



TCD200 Digital Clock User Manual



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Introduction

Overview

Disclaimer

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Trademarks

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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.

Introduction

The TCD200 is a precision, multi-featured time code driven digital time display. The TCD200 decodes IRIG-B and SMPTE linear/longitudinal time code formats to function as a clock.

IRIG-B

Defined by the Range Commanders Council, U.S. Army White Sands Missile Range. The format is used by military, government, power industry and many other commercial and industrial applications. The TCD200 decodes IRIG-B in both a 1 kHz modulated (IRIG-B1) and un-modulated/pulse width coded/DC level shifted (IRIG-B0) format. All formats of IRIG-B time code decoded by the TCD200 use the time of year information BCD (Binary Coded Decimal). All formats of IRIG-B time code decoded by the TCD200 also use the extended year/date and time zone information in the control functions as defined by the IEEE 1344 specification. SBS (Straight Binary Seconds) information is not decoded. Manchester format/encoding is not supported.

The TCD200 can be configured for world-wide time zone offset and automatic DST (Daylight Saving Time) adjustment and allows for reliable, accurate and maintenance free operation. Use of the automatic DST feature requires that the clock be enabled to accept the time code date encoding, using the USB port and TCD-Set software application. The time code source must provide date encoding in the control bits/fields to the Masterclock/Leitch date encoding standard for SMPTE or the IEEE-1344 year encoding for IRIG-B.

SMPTE

Society of Motion Picture and Television Engineers format is available in frame rates of 24, 25, and 30 frames second. The TCD200 time code clock supports all three formats. All formats of SMPTE time code decoded by the TCD200 use the full date information in the user bits as defined by Leitch, Inc.

The TCD200 does not support decoding of SMPTE drop-frame, reverse running, VITC, NTSC, color frame, blackburst or other video time code formats and synchronization options.

Please refer to the “Specifications” section of this document for additional details on each model. For available options, visit Masterclock’s website: www.masterclock.com

Features

- Time or Date display
- 24 or 12 hour display mode
- +12 to -11 hour time zone offsets
- Programmable time and date when time code not present
- Automatic level adjustment to incoming time code signals
- Automatic detection of time code type and date encoding availability
- Retains time and date during loss of power and/or time code using a battery backed real-time clock (RTC) and maintenance free rechargeable battery

General Use Precautions

Do not expose this clock to temperatures outside the range of 0° C to 50° C (32° F to 122° F). Placing your device in an environment that is too cold or humid may damage the unit. Do not place heavy objects on top of this clock or use excessive force on it. Never use benzene, paint thinners, detergent or other chemical products to clean the outside of this clock. Such products will disfigure and discolor the casing.

Please refer to the “Care and Cleaning” section of this document for details on cleaning and recommended products.

The Masterclock's TCD200 warranty may be void as a result of the failure to respect the precautions stated above.

Only qualified persons are authorized to carry out maintenance on this device. Read this User’s Manual carefully, and follow the correct procedure when setting up the device. Do not open your Masterclock product or attempt to disassemble or modify it.

Never insert any metallic object into the clocks case, doing so increases the risk of electrical shock, short circuiting, fire or personal injury.

Never expose your clock to rain or use it near water or in damp or wet conditions. Never place objects containing liquids on or near this clock, as they may spill into its openings increasing the risk of electrical shock, short circuiting, fire or personal injury.

Operating Environment

The TCD200 contains microprocessor control electronics designed to operate indoors between 32° to 140°F (0° to 60°C) with 0-90% relative humidity, non-condensing.

The TCD200 is not water or moisture proof. Treat it as you would any other delicate electronic device and do not expose it to water, excessive heat or physical abuse.

Operation

After applying power, the clock will go through an internal check. Time from the RTC backup will be applied until a Time Code reference is acquired.

Connect a valid time code signal to the unbalanced BNC connector located on the back of the clock.

The time code input circuit of the TCD200 can automatically detect and synchronize to a single-ended unbalanced time code signal.

Once a source of IRIG-B or SMPTE time code is “Locked”, the time should appear on the display. If the time code signal is lost or disconnected, the TCD200 will continue to display time based on its internal reference until the time code signal is returned.

The green LED “LOCK” display will flash twice or dual pulse when the time displayed is not locked to time code. When time code is present and decoding properly the green LED will flash once or in a singular pulse.

To change the display to/from local time, the user must select the time zone offset for the region of interest and if desired, the optional DST feature which automatically adjusts according to the currently entered DST rules.

In the event that a time code source is not present, the unit is designed to operate as a standard (stand-alone) clock using the built in RTC (Real Time Clock). The RTC is battery backed with a maintenance free rechargeable battery. When operating in time/date display mode the operator may program time and date information into the clock.

When time and/or date information is available from the time code source it will always override any operator-programmed information.

Time Zone Offsets

The TCD200 time display maintains time as UTC initially. A time zone offset or bias can be provided to adjust the time for display purposes. A bias can be set as a positive (+) or negative (-) value with a resolution of one second.

If the time code being input into the TCD200 is different from UTC do not adjust the time zone and/or DST offset.

Daylight Saving Time

An automatic daylight saving time (summer time for European Union) adjustment can be configured separately and in addition to a time zone offset.

The incoming time code must have a date encoded in a format recognized by the TCD200 for daylight savings time adjustments to be performed. For best reliability Masterclock recommends a time code source that encodes full date information, such as Masterclock's GPS500 time code generator.

For SMPTE time codes, date must be encoded to the Leitch specification. IRIG-B date decoding is supported for the IEEE 1344 standard. Masterclock's master clock system also supports these specifications.

Pre 2007 Standard – U.S.A. and Canada

Traditional US/Canada daylight/summer time is configured as one (1) hour positive bias. For the U.S. (through 2006) and Canada, daylight savings time begins on the first Sunday of April at 2:00AM (Local Time) and ends on the last Sunday of October at 2:00AM (Local Time).

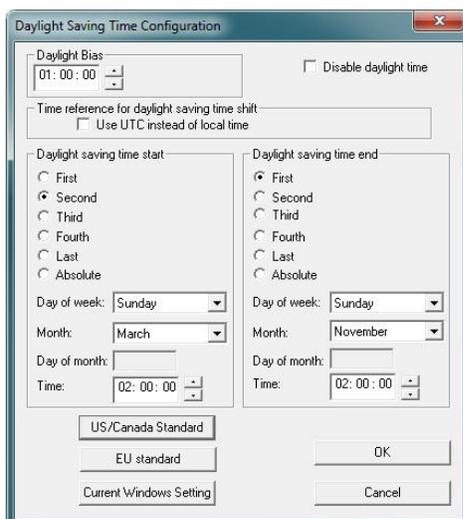
Post 2006 Standard – U.S.A. and Canada

On August 8, 2005, the Energy Policy Act of 2005 was signed. This Act changed the time change dates for Daylight Saving Time in the U.S, effective in 2007. DST now 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).

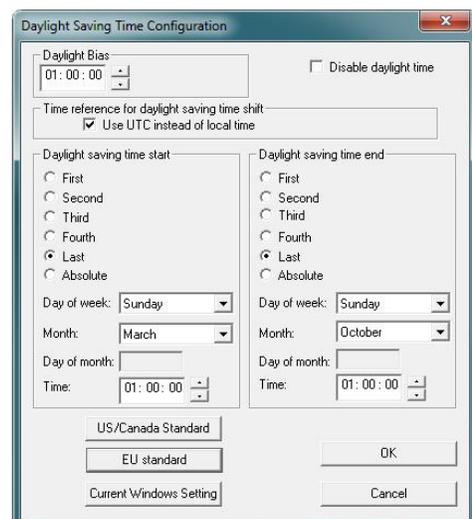
EU Standard – European Union

In the European Union, daylight change times are defined relative to the UTC time of day instead of local time of day (like in the U.S.). For the 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. European customers, please carefully consult the section entitled Device Settings for details on setting daylight time.

To ensure proper year-around operation, daylight time adjustments must be configured using the daylight time option and not with the time zone offset option.



US/Canada Standard, Post 2006



European Union Standard

Freewheeling Accuracy

The TCD200 has built-in provisions to allow the clock to freewheel and maintain accuracy for extended periods in the absence of time code. These features also allow the unit to be set manually and run without time code with precision.

TCXO and RTC circuit

The TCD200 contains a precision TCXO (Temperature Compensated Crystal Oscillator) and RTC (Real Time Clock) 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 time code is not present 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 once the battery is charged.

Default Configuration

The TCD200 digital clock maintains its configuration data in non-volatile flash memory allowing the unit to retain configuration settings even when power is off. The clock may be configured by using the Windows software application and a USB cable.

The TCD200 ships from the factory with the following configuration as defined below.

SETTING	CONFIGURATION SELECTION
<i>Disabled</i>	Time Zone Offset
<i>Disabled</i>	Daylight Savings Time
<i>Enabled</i>	Date information in time code
<i>Enabled</i>	24 Hour format

The TCD200 ships from the factory with “Time Zone / Time Offset” options set to off in order to display UTC time.

The TCD200 interprets the incoming time code as UTC.

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Unpacking and Installation

Supplied (Ship Kit)

The list below is for illustration purposes. Refer to your sales order for actual items shipped.

- TCD200 digital clock/date display
- CD-ROM (WinDiscovery USB Configuration Utility and User Manual)
- Power cord

TCD200
6 Digit Display



CD-ROM



IEC power cord (select power option when ordering)



Connections

USB: Insert USB B cable end for configuration using WinDiscovery software.

DC: DC power – Insert the DC power cord (included) into the DC IN socket located on the back panel.



Terminal Block:
3 conductor dry contact

Reset: Manual reset of the device back to factory settings.

Un-balanced Signal: Connect the 50 ohm (Ω) RG59 coaxial cable (not included) to the BNC connector, located on the back panel.

Mounting

The TCD200 digital time display is designed for desk or rack mount. Power and low voltage signal wiring should be installed according to local electrical codes, so to access the back of the clock.



Do not route power or signal cables between the case and the wall (along the exterior of the wall), which may pinch the power or signal cable and create a hazardous condition.

RACK MOUNT BRACKET

Attach the Cat 5 cable and/or power cord, and then secure the clock to the equipment rack (RM4 shown below).



RM4

USB Device Driver

A USB type B port has been included on the rear cover of the clock to provide a means of configuring the clock via software and to allow for firmware upgrades for either firmware corrections or future product enhancements.

To utilize the USB port, connect a USB type A to USB type B cable from the computer to the clock.



USB A cable end
(to computer)



USB B cable end
(to clock)



USB B port on clock
(back panel view)

Installing the Device Driver

First, power-on the TCD200. Next, use a USB cable (not supplied) and connect to the PC.

The Windows Plug and Play manager will detect a new USB device and request device drivers. If Windows is unable to install the USB device drivers, the system will send an alert.

