PoE DotMatrix Clock

Installation and Operation Manual

Table of Contents

1 Introduction

TimeMachines Precision Clocks (TMPCs) provide an accurate synchronized time and messaging source across the entire network. TMPCs use Power over Ethernet (PoE) and Simple Network Time Protocol (SNTP) to make installation and setup as clean and simple as possible. Connecting the clock to a PoE enabled Local Area Network (LAN) Ethernet drop is all that needs to be done.

2 Installation

2.1 PoE Connection

TMPCs require connection to a PoE enabled LAN. There are two ways of going about this, one is to have a PoE switch and the other is to have a PoE injector. PoE injectors are offered through TimeMachines as an accessory.

2.2 Network

Beyond connecting to a PoE enabled LAN, nothing else is required to get TMPCs up and running. IP, Netmask, Gateway, and DNS addresses are all setup using Dynamic Hosting Configuration Protocol (DHCP) by default. Static addresses may be assigned by accessing a configuration web page. The default time server is set to nist1-chi.ustiming.org but can be changed using the configuration web page. These processes are described with further detail in the Configuration section.

2.3 Mounting

TMPCs may be surface mounted, rack mounted, or in a dual mount bracket (using two clocks).
Required tools: hammer, drill, 1/4" drill bit, screwdriver and pencil. Mounting options are optional.

2.3.1 Surface Mounting to Drywall

1. Mark the holes to be drilled based on the spacing of your specific clock. The Dot-Matrix clocks have two tabs for wall mounting.
2. With a 1/4" drill bit, drill through the two marks.
3. Insert an anchor into each of the 2 holes using a hammer.
4. Insert a screw into each anchor leaving a 1/16-1/8 inch gap between the head of the screw and the mounting surface.
5. Connect the network cable to the back of the clock.
6. Place the keyhole slots on the back of the clock over the screws and secure it into place.

3 Configuration

3.1 Web Page – Default password is "tmachine"

All TMPC parameters are accessed on the configuration web page. The page can be accessed by pointing any web browser at the IP address of the TMPC. The initial IP address can be found by using the push button (double-click) located on the back of the TMPC. After making changes to the configuration page the "Save Settings" button must be pushed to submit form data. If the changes made do not take effect, the "Restart" button must be pushed to restart the clock allowing changes to be applied.
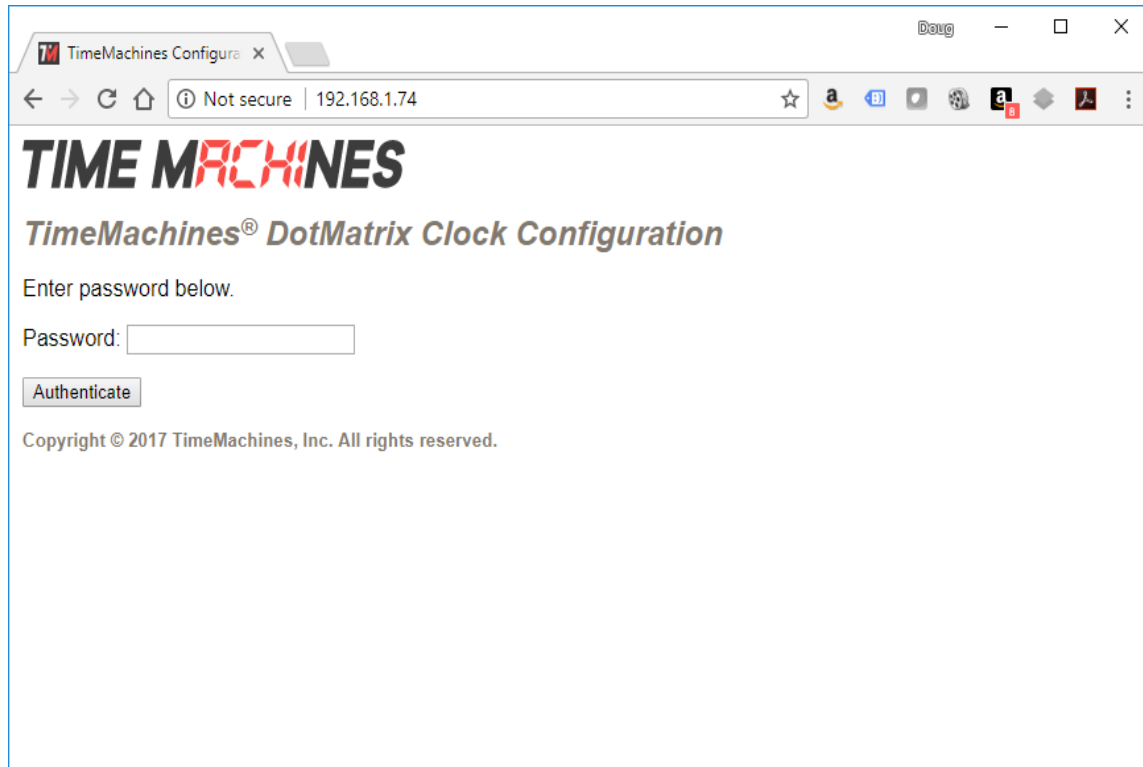
3.2 Browser Notes:

