the address, the unit should return to its time display. (If you accidentally enter programming mode, you can press the "Set Hour" button to scroll through the menu options until the time display returns.)
3. Navigate to the displayed IP address in your web browser. You will be prompted to log in. In the screens provided as illustrations herein, the IP address assigned to the transceiver was 192.168.1.41.

### 2.2.3 If Your Network Does Not Support DHCP

If your network does not support DHCP or your transceiver cannot acquire an IP address from your network, set the unit to its default static IP address by performing the following steps:

1. There are two buttons located on the transceiver next to the LED display. These buttons are "Set Hour" and "Set Minute." To enter the programming mode, which allows you to configure the transceiver at the unit, press both the "Set Hour" and "Set Minute" buttons simultaneously.
2. Once programming mode has been entered, the number "1" will appear in the far left position. Option 1, for example, sets the year, while options 2 and 3 set the month and day. (It is not necessary to change the year, month, or day manually if your transceiver receives an external timing reference from some other source, such as a NetClock.)
3. Press the top button (the "Set Hour" button) to advance the option until the number displayed is " 45 ." Press the bottom button (the "Set Minute" button to change the option on the right side from "OFF" to "cr." This means the unit has entered the crossover mode. It has been set to its factory default static IP address, 192.168.0.123.

NOTE: Do NOT change any other options when making this adjustment. Refer to Configuring the Transceiver from the LED Display for more information.
4. Use the "Set Hour" button to scroll past the remaining menu options and return to the time display. Cycle the unit power.

NOTE: Power to the unit MUST be cycled once this configuration change has been made, or the change to static IP address will not be applied. Wait 20 seconds before cycling power. It is critical that power be cycled after this delay.
5. Using a web browser on a computer connected to your transceiver's network, navigate to 192.168.0.123.

### 2.2.4 Web UI Configuration

When you navigate to the transceiver's IP address (either assigned through DHCP or as set statically using the factory default), you will be prompted to $\log \mathrm{in}$. The factory default password is $\mathbf{6 0 6 3}$.

NOTE: Screen captures are shown for illustrative purposes. Your software may vary slightly from the depictions contained herein.


Figure 2-4: Login Screen
Once you have logged into the Web UI (Figure 2-5), you may change the date and time or access the technician-level menu.

NOTE: Remember to click "submit" rather than simply pressing "enter" when making changes in the Web UI.


Figure 2-5: Successful Login
From the technician-level menu (Figure 2-6), the user may change system settings such as password, RS-485 data rate, time zone offset, and input references. Web UI pages are reasonably intuitive; simply follow the directions provided.


Figure 2-6: Technician-Level Menu
NOTE: When setting IP addresses (Figures 2-7) it may or may not be necessary to repeat IP addresses in multiple fields.


Figure 2-7: Populating IP Address Fields
NOTE: There may be many settings accessible through the Web UI that you need not change for your application. Whenever you are not certain of a value, leave it set to the factory default. Contact Spectracom Customer Service at US +1.585.321.5800 if you require further assistance.

### 2.3 Installing Antennas and Repeaters

Antennas and repeaters are built using identical housings. Install repeaters to cover gaps in signal coverage. Remove the cover of the chassis, install physically as shown in Figure 2-8, and wire as shown in the repeater wiring table. Set repeater jumpers JP1 and JP2 on the bottom pair of each trio of pins. (The top pair of pins on the jumpers are used when the unit is used as a transmitter.)

NOTE: 14 AWG is the smallest conductor acceptable for power input.


Figure 2-8: Repeater Installation
REPEATER WIRING TABLE

| RS-485 |  |  | 120VAC @ 0.2 Amps |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Input A | 10 |  |  | USA | Europe |
| Input B | 9 |  | L2 Neutral | White | Blue |
| Output B | 8 |  | Ground | Green | Yellow/Green |
| Output A | 7 |  | L1 Hot | Black | Brown |

### 2.4 Installing Digital Display Clock(s)

Display clocks can be wall-mounted (Figure 2-9) or double-mounted (Figure 2-12). Spectracom recommends the following installation procedure:

1. Wireless Clocks can be powered from a 24 volt source or from a 110 volt source. For four-digit clocks, connect the wiring as shown in Figure 2-10, setting the clock board's jumpers as required.

