Installation Manual V5.1

SMA 4000 TalkBack Network Repeater

Current as of April 2019

SMA 4000 TalkBack Network Repeater

Table of Contents

*Manuals may change without prior notice

Important Safety Instructions

⚠ DANGER

⚡ SHOCK HAZARD

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

NOTICE

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

⚠ WARNIMG

FIRE HAZARD

- Always follow your national and regional electrical codes or ordinances.
- The AC power circuit for the device 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 device, 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.

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System Preparations

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

1) The repeater should be installed close enough to the network switch or router that the user can run data cable between both devices. The accepted maximum distance for CAT5/CAT5e/CAT6 cable is 328 feet (100 meters).

2) The repeater must be placed in a location where the signal is not interfered with or blocked. Be aware of large structures made of stone, concrete, bricks, or sheet metal as these materials will block a wireless signal. The installer should also be aware of other objects that may cause interference to the transmission including, but not limited to, large tanks of salt water, old microwave ovens, and large industrial machines.

3) The repeater must be within range of at least one wireless secondary clock. The maximum transmission distance of the repeater in an unobstructed, open space is 3300 feet (1000 meters). Obstructions will reduce this distance, particularly obstructions made of the materials mentioned in the previous paragraph.

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5

Repeater Installation

Description	Quantity	Picture
Network Repeater	1	

Description	Quantity	Picture
Paper Mounting Template M-SMA1-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	

Repeater Installation

1) Use the provided template and a leveling device to mark four points on the wall.

6 and 15/16in (15.08cm)
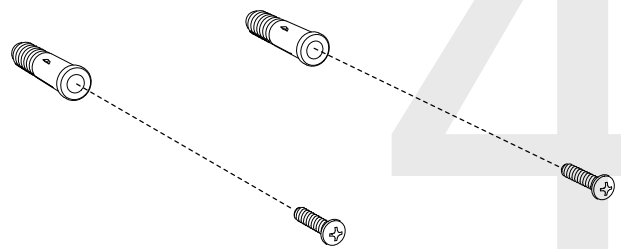
5 and 3/4in
(14.61cm)
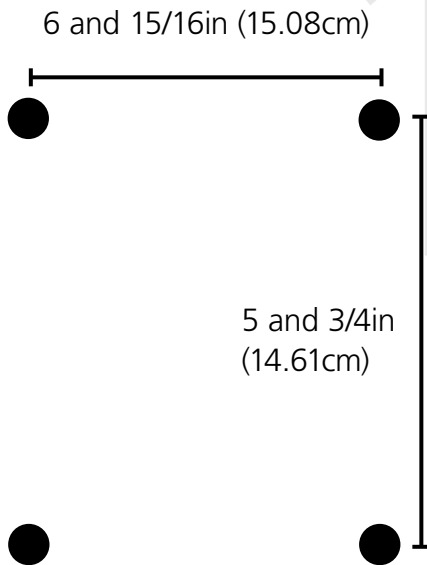
2) Use a drill to drill holes into the wall at the marked locations.
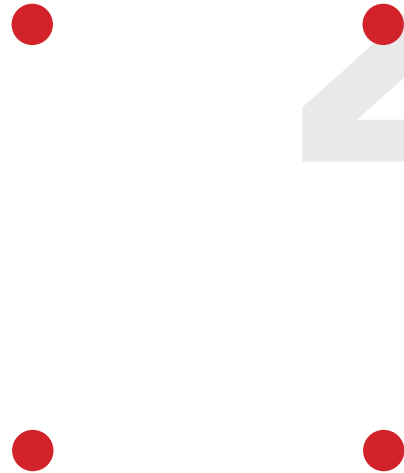
3) Insert the wall anchors into the holes.
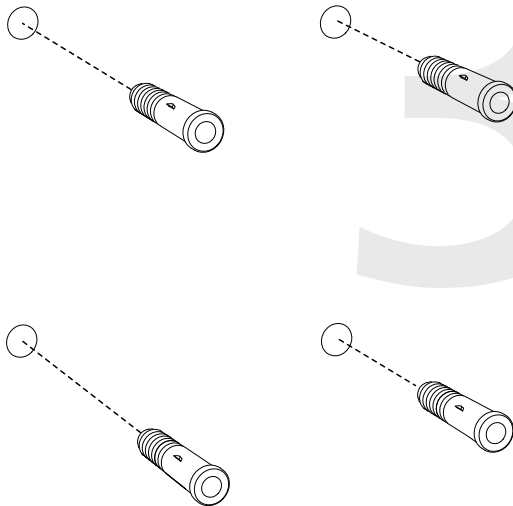
4) Insert the sheet metal screws into the wall anchors.
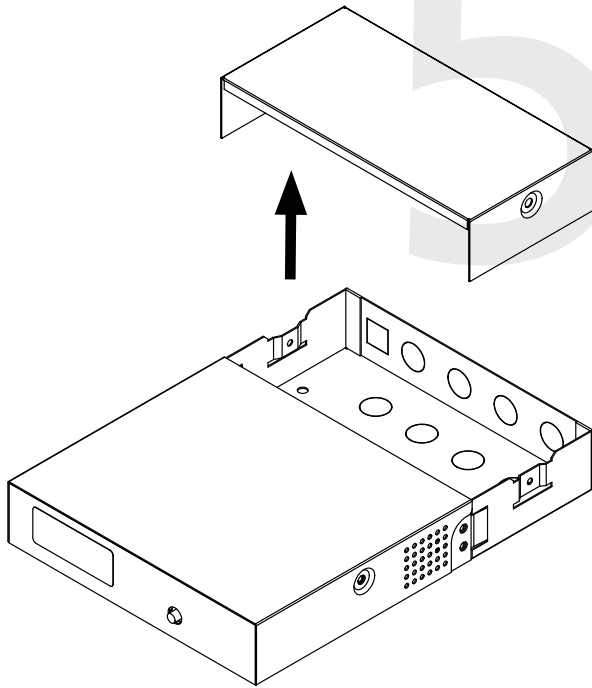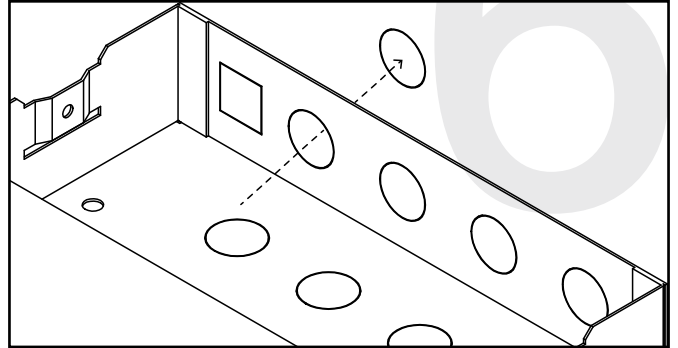
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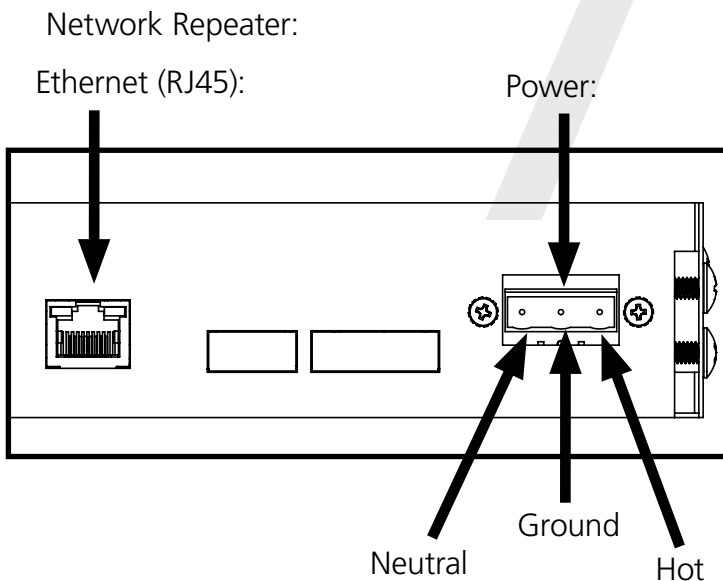www.sapling-inc.com