Most development testing is done with Chrome and Firefox. Javascript is used to populate the settable values into the web page fields and must be enabled in the browser. Safari is one browser that has issues with this. Other browsers may work fine, or may exhibit odd behaviors. Given the large number of browsers in the market, it is impossible to test with them all.
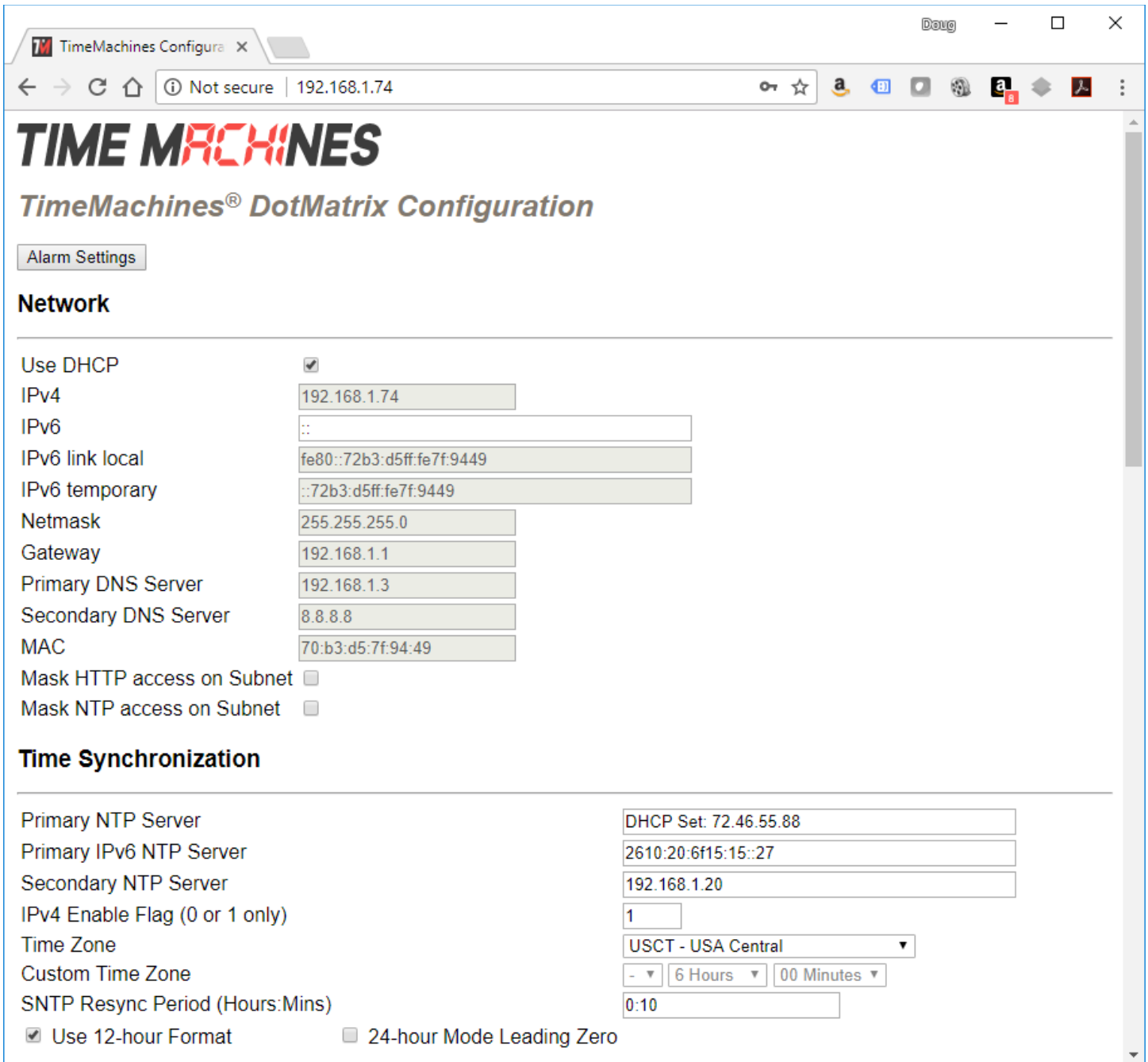
3.3 Network

