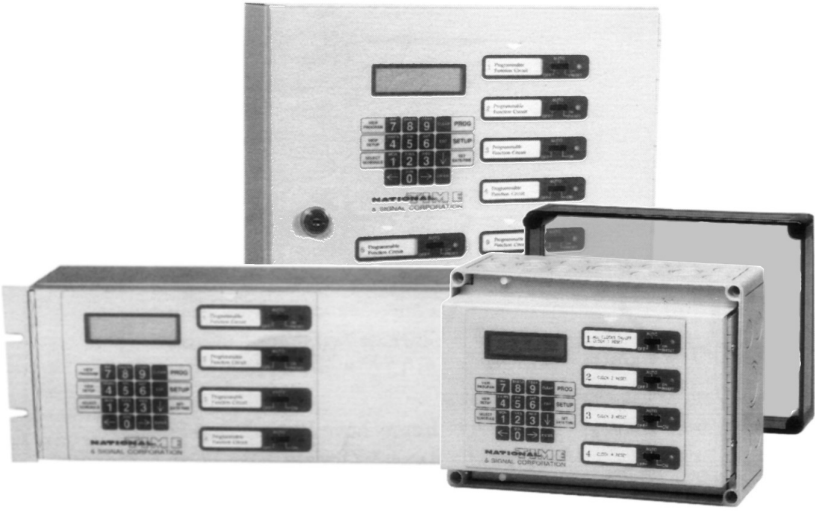


MC100 Master Clock



User's Manual

Firmware version 2.x
Rev.H
C-478



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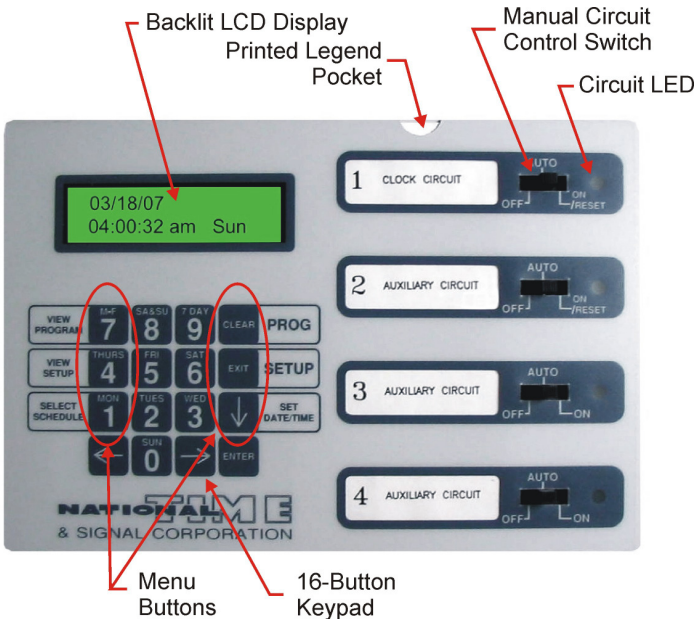
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Introduction

The MC100 Master Clock is the time keeper of slave (or secondary) clocks found in large buildings such as schools, hospitals, factories, office buildings, and college campuses. The master clock's duty is to keep all of the clocks synchronized and on the correct time throughout the facility. Power outages and time changes are handled automatically without any user intervention. The time is kept accurate through various methods including the power-line frequency, crystal oscillator, GPS satellites, local area network (LAN) computer system, or the internet synchronizing to the National Institute of Standards and Technology (NIST) time base.

The MC100 is also capable of controlling auxiliary devices such as bells, chimes, audio tones, or building lighting systems. The standard wall mount MC100 comes standard with 4 circuits for clock or auxiliary control and is expandable to 12 circuits. There also exists a rack mounted version with 4 circuits standard and expandable to 8 circuits. For controlling outdoor clocks, lights, or carillons there is a weather proof version with 4 circuits.

Front Panel



The front panel consists of an LCD backlit display, 16 button keypad, and four manual circuit control switches. The six keypad buttons on the sides double as the menu selection buttons.

Manual Circuit Control Switches

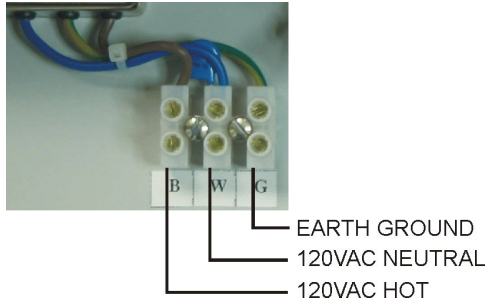
The three position slide switches are used to manually control each of the four circuits (or 8 or 12 if ordered with relay expansion boards). If the circuit is configured as an auxiliary circuit (i.e. bells, chimes, tones, etc.) sliding it to the ON position will activate the circuit while the switch is held. Sliding it to the OFF position will inhibit any programmed events from activating the circuit. Keep the switch in the AUTO position to allow programmed events to activate the circuit relay.

If the circuit is programmed as a clock circuit, the function of the switch will depend upon the type of clock chosen, and the selection in the Setup - Rst menu. See the Setup Menu section and Clock Types appendix for details. Typically, the OFF position will stop the clocks while RESET will reset the clocks per the RST menu selection.

Wiring Connections

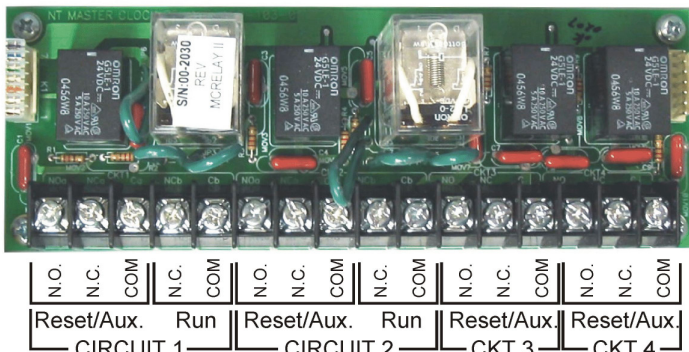
120VAC Power

The MC100 Master Clock is powered from a standard 120VAC 50 or 60 Hz power source. This connection is typically wired to a dedicated circuit to supply the master clock as well as secondary clocks of the building. Refer to the Specifications Appendix for power requirements.



Output Circuit Connections

The MC100 comes standard with four (4) output circuits. The first two circuits have two relays each. These two relays work in tandem to control most clocks by National Time or others. Alternately, the first two circuits could also be programmed for auxiliary output control which would use only the Form C relay (NO/NC/C) of the two available relays for each circuit.



The outputs are of the dry-contact type with built-in snubber circuitry to dampen inductive loads. The reset/auxiliary circuit relays are Form C (NO, C, NC). The run circuit relays on circuits 1,2,5,6,9, and 10 are Form A (NC, C).

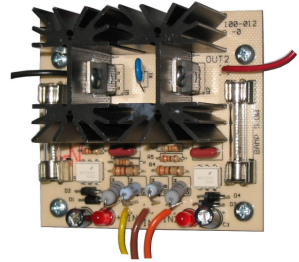
For low voltage clock systems, typically 120VAC is wired through the relay contacts to control the primary side of a 24VAC power transformer such as

National's PS-3, PS-6 and PS-12 class 2 power-limited supplies. This method increases the relay life and circuit capacity.

Impulse clock systems would require the 24VDC wired through the relay contacts.

Optional PS-DRIVER Output

A solid-state output driver can be added to the MC100 to create two 120VAC 5 Amp outputs. Order separately as PS-DRIVER 2/5A. This module is used to increase relay life or to add On-Demand Instant Reset time-data over the power wires of an existing system. Refer to Bulletins C-334 and C-446 of the National Time & Signal catalog or website.



Optional WeM-MC100 Web enable module

The MC100 can be equipped with a Web enable module which will allow programming from any PC on a LAN or the internet. Since it is a web based module, no software is required to be installed on the PC. The user navigates to the MC100 like a web page using a standard web browser such as Internet Explorer™ (Registered trademark of Microsoft Corporation).

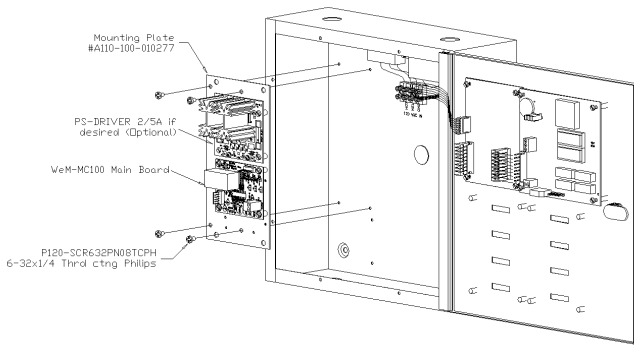
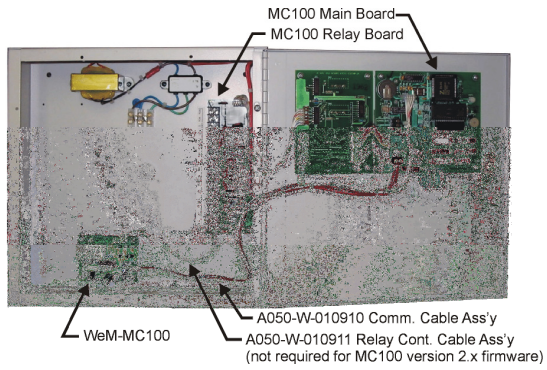


Time keeping can be based upon a local LAN timeserver or any timeserver on the internet such as the NIST (National Institute of Standards and Technology) timebase. All programming of the events or MC100 settings can be accomplished through either the web browser or the keypad of the MC100. Refer to the National Time WeCAN Programming Manual for web based programming details. (Bulletin C-475)

If this is a retrofit application not assembled from the factory, the Web Enable module must be configured in the CLK menu using the MC100 keypad to begin communication.

WeM-MC100 Mounting

The WeM-MC100 module mounts directly into the standard MC100 wall box as shown in the figure. The WeM-MC100 is connected to the MC100 Main Board with the A050-W-010910 Communications Cable Assembly which provides both power and communication data. With firmware version 2.0 or greater, the A050-W-010911 Relay Control Cable is not required. For retrofits and field upgrades, The WeM may be mounted internal to the MC100 cabinet using mounting plate #A110-100-010277 which would also provide mounting of a PS-DRIVER-2/5A if desired.