Repeater Installation

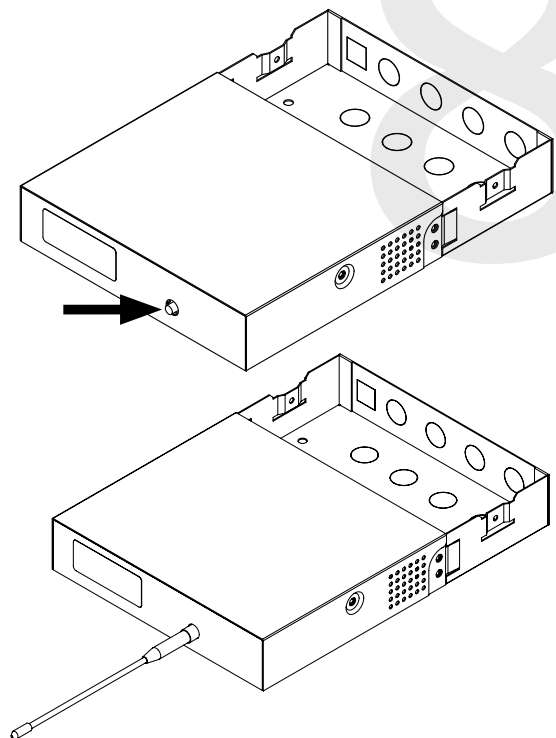5) Unscrew the bottom panel from the wireless repeater.

6) Remove at least one metal punch-out from the bottom of the wireless repeater and thread the power/data cables through the hole.

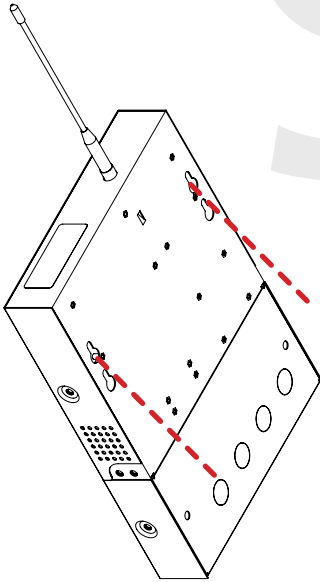7) Attach the power and data cables.