NOTE: For six-digit clocks, connect the wiring as shown in Figure 2-11 and refer to Section 3 for clock configuration and programming. Figure 3-1 includes detailed wiring.
2. Mount the wall mount box into the double gang box using four machine screws.
3. Connect the ground wire into the flush mount box using a tooth lockwasher and machine screw nut.
4. Disconnect the red filter from the display panel.
5. Complete the wiring connections as shown herein.

NOTE: For 24 volt installations, make sure the transformer is ISOLATED.
6. Mount the display panel into the flush mount box using four black machine screws. Make sure the switches are on the right side.
7. Snap the red filter into the display panel.

NOTE: Wall-mounted clocks may also be mounted flush with the wall surface.

To double-mount digital display clocks (Figure 2-12), Spectracom recommends the following procedure:

1. Screw the hanger/mounting rod into the crossbar.
2. Insert the wires through hanger/mounting rod.


Figure 2-9: Mounting Digital Display Clocks
Refer to the following section for information regarding digital display clock wiring (4 and 6 digit units).


Figure 2-10: Digital Display Clock Wiring (4-Digit Typical)


Figure 2-11: Digital Display Clock Wiring (6-Digit Units)
Refer to the following section for an illustration of double-mounting digital displays.


Figure 2-12: Double-mounting Digital Display Clocks
3. Install the crossbar into the double gang box using two screws.
4. Mount the double mount box into the clock base using two nuts and a tooth lockwasher. The double mount can be mounted on a wall or ceiling.
5. Insert the two 0.187" locking hole plugs and the $0.562^{\prime \prime}$ locking hole plug into the unused holes.
6. Insert the double mount case onto the hanger/mounting rod.
7. Insert the support bracket onto the hanger/mounting rod.
8. Screw the two nuts onto the hanger/mounting rod and secure the clock base to the wall.
9. Connect the ground wire into the double mount box using a tooth lockwasher and machine screw nut.
10. Disconnect the red filter from the display panel.
11. Complete the wiring connections as detailed herein.

NOTE: For 24 volt installations, make sure the transformer is ISOLATED.
12. Mount the display panel on one side of the double mount box using four black machine screws. Make sure the switches are on the right side.
13. Snap the red filter into the display panel.
14. Repeat steps 9-13 for the second clock.

### 2.4.1 Synchronizing to the Transceiver

1. Place transceiver in a central location (hallway recommended).
2. Pick the location of the digital display clock(s).
3. Place each display clock in a location where the signal is available from the transceiver. In order to verify that the clock is receiving a signal from the transceiver, power up the clock. The display clock should indicate the transceiver's transmitted time within a few minutes of power-up and will search for a signal for 30 minutes after initial startup. If the clock does not correct to the transceiver time, choose a different location for the clock.
4. Repeat steps 2 and 3 for each display clock. Remember as you test each clock that display clocks can receive and repeat signals from and to each other, not just from the transceiver unit.

### 2.5 Installing Analog Display Cock(s)

Display clocks can be wall-mounted or double-mounted. For simple wall mounting, refer to Figure 2-13. Spectracom recommends the following installation procedure:

NOTE: Before installing display clocks, remove the pin used to immobilize the clock hands for shipping. The pin is clearly designated with the label, "Remove Pin Before Installation."

1. Wireless Clocks can be powered using two D-cell batteries, from a 24 VAC source, or from a 110 VAC source. Install the batteries before mounting the display clock(s). If you are directly wiring power to the display clock(s), connect the wiring as shown in Figure 2-14.
2. Mount both plastic anchors in the wall.
3. Insert the sheet metal screws (\#10) through the mounting bracket into the plastic anchors.
4. Plug the connector into the movement (220V, 110V, and 24 V installations only).
5. Hang the clock on the mounting bracket.
6. Install the screw ( 4 mm ) through the hole on the top of the clock into the hole at the top of the mounting bracket.


