RC 500

Remote Control Up/Down Timer

User Manual

The **RC 500** is a remote control timer that adds count down and count up control features to our NTDS and TCDS clocks.

Masterclock®

Table of Contents

The RC 500 is a remote control timer that adds count-down and count-up control to NTDS and TCDS digital display clocks.

Thank you for your purchase of a RC 500 remote control timer from Masterclock

Here you'll find instructions for unpacking and installing your device, proper care and configuration.

We are here to help.

You can reach us using various contact methods (phone, email, etc.) found at our website:

www.masterclock.com

Before calling, please attempt to find the answer to your situation here. You'll find this user manual will handle virtually all of your questions.

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Introduction

The RC500 is a programmable, single channel, timer control unit. It remotely communicates with TCDS or NTDS digital time displays, providing count-up, count-down and count-to capabilities.

FEATURES

- Reference time input from NTP or stand alone with internal oscillator

- Modes include count-down, count-up and clock

- Count-down mode includes a "to time" feature

- Current mode select indicated by illuminated buttons

- UTC, local, Daylight Saving Time or custom time

- Control up to 6 TCDS clocks and devices simultaneously

- Control an unlimited number of Ethernet clocks and devices simultaneously

- All configuration settings are retained in non-volatile flash memory during loss of power

- RTC (Real Time Clock) backup retains time during loss of power or reference

- Uses RJ12 (6P6C) modular cable to interface with remote displays

- Six-digit LED display counter

- Rubber feet for tabletop use

- Stainless steel or black powder painted case

Icons Used In This Manual

Caution: This icon signifies a potential hazard, and gives tips on how to avoid them.

Important Information: This icon indicates to an important step that must be followed.

Technical Note: This icon describes technical terms and actions.

Helpful Hint: This icon suggests the general setup and practice.

Printing

While optimized for onscreen viewing, the pages of this manual are formatted for printing on 8 1/2" x 11" and A4 sized paper, giving you the option to print the entire manual or just a specific page or section.

Unpacking and Installation
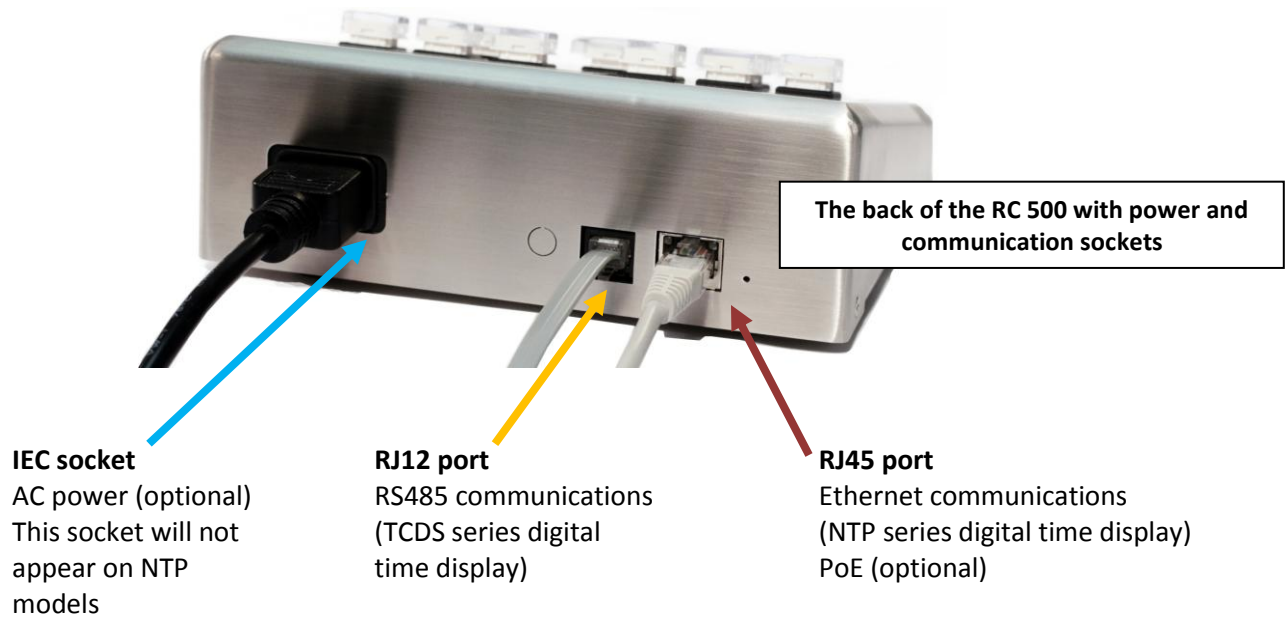
Supplied (Ship Kit)

The list below is for illustration purposes. Refer to your sales order for actual items shipped.
- RC500
- CD-ROM (WinDiscovery and User Manual)
- Power
  - AC power cord with IEC plug
  - PoE uses the CAT5 Ethernet patch cable
- Communications
  - CAT5 Ethernet patch cable (NTDS series)
  - 6P6C modular cable (TCDS series)

Cat5 Ethernet patch cable || CD with user manual and software || AC power cord with IEC plug

Connections

The back of the RC 500 with power and communication sockets

IEC socket
AC power (optional)
This socket will not
appear on NTP
models

RJ12 port
RS485 communications
(TCDS series digital
time display)

RJ45 port
Ethernet communications
(NTP series digital time display)
PoE (optional)

Network Installation

Some users will connect their RC500
to a network for external time
reference.

Others will use their RC500 '**as is**' by
simply plugging it in. If you do not use
network inputs, please refer to the
Standalone Instructions on page 13.

You may install the RC500 on your desk top. Attach power and communication at the back according to these specs:

If you ordered a PoE (Power over Ethernet) unit, plug in the CAT5 Ethernet patch cable for power and communication input/output to the RJ45 port.

If you ordered AC power, plug in the AC cord into its IEC socket (customized for your country). All AC power cords have a standard IEC female plug on one end and a country specific male plug on the other.
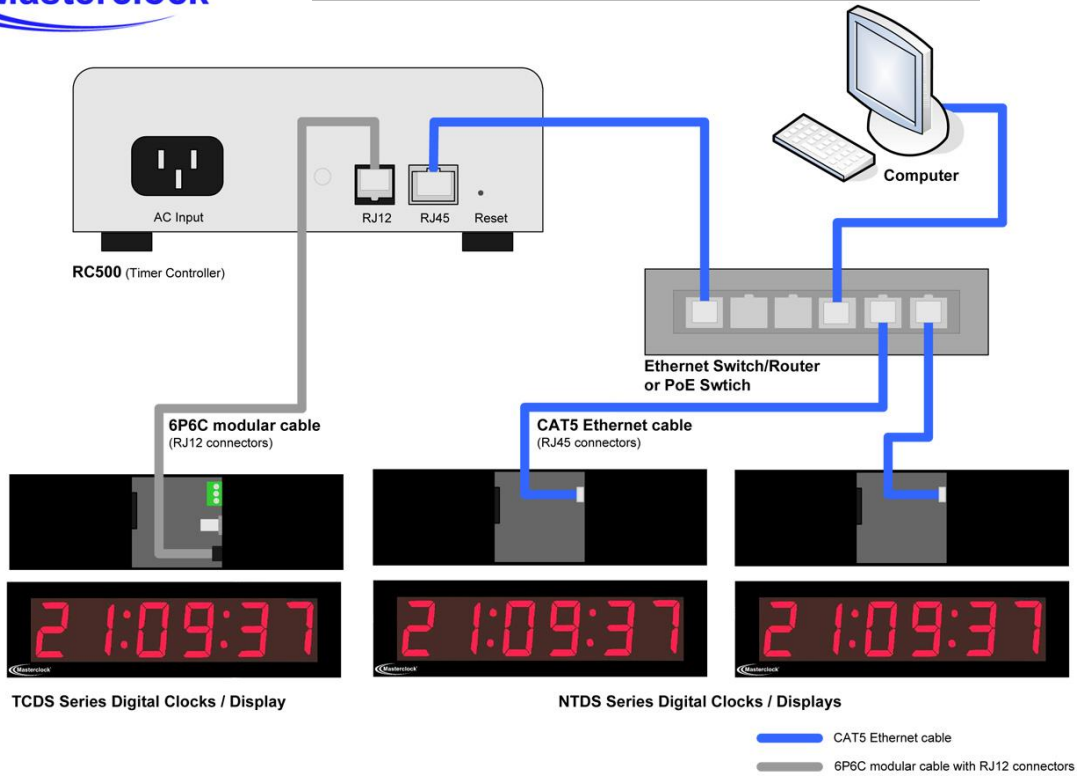
When using AC power, do not also use PoE.
Instead use a 6P6C modular cable (TCDS series) for communication input/output to the RJ12 port.

The enclosed CD contains a pdf of this User Manual and discovery/communication/configuration Microsoft Windows-based software called **WinDiscovery.** If you have not already downloaded WinDiscovery for another Masterclock product, you should do so now for your RC500. See page 16.
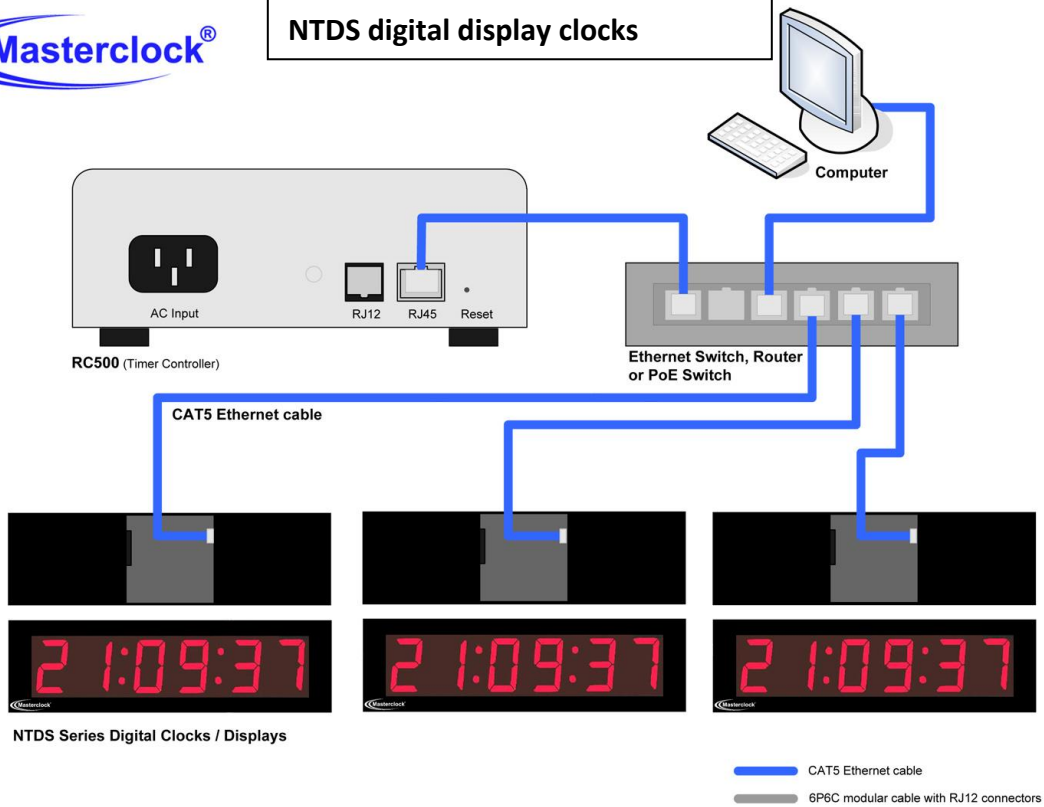
On the following page (p.6) are two sample wiring diagram solutions using the RC500, one for NTDS along with a TCDS digital display clock and one for only NTDS digital display clocks.

TCDS and NTDS digital display clocks

Computer

AC Input   RJ12   RJ45   Reset

RC500 (Timer Controller)

Ethernet Switch/Router or PoE Swtich

6P6C modular cable
(RJ12 connectors)

CAT5 Ethernet cable
(RJ45 connectors)

21:09:37   21:09:37   21:09:37

TCDS Series Digital Clocks / Display   **NTDS Series Digital Clocks / Displays**

CAT5 Ethernet cable

6P6C modular cable with RJ12 connectors

NTDS digital display clocks

Computer

AC Input   RJ12   RJ45   Reset

RC500 (Timer Controller)

Ethernet Switch, Router or PoE Switch

CAT5 Ethernet cable

21:09:37   21:09:37   21:09:37

NTDS Series Digital Clocks / Displays

CAT5 Ethernet cable

6P6C modular cable with RJ12 connectors

Interface

The top panel provides immediate access to all major RC500 functions. The panel consists of a 6 digit, 7 segments LED display along with three sets of pushbuttons.

Status LED

The colons on the LED display are used to alert the user of lock to time reference.

Colons	Description
Flashing	Time is not able to be decoded from the time reference or the reference is not present. Time displayed on the face of the unit is based upon internal RTC and may not be accurate.
On Solid	The unit acquired valid time and has synchronized its internal RTC to the time reference. The internal clock time is considered accurate.

Button Assignments

Modes

There are three mode buttons: CLOCK, UP and DOWN. Each mode performs a different operation and is listed in the table below.

Mode	Description
CLOCK	Display UTC time plus any Time Zone and/or DST information. {Standalone Menu} Exit standalone menu.
UP	Perform a count up or stop watch routine. {Clear Preset} In current mode, press to set the preset to 00:00:00.
DOWN	Perform a count-down routine. {Clear Preset} In current mode, press to set the preset to 00:00:00. {Standalone Menu} Navigate the menu options (i.e. roll through).

Interface

Set

There are three set buttons: HOUR, MINUTE and SECOND. Besides adjusting the counter preset, the buttons are used to change settings in the standalone menu.

Set	Description
HOUR	Select a preset of 0 – 24 hours.
	{Standalone Menu} Select a negative (-) Time Zone offset.
MINUTE	Select a preset of 0 – 59 minutes.
SECOND	Select a preset of 0 – 59 seconds.

Action

There are three action buttons: START, PAUSE and STOP.

Set	Description
START	Initiate or resume the count routine.
PAUSE	Pause the running count.
STOP	Terminate the count routine and reset preset for next routine.

OVERVIEW

The RC500 is a programmable, single-channel, timer control unit. The RC500 will communicate with single or multiple TCDS and NTDS digital time displays or it may stand alone.

RS485 COMMUNICATION

TCDS series of digital time displays are connected to the RC500 using the RJ12 port and a 6 wire (6P6C) straight-through modular cable.

Time stamps are sent to the RC500 every several seconds. The accuracy of the time is dependent upon the referenced time in the TCDS.

To control multiple remote clock displays using a single RC500, connect each remote clock display and the RC500 to a 6P6C male splitter (shown at left). Any remote display connected will receive commands sent from the RC500.

Do **not** connect more than one RC 500 to the same splitter. The RC500 can control up to six digital clocks.

6-WAY SPLITTER

RC500 - Connect one end of a 6P6C cable to the RC500 and the other end to a splitter.

TCDS - Connect one end of a 6P6C cable to a TCDS digital time display and the other end to the same splitter as the RC500.

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NTP (Network Time Protocol)

NTP driven clock displays are connected to the RC500 on a local Ethernet network using the RJ45 port and a CAT5 Ethernet patch cable.