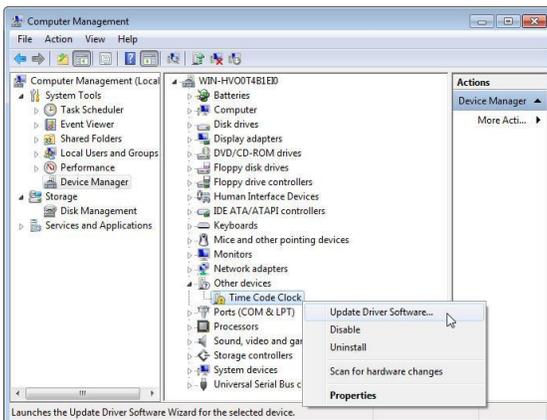


Open "Device Manager" and locate "Time Code Display" listed under "Other devices". Right click the device and click on "Update Driver Software". This will need to be performed for both USB device drivers (i.e. COM and BUS).

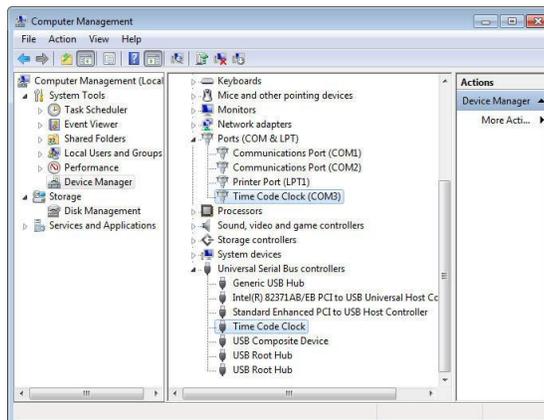
There are two locations for the USB Device Driver:

1. C:\Program Files\Masterclock\WinDiscovery\Drivers\
2. CD labeled, "Time Code Products" X:\Products\TCD200\Drivers\

Note: "X" is the CD/DVD drive letter of your Windows PC.



Device Manager



Device Manager with correct USB Device Driver

WinDiscovery

Management Window Settings

WinDiscovery

The **WinDiscovery** software application is a clock setup and configuration program that operates in the Microsoft Windows operating system and is supplied FREE with your TCD200 device.

INSTALLING WINDISCOVERY

To install the **WinDiscovery** complete the following steps:

1. **Insert the CD** that shipped with your network device.
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**. Click OKAY.



USING WINDISCOVERY

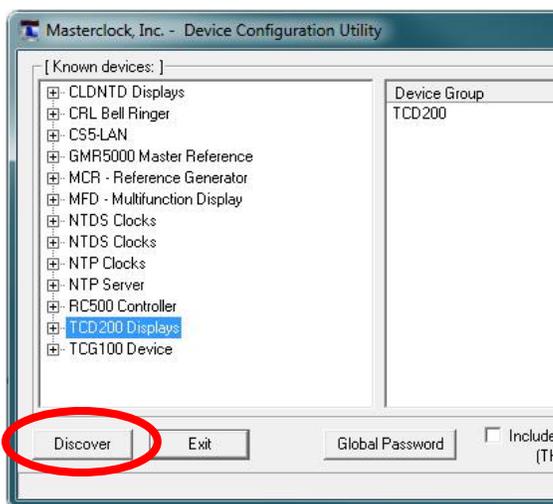
Open WinDiscovery from the “Start Menu” or by double-clicking the shortcut icon on the desktop (shown above).

Once you **open WinDiscovery**, click the **Discover** button and all devices 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.

Each device is configured with a **device name** from the factory. This name includes the model name and a MAC address extension. You should change the device name to one that can identify the location of the device.

It is highly recommended that only one user opens **WinDiscovery** at a time. Other methods should not be used to manage the network devices while using this software application.

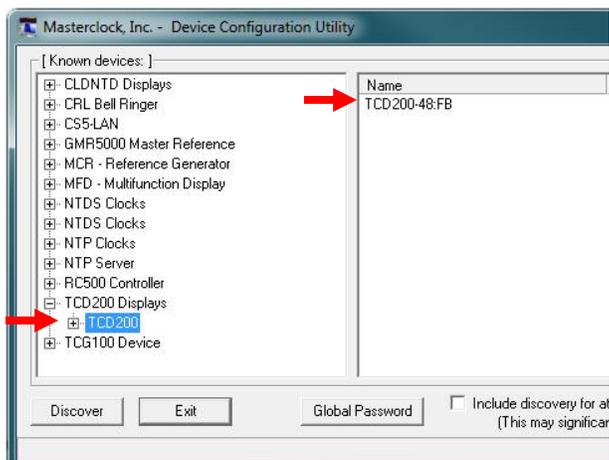
By clicking **Discover** button, **WinDiscovery** will search for connected devices and allow access to the device settings.



You should change the device name to one that can identify the location of the device.

It is highly recommended that only one user opens **WinDiscovery** at a time. Other methods should not be used to manage the network devices while using this app. In the event of WinDiscovery crash issue, set to Windows XP compatibility mode.

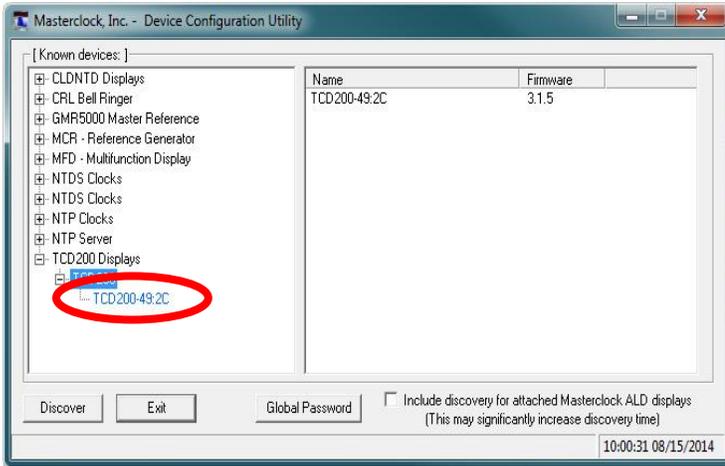
Clicking on any device group will list in the right pane of the WinDiscovery window all devices of that type found. Only the devices shown in the right window can be managed. To configure another device group, click on the device name in the left window and the device names will then appear in the right window, ready to be managed.



Click on the plus [+] sign to the left of any family or group to open and view device types that were found or click on the **Expand All** button.

Click on the minus [-] sign to collapse these files or **Collapse All** button.

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.



MENU

To open a **Menu of Options** window, including **Properties and Device Settings**, right click the device name.

Or

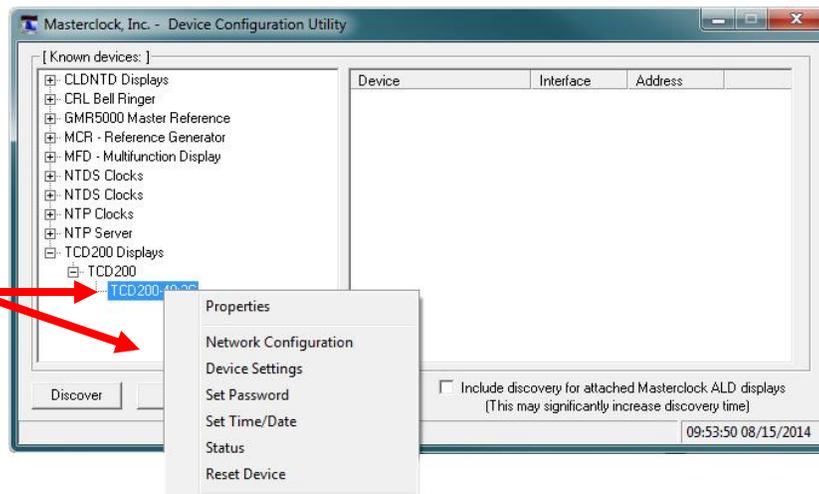
To open the **Device Settings** window, left click the device name.

Both options will be covered in the following instructions.

To configure and manage a device shown in the right window, double click or right mouse click the device name and a menu appears. The current choices are:

- Properties
- Network Configuration
- Device Settings
- Set Password
- Set Time
- Status
- Reset Device

Right: This menu appears following a right click to the device name.

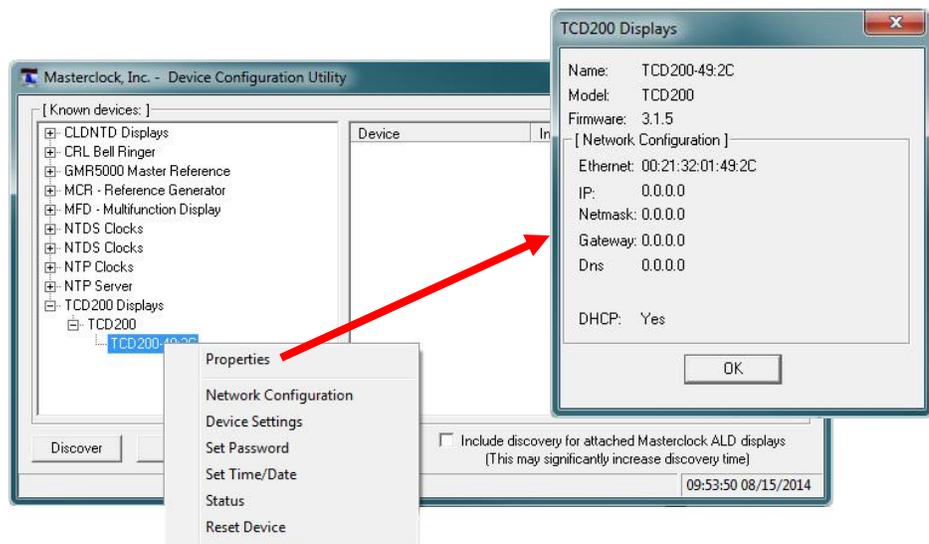


Clicking a menu choice opens a new window for that function. When working in the management windows, use the *Save* and *OK* button to accept changes that you have made. Use the *Cancel* button to exit the screen without applying changes.

NOTE: *Cancel* does not undo changes that have been saved using the *Save* button.

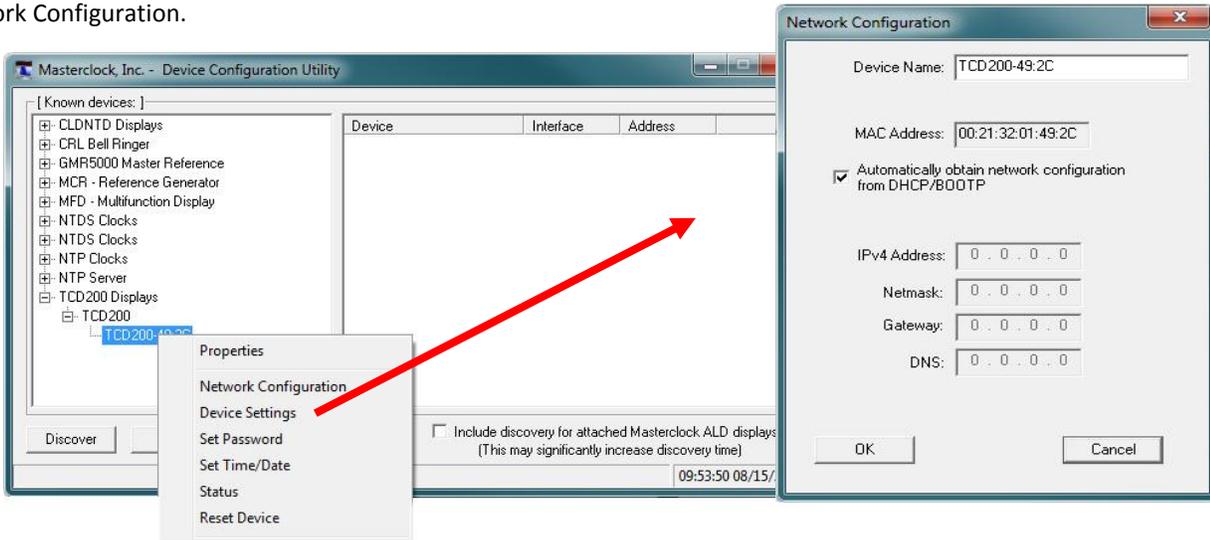
Properties

The properties of the TCD200 device of interest can be viewed in summary form, using this selection. Under "Properties" the device name, model, and network configuration settings are available.