Figure 2-13: Mounting Analog Display Clocks

Refer to the next section for information regarding Analog Display Clock wiring, LEDs, and switches.


Figure 2-14: Analog Display Clock Wiring, LEDs, and Switches

Refer to the next section for information regarding double-mount installation of display clocks.


Figure 2-15: Double-mounting Analog Display Clocks

To double-mount display clocks (Figure 2-15), Spectracom recommends the following procedure:

1. Wireless Clocks can be powered using two D-cell batteries, from a 24 VAC source, from a 110 VAC source, or from a 220 VAC source. Install the batteries before mounting the display clock(s).
2. Screw the mounting bracket to the double gang box using the four inner holes on the mounting bracket, or mount the mounting bracket directly to the wall or ceiling using the four outer holes.
3. Insert the wires through the mounting bracket ( $220 \mathrm{~V}, 110 \mathrm{~V}$, and 24 V installations only)
4. Fish the wires through the clock hanging rod.
5. Secure the hanging rod to the mounting bracket with the appropriate screws. Place the cover over the connection.
6. Connect the wiring as shown in Figure 2-14 ( $220 \mathrm{~V}, 110 \mathrm{~V}$, and 24 V installations only).
7. Plug the connectors into the movements ( $220 \mathrm{~V}, 110 \mathrm{~V}$, and 24 V installations only).
8. Place the clocks on the double mount housing and tighten the screws to secure the clocks as shown above.

### 2.5.1 Synchronizing to the Transceiver

1. Install the transceiver.
2. Pick the location of the display clock(s).
3. Place each display clock in a location where the signal is available from the transceiver. In order to verify that the clock is receiving a signal from the transceiver, power up the clock. (This can be done simply by removing the clock's battery cover, installing two D-cell batteries, and replacing the battery cover.) The display clock should indicate the transceiver's transmitted time within five minutes of power-up. If the clock does not correct to the transceiver time, choose a different location for the clock.
4. Repeat steps 2 and 3 for each display clock. Remember as you test each clock that display clocks can receive and repeat signals from and to each other, not just from the transceiver unit.

NOTE: The transceiver transmits once per minute. Batterypowered wireless analog clocks transmit once every two hours in normal mode and once every four hours in economy mode. Refer to Conserving Battery Power to toggle economy mode.

### 2.5.2 Conserving Battery Power

To toggle economy mode, press Switch \#1 and Switch \#2 (on the back of the clock) simultaneously. When in economy mode, the diagnostic LED will illuminate solid green for one minute and the second hand will move to numeral 8 . When in normal mode, the diagnostic will illuminate solid red for one minute and the second hand will move to numeral 5 .

### 2.5.3 Manually Transmitting and Receiving

To synchronize display clocks after initial installation, you may wish to send or receive time signals manually:

Pressing Switch \#2 twice in rapid succession will enable the receiver manually for ten minutes, allowing the clock to receive the time signal. The second hand will move to the 20 second location until the signal is received. The clock will then resume normal operation.

Pressing Switch \#2 once will enable the clock transceiver for ten minutes, allowing the clock to transmit the time signal. The clock transceiver can be enabled only if the clock has received a time signal within the last 12 hours. In this case, the second hand will move to the 40 second location. The clock will resume normal operation after ten minutes.

### 2.5.4 Testing the Distance Between Clocks Used as Repeaters

If display clocks distributed through a facility or across a campus are too far apart, they may fail to transmit/repeat time to each other. If during installation all clocks do not correct for the transceiver's time, find the corrected, synchronized clock closest to the first unsynchronized clock. Press Switch \#2 on the synchronized clock. The second hand should move to 40 seconds and the clock should stop running. This indicates that the synchronized clock is now in transmission mode.

Go to the unsynchronized clock and press Switch \#2. The second hand should move to 20 seconds until the unsynchronized clock receives the signal from transmitting, synchronized clock. The previously unsynchronized clock should correct for the synchronized time within five minutes. Within ten minutes, the first clock (the clock used to transmit time) should resume normal operation.