By default the network parameters are setup up using DHCP. In order to set static values, un-check the DHCP check box and enter new values in the address fields. If the values aren't changed the current addresses will be kept. **The TMPC must be restarted for these changes to take affect.** Addresses in the Network section must be entered in Ipv4, dotted

quad, format.

3.3.1 IPv4 and IPv6

Both IPv4 and IPv6 are supported for static and DHCP setup. Set the parameters to match your network setup.

3.3.2 DNS

If using fully qualified domain names for the time servers, then DNS entries must be included.

3.3.3 Mask HTTP Access on Subnet

Check this box to only allow setup of the TM1000A, through the web interface, from the local sunnet. This provides a measure of security for the device from outside the subnet attack.

3.3.4 Mask NTP Access on Subnet

Check this box to only allow NTP access from the local subnet. Traffic originating from sources other than the local subnet will be rejected.

3.4 Time Synchronization

NOTE* If any timezone settings are changed, the changes will not take effect until the next SNTP Resync Period.

3.4.1 SNTP Servers

The first entry (Primary SNTP Server) sets the address of the SNTP server, where where the TMPC gets its timing information. In case the Primary SNTP Server is unreachable the TMPC will fall to the Backup SNTP Server. Both DNS names (time.nist.gov) and IPv4 (192.43.244.18) formats are accepted.

3.4.2 DHCP Option 42 – NTP Server Setting

The TimeMachines display products support DHCP option 42 which allows the DHCP server to serve the IP address for the device, as well as the IP address of time sources to be used by devices on the network. Up to two can be specified for use by the TimeMachines displays. When a DHCP set NTP source is used, the web page will display "DHCP Set: IP Address" in place of the stored configuration. It is possible to save these if the web page is updated which then in the absence of a DHCP provided time server, would then attempt to be used as written and fail. Consult your DHCP server documentation on how to add these settings.

3.4.3 Time Zone

Selecting the Time Zone sets the offset the clock will display from Greenwich Mean Time. All fields have a predetermined offset except for CUSTOM.

3.4.4 Custom Time Zone

If CUSTOM is selected for the Time Zone then this field is editable. Set the desired custom offset by using the drop down menus to select hours, minutes and (+/-).

3.4.5 SNTP Resync Period

The SNTP Resync Period entry sets the period between SNTP requests. Enter the number of hours and minutes separated by a colon (Hours:Min). The default setting is 0 hours and 10 minutes and is the recommended update interval.

3.4.6 Twelve Hour Time

Select 12 or 24 hour time. When the box is checked the TMPC is in 12 hour mode, when the box is unchecked the TMPC is in 24 hour mode. The default setting is 12 hour mode. In the 12 hour mode of operation AM hours will display a dot in the upper left corner of the display. PM hours will display a dot in the lower left corner of the display. (In 24 hour mode there will be no indication of AM or PM)