Network Configuration

The network configuration must be established for the TCD200 to be accessible to the network. You must be a network administrator or have their support to complete these functions. Your network administrator determines the information for the Network Configuration.



[Note: The default factory setting for network configuration is to use DHCP/BOOTP.]

Device Name

Each clock is programmed at the factory with a factory device name. This name includes the model name and a “MAC address” extension.

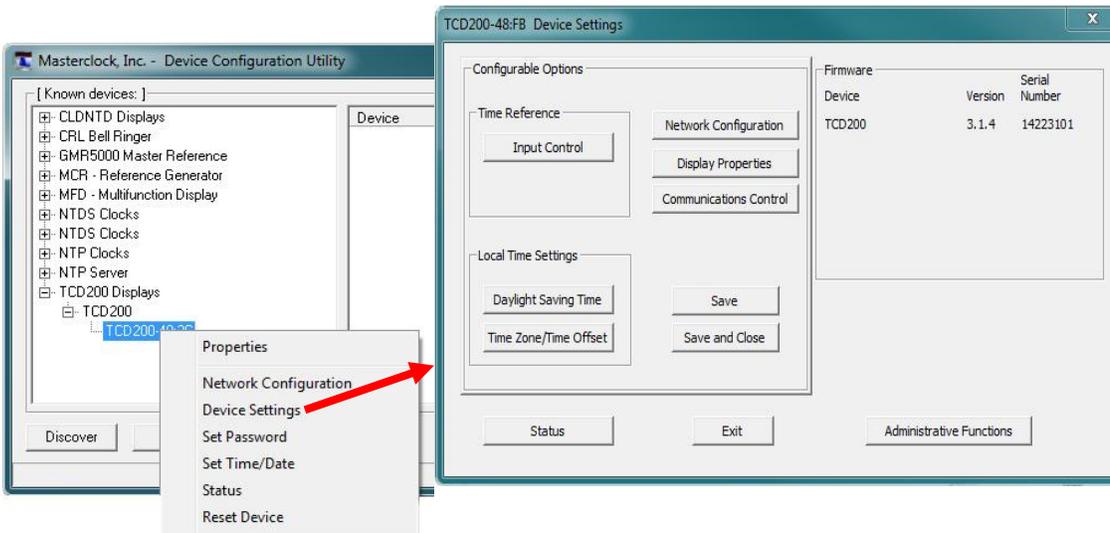
[Hint: You can change the device name to one convenient for you're site – preferably one that helps you to later identify the exact physical location of the device.]

Device Settings

The “**Device Settings**” window is the same one that appears with a left double-click of the device on the “Network Discovery” window.

The Device Settings window configures the TCD200 to receive and display in the format that you prefer, using Time Zone offsets and Daylight Saving Time (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 TCD200.

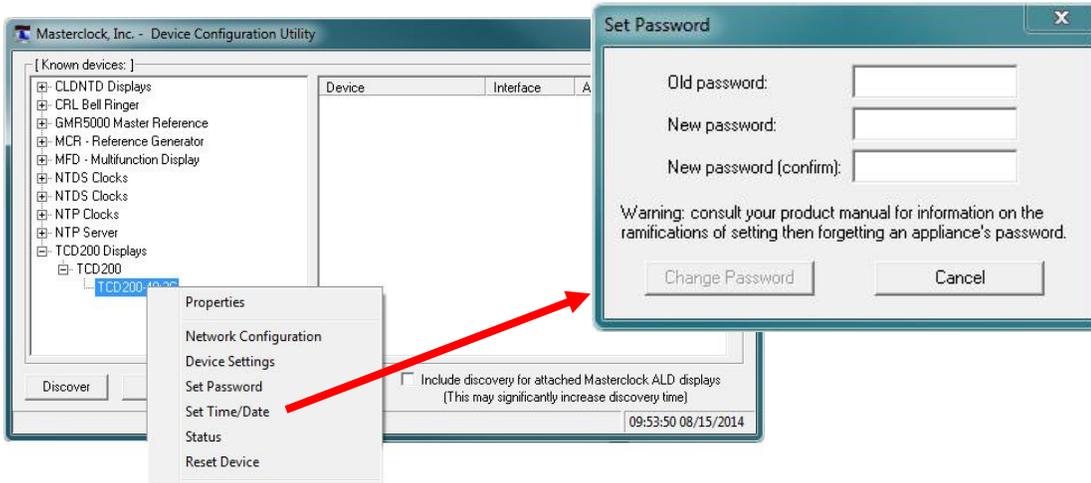


The rest of the “**Device Settings**” window includes access to all configuration options for the network. These include time reference input control, network configuration, display properties, communication control, local time settings and administrative functions, such as password. There is also a status display to monitor remote devices from your computer screen using the 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

Set/reset the password controlling access to the TCD200’s configuration.



A password can be a maximum of 10 characters and may contain any sequence of letters, numbers, and common punctuation. Passwords are case-sensitive.

WARNING: If the password is lost, the user must reset the TCD200 using the Reset button on the rear of the unit. This will cause the unit to return all configurations to factory-default settings.

WinDiscovery will not remember or store the password (s) after the session is closed. It is important for the user/system administrator to maintain passwords in a safe place.

Note: the factory default password is: “public”

When a password is set for a device, each time you click OK or Apply for that device you will be asked for the password. You may create a unique password for each device. You may enable the ‘Remember this password for the session’ checkbox to eliminate typing the password for each configuration change.

[Note: each device listed can have a unique password associated with it, which will default to the factory default password. You must enable the “Remember this password for the session’ checkbox for each device that is being configured.]



If you enter the wrong password and selected the “remember password” checkbox, you will receive an error upon selecting OK or Apply to any configuration changes. You can close the WinDiscovery session to “forget” the password(s), however this will require entering the password again for each device. Alternately, you can remove the incorrect password entry during a WinDiscovery session by going to the right click menu for the device and selecting Forget memorized password option. This option will be added to the right click list and will only be displayed if a password is memorized.



[Hint: To remove password protection for a device, select the Set Password command. You will be prompted to enter the old password. Enter the old password. Do not enter anything into the New Password or Confirm Password fields. Click Change Password to save. Upon you next session, you will not be prompted for a password for the device.]

Global Password



The **Global Password** being used must match the password on all the devices being administered. On any new system being installed, the factory default password on all devices is “**public**”.

The **Global Password** feature allows the user to enter a single password for all devices using the same password. During this session and subsequent sessions of **WinDiscovery**, you will not have to enter the password.

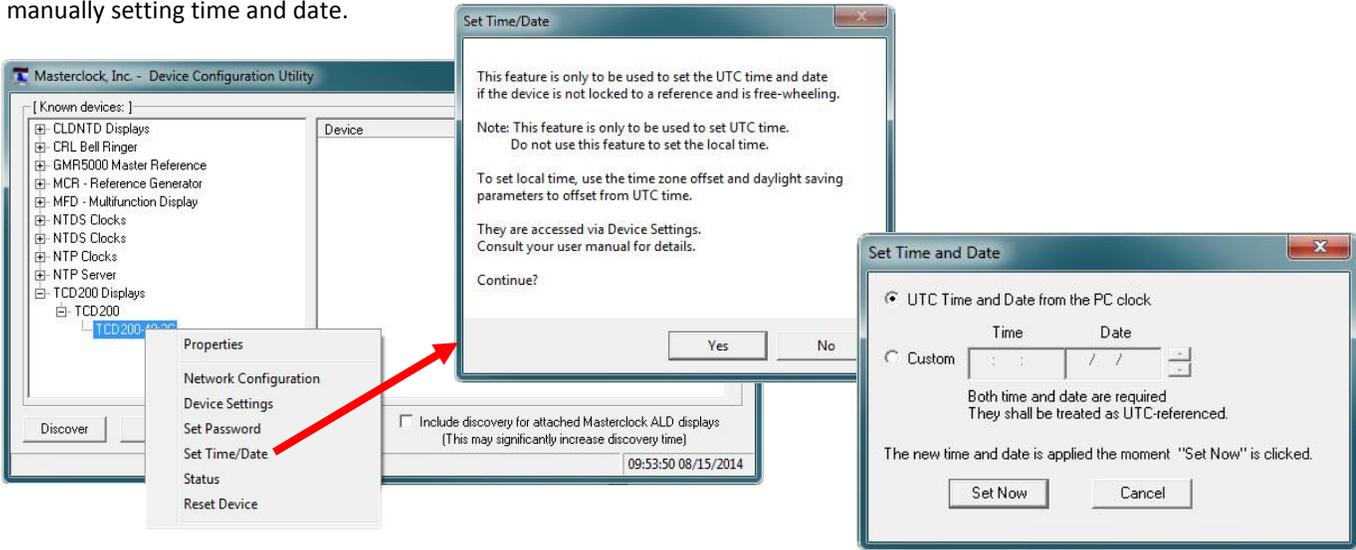
1. Check [**Enable Global Password**].
2. Type your password.
3. Click [**OK**]

To disable the Global Password, de-select the [**Enable Global Password**] checkbox and click [**OK**].

Note: Run program in administration mode if password doesn’t retain in WinDiscovery after end of session.

Set Time/Date

Here you may break the link to UTC time to create a custom time. Click this button to reveal a preliminary warning. Read the warning and continue if you wish to create a custom time for your TCD200. Selecting [Custom] switches from [UTC] Time to manually setting time and date.