8) Attach the antenna to the output port on top of the device.

Network Repeater:

Ethernet (RJ45):
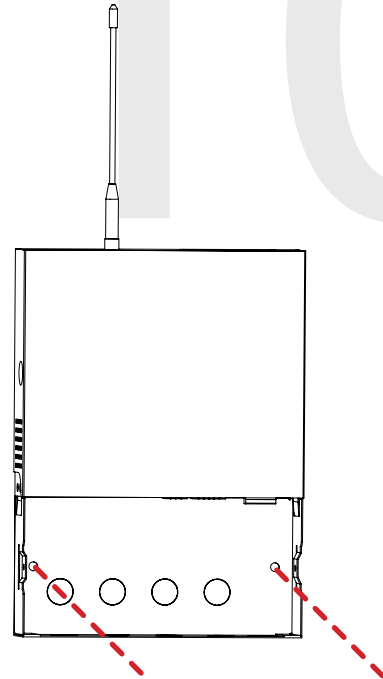
Power:

Neutral

Ground
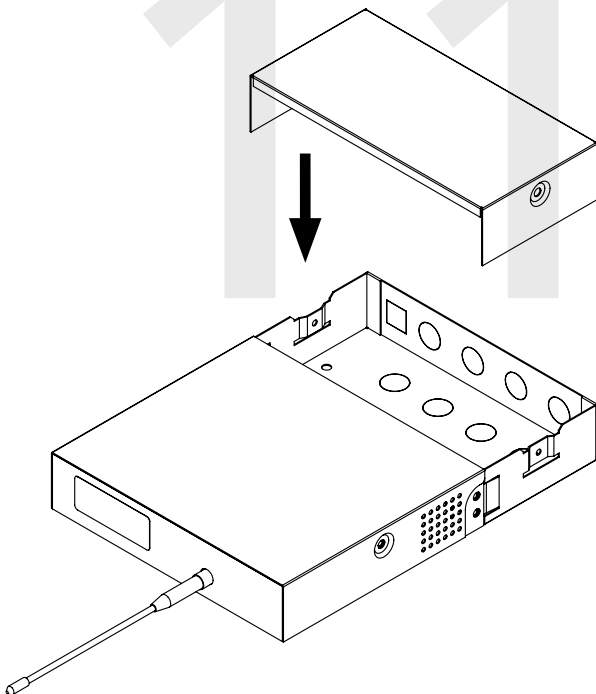
Hot

Repeater Installation

9) Hang the wireless repeater 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) Reattach the bottom panel.

12) The transmitter will begin to transmit as soon as it is powered and is receiving time data.

Connecting to the Repeater

Network Monitor:

As long as the Network Repeater is on the network, it will appear on any Network Monitor that runs on a computer on the same subnet. Double-clicking on the same line as the Network repeater will take the user to the repeater's web interface.

For more information on the other functions of the Network Monitor, refer to the Analog or Digital IP Clock Manuals. These manuals are available online at sapling-inc.com/manuals/

Name	Serial Number	Type
IP Clock 1	9999	IP Digital
Los Angeles	10373	IP Digital
IP 10562	10562	IP Analog
Sydney	10378	IP Digital
Network Repeater	5537	Network Rptr
IP 9678	9678	IP Digital
Dubai	10376	IP Digital

If you have multiple network repeaters, you will need to tell them apart by their Serial Numbers. Once you have accessed the web interface, you will be able to change the name of each repeater, making them easier to identify on the Monitor.

There are two methods for connecting to the repeater for the first time; Static IP and DHCP. The repeater is shipped in DHCP configuration.
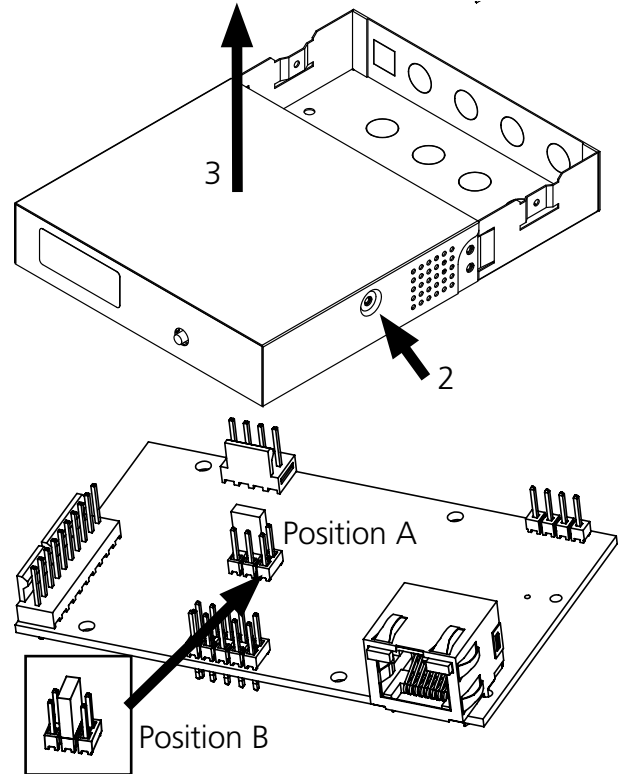
DHCP:

1) Locate the device's Serial Number. It will be printed on a rectangular sticker located next to the antenna port.