Continue this troubleshooting process with all clocks that failed to correct for the transceiver's transmitted time. Remember that while one clock is transmitting, you may synchronize multiple display clocks within range of receiving the transmitted signal. Each clock you synchronize as you move farther away from the transceiver extends the range at which you can synchronize more clocks.

## 3 Configuring 6-Digit Digital Clocks

Spectracom Wireless Clock Systems incorporating six-digit display clocks offer certain features not found on four-digit display clocks. Configuration of these clocks therefore differs from four-digit models.

Unlike four-digit display clocks, six-digit display clocks do not have jumpers. All feature programming and configuration is performed at the clock. If your six-digit display clocks will be used with other systems and infrastructure, refer to the detailed wiring specifications in Figure 3-1.

NOTE: These wiring details include specifications for the Digital Timer System control box. For more information, refer to the Digital Timer System Instructions, which are provided with your Digital Timer System.

### 3.1 Configuring Six-Digit Clocks Individually

After your six digit clocks are installed, configure their display options at the individual clocks themselves. There are two buttons on the right side of the clock that are used for this purpose. (The top button, pressed by itself, sets the hours, while the bottom button, pressed by itself, sets the minutes. You will not need to set the clock time because your wireless system governs this.)

Press both buttons together to put the clock in programming mode. Press the top button to advance the option and press the bottom button to change the option. To exit programming mode, continue to press the top button until the time is displayed (after option 40 ).

NOTE: When the LED in the top left corner of the unit is illuminated, the time is displayed in PM hours.


Figure 3-1: Detailed Wiring for 6-Digit Digital Clocks


Once programming mode has been entered, the number "1" will appear in the far left position. Option 1, for example, sets the year, while options 2 and 3 set the month and day. It is not necessary to change the year, month, or day manually because system time is driven by the wireless clock system.

Press the top button (the "Set Hour" button) to advance the option until the number displayed matches the numbers described herein (the left-hand numbers). Press the bottom button (the "Set Minute" button to change the option as described, configuring your clocks as required.

NOTE: Do NOT change options that are not listed in these instructions. Changing options unnecessarily may alter the configuration of your clock. Scroll through options not described herein and change only those options listed (and necessary).

After each option is set as desired, use the top button (the "Set Hour" button) to scroll to the next option you wish to configure.

Option 4: Set 12 or 24-Hour Mode


Option 5: Set Daylight Saving Time
Use the bottom button (the "Set Minute" button) to change the option to 1, 2, or "d."
1: Pre-2007 DST Rule
2: Post-2007 DST Rule
d: Disable DST Rule

Option 6: Set Alternating Time/Date Display
Use the bottom button (the "Set Minute" button) to change the option to "E" or "d."
E: Enable alternating time display (switches from time to date and back automatically)
d: Disable alternating time display

Option 8: Set Brightness
Use the bottom button (the "Set Minute" button) to change the option to 0 or 1 .
0: Normal Brightness
1: Brightest Setting

Option 13: Activate or Deactivate Loss of Communication Alert
Use the bottom button (the "Set Minute" button) to change the option to "E" or "d".
E: Enables the option, allowing the user to scroll to Option 14 to set the alert.
d: Disables the option. Use this option when the clock is used independently.


Option 14: Set the Loss of Communication Alert
This option allows the user to set the delay after which the clock's digital colon will flash to indicate a loss of communication from the transceiver. Use the bottom button (the "Set Minute" button) to change the option from among the ten possible choices.
1: 5 minutes
4: 30 minutes
7: 90 minutes
10: 240 minutes
2: 10 minutes
5: 45 minutes
8: 120 minutes
3: 15 minutes
6: 60 minutes
9: 180 minutes

Option 20: Disable the Programmable Relay
Option 20 must be set to "d" to disable the programmable relay, which does not apply to your product. Use the bottom button (the "Set Minute" button) to select "d" from among the available numerical options. Do not choose settings1 through 9.

Option 30: Disable Auxiliary Input Control
Option 30 must be set to "d" to disable the programmable relay, which does not apply to your product. Use the bottom button (the "Set Minute" button) to select "d" from among the available options. Do not choose "E".