3.4.7   24-Hour Mode Leading Zero

When checked, and the clock is displaying 24 hour time, a leading zero will be added to times with single digit hours, such as 00-09 hundred hours.
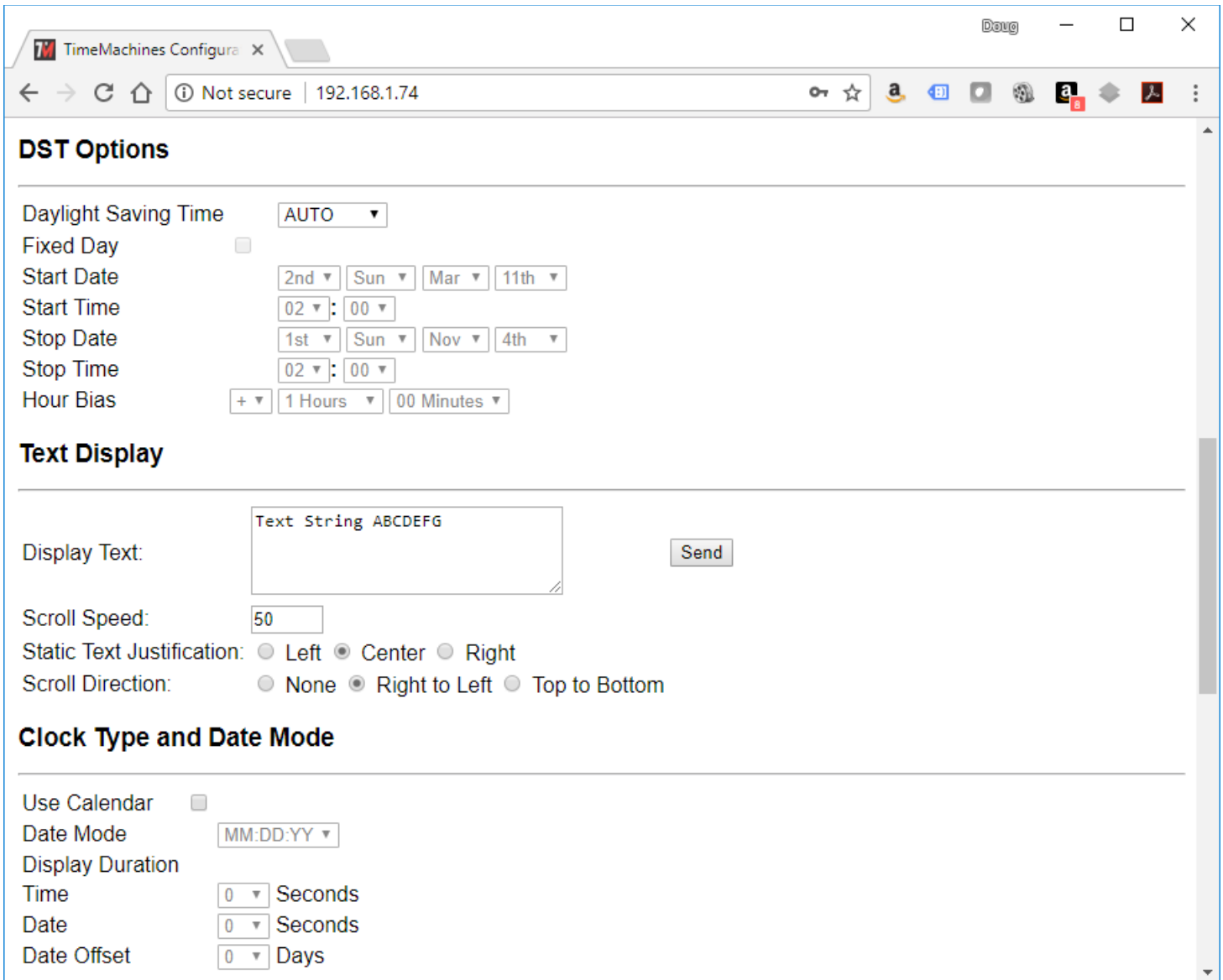
3.5 Daylight Savings

Daylight Savings Time (DST) varies greatly from one country to another and sometimes even within countries themselves. As a result there are many parameters used to handle all of the various rules that are in use throughout the world. The default setting uses the rule that is observed by the majority of the United States.
NOTE* If any DST settings are changed, the changes will not take effect until the next SNTP Resync Period.

3.5.1 Daylight Savings (DST Options)

The Daylight Saving Time Drop down, allows you to select AUTO, OFF, or CUSTOM. When AUTO is selected the clocks use the default US Daylight Savings start and stop dates. If OFF is selected the clock does not adjust for Daylight Savings

Time. If CUSTOM is selected the user can specify a custom start date with a start time and stop date with a stop time. The user can also adjust the bias of the offset.
NOTE* If a US Time Zone is selected then and DST setting of OFF is not allowed. If a DST setting of OFF is needed the Time Zone should.

3.5.2 Fixed Day

The Fixed Day check box indicates whether or not DST occurs on a specific date. For example, if DST started on March 1st of every year, the Fixed Day box would need to be checked. The Fixed Day box is important in that it changes how the Start and Stop parameters function. Based on the Fixed Day Check box certain drop down menus will be available for editing.