2) Power the clock and attach the data cable to the RJ45 port, as shown in Installation step #7.

3) Use the Network Monitor to identify the network repeater. Look for the serial number as a way of identifying the device.

4) Doube-click on the matching serial number to access the web interface.

Connecting to the Repeater (ctd.)

Method 2

Static IP:

1) POWER DOWN AND UNPLUG the repeater.

2) Use a screwdriver to unlock the top panel.

3) Lift the top panel away from the repeater casing.

4) Identify the circuit board in the diagrams on the right.

5) Locate the black jumpers on the board. Move the jumper from Position A to Position B.

6) Attach the repeater to the network. On a computer attached to the network, the repeater should be accessible by typing IP address **192.168.0.123** into a web browser.

7) Log in to the clock by entering the password **6063** into the password field, then pressing the Log In button.

8) On the Network Settings Tab, set DHCP to OFF.

Network Repeater

Gateway IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
DNS Router:	192.168.0.31
IP Address:	192.168.1.135
MAC Address:	60:36:96:06:00:64
DHCP:	On ▼
Broadcast to Monitors:	On ▼
Send Specific Monitor IP:	Off ▼
Monitor IP Address:	0.0.0.0
Ethernet Speed:	Auto Negotiate ▼
Connection Mode:	Auto Negotiate ▼

Submit

9) Set the following values: **Gateway IP Address, Subnet Mask, DNS Router,** and **IP Address.** If you need help with these values, ask your Network Administrator for assistance. Record the new IP address in your records.

10) Press the Submit button, log out of the network repeater, and power down the device.

11) Move the jumper from Position B back to Position A, then use the screwdriver to reattach the front panel.
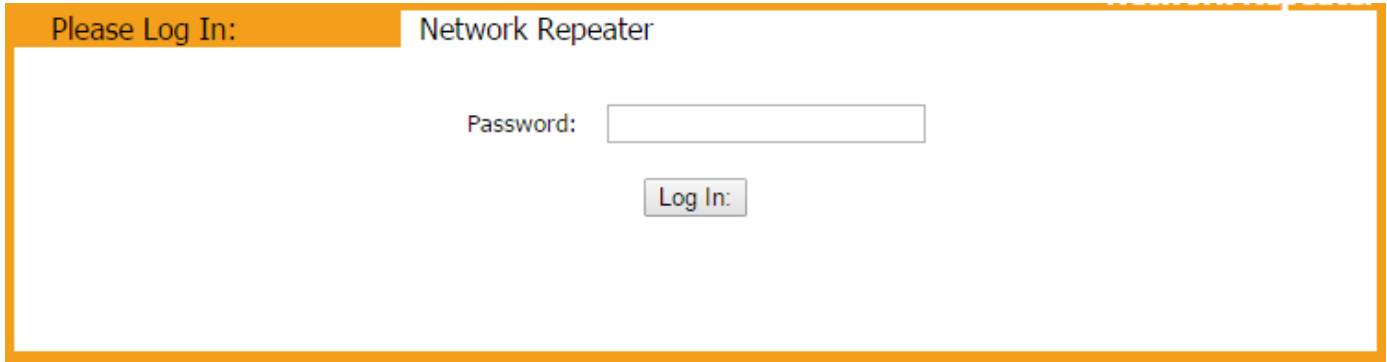
12) Power the device. Attempt to use the new IP address in a web browser to reach the repeater's web interface.

If you successfully reach the web interface, then the repeater's network settings have been properly configured. If you do not reach the web interface, reattempt the setup, starting from the beginning.

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Web Interface - Log In

Please Log In:	Network Repeater
	Password: [ ]
	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 repeater.

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

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

Web Interface - Clock 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. Clock Name - This field allows the user to set the name for the repeater. This name will only appear on the Web Interface and Network Monitor Software.

4. Clock Number - This field displays the repeater's Serial Number. This value cannot be changed.

5. Network Sync Every - This field allows the user to determine how often the Network Repeater updates its time from a Sapling Master Clock.

6. 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).

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Web Interface - Clock Settings (ctd.)