Assigning the remote clock displays to your RC500 is done within the software application, WinDiscovery (page 16).

Please refer to the "Configuration" section of this document for details on using WinDiscovery and assigning remote clock displays to a RC500.

Control Button Details

THREE BUTTON SETS ON THE FACEPLATE

The "**MODE**" set controls whether you want simple clock operation, count-up, or count-down.

The "**SET**" set controls the hour, minute and second.

The remaining (lower row) set starts, pauses and stops the other two modes.

Examples

There are four modes of operation.

- Clock
- Count-up
- Count-down
- Count to Time

 The combination of LED display and illuminated buttons indicate the selected mode and current step being performed.

Below are a few scenarios of how to program and run a routine.

Clock

Press [CLOCK] to exit the "Up" or "Down" mode or the standalone configuration menu.

 Please refer to the "Configuration" section of this document for details on the standalone menu.

Count Up

Select the mode of operation by pressing the button labeled [UP].
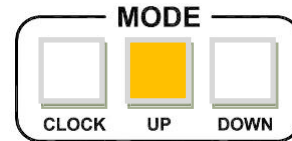
Enter the end number (preset) by pressing the [HOUR], [MINUTE] or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment.

Press [START] to send a command to the remote display and start the routine. The display will show the running count. At the end of the routine, the display on the RC500 and remote display will flash three times and hold for a command.
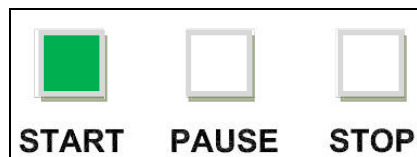
During a routine, press [PAUSE] to freeze the running count. To continue, press [START] and the routine will continue from its paused count.

To end a running count before its end number is reached; press [STOP] and the count will reset back to the preset (i.e. end number) and hold for the next command.
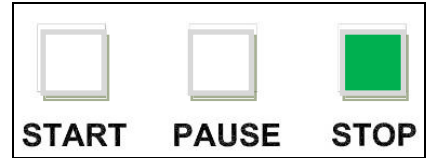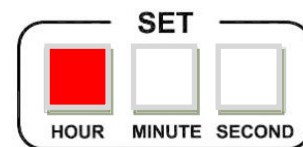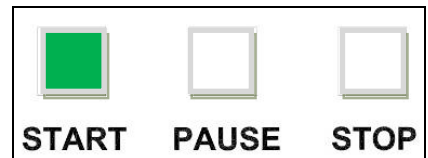

Count-down
Select the mode of operation by pressing the button labeled [DOWN].

Enter the start number (preset) by pressing the [HOUR], [MINUTE] or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment.

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Press [START] to send a command to the remote display and start the routine. The display will show the running count. At the end of the routine, the display on the RC500 and remote display will flash three times and hold for a command.

During a routine, press [PAUSE] to freeze the running count. To continue, press [START] and the routine will continue from its paused count.

To end a running count before its end number (i.e. 0) is reached; press [STOP] and the count will reset back to the preset (i.e. start number) and hold for the next command.
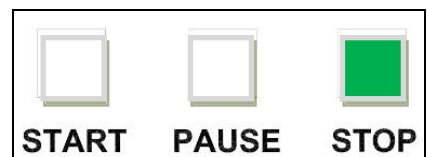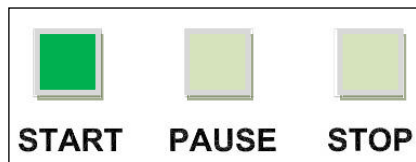
COUNT TO TIME

Select the "Count to Time" mode by pressing and holding the [DOWN] button for 2 seconds. The [DOWN] button should begin to steadily flash.

Enter the end real time of the count up by pressing the [HOUR], [MINUTE] and/or [SECOND] buttons. With each corresponding button pressed, the digit on the display will increment. Enter the Real Time that you want to the display to count-down toward in a 24 hour timescale. (e.g.: if the current time is 1:05pm and you want to count-down towards 1:30pm program the unit to 13:30. At the end of the routine, the [DOWN] button will continue to flash indicating the RC500 is currently in Count to Time mode.

Press the [START] button to send a command to the remote display and start the Count to Time. The display will show the running count to time displaying the count-down or remaining hours, minutes, and seconds until the preprogrammed real time. The preprogrammed real time may reference local or UTC or whatever "real time" was programmed into the RC500 prior to the initialization of the count time.

You cannot freeze the Count to Time routine.

To abandon the existing Count to Time, press [DOWN] again.

To release the display device, press [CLOCK].

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RC500 will auto adjust for Daylight Savings Time and Leap seconds. Therefore, if the RC500 is counting down towards a time between 0200 and 0259 on the first morning of Daylight Savings Time, the count will advance 24 hours to the first "available" time of 02**; because that time does not exist on that morning.

The Count to Time feature will automatically count down towards the next real time programmed into the RC500. Depending on the settings in WinDiscovery, the RC500 will then perform a Count-end flash and commence a negative count upwards from zero removing leading zeros. Or, will then infinitely flash all zeros.
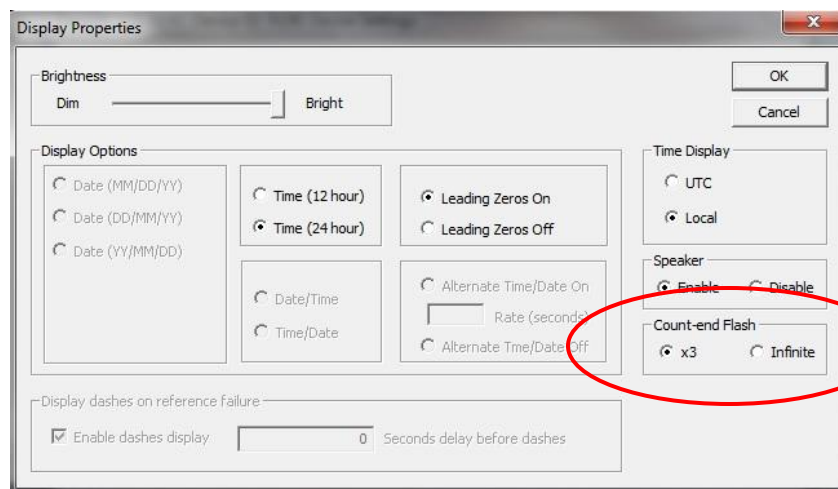
Custom Time Menu

There are situations where the end-user needs to display time differently than from a time reference. When the custom time is used, the time displayed will not have Time Zone offsets or DST applied. However the time can be displayed in 12 or 24 hour format.

Please refer to "Standalone Menu Display Properties" in the previous section of this document for configuration of display settings.

To use the custom time feature, any external time reference (i.e. time stamp) has to be removed or disabled. If the RC500 is receiving time stamps, it will display this time, not the custom time entered.

To enter the custom time menu, press [CLOCK]. If you entered the custom time menu accidently, press [CLOCK] to cancel and return to clock mode.

Enter the time, in 24 hour format, by pressing the [HOUR], [MINUTE] and [SECOND] buttons until all dashes (--) are replaced with digits. With each corresponding button pressed, the digit on the display will increment. Press and hold to enter a rapid movement.

Press [CLOCK] to exit the menu and display the custom time.

If dashes (--) are displayed, the time will not be set and the display will revert back to the internal RTC time.

When the custom time is no longer needed, there are three ways to restore time.
- Receive time stamps from TCDS or lock to a NTP time server
- Cycle power by removing the AC power cord for a few seconds
- Reset RC500 to factory defaults

Please refer to "Reset Configuration to Factory Default" in the next section of this document for details on resetting the RC500. All user configurations will be cleared.

Standalone Menu Display Properties

The RC500 can be customized to display time in a variety of formats and brightness levels.

To enter the configuration menu press and hold [CLOCK] for approximately 2 seconds.

Press [DOWN] to cycle through the configuration menu.
Press [HOUR], [MINUTE] and [SECOND] to change settings.
Press [CLOCK] to exit the configuration menu.

Each menu setting will be saved until a user makes a change to the setting or the unit is reset to factory default.

Factory default settings are:

Brightness:	4
Speaker:	On
Time Display Format:	24 hour
Time Zone Offset:	0
Daylight Saving Time:	Off
Time Displayed:	Local
Leading Zero:	Off

Default Settings
br: : 4
SP: :on
hr: :24
L :00:00
dS: :off
t : :Loc
0 : :off

Brightness
This setting controls the brightness of the LED display and illuminated buttons.

There are four levels of brightness.

Brightest:	4
Bright:	3
Dim:	2
Dimmest:	1

br: : 4
: 3
: 2
: 1

Speaker
When enabled, the unit will emit a short audible tone (3.7kHz) during initialization and at the end of each timer count.

When speaker is set to off, the unit will continue to emit a short audible tone during initialization.

SP: :on
:off

Time Display Format

The unit can display time in 24 or 12 hour formats. When set to 12 hour format, the AM/PM indicator will be on during the PM hours.

hr: :24

:12

Time Zone Offset

To have the unit display time other than UTC, press [HOUR] to select positive (+) or negative (-), press [MINUTE] to select the hour and press [SECOND] to select the minutes.

L :00 :00

−:06 :00

:12 :30

Do not adjust for DST in Time Zone Offset. Set DST from the next menu setting, Daylight Saving Time.

Daylight Saving Time

There are three options for DST settings. For information of standards for United States/Canada and European Union DST, please refer to the section, "Daylight Saving Time" in the previous section of this manual.

dS: :off

:EU

:US

Time Displayed

In addition to time zone offset, the display can show UTC or local time (i.e. time zone offset + daylight saving time).

t :   :Loc

:UtC

Leading Zero

This feature will allow a "0" to be displayed for the first digit, between the hours of 1 and 9.

0:      :off

:on

*The RC500 "Display Properties" will not affect the remote clock display settings.*

Changes made using WinDiscovery will over-write the standalone settings and vice versa.

Installation

The WinDiscovery software application is a program designed to run under the Microsoft Windows operating system and is supplied with the network clock. To install the WinDiscovery program on your server/workstation/personal computer, complete the following steps:
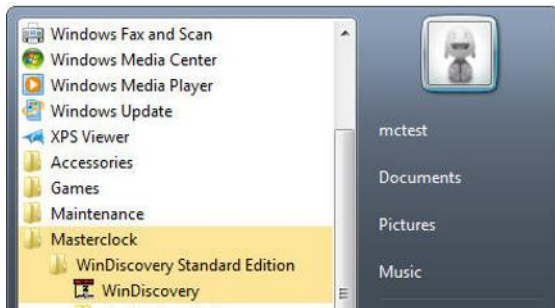
1. Insert the CD that shipped with your network clock.
2. Run the "**setup.exe**" application from the CD.
3. By default, the setup utility will suggest installing files to **C:\Program Files\Masterclock\WinDiscovery**.
4. Click the [**OKAY**] button
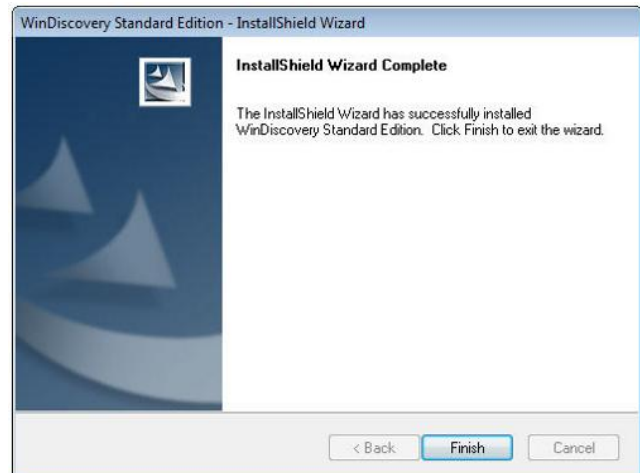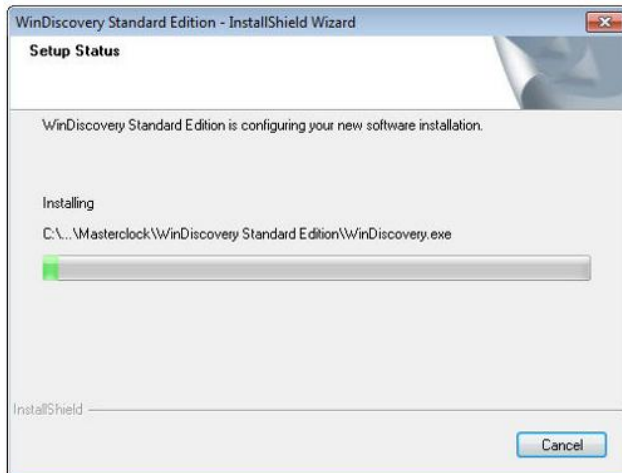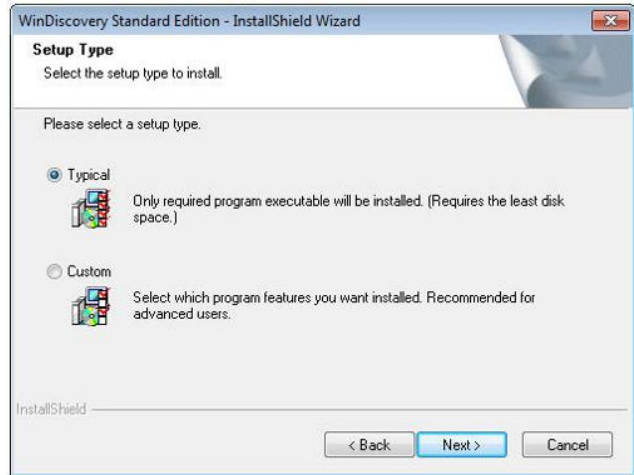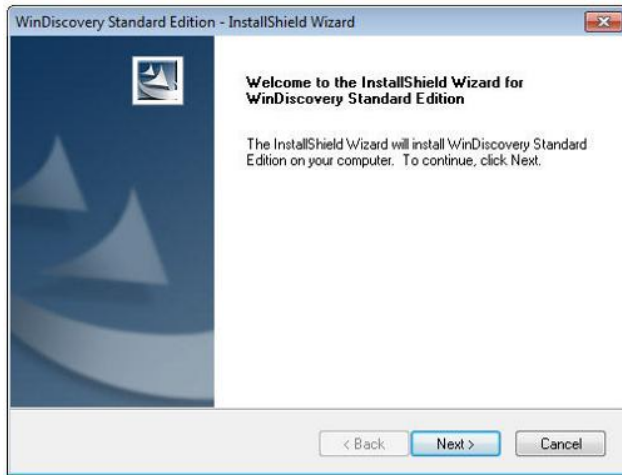
WinDiscovery Installation and Operation

Using WinDiscovery

Open WinDiscovery from the "**Start Menu**" or by double-clicking the shortcut icon on the desktop.

