NTDS Series of Digital Clocks
User Manual

The **Masterclock NTDS series of digital clocks**
display accurate time referenced from
an NTP time server or one located on the Internet

NTDS 16 Desktop

NTDS16, NTDS19, NTDS112 Rack Mount

NTDS24, NTDS24, NTDS26, NTDS29 Rack and Wall Mount

NTDS44, NTDS46, NTDS84, NTDS86 Wall Mount

NTDS4626, NTDS4626-3AL, NTDS46-12AL, NTDS8646 Wall Mount

Masterclock®

Table of Contents

Thank you for your purchase of a NTDS digital clock from Masterclock. Here you'll find instructions for unpacking and installing your clock(s), including suggestions for 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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The NTDS series of digital clocks 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 NTDS series of digital clocks 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

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Introduction

NTDS
(NETWORK TIME DISPLAY SLIMLINE) DIGITAL CLOCKS

Masterclock NTDS digital clocks are designed to display accurate time referenced from an NTP time server, or one located on the Internet. The wide variety of sizes (illustrated to scale at left), are designed for a wide variety of applications and mounts. The built-in NTP client can set time from one or two NTP servers.

Masterclock produces a full line of NTDS clocks including:

NTDS 16 Desktop

NTDS16, NTDS19, NTDS112 Rack Mount

NTDS24, NTDS24, NTDS26, NTDS29 Rack and Wall Mount

NTDS44, NTDS46, NTDS84, NTDS86 NTDS4626 Wall Mount

NTDS4626-3AL, NTDS4626-12AL, NTDS8646 Wall Mount

Many of these include dual face models.

All may be ordered in your choice of four LED colors (blue, amber, green, red) and several metal case styles.

Please refer to the "**Specifications**" section of this document (p. 24) for additional details on each model. For available options visit Masterclock's website: **www.masterclock.com**.

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Features

Your new **NTDS digital clock** features:

- RTC (Real Time Clock) back-up maintains time during loss of power and/or loss of NTP reference

- Time Zone offsets (to one second resolution) supports any biasing requirements

- Operates on WAN or LAN at 10/100 Mbps

- Complete flexibility in Daylight Savings Time configurations

- Fully configurable network settings, including DHCP/BOOTP support

- Primary and secondary NTP reference with fault-tolerant switching

- Supports NTP Broadcast, Multicast and query (Unicast) modes

- Security features include password protected communication and the ability to disable Telnet management access

- Status display to remotely view, adjust and configure devices with WinDiscovery app

- Rechargeable maintenance-free battery retains configuration settings and time for at least two weeks after power loss

- **Six-digit models:** six-digit time or date display

- **Nine-digit models:** six-digit time display plus three-digit DOY (Day of Year)

- **Twelve-digit models:** six-digit time display plus six-digit date display

- 12- or 24-hour display formats

- One year warranty from date of sale

Just one of our many NTDS desktop, rack mountable and wall mountable digital clocks, the NTDS26 features six 2.3" (5.8cm) LED digits in a sturdy attractive powder-coated steel case.

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Power, Accessories and Software

Cat5 patch cable   CD-ROM   IEC power cord
(select power option when ordering)

Due to the large variety of clocks covered in this User Manual, the list of accessories below is for illustrative purposes. Refer to your sales order for actual items shipped.

- NTDS digital time display (clock)

- Mounting bracket

- Cat 5 patch cable

- CD-ROM (with WinDiscovery software application and User Manual pdf)

- Power cord – note Cloverleaf ("Mickey Mouse") C5 style plug (below) is model specific

Above left: AC power – Insert the IEC AC power cord (included) into the IEC socket located on the back panel.

Above right: Ethernet PoE – Insert the CAT5 Ethernet patch cable (included into the RJ45 socket.

PoE (Power over Ethernet) models require an IEEE 802.3af compliant PoE injector or switch with +48VDC output on spare pairs of the network cable conductor 4 and 5, with corresponding 48 VDC returns on pins 7 and 8 or by sharing the data pins and their returns. This single network cable carries both data and power. Maximum cable distance is 328 feet (100m).

RELAY OPTION

When the NTDS digital display is not locked to a NTP reference, the dry contact relay will actuate.

The NTDS request time from the primary NTP time server. If no response, then it will send a request to the secondary NTP time server. If the NTDS is unable to communicate with either NTP time servers, the NTDS will change its Current Reference from "NTP" to "Internal Osc (oscillator)". This is considered an un-locked condition and the dry contact relay will actuate.
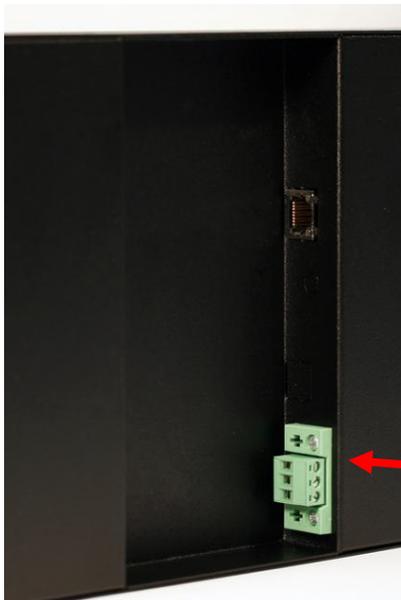
TERMINAL BLOCK

Top: Pin 1 – NO (Normally Open)

Middle: Pin 2 – COM (Common)

Bottom: Pin 3 – NC (Normally Closed)

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Mounting

DESIGNED FOR WALL, RACK OR TABLE MOUNT

Your NTDS clock is designed to fit a variety of surfaces and environments supported by these sturdy brackets.

WALL MOUNT BRACKET

For the smaller NTDS clocks a single wall mounting bracket is supplied which has been designed to fit on either a standard 2"x 4" or 4" x 4" conduit box. Mount the bracket on the wall/conduit box, attach the power cord and CAT5 Ethernet patch cable and secure the NTDS to the bracket using the supplied retaining screws. See page 7 for a plan view with measurements.

Larger clocks require two such brackets.

PLAN VIEW OF WALL MOUNTING BRACKET
(see page 7)
Designed to fit on either a standard 2"x 4" or 4" x 4" conduit box. Mount the bracket on the wall/conduit box, attach the power cord and CAT5 Ethernet patch cable and secure the NTDS to the bracket using the supplied retaining screws.

RACK MOUNT BRACKET

Attach the Cat 5 cable and/or power cord, and then secure the clock to the equipment rack, cabinet or wall.