WeM-MC100 Wiring

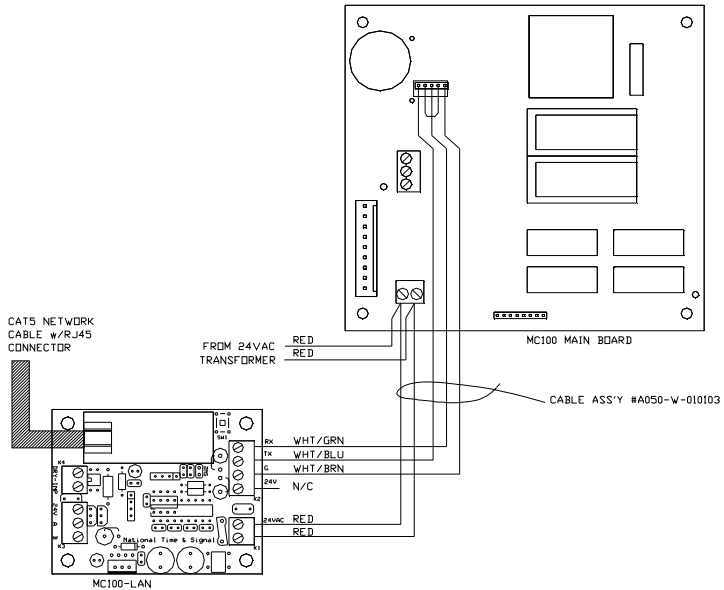
The connections to provide power and communications to the WeM main board requires National Time & Signal cable assembly #A050-W-010910 between the MC100 main board and the WeM connectors K2 and K5 as shown in the figure above.

The #A050-W-010910 cable assembly is wired as follows:

WeM-MC00 Terminal	Wire Color	MC100 CPU Board Terminal
K6 pin 3-Rx	White, Blue Stripe	Block K2: Pin 1
K6 pin 4-Tx	White, Green Stripe	Block K2: Pin 3
K6 pin 2-Gnd	White, Brown Stripe	Block K2: Pin 5
K1- 24VAC-2	Red	K5.2
K1-24VAC-1	Red	K5.1

In addition, on the MC100 CPU board terminal block K3, pins 2 and 4 are connected.

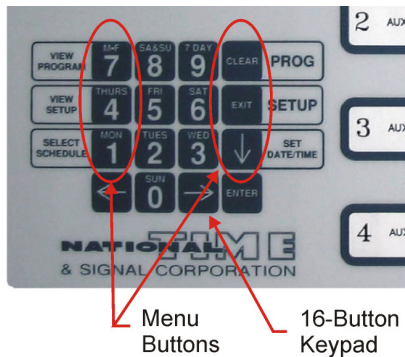
The LAN connection uses a standard RJ-45 network cable. It plugs into the side of the small metal housing on the We-MC100 module. For direct connection to a PC without a network, a cross-over cable may be used. Refer to the WeCAN Programming Manual for details.



Configuring the MC100

Selecting Menus

The MC100 can be programmed either through the web interface at a PC or using the keypad on the MC100. (With the exception of enabling the web enable module in the CLK menu described below.) For web based programming, refer to the WeCAN Programming Manual C-475. The MC100 programming menus can be accessed by pressing the menu buttons of the keypad.



Setup Menu:



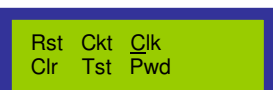


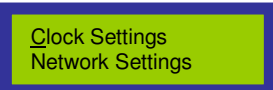

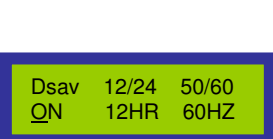



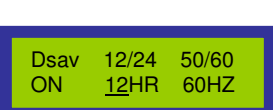





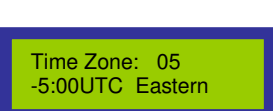




Press the blue area of the button labeled SETUP to enter the menu. This menu is used for:

1. Selecting the type of secondary clocks or auxiliary outputs on each circuit. (Choose **Ckt** from the sub-menu.)
2. Selecting the time keeping functions of the master clock. (Choose **Clk** from the sub-menu.)
3. Defining the operation of the manual circuit control switches. (Choose **Rst** from the sub-menu.)
4. Clearing the event schedules of auxiliary outputs. (Choose **Clr** from the sub-menu.)
5. Initializing the MC100 to factory defaults. (Choose **Tst** from the sub-menu.)
6. View the status of ancillary equipment such as GPS and LAN connections. (Choose **Tst** from the sub-menu.)
7. Setting the passwords that protect access to programming. (Choose **Pwd** from the sub-menu.)

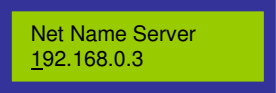

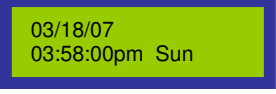
Note - If there are passwords currently set, the Setup Menu requires the Technician level password.

Setup - Clk Menu – Clock Settings

		<p>Press the blue area of the SETUP button to enter the Menu.</p>
	 	<p>Press RIGHT arrow twice to move the cursor under the Clk selection.</p> <p>Press ENTER.</p>
		<p>Press ENTER to select the “Clock Settings” menu.</p>
	  	<p>Toggle desired Daylight Savings setting On/Off by pressing the Down Arrow. This will enable or disable automatic daylight savings adjustments.</p> <p>If all displayed settings are correct, press ENTER.</p> <p>Otherwise, Press RIGHT arrow to move on to the 12/24 hour column.</p>
	 	<p>Press DOWN arrow to toggle between 12hr and 24hr format. This will change the time format display of the MC100 LCD display only.</p> <p>Press RIGHT arrow to move on to the 50/60Hz column.</p>
	 	<p>Press DOWN arrow to toggle between 50Hz or 60Hz to match the power feed to the MC100.</p> <p>Press ENTER when all values are correct.</p>
	 	<p>Press DOWN arrow to select the proper time zone for your location. <i>This is only necessary for GPS and LAN time keeping options.</i></p> <p>Press ENTER.</p>

<p>WebEnable Module YES 0=N 1=Y</p>	<p>MON 1</p> <p>ENTER</p>	<p>Select whether the WeM-MC100 network card is installed by pressing 0 for no, 1 for yes. If "yes" is chosen, then you will be prompted for network configuration information.</p> <p>Press ENTER.</p>
<p>IP Addressing Dynamic</p>	<p>↓</p> <p>ENTER</p>	<p>Press DOWN to select between IP addressing schemes. Consult your IT administrator for the correct settings.</p> <p>Options include: Dynamic: (Recommended) Use dynamic IP settings. Static: Use static IP settings.</p> <p>Press ENTER to save your setting.</p>
<p>DHCP Addressing ENABLED 0=D 1=E</p>	<p>MON 1</p> <p>ENTER</p>	<p>Press 1 or 0 to enable/disable DHCP addressing. This will be ignored if static addressing was enabled. Enabling DHCP is recommended.</p> <p>Press ENTER.</p>
<p>PingARP Addressing ENABLED 0=D 1=E</p>	<p>MON 1</p> <p>ENTER</p>	<p>Press 1 or 0 to enable/disable PingARP addressing. Enabling is recommended. See the WeCAN programming guide for more information on PingARP configuration.</p> <p>Press ENTER.</p>
<p>IP Address 192.168.0.67</p>	<p>ENTER</p>	<p>If address mode is <i>dynamic</i>, this screen will show the IP address assigned from the network. If address mode is <i>static</i>, enter the IP address given to you by your IT administrator.</p> <p>Press ENTER.</p>
<p>Gateway IP Address 192.168.0.1</p>	<p>ENTER</p>	<p>If address mode is <i>dynamic</i>, this screen will show the Gateway IP address assigned from the network. If address mode is <i>static</i>, enter the Gateway IP address given to you by your IT administrator.</p> <p>Press ENTER.</p>






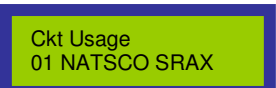


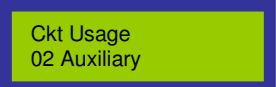


<p>Network IP Mask 255.255.255.0</p>	<p>ENTER</p>	<p>If address mode is <i>dynamic</i>, this screen will show the netmask assigned from the network. If address mode is <i>static</i>, enter the netmask given to you by your IT administrator.</p> <p>Press ENTER.</p>
<p>Time Server Internet NIST</p>	<p>↓ ENTER</p>	<p>Choose the network timebase. The MC100's LAN card will query the network once an hour for the current time and date. Options include:</p> <p>Internet NIST: (Default) Use the official government time server.</p> <p>Specified IP: (Recommended)</p> <p>Automatic Detect: (Not recommended). Attempts to find a local time server.</p> <p>Press ENTER.</p>
<p>Time Server IP Internet NIST</p>	<p>ENTER</p>	<p>Enter the IP address of your time server. This only applies if <i>Time Server</i> was set for <i>Specified IP</i>.</p> <p>Note: if the time server specified on the web admin page is a hostname rather than an IP address, this screen will show the looked-up IP of that host. However, the hostname will be retained on the admin page as long as no changes are made to the displayed IP.</p> <p>Press ENTER.</p>
<p>Time Server Type SNTP</p>	<p>ENTER</p>	<p>Choose the time server protocol. Options include:</p> <p>SNTP: (Recommended) Use simple network time protocol. (UDP port 123)</p> <p>TIME: Use the <i>TIME</i> protocol. (TCP port 37)</p> <p>Press ENTER.</p>
<p>Net Host Name WEMC100</p>	<p>ENTER</p>	<p>Enter the host name of the master clock. In the example shown to the left, users could type http://wemc100 into their web browser to get to the device configuration page.</p> <p>Press ENTER.</p>

		<p>If address mode is <i>dynamic</i>, this screen will show the name server assigned from the network. If address mode is <i>static</i>, enter the name server IP given to you by your IT administrator.</p> <p>Press ENTER.</p>
		<p>The display will return to the normal time and date display.</p>

Setup - Ckt Menu

The Circuit Menu is used to define the types of clocks connected to each circuit or whether the circuit is used for auxiliary events such as bells, chimes, or tones.

Selecting the proper clock type will cause the MC100 to automatically output the required pulses or data to control the clocks for power outages, daylight savings, and periodic synchronization.

		<p>Press the blue area of the SETUP button to enter the Menu.</p>
	 	<p>Press RIGHT arrow once to move the cursor under the Ckt selection.</p> <p>Press ENTER.</p>
	 	<p>Press DOWN arrow to select the desired circuit usage for Circuit 1. Choose either a clock type or Auxiliary for programmed events. Choose Disabled if not in use. See Appendices B and C.</p> <p>Press ENTER.</p>
	 	<p>Repeat the circuit selection for each circuit by pressing DOWN arrow followed by the ENTER button. The EXIT button can be used at any time to return to normal operation.</p>

Setup - Rst Menu

The Reset Menu is used to define the function of the manual circuit switches on the front panel of the MC100 when the circuit is defined as a type of clock. Depending upon the clock type configured, these options could include:

- Min - This will cause the MC100 to output the minute pulse when the switch is slid to the ON/RESET position. (Used only for minute impulse clock types)
- Hour - This will cause the MC100 to output the hour reset pulse when the switch is slid to the ON/RESET position. In most cases, this will advance the clocks to the next hour.
- 12 Hour - This will cause the MC100 to output the 12hour reset pulse when the switch is slid to the ON/RESET position. In most cases this will advance the clocks to their respective 12 hour reset position.
- Actual Time - This will advance all of the clocks to the actual time of day when the switch is slid to the ON/RESET position. This is available on National Time clocks with On-Demand Instant Reset capability such as the D/DX/DU Digital clocks, Rotary Drive impulse (RDI) and Rotary Drive Synchronous (RDS) clocks.