Once you click [**Discover**], shown below, all network clocks accessible on the network will announce their presence and the status bar will display the count of devices found. When complete, a list of device families and groups will be displayed in the left pane of the *WinDiscovery* window. RC500 will be displayed along with any other devices that are on the network
.
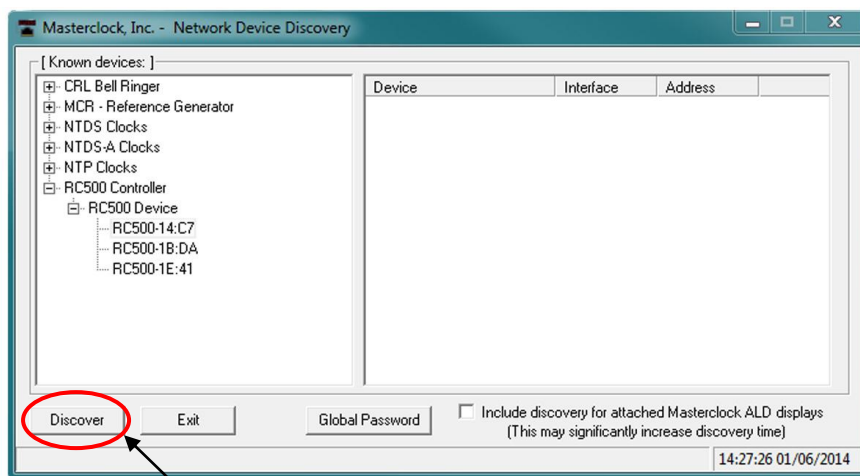
Click [Discover] to view NTP devices on your network.

Each clock is configured with a device name from the factory. This name includes the model name and a "MAC address" (Media Access Control) extension. You can change the device name to one convenient for your site – preferably one that helps you to later identify the exact physical location of the device.

> *It is highly recommended that only one user uses WinDiscovery at a time and other methods should not be used to manage the network clocks while using the WinDiscovery software application.*

Click on the plus [+] sign to the left of any family or group to open and view device types that were found. Click on the minus [-] sign to close and not show the device family or group.

Click on any device group and it will list the devices in the right pane with all devices of that type found. To configure another device group, click on the device name in the left window and the device names will then appear in the right window, ready to be managed.
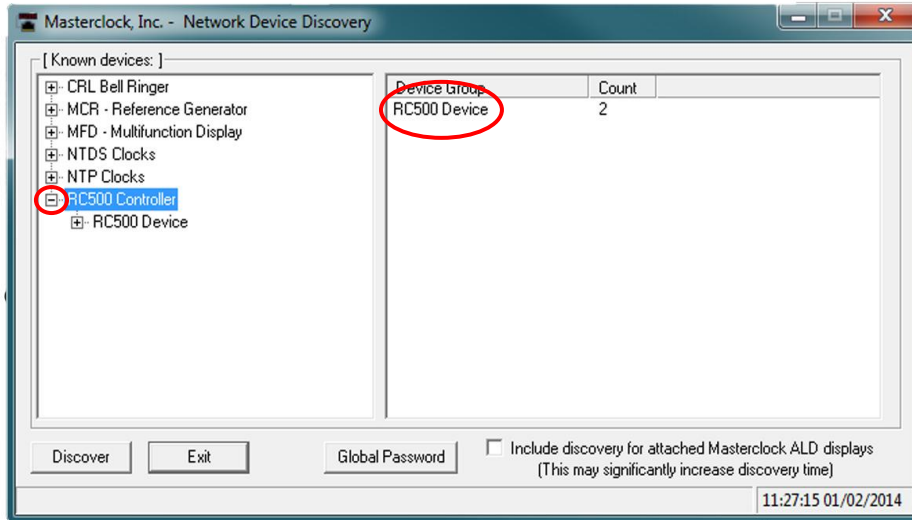
Right click the device name and the properties window will open. Click on a menu choice to open the window for that function.

The choices are:
Properties
Network Settings
Device Settings
Set Password
Set Time/Date
Status
Reset Device
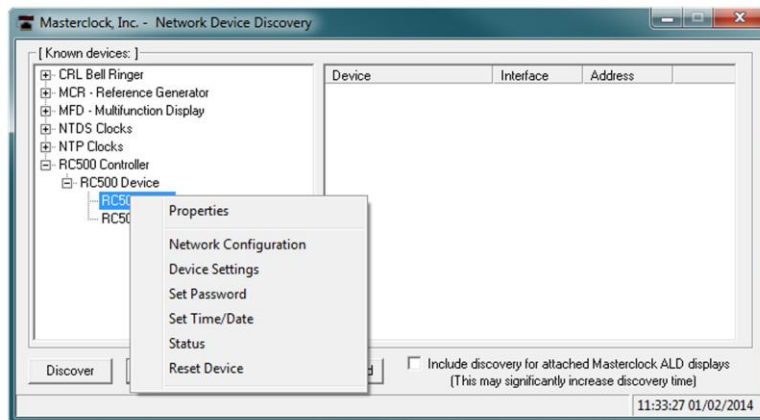
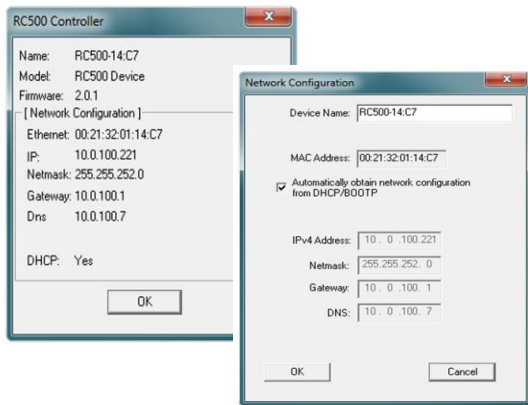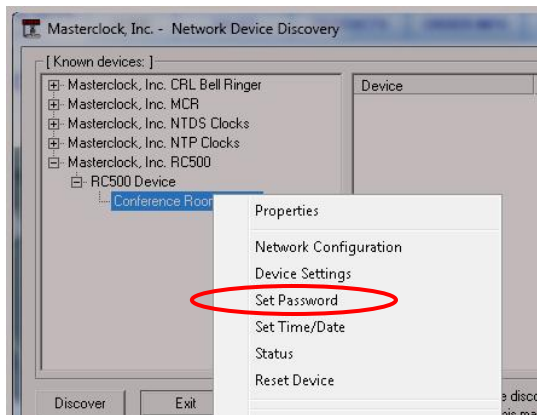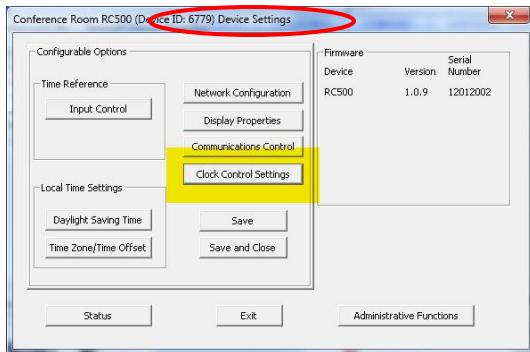Use the [Cancel] button to exit the screen without applying changes.
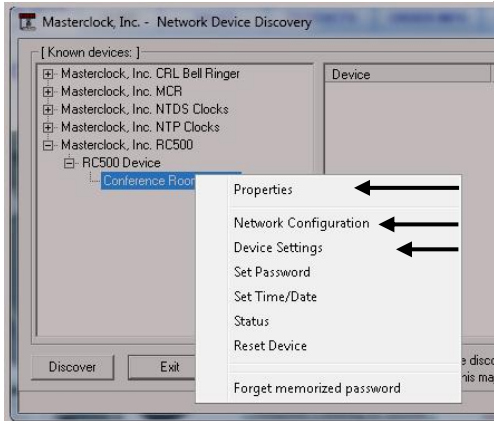
Properties Window

Network Configuration

INSIDE THE DROP DOWN MENU WINDOW:

PROPERTIES

Click the [**Properties**] button to view the "**Properties**"
window (middle left). This presents a summary of the
current Network Configuration and cannot be changed
except through the other windows.

NETWORK CONFIGURATION

The network configuration (middle right) may be viewed
in summary by clicking the [**Network Configuration**]
button.

DEVICE SETTINGS

The "**Device Settings**" window (pg. 22) configures the RC
500 to receive and display in the format that you prefer,
using Time Zone offsets and DST settings to completely
customize it relative to UTC time.

The top right section of the "**Device Settings**" window
shows a list of the firmware and options associated with
your RC 500.

The rest of the "**Device Settings**" window includes access
to all configuration options for the network. These
include time reference inputs and outputs, display
properties, relay control and administrative functions,
such as password. There is also a status display to
monitor remote clocks and devices from your computer
screen using the free, included WinDiscovery software
application.

Any changes made in this window, including all the
buttons thereon, will not be applied until you click the
[**Save**] button or the [**Save and Close**] button, prior to
clicking the [**Exit**] button.

SET PASSWORD

Each Masterclock device in your network may have its
own password (see the "**Properties**" window to **[Set
Password]**) or you may create a **Global Password** on the
"**Discover**" window. The default password is "**public**".

Your custom password should be one to eleven
characters and is case-sensitive. For added password
strength, you should use both alphanumeric and special
ASCII characters.

**The password must be entered twice to confirm the
entry**. Click [**Change Password**] to save it.

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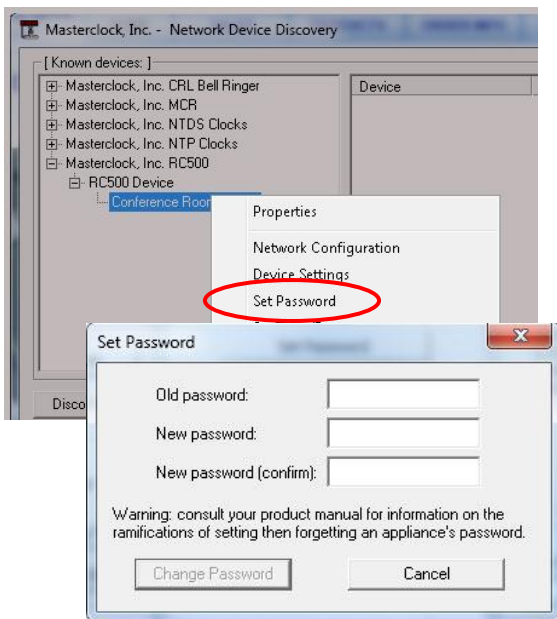
When a password is set for a device, each time you click [**OK**], [**Apply**] or [**Apply and Close**] for that device you will be asked for the password. You can select the **[Remember this password for the session]** button and you will not be prompted for the password, until you restart WinDiscovery. Or you can use the Global Password feature (see below).

If you enter the wrong password and selected the [**Remember this password for the session**] checkbox, you will receive an error upon clicking [**OK**], [**Apply**] or [**Apply and Close**] to any configuration changes. You can close the WinDiscovery session to forget the wrong password(s). However, this will require entering the password(s) again for each device.

You can also remove the incorrect password entry during a WinDiscovery session by going to the drop-down menu for the device (right click to see this) and selecting the [**Forget memorized password**] button.

Global Password

The global password feature allows the user to enter a single password for all NTP devices using the same password. During this session and subsequent sessions of WinDiscovery you will not have to enter the password.
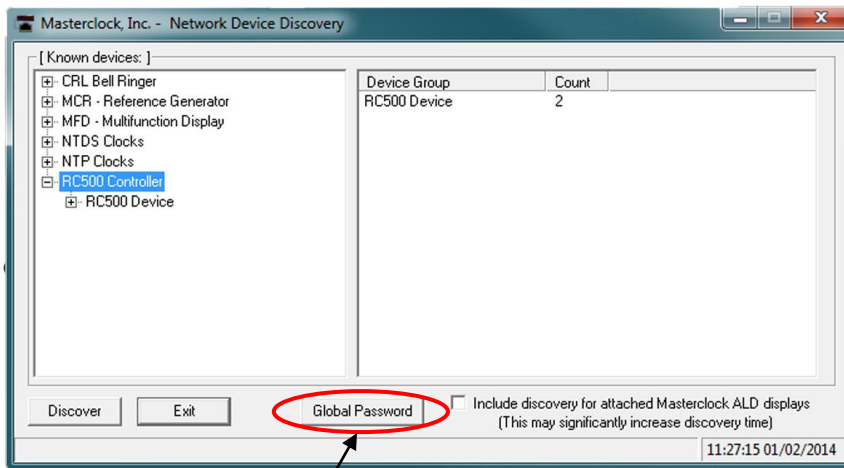
To use global password, click [Global Password] from the main window of *WinDiscovery*.

The global password being used must match the password on all the devices being administered. For example, on any new system being installed, the factory default password on all devices is "public".

Enabling / Disabling Global Password

1. Enable the global password feature by selecting the "Enable Global Password" checkbox.
2. Type the global password
3. Click [OK]

Select by clicking

To disable the Global Password, de-select the "Enable Global Password" checkbox and click [OK].
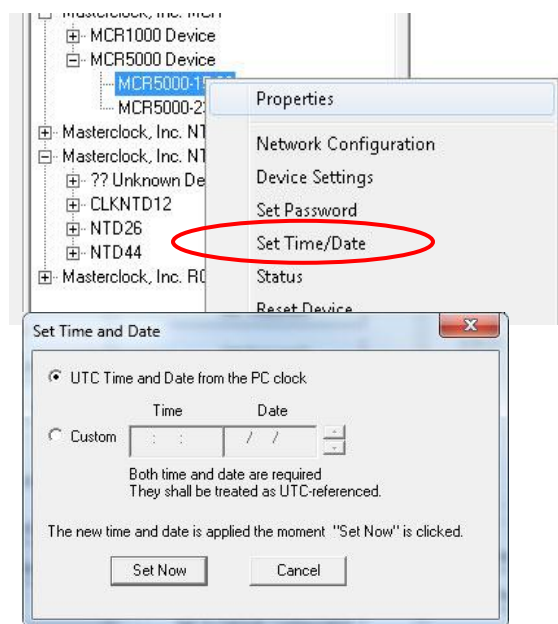
SET TIME/DATE

Click the [**Set Time/Dat**e] button and a window appears reminding the user, "**This feature is only to be used to set the UTC time and date if the device is not locked to a reference and is free-wheeling.** " Other cautionary remarks follow. At the bottom of the window you may choose to continue or not. If you choose the [**Yes**] button, the "**Set Time/Date**" window appears, also seen on page 32.
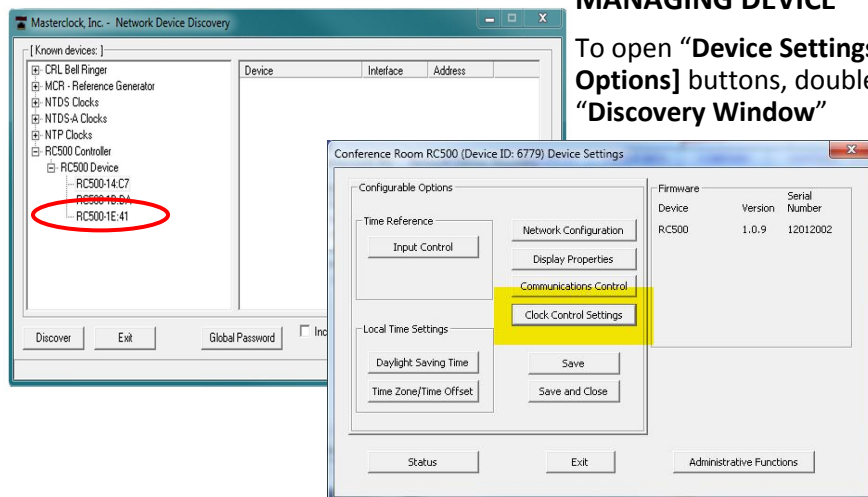
STATUS

See "**Status**" window, page 34.

RESET DEVICE

See "**Reset Device**" window, page 32.