SWIVEL MOUNT BRACKET

Mount both swivel brackets to the wall, attach the Cat 5 cable and/or power cord and secure the clock to the brackets using the supplied retaining screws. Adjust the angle to provide the best viewing.
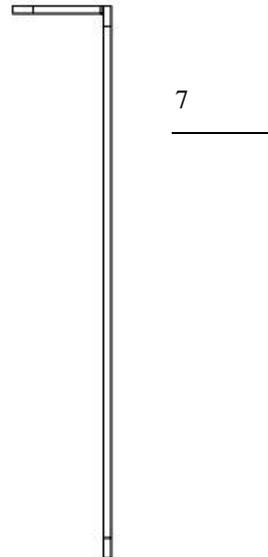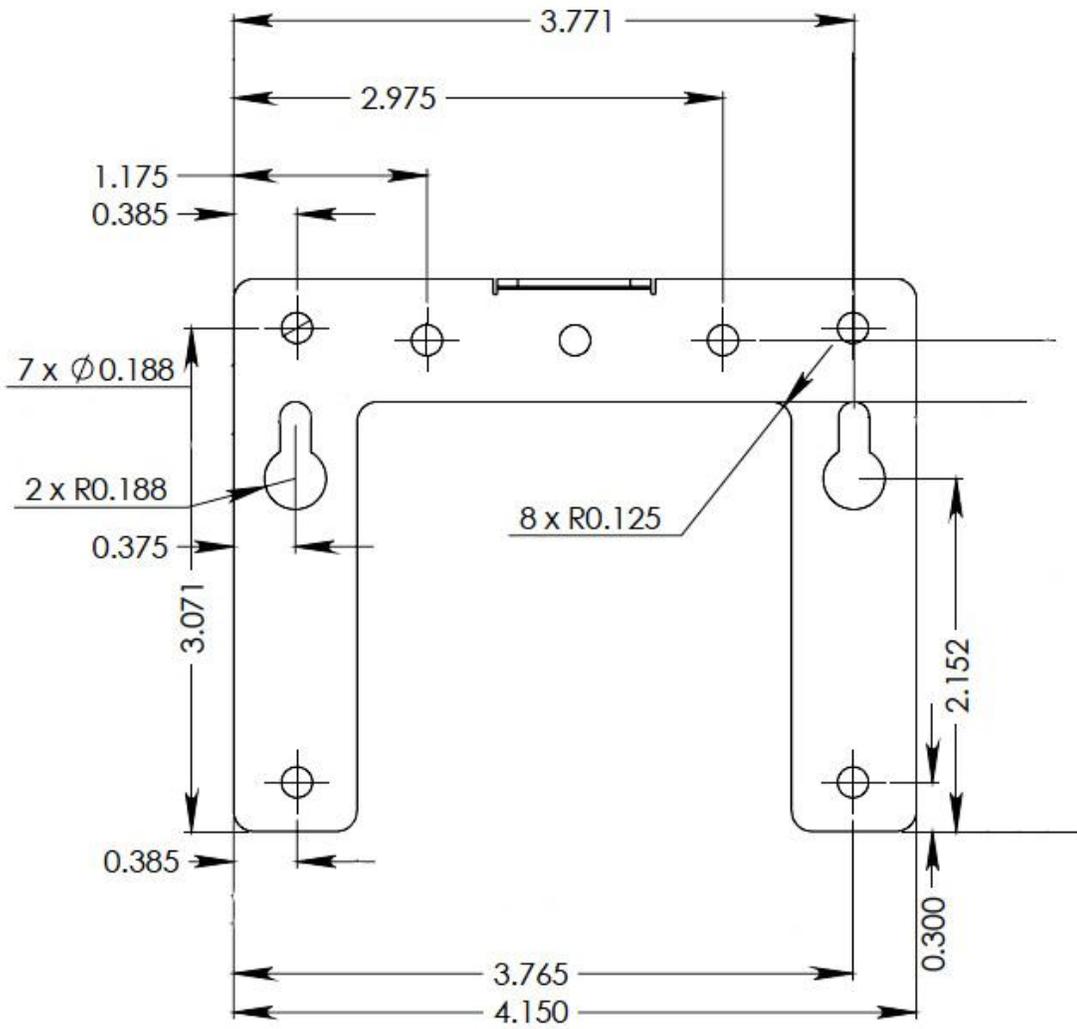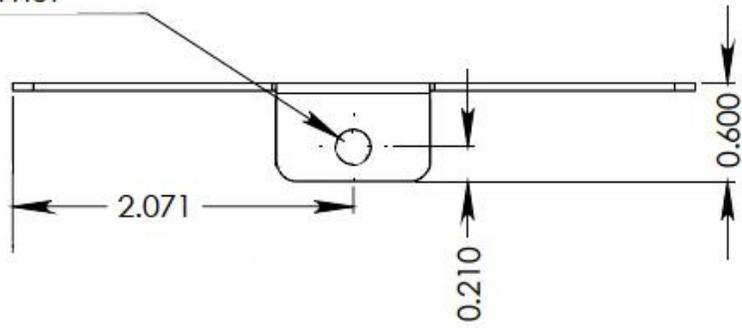
TAKE CARE DURING INSTALLATION

Power and low voltage signal wiring should be installed according to local electrical codes and to enable access to the back of this device.

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.

#8-32 PEM nut

2.071

0.600

0.210

3.771

2.975

1.175

0.385

7 x Ø0.188

2 x R0.188

0.375

3.071

8 x R0.125

2.152

0.385

3.765

4.150

0.300

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Plan View of Wall Mounting Bracket

Configuration Checklist

Our NTDS clocks get their time signals from the Ethernet. Therefore, before installing this device, one should be prepared with the following basic configuration information that the device will require. It may be necessary to obtain some or all of this information from a network administrator in your organization.

STATIC NETWORKING CONFIGURATION

__ IP address and netmask designation for device

__ Primary and secondary DNS (Domain Name Server)

__ Gateway/router

__ Primary and secondary NTP time references

DYNAMIC NETWORKING CONFIGURATION

__ Confirm that a DHCP/BOOTP service is accessible on the local network

__ Determine if DHCP server will provide NTP server configuration

__ Determine if DHCP server will provide Time Zone configuration

NTP ADDRESSING MODE

__ Determine if this device (client) will query the NTP server (Unicast mode), listen for NTP broadcast messages (Broadcast mode), or listen to NTP as part of a Multicast group.

NAMING

All NTP devices can be provided with a verbose name. The name is arbitrary and may be useful for organizing and managing devices once installed. By default, device names are the product name abbreviation followed by the device's MAC address. Customers should designate their own custom names relating to their own organizational requirements, 32 characters max.

Default	Recommendation (Examples)
SL26-21:4B	Bldg101-Rm121
SL29-45:8A	Conference_Room-342

INITIAL OPERATION / SERVER ACQUISITION

After receiving power, the NTDS clock will go through an internal check. Time from the RTC backup will be applied until the NTDS server signal is acquired.

LED STATE	STATUS INDICATION
Flashing	**No Reference:** The NTDS is not able to reference NTP
On Solid	**Referenced Time:** The NTDS is receiving time referenced from a NTP server

If the Time Code input is different from UTC, do not adjust the Time Zone and/or DST offset. These will adjust automatically.

Daylight Savings Time (DST) adjustments must be configured using the daylight time option and not with the Time Zone offset option in order to ensure proper year-around operation.

European customers: Please carefully consult the section entitled "**Device Settings**" for details on setting your "**Summertime Period.**"

STATUS LED (LIGHT EMITTING DIODE)

The LED colons on the display will follow the following protocol after power is applied:

TIME ZONE OFFSETS

The NTDS digital 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. Expect a resolution of one second.

DAYLIGHT SAVING TIME

An automatic Daylight Saving Time (DST) adjustment can be configured separately and in addition to a Time Zone offset. DST begins on the second Sunday of March at 2:00 AM (Local Time) and ends 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. 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.

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FREEWHEELING ACCURACY

The NTDS has built-in provisions to allow it 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 NTDS 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 mSec 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 with a fully-charged battery under constant drain.

SETTING	CONFIGURATION SELECTION
Disabled	Time Zone Offset
Disabled	Daylight Savings Time
Enabled	NTP Client with DHCP
Enabled	24 Hour format

DEFAULT CONFIGURATION

The factory defaults may be restored by using the **WinDiscovery** program, **Telnet** or by using the reset button at the rear of each clock. On dual face clocks, the reset button is located on the top.

Your NTDS clock/device ships from the factory with the following configuration as defined below. The NTDS firmware interprets the incoming time as UTC.

Configuration

Masterclock NTDS clocks maintain their configuration data in non-volatile flash memory, even when the power is off. Our NTDS clocks are configured on screen using either Telnet, or WinDiscovery software.

The factory default configuration:

SETTING	CONFIGURATION SELECTION
Enabled	DHCP/BootP provided network configuration
Enabled	DHCP provided NTP server address entry
Enabled	Query (Unicast) NTP client
Disabled	Time Zone offset
Disabled	Automatic Daylight Savings Time adjustment
Enabled	Telnet access

DHCP/BOOTP AUTO-CONFIGURATION

DHCP (Dynamic Host Configuration Protocol) is a mechanism for automating the configuration of network devices that use TCP/IP. When DHCP is enabled, DHCP configuration acquisition will overwrite any manual configuration items.

Factory default: DHCP enabled.

BOOTP was a precursor to DHCP. The network device can obtain configuration from a BOOTP server when no DHCP server is present.

The following RFC2132 DHCP options defined configuration items are, when available, used by the network device for configuration purposes:

OPTION	#	COMMENTS
Time Offset	2	The value provided will be used for the Time Zone offset configuration, unless it is defined as zero in which case it will be ignored and the network device will rely on internal configuration. Note: this option does not provide information appropriate for dynamic Daylight Savings Time use.
Router	3	The first IP address provided will be used for router/gateway configuration.
Domain Name Server	6	Up to two server IP addresses may be specified. Network device will treat addresses as primary and secondary DNS servers.
Network Time Protocol Server	42	Up to two server IP addresses may be specified. Network device will treat addresses as primary and secondary NTP servers.