Clock Settings	Network Repeater

User Password: [   ]
Confirm Password: [   ]
Technician Password: [   ]
Confirm Technician Password: [   ]
Clock Name: [Network Repeater]
Clock Number: [1100]
Network Sync Every: [5 Minutes ▾]
Bias Seconds: [+0]
7 GMT Offset: [-5]
8 Forward Countdown and Message: ☑
9 [Submit]
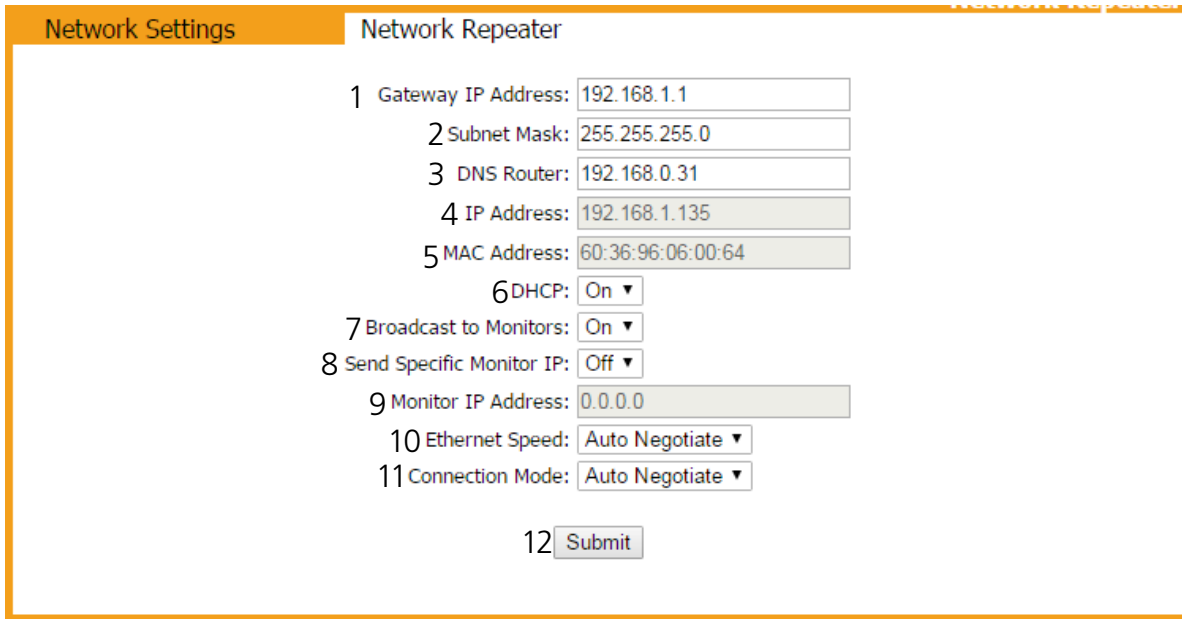
7. GMT Offset - This field sets the time zone relative to Greenwich Mean Time (GMT) also known as Coordinated Universal Time (UTC). Under this system, time zones in Asia, Australia, and most of Africa and Europe have a positive hour offset, while time zones in North and South America have a negative 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

8. Forward Countdown Message - When selected, the Network Repeater will forward countdown messages sent by the master clock.

9. Submit - This button, when pressed, saves and applies all of the selections to the repeater.
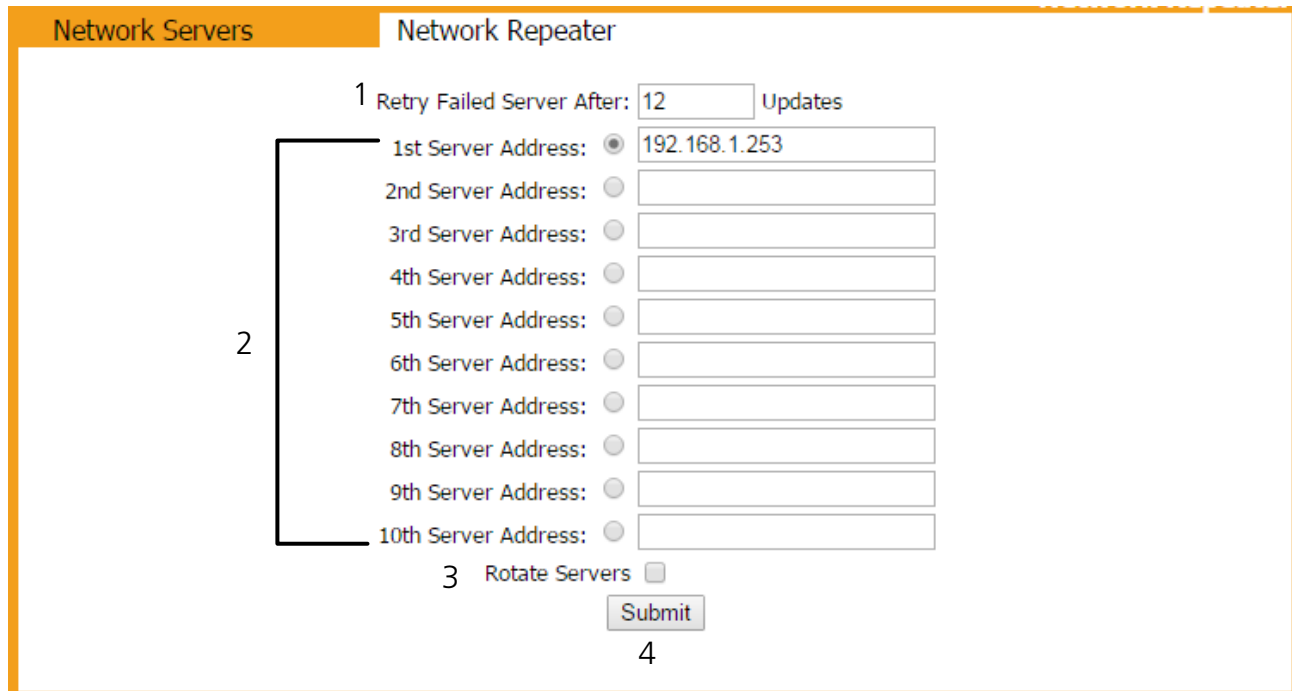
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Web Interface - Network Settings

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

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

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

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

5. MAC Address - This field displays the MAC address of the repeater. This value cannot be changed.

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

7. Broadcast to Monitors - When set to ON, allows any device that is on the same subnet as the Network Repeater to discover it with the Network Monitor software. When set to OFF, the Network Repeater will not appear on the Network Monitor. Port 1777 must be open to allow the repeater to broadcast to devices running Network Monitor software.