Refer to the Appendix - Circuit Types for an explanation of available resets.






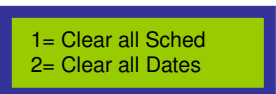

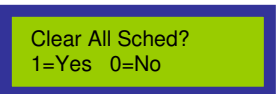



TIP - To disable the switch so that it is not accidentally used to scatter the clocks, choose a reset type that does not apply to your type of clocks. This way nothing will happen if the switch is used.

		Press the blue area of the SETUP button to enter the Menu.
		Press ENTER to select the Rst menu.
		Use the numeric key pad to enter the desired circuit number. (i.e. press '01' for circuit 1.) Press ENTER.
		Move the cursor to the desired action for the manual reset switch for this circuit using the arrow keys. Press ENTER. Repeat all steps if there are more clock circuits.

Setup - Clr Menu



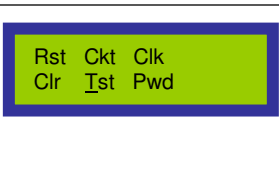



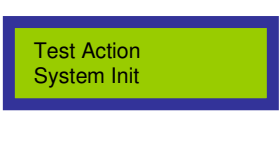


The Clear Menu is used to clear **all** programmed events that activate circuits defined as auxiliary. There are 20 schedules in the MC100. The schedules themselves will always exist, but all of their events can be deleted using this menu. This will delete **all** events in **all** schedules and return the schedule names to the factory default (Schedule 01, etc.). An individual schedule can be cleared of events using the View Program Menu. All of the Special Dates can be deleted by selecting option 2 "Clear all Dates" shown below.

		Press the blue area of the SETUP button to enter the Menu.
	 	Press the Down arrow once to move the cursor under the Clr selection. Press ENTER.
		Press '1' to clear all Schedules, press '2' to clear all Special Dates.
		Press '1' to confirm deleting all events/dates or '0' to exit.

Setup - Tst Menu

The Test Menu is used for technician level testing, verification, and installation of the MC100. Some of the menu options include:

- System Init - This will initialize all of the MC100 memory locations to a known state. This is used if the firmware is updated, battery replaced, or some other event caused memory corruption.
- GPS Config - This will configure the GPS antenna for use with the MC100. This will configure the serial port and other communication values for the data sent from the GPS antenna. This only needs to be done once upon installation of the antenna. This step is usually done at the factory prior to shipment.
- View Timebases - This selection will provide the technician various information to diagnose time base issues.
- View GPS Status - This selection will provide GPS communication statuses to the technician to troubleshoot antenna wiring and placement issues.
- RAM Hex View - This is for engineering purposes only and is beyond the scope of this manual.
- Reset Web Card - This will reboot the WeM-MC100 add-in card. This allows the card to acquire a new network connection. The card requires about one minute to complete its boot cycle.

 <p>Rst Ckt Clk Clr Tst Pwd</p>		<p>Press the blue area of the SETUP button to enter the Menu.</p>
 <p>Rst Ckt Clk Clr Tst Pwd</p>	  	<p>Press the DOWN and RIGHT arrows to move the cursor under the Tst selection.</p> <p>Press ENTER.</p>
 <p>Test Action System Init</p>	 	<p>Press the DOWN arrow to select the desired action.</p> <p>Press ENTER.</p>

Setup - Pwd Menu

The Password Menu is used to set passwords to inhibit certain functions. There are two levels of passwords: Technician level and User level.

If both passwords are set to '0000', passwords will be disabled and will not be required for any action.

If passwords are set:

No Password - will allow access to the 'View Program' and 'View Setup' menus only.

User Password - will allow access to all menus with the exception of the Setup Menu.

Tech Password - will allow complete access to all menus.



TIP - To disable password requirements, set both levels of passwords to '0000'. To require a password to only the Setup Menu, set the user password to '0000' and the tech password to something non-zero.

		<p>Press the blue area of the SETUP button to enter the Menu.</p>
	 	<p>Press the DOWN and RIGHT arrows to move the cursor under the Pwd selection.</p> <p>Press ENTER.</p>
	 	<p>Select the desired passwords using the numeric keypad.</p> <p>Press ENTER.</p>

Set Date/Time Menu:



Note - If a GPS antenna or LAN time base is used, set the appropriate date and day-of-week. Set the time to any time of day with the minutes equal to 40. For example, 12:40a. If the time base connection is functioning properly, the time of the MC100 will adjust to the NIST time within a few seconds.

		Press the blue area of the SET DATE/TIME button to enter the Menu.
		Press the LEFT and RIGHT arrows to move the cursor under the desired location.
		Enter the date and time using the numeric keypad.
		To toggle between am and pm, press the DOWN arrow when the cursor is below the 'a' or 'p'.
		When the cursor is below the day of week, use the corresponding number key to select the new day of week.
		When the ENTER button is pressed, the time and date will be set with the seconds equal to zero.

Programming Overview

The MC100 with version 2.0 firmware or higher has an improved event programming interface over previous versions by increasing the number of schedules and total events. Multiple schedules can be simultaneously enabled and assigned custom names. There is also an automatic method to change the enabled schedules automatically on any date of the year. These “Special Dates” can be scheduled ahead of time for special holidays, half day schedules, assembly days etc.

Individual event entries can also specify any combination of days-of-week as well as any combination of auxiliary circuits. This reduces the number of entries required to program most schedules.

Schedules

An event is a time of day when one or more circuits are automatically activated. A schedule is a list of these events. The MC100 holds 20 unique schedules. These schedules are numbered 01 through 20. These schedules can be assigned custom names of up to 13 characters long to make it easier to keep track of the schedule’s function.

Any number of these schedules can be enabled at one time. This allows schedules for different areas of the building to be maintained individually.

For instance, consider Example 1: In a school setting, upper-elementary classes may operate on a different class change schedule than lower-elementary classes. Keeping these two schedules separate will allow the administration to modify one without affecting the events of the other even if they share a common output circuit.

Example 1

Schedule	Function
01- Lower EI Full	A list of events that ring Circuit 2 for lower elementary regular day of school. i.e. Start of day, recess, lunch, end of day.
02- Lower EI Half	A list of events that ring Circuit 2 for lower elementary half day of school. i.e. Start of day, recess, end of day.
03- Upper EI Full	A list of events that ring Circuit 2 for upper elementary regular day of school. i.e. 1 st hour, 2 nd hour, 3 rd hour, lunch, etc.
04- Upper EI Half	A list of events that ring Circuit 2 for upper elementary with shortened class times.
05- A.M. Assembly	An event that rings Circuit 2 at a special time for morning assemblies in the gymnasium or auditorium.
06- P.M. Assembly	An event that rings Circuit 2 at a special time for afternoon assemblies in the gymnasium or auditorium.

- Normal days will have Schedule 01 and Schedule 03 as the only enabled schedules.
- When the lower-elementary has a half day, Schedule 01 is disabled and Schedule 02 is enabled.
- When the upper-elementary has a half day, Schedule 03 is disabled and Schedule 04 is enabled.
- When there is a morning assembly, Schedule 05 is enabled in addition to the other schedules.

- When there is an afternoon assembly, Schedule 06 is enabled in addition to the other schedules.

Another example may be one schedule programmed to control bell events and a second programmed to control outdoor lighting on a different circuit. Bells or lighting can be switched to a different active schedule without having to duplicate the other's events in every schedule.

Special Dates

Schedule changes like those described in Example 1 can be programmed ahead of time for any date of the year using the "Special Dates" programming capability. Simply program the dates of half days and assemblies, select the desired schedules to enable, and the MC100 takes care of the rest.

Special Dates for Example 1:

Date	Type	Schedule E=Enable, D=Disable							
		1	2	3	4	5	6	...	20
09/04/2007 (AM Assembly)	1 day	E	D	E	D	E	D	...	D
12/18/2007 (Half Day for all)	1 day	D	E	D	E	D	D	...	D
12/20/2007 (PM Assembly)	1 day	E	D	E	D	D	E	...	D
06/14/2008 (Summer Break)	Perm	D	D	D	D	D	D	...	D
09/03/2008 (School Begins)	Perm	E	D	E	D	D	D	...	D

The possibilities are virtually limitless and will simplify even the most complicated schedules. Notice in the example that the "Special Date" can change the schedules only for one day, or the change can be permanent for long durations like summer break.


To make this feature even more powerful, "wild cards" can be used in place of a month, day, or year by entering "00" or "0000" in its place. For example, if you require a "Special Date" every year on December 25, program the date as 12/25/0000. For a "Special Date" on the 15th of every month of every year, program the date as 00/15/0000. For a "Special Date" every day of July 2009, program the date as 07/00/2009.

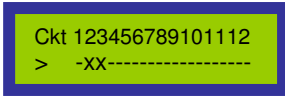
Event Display


Each auxiliary event programmed into the MC100 is described in three display screens on the LCD display.

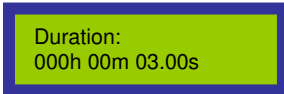
The first screen displays the time of the event and the days of the week the event will occur.


Auxiliary Event:
08:00a -MTWTF- >

Pressing the RIGHT arrow  will advance to the second screen that displays the circuits activated by the event. The circuit numbers with an 'X' below the number will be activated.





Pressing the RIGHT arrow  will advance to the third screen that displays the duration the circuit(s) will be activated. This example shows an event duration of 3 seconds.



Pressing the ENTER button  will display the next event of the schedule.

NOTES-

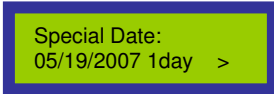
 Pressing ENTER at any time instead of the RIGHT arrow will advance directly to the next event.

 Pressing the Program button will enter the Edit Event Menu for that event and is described later in this document.


Special Date Display

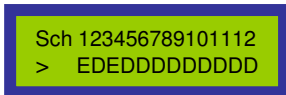
Each "Special Date" programmed into the MC100 is described in three display screens on the LCD display.

The first screen displays the date and type of the "Special Date". The special date can be either one day (1day) or a permanent (perm) schedule change.




Special Date:
05/19/2007 1day >

Pressing the RIGHT arrow  will advance to the second screen that displays the status (enabled or disabled) for the first 12 schedules. The status is displayed beneath each schedule number.




Sch 123456789101112
> EDEDDDDDDDDD


Pressing the RIGHT arrow  will advance to the third screen that displays the status for schedules 13 through 20.




Sch 13 14 15 16 17 18 19 20
> D D D D D D D D

Pressing the ENTER button  will display the next event of the schedule.

NOTES-

 Pressing ENTER at any time instead of the RIGHT arrow will advance directly to the next event.

 Pressing the Program button will enter the Edit Special Dates Menu described later in this document.










Programming Events












There exists 20 schedules capable of storing programmed events. The MC100 without a Web-enabled interface can store 500 events. These 500 events can be divided amongst any number of the 20 schedules. "Special Dates" are not stored in a schedule, but do share the same memory space as events. Each "Special Date" programmed equals one event space.