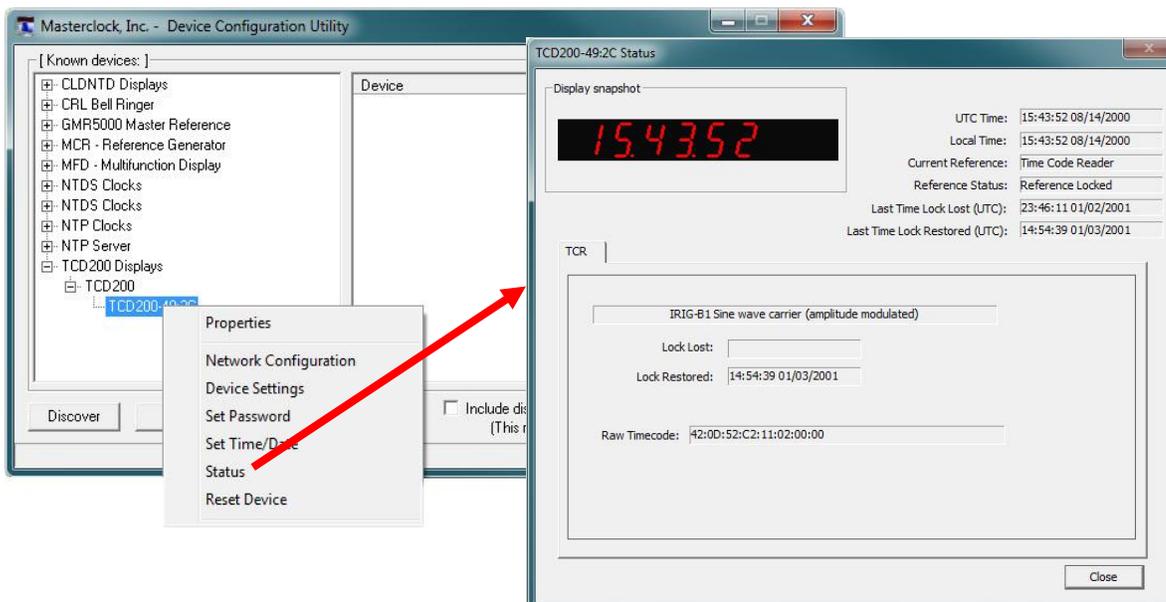


The [Custom] function may be most useful for demonstration, in lab situations, environments where an external signal is not available. The time for the TCD200 can either be set to the time of the PC or a manual custom time can be entered.

Status

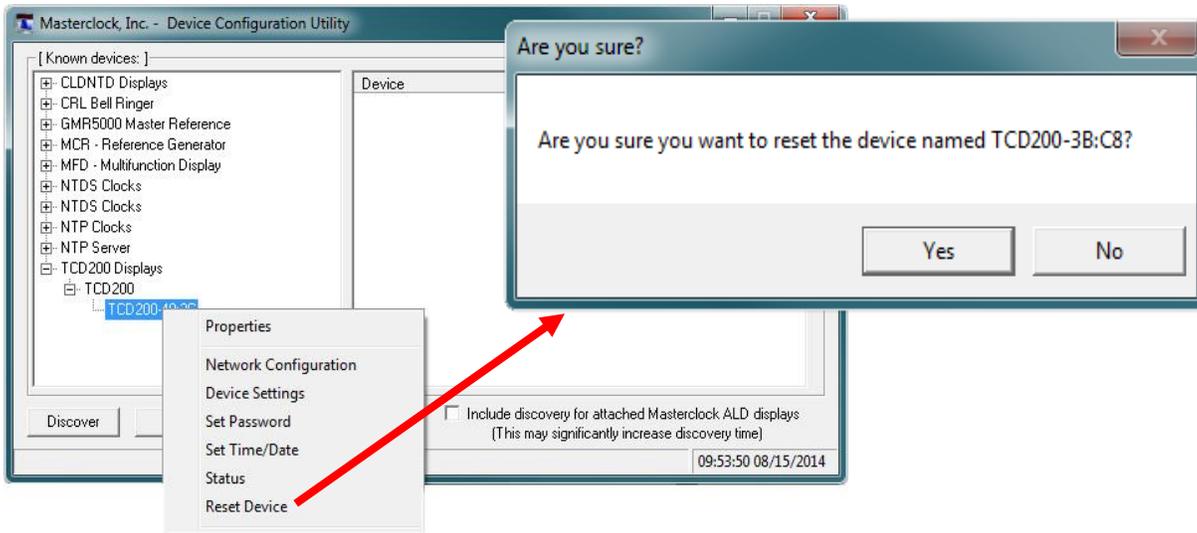
The "Status" window includes a "Display snapshot" of the TCD200 face. On the right are constantly updated listings of the UTC Time, Local Time, Current Reference, Reference Status, Last Time Lock Lost and Last Time Lock Restored (UTC)

Below "Display snapshot" is the TCR tab. The TCR tab indicates timecode received, when timecode is lost and restored, along with raw timecode. (See pg. 30 for more details on Status)



Reset Device

This button brings up the “**Are you sure?**” window. Press the [Yes] button and you will “soft reset” your TCD200 to allow the device to clear its current communications buffer and re-initialize its processing, which includes re-requesting of a DHCP address. This feature is intended to allow the user to remotely reset the unit and does not restore the factory default state.



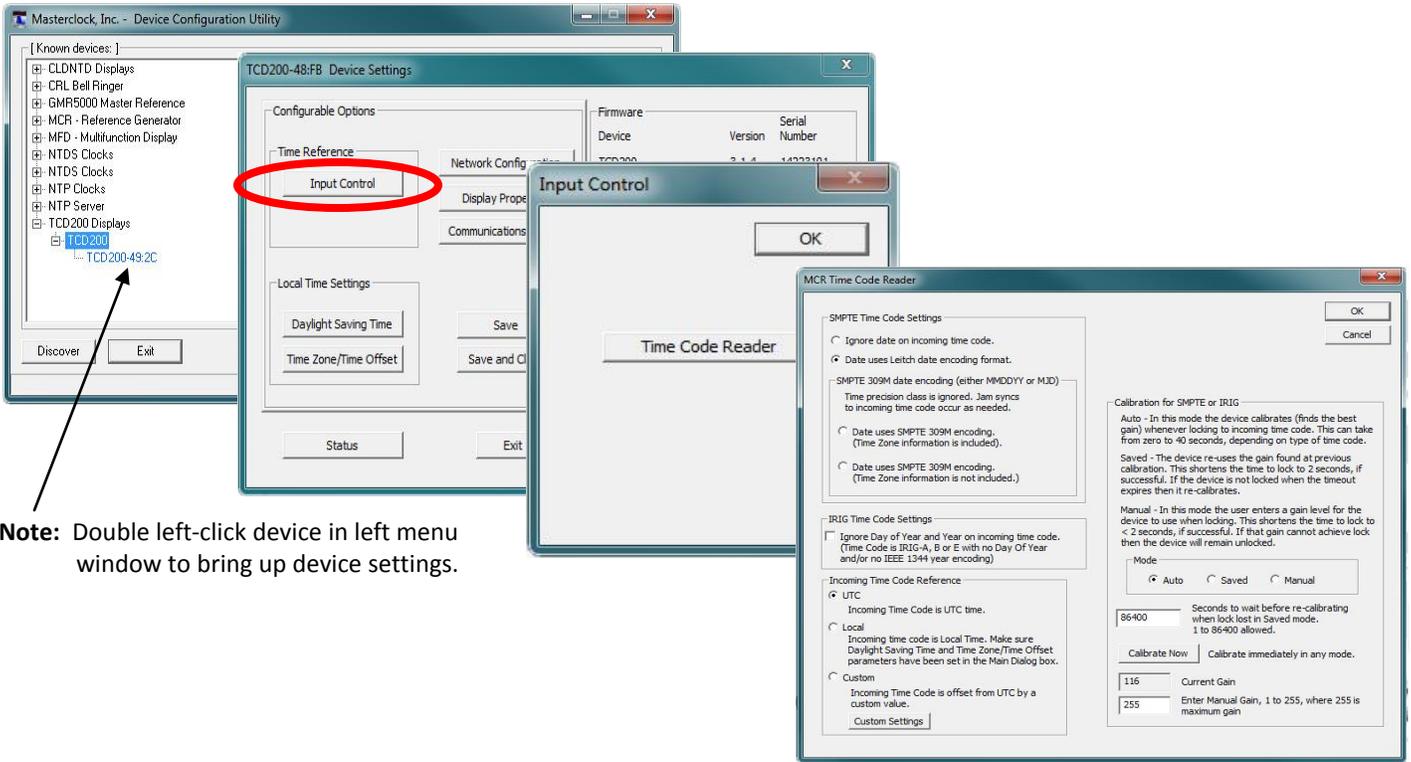
WinDiscovery

Input Control

Device Settings – Input Control

The “Device Settings” window includes three sections. In “Configurable options” the [Input Control] button takes you to [Time Code Reader button].

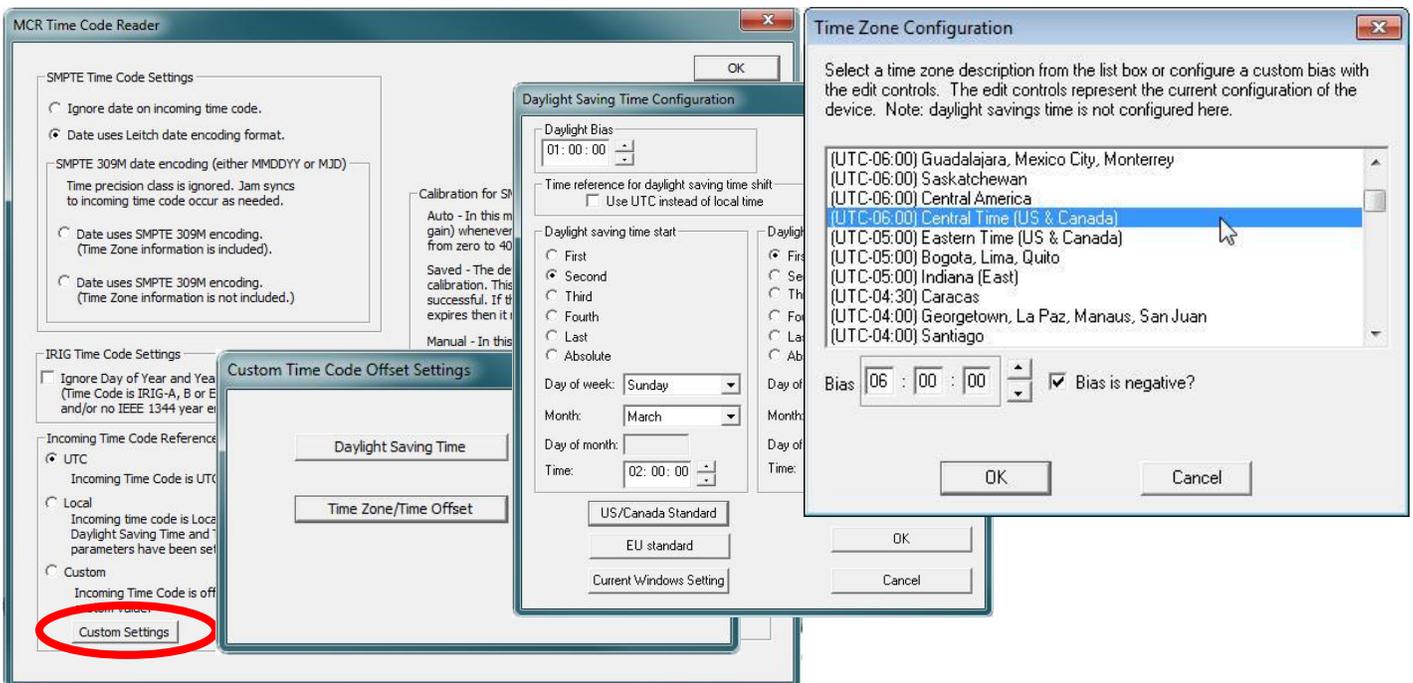
Clicking [Time Code Reader] permits the user to access and configure SMPTE Time Code Settings, IRIG Time Code Settings, Incoming Time Code Reference and Calibration for SMPTE or IRIG window. (Details pg. 24)