## 4 Troubleshooting

Spectracom NetClock Wireless Clocks are not field-serviceable and must be returned to the factory for repair. Users may, however, troubleshoot the system using the following guidelines.

### 4.1 Transceiver Troubleshooting Tips

If the following troubleshooting tips do not cover your installation issue, contact Spectracom Customer Support at US +1.585 .321 .5800 .

NOTE: For RS-485 connections, time zone offset and DST rules are configured in the NetClock unit and NOT configured in the transceiver if you are using a NetClock as an external timing reference. The NetClock remote output (RS-485) must be set to Format 0, 1200 baud only. Refer to the NetClock manual for more information.

### 4.1.1 Transceiver Will Not Synchronize to External Timing Reference

Check the connection from the reference to the transceiver. Refer to the NetClock instrtuction manual for more information. If necessary, contact Spectracom Customer Support at US +1.585.321.5800.

### 4.1.2 Transceiver Does Not Power Up

Make sure the power cord is securely and properly connected. There is no power switch as such. Power is applied when the unit is plugged in.

### 4.2 Clock Troubleshooting Tips

If the following troubleshooting tips do not cover your installation issue, contact Spectracom Customer Support at US +1.585 .321 .5800 .

### 4.2.1 Digital Clock Does Not Receive Signal (Colon Blinking)

Take the clock within close proximity to the transceiver and power up the clock. If the clock still does not synchronize, call Spectracom Customer Support at US +1.585.321.5800.

### 4.2.2 Digital Clock Does Not Power Up

Make sure the wiring is correct. If the clock is 24 volt, the power should be on the orange and yellow wires of the harness. If the clock is 110 volt, the power should be on the black and white wires. The middle wire is ground. If the wiring is correct, take a voltmeter and measure the voltage. For 24 volt models, the voltage should be between 14-28 volts. For 110 volt models, the voltage should read 85-135 volts.

### 4.2.3 Analog Clock Hands Do Not Move After Power-Up

The clock should move at normal speed upon power up. If it does not move at normal speed, check the battery and make sure the clock receives power. Also, be sure to remove the pin prior to starting up the clock. If the clocks are 24 volt or 110 volt, verify the wiring.

### 4.2.4 Analog Clock Does Not Receive Signal

Take the clock within close proximity to the transceiver and power up the clock. If the clock is battery operated, remove the battery and put the battery back in again.

Press Switch \#2 on the clock closest to the clock that isn't working. The second hand will go to 8 , notifying the user that the clock is transmitting the signal. Go to the clock that isn't working and press Switch \#2. The second hand will go to 4 , notifying the user that it is searching for the signal. If the clock still does not correct, call Spectracom Customer Support at US +1.585.321.5800.

### 4.2.5 Analog Clock Displays Incorrect Time

Perform Diagnostic \#1 in order to find the last time that the clock received the time signal. Perform Diagnostic \#3 to check the gears for the clock.

### 4.2.6 Desire to Verify Analog Clock Signal Quality

Perform Diagnostic \#2.

### 4.2.7 Signal to Desired Clock Location Receives is Marginal

Reposition the transceiver or install a clock to act as a repeater.

### 4.2.8 Distance Between Clocks is Too Great

Install a repeater to provide additional range between clocks.

### 4.3 Analog Diagnostic 1

In order to enter the diagnostic mode, press Switch \#1 (Figure 2-14). The number of times the switch is pressed determines which diagnostic is applied. The LED between the two switches will start flashing green. The number of flashes corresponds to the diagnostic number.

Diagnostic 1 determines how long (in number of hours) it has been since the clock last received the communication signal. In order to enter Diagnostic 1, press and release Switch \#1 only once. The LED should indicate green and flash once every three seconds.