MANAGING DEVICE

To open "**Device Settings**" and show **[Configurable Options]** buttons, double left click on device in "**Discovery Window**"

Device Settings

The device settings window will display network device and can be configured to display time in the format that you prefer, using time zone offsets and DST settings to completely customize it relative to UTC time.

The top right section of the Window shows the current firmware version and serial number of the device.
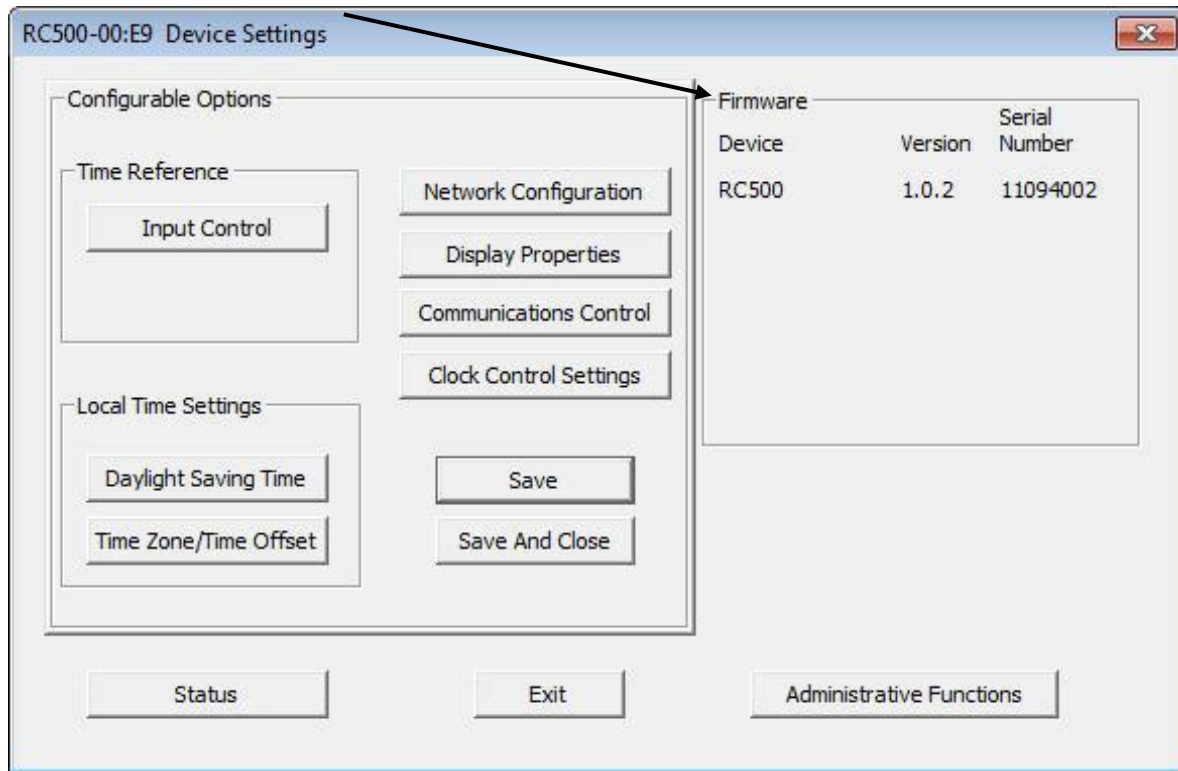
When working in these management windows use the [Apply], [Apply and Close] and [OK] buttons to accept changes that you have made. Any changes made in these windows will not be saved until you click the [OK] to exit the window or the [Apply] or [Apply and Close].
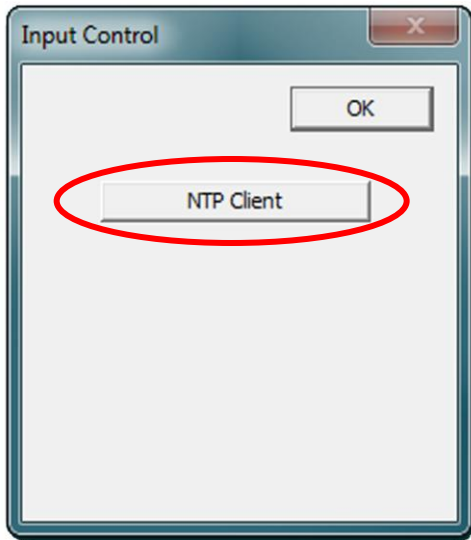
Use the [Cancel] button to exit the screen without applying changes.
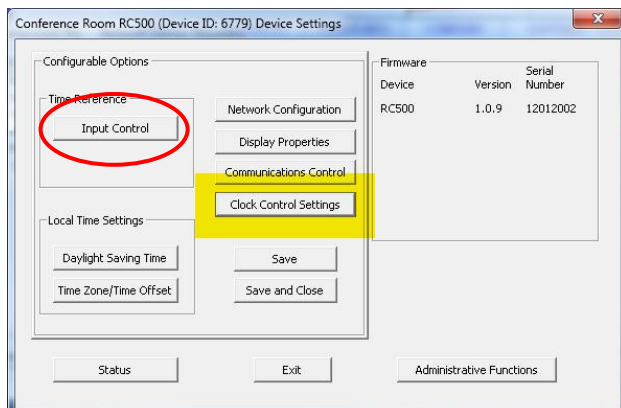
INPUT CONTROL

The [**Input Control**] button provides access to the "Input Control" window, which provides button for **NTP Client**.

Device Settings – Input Control is circled.
Clock Control is surrounded by yellow.

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NTP CLIENT

While on the "**Input Control**" window, click the [**NTP Client**] button to access settings for the NTP client.

ENABLE NTP CLIENT – is enabled by default. However, it may be desirable to disable the NTP client for certain applications, such as those in which the RC 500 will not reside on a network during typical operation. Deselect "**Enable NTP client**" if desired.

The network client can be configured to either query the NTP time server at a selected interval, to listen to NTP broadcasts only, or to listen to multicast broadcasts.

NTP CLIENT SETTINGS

QUERY NTP SERVER FOR TIME – is enabled by default.
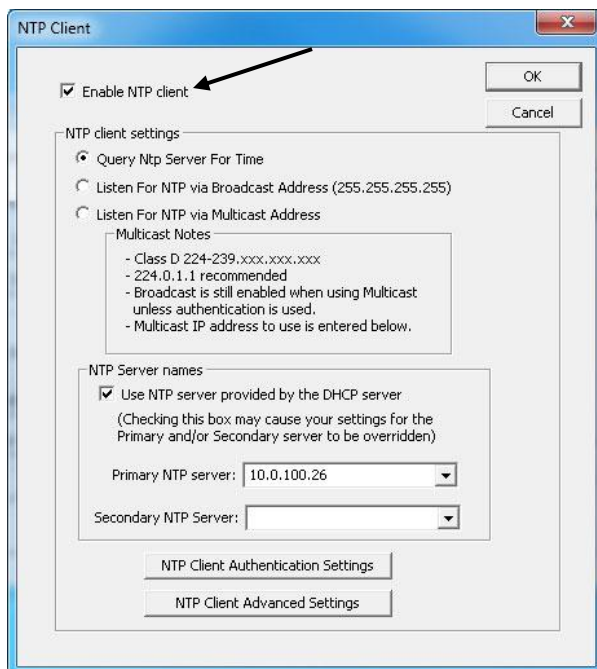
This is the **unicast** mode. The default configuration is to query the NTP server at 10-second intervals.

The NTP settings are located in the upper left-hand section of the window. The Primary reference information must be configured in order to acquire time from an NTP reference.

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Enter either the IP address or Internet address/URL (Uniform Reference Locator) for the NTP reference. If available, enter a secondary reference for backup.

The primary and secondary server information can automatically be configured by the DHCP server when selecting the "Use NTP server(s) address provided by DHCP server" provided your DHCP server is configured to do so. Consult your network administrator to use this option.

By default, the NTP clock will operate only in Unicast/Query mode using server port 123.This mode is selected exclusively when neither the listen for NTP broadcast nor the listen for NTP multicast modes are selected.

Listen for NTP via broadcasts address

The network clock can be configured to listen to NTP broadcasts by selecting the "Listen for NTP via broadcast address "255.255.255.255" checkbox.

Select by clicking
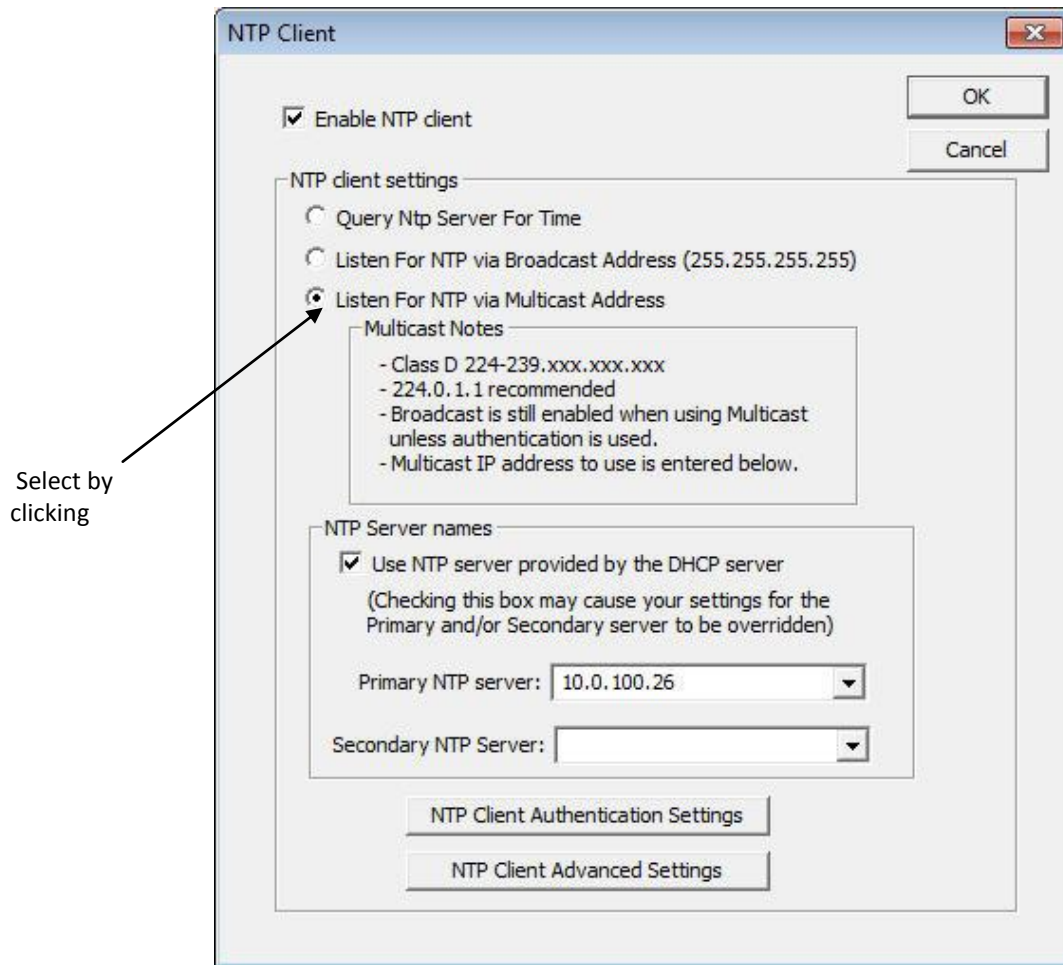
The Broadcast timeout period is adjustable when this mode is selected.

The default configuration is to query the NTP server at 10-minute intervals. The clock drift is +/- 1 minute per year, so you can adjust as need. To configure the network clock device to only listen to NTP broadcasts, click the checkbox for "Listen for NTP broadcasts only" and enter a "Broadcast timeout" in minutes. The default timeout is 60 minutes.

While listening to NTP broadcasts/multicasts, the network clock cannot be configured to query the time server.

Some NTP/SNTP clients will expect NTP servers to operate on port 123 and cannot be configured to use alternate ports.

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Listen for NTP via multicast address(s)

The network device can be set up to listen to NTP using multicast addressing by selecting the "Listen for NTP via multicast address(s)" checkbox.

Select by clicking
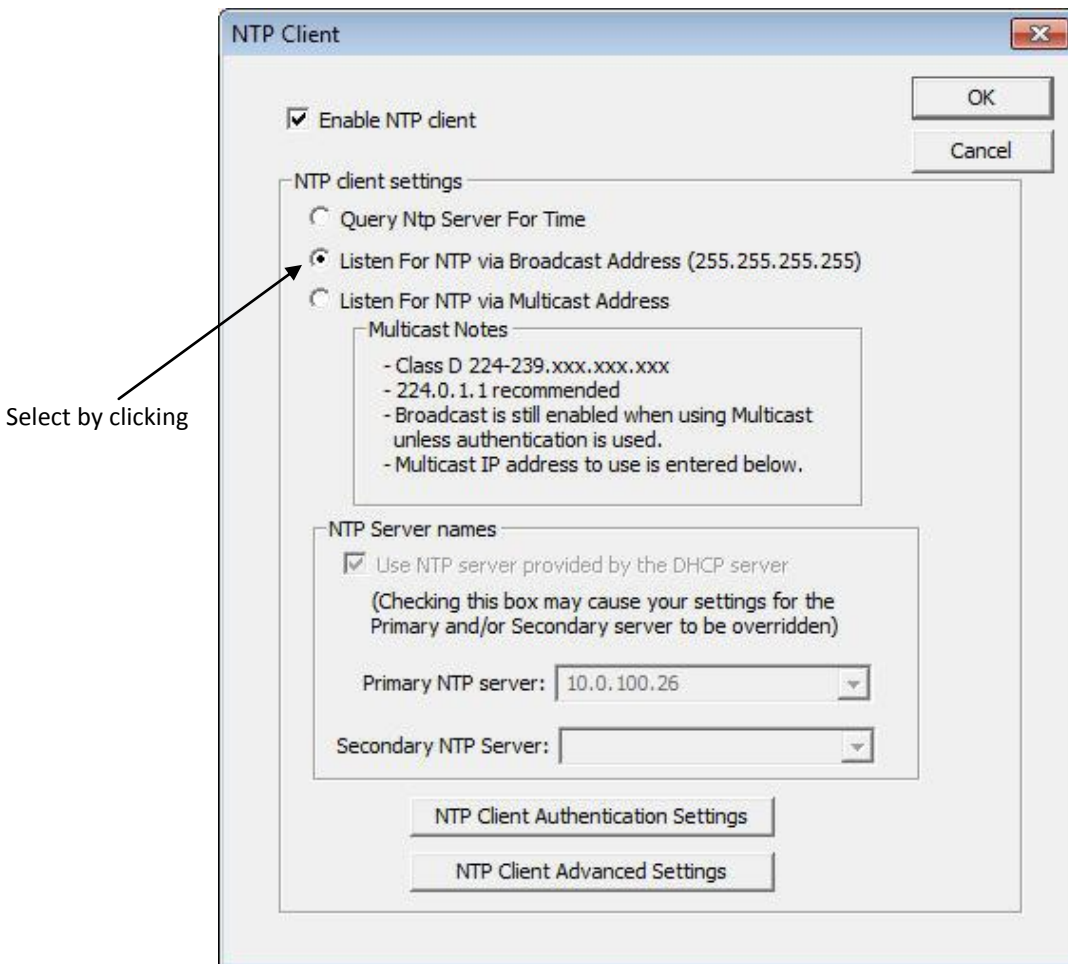
When enabled, the multicast class D / group address may be specified as well as the frequency that multicast broadcasts will be issued. This can be changed as desired. The network clock can listen for NTP multicast broadcasts using the full class D/ group address range. The network clock does not restrict the use of the multicast address assignment and supports the full range of class D multicast addresses or groups from "224.0.0.0" to "239.255.255.255". These groups or class D address ranges for multicasting are defined and governed by RFC3171, IANA IPv4 Multicast Guidelines.