DEVICE NAME/DHCP NAME REGISTRATION

As mentioned earlier, all network devices should be provided with a custom name (e.g. "reception-north-wall"). By default, device names are the product name abbreviation followed by the last octet of the device's MAC (Media Access Control) address (e.g. NTDS12-04:F7).

If a DHCP server is networked when the NTP device is installed, the unit will be auto-registered with the DHCP server. The network system administrator can then view this DHCP name registration and the currently assigned IP address, at the DHCP server.

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A network device will not function properly if configured to use DHCP services when no DHCP server is available on the network.

The factory default displaying local time is disabled. You must enable and configure that setting to display local time.

We suggest you use an NTP time server with a UTC reference to configure the offset for your Time Zone and DST.

To ensure proper year-around operation, the automatic DST adjustments must be configured using the "Daylight Saving Time" option and not with the "Time Zone" option.

European customers, please refer to the "WinDiscovery, DST Settings" section of this document for additional details on, setting daylight saving time.

DEFAULT PASSWORD

The factory-default password for the network device is: **public**. Please use lower case.

RESET FACTORY DEFAULT CONFIGURATION

In some situations (such as a lost password) it may be necessary to return your device to its factory default configuration. A [**RESET**] button is located either on the clock's rear cover (on single-face clocks) or on top (on dual-face clocks).

To reset the configuration to factory default:

Press and hold the reset button for 10 seconds (until dashes appear on the digits) and then release. The configuration will now be reset, including the password. The unit will need to be reconfigured to your custom settings.

IGMP
Use of the multicast addressing method requires the use of routers and switches and other network devices which support the **Internet Group Management Protocol (IGMP)**.

In addition, the IGMP mode must be enabled and configured for multicast addressing to be implemented properly. Please ensure that your network system components are capable of, and configured properly for, IGMP **before** utilizing the multicast addressing feature.

Consult you network administrator for assistance in utilizing the multicast addressing feature.

FIREWALLS
Check with your firewall vendor to determine how to enable multicast traffic through a firewall. In addition, you may want to read **RFC 2588: IP Multicast and Firewalls**.

Port 123
Some NTP/SNTP servers will expect NTP clients to operate on port 123.

If the advanced settings have been altered for your clock and you begin experiencing difficulty in getting your clock to synchronize to the NTP time server, or the clock begins acting erratically, try returning the advanced settings to the default values: **"123**."

NTP CLIENT ADVANCED SETTINGS

From the NTP Client window, the [NTP Client Advanced Settings] button allows for the adjustment of additional network communication settings. Under most operating circumstances it is not necessary to change these settings.

The factory-default TCP/UDP port for NTP service is: "**123**"

MULTICAST

The network device also supports **Multicast Addressing** of NTP packets. Multicasting is useful because it conserves bandwidth. Multicasting replicates only the necessary packets and only as needed to send them only to clients that want them.

The concept of a group, and group membership, is crucial to multicasting. Every multicast requires a multicast group; the sender transmits to the group address, and only members of the group can receive the multicast data. A group is defined by a Class D address.

The network device 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 are defined and governed by RFC3171, IANA IPv4 Multicast Guidelines.

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

The **IGMP (Internet Group Management Protocol)** controls group membership for individual hosts. This protocol only operates in a LAN setting, but is required if you wish to be able to join a multicast group on a host. IGMP is defined in RFC 2236.

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ANYCAST

The network device **does not** currently provide **Anycast** capability.

STATIC IP

To use a static IP address, de-select the checkbox for "**Automatically obtain network configure tion from DHCP/BOOTP**." You must enter the IP address, netmask, gateway, primary DNS and also a secondary DNS.

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.

NTP CLIENT AUTHENTICATION SETTINGS

The NTDS series uses the **MD5 Message Digest Algorithm**, which is a widely used cryptographic hash function that produces a 128-bit hash value.

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 NTDS device.

INSTALLING WINDISCOVERY

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

Insert the CD that shipped with your network device.

1. Run the "s**etup.exe**" application from the CD.

2. 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.

Once you **open WinDiscovery**, all devices will **automatically** announce their presence and the status bar will display the count of devices found (usually takes a few seconds for search to complete). 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 <u>not</u> be used to manage the network devices while using this 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 collapse these files.

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.

To configure and manage a device, <u>right click</u> the device name and a drop-down menu appears. The top item is a [**Properties**] button. This may take a few seconds to appear.

To open the "Device Settings" window, <u>double click</u> the NTDS clock name. The top left item is labeled "**Configurable Options**."
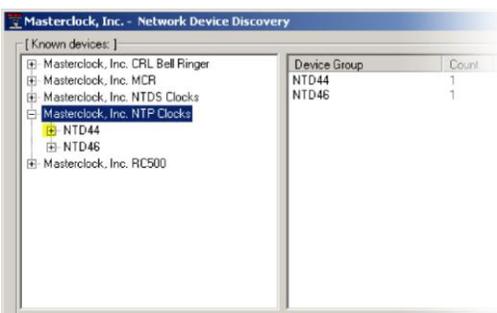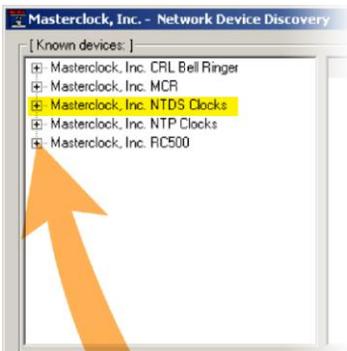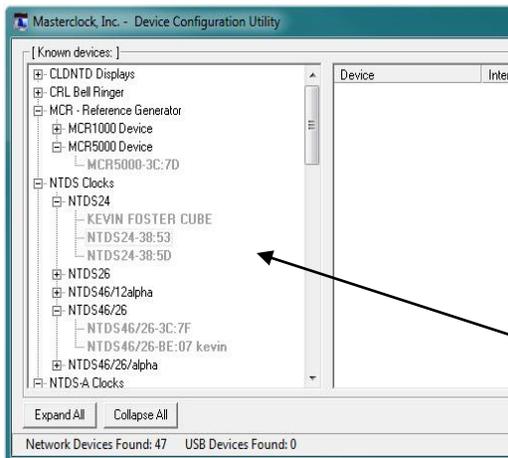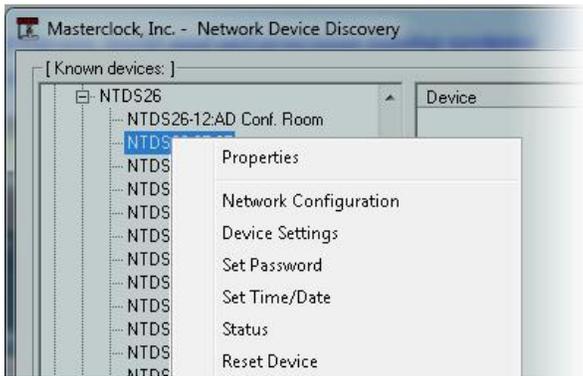
WITHIN THE DROP-DOWN WINDOW:

Click on a menu choice to open the window for that function.

[PROPERTIES] BUTTON
"MASTERCLOCK INC. NTDS CLOCKS" WINDOW

The "**Masterclock Inc. NTDS Clocks**" window lists the name, model, firmware and network configuration of your NTDS clock. These configurations may be changed in other windows, but not in this one. Click [**OK**] to exit.

[NETWORK CONFIGURATION] BUTTON

The **"Network Configuration"** window (left) lists the device name and offers a checkbox to "Automatically obtain network configuration from DHCP/BOOTP" or not. If not, you may manually fill in the IP address, Netmask, Gateway and DNS.
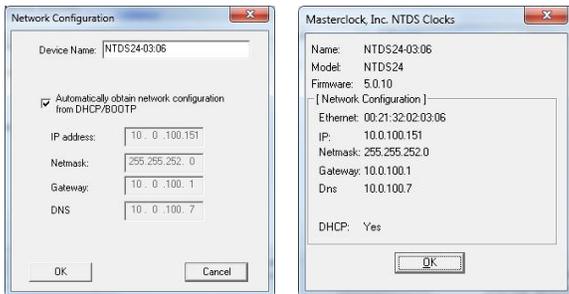
DEVICE SETTINGS BUTTON

The "**Device Settings**" window is the same one that appears with a left double-click of the device on the "Network Discovery" window and is detailed on page 17**. Note**: There are several buttons (Save, Status and Administrative Functions) that will be grayed out for a few seconds before you're able to select them.