8. Send Status to Monitor on Specified IP - When set to ON, allows the repeater to talk to the Network Monitor Software at a specific IP address. This is particularly useful for addresses that exist outside of the repeater's subnet.

9. Monitor IP Address - Allows the user to select the destination address for the unicast mentioned
in setting 8.

10. Ethernet Speed - This field allows the user to set the Ethernet Speed at 10MBit, 100MBit, or allows the repeater to Auto Negotiate the speed with the Network Router/Switch.

11. Connection Mode - This field allows the user to set the connection mode to Full Duplex, Half Duplex, or allows the repeater to Auto Negotiate the mode with the Network Router/Switch.

12. Submit - This button, when pressed, saves and applies all of the selections to the repeater.

*Setting 6 to ON overrides the entries for the Gateway IP address, Subnet Mask, and IP Address

14

Web Interface - Network Servers

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

2. Master Clock Addresses - These fields allow the user to create a list of master clocks to be used as sources for synchronized time. Each used field should have an IP address for a functioning Sapling master clock. At least one field must be filled for the repeater to acquire time data. A user may select which address the repeater should contact first by clicking on the white circle to the left of the desired field. Valid addresses that fail to return time data when queried are highlighted in red.

3. Rotate Servers - When the box is selected, the repeater will attempt to acquire time data 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 repeater will acquire time from the first master clock address on the first update, the second master clock on the second update, and so on. Empty fields are not treated as functioning addresses and are skipped.

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

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Web Interface - Clock Status

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

1. NTP Details - When clicked, this button provides additional details about the repeater's synchronization history.

2. Resync NTP Now - When clicked, this button forces the repeater to synchronize with the master clock immediately.

3. Reset NTP History - When clicked, this button resets all of the data in the NTP Details window.

4. Reset Time Drift Data - When clicked, this button resets the following fields on the Clock Status page: Cumulative Drift, Cumulative, Drift per Hour, Avg Diff Server vs Clock, Worst Diff Server vs Clock.

Web Interface - DST (Daylight Saving Time)

1. Daylight Saving Time Selection - This drop down list gives four options for configuring Daylight Saving Time:
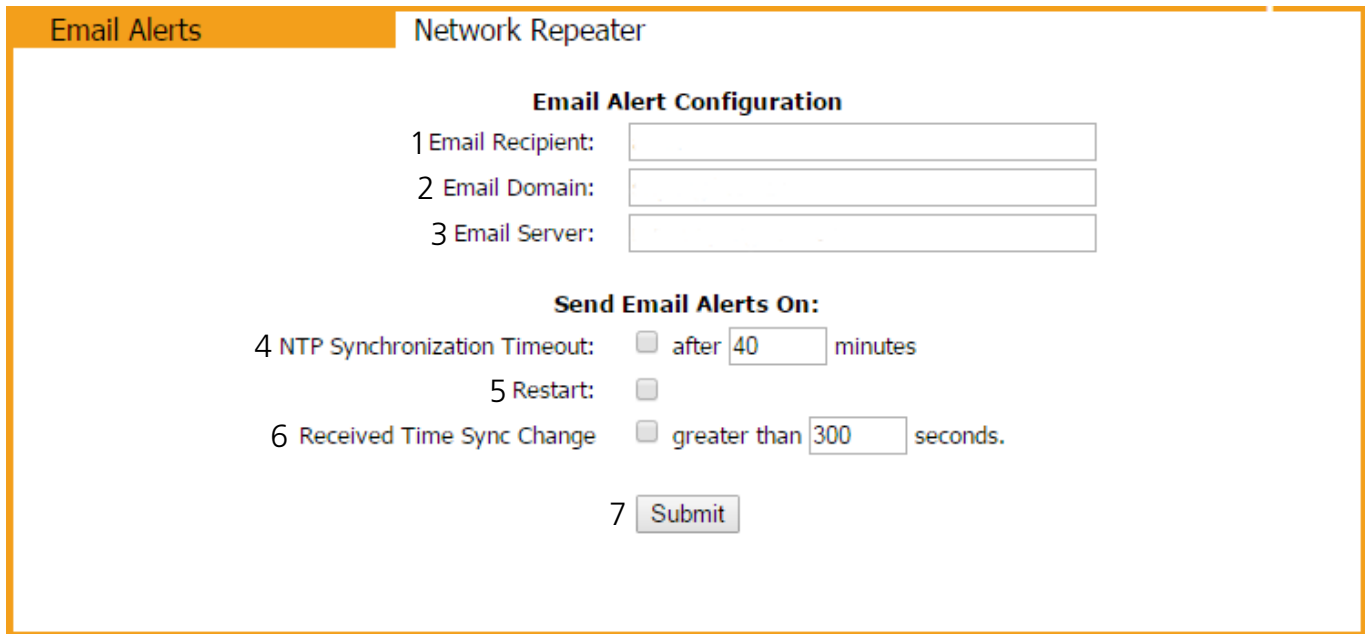
- None - When this option is selected, Daylight Saving Time is not applied.
- By Country - When this option is selected, the Daylight Saving Time can be chosen based on the established DST laws of a country. For instance, if the United States is selected in the Configuration Area, then the repeater will 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 November 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.