Typically, the multicast address range "224.0.1.0" – "224.0.1.255" (Internetwork Control Block) is used for NTP traffic; however, please refer to the RFC3171 for your specific application and implementation.

While listening to NTP broadcasts/multicasts, the network clock cannot be configured to query the time server.

Some NTP/SNTP clients will expect NTP servers to operate on port 123 and cannot be configured to use alternate ports.
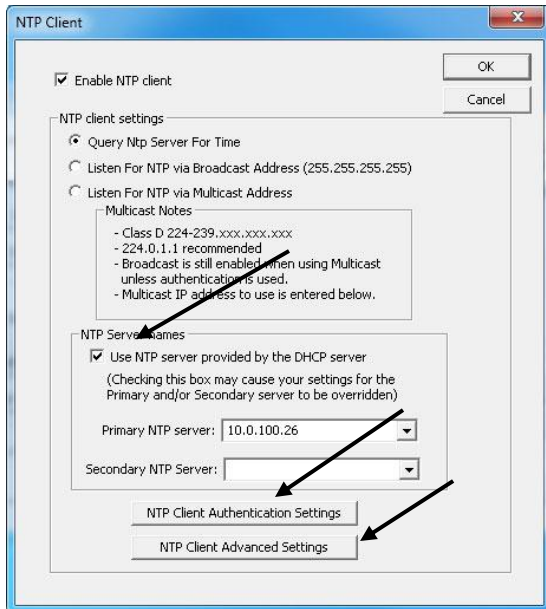
NTP SERVER NAMES – By default the [**Use NTP server provided by the DHCP server**] box is checked and a primary NTP server address is displayed. If you wish to uncheck the box and provide your own server addresses for both primary and secondary servers, do so here.

NTP CLIENT AUTHENTICATION SETTINGS – This window permits the entering of up to 15 MD5 key values to be trusted or allowed. Primary client settings permit the entry of a primary server key number, a secondary server key number and a broadcast key number.

NTP ADVANCED SETTINGS – Under most typical operating circumstances it is not necessary, nor is it suggested, to change the "**Advanced Settings**" options.

NTP ADVANCED SETTINGS PARAMETERS
This allows for setting the NTP mode and parameters of the SNTP client in the network clock.
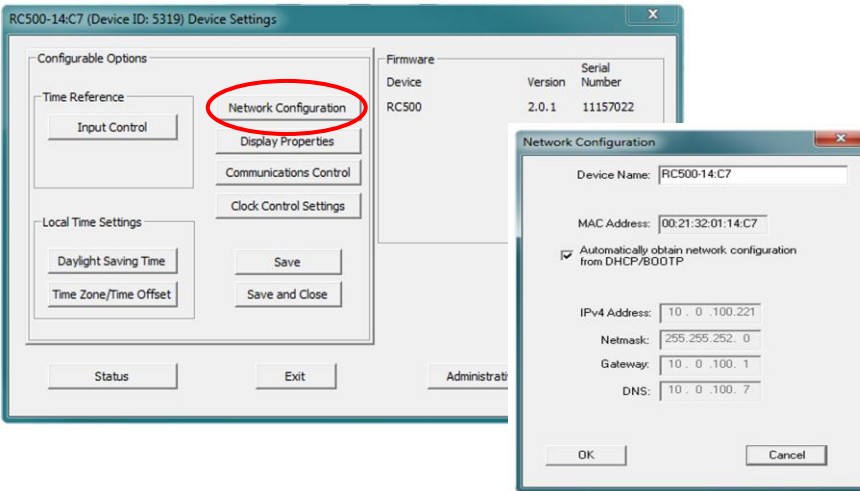
The default TCP/UDP port for NTP service is 123.
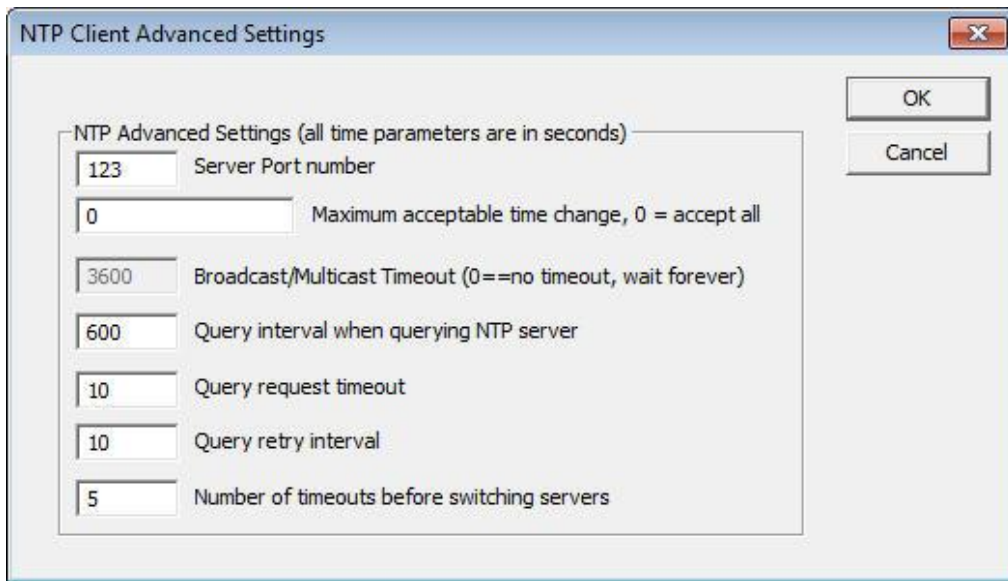
Ⓣ *Some NTP/SNTP servers will expect NTP clients to operate on port 123.*

NETWORK CONFIGURATION

The "**Network Configuration**" window may be viewed in summary by clicking the [**Network Configuration**] selection.

DISPLAY PROPERTIES

In the "**Display Properties**" window (below), you can change the brightness of the display or modify the presentation of the date and time. You can change the display from UTC to local time and you can alternate times with dates and set the rate at which they change.
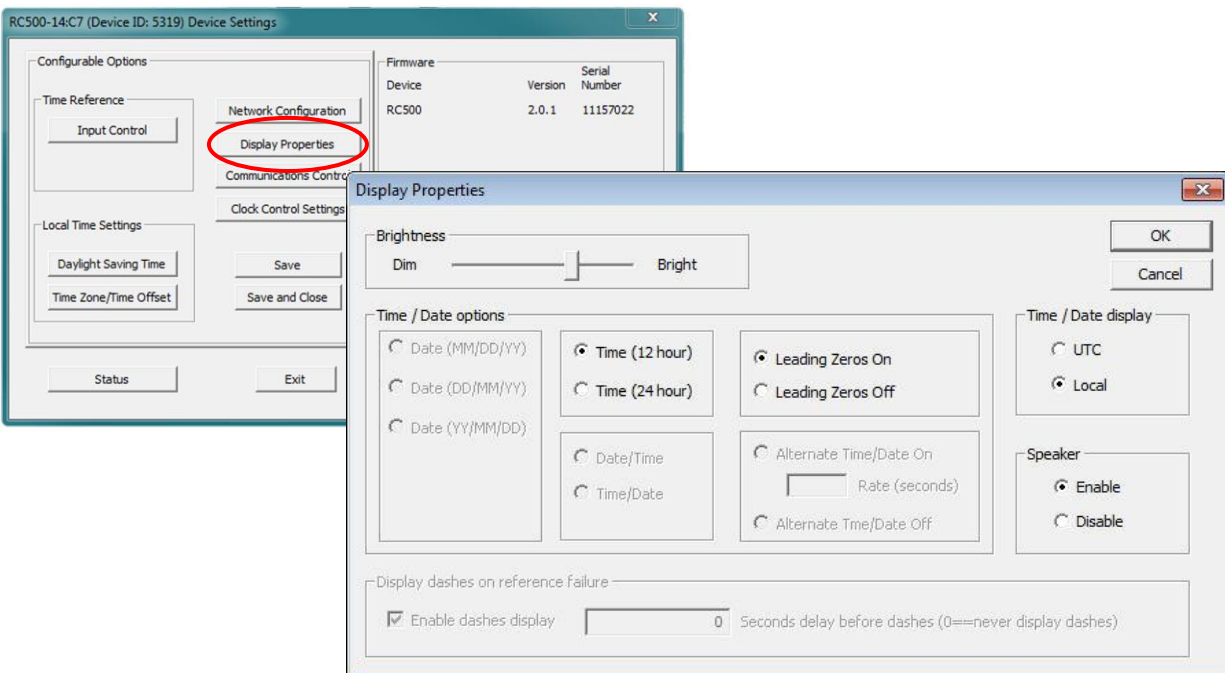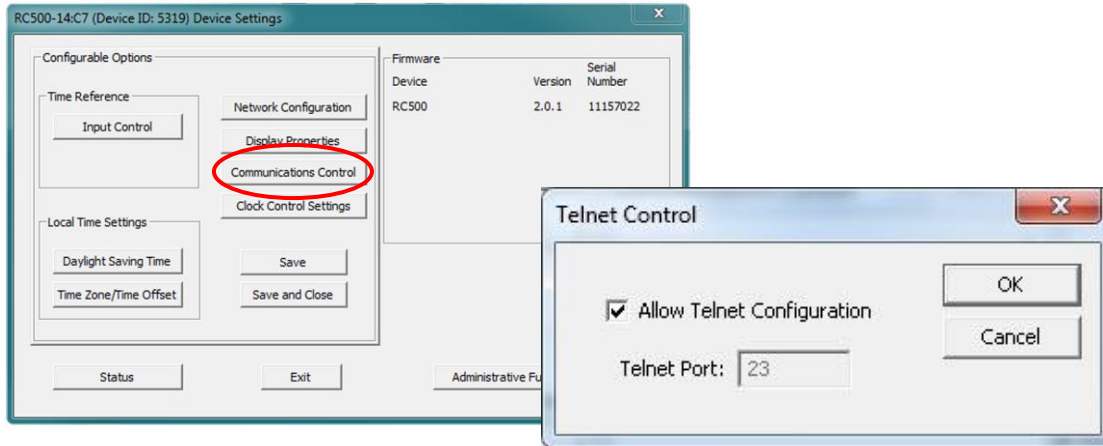
Display Control

The upper left-half corner allows you to adjust the brightness of the LEDs and button illumination. The options in this configuration region may be grayed out; this indicates unavailable options for this model of network device.

COMMUNICATIONS CONTROL (TELNET OPTION)

Certain advanced features may be configured using the [**Communications Control**] button. This gives access to the "**Telnet Control**" window (below). If Telnet is allowed, the port must be defined. The default Telnet port is 23. See your network administrator if you need additional information.


CLOCK CONTROL SETTINGS

Click the [**Clock Control Settings**] button to access the RC500 "**Clock Assignment**" window.
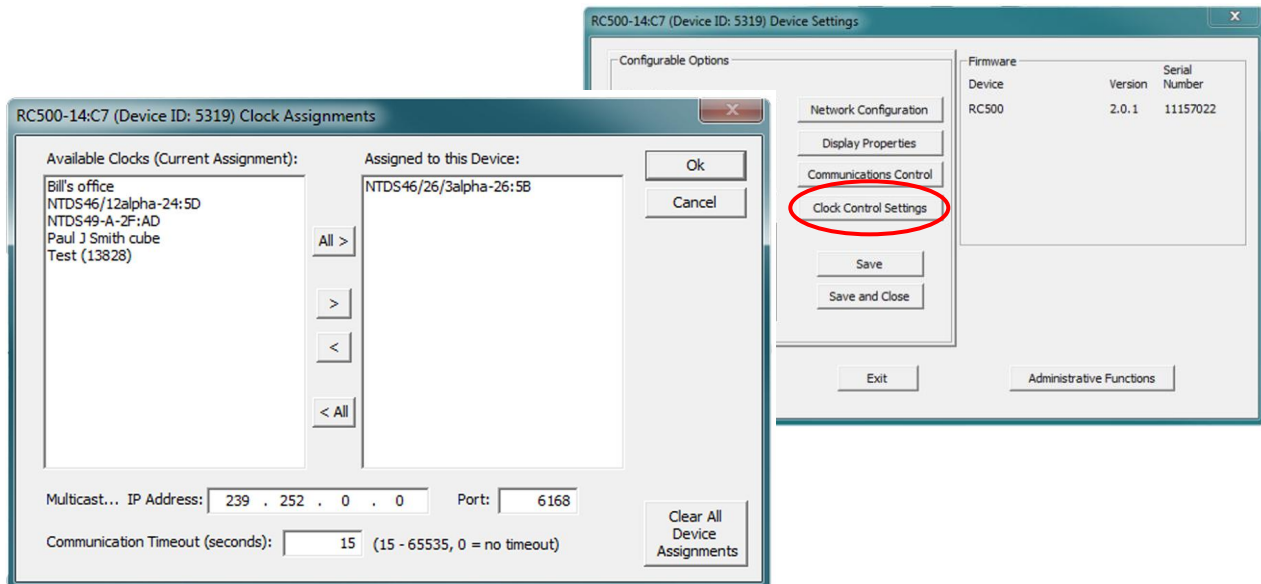

Use this menu to configure which remote NTP clock displays will respond to the RC500 commands. The list in the left column is the available clock displays and the right column show the devices assigned to the RC500.