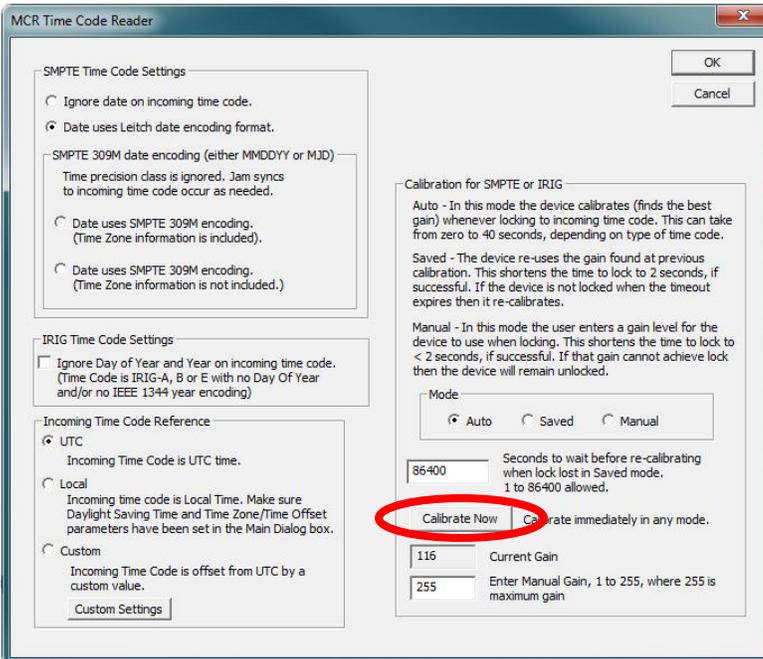
Note: Double left-click device in left menu window to bring up device settings.

Time Code Reader – Custom Settings

The “Time Code Reader” window is used to select settings for the Incoming Time Code Reference. Choose between UTC, Local, and “Custom Settings,” which can configure Daylight Saving Time and modify Time Zone. (Details on page 29)



Time Code Reader – Calibration for SMPTE or IRIG



Auto - In this mode, the device calibrates (finds the best gain) whenever locking to incoming time code. This can take from zero to 40 seconds, depending on type of time code.

Saved - The device re-uses the gain found at previous calibration. This shortens the time to lock to 2 seconds, if successful. If the device is not locked when the timeout expires, then it re-calibrates.

Manual - In this mode, the user enters a gain level for the device to use when locking. If that gain cannot achieve lock, then the device will remain unlocked. There is no timeout period; calibration will not be done for any reason. If the user enters an appropriate gain, then locking occurs in 2 seconds

Note: The user must be aware that in Manual Mode he is responsible for gain used.

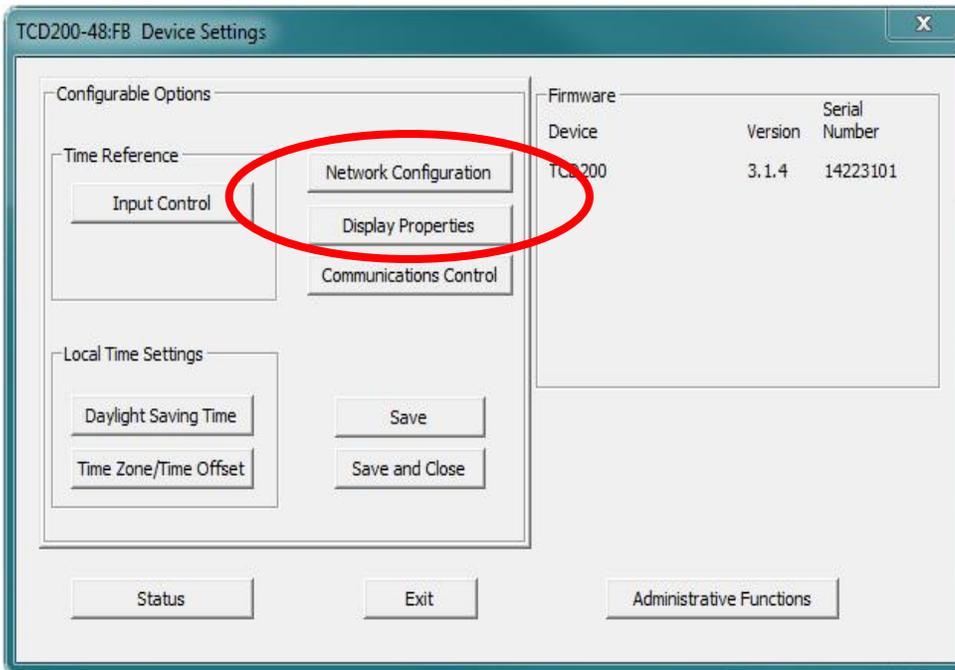
Calibrate Now - calibrates the time code reader when the user wants to. This is a manual calibration, not to be confused with manual gain. The gain found is put into use at once, and becomes the manual gain level. This can be done in any mode, and the mode does not change.

WinDiscovery

Network Configuration
Display Properties
Communication Control
Status

The [Network Configuration] button accesses window to view Device Name, MAC Address, IPv4 Address, Netmask, Gateway, and DNS. The network configuration must be established for the TCD200 to be accessible to the network. You must be a network administrator or have their support to complete these functions. Your network administrator determines the information for the Network Configuration. (Details on pg. 17)

The [Display Properties] button and window (shown below) permits the user to change the brightness of the LEDs, to change the Time/Date presentation order, to choose 12 or 24-hour time formats with leading zeroes on or off and to choose UTC or local time (once local time offsets have been input).

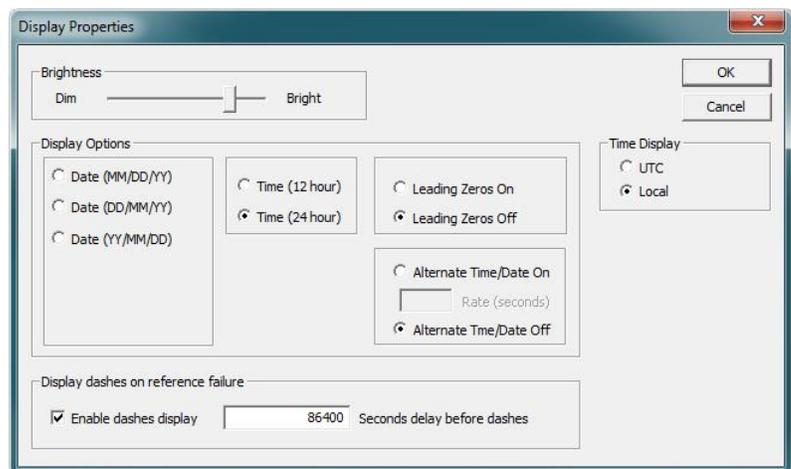


Brightness - The brightness or intensity of the TCD200's front-panel time display can be adjusted from dim to bright. The display can be dimmed here for low-light environments.

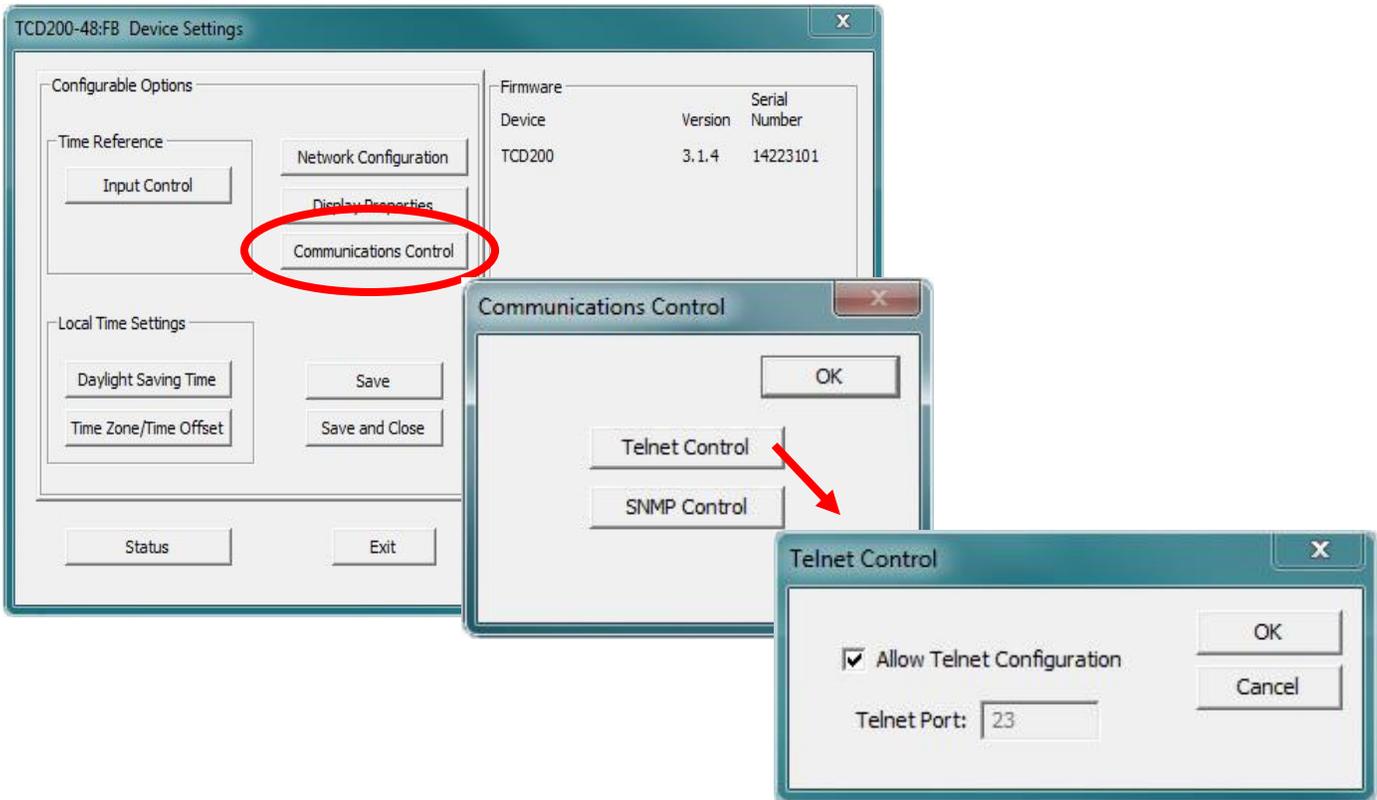
Display Options – Select date format (MM/DD/YY, DD/MM/YY or YY/MM/DD), 12 or 24-hour time, leading zeros, and Alternate Time/Date.

Time Display – Choose UTC or Local Time Display.