3.5.3 Start/Stop Date

The Start and Stop Date parameters indicate when DST changes occur.
• The first drop down is only used on floating day start time (i.e. 2nd Sunday of the month). If fixed day is selected this option is greyed out.
• The second drop down allows the user to select the day of the week you want DST to start or stop. This parameter is also only available in a floating day scenario.
• The third drop down allows the user specify the month of the start or stop date. This field is always used.
• The last field is the date, this is only used when a fixed is used (i.e. June 4th).

3.5.4 Hour Bias

The Hour Bias parameter allows the user to input a custom hour and/or minute offset if a CUSTOM Daylight Saving Time is chosen.

3.6 Text Display

The Dot-Matrix displays have the ability to display static and scrolling text. This can be controlled from the web page of the individual device, or to multiple displays using TM-Manager, available on our website.

3.6.1 Text String

This is the text that will be displayed. The entry field supports single line text for Right to Left scrolling, as well as Multi-Line entries (carriage-return between lines) for Top to Bottom scrolling. The Dot-Matrix does not reformat the text for best display, it is up to the user to format it within this entry field.

3.6.2 Scroll Speed

This is a number between 0 and 999 that controls the speed of horizontal and vertical scrolling. A lower number if faster and a higher number is slower. 60 is a good default to start with.

3.6.3 Static Text Justification

When displaying a specific static word, the Dot-Matrix will attempt to place the entire word/phrase on the display and may adjust to a smaller font if the default Arial won't fit. This setting controls whether the word is Left, Center, or Right justified.

3.6.4 Scroll Direction

Using scrolling, longer messages can be displayed. When scrolling, use this setting to control the direction of the scroll.

3.6.5 Send Button

The Send button is used to update the display with the parameters for text display that are currently set on the web page.

3.7 Clock Type and Date Mode

This section is for utilizing the Calendar feature of the clock. When in Calendar mode the clock will alternate between displaying the current time for a selected duration, and the current (or offset) date for a selected duration.

3.7.1 Use Calendar

Check this box if the Calendar mode of the clock is desired. If unchecked, the following fields will be greyed out and the clock will operate as a precision digital clock only.

3.7.2 Date Mode

This field is used to select the format in which the date is to be displayed.

3.7.3 Time

This field is used to select the amount of time, in seconds, that the current time is to be displayed on the clock.

3.7.4 Date

This field is used to select the amount of time, in seconds, that the date is to be displayed on the clock.
NOTE* If a constant display of the date is desired, the "Time" field can be set to 0 seconds, and the "Date" field can be set to any value greater than 0.