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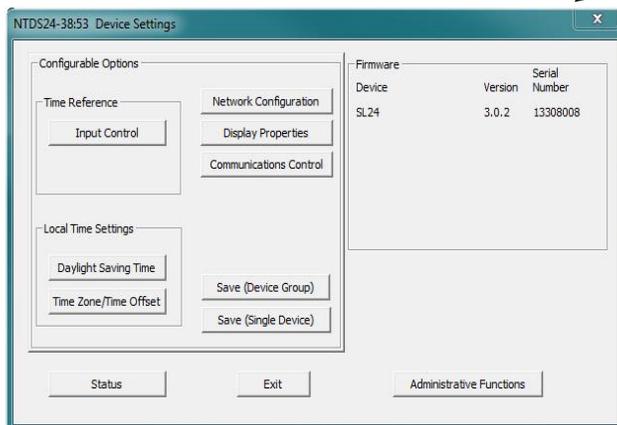
SET PASSWORD BUTTON

The "**Set Password**" window permits the user to enter a unique password for either a single device or all devices. The factory default password is set as, "public".

A password is one to eleven characters and is case-sensitive. For added password strength, you should use a combination of alphanumeric and special ASCII characters. The [**Change Password**] boxes will be grayed out until the Old and New passwords are filled in.

Fill in the old password, "public" then enter the new password twice. Click [**Change Password**] to save to either a "**Single Device**" or "**All Devices**". If all devices are chosen, then all discovered devices will have same password. If after you have saved to all devices and you change a single device password, the group password will be broken and not all devices will have same password.

When a password is set for a single device, each time you click [**Change Password (Single Device)**]; you will be changing the password for that specific device. You can select the [**Change Password (All Devices)**] box if you wish to make all discovered devices have the same password and eliminate single device passwords.

If you enter the wrong password, you can select "Cancel" and no configuration changes will be made. You can close the **WinDiscovery** session to forget the wrong password(s), however this will require entering the passwords again for each device.
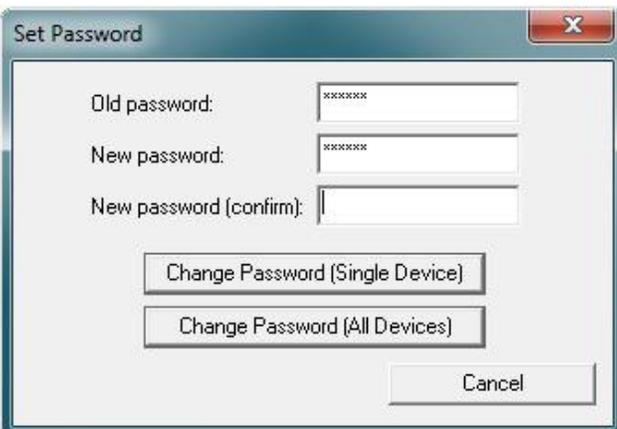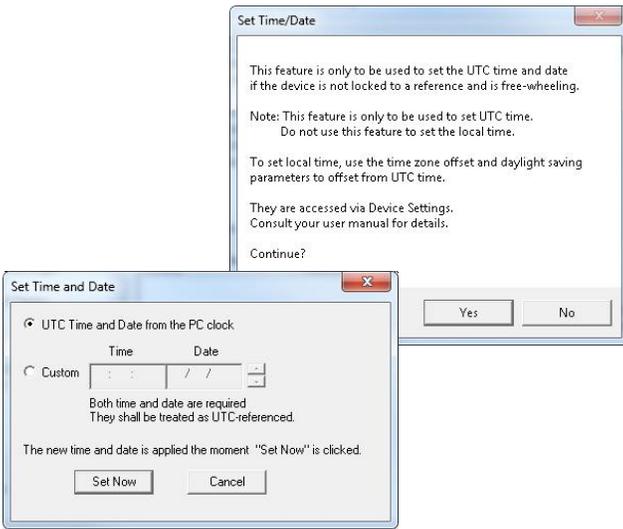
[SET TIME/DATE] BUTTON

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 NTDS clock by unclicking the [**UTC**] button. By clicking the [**UTC**] button you will return to UTC time.
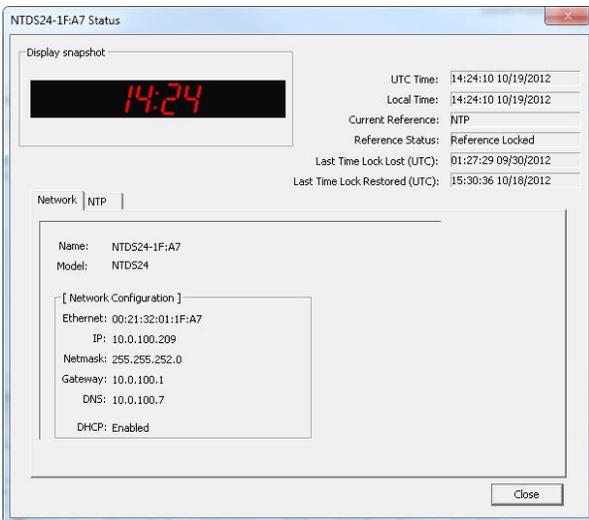
[STATUS] BUTTON

The "**Status**" window includes a "**Display snapshot**" of the clock's face. On the right are constantly updated listings of the UTC Time, Local Time, Current Reference, Reference Status, Last Time Lock Lost (UTC) and Last Time Lock Restored (UTC). Below are Network and NTP tabs. The first lists the name and model number of the unit followed by the network configuration numbers. These would echo the "**Network Configuration**" window figures (page 15). The NTP tab lists whether or not the server and/or client is enabled and various stats about each.

[RESET DEVICE] BUTTON

This button brings up the "**Are you sure?**" window. Press the [**Yes**] button and you will "soft reset" your clock 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.
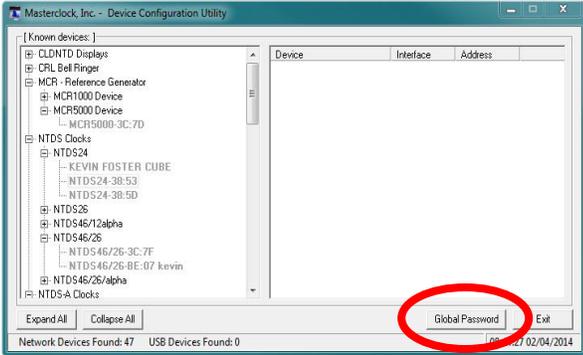
[SET TO DEFAULT CONFIGURATION] BUTTON

This button brings up another "**Are you sure?**" window. Press the [**Yes**] button and you will reset your clock back to the factory defaults. No further window will appear.

[SET RELAY SCHEDULE AND VIEW RELAY SCHEDULE]

These buttons are only used with the MCR 1000, MCR 5000 and the CRL 1000, which have scheduling functions.

[FORGET MEMORIZED PASSWORD] BUTTON

Click this (if present) and the memorized password will be forgotten. There is no window associated with this button. The password reverts to the factory default password: "**public**".

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.

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**].

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**".

[DEVICE SETTINGS] BUTTON

The "Device Settings" window includes three sections. In "Configurable options" the [**Input Control**] button takes you to a [**NTP button**]. Clicking it permits the user to enable or disable the NTP client. If enabled, you can choose Query, Broadcast or Multicast services to receive Time Code.

The [**Nework Configuration**] button and window are detailed on page 15.

The [**Display Properties**] button and window (at left) 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).

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

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.