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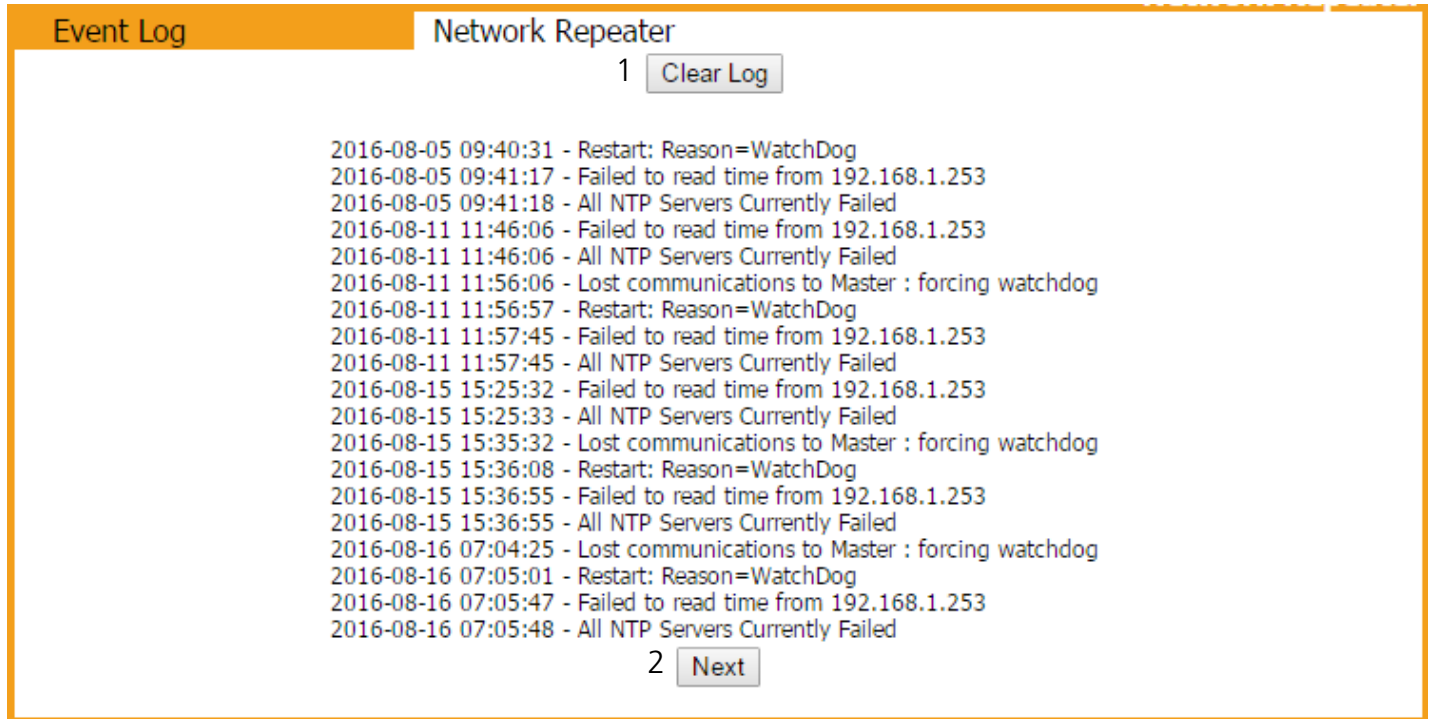
4. NTP Synchronization Timeout - When the box is checked, the repeater checks the amount of time since the last time data signal has been received. If the amount of time recorded exceeds the amount of time specified in the box to the right, then the repeater sends an email alert. If this option is selected,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

5. Restart - When the box is checked, the repeater sends an email alert every time that it is restarted (including after power loss or deactivation by the user).

6. Received Time Sync Change - When the box is checked, the repeater will check to determine if the latest synchronized time received from the master clock is greater than the stored time. If the time change is larger than the value entered into the box on the right, then the repeater will send an email.

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

Web Interface - Log

1. **Clear Log** - When clicked, this button deletes all of the information on the Log page.