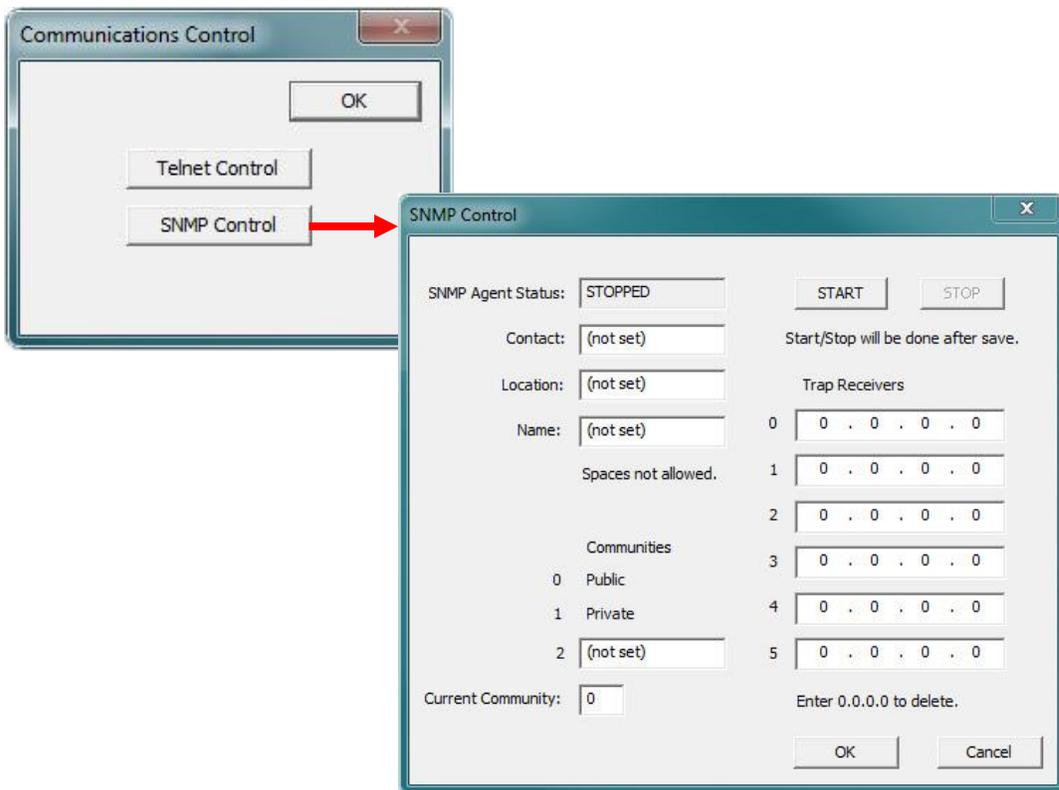
Display dashes on reference failure – Enable dashes display and enter seconds delay before dashes.



The [Communications Control] button and window enable or disable Telnet.



The [Communications Control] button and window enable SNMP settings.



SNMP = Simple Network Management Protocol

SNMP is a standard way to monitor a device on an Ethernet network. It is used so a network manager can get a lot of data about the health and network traffic on an Ethernet LAN.

SNMP's purpose is to convey the network status of a TCD200; it is not for fully controlling the device.

Note: Do NOT control the TCD200 via SNMP; that will continue to be done via WinDiscovery.

The TCD200 runs firmware called the SNMP Agent. The user runs software called the SNMP Manager (or Client) on a PC. THE USER MUST ACQUIRE THE MANAGER SOFTWARE; Masterclock does not offer one.

Our Agent supports versions 1 and 2 of SNMP. The PC on which the Manager is running a TCD200 must also have SNMP abilities for Manager and Agent to communicate. Windows 7 and XP support SNMP v1 and 2. The user runs the Manager to get the data, issuing requests to the Agent. If some security tests are passed, then the Agent responds with the data.

SNMP Control window in WinDiscovery (shown on pg.27), can set options like: Name and location for the device, and the name of the person responsible for it, called the Contact, thus a device could be named "Conference Room Clock", with the location "Room A - Bldg. 1", and the contact "Maint. ext. 10".

There are messages that the Agent can send to the Receiver PC without being asked. They are called Traps, which tell of events like:

1. Device Restart
2. Ethernet Link Up
3. Authentication Failure (Community mismatch)

SNMP Control

SNMP Agent Status: STOPPED [START] [STOP]

Contact: (not set) Start/Stop will be done after save.

Location: (not set)

Name: (not set) Trap Receivers

Spaces not allowed.

Communities

0 Public 0 0 . 0 . 0 . 0

1 Private 1 0 . 0 . 0 . 0

2 (not set) 2 0 . 0 . 0 . 0

3 0 . 0 . 0 . 0

4 0 . 0 . 0 . 0

5 0 . 0 . 0 . 0

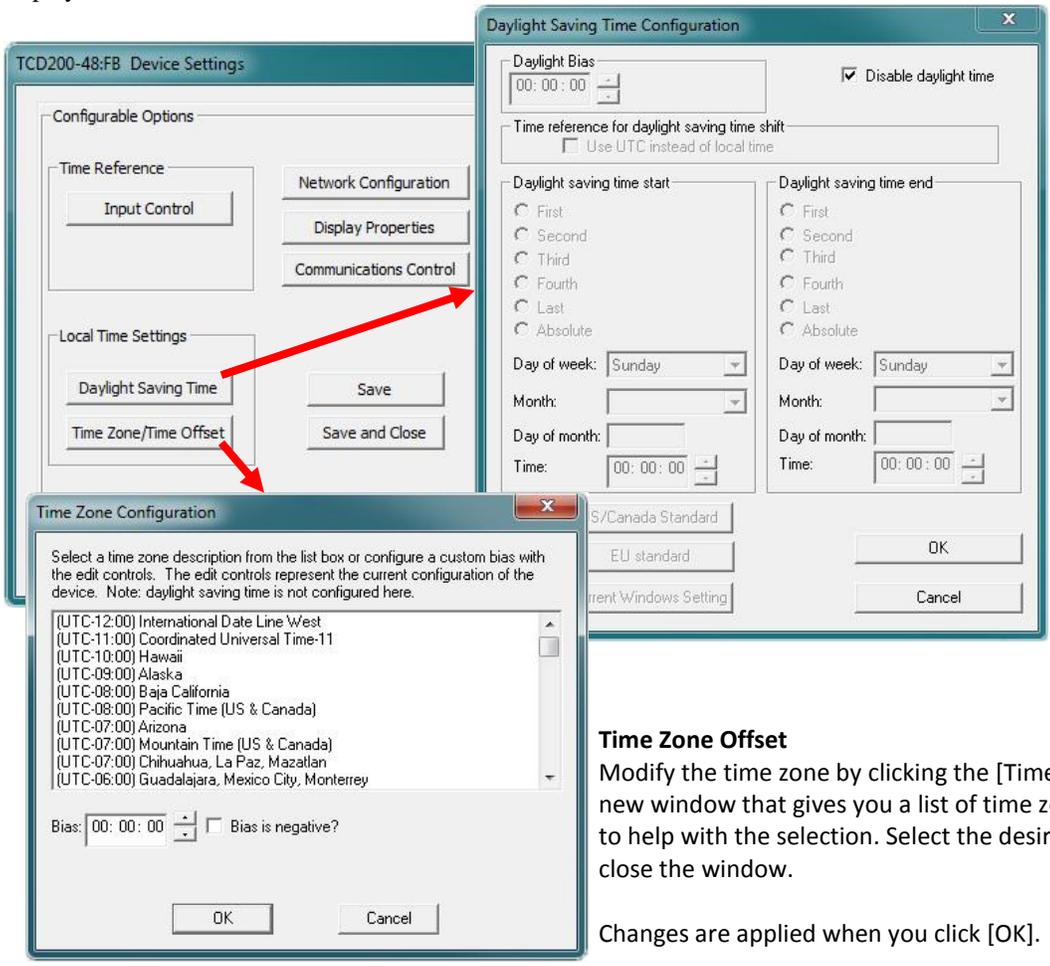
Current Community: 0 Enter 0.0.0.0 to delete.

[OK] [Cancel]

Traps are sent to the IP addresses listed as Receivers, 6 of which can be stored in the device. Not every Manager can receive traps, as such the case when an SNMP Manager is part of a multi-function utility.

Note: The SNMP is NOT a server/client scheme.

The “**Local Time Settings**” section includes two buttons for [**Daylight Savings Time**] and [**Time Zone/Time Offset**] to offset your displayed time from UTC to Local time.



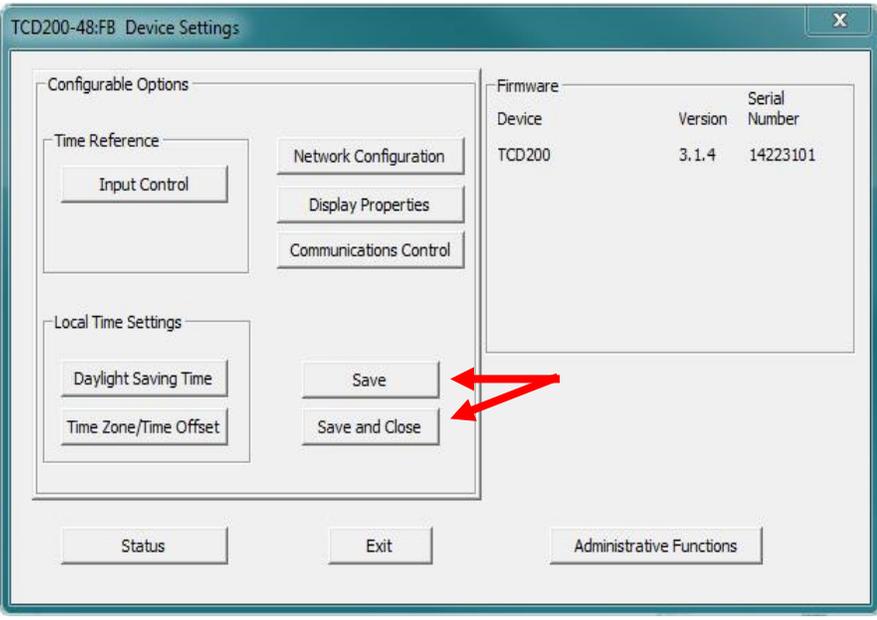
Daylight Saving Time
Configure and/or enable the daylight saving function by clicking the [**Daylight Saving Time**] button. North American and European Union DST settings are quickly entered by clicking the appropriate button; [**US Standard**] or [**EU Standard**].

Daylight saving time configurations will be applied when you click [**OK**].

Time Zone Offset
Modify the time zone by clicking the [**Time Zone**] button. This opens a new window that gives you a list of time zones, including descriptions to help with the selection. Select the desired time zone and click [**OK**] to close the window.

Changes are applied when you click [**OK**].

Note: The [**Save**] and [**Save and Close**] buttons must be clicked before hitting the [**Exit**] button. Otherwise any entered changes will not take effect.