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

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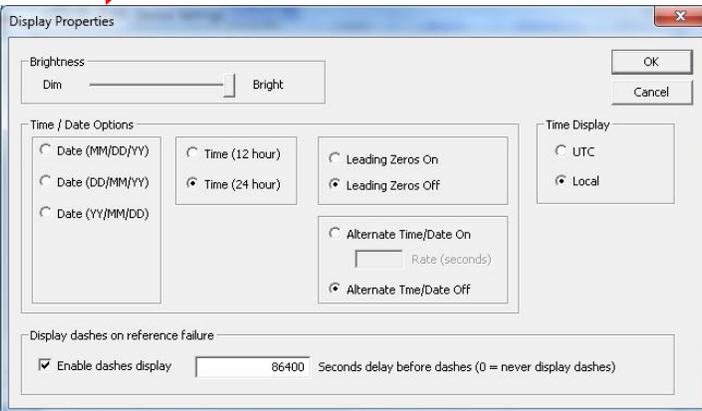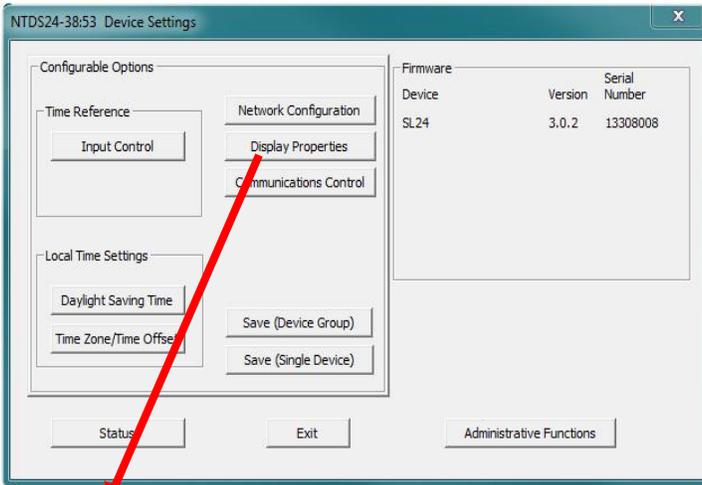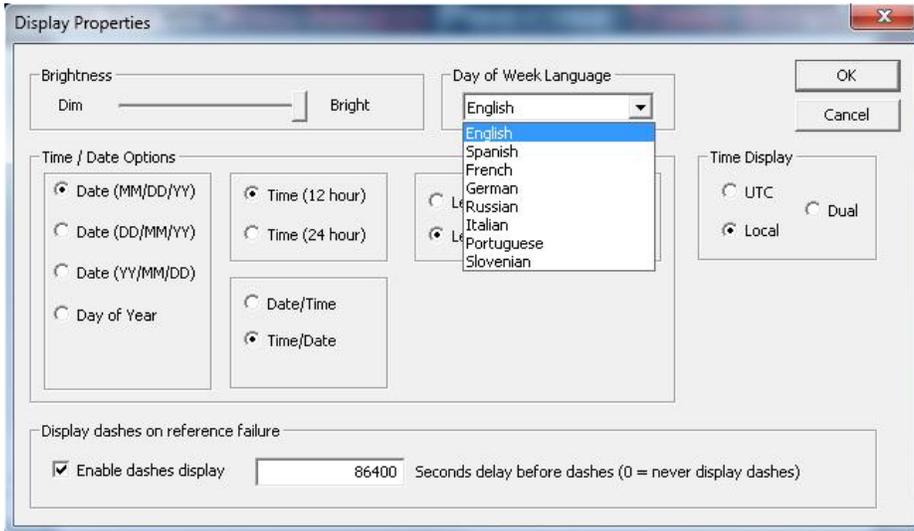
The following pertains only to NTDS models with alphanumeric characters.

DAY OF THE WEEK LANGUAGE CHOICE

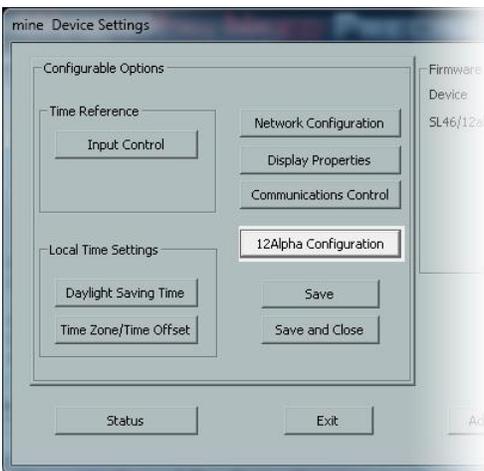The language (English, Spanish, etc.) for the day of the week display is selected from a drop-down menu on the "**Display Properties**" window.

ALPHA MESSAGE DISPLAY FOR THE NTDS46-12AL

To edit the alpha message display on the NTDS46-12AL, go to the "Device Settings" window and click [**12Alpha Configuration**] (at left). That will reveal the window below.

The Alpha message display can cycle through up to three messages (up to 100 characters per message) and can provide a date in one of four display modes:

1. Scrolling with unabridged month/day-of-week, date and year

2. Static abbreviated month/day-of-week plus date (no year)

3. Static abbreviated month, date and year (no day-of-week)

4. Static numeric showing month, day and year.

Check the [**Enable**] box adjacent to your choice.

Scroll speed (the rate at which a message propagates right to left across the display) is adjustable in eight steps from slow to fast.

Static hold duration (the time a static message/date remains on the display) is adjustable in three steps from shorter to longer.

Allowable characters:
ABCDEFGHIJKLMNOPQRSTUVWXYZ
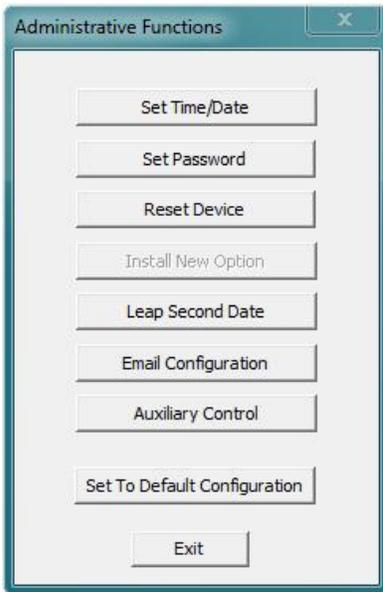0123456789@$%&*^()[]{}_-+=\'/?.,
[space]

Date display configurations:
MM/DD/YY, DD/MM/YY or YY/MM/DD.
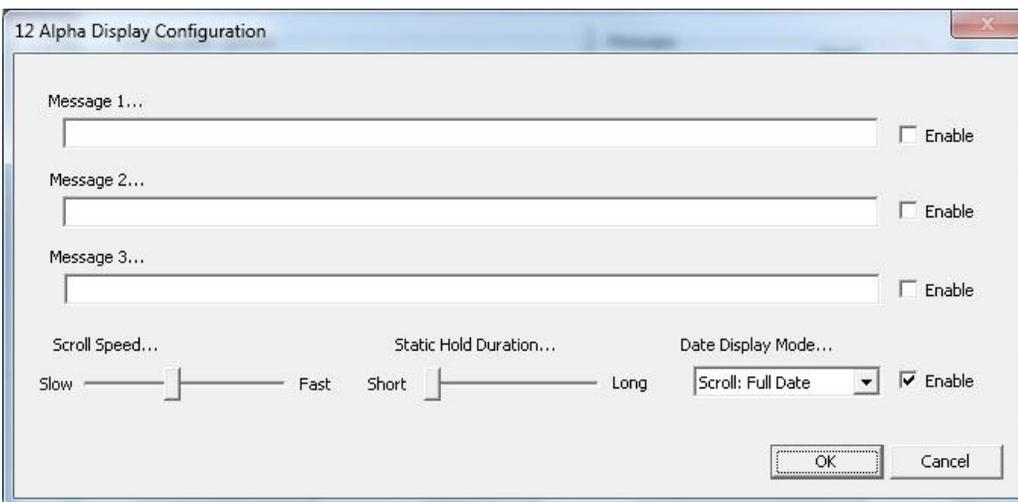
Messages longer than 12 characters will scroll.

All other messages will center-justify and hold.

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ADMINISTRATIVE FUNCTIONS

From the "**Device Settings**" window, click [**Administrative Functions**].

SET TIME AND DATE

This feature may be most useful for demonstration, in lab situations, environments where an external reference time signal is not available, when the built-in NTP client is disabled or when a network connection to an NTP server is not available.

SET PASSWORD

See page 15.

RESET DEVICE

See page 16.

INSTALL NEW OPTION

This window will ask you to "Paste the Option Key you received here. Then click Install." Not available in all applications.