1. While in diagnostic modes, the clock's hour and minute hands will continue to run normally.
2. The second hand will display how long it has been since the clock received a time signal (Table 4-1).
3. After three minutes, the clock will resume normal operation.

| Second <br> Hand <br> Position | Time Since Clock Last <br> Received Communication Signal |
| :---: | :--- |
| $\mathbf{1 2}$ | Within the past hour |
| $\mathbf{1}$ | Between one and two hours ago |
| $\mathbf{2}$ | Between two and three hours ago |
| $\mathbf{3}$ | Between three and four hours ago |
| $\mathbf{4}$ | Between four and five hours ago |
| $\mathbf{5}$ | Between five and six hours ago |
| $\mathbf{6}$ | Between six and seven hours ago |
| $\mathbf{7}$ | Between seven and eight hours ago |
| $\mathbf{8}$ | Between eight and nine hours ago |
| $\mathbf{9}$ | Between nine and ten hours ago |
| $\mathbf{1 0}$ | Between ten and eleven hours ago |
| $\mathbf{1 1}$ | More than eleven hours ago |

Table 4-1: Second Hand Positions and Time Indications

### 4.4 Analog Diagnostic 2

In order to enter the diagnostic mode, press Switch \#1 (Figure 2-14). The number of times the switch is pressed determines which diagnostic is applied. The LED between the two switches will start flashing green. The number of flashes corresponds to the diagnostic number.

Diagnostic 2 determines the quality of the time signal. In order to enter Diagnostic 2, press and release Switch \#1 twice. The LED should indicate green and flash twice every three seconds.

1. While in diagnostic modes, the clock's hour and minute hands will continue to run normally.
2. The second hand will display the quality of the time signal as a percentage on the dial of the clock. It will move from 1 to 10 , with 1 being the best signal and 10 being the weakest signal.
3. After three minutes, the clock will resume normal operation.

### 4.5 Analog Diagnostic 3

In order to enter the diagnostic mode, press Switch \#1 (Figure 2-11). The number of times the switch is pressed determines which diagnostic is applied. The LED between the two switches will start flashing green. The number of flashes corresponds to the diagnostic number.

Diagnostic 3 tests the mechanical portion and some of the electronic components of the clock. In order to enter Diagnostic 3, press and release Switch \#1 three times. The LED should indicate green and flash three times every three seconds.

If an error occurs, the clock will flash the red LED to signal the error code number (Table 4-2). While in Diagnostic 3, the clock will perform the following steps:

1. Clock moves second hand to numeral 12.
2. Clock moves second hand again to numeral 12, to verify that the hands arrived after 60 pulses.
3. Clock moves minute and hour hands to the next known position.
4. Clock moves minute and hour hands again to the same known position in order to verify that the hands reach the position after 720 pulses.
5. Clock moves the hour and minute hands to numeral 12.

| Red <br> Flashes | Diagnosis of Error Code |
| :---: | :--- |
| 1,2 | Problem with the second hand. Check to see if the <br> hands are striking each other. Repeat the test. |
| $3,4,5$ | Problem with the hour and/or minute hands. Check <br> to see if the hands are striking each other. Repeat <br> the test. |
| 6 | Call Spectracom Customer Service at US <br> +1.585 .321 .5800 |

Table 4-2: Error Codes

| Document Revision History |  |  |  |  | Date |
| :---: | :---: | :--- | :--- | :---: | :---: |
| Rev | ECN | Description |  |  |  |
| A | 2023 | First draft of Spectracom instructions. |  |  |  |
| B | 2129 | Reformat, add reference to power cord installation. |  |  |  |
| C | 2234 | Added alternate digital board wiring diagram, analog 200V variant wiring. |  |  |  |
| D | 2380 | Removed material applicable to Digital Timer System and added information <br> about lower-power transceiver option. |  |  |  |
| E | 2381 | Added section for 6-digit clock wiring and programming. |  |  |  |
| F | 2398 | Revised manual for new transceiver; added repeater info. Revised analog clock <br> diagnostics; added economy mode info. |  |  |  |
| G | 2425 | Revised power cord installation procedure; added information concerning rack- <br> mount antenna. |  |  |  |
| H | 2670 | Updated images for mounting / double-mounting Digital and Analog display <br> clocks. Updated caution \& warning notes to use new standard table. Additional <br> minor typographical corrections and maintenance. | June 2011 |  |  |

## Spectracom Corporation

1565 Jefferson Road
Rochester, NY 14623
www.spectracomcorp.com
Phone: US +1.585.321.5800
Fax: US +1.585.321.5219