STATUS

At the bottom left of the “TCD200 Device Settings” window is the [Status] button. The “TCD200 Status” window includes a “Display Snapshot” of a graphic digital clock representing the face of the actual TCD200 in real time. On the right appear the “UTC Time” and date, “Local Time” and date, the “Current Reference” signal (in this case Time Code), the “Reference Status” (in this case Locked) and two windows listing **Last Time Lock Lost** and **Restored**.

Below the Display snapshot is the **TCR Tab**.

The image shows two overlapping software windows. The background window is titled "TCD200-48:FB Device Settings" and contains several sections: "Configurable Options" with sub-sections for "Time Reference" (containing an "Input Control" button), "Network Configuration", "Display Properties", and "Communications Control"; "Local Time Settings" with "Daylight Saving Time" and "Time Zone/Time Offset" buttons, and "Save" and "Save and Close" buttons. At the bottom, there are buttons for "Status" (circled in red), "Exit", and "Administrative Functions". A "Firmware" table is also visible with columns for "Device", "Version", and "Serial Num".

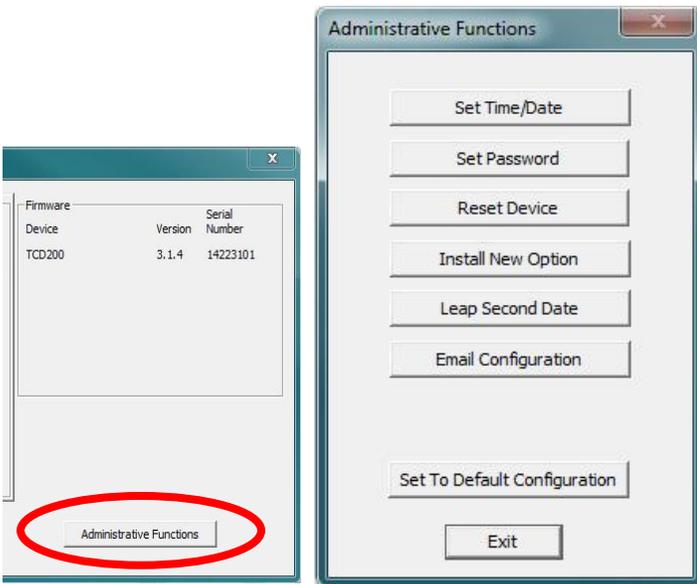
The foreground window is titled "TCD200-49:2C Status" and features a "Display snapshot" of a digital clock showing "15.4352". To the right, it displays time and reference information: UTC Time: 15:43:52 08/14/2000, Local Time: 15:43:52 08/14/2000, Current Reference: Time Code Reader, Reference Status: Reference Locked, Last Time Lock Lost (UTC): 23:46:11 01/02/2001, and Last Time Lock Restored (UTC): 14:54:39 01/03/2001. Below this is a "TCR" tab (indicated by an arrow) containing fields for "IRIG-B1 Sine wave carrier (amplitude modulated)", "Lock Lost:", "Lock Restored: 14:54:39 01/03/2001", and "Raw Timecode: 42:0D:52:C2:11:02:00:00". A "Close" button is at the bottom right.

TCR Tab – includes the **Time Code Receiver** (in this case IRIG-B1), the **Raw Time Code** and the **Lock Lost** and **Lock Restored** notification windows.

WinDiscovery

Administrative Functions

ADMINISTRATIVE FUNCTIONS



From the “**Device Settings**” window, click [**Administrative Functions**] button to open a menu that is rarely accessed. These include:

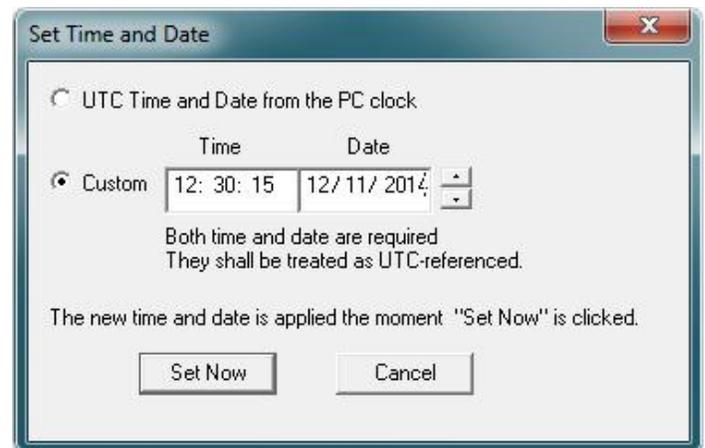
1. [**Set Time/Date**] (for custom time, not UTC or local time)
2. [**Set Password**]
3. [**Reset Device**]
4. [**Install New Option**] (May not be applicable to all devices)
5. [**Leap Second Date**] (input this whenever announced);
6. [**Email Configuration**] (to automatically alert you via email of any situations within the system when they happen) (May not be applicable to all devices)
7. [**Set To Default Configuration**] Below we’ll look at these windows in detail.

SET TIME AND DATE

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**].

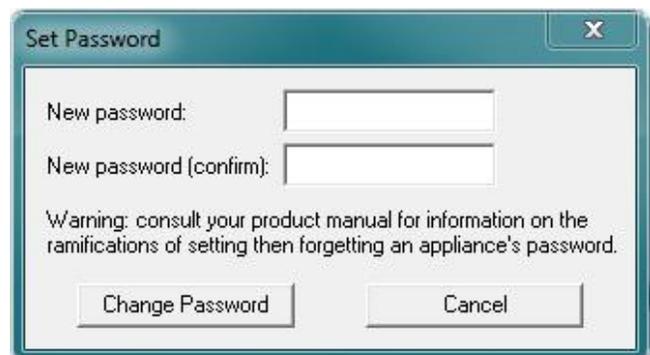
In the “**Set Time and Date**” window (left) click the [**Custom**] button to enter your new time and date. Click the [**Set Now**] button to activate your custom time. To return to UTC time choose [**UTC Time and Date button from the PC clock**] then click [**Set Now**]. (See page 20)



SET PASSWORD

Click the [**Set Password**] button to create a new password. In a worst-case scenario you would have to reset the TCD200 to its factory default settings. That reverts back to the factory default password: “**public**”.

There is a second way to set a password (page 18) and describes more fully the rules surrounding password usage.



RESET DEVICE

Click **[Rest Device]** to induce a soft reset. This procedure allows the TCD200 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 not in the “**Administrative Functions**” window, but are viewing the list of devices after pressing the **[Discover]** button, simply right click on the device you are interested in and select the **[Reset Device]** button. (See page 21)



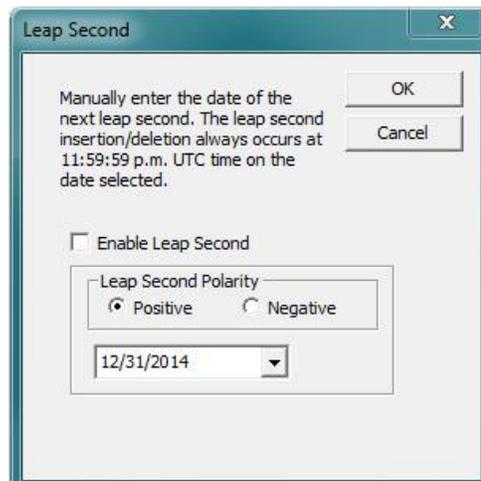
INSTALL NEW OPTION (MAY NOT BE APPLICABLE TO ALL DEVICES)

This window will ask you to “Paste the Option Key you received here. Then click Install.” This will install the new option into the software. Keys are generated by a Masterclock Technician (NTP, Event Time, TCR/TCG, and NMEA 0183).



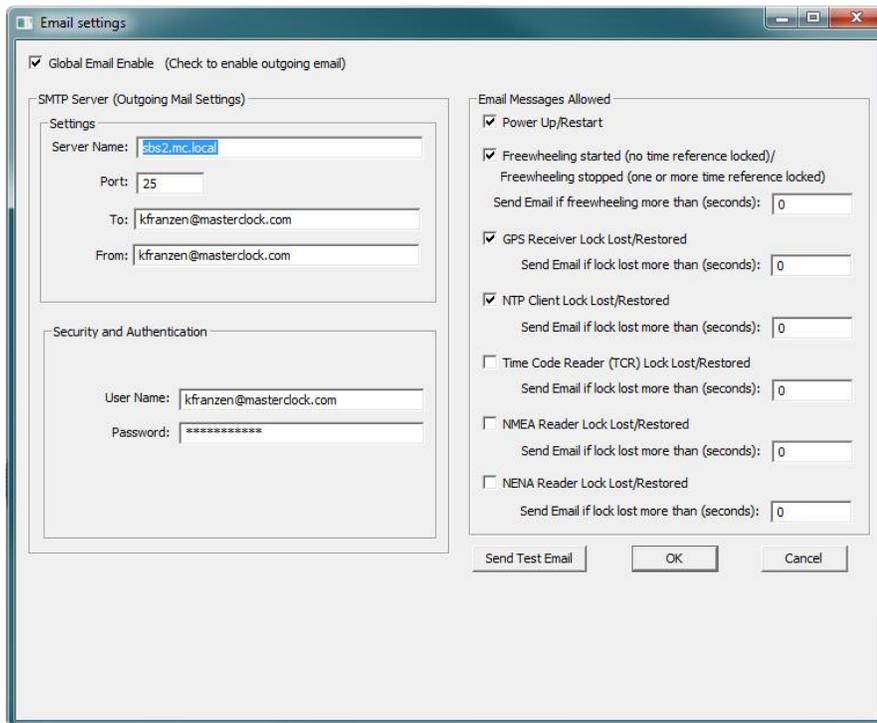
LEAP SECOND DATE

This window enables the placement of a leap second when it occurs. Enter the date and polarity ahead of time. Click the **[Leap Second Date]** button to enable a future leap second to occur on any specific date that you manually enter.



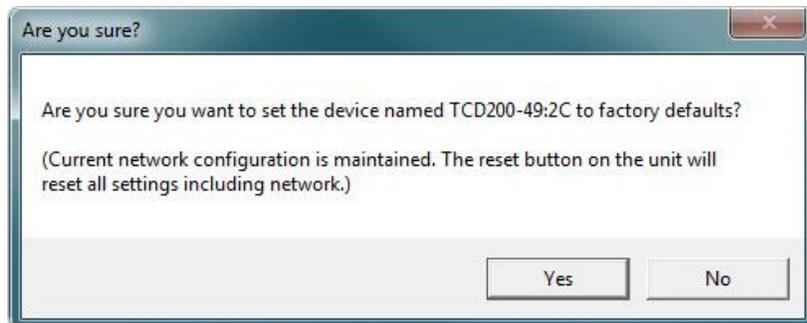
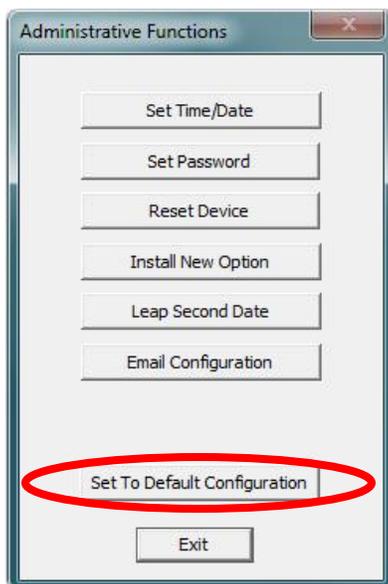
EMAIL CONFIGURATION (MAY NOT BE APPLICABLE TO ALL DEVICES)

Click the [Email Configuration] button to generate email alerts when certain conditions are met. Only use unsecured networks.