LEAP SECOND DATE

This window enables the placement of a leap second when it occurs. Enter the date and polarity ahead of time.
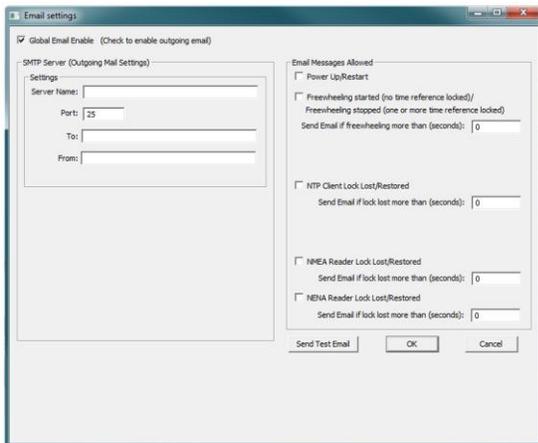
EMAIL CONFIGURATION

Click the [**Email Configuration**] button to generate email alerts when certain conditions are met.

AUXILIARY CONTROL

This window (at left) enables the addition of an auxiliary control source (input the source ID). You will be asked to input the [**Multicast IP Address**] and [**Port**]. Then you will need to set the number of seconds (if any) in a Communication Timeout.
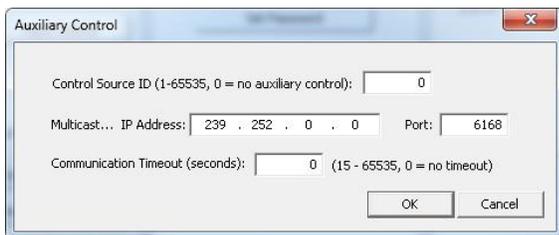
SET TO DEFAULT CONFIGURATION

Click this button to set your clock back to the factory defaults. The password will revert to "**public**".

NTP Addressing Modes
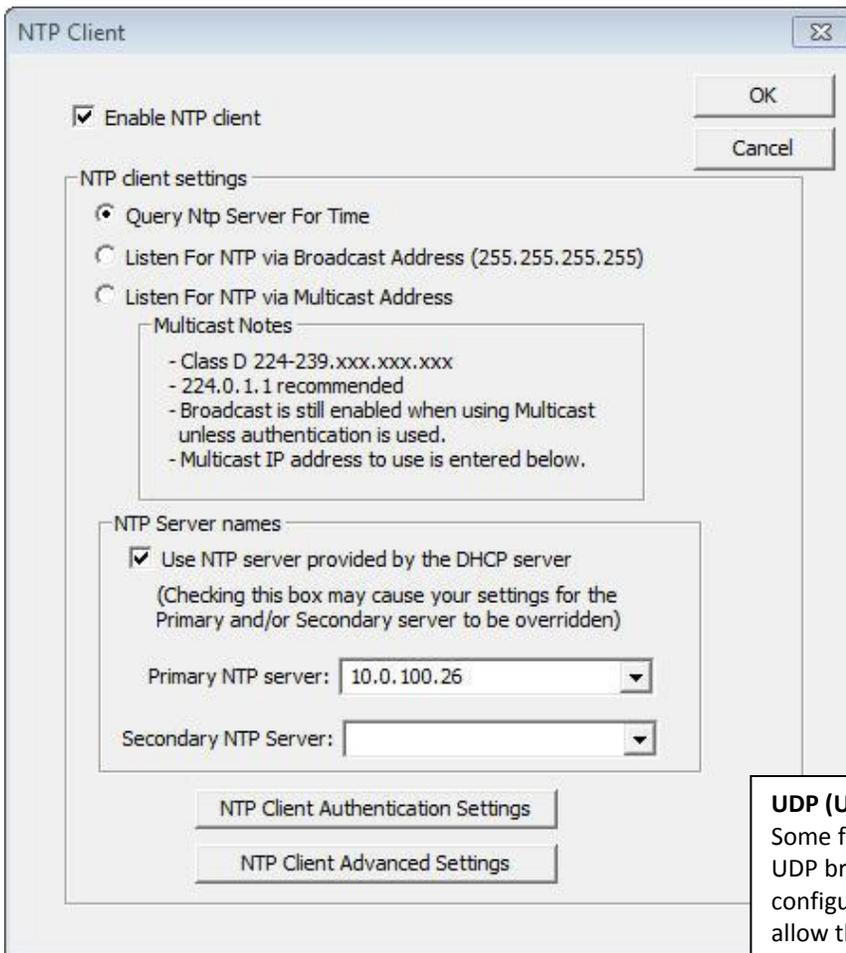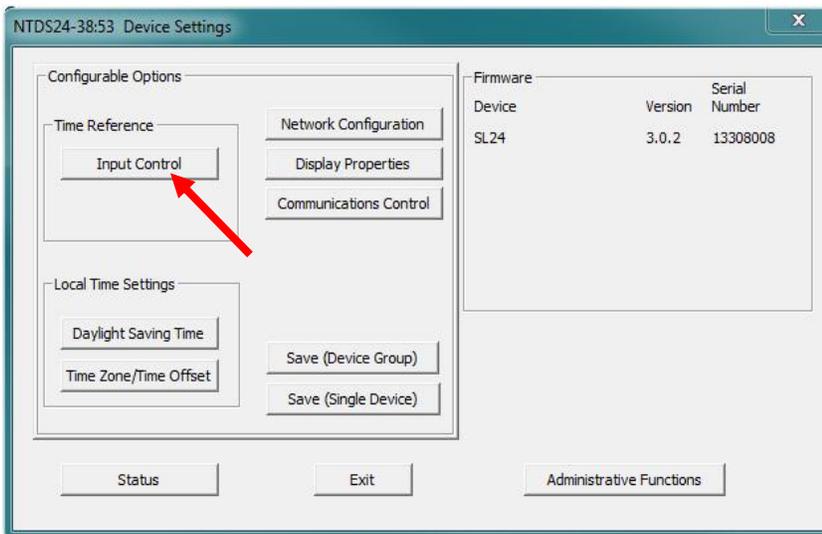
Setting up to receive NTP is relatively easy to do once you known what you want.

UNICAST (QUERY)

NTPS clocks and devices support the **Unicast Method** of **NTP (Network Time Protocol)** packets transfer. The unicast method involves direct transfer of requested information from the NTP server to the NTP client (clock or other device) based on an automatically generated electronic query or NTP time request. The Unicast method is supported simultaneously when either the Broadcast or Multicast modes are selected.

UDP (User Datagram Protocol) Broadcasts Some firewalls and routers will not forward UDP broadcasts by default. Security configurations may need to be adjusted to allow the UDP broadcast packets to pass on the configured port.

BROADCAST

NTPS clocks and devices also support the broadcasting of NTP packets. The broadcast mode is a widespread or open-ended broadcast, not intended for any specific IP address. Broadcast packets are useful in situations where network administrators may wish to avoid heavy network traffic created by periodic NTP requests. Often such periodic requests end up synchronized, which can exceed the time server's ability to reply promptly.

The network device listens for NTP using the **UDP (User Datagram Protocol)** broadcasts using the broadcast address "255.255.255.255".

"SOFT" RESTARTS

A soft restart may periodically be performed by the network device to automatically attempt to rectify a problem it may be experiencing.

The network device will perform a soft restart under the following conditions:

1. If the device is not receiving an NTP poll response or an NTP broadcast response depending on which mode the NTDS is in.

2. If the NTDS device is set to use DHCP and no DHCP server can be found.

The timeout before doing a soft restart is not less than ten minutes.

Note: Several factors can increase the time between these soft restarts.

1. The soft restart will be delayed by two hours if a connection is made by Telnet or WinDiscovery.

2. The soft restart could be delayed if the user changes the default parameters for NTP poll retries/timeouts or the NTP broadcast times out. For example, if the NTP broadcast timeout is increased to 60 minutes the soft restart timeout will also be increased to 60 minutes.

Special Error Indicator
In addition to the standard status indications, the network clock 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 clock 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.

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Telnet

Telnet is a 40-year-old network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection.
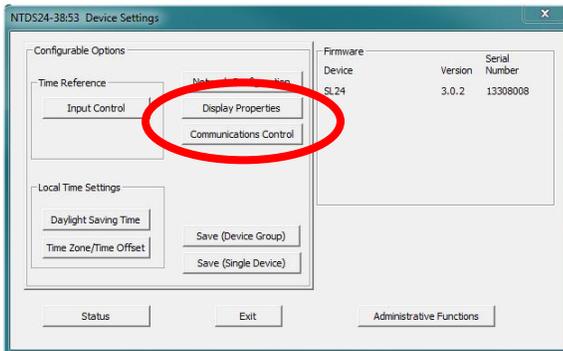
Configuration via **Telnet** may not be convenient for devices operating with a factory default configuration since the IP address is not known.