If passwords are enabled, programming events and special dates requires at least the User level password.

Adding a New Event

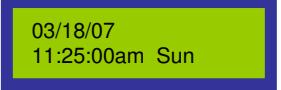



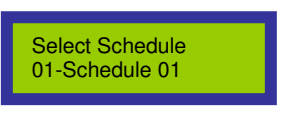

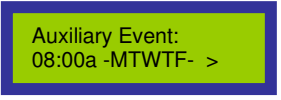

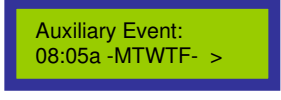

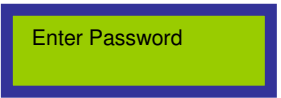

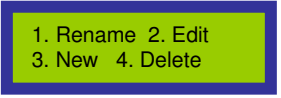

To begin programming a schedule, follow these steps. To edit existing events see the Editing Events section of this document.

<p>03/18/07 11:25:00am Sun</p>	 	<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
<p>1. Event Schedule 2. Special Dates</p>		<p>Press '1' to choose Event Schedule.</p>
<p>Select Schedule 01-Schedule 01</p>	 	<p>Press the DOWN arrow to choose the desired schedule. Then press ENTER. Note: To enter a custom name for the schedule, see Renaming Schedules.</p>
<p>End of Sched 01 1=Add New;0=EXIT</p>		<p>If there are currently no events in the schedule, simply press '1' to add a new event.</p> <p>Or</p>
<p>Auxiliary Event: 08:00a -MTWTF- ></p>		<p>If there were existing events, the first event will be displayed. To add a new event, press PROG to enter the Add/Edit menu,</p>
<p>Enter Password</p>		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
<p>1. Rename 2. Edit 3. New 4. Delete</p>		<p>Now, choose '3. New' by pressing the numeric keypad.</p>

<p>Enter Time/days: --:--a -MTWTF-</p>		<p>Use the numeric keypad to enter the time of day for the new event.</p>
<p>Enter Time/days: 08:30a -MTWTF-</p>		<p>While the cursor is beneath the am/pm character, pressing the DOWN arrow will toggle am/pm.</p>
<p>Enter Time/days: 08:30a -MTWTF-</p>	 	<p>While the cursor is beneath the am/pm or day-of-week characters, press the number key(s) corresponding to the desired days. (The days are printed on the key above the numbers.)</p> <p>Press ENTER when all desired days are selected.</p>
<p>Ckt123456789101112 -xxx-----</p>	  	<p>Use the RIGHT/LEFT arrow keys to navigate the cursor under the desired circuit number(s) to activate. Pressing the DOWN arrow will toggle between 'X' for activate, '-' for do not activate.</p> <p>Press ENTER when complete.</p>
<p>Duration: 000h 00m 03.00s</p>	 	<p>Use the numeric keypad to enter the desired event duration in hours, minutes, and seconds.</p> <p>Press ENTER when complete.</p>
<p>Enter Time/Days: --:--a SMTWTFS</p>	 	<p>The display will return to the "Enter Time/Days" screen to enter another event. Repeat the above steps to enter another event,</p> <p>Or</p> <p>Press EXIT when complete to back out of the Program Menu.</p>












Modifying Existing Events

Existing events can be edited or deleted and new events added following these steps:

		<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
		<p>Press '1' to choose Event Schedule.</p>
		<p>Press the DOWN arrow to choose the schedule containing the desired event to edit.</p> <p>Press ENTER. Note: To enter a custom name for the schedule, see Renaming Schedules.</p>
		<p>The first programmed event of that schedule will be displayed.</p> <p>Pressing the RIGHT arrow will display the details of the event shown.</p> <p>Press the DOWN to display the next event.</p>
		<p>When the event you want to edit is displayed, Press the blue area of the PROG button.</p>
		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
		<p>Choose "1. Rename" to create a name for this event. (only available with the WeCan interface)</p> <p>Choose "2. Edit" to modify the event.</p> <p>Choose "3. New" to add an additional event. See "Adding a New Event" above.</p> <p>Choose "4. Delete" to delete only the event that was being displayed when the PROG button was pressed.</p>

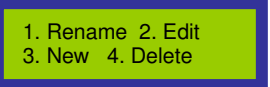

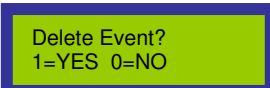

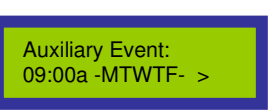


Editing an Existing Event

Navigate to the Edit Menu as described above choosing the event to be modified.

<p>1. Rename 2. Edit 3. New 4. Delete</p>		<p>Choose "2. Edit" to modify the previously displayed event.</p>
<p>Enter Time/days: Q8:05a -MTWTF-</p>	    	<p>The time and days of the selected event are shown.</p> <p>If the time requires a change, type in the new time with the numeric keypad. Move the cursor under the am/pm location using the RIGHT arrow.</p> <p>Toggle the am/pm choice by pressing the DOWN arrow.</p> <p>Modify the days of week by pressing the corresponding number button.</p> <p>When the display reflects the desired changes, Press ENTER to advance to the next screen.</p>
<p>Ckt123456789101112 -xxx-----</p>	  	<p>Use the RIGHT/LEFT arrow keys to navigate the cursor under the desired circuit number(s) to activate. Pressing DOWN arrow will toggle between 'X' for activate, '-' for do not activate.</p> <p>Press ENTER when complete.</p>
<p>Duration: 000h 00m 03.00s</p>	 	<p>Use the numeric keypad to enter the desired event duration in hours, minutes, and seconds.</p> <p>Press ENTER when complete.</p>

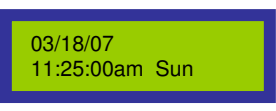



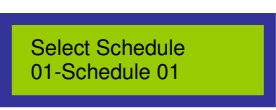




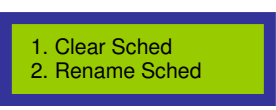

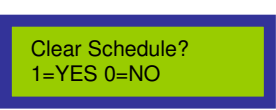

Delete an Existing Event

Navigate to the Edit Menu as described above choosing the event to be deleted.

		Choose "4. Delete" to delete the previously displayed event.
		Confirm the event deletion by pressing '1'.
	 	The next event of the schedule will be displayed. Continue viewing the schedule by pressing the DOWN arrow or EXIT to go back.

Delete All Events of a Schedule

All of the events of an entire schedule can be cleared (the custom name for the schedule will remain) by following these steps:
(To delete all events from all schedules and return the schedule names to the default setting, refer to the Setup - Clr section of this manual.)

		<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
		<p>Press '1' to choose Event Schedule.</p>
	 	<p>Press the DOWN arrow to choose the schedule containing the desired events to delete.</p> <p>Press the blue area of the PROG button.</p>
		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
		<p>Press "1. Clear Sched" to clear all the events of the previously selected schedule.</p>
		<p>Confirm schedule deletion by pressing "1".</p>

Naming Schedules

The default names of “Schedule 01, Schedule 02, etc.” can be customized to make it easier to remember the function of each schedule. For example, schedule 01 could be named “Lower EL Full” to designate that it contains all of the events for the lower elementary full day of school. Naming the schedules make it much easier to distinguish which schedules need to be selected in the Select Schedule menu or the Special Dates programming. Each custom name can be up to 13 characters long.

To rename a schedule:

		<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
		<p>Press '1' to choose Event Schedule.</p>
		<p>Press the DOWN arrow to choose the schedule to Rename. Press the blue area of the PROG button.</p>
		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
		<p>Press “2. Rename Sched”.</p>

<p>Enter Sched Name 01_Schedule 01</p>	<p>The schedule name is shown with the cursor under the first character. A new name of up to 13 characters may be selected.</p> <p>The characters may be selected using the DOWN arrow key to select appropriate letter and the RIGHT/LEFT arrows for selecting the next space. Press CLEAR to enter a space.</p> <p>Alternately, the numeric keypad will function similar to that of a cell phone for text messaging. The characters corresponding to each number are shown in the figure.</p> <p>For example, pressing the “5” key would cycle through “5-J-K-L”. Press the “0” key twice to change the case of the letters. The “1” key will cycle through punctuation and special characters.</p>
--	---



Selecting Active Schedules

Any number of the 20 schedules in the MC100 can be enabled at one time. Any schedule can activate any auxiliary circuit. This allows for the utmost flexibility to accomplish the most complex scheduling tasks. The schedules are enabled or disabled using the Select Schedule menu. Any manual changes to schedule status will remain permanent until manually changed again or until a Special Date programmed event occurs.

To Enable Schedules:

		<p>From the normal time/date display, press the blue area of the SELECT SCHEDULE button to enter the Menu.</p>
		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
		<p>The current status of Schedule 01 is displayed. Use the LEFT or RIGHT arrows to choose "Disable" or "Enable" respectively.</p>
		<p>Press the DOWN arrow to display the status of the next schedule. Continue choosing the status of each schedule using the arrow keys.</p> <p>Alternately, the number of the desired schedule can be entered using the numeric keypad.</p>
		<p>Press ENTER after all of the schedule statuses have been selected.</p> <p>Or</p> <p>Press EXIT at any time to return to the main screen.</p>

Programming Special Dates

Special Dates are days that you choose to have the MC100 make an automatic schedule change. Any or all of the 20 schedules can be enabled or disabled on any particular date of the year. If the "One-day" type is chosen, the schedules will return to their previous state the following day. If "Permanent" type is chosen, the new settings will remain until another "Special Date" occurrence or a manual schedule selection is made through the "Select Schedule" menu on the keypad.

Each special date is defined by entering the month, day, and year. The schedules will be changed at 12:00am on that date.

"Wild Card" Dates

The MC100 allows the entry of "wild cards" in place of the month, day, or year field when entering Special Dates.

"00" in place of the month means "any" month.

"00" in place of the date means "any" date.

"0000" in place of the year means "any" year.

Examples:

3/18/2007: The Special Date will adjust the schedules on May 18, 2007.

3/00/2007: The Special Date will adjust the schedules every day of March 2007.












3/00/0000: The Special Date will adjust the schedules every day of March every year.

00/01/0000: The Special Date will adjust the schedules the first of every month, every year.

12/25/0000: The Special Date will adjust the schedules every December 25.