3.7.5 Date Offset

This field is used to select a forward offset, in days, to the current date. If the "Date Offset" value is selected as 0, the current date will be displayed.
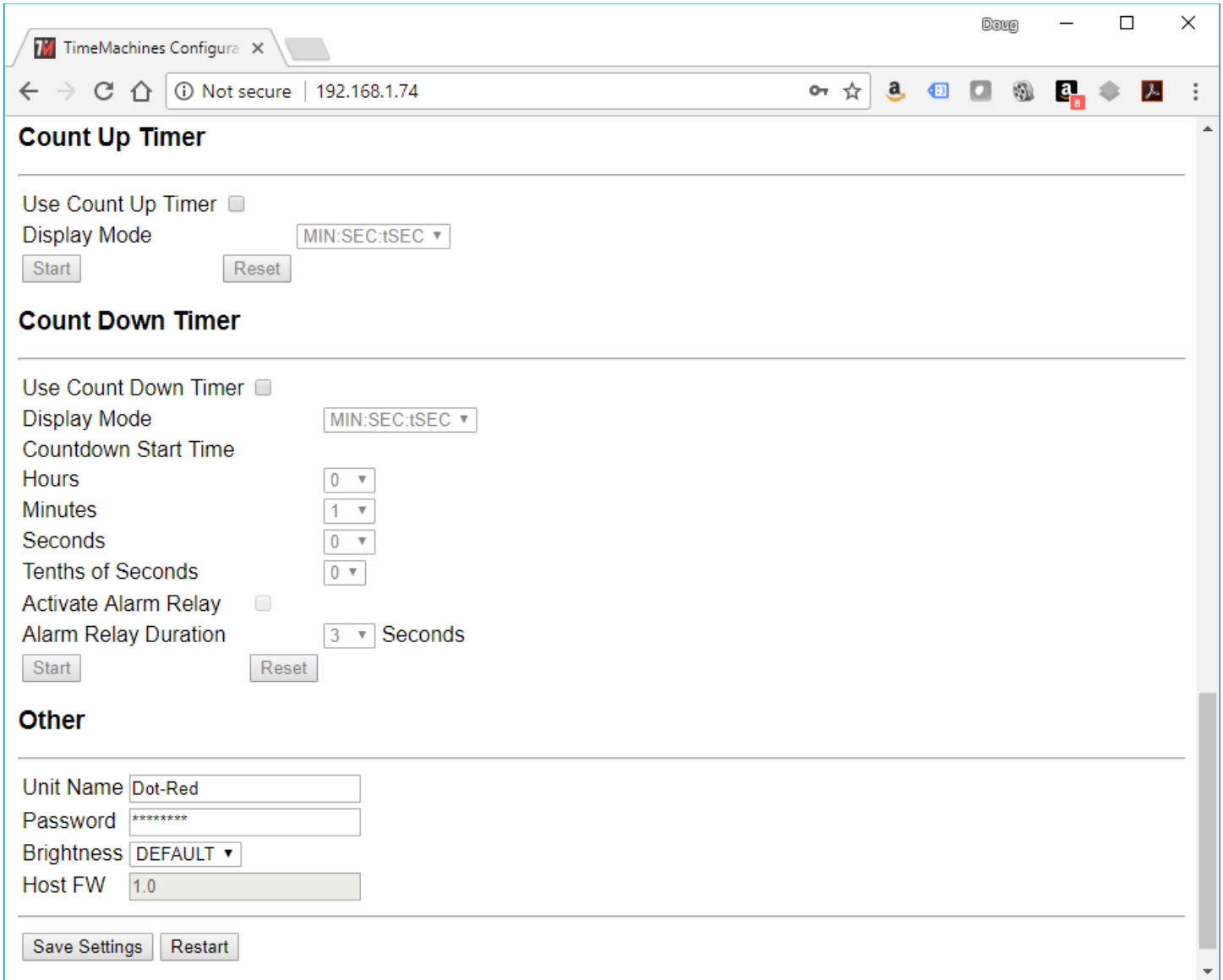
3.8 Count Up Timer

This section describes utilizing the up counting timer feature of the clock.

3.8.1 Use Count Up Timer

Check this box to use the count up timer. If unchecked, the fields in this section will be grayed out and inaccessible. As soon as this box is checked, the clock will switch to the up-counter mode showing the reset value of "00:00:00".

3.8.2 Display Mode

This field is used to select the format in which the up counter is to be displayed. The two options are "MIN:SEC:tSEC" and

"HR:MIN:SEC". These will show minutes, seconds and tenths of seconds or it will show hours, minutes and seconds respectively.

3.8.3   Start/Pause/Reset Buttons

The Start button for this section will begin an up counting timer. As soon as it's clicked, the button will dynamically switch to read "Pause" so that it now acts as a pause button for the running timer. Clicking this Pause button will switch it back to read "Start", and it will immediately stop the timer to display its current values. Selecting this button again will continue the up counting timer from this paused state.

The Reset button is only selectable when the timer is paused. It will clear the current timer values back to "00:00:00" so that it can be restarted from this point. The up counting timer is also automatically reset whenever it leaves timer mode and goes back to a normal clock display.

3.9   Count Down Timer

This section describes utilizing the down counting timer feature of the clock.

3.9.1   Use Count Down Timer

Check this box to use the count down timer. If unchecked, the fields in this section will be grayed out and inaccessible. As soon as this box is checked, the clock will switch to the down-counter mode showing the reset value of the current "Countdown Start Time" parameters.

3.9.2   Display Mode

This field is used to select the format in which the up counter is to be displayed. The two options are "MIN:SEC:tSEC" and "HR:MIN:SEC". These will show minutes, seconds and tenths of seconds or it will show hours, minutes and seconds respectively.

3.9.3   Hours

This field is used to select an hours start time for the count down timer. This will not be selectable when the countdown timer is in MIN:SEC:tSEC mode. Selectable from 0 – 23.

3.9.4   Minutes

This field is used to select a minutes start time for the count down timer. Selectable from 0 – 59.

3.9.5   Seconds

This field is used to select a seconds start time for the count down timer. Selectable from 0 – 59.

3.9.6   Tenths of Seconds

This field is used to select a tenths of seconds start time for the count down timer. This will not be selectable when the countdown timer is in HR:MIN:SEC mode. Selectable from 0 – 9.