Use the buttons located in the center to move a device from the "Available" to the "Assigned" column. Move all available clock displays by pressing [All >] and [< All] respectably and [>] and [<] to move individual clock displays. When finished, click [Ok] and the assignment will be saved.
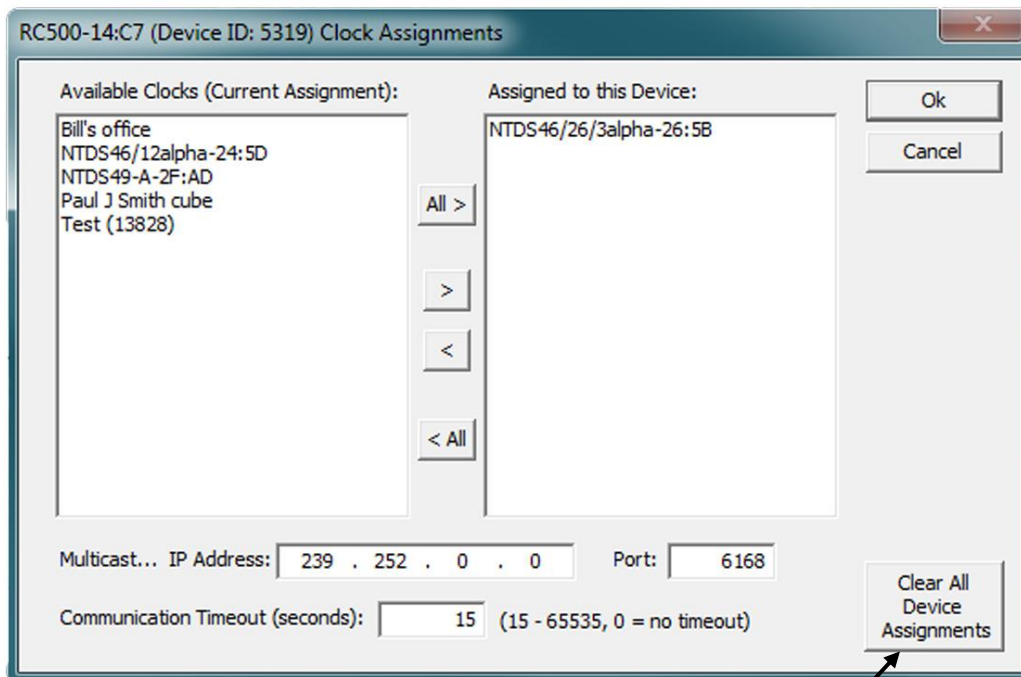
## Clear All Device Assignments / Reset All Control Assignments
This feature allows the end user to clear all RC500s and clock displays association.
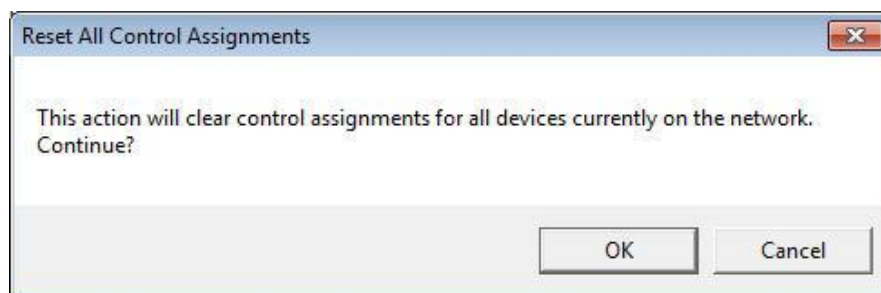

By clicking [OK], all RC500s and clock displays on the network will have their assignments cleared. This is a global "clear all" and in order for a RC500 to control a clock display, it will need to go through the "Clock Assignment" configuration.
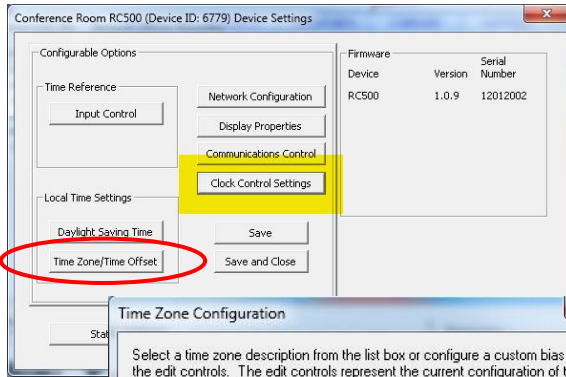
TIME ZONE/TIME OFFSET SETTINGS

Click the [**Time Zone/Time Offset**] button to open the "**Time Zone Configuration**" window. This window displays a list of time zones, including descriptions to help with the selection. Select the offset and click [OK] to close the Window. The DST rules will be applied when you click [Apply] or [Apply and Close] from the "Device Settings" window.
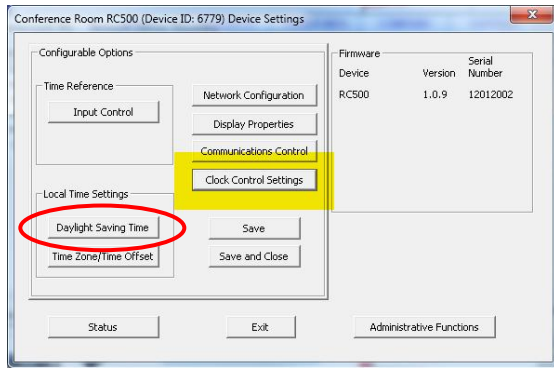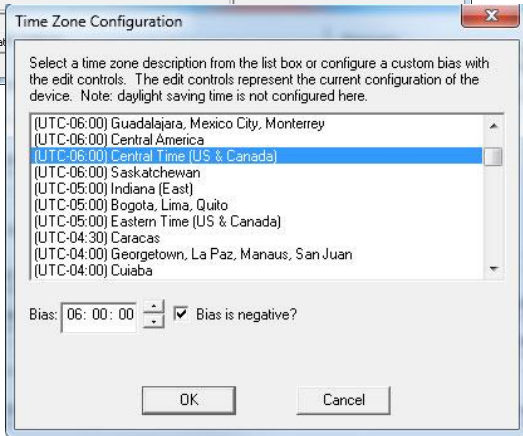
DAYLIGHT SAVINGS TIME SETTINGS

Click [**Daylight Saving Time**] to open this window. The clock has complete flexibility to display any Time Zone and DST combination.

For setting the DST rules, use one of the following options.

1. Manually enter the Daylight Saving Time rules; or
2. Click the [**US/Canada Standard**] button; or
3. Click the [**EU Standard**] button.
4. Then click [**Current Windows Setting**] to apply the current configuration for your Windows OS.
5. Click [**OK**] to close the Window.

The DST rules will be saved when you click either the [**Apply**] button or the [**Apply and Close**] button on the "**Device Settings**" window.
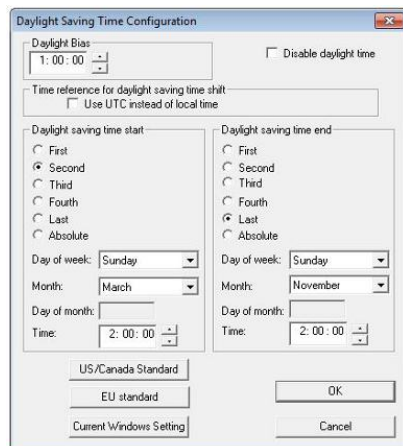
US/Canada DST standard   **EU DST standard**

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Time Zone Offsets

The RC500 interprets time input as UTC. If the time reference to this unit is not UTC, do not adjust the Time Zone and/or DST offset.

A Time Zone offset or bias can be used to adjust the time for display purposes because the default is UTC time. Local or custom time can be set as a positive (+) offset indicating that the unit is earlier than UTC time or negative (-) offset indicating the unit is later than UTC time. See page 30.

DAYLIGHT SAVING TIME (DST)

An automatic DST setting can be configured separately and in addition to a Time Zone offset. The RC500 provides flexible configuration options supporting most DST standards through the **Configuration Menu** (p. 30).

To ensure proper hands-free year-around operation, DST adjustments must be configured using the "**Daylight time**" option and not with the "**Time Zone offset**" option.

USA and Canada

DST begins on the second Sunday of March at 2:00 AM (Local Time) and end the first Sunday of November at 2:00 AM (Local Time).

EU Standard – European Union

Summertime period begins at 1:00 AM UTC on the last Sunday of March and ends at 1:00 AM UTC on the last Sunday of October.

Please carefully consult the section entitled "**Device Settings**" (p. 13 for Standalone and p. 22 for Network input) for details on setting DST.

Freewheeling Accuracy

The RC500 has built-in provisions to allow its internal clock to freewheel and maintain accuracy for extended holdover periods in the absence of a reference. You can also set the unit manually **(Standalone Configuration)** and operate without a reference input.

TCXO AND RTC CIRCUIT

The RC500 contains a precision TCXO and RTC circuit allowing the clock to maintain an accuracy of ±1 minute per year to the last known Time Code input (±165 mS per day) when a time reference is not preset or cannot be decoded (i.e. freewheeling mode).

MAINTENANCE-FREE RECHARGEABLE BATTERY

The RTC and TCXO are maintained continuously from a rechargeable battery circuit during periods of power outage. Minimum holdover period is two weeks with a fully-charged battery. The battery automatically charges whenever the unit is powered and it requires no maintenance.

NON-VOLATILE CONFIGURATION

The configurations you set are maintained in non-volatile memory allowing your custom settings to be retained during power outages.
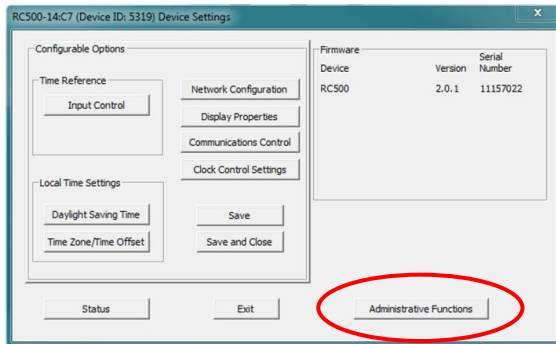
ADMINISTRATIVE FUNCTIONS (AF)

Click the [**Administrative Functions**] button to open a menu that is rarely accessed. These include: 1. [**Set Time/Date**] (for custom time, not UTC or local time); 2) [**Set Password**]; 3) [**Reset Device**]; 4) [**Install New Option**]; 5) [**Leap Second Date**] (input this whenever announced); 6) [**Email Configuration**] (to automatically alert you via email of any situations within the system when they happen). Below we'll look at these windows in detail.
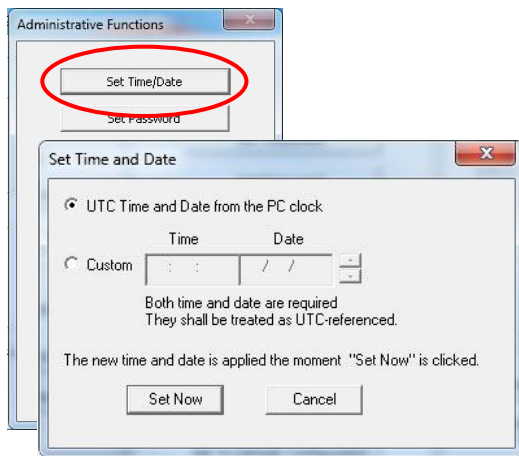
SET TIME/DATE WINDOW

There may be situations where you do not want to display UTC or local time. This feature may be most useful for demonstrations, in lab situations or in environments where an external reference time signal is not available. Use this when the built-in NTP client is disabled or when a network connection to an NTP server is not available.

Click the [**Set Time/Date**] button to reset the time to your preference. You will be prompted with some additional instructions then offered the choice to continue. Click [**Yes**].

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In the **"Set Time and Date"** window (left) click the [**Custom**] button to enter your new time and date. Click the [**Set Now**] button to activate your custom time. To return to UTC time choose [**UTC Time and Date button from the PC clock**] then click [**Set Now**].
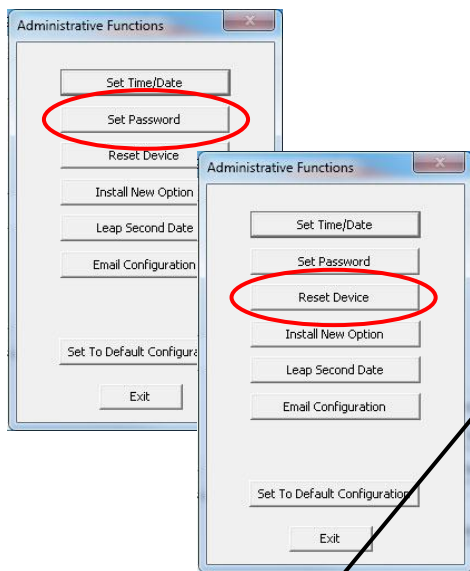
SET PASSWORD (See pg. 19)

RESET DEVICE

Click [**Reset Device**] to induce a soft reset. This procedure allows the RC 500 to clear its current communications buffer and re-initialize its processing, which includes another software request for a DHCP address. This feature is intended to allow the user to remotely reset the unit and does not restore the factory default state.

Alternatively, if you are <u>not</u> in the "**Administrative Functions**" window, but are viewing the list of devices after pressing the [**Discover**] button, simply <u>right click</u> on the device you are interested in and select the [**Reset Device**] button.
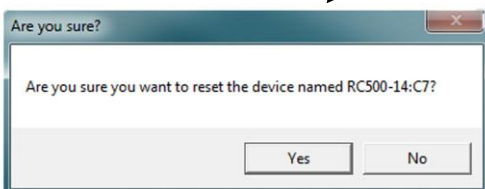
Soft Restarts

A soft restart may periodically be performed by the network device to automatically attempt to rectify a problem it may be experiencing. A soft restart is essentially the same as performing a manual soft reset device as described above.

The network device will perform a soft restart under the following conditions:
- If the device is not receiving an NTP poll response or an NTP broadcast response depending on which mode the device is in.
- If the device is set to use DHCP and no DHCP server can be found.

The timeout before doing a soft restart is not less than 10 minutes. Several factors can increase the time between these soft restarts.
- The soft restart will be delayed by two hours if a connection is made by telnet or WinDiscovery.
- The soft restart is delayed if the user changes the default parameters for NTP poll retries/timeouts or the NTP broadcast timeout. For example, if the NTP broadcast timeout is increased to 60 minutes the soft restart timeout will also be increased to 60 minutes.

Reset Configuration to Factory Default

In some situations it may be necessary to return the unit to factory default settings. The unit will go through an initialization process. Next, the RC500 will show the time on the display.
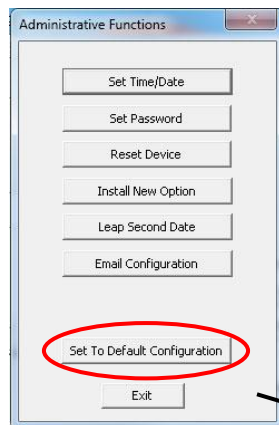
SET TO DEFAULT CONFIGURATION

Click the [**Set to Default Configuration**] button to reset all of your previously entered options and customs settings back to the original factory settings. You will get the "**Are you sure?**" window. Click the [**Yes**] button if you are sure you want to return to the default configuration with the default password: "**public**".
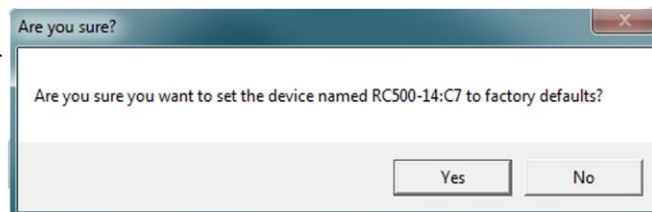
Default Settings	
Brightness:	4
Speaker:	On
Time Display Format:	24 hour
Time Zone Offset:	0
Daylight Saving Time:	Off
Time Displayed:	Local
Leading Zero:	Off
Display dashes:	Disabled

Reset Configuration through pinhole

1. Located on the rear of the unit is the pinhole to the reset button (i.e. next to the RJ45 Ethernet port).

2. While the unit is powered on, insert a non-metallic reset tool straight through the pinhole and hold the button for proximity 5 seconds or until the display shows dashes.

Reset button through pinhole

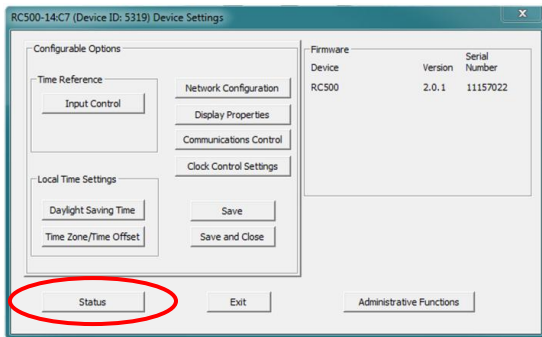The unit will go through an initialization process and will show the time on the display when reset is complete.