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 device must be reset to factory default.

AN ALTERNATIVE WAY TO INTERFACE

A terminal-style configuration is available via **Telnet.**

If you are on a non-Windows operating system (like Linux), you will have to use Telnet. WinDiscovery is configured only for the Windows operating system.

Use any standard Telnet client application and specify the IP address of the device as the server with which to connect. The factory default is Telnet server port 23.

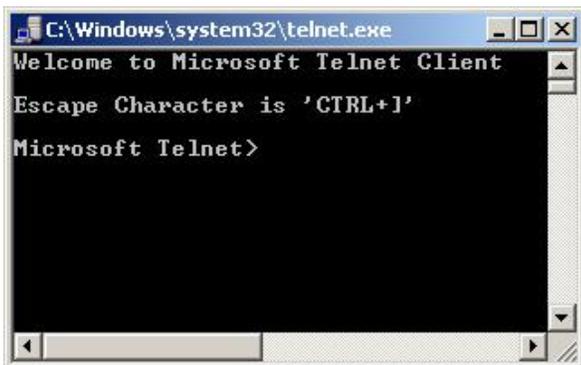Access the Telnet configuration by clicking the [**Communications Control**] button on the "**Device Settings**" window (at left).

The following sections provide basic descriptions of using the Telnet interface of the network device. Please refer to the previous WinDiscovery section (p. 14) for additional details and important operational information regarding the special features and modes of the network device.

TO INITIATE A TELNET SESSION

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**].

At the login prompt, type the user name and press the [**Enter**] or [**Return**] key. Next you will be prompted to type the password.

The factory default for both user name and password are: **"public".**

To initiate commands, type the desired command name and press the [**Enter**] or [**Return**] key.

At left a sample window from Telnet.

Specifications

COMMUNICATIONS – PROTOCOL

DHCP (enabled by default) configuration, or via Static IP mode entry.

- Network configuration: IP address, Netmask

- Gateway (router – DHCP option 03)

- Primary and secondary DNS – DHCP option 06)

- Primary and secondary NTP servers – DHCP option 042)

- Time Zone offset (DHCP option 02) – Not enabled by default

IPV4

SNTP /NTP version 4 – UDP, port 123 (default)

Unicast (query, default), Broadcast, Multicast modes

Telnet – TCP, port 23 (default)

Control: WinDiscovery protocol – UDP, port 6163

COMMUNICATIONS – I/O

Ethernet (10mbps) RJ45, 10baseT

Length of Ethernet cable (Cat5/5e) ....328 feet maximum (100 meters)

Relay (dry contact) ....24V AC/DC, 250mA

RTC ACCURACY

0˚ to 70˚C................................± 1 minute per year

There are no user serviceable parts inside the NTDS digital time display. Please contact Masterclock, Inc. if you require servicing or repair.

POWER REQUIREMENTS

PoE option

Power over Ethernet input voltage ....+48VDC per IEEE802.3af

Mode A:.................... +48VDC on spare pins 4 and 5, return on pins 7 and 8

Mode B:.................+48VDC and data on pins 1 and 2, return on pins 3 and 6

PoE input connector RJ45

PoE power consumption..................... < 15 W, class 0

Protection ..... . Provided by the IEEE802.3af standard

Length of network cable (Cat5/6) .... 328 feet (100m) maximum

AC option

AC Input Voltage .... 100-240 VAC +/-10% (90-264VAC), 47-63 Hz

AC Input Connector .... IEC input connector

AC power consumption .... 10 W

Protection ....Built in fuse, output power limiting, over voltage and short circuit protection.

Internal Battery Circuit - Maintenance Free Rechargeable Battery

A rechargeable manganese lithium coin cell battery (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)

3V,17 mAh, coin cell
Rechargeable manganese lithium
Panasonic ML1220/V1A

Troubleshooting

WinDiscovery uses bi-directional UDP messaging on port **6163** for both the discovery process and to communicate configuration and status packets to and from the NTP network device(s). **Delivery of UDP messages/packets is not guaranteed.** If you experience intermittent problems with WinDiscovery, close the current session and restart the application. If this does not resolve the issue try the following troubleshooting tips, or switch to an alternate method of configuration, such as Telnet.

Lost password

Possible reasons and solutions:

A password cannot be recovered if it is lost or forgotten. Reset the device to the factory default configuration using the procedure described in the section, "**Configuration**" (page 10). Then the unit can be reconfigured and provided with a new password. The default password will once again be "**public**".

Unable to find/discover the device on the network using WinDiscovery

Possible reasons and solutions:

1. The discovery process was not complete before selecting your device(s). After clicking [**Discover**] wait until the status indicates 100% completion.

2. Verify that all network cables, hubs, etc. are in proper working order. Be sure that Ethernet cross-over cables are not being used where inappropriate.

3. Verify that the network device is on the same physical network as the computer from which you are running WinDiscovery. If the computer is separated from the device by a router or a firewall it is likely that the router/firewall is blocking communication 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. If this does not resolve the detection problems you may additionally configure to pass through both directions UDP broadcasts on ports 6165, 6166, and 6264.

4. Verify that the hub/router/switch is capable of supporting the 10mb speed that the attached network device requires.

5. Verify that a DHCP/BOOTP server is present on the network. If the device has been configured to use DHCP for network configuration but no DHCP/BOOTP server is present, the device may not respond to discovery requests for up to twenty seconds after power-on. DHCP configuration is

enabled as a factory-default. In addition, the device will reset its fallback address to one within the link-local address space **"169.254.xxx.xxx"** when no DHCP server is present or is not able to be reached. **Reset the device** to initiate a new DHCP IP address request, or use static IP address mode. Consult your network system administrator to ensure that a DHCP server is present and accessible on your network and/or to obtain a list/range of available IP addresses.

Clock does not respond to configuration changes and/or status display is intermittent

Device was found using WinDiscovery, but the status display is intermittent or not updating and/or the clock does not appear to be responding to configuration changes under the current WinDiscovery session.

Clock(s) previously found during a recent session of WinDiscovery do not show up during the current session.

The clock status or settings displayed under WinDiscovery show garbled characters.

Possible reasons and solutions:

1. The WinDiscovery application has been open for too long and the clock configuration(s) have changed. For example, this can occur if the DHCP server has issued a new/refreshed address. Close the WinDiscovery application and restart.

2. The discovery process was not complete before selecting began. After clicking [**Discover**] wait until the discovery status indicates 100% completion.

3. Verify that the physical network cables and equipment are configured for UDP.

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 packets between the device(s) 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.

6. In some cases, the device may not be discovered and displayed in the WinDiscovery device tree. In others, previously discovered devices may no longer be accessible or responding. Click [Discover] again and wait until the discovery process to complete. Close the current WinDiscovery session and restart the WinDiscovery application. Take steps to increase the bandwidth and reduce network traffic.

If these continue to be ongoing problems, consider the Telnet configuration method or remove the device to an isolated LAN.

Clock periodically resets itself

Clock appears in red text under WinDiscovery device tree

Clock is being assigned an IP address of 169.254.xxx.xxx

Clock is showing an "Error" field under the status window in WinDiscovery

Possible reasons and 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) an 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 field 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.)

> If the configuration of the network device is changed while a "169.254.xxx.xxx" is being used (for example: changing the Time Zone offset), then the current "169.254.xxx.xxx" address will become the permanent static address and the original conflicting static address will be lost.
>
> At this point, it is necessary to manually change the static IP address to one that does not conflict, or you may do a [**Reset Configuration**] to restore the system to factory default settings.

2. If static IP addressing is being used the original conflicting static IP address can be restored. Perform a soft restart of the network device using either WinDiscovery or Telnet prior to changing any other configuration parameters.

3. If DHCP was selected and the network device falls back to a "169.254.xxx.xxx" address approximately every 10 minutes (depending upon the "Advanced Settings" values) the Ethernet interface will be reinitialized and the network device will attempt to get an IP address from the DHCP server. If the network 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 two hours.

Status LED is flashing

Status in WinDiscovery says '"Unsynchronized"

Clock is unable to find NTP reference, either primary or secondary

Possible reasons and solutions:

1. Verify that the NTP server(s) specified are reachable, communicating, and are not flagging their reported time as invalid. Use a PC-based SNTP client application to verify the server(s) if necessary.