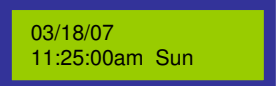

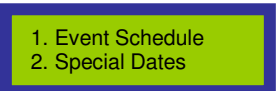

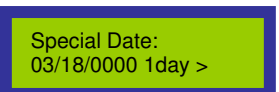

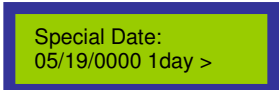

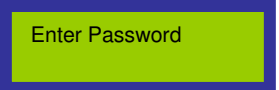

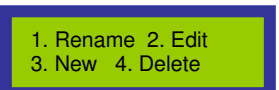

Adding a New Special Date

<p>03/18/07 11:25:00am Sun</p>	<p>VIEW PROGRAM M-F 7</p>	<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
<p>1. Event Schedule 2. Special Dates</p>	<p>TUE 2</p>	<p>Press '2' to choose "Special Dates".</p>

<p>End of Dates 1=Add New;0=EXIT</p>		<p>If there are currently no dates programmed, press '1' to add a new date.</p>
<p>Special Date: 05/19/2007 1day></p>		<p>Or</p> <p>If there were existing dates, the first will be displayed. To add a new date, press PROG to enter the Add/Edit menu,</p>
<p>Enter Password</p>		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
<p>1. Rename 2. Edit 3. New 4. Delete</p>		<p>Now, choose '3. New' by pressing the numeric keypad.</p>
<p>Enter Date: _/_/--/----</p>	 	<p>Use the Numeric Keypad to enter the desired date in Month/Day/Year format.</p>
<p>1= Only One Day 2= Permanent</p>		<p>Then press ENTER.</p> <p>Choose between a "One Day" or "Permanent" schedule change using the numeric keypad.</p>
<p>01-Schedule 01 Enable <=D >=E</p>	 	<p>Choose the desired status of Schedule 01 on that date. Use the LEFT or RIGHT arrows to choose "Disable" or "Enable" respectively.</p>
<p>02-Schedule 02 Enable <=D >=E</p>		<p>Press the DOWN arrow to advance to the next schedule. Continue choosing the status of each schedule using the arrow keys.</p>
<p>20-Schedule 20 Disable <=D >=E</p>		<p>Press ENTER after all of the schedule statuses (20) have been selected.</p>









Modifying Existing Dates

Existing dates can be edited or deleted and new dates added following these steps:

		<p>From the normal time/date display, press the blue area of the VIEW PROGRAM button to enter the Menu.</p>
		<p>Press '2' to choose Special Dates.</p>
		<p>The first programmed date will be displayed.</p> <p>Pressing the RIGHT arrow will display the schedule settings for that date.</p> <p>Press the DOWN to display the next date.</p>
		<p>When the event you want to edit is displayed, Press the blue area of the PROG button.</p>
		<p>If passwords are enabled, enter the User or Tech level password using the numeric keypad.</p>
		<p>Choose "1. Rename" to create a name for this date. (only available with the WeCan interface)</p> <p>Choose "2. Edit" to modify the date or schedule settings.</p> <p>Choose "3. New" to add an additional date. See "Adding a New Special Date" above.</p> <p>Choose "4. Delete" to delete only the date that was being displayed when the PROG button was pressed.</p>

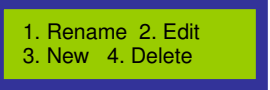

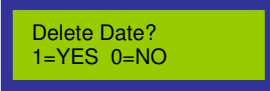

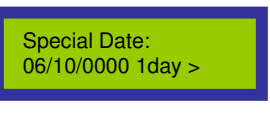


Editing an Existing Special Date

Navigate to the Edit Menu as described above choosing the date to be modified.

<p>1. Rename 2. Edit 3. New 4. Delete</p>		<p>Choose "2. Edit" to modify the previously displayed date.</p>
<p>Special Date: 05/19/0000</p>	 	<p>The date of the selected entry is displayed.</p> <p>If the date requires a change, type in the new date with the numeric keypad.</p> <p>When the date reflects the desired changes, Press ENTER to advance to the next screen.</p>
<p>1= Only One Day 2= Permanent</p>		<p>Choose between a "One Day" or "Permanent" schedule change using the numeric keypad.</p>
<p>01-Schedule 01 Enable <=D >=E</p>	 	<p>Choose the desired status of Schedule 01 on that date. Use the LEFT or RIGHT arrows to choose "Disable" or "Enable" respectively.</p>
<p>02-Schedule 02 Enable <=D >=E</p>		<p>Press the DOWN arrow to advance to the next schedule. Continue choosing the status of each schedule using the arrow keys.</p>
<p>20-Schedule 20 Disable <=D >=E</p>		<p>Press ENTER after all of the schedule statuses (20) have been selected.</p>

Delete an Existing Special Date

Navigate to the Edit Menu as described above choosing the Date to be deleted.

		Choose "4. Delete" to delete the previously displayed date.
		Confirm the date deletion by pressing '1'.
	 	The next date will be displayed. Continue viewing the Special Dates by pressing the DOWN arrow or EXIT to go back.

Delete All Special Dates

All of the Special Dates can be cleared by following the steps shown in the **Setup - Clr** section of this manual.

Appendix A - Time Zones

When using the NIST time bases such as a LAN time server, NIST website, or a GPS antenna, the MC100 uses the Universal Coordinated Time (UTC) standard (formerly known as Greenwich Mean Time). To acquire the local time in your area, this time must be adjusted based upon the time zone. The time zone number is set through the MC100 SETUP-Clk Menu.

Zone Number	Description
00	UTC (Universal Coordinated Time)
01	UTC -1:00
02	UTC -2:00
03	UTC -3:00
04	UTC -4:00
05	UTC -5:00 (U.S. Eastern Time)
06	UTC -6:00 (U.S. Central Time)
07	UTC -7:00 (U.S. Mountain Time)
08	UTC -8:00 (U.S. Pacific Time)
09	UTC -9:00 (Alaska)
10	UTC -10:00 (Hawaii)
11	UTC -11:00
12	UTC -12:00
13	UTC +1:00
14	UTC +2:00
15	UTC +3:00
16	UTC +4:00
17	UTC +5:00
18	UTC +6:00
19	UTC +7:00
20	UTC +8:00
21	UTC +9:00
22	UTC +10:00
23	UTC +11:00
24	UTC +12:00
25	UTC +13:00
26	UTC -3:30 (Newfoundland)

Appendix B - Clock Types

	Voltage	Type Code	Wiring Fig.
Secondary Clock Type			
National Time RD2WS, D/DX Digital	120	02	1
National Time RD2WS, D/ DX Digital	24	02	2
National Time EX (SRAX) Synch. (-HH)	120	03	3
National Time EX (SRAX) Synch. (-LL)	24	03	4
Combination EX and RD2WS, D/DX	120	02	6
Combination EX and RD2WS, D/DX	24	02	8
National Time SRA hourly Synch. (-HH)	120	06	3
National Time SRA hourly Synch.(-LL)	24	06	4
Combination SRA and RD2WS, D/DX	120	12	6
Combination SRA and RD2WS, D/DX	24	12	8
National Time D64 and D64 Digital	24	9	17
National Time D2, D2M, D4, D4M	120	11	1
National Time D2, D2M, D4, D4M	24	11	2
National Time RD2WI Rotary Drive Impulse	24	10	13
National Time 2MR	120	04	11
National Time 3MR,HMR,4MR etc.	120	04	12
National Time 120V Resetting Minute Impulse (3MIR, HMIR, 4MIR, 7MIR etc.)	120		
Simplex 2310-92XX,57, 77,93-9,91-9,941-9,943-9 Series	120	07	3
IBM 57,62,67,77,82 and 87 Series	120	07	3
Cincinnati D10 and D12	120	07	3
Lathem SS12 Types	120	07	3
Edwards 010 Synchronous, 2400 Series	120	07	3
Rauland 2460 Series	120	03	3
Rauland 2460 Series Low Voltage	24	03	4
Dukane 24030, 24023, 24050, 24060,24010	120	03	3
Dukane 24030, 24023, 24050, 24060,24010 Lv	24	03	4
Honeywell St402,403,404,410-413,802-804,810-813	120	08	3
Faraday 1310,1311,1320,1321	120	08	3
Cincinnati D8	120	08	3
Standard/Faraday New Types 2310, 2331	120	08	3
Standard Electric Time 2370, 2380 Series	120	07	3
ATS CC2000 Series Digital System Clocks	120	07	3
Stromberg 3000	120	07	3
American A4015D10	120	07	3
Combine National RDS/D/DX with any conventional synchronous on same wires. Ckt2 as type 02, Ckt1 as 07,08 etc.	120	02,xx	9

Combine National RDS/D/DX with any conventional synchronous on same wires. Ckt2 as type 02, Ckt1 as 07,08 etc.	24	02,xx	10
Cincinnati D3 2-wire hourly minute impulse	24	17	13
Latham Type ISC Recorders (2-wire)	24	17	13
Simplex 8042	24	17	13
Cincinnati D2, D4 3-wire hourly minute impulse	24	17	15
Latham Type ISC Recorders (3-wire)	24	17	15
Edwards 3-wire Impulse	24	17	15
Faraday 3-wire hourly impulse	24	17	15
IBM 75 Series	24	17	15
Simplex 75 Series	24	17	15
Simplex 6310 Series	24	17	*
Stromberg 3-wire impulse	24	17	15
Standard 3-wire impulse	24	17	15
Cincinnati D6 2-wire 12-hour minute impulse	24	18	13
Standard Electric Time AR2 minute impulse	24/48	14	16
Standard Electric Time AR2A minute impulse	24/48	15	16
Standard Electric Time AR3 minute impulse	24	14	15
Bipolar Minute Impulse	24	19	13
Franklin Mark 5M Series	24	19	13
ATS SC5A Series	24	19	13
Generic Digital Clock	120	09	1,2

*See MC100 wiring diagram (shipped separately)

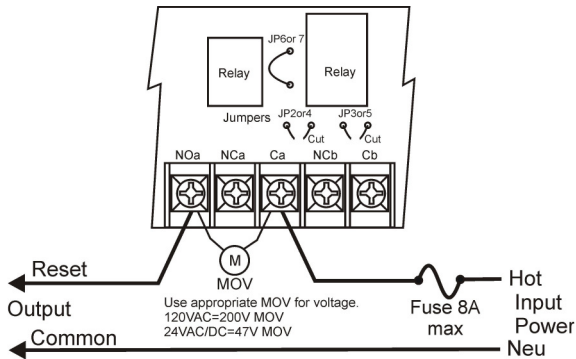
Appendix C - Circuit Types

00-Disabled

When selected as disabled, the output will be OFF and no automatic resets or scheduled events will be transmitted.

01-Auxiliary

Used when it is desired to activate bells, chimes, tones etc. at scheduled times.



Manual Control of Auxiliary Circuits

Any circuit programmed for auxiliary control can be activated by sliding the manual control switch to the ON/RESET position. The switch is spring-loaded and the circuit will activate for as long as the switch is held.

02-On Demand Instant Reset Clocks (NTS:D/DX/RDS)

This selection will control National Time's Rotary Drive analog clocks (RD2WS/RD3WS Series) as well as National Time's D/DX/DU Series digital clocks (See NATSCO DIG for RDS and digitals manufactured prior to May 2004). Power to the clocks and time data share the same wires and provide instant resets to the exact time of day. The time data will not affect existing clocks so that it may double as the RUN power for existing synchronous clocks sharing the same wires.

Operation:

The 'RUN' relay is used to power the clocks and transmits Instant Reset time data upon power-up, during daylight savings correction and each 12:00am.