STATUS

At the bottom left of the "**RC 500 Device Settings**" window is the [**Status**] button. The "**RC 500 Status**" window includes a "**Display Snapshot**" of a graphic digital clock representing the face of the actual RC 500 in real time. On the right appear the "**UTC Time**" and date, "**Local Time**" and date, the "**Current Reference**" signal (in this case GPS), the "**Reference Status**" (in this case "Locked") and two windows listing "**Last Time Lock Lost**" and "**Last Time Lock Restored**."

Below these listings are tabbed windows for **"Network,"** "**NMEA**," "and "**NTP**."
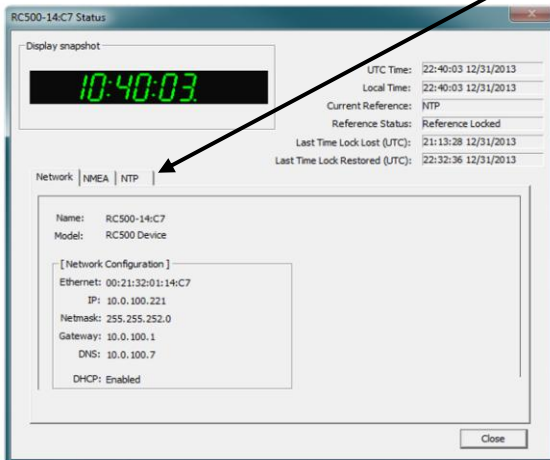
Network Tab – includes the name of the device, the model of the device and a summary of the network configuration, much of this data is repeated from the network configuration window described earlier (page 20).

NMEA Tab – Default set to enabled.

NTP Tab – includes a checkbox for an enabled NTP server, plus the number of NTP requests service and the server stratum. Also includes a checkbox for an "**Enabled**" NTP client including indications for the "**Active Server**," the "**NTP Status**," the "**Last NTP Time Stamp**," the "**Largest Time Adjustment**" and the "**Average Time Adjustment**."

The Status window is a display-only window that gives you the current information on the network device and synchronization activity. This status update is not precise, but is intended to give you a view of the device display for troubleshooting purposes. The Status also shows the active NTP server; primary and/or secondary, the current synchronization status and time adjustment information.

Time adjustments are changes to the internal time reference as compared to the NTP server.

1. While acquisition of NTP server.
   - Initial startup
   - After loss of power
   - After loss of NTP

2. Change to the device configurations.
   - Network Configuration
   - Reset Device
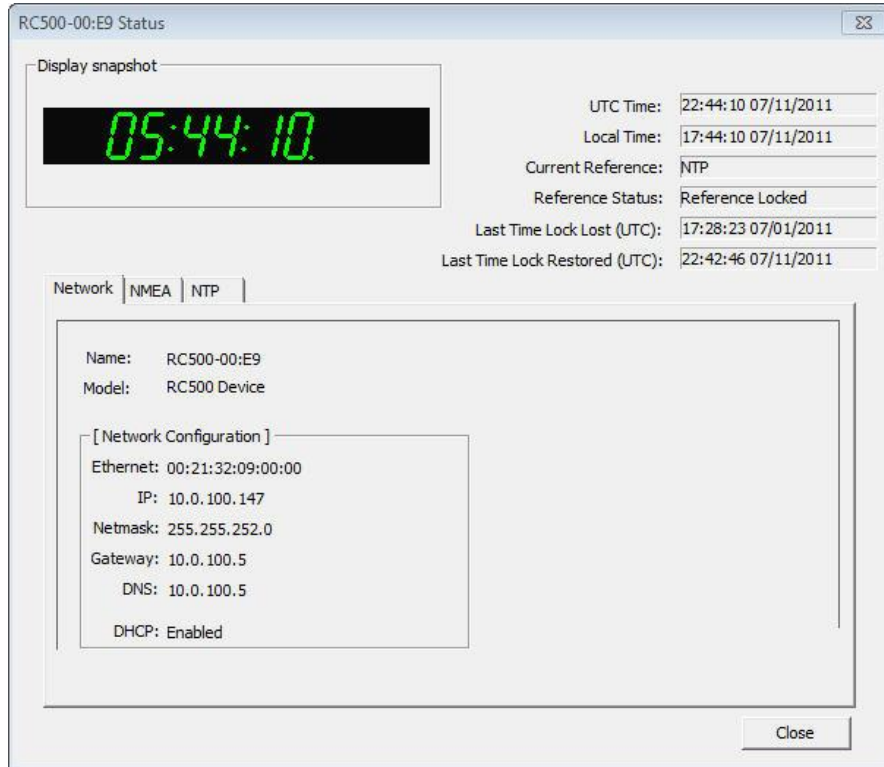
In addition to the standard status indications, the network device will display a special error indicator under the status window if either a DHCP server cannot be located, or if the device has an IP address conflict due to either DHCP or Static IP addressing. Under these conditions the unit will also be assigned a fallback IP address of "169.254.xxx.xxx", and appear in RED text under the main WinDiscovery window. To determine the cause of why the device received a "169.254.xxx.xxx" address the user should display the status of the clock. Near the bottom of the Status window the error will be displayed

Telnet

Those with Linux and other non-Windows operating will not be able to use WinDiscovery.

Configuration via Telnet may not be convenient for devices operating with a factory default configuration since the IP address is not known. Use the WinDiscovery application to establish first-time networking configuration.

For security purposes, the Telnet interface can be disabled. When disabled, you will no longer be able to access the device with Telnet. To re-enable the Telnet feature, one of the other configuration methods must be used, or the clock must be reset to factory default.

If you are not familiar with Telnet, ask your network administrator for assistance.

A terminal-style configuration interface is available via Telnet. To connect with the network device in this manner use any standard Telnet client application, specifying the IP address of the clock as the server with which to connect.

The factory default port is Telnet server **port 23**.

By default, Microsoft Windows 7 has the Telnet Client disabled.

TO INITIATE A TELNET SESSION IN WINDOWS

Select the Run command-line interface from the Start menu and enter the command "**Telnet**" followed by a space, and then the IP address of the unit and click [OK].

TO ENABLE TELNET IN WINDOWS

Open the Windows Control Panel, click on [**Programs**], click on [**Turn Windows features on or off**], check [√] Telnet Client and click [**OK**].

TO ENABLE TELNET IN LINUX

See your system administrator.
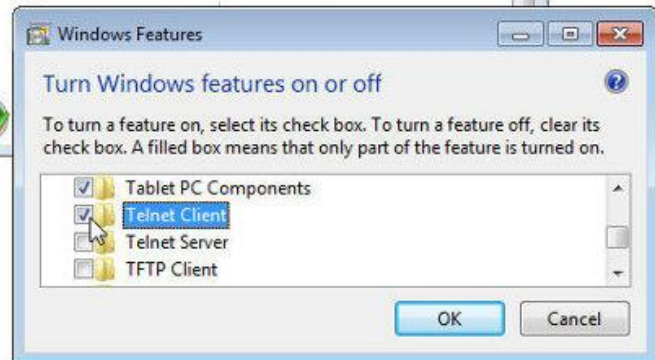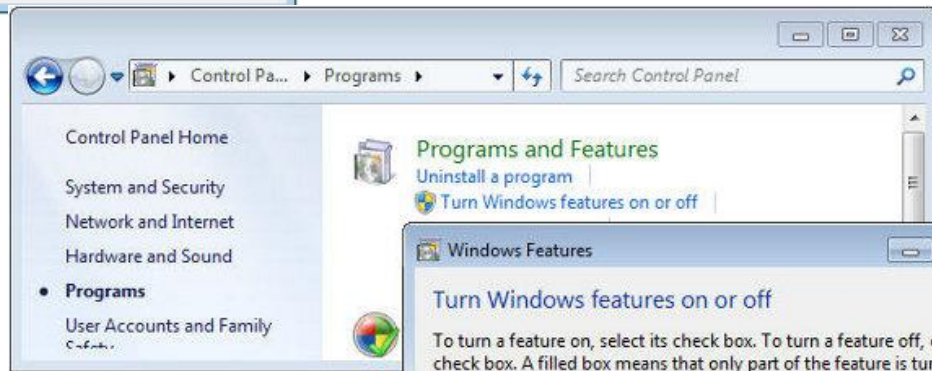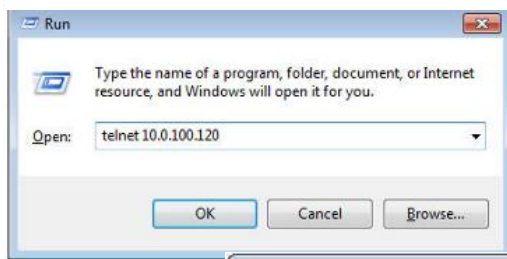
By default, Microsoft Windows 7 has the Telnet Client disabled. To enable, open Control Panel, click on "Programs", click on "Turn Windows features on or off", check [√] Telnet Client and click [OK].
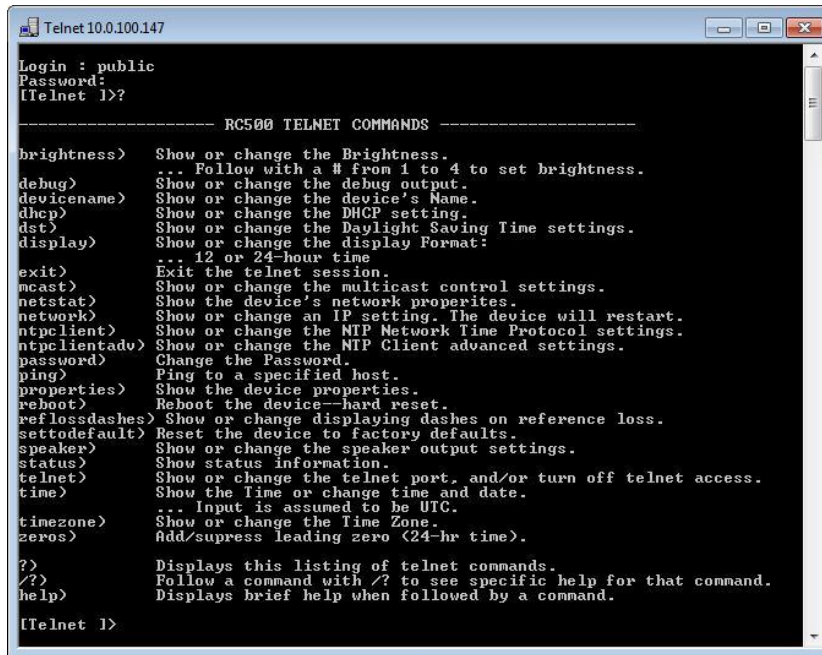
TELNET

A login prompt is presented if a password has been configured for the device. The configuration menu will be displayed when the correct password has been provided.

The factory default password is: "**public**".

Type "**?**" to display the screen at left.

(See this and commands like this at the bottom of the Telnet screen at left.)

Type "**help**" to display the abbreviated screen at left.

Type the command name corresponding to the desired action (such as "**timezone**" then press [**Enter**] or [**Return**].

Follow the command with a "**?**" to show more options and the command string.

Shown at left, "**timezone**" command with results and "**timezone?**"command with results.

Current configurations default settings are displayed.
Depressing the [Enter]/ [Return] key with no number or letter will retain the current setting.

It is recommended that a robust naming scheme be developed before devices are installed to different locations within an organization.

If Telnet is turned off while in a Telnet session, the network device will reboot and the session will end.

To enable Telnet access, either "Reset to Default" or use WinDiscovery and from the "Device Settings" window, click [**Communications Control**], [**Telnet Control**] and check [**√**] "Allow Telnet Configuration."

TELNET CURRENT CONFIGURATION/ DEFAULT SETTINGS

Depressing the [**Enter**] or [**Return**] key with no number or letter will retain the current setting.

brightness – Default: 4
Show or change the Brightness level of the LED display and button illumination.

debug – Default: Disabled
Show or change the debug output settings.

devicename – Default: RC500-xx:xx,
where xx:xx is the last four characters of the MAC Address.
Show or change the device name.

dhcp – Default: Enabled
Show or change the DHCP settings.

dst – Default: No
Show or change the Daylight Saving Time settings.

display – Default: 24-hour
Show or change the display format.

exit
Exit the current telnet session.

mcast – Default: Port 6168
Show or change the multicast control settings.

netstat
Show the device's network properties.

network
Show or change an IP setting. The device will restart.

ntpclient
Show or change the NTP Network Time Protocol settings.

ntpclientadv
Show or change the NTP Client advanced settings.

password - Default: public
Show or change the password.

ping - Ping to a specified host
This is useful in situations where the communication path from the network clock to the NTP server is in question.

properties
Show the device properties.

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reboot
Reboot the device

reflossdashes
Show or change displaying dashes on reference loss

settodefault
Reset the device to factory default or restart

Speaker - Default: On
Show or change the speaker output setting

status
Show status information by querying the device parameters. This includes information regarding the reference to UTC, local time, displayed time, whether it is synchronized, etc.

telnet - Default: 23
Show or change the Telnet port and/or turn off Telnet access.

time
Show or change the time and date. This is useful in situation where NTP server synchronization is not available but reasonably correct time/date is desired on the display. When the network device has access to NTP servers, information obtained via NTP will automatically overwrite any manually established time/date. Therefore, practical use of this feature requires the device to be removed from the network or for NTP server configuration to be left undefined.

timezone - Default: UTC
The Time Zone Bias indicates the offset from UTC. Enter the time in HH:MM:SS format as indicated, including the plus or minus sign to indicate positive or negative bias. Remember that this field can also be set from DHCP, so check with your network administrator if you are getting inexplicable results.

zeros - Default: Off
Show or change the leading zero setting.

?
Displays the list of Telnet commands.

/?
Follow a command with "**/?**" to see specific help for that command.

help
Displays brief help when followed by a command.

Specifications

Communications I/O

Connectors
RJ12 .... RS485 communication with TCDS Digital Time display
RJ45 .... Ethernet communication with NTDS Digital Time display

Power

AC
Voltage .... 100-240 VAC
Frequency... 50/60 Hz
Consumption .... 5 W
Connector... Universal IEC input connector

PoE
RJ45 .... PoE (Power over Ethernet)

⚠️ There are no user serviceable parts inside the RC500 Timer Control Unit.
Please contact Masterclock, Inc. if you require servicing or repair.

Internal Battery Circuit

Maintenance Free Rechargeable Battery

3V,17 mAh, Coin Cell
Rechargeable Manganese Lithium
Panasonic ML1220/V1A

Rechargeable Manganese Lithium coin cell (Panasonic ML1220) and recharging
circuit requires no maintenance and retains all configuration settings for two weeks
(minimum holdover) without applied external power.

Operating/Storage Temperature and Humidity
Operating Temperature .... 32˚ to 140°F (0˚ to 60˚C)
Relative Humidity .... 0 to 90%, non-condensing
Storage Temperature .... -40° to 185°F (-40° to 85°C)

Size and Weight
Width .... 6.82" (17.32cm)
Length .... 5.24" (13.31cm)
Depth .... 2.37" (6.02cm)
Weight 2.2lb (35.2oz)

Problems - Troubleshooting

Unable to communicate to slave display / clock

Possible reasons/solutions:
1. Verify the correct RJ12 (6P6C) modular cable is being used (i.e. 6 conductor).
2. Verify all connections are secure between the RC500 and slave display/clock.
3. Check to make sure power is applied to all devices.
4. Check the cables for hard bends, kinks, or cuts.
5. Verify that the correct adapters and splitters are being used (i.e. 6P6C).