SET TO DEFAULT CONFIGURATION

Click the [Set to Default Configuration] button to reset all of your previously entered options and custom 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**”.



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Specifications

Communications I/O

USB.....B type connect

Format.....v1.1

Time Code Formats		DST supported	
		Masterclock/Leitch Date Encoding	IEEE - 1344 Year Encoding
I N P U T S	SMPTE – 30 fps	√	-
	SMPTE – 25 fps (EBU)	√	-
	SMPTE – 24 fps (FILM)	√	-
	IRIG-B* pulse width modulated	-	√
	IRIG-B(1)* amplitude modulated	-	√

Type.....LTC (Longitudinal/Linear Time Code), forward running,
automatic detection and automatic gain adjustment.

Impedance> 50 KΩ

Nominal Level1.5 Vpp (0dB/600Ω)

Input Level Range.....0.175-12 Vpp (-15dBV to 20dBV)

Auto-Detection/Gain Adjustment Range.....IRIG-B00 un-modulated, 0.5 to 12 Vpp
IRIG-B12, 1 KHz AM, 0.5 to 8 Vpp, 3:1 mark to space ratio
SMPTE 24, 25 and 30 fps, NDF, 0.2 to 12 Vpp

Input Signal and ConnectorBNC-female, Single Ended, Unbalanced:
Center pin: Time Code Signal (+)
Outer Conductor: Time Code Return (Common)

Power Requirements

AC

AC (Adaptor Included)

AC Input Voltage100-240 ±10% (90-264 VAC), via AC/DC
 AC Input Frequency.....47-63 Hz
 AC Input Connector.....Universal IEC input connector
 AC power consumption<7.5 W



*There are no user serviceable parts inside the TCD200 digital clock.
 Please contact Masterclock, Inc. if you require servicing or repair.*

DC

DC Input Voltage9-28 VDC
 DC power consumption<7.5 W

Internal Battery Circuit

Maintenance Free Rechargeable Battery



3V,17 mAh, Coin Cell
 Rechargeable Manganese Lithium

Rechargeable Manganese Lithium coin cell and recharging circuit requires no maintenance and retains all configuration settings for at least one year without applied external power.

Operating/Storage Temperature and Humidity

Operating Temperature0 to +50°C
 Relative HumidityUp to 90% (non condensing @ 25°C)
 Storage Temperature-40 to 70°C

Size and Weight

	6 Digit Display
	TCD200
Physical Size	
Width	6.5" (16.51 cm)
Height	1.75" (4.45 cm)
Depth	4.2" (10.67cm)
Weight	1 lb (.45 kg)
Material	
Case	Powder Coated Steel
Lens	Acrylic

Compliance

CE Marking



Electromagnetic Compatibility 2004/108/EC

Tested and Conforms to the following EMC standards :

EN 55024:1998 +A1 +A2
EN 61000-4-2:1995 +A1:1998 +A2:2001 (Electrostatic Discharge)
EN 61000-4-3:2000 +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 61000-6-3:2006 +A1:2009 +A2:2009 (EMC Emissions Generic Commercial)
EN 55022:2006 +A1:2007
CISPR22

EN 61000-3-2:2006 (Harmonic Current Emission)

EN 61000-3-3:2008 (Voltage Fluctuations and Flicker) (TCDS26)
EN 61000-3-3:1995 +A1:2001 +A2:2005 (Voltage Fluctuations and Flicker) (TCDS29)

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 = 800425240291 (TCDS26)

UCN = 800342569958 (TCDS29)

FCC Statement



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 TCD200 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.

The TCD200 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.

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 clock be removed from the wall and stored face up in its protective shipment bag during painting and construction.

New construction and renovations frequently require that the job site be cleaned of any excess mortar, paint, sealant, primers or other construction compounds. Only recommended cleaners should be used to clean the polycarbonate lens. Contact with harsh solvents such as methyl ethyl ketone (MEK) or muriatic acid can result in surface degradation and possible crazing of the polycarbonate.

When the clock is first installed, glazing compound and masking tape adhesive can be easily removed from the lens by applying naphtha (VMandP) or kerosene with a soft cloth, followed immediately with a thorough soap and water cleaning.

Stainless Steel Case

If your clock 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

Wash with a mild soap or detergent (such as 409™ (Clorox Co.), cleaner) and lukewarm water, using a clean sponge or a soft lint free cloth. **DO NOT USE PAPER TOWELS OR PAPER PRODUCTS TO CLEAN OR DRY THE LENS.** Rinse well with clean water. Dry thoroughly with a chamois or moist cellulose sponge to prevent water spots. Do not scrub or use brushes or abrasives on these products; the UV coating is not mar resistant. Also do not use butyl cellosolve in direct sunlight.

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.

Minimize Hairline Scratches

Always store the clock face-up in the protective plastic shipping bag until ready for installation and during transporting to the installation site. Do not place the clock face (lens surface) down on any surface as this may scratch or mar the lens.

Scratches and minor abrasions can be minimized by using a mild automobile polish. Three such products that tend to polish and fill scratches are Johnson Paste Wax; Novus Plastic Polish #1 and #2, Novus, Inc., Minneapolis, MN and Mirror Glaze plastic polish (MG M10) Mirror Bright Polish Co., Pasadena, CA. It is suggested that a test be made on a very small section of the polycarbonate lens with the product selected and that the polish manufacturer's instructions be followed.

"Don't" - Very Important

- Don't store the clock without the protective plastic shipment bag.
- Don't store or place the clock face down on any surface, as this may scratch the lens.
- Don't use abrasive or highly alkaline cleaners.
- Don't use paper towels, paper products, rayon or polyester cloths to clean or dry the lens.
- Don't scrape the lens with squeegees, razor blades or other sharp instruments.
- Don't ever use benzene, gasoline, acetone, methyl ethyl ketone (MEK), muriatic acid or carbon tetrachloride on the lens.
- Don't clean lenses in hot sun or on very hot days.

Cleaning the Lens

The following cleaning agents have been found to be compatible with the Polycarbonate and Acrylic lens. Manufacturer's instructions should be followed. Formula 409™ (Clorox Co.), Top Job™ (Proctor and Gamble), VM and P grade Naphtha Joy™(Proctor and Gamble), Windex w/Ammonia D™(Drackett Products), Palmolive Liquid™(Colgate Palmolive).

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.

Troubleshooting

The easiest way to verify that TCD200 is decoding time code is to observe the LED colons (and LED “LOCK”) on the front of the clock. The colons (and “LOCK”) will flash at a rate of 1 pulse per second when the TCD200 is synchronized to a time source (i.e. decoding time code). If the colons are flashing at a rate of 2 pulse per second or dashes are displayed, then there is an issue with the input time code signal.

A secondary method is to monitor the time code status while using the WinDiscovery application.

Time code decoding problems can include any of the following:

- No time code present
- Ground loops or other interference such as coupling from nearby AC power lines, bad/intermittent cables, wiring or connectors incorrect wiring connection for unbalanced or balanced input signals
- Out of range signal level that is too high or too low
- Fluctuating signal level
- A signal that is distorted
- Excessive loading on the time code line
- A time code type or encoding that the TCD option does not support

*There are no user serviceable parts inside the TCD200 digital clock/display.
Please contact Masterclock, Inc. if you require servicing or repair.*

Clock is displaying dashes (- - -) and/or colon’s are flashing (i.e. unable to “lock” to time code)

Possible reasons/solutions:

1. Clock is not currently connected to a time code source.
2. There is a problem with the cabling between the clock and the time code source.
3. There is a ground loop or other interference between the clock and the time code source. Verify that a common ground exists between the clock and the time code source. If the cabling distance between the time code source and clock is large you may want to consider inserting an audio distribution amplifier between the devices.
4. The signal level of the incoming time code is out of the range of the time code circuitry.
5. The signal level of the incoming time code is fluctuating or has changed. The signal level must be stable for the TCD200 to detect and decode the time code. Cycle power of the TCD200 device to re-initiate the auto-detection of time code.
6. The time code being fed to the TCD200 is not a recognized format. Verify that your time code source is providing one of the time code formats that the TCD200 can decode.

Not displaying the correct local time and/or date.

Possible reasons/solutions:

1. The TCD200 has a time zone offset and/or DST offset configured.
2. Your time code source and/or the TCD200 are set with time zone and/or DST offsets.
3. Your time code source is not providing the time and/or date that you expect. Contact the individual responsible for the time code source for more information.

Clock did not properly negotiate the DST.

Possible reasons/solutions:

1. Your time code source is not providing date information and/or a valid date was not programmed into the TCD200.
2. Your time code source already provides the DST adjustment.
3. Your time code source or the TCD200 does not have the correct DST rules configured.

UTC time and/or date is incorrect.

There are several potential failure points:

- Invalid, intermittent or missing time code source
 - Date/year overwrite function for non-date encoded time code may be configured improperly
 - Battery may need to be replaced
 - A local time zone or DST configuration not set correctly
1. Verify that your time code source is generating the UTC referenced time and date that you expect and that this time code format is at an acceptable signal level and quality that can be detected at the client side (i.e. TCD200 input).
 2. When using SMPTE time code, verify that you are not using drop frame time code. Use only NDF (non-drop frame) SMPTE time code.
 3. If you are using in-house time code, verify that the time code source is locked to the GPS satellite system for UTC time code. Time code sources such as SMPTE time code that is fed via a broadcast satellite will have a delay due to the satellite transmission. The TCD200 cannot compensate for satellite transmission delays.
 4. If you are using a time code source from another vendor, be certain your time code contains encoded year/date information to the IEEE 1344 [IRIG-B] or Masterclock/Leitch [SMPTE] time code encoding formats. IRIG-B(0)/B(1) time code format must have the year/date encoded to the IEEE 1344 specification in the CF (Control Functions). SMPTE-type time codes must have the date be encoded to the Masterclock/Leitch specification in the user bits.
 5. If your time code source is providing DST adjustments and time zone offsets these functions must be disabled in your TCD200 in order to eliminate double offsets.
 6. If you are using the date/time display such as on a Windows system to validate the time on the clock, this may provide misleading information as these may be configured to display local time zone and daylight saving time information and they may not be currently synchronized to UTC time. This is configured through the Date/Time applet in the Control Panel or using an NTP client.

Limited Warranty

This Masterclock, Inc. product warranty extends to the original purchaser.

Masterclock warrants this product against defects in materials and workmanship for a period of five years from 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 installation or 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).

Limitations

Masterclock makes no other warranty, either expressed or implied, with respect to this product. Masterclock specifically disclaims the implied warranties of merchantability of 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.

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 first year of the five year 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.

Please supply us with as many details about the problem as you can. The information you supply will be given 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

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St. Charles, MO 63301 USA

website
www.masterclock.com

USA and Canada
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