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2. Verify that a gateway/router/firewall has been configured that allows the device to communicate outside of its local network.

3. Verify that the IP address configured for the device is correct. If you manually enter or DHCP assigns an IP address that already exists on the network, this will create an IP address conflict. The device will reset its address to one within the link-local address space "169.254.xxx.xxx". If you see that the IP address starts with "169.254", obtain a new IP address for the device or resolve the duplication. Consult your network administrator for a range of available IP addresses to avoid IP address conflicts.

4. If using DHCP mode, consult your network administrator to ensure that your DHCP server is configured to automatically supply the NTP server address before selecting the *"Use NTP server(s) address provided by DHCP server"* checkbox. If the DHCP server cannot automatically supply the NTP server address(s), then deselect this option and enter the NTP server(s) address(s) manually.

5. Verify that the device is connected to the Ethernet LAN.

6. Verify that all network cables, hubs, etc. are in proper working order. Be sure that Ethernet crossover "patch cables" are not being used where inappropriate.

Clock is not displaying
the correct local time or date

Possible reasons and solutions:

1. Clock did not properly negotiate the DST to standard time (or vice-versa) transition

2. Time Zone offset has been configured incorrectly. Provide the correct Time Zone configuration.

2. DST has been configured incorrectly. This is configured separately from the Time Zone configuration. Provide the correct DST configuration by either manually entering the DST rules or selecting the single button configuration under WinDiscovery. If using the convenient single-button configuration for [US/Canada] or [EU DST], be certain to use the latest version of WinDiscovery and apply it for each device. If using the [Current Windows Setting] button to apply the DST rules, verify that the rules on the computer are correct.

3. If using DHCP/BOOTP for network configuration, consult with your network administrator to see if the optional Time Zone option has been changed as this option as provided by DHCP can override manual settings.

4. If you have used the Set Time/Date function, note that the device assumes that you have entered UTC and will apply your Time Zone and DST configuration relative to the manually entered time.

5. The NTP time server(s) is not available or the NTP server being used has the incorrect UTC time. Verify the NTP time server(s) are available and is providing the correct UTC time.

"Bad Password" Windows pop-up each time a configuration setting is applied

Possible reasons and solutions:

1. You have entered and "remembered" an incorrect password in the password windows. This is now causing multiple error indication windows titled "Bad Password" to pop-up for each portion of the configuration message that is being sent to the device. You must clear the memorized password using one of the two options below.

   a. WinDiscovery only remembers the password for the current session, close the WinDiscovery session and reopen. All passwords will be forgotten by WinDiscovery.

   b. As an alternative to closing the WinDiscovery session, from the drop-down menu on the device being administered, click on "Forget memorized password".

2. If using the Global Password feature, the global password does not match the existing password of the device you are trying to manage. Either change the device password to match that of the global password, or change the global password to match that of the device(s) you are attempting to manage.

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IF THESE INSTRUCTIONS ARE CONFUSING OR NOT WORKING FOR YOU

Send us an e-mail or call right away.

Care and Cleaning

Adherence to regular and proper cleaning procedures will preserve the appearance of your device. Scratched or damaged surfaces caused by misuse, mishandling, improper storage, or improper cleaning are not covered under the limited warranty.

MINIMIZE HAIRLINE SCRATCHES

Always store the device face-up in the protective plastic shipping bag until ready for installation and during transportation to the installation site. Do not place the device 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:

1. **Johnson Paste Wax** (Johnson and Johnson Co.)

2. **Novus Plastic Polish #1 and #2** (Novus, Inc.)

3. **Mirror Glaze plastic polish (MG M10)**
   (Mirror Bright Polish Co.)

We suggest a test be made on a very small section of the polycarbonate lens with the polish selected and that the manufacturer's instructions be followed.

A LIST OF "DON'TS"

- **Don't** store the device without the protective plastic shipment bag.

- **Don't** store or place the device 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** 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

The use of the following products should help remove foreign substances from your Masterclock clock or device:

Butyl Cellosolve (Removal of paints, marking pens, lipstick, etc.)

The use of adhesive tape or lint removal tools work well for lifting off old weathered paints.

Kerosene, naphtha, or petroleum spirits is generally effective to remove labels, stickers, etc. When the solvent will not penetrate sticker material, apply heat (hair dryer) to soften the adhesive and promote removal.

Gasoline should never be used.

JOB SITE PRECAUTIONS

We recommend that devices be removed from the wall and stored face up in their protective shipment bags 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 device is first installed, glazing compound and masking tape adhesive can be easily removed from the lens by applying **VM&P** naphtha or kerosene with a soft cloth, followed immediately with a thorough soap and water cleaning.

STAINLESS STEEL CASE CARE

If your device 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.

The following cleaning and polish agent has been found to be compatible with the stainless steel case finish. Manufacturers' instructions should be followed.

- **Magic® Complete™ Stainless Steel Cleaner** (Magic American)

- **Polish Spray Magic** (American Products).

Wash with a mild soap or detergent, such as **409™** by Clorox Co., 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.

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Limited Warranty

This Masterclock product warranty extends to the original purchaser.

Masterclock warrants this NTDS digital clock against defects in materials and workmanship for a period of one year 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 NTDS device to Masterclock for repair service. Please contact the factory for **RETURN AUTHORIZATION** before returning the unit. When you return your device for service, you must prepay all shipping charges, duty and taxes. For international returns, please contact the factory.

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 straightforward 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 gives trouble beyond 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 provide 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.

Health and Safety

These devices generate, use and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by removing power from the device, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Connect the devices AC power cord into an outlet on a different circuit than other devices.

2. Increase the physical distance between the NTDS digital time display and other devices.

3. Contact technical support.

This NTDS series has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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 devices case. Doing so increases the risk of electrical shock, short circuiting, fire or personal injury.

Never expose this device to rain, or use it near water or in damp or wet conditions.

Never place objects containing liquids on or near this device, as they may spill into its openings increasing the risk of electrical shock, short circuiting, fire or personal injury

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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 8.5" x 11" and A4 sized paper, giving you the option to print the entire manual or just a specific page or section.

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Compliance

CE MARKING

Electromagnetic Compatibility   89/336/EEC ; 92/31/EC ; 93/68/EEC ; 2004/108/EC

Tested and Conforms to the following EMC standards :

EN61000-6-1:2001 (EMC Immunity Generic Commercial)

EN61000-4-2:1995 +A1:1998 +A2:2001
   (Electrostatic Discharge)

EN61000-4-3:2006 +A1:2008 (RF Immunity)

EN61000-4-4:2004 (Fast Transient Common Mode)

EN61000-4-5:2006 (Surge)

EN61000-4-6:2007 (RF Injection Common Mode)

EN61000-4-8: 1993 +A1:2001
   (Power Frequency Magnetic Field)

EN61000-4-11:2004 (Voltage Dips)

EN61000-6-3:2001 (EMC Emissions Generic Commercial)

EN55022:2006 +A1:2007

CISPR22:2008
ANSI C63.4:2009

EN61000-3-2:2006 +A1:2009 +A2:2009
   (Harmonic Current Emission)

EN61000-3-3:2008 (Voltage Fluctuations and Flicker)

Low voltage directive 2006/95/EC

**Tested and Conforms
to the following Safety standards:**

EN60950-1:2006
(Safety of Information Technology Equipment)

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

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT DIRECTIVE (WEEE) 2002/95/EC

The NTDS models are 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*

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.

RoHS

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 time display product NTDS 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.

Declaration of Conformity

DoC#: NTDS-AC-201207

Masterclock, Inc.
2484 West Clay St.
Saint Charles, MO 63301

<div style="border:1px solid">

NTP Digital Time Display

NTDSxxxx-AC

where alphanumeric **xxxx** indicates digit size, count and configuration,
is compliant with the CE directives and standards listed below.

</div>

Directives:
    Electromagnetic Compatibility (2004/108/EC)
    Low Voltage Directive (2006/95/EC)

Standards:
    CENELEC EN 55022:2010 Class B
    CENELEC EN 55024:2010 Immunity
            IEC 61000-4-2:2008
            IEC 61000-4-3:2006 +A1:2007, +A2:2010
            IEC 61000-4-4:2004 +A1:2010
            IEC 61000-4-5:2005
            IEC 61000-4-6:2008
            IEC 61000-4-11:2004
    CENELEC EN 60950-1:2006 +A11:2009

By:

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