Colons are flashing / Time is incorrect

Possible reasons/solutions:
1. The RC500 is not currently connected to a valid time reference.
2. There is a problem with the cabling between the RC500 and the time reference. Verify that all cables and connectors are in good condition.

Unable to lock to time code

Possible reasons/solutions:
1. RC500 is not currently connected to a valid time code source.
2. Verify that all cables are properly connected.
3. Verify that all cables and connectors are in working condition.
4. The time code format being fed to RC500 is not recognized format.
5. Verify the time code reference is a format supported by the RC500.
6. Signal level of time code is not at acceptable levels.

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Not displaying the correct local time.

Possible reasons/solutions:
1. The unit is not receiving time code. Verify that the colons on the LED display are on solid.
2. The time reference is referenced to UTC but your local time zone reference of your time reference and then set the time zone offset to arrive at a correct local time.
3. If the time reference is already providing time with local time zone and/or DST offsets, then set the time zone and/or DST offset of the RC500 to UTC.   If the time reference is providing UTC time, then configure your RC500 to have a local time zone and/or DST offset.
4. Your time reference is not providing the time/date that you expect. Contact the individual responsible for the time reference for more information.

DST is not properly negotiated

Possible reasons/solutions:
1. Verify the DST is enabled on RC500
2. Verify that the correct format of DST is enabled (US/EU).
3. Check to make sure that you do not have DST enabled on both clocks and RC500.

Unable to discover the RC500 using WinDiscovery.

Possible reasons/solutions:
1. Verify that you have supplied power to the network device.
2. The discovery process was not complete. "After selecting the Discover" button, wait until the discovery status indicates 100% completion.
3. Verify that the RC500 is on the same physical network as the computer from which you are running WinDiscovery.

4. If the computer is separated from the device by a router (on a remote network) or a firewall it is likely that the router/firewall is blocking communications with the device. Run WinDiscovery from a computer within the remote network, or ask a network system administrator to configure the router/firewall in question to pass through (both directions) UDP broadcasts on port 6163. [Note: If this does not resolve the detection problems you may additionally configure to pass through both directions UDP broadcasts on ports 6165, 6166, and 6364]. Some routers will not forward UDP broadcasts across networks-currently; this capability is required to use WinDiscovery for enterprise-level management of Masterclock, Inc. network appliances. If you are running a personal firewall product, such as Zone Alarm or Black ICE, or the built in Windows firewall you must adjust their configuration to pass through (both directions) UDP traffic on port 6163.
5. Verify that the hub/switch/router is capable of supporting the 10MB speed that the attached network device requires.
6. Verify that the network device and the computer running WinDiscovery are attached to the network.
7. Verify all network cables; hubs, etc are in proper working order.

No response to configuration changes under WinDiscovery / garbled characters
Possible reasons/solutions:
1. The WinDiscovery application has been open for too long and the device's configuration(s) has (have) changed. For the example, this can occur if the DHCP server has issued new/refreshed addresses. Close the WinDiscovery application and restart.
2. The discovery process was not complete before selecting device. After selecting "Discover" button, wait until the discovery status indicates 100% completion.
3. Verify that the physical network cables and equipment and configuration for UDP have not changed.
4. Verify that you are currently the only user accessing the device via WinDiscovery or Telnet.
5. The network may currently be experiencing heavy traffic which is reducing bandwidth and/or causing collisions with the UDP messages/packets between the device and WinDiscovery. Since delivery of UDP messages are not guaranteed, this can cause WinDiscovery to not receive the latest configuration or status packets, and thus show outdated or garbled information. In some cases, the device may not be discovered and displayed in the WinDiscovery device tree.

RC500 appears in RED text under WinDiscovery device tree
Possible reasons/solutions:
1. Incorrect network configuration may be causing the device to receive a fallback IP address and or perform soft restarts. Verify that the IP address configured for the device is correct. If you manually enter (or DHCP assigns) and IP address that already exists on the network, this will create an IP address conflict. The device will reset its address (fallback) to one within the link-local address space. Determine the cause of fallback IP address and resolve issue. View the error status under the status window to help determine the cause of why the device received a 169.254.xxx.xxx. Near the bottom of the status window the error will be displayed. (If there is no error the text box will not be displayed.)

Devices which have been assigned a fallback IP address of 169.254.xxx.xxx will be displayed in the main WinDiscovery window with RED text, indicating a problem with the configuration.

2. When the Ethernet Interface is initialized the network device will verify the IP address (either Static or assigned by DHCP) is not being used by another device on the network. If a conflict is found the device will default to a 169.254.xxx.xxx address. The IP address that caused the error

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is saved and returned as an error to WinDiscovery. This error status is available to the user via the Status window on WinDiscovery.

If the configuration of the network device is changed while a 169.254.xxx.xxx is being use, then the current 169.254.xxx.xxx address will become the permanent static address and the original conflicting static address is lost. At this point, it is necessary to manually change the static IP address to one that will not conflict, or you may do a "Reset Configuration" to restore the system to factory default settings.

3. If DHCP was selected and the network device fell back to a 169.254.xxx.xxx address approximately every 10 [depending upon the "Advanced Setting" values] minutes the Ethernet interface will be reinitialized and the RC500 will attempt to get an IP address from the DHCP sever. If the device is successful, the error will be cleared and the new address from the DHCP server will be used. If a discovery was done using WinDiscovery or Telnet was used this initialization will be delayed by 1 hour.

RC500 appears to 'reset' periodically
Possible reasons/solutions:
1. Check the network connection and setup. If DHCP is enabled [Note: DHCP is enabled by default] and a DHCP server is not active on the local network the clock will hesitate periodically while attempting to resolve DHCP configuration. To correct the problem, switch to manual networking configuration or determine why the local DHCP server is not operating.
2. If the device cannot resolve its DHCP mode, the unit will periodically perform a soft restart to reinitialize its communication port and DHCP configuration.
3. If the RC500 has not been configured with a least one valid DNS server (or that DNS server is down) hesitations similar to those described in #1 will occur. At least one valid DNS server is required for operation.

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Unable to communicate with the RC500 using Telnet
Possible reasons/solutions:
1. If the Slimline NTD has been configured to use DHCP for network   configuration but no DHCP/BOOTP server is present, the Slimline NTD may not respond to discovery requests for up to twenty seconds after power-on. [Note: DHCP is enabled as a factory-default.]
2. Verify that you have the correct IP address for the unit and the IP address did not change. If using DHCP to provide the IP address, this address may change periodically; you must know the IP address of the unit to use the TELNET interface.
3. Verify that the device does not have the Telnet interface disabled.

For security purposes, the Telnet interface can be disabled. When disabled, you will no longer be able to access the unit with Telnet. To re-enable the Telnet feature, one of the other configuration methods must be used, or the unit must be reset to factory default configuration.

Lost the password
Possible reasons/solutions:
1. The password cannot be recovered if it is lost. Reset the clock to the factory default configuration using the procedure described in the Configuration section. After the clock has been reset to factory defaults, the unit must be reconfigured. The factory - default password is "*public"*

Care and Cleaning

Adherence to regular and proper cleaning procedures is recommended to preserve appearance. Scratched or otherwise damaged lens caused by misuse, mishandling and improper storage or improper cleaning is not covered under the limited warranty.

Job Site Precautions
It is recommended the unit be removed and stored in a protective area during painting and/or construction.

Stainless Steel Case
If your unit has a stainless steel case, a cleaner and polish designed for use on stainless steel is recommended. Use a recommended product to maintain and protect the stainless steel finish while resisting water spots and fingerprints.

Compatible Cleaners and Polish
The following cleaning and polish agent has been found to be compatible with the stainless steel case finish. Manufacturer's instructions should be followed. Magic® Complete™ Stainless Steel Cleaner and Polish Spray (Magic American Products.)

Washing to Minimize Scratching
Fresh paint splashes, grease and smeared glazing compounds can be removed easily before drying by rubbing lightly with a good grade of naphtha or isopropyl alcohol. Follow the alcohol rub with a mild detergent wash with warm water and end with a thorough rinsing with clean water using a clean damp lint free cloth.

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Foreign Substance Removal
- Butyl Cellosolve (For removal of paints, marking pens, lipstick, etc.)
- The use of adhesive tape or lint removal tools work well for lifting off old weathered paints.
- To remove labels, stickers, etc., the use of kerosene, naphtha or petroleum spirits is generally effective. When the solvent will not penetrate sticker material, apply heat (hair dryer) to soften the adhesive and promote removal. Gasoline should never be used.

Service Information

We sincerely hope that you never experience a problem with any Masterclock product. If you do need service, contact Masterclock's Technical Support team. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call or email. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

Visit our website to download a current RMA request form.
http://www.masterclock.com/rma.php

Masterclock tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

RMA Policy

Our RMA policy is straight forward and is based on several basic premises
- An item can be returned, subject to several basic requirements, under our 30 day Satisfaction Guarantee.
- If an item fails within the Warranty Period we will repair and return it freight prepaid.
- If an item is outside the warranty period and requires repair we will inspect, repair and return the item to you for a reasonable charge for the work and the cost for freight.
- If you think an item or system is not working properly we expect you to read the instruction manual, talk with our technical support department and make a reasonable effort to resolve the issue.
- If you return an item to us for repair and the item is found to work properly then we will charge you an "Analysis and Inspection" charge plus the return freight.

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Please supply us with as many details about the problem as you can. The information you supply will be supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

Contacting Us

	USA and Canada	Sales
Masterclock, Inc.	1-800-940-2248	*sales@masterclock.com*
2484 West Clay Street	1-636-724-3666	
St. Charles, MO 63301 USA	1-636-724-3776 (fax)	**Technical Support**
		support@masterclock.com
website	**International**	
www.masterclock.com	1-636-724-3666	
	1-636-724-3776 (fax)	

Limited Warranty

This Masterclock product warranty extends to the original purchaser.

Masterclock warrants this RC 500 against defects in materials and workmanship for a period of five years from the date of sale. If Masterclock receives notice of such defects during the warranty period, Masterclock will, at its option, either repair or replace products that prove to be defective.

Should Masterclock be unable to repair or replace the product within a reasonable amount of time, the customer's alternate remedy shall be a refund of the purchase price upon return of the product to Masterclock. This warranty gives the customer specific legal rights. Other rights, which vary from state to state or province to province, may be available.

EXCLUSIONS

The above warranty shall not apply to defects resulting from improper or inadequate maintenance by the customer, customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product or improper site preparation and maintenance (if applicable).

WARRANTY LIMITATIONS

MASTERCLOCK MAKES NO OTHER WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THIS PRODUCT. MASTERCLOCK SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

In any state or province which does not allow the foregoing disclaimer, any implied warranty of merchantability or fitness for a particular purpose imposed by law in those states or provinces is limited to the one-year duration of the written warranty.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE THE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MASTERCLOCK BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

In any state or province that does not allow the foregoing exclusion or limitation of incidental or consequential damages, the customer may have other remedies.

HARDWARE SERVICE

You may return your RC 500 to Masterclock for repair service. Please contact the factory for **RETURN AUTHORIZATION** before returning the unit. When you return yourRC 500 for service, you must prepay allshipping charges, duty, and taxes. For international returns, please contact the factory.

Compliance

CELAB®
Via Maira snc
04100 Latina
Italy
celab@celab.com

CERTIFICATE OF CONFORMITY

Certificate Number **UCN** : 800509446285
Job : J10453
Date of Issue : 2011-10-17
Certificate valid up to : 2014-10-16

Brand Name : *Masterclock, Inc.*
Type : *COUNTER CONTROLLER RC500 POE*
Model N : *COUNTER CONTROLLER RC500 POE*

Manufacturer : Masterclock, Inc.
Address : 2484 W. Clay St.
     63301 St. Charles, MO. United States

    Standard Used
EN 55024:1998 +A1+A2

EN 55022:2006 +A1:2007

Conclusion:
The product meets the technical requirement of the above standards and the technical requirements of the following directives.
EMC 2004/108/EC
This certificate is only valid for the equipment and configuration described, in conjunction with the test data detailed above and with compliance with all applicable legal requirement for the product .
The CE mark as show below can be used, under the responsibility of the manufacturer or the importer, after completition of an EC Declaration of Conformity and compliance with all relevant EC Directives prescriptions.

CE

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Please check the authenticity of this certificate and related information in the web site www.celab.com **introducing the UCN number in the ' Check document authenticity' area. You will see copy of this certificate and regulation on certificate use. This document is released only for scope allowed by laws-**

Massimiliano Bertoldi
General Manager – CELAB
www.celab.com *DOC 121*

Compliance

CE Marking

Electromagnetic Compatibility   2004/108/EC

Tested and Conforms to the following EMC standards :
EN 61000-4-2:1995 +A1:1998 +A2:2001 (Electrostatic Discharge)
EN 61000-4-3:2006 +A1:2008 (RF Immunity)
EN 61000-4-4:2004 (Fast Transient Common Mode)
EN 61000-4-5: 2006 (Surge)
EN 61000-4-6: 2007 (RF Injection Common Mode)
EN 61000-4-8: 1993 +A1:2001 (Power Frequency Magnetic Field)
EN 61000-4-11: 2004 (Voltage Dips)

EN 61000-6-3:2001 (EMC Emissions Generic Commercial)
EN 55022:2006 +A1:2007
CISPR 22:2008
ANSI C63.4:2009

EN 61000-3-2:2006 +A1:2009 +A2:2009 (Harmonic Current Emission)

EN 61000-3-3:2008 (Voltage Fluctuations and Flicker)

Low voltage directive 2006/95/EC

Tested and Conforms to the following Safety standards:
EN 60950-1:2006 (Safety of Information Technology Equipment)

Certificated By CELAB® www.celab.com
UCN = xxxxxxxxxxxxxxxxxxxxx

This device complies with Part 15 of the FCC Rules and found to comply with the limits for a Class B digital device. These limits are designed to provide reasonable protection against harmful interference in a commercial/residential installation.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

WEEE

Waste Electrical and Electronic Equipment Directive (WEEE) 2002/95/EC

The RC500 is considered WEEE Category 9 (Monitoring and Control Instruments Equipment) as defined by the WEEE Directive and therefore fall within the scope of the WEEE Directive.

For more information about Masterclock's WEEE compliance and recycle program, please visit: *http://www.masterclock.com/rohs_compliance.php*

RoHS

Compliant
by
Exemption

Restriction of the Use of Certain Hazardous Substances Directive 2002/95/EC

The RoHS directive covers the same scope of electrical and electronic equipment that are under the WEEE directive, except that Category 8, Medical Devices, and Category 9, Monitoring and Control Instruments, which are under WEEE, are excluded from the RoHS directive.

This device fall under the category of Monitoring and Control Instruments Equipment (Category 9 as defined in Annex 1A of WEEE 2002/96/EC Directive) which is excluded from the RoHS directive 2002/95/EC (reference Article 2, paragraph 1) requirements.

These products are manufactured using lead in the soldering process as allowed for items excluded from the RoHS directive. These units are RoHS Compliant only in that they are excluded from the RoHS directive under Category 9, Monitoring and Control Instruments.

Contact Us

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Masterclock®