3.9.7   Activate Alarm Relay

TSelect this box to allow the countdown timer to trigger an "alarm" when it reaches 00:00:00. This will flip the relay, which feeds to the connector on the back (referencing section 4.1).

3.9.8 Alarm Relay Duration

This field is used to select the number of seconds a countdown "alarm" will last. This can only be changed when the Activate Alarm Relay box is checked. Selectable from 1 – 59.

3.9.9 Start/Pause/Reset Buttons

The Start button for this section will begin a down counting timer. As soon as it's clicked, the button will dynamically switch to read "Pause" so that it now acts as a pause button for the running timer. Clicking this Pause button will switch it back to read "Start", and it will immediately stop the timer to display its current values. Selecting this button again will continue the down counting timer from this paused state.

The Reset button is only selectable when the timer is paused. It will clear the current timer values back to the displayed Start Time parameters, so that it can be restarted from this point. The down counting timer is also automatically reset whenever it leaves timer mode and goes back to a normal clock display.

3.10   Other

3.10.1   Unit Name

This can be any alpha numeric name up to 20 characters long.

3.10.2   Password

The password field displays the current password. To change it, enter a new password, push Set and Restart Clock. TMPC passwords are limited to12 characters. The default password is "tmachine".

3.10.3   Brightness

This parameter allow the user to control the brightness of the display. There are three settings that are selectable.
• DEFAULT, the brightest setting
• MEDIUM
• LOW, the lowest setting.
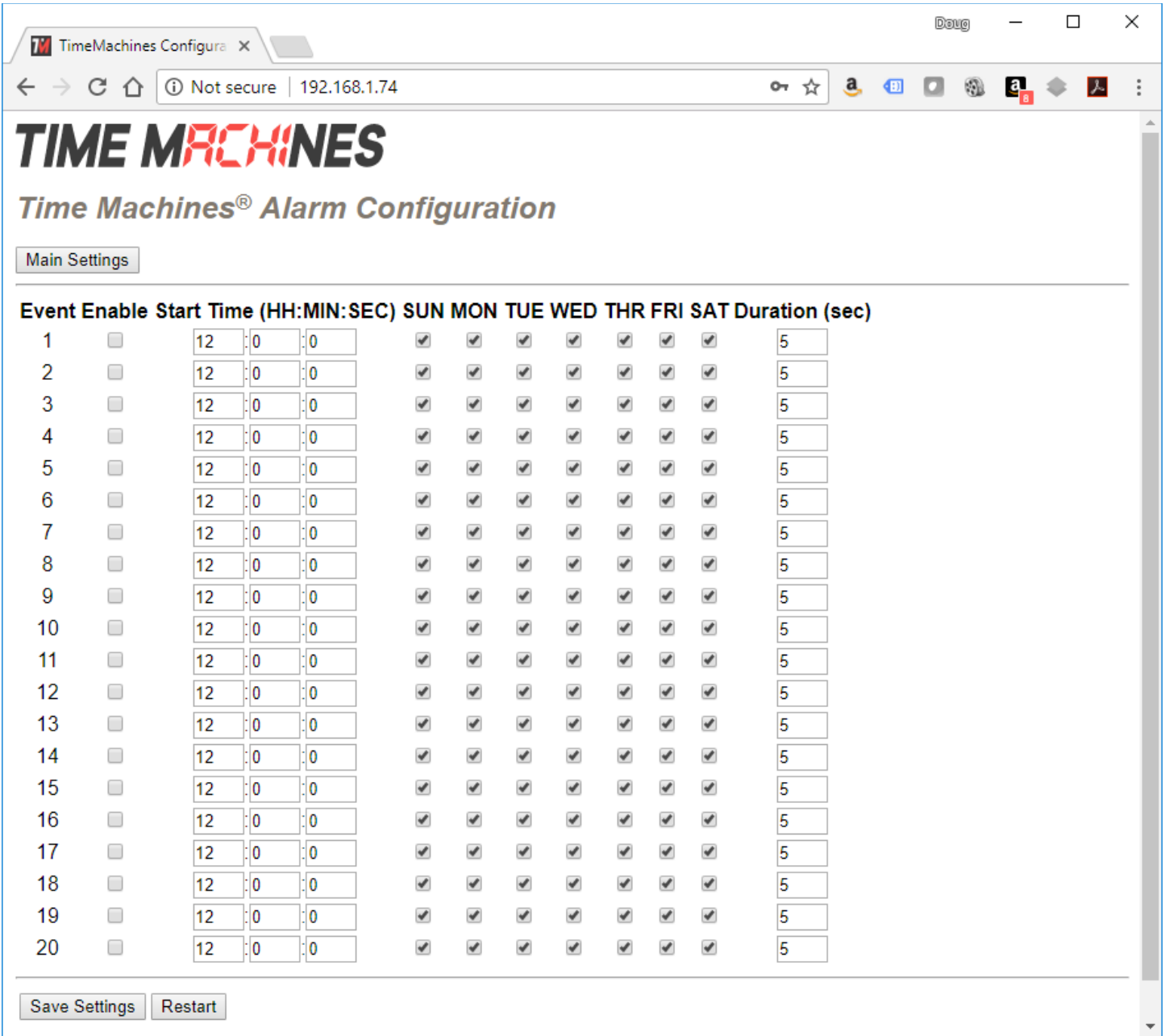
3.11   Alarm Configuration Page