The 'RESET' relay will output the NATSCO SRAX reset pulses. This output is only used if National's EX Series clocks (3-wire) share the same circuit wires. EX Series clocks will correct their minutes each hour. Each 6:00, the clocks will correct their minutes and hours.

Resetting Clocks

The On-Demand Instant Reset time data is automatically transmitted following power outages, daylight savings adjustments, and each midnight. If it is desirable to transmit the time data at other times or to turn off power to the circuit, the Circuit Control Switch may be used.

During initial setup, the switch is normally configured for **Actual Time** using the SETUP-Rst menu. Refer to the Setup Menu section of this document.



If the circuit switch is configured for:

Actual Time - Momentarily sliding the switch to the RESET position will output On-Demand Instant Reset time data on the RUN relay. All RDS or D/DX/DU Digital clocks will adjust to the actual time. (EX Series clocks sharing the circuit will be unaffected.)

Hour - Momentarily sliding the switch to the RESET position will advance the EX Series clocks to the next hour. Wait at least 5 minutes before outputting a second hour reset. (2-wire RDS and Digital clocks will be unaffected.)

12Hour - Momentarily sliding the switch to the RESET position will advance all EX Series clocks to within the 6:00 hour. (2-wire RDS and Digital clocks will be unaffected.)

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

03-National EX Series Synchronous (NATSCO SRAX)

This selection will control the National EX Series (SRAX) synchronous clocks (hour and 12 hour resets).

Operation:

The power for the clock circuit is controlled by the RUN relay. A drift compensation OFF pulse of 1 second is output each 59th minute. This will prevent clocks from drifting ahead of the master clock which could cause them to advance 12 hours to correct to the proper time.

Resetting Clocks

The preferred reset switch setting is **Hour** and should be set during initial installation using the SETUP-Rst Menu.



If the circuit switch is configured for:

Hour - Momentarily sliding the switch to the RESET position will output an hour reset for EX Series clocks advancing them to the next hour.

12Hour - Momentarily sliding the switch to the RESET position will output a 12 hour reset pulse for EX Series clocks advancing them to within the 6:00 hour.

Sliding the switch to **OFF** will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

04-National Outdoor Clocks (NATSCO x10)

This selection will control the National outdoor clock series such as 2MR, 3MR, HMR, 4MR etc. as well as Dual Motor (-DM) series clocks. These clocks have a 10 times speed correction that is controlled either by a second motor or a reversible motor transmission.

Operation:

One clock is controlled by each circuit of the MC100. This allows individual correction of each clock in the fast forward direction. Clock Circuit 1, however, will control the RUN power to all of the clocks. If Circuit 1 is turned off, **all** of the clocks will stop.

After any power outages or daylight savings correction, the MC100 will calculate the required amount to correct the clocks and advance them at 10 times rate until the actual time is reached.

Resetting National x10 Clocks

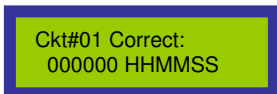
The reset switch setting must be set up for **Actual Time** using the SETUP-Rst menu for all x10 circuits.

To advance one or more clocks:



Slide the desired circuit switch to the RESET position and release.

The correction menu should activate on the LCD display:



Enter the desired amount to correct the clock of that circuit in hours, minutes, seconds. For example, to advance 2 hours and 10 minutes, enter 021000.

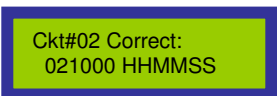
Then press ENTER.

The clock for that circuit will begin to advance at 10 times speed and will switch to normal speed when the time is reached.

A second clock can be reset (even if clock 1 is currently resetting) by sliding its corresponding circuit switch to the RESET position and release.



The correction menu will display on the LCD for that circuit number:



Enter the desired correction amount for the clock on circuit 2.

Then press ENTER .

Repeat for any additional clocks.

To Slow Down one or more clocks:

Since all of the clocks are controlled by the same RUN relay (circuit 1), clocks cannot be turned off individually. The errant clock(s) must either be corrected forwardly as described above, or all of the clocks can be turned off until they are all equal to or behind actual time. The now slow clocks can be advanced to the correct time as described above.

Example: Clock 2 is 10 minutes fast while clocks 1 and 3 are on time.

Stop all of the clocks by sliding the circuit 1 control switch to OFF for 10 minutes.

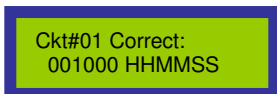


After this 10 minutes, slide the circuit 1 control switch back to the AUTO position.

Now, clock 2 should be on time while clocks 1 and 3 are 10 minutes slow.

Advance clock 1 ten minutes by sliding the circuit 1 slide switch to the RESET position and release.

The correction menu will display on the LCD display:



Enter 10 minutes by typing 001000 on the keypad.

Then press ENTER.

Advance clock 3 ten minutes by sliding the circuit 3 slide switch to the RESET position and release.

The correction menu will display on the LCD display.

Enter 10 minutes by typing 001000 on the keypad.

Then press ENTER.

Clocks 1 and 3 will advance to the correct time.

05-National 120V Minute Impulse Resettable (NATSCO MIR)

This selection will control the National Time 120V large interior/exterior minute impulse clocks such as 3MIR, HMIR, 4MIR etc. One circuit can control up to 8 Amps of clocks. Each clock will automatically adjust itself to the correct time through hourly and 12-hour reset sequences.

06-National Hourly Synchronous (NATSCO SRA)

This selection will control the National SRA Series synchronous clocks without 12 hour reset capability. This should also be used if there is a mixture of SRA and SRAX clocks sharing a circuit.

Operation:

The power for the clock circuit is controlled by the RUN relay. A drift compensation OFF pulse of 1 second is output each 59th minute. This will prevent clocks from drifting ahead of the master clock which could cause them to advance 12 hours to correct to the proper time.

Daylight savings in the fall will remove power for one hour and one extra hour reset will be added in the spring.

Resetting Clocks

The preferred reset switch setting is **Hour** and should be set during initial installation using the SETUP-Rst Menu.



If the circuit switch is configured for:

Hour - Momentarily sliding the switch to the RESET position will output an hour reset for SRA Series clocks advancing them to the next hour. Wait for approximately 5 minutes before advancing them a second time.

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

07- Simplex Synchronous (SIMPLEX Syn)

This selection will control synchronous clocks common to Simplex and other manufacturers. Refer to Appendix B for specific models. The circuit programmed as this type will output the reset sequences required for the clocks. The RUN power can either be wired to this circuit's RUN relay, or share the power/data RUN output of an On-Demand Instant Reset clock circuit and share the same wiring. Refer to the wiring diagram section for details.

Operation:

The RUN relay is used to power the clock circuit. The RESET relay will output reset pulses.

Manual Control

The preferred reset switch setting is **Hour** and should be set during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Hour - Momentarily sliding the switch to the RESET position will output an hour reset advancing the clocks to the 58th minute.

12Hour - Momentarily sliding the switch to the RESET position will output a 12 hour reset pulse advancing the clocks to 5:58.

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

08- Faraday/Cincinnati Synchronous (CINCINTI D8)

This selection will control synchronous clocks common to other manufacturers. Refer to Appendix B for specific models.

Operation:

The RUN relay is used to power the clock circuit. The RESET relay will output reset pulses.

Manual Control

The reset switch setting should be set to **Hour** during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Hour - Momentarily sliding the switch to the RESET position will output an hour reset.

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

09- Digital Clocks (NATSCO D62/4)

This selection will control older National D62 and D64 digital clocks as well as some digital clocks common to other manufacturers. Refer to Appendix B for specific models.

For National Time D/DX/DU Series digital clocks, refer to On-Demand Instant Reset Clocks.

Operation:

Each 12:00 midnight, the RESET relay is activated for 2 seconds.

For four wire clocks, the RUN relay can be used to control the power while the RESET normally open contact is used for the reset.

For two wire clocks, the run power can be wired through the RESET normally closed contacts which will remove power to the clocks each 12:00.

Manual Control

If the circuit switch is configured for:

12 Hour - Momentarily sliding the switch to the RESET position will output a 12 hour reset. (2 second pulse on the RESET relay.)

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

10- Rotary Drive Impulse (NATSCO RDI)

This selection will control National Time's Rotary Drive Impulse clocks (RD2WI). These clocks require a 24VDC power supply. Proper configuration of the Relay Board jumpers is required to create a reverse polarity clock circuit combining both the RUN and RESET contacts of the circuit. Refer to wiring diagrams for details.

Operation:

A combination of the RUN and RESET relay contacts will output the appropriate polarity pulses each minute. Clocks will automatically reset each hour to the appropriate minute, and each 12 hours to the appropriate hour and minute. Following power outages and daylight savings

adjustments, the MC100 will output time-data advancing the clocks to the exact time of day.

Manual Control

The preferred reset switch setting is **Actual Time** and should be set during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Actual Time - Time data is transmitted to the clocks and power held for 25 seconds. Clocks will advance to the exact time of day.

Hour - Momentarily sliding the switch to the RESET position will output an hour reset. Clocks will advance to the 59th minute.

12Hour - Momentarily sliding the switch to the RESET position will output a 12 hour reset pulse. Clocks will advance to 5:02.

Sliding the switch to OFF will inhibit all pulses.

11-National Time Digital (historical) (NATSCO DIG)

This selection will control National Time's D2, D4, D2M and D4M digital clocks as well as RDS analog and D/DX/DU Digital series manufactured prior to May 2004. Power to the clocks and time data share the same wires and provide instant resets to the exact time of day. This circuit is normally powered so that it may double as the RUN power for existing synchronous clocks and share the same wires.

Operation:

The 'RUN' relay is used to power the clocks and transmits Instant Reset time data upon power-up, during daylight savings correction. Power is removed for 5 seconds each 11:59:55pm.

The 'RESET' relay will output the NATSCO SRAX reset pulses. This output is only used if National's EX Series clocks (3-wire) share the same circuit wires.

Resetting Clocks

The On-Demand Instant Reset time data is automatically transmitted following power outages, daylight savings adjustments, and each midnight. If it is desirable to transmit the time data at other times or to turn off power to the circuit, the Circuit Control Switch may be used.

During initial setup, the switch should be configured for **Actual Time** using the SETUP-Rst menu. Refer to the Setup Menu section of this document.

If the circuit switch is configured for:

Actual Time - Momentarily sliding the switch to the RESET position will output On-Demand Instant Reset time data on the RUN relay. All Digital clocks will adjust to the actual time. (EX Series clocks sharing the circuit will be unaffected.)

Hour - Momentarily sliding the switch to the RESET position will output an hour reset for EX Series clocks if they share the same circuit. (2-wire RDS and Digital clocks will be unaffected.)

12Hour - Momentarily sliding the switch to the RESET position will output a 12 hour reset pulse for EX Series clocks if they share the same circuit. (2-wire RDS and Digital clocks will be unaffected.)

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

12- On-Demand Instant Reset and SRA (NTS:SRA/OD)

This selection will control National's Rotary Drive analog clocks (RD2WS/RD3WS Series) as well as National's D/DX/DU Series digital clocks combined with National Time SRA hourly reset synchronous clocks. Power to the clocks and time data share the same wires and provide instant resets to the exact time of day. The time data will not affect existing clocks so that it may double as the RUN power for existing synchronous clocks sharing the same wires.