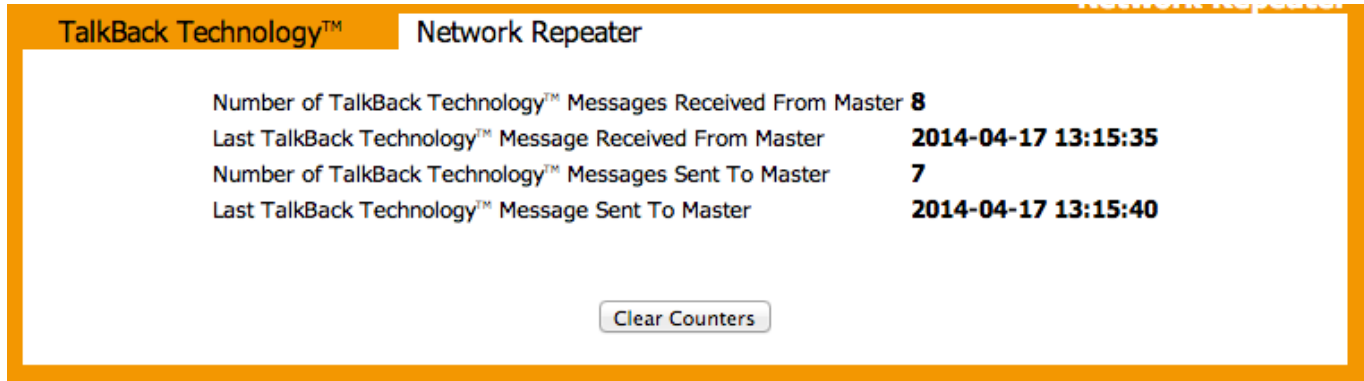2. **Next** - When clicked, this button displays the next page of log entries.

Each log entry will display the date and time of the event, along with a note describing the event being logged.

The log shown here demonstrates a repeater that cannot find its master clock on the network and is performing self-correction restarts ("WatchDog"). A properly configured repeater will not have as many entries.

Web Interface - TalkBack Technology

1. **Number of TalkBack Technology Messages Received From Master** - Displays the number of TalkBack messages sent from the master clock to the secondary clocks through the repeater.

2. **Last TalkBack Technology Message Received From Master** - Displays the time and date of the last event where the repeater received a TalkBack message from the master clock.

3. **Number of TalkBack Technology Messages Sent to Master** - Displays the number of TalkBack messages sent from secondary clocks to the master clock through the repeater.

4. **Last TalkBack Technology Message Sent to Master** - Displays the time and date of the last event where the repeater received a TalkBack message from one of the secondary clocks.

5. **Clear Counters** - When clicked, this button resets the number of messages received to 0.

PAIRING IS CONTROLLED BY THE MASTER CLOCK. While a network repeater acts as a remote transmitter for the master clock, the controls to start the TalkBack pairing process can be found on the master clock's web interface. TalkBack pairing cannot be performed through the repeater's web interface.

Refer to the TalkBack Master Clock manual for detailed instructions on how to pair a secondary clock with the master clock. **Since the repeater acts as a remote transmitter, note that any instructions in the master clock manual asking the user to "place the secondary clock near the master clock transmitter" can be reinterpreted as "place the secondary clock near the network repeater."**

Frequently Asked Questions

Where is the best place to mount a Repeater?

Usually, the hallway is the best location because it is mostly open space in typical applications. Refer to the section "System Preparations" for more options and a detailed explanation.

How far can the Repeater transmit the wireless signal?

The maximum transmission distance in an unobstructed, open space is 3300 feet (1000 meters).

Will cordless or cellular phones interfere with the repeater signal?

No. The repeater uses frequency hopping technology to avoid interference from other devices. The repeater switches frequencies automatically when the receiver and transmitter is open, thus interference is avoided.

Can analog wireless clocks be combined with digital wireless clocks?

Absolutely. The analog and digital wireless clocks are designed to work together, whether the clocks are running on battery (analog wireless clock only), 24 volts or 110 volts.

My power source is 220 volts. Can the Repeater be powered on that voltage?

Yes, the Repeater can work on 110 volts/50-60 Hz or 220 volts/50-60 Hz.

Can I connect this device to my Wi-Fi network?

No. This repeater does not receive or transmit data over a Wi-Fi network.

Can this device acquire NTP time from locations other than a Sapling master clock?

No. It only accepts data from Sapling master clocks.

How may I pair my TalkBack clock to the TalkBack Network Repeater?

Refer to the instructions on the page "Web Interface - TalkBack Technology"

Can this repeater transmit time data to non-TalkBack clocks like SAL and SBL?

Yes, however it will not receive TalkBack messages from non-TalkBack clocks.

Troubleshooting

The clocks aren't receiving the signal. What should I do?

Make sure that the Repeater is powered and in a place where the signal can be transmitted in open space.

What should I do if the Repeater is not powering up?

Measure the voltage between the hot and neutral wires leading to the repeater. The voltmeter should read 85 - 135 VAC between the hot and the neutral.

Why isn't the Repeater appearing on the Network Monitor Software?

Check the following:

1) Confirm that the computer running the Network Monitor Software and the Repeater are on the same subnet.

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

FCC Wants You to Know

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. 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:

    a) Reorient or relocate the receiving antenna.

    b) Increase the separation between the equipment and receiver.

    c) Connect the equipment to an outlet on a circuit different from which the receiver is connected.

    d) Consult the dealer or an experienced radio/TV technician.

FCC WARNING

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC Rules.

Note: For precautionary measures, FCC recommends a distance of 10cm from the clock to constant human physical exposure.

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.

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