The Alarm Configuration Page is access at the top of the web page by clicking the Alarm Settings button The Alarm Settings allow for setting of up to 20 alarms with each alarm being configurable for time of day, using 24 hour time entry mode, days of week to occur, and duration of the alarm.

4 External Connections and Interfaces

4.1 External Connection

External connection will require the user to make a connection from the clock's internal relay to an external system. The TimeMachines Clock alarm closes an internal relay.   The pinout of the connector is as follows:

Pin 1: Approximately +12V maximum current of 50mA
Pin 2: RxD – TTL serial data input
Pin 3: TxD – TTL serial data output
Pin 4: Relay Normally Closed
Pin 5: Relay Normally Open
Pin 6: Relay Normally Common
Pin 7: Ground

Small, low power piezo buzzers, lights, or relays can be driven directly from the clocks power supply. For larger loads, an intermediate relay is recommended.

*NOTE: This connector is not provided with purchase. If you are interested in information on obtaining this part contact TimeMachines. (techsupport@timemachinescorp.com). It can be ordered from our website, or from an electroincs distributor as a Molex 39500-0007 connector.

4.2 Serial or IP Protocols

The serial data connections, and corresponding IP based API, are used for putting other messages on the display from an external, non-networked source. Contact TimeMachines if you are interested in doing this.

4.3 Push Button

4.3.1 Changing the Time Zone

Using the push button provides a quick way to set the time zone without having to access the configuration web page. The button is accessible with a paper clip or other small wire from the bottom side of the clock though a small hole. With every push of the button the GMT offset decreases by 1. Since the default offset is -6, pushing the button once would set the offset to -7. Once the negative offset reaches its limit (-11) the next offset is the maximum positive offset (14).

4.3.2 Scrolling the IP address

The push button also provides a quick way to determine the IP address of the TMPC. A rapid double push of the button will cause the IP address to scroll across the display.

4.3.3 Set Parameters to Default

One way to set all parameters to their factory default values is to hold the button on the back of the clock down when the clock is powered up. If done successfully, three "8's" will scroll across the display before entering the usual start up routine.

5   Troubleshooting

5.1   Flashing Seconds

There are two instances when the seconds (6 digit clock) and the AM/PM dots will flash to indicate a problem.

5.2   Lost Link

If the seconds and the AM/PM dots are flashing it is possible that the link was lost, check to make sure everything is connected properly at both ends of the cable.

5.3   Missed NTP Packet

If an NTP packet was sent but a reply wasn't received the seconds and AM/PM dots will flash. This can happen every now and then, the flashing will stop as soon as the TMPC completes a successful send and receive cycle. If the primary server can no longer be reached the backup server will become the primary server. This is observable by looking at the configuration web page, if the primary and backup servers display the same address(primary will be in IPv4 format) than this scenario has occurred. If both servers fail the seconds and AM/PM dots will continue to flash until the issue is resolved. Log into the configuration web page and set new SNTP servers.

5.4   Unable To Access Web Page

This can occur for many different reasons. Below are a few examples with ways to potentially fix.

-Make sure the PC being used is on the same subnet as the clock.

-There are a few antivirus programs that may prevent accessing or viewing information on the web page. To avoid this try temporarily disabling before attempting to access the web page. Once you have made your changes re-enable security. This will not affect the function of the clock only the web page access.

-Some of the lesser known web browsers may not be compatible with the TimeMachines web interface. Try using a different browser such as Firefox or Chrome.