Operation:

The 'RUN' relay is used to power the clocks and transmits Instant Reset time data upon power-up, during daylight savings correction and each 12:00am.

The 'RESET' relay will output the NATSCO SRA reset pulses. This output is only used if National's SRA Series clocks (3-wire, hourly reset only) share the same circuit wires.

Resetting Clocks

The On-Demand Instant Reset time data is automatically transmitted following power outages, daylight savings adjustments, and each midnight. If it is desirable to transmit the time data at other times or to turn off power to the circuit, the Circuit Control Switch may be used.

During initial setup, the switch is typically setup as **Hour** using the SETUP-Rst menu. Refer to the Setup Menu section of this document. This provides for easy correction of the existing SRA clocks which are only capable of hour resets. If it is desired to reset the On-Demand Instant reset clocks, the switch can be changed in the SETUP-Rst menu, or a second circuit could be used for the RUN relay and wired/labeled accordingly.

If the circuit switch is configured for:

Actual Time - Momentarily sliding the switch to the RESET position will output On-Demand Instant Reset time data on the RUN relay. All RDS or D/DX/DU Digital clocks will adjust to the actual time. (SRA Series clocks sharing the circuit will be unaffected.)

Hour - Momentarily sliding the switch to the RESET position will output an hour reset for SRA Series clocks if they share the same circuit. Clocks will advance to the next hour. Wait 5 minutes before resetting a second time. (2-wire RDS and Digital clock will be unaffected.)

12Hour - none

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

13- Generic Impulse (Generic Imp)

This selection can be used to control impulse clocks that do not have, or require, resets.

Operation:

The 'RESET' relay will pulse each minute for one second. After power outages, the missed pulses will be added at a rate of one second on, one second off (subtracting multiples of 12 hours). Daylight savings will advance one hour at the fast rate or turn off for an hour.

Resetting Clocks

During initial setup, the switch should be configured for **Min** using the SETUP-Rst menu. Refer to the Setup Menu section of this document.

If the circuit switch is configured for:

Min - The reset relay will activate for one second each activation.

Sliding the switch to OFF will inhibit any RESET relay activation.

14-Standard Electric Time AR2 Impulse (STANDRD AR2)

This selection will control Standard Electric Time minute impulse clocks of the type AR2. These clocks are 2-wire dual voltage clocks. This same correction can be used for AR3 which is a 3-wire 24V clock simply by using the appropriate wiring diagram.

Operation:

The RUN and RESET relays work in conjunction to create the dual voltage output when wired per the wiring diagram and with proper jumper settings.

Resetting Clocks

The clocks will be corrected after power outages and daylight savings adjustments by either sending out rapid pulses or inhibiting pulses. During initial setup, the switch should be configured for **Min** using the SETUP-Rst menu. Refer to the Setup Menu section of this document.

If the circuit switch is configured for:

Min - Momentarily sliding the switch to the RESET position will advance clocks one minute.

Sliding the switch to OFF will inhibit any minute or reset pulses.

15-Standard Electric Time AR2A Impulse (STANDRD AR2A)

This selection will control Standard Electric Time minute impulse clocks of the type AR2A. These clocks are 2-wire dual voltage clocks.

Operation:

The RUN and RESET relays work in conjunction to create the dual voltage output when wired per the wiring diagram and with proper jumper settings.

Resetting Clocks

The clocks will be corrected after power outages and daylight savings adjustments by either sending out rapid pulses or inhibiting pulses. During initial setup, the switch should be configured for **Min** using the SETUP-Rst menu. Refer to the Setup Menu section of this document.

If the circuit switch is configured for:

Min - Momentarily sliding the switch to the RESET position will advance the clocks one minute.

Sliding the switch to OFF will inhibit any minute or reset pulses.

16-Standard Electric Time Synchronous (STANDRD Syn)

This selection will control Standard Electric Time synchronous clocks.

Operation:

The RUN relay is used to power the clock circuit. The RUN relay will be deactivated and the RESET relay will activate during hour resets. The RESET relay will activate during 12 hour resets.

Manual Control

The reset switch setting should be set to **Hour** during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Hour - Momentarily sliding the switch to the RESET position will advance the clocks to the next hour.

Sliding the switch to OFF will deactivate the RUN relay, removing power from the clocks and inhibit any resets activating either relay.

17- Cincinnati Impulse and Other's (CINCINTI D3)

This selection will control Cincinnati impulse clocks with only hourly reset capability. National Time Rotary Drive Impulse (RD2WI) can also share the same circuit and simulate the D3 operation.

Operation:

The RUN and RESET relays work in conjunction to create the reverse polarity pulses required. (Verify relay board jumpers prior to power-up.) Three wire versions can use this same setting by following the appropriate wiring diagrams and jumper settings. Clocks are automatically corrected following power failures and daylight savings adjustments. Every hour, clocks will be corrected for missed minutes.

Manual Control

The reset switch setting is 'Min' and should be set during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Min - Clocks will advance one minute regardless of hand position.

Sliding the switch to OFF will inhibit all pulses.

18- Cincinnati Impulse and Other's (CINCINTI D6)

This selection will control Cincinnati impulse clocks with hourly and 12-hour reset capability. National Time Rotary Drive Impulse (RD2WI) can also share the same circuit and simulate the D6 operation.

Operation:

The RUN and RESET relays work in conjunction to create the reverse polarity pulses required. (Verify relay board jumpers prior to power-up.) Three wire versions can use this same setting by following the appropriate wiring diagrams and jumper settings. Clocks are automatically corrected following power failures and daylight savings adjustments. Every hour, clocks will be corrected for missed minutes. Twice a day at 6:00, clocks will be corrected for minutes and hours.

Manual Control

The reset switch setting is **Min** and should be set during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

Min - Clocks will advance one minute regardless of hand position.

Sliding the switch to OFF will inhibit all pulses.

19- Bipolar Minute Impulse (Bipolar Imp)

This selection will control 2-wire reverse polarity impulse clocks. The polarity of the pulse is reversed each minute pulse.

Operation:

The RUN and RESET relays work in conjunction to create the reverse polarity pulses required. (Verify relay board jumpers prior to power-up.) Clocks are automatically corrected following power failures and daylight savings adjustments.

Manual Control

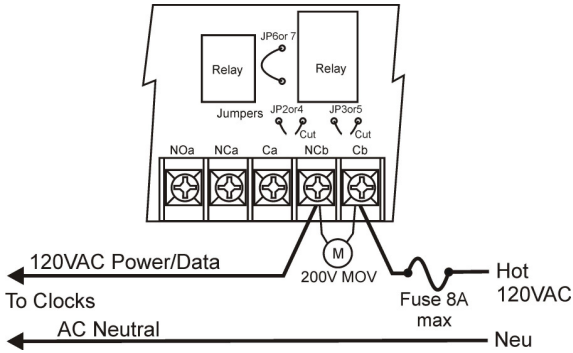
The recommended reset switch setting is **Actual Time** and should be set during initial installation using the SETUP-Rst Menu.

If the circuit switch is configured for:

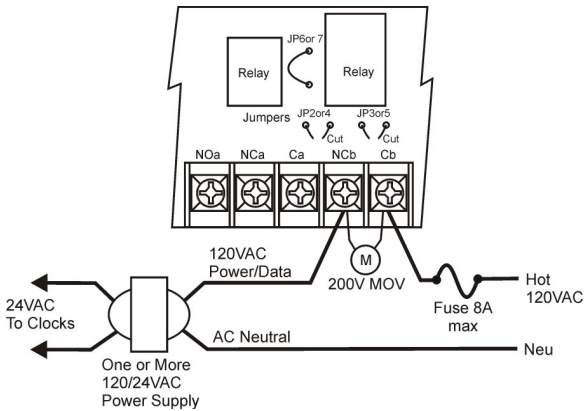
Actual Time - Slide the manual circuit control switch to RESET. The screen will prompt for entry of the position of the secondary clocks. Type in the time shown on the clocks using the numeric keypad and press ENTER. Clocks will advance to the correct time of day.

Sliding the switch to OFF will inhibit all pulses.

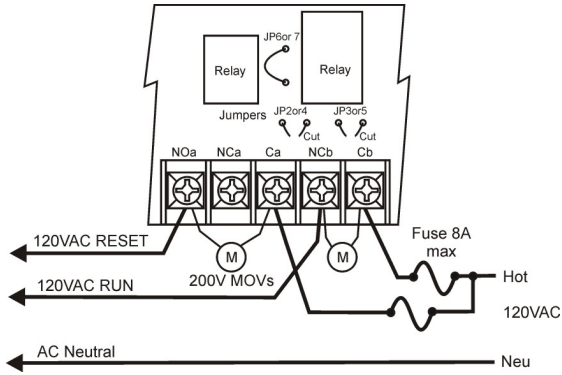
Appendix D - Wiring Diagrams



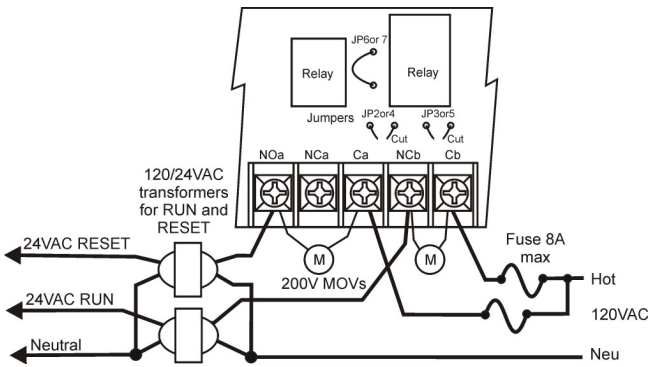
Wiring Figure 1: Two-wire clocks 120V
 (Clocks may require appropriate transformer for 120V operation)
 For Circuits 1,2,5,6,9 or 10.



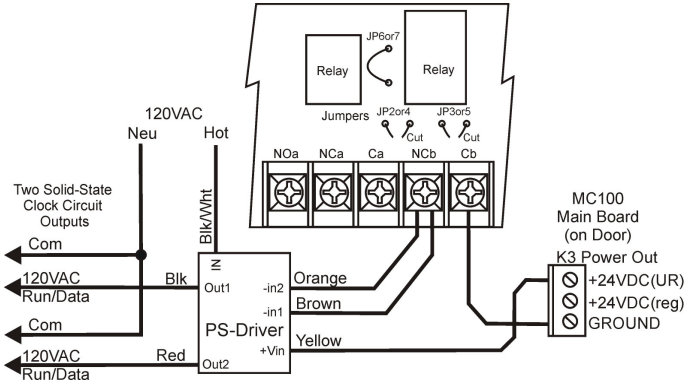
Wiring Figure 2: Circuit 1 two-wire clocks 24V
 Circuits 1,2,5,6,9 or 10.



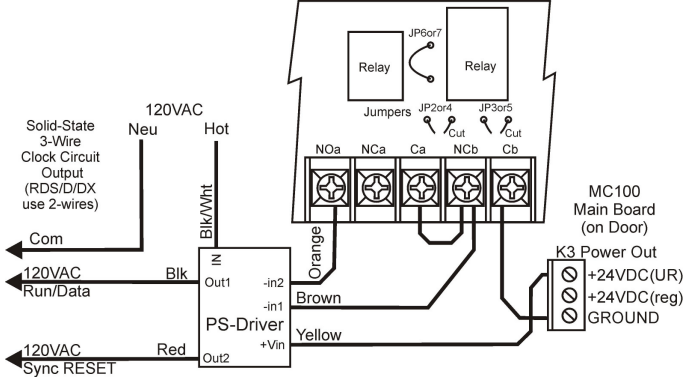
Wiring Figure 3: Three-wire synchronous clocks
Circuits 1,2,5,6,9 or 10.



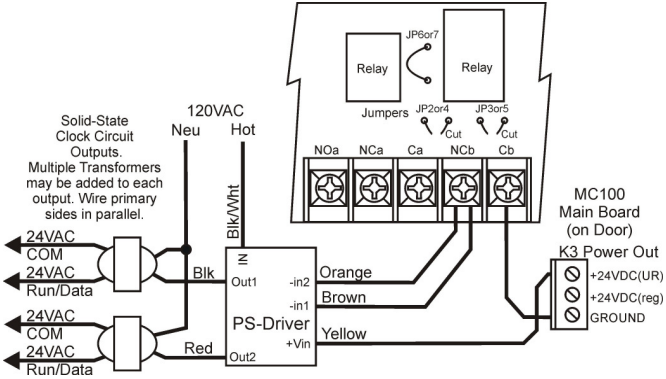
Wiring Figure 4: Three-wire synchronous clocks 24V
Circuits 1,2,5,6,9, or 10.



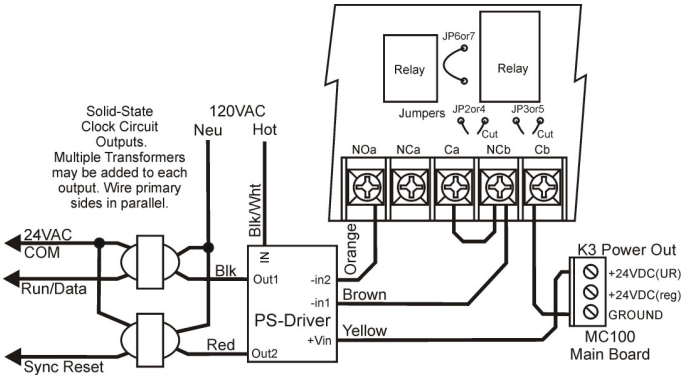
Wiring Figure 5: Two-wire Clocks 120V (Solid-State)
 PS-DRIVER (optional) creates 2 solid state outputs. Clocks may require appropriate 24VAC transformers.



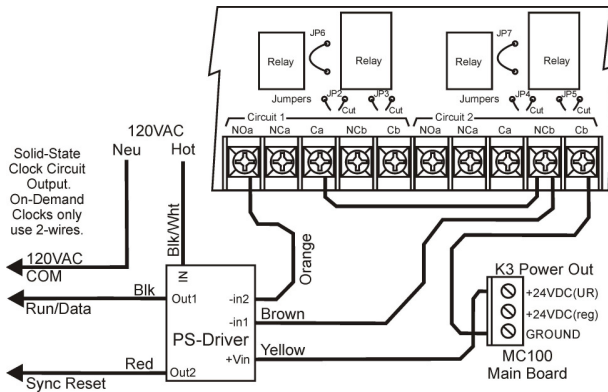
Wiring Figure 6: Combination NATSCO 3-wire Synchronous/ 2-wire On-Demand Instant Reset clocks 120VAC.
 National Time synchronous combined with National Time RDS/D/DX. Clocks may require appropriate 24VAC transformers.



Wiring Figure 7: Two-wire Clocks 24VAC (Solid-State)
 PS-DRIVER (optional) creates multiple 24VAC outputs. Add additional transformers (PS-3) up to limit of PS-DRIVER outputs.

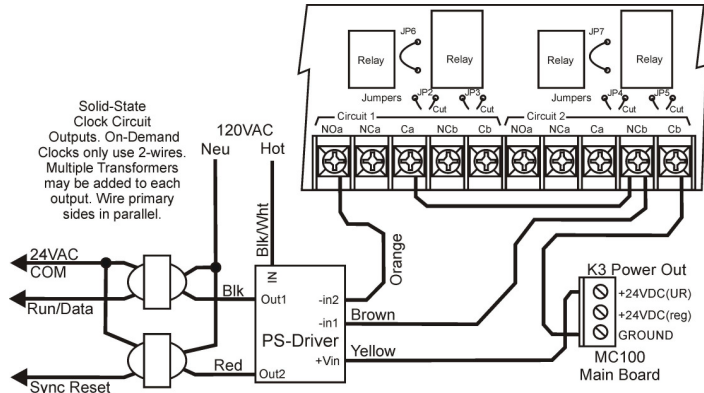


Wiring Figure 8: Combination NATSCO 3-wire Synchronous/ 2-wire On-Demand Instant Reset clocks 24VAC.
 National Time synchronous combined with National Time RDS/D/DX.



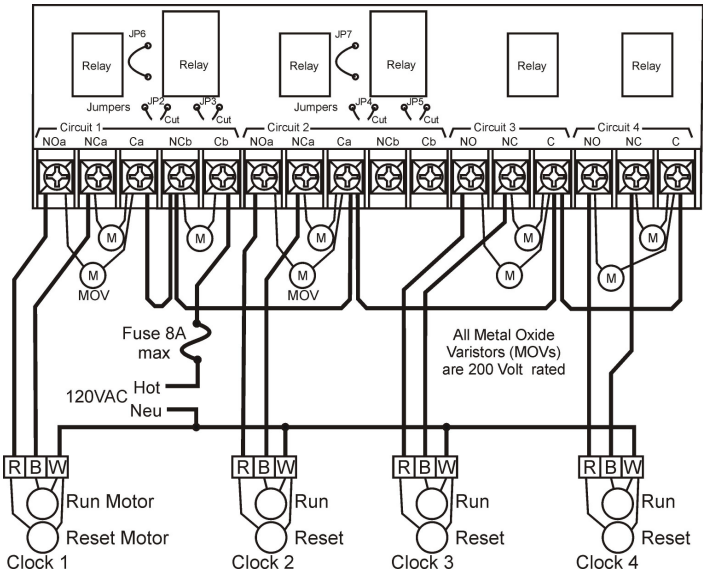
Wiring Figure 9: Combination 3-wire Synchronous/ 2-wire On-Demand Instant Reset Clocks 120VAC.

Two Circuits can combine to offer individual reset switches for each type of clock. As shown, circuit 1 will reset synchronous clocks while circuit 2 will reset On-Demand Clocks.

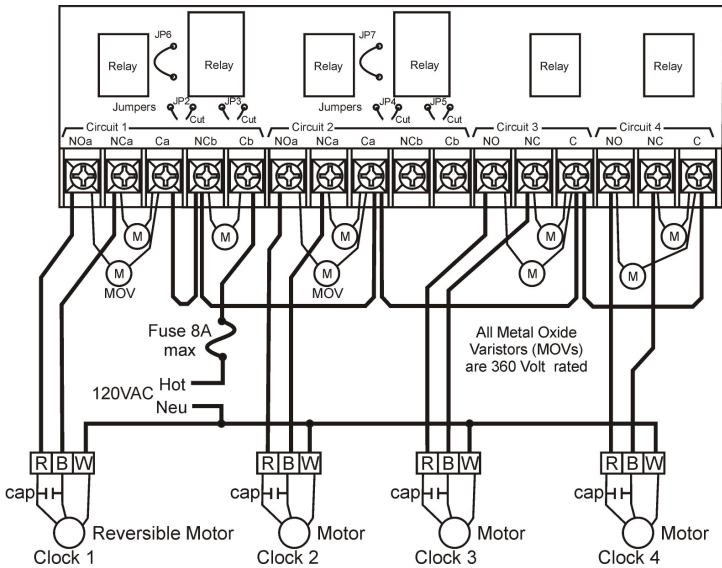


Wiring Figure 10: Combination 3-wire Synchronous/ 2-wire On-Demand Instant Reset Clocks 24VAC.

Two Circuits can combine to offer individual reset switches for each type of clock. As shown, circuit 1 will reset synchronous clocks while circuit 2 will reset On-Demand clocks.

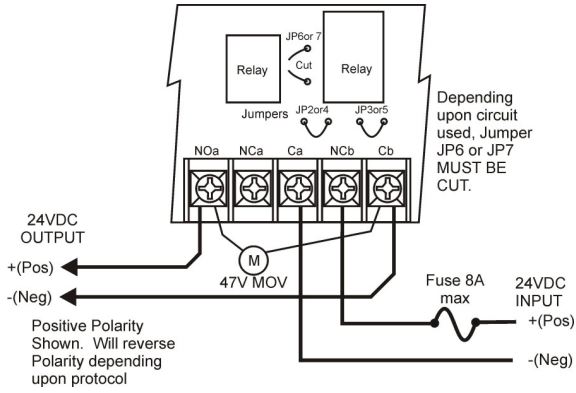


Wiring Figure 11: Outdoor Clocks Dual Motor Type (2MR)

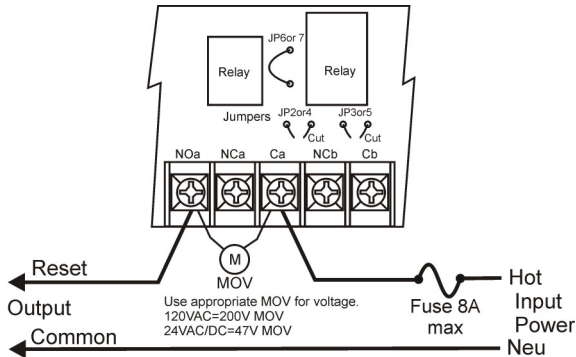


Wiring Figure 12: Outdoor Clocks Reversible Motor Type

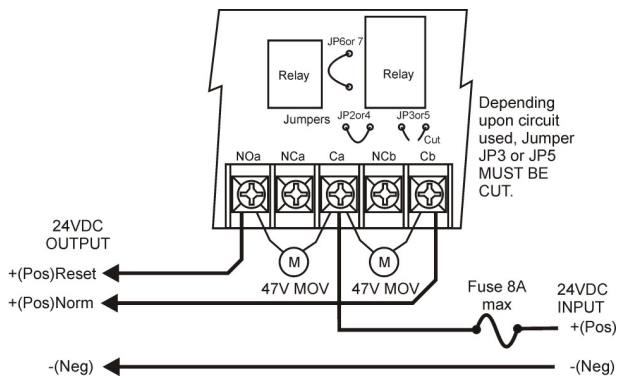
(3MR, HMR, 4MR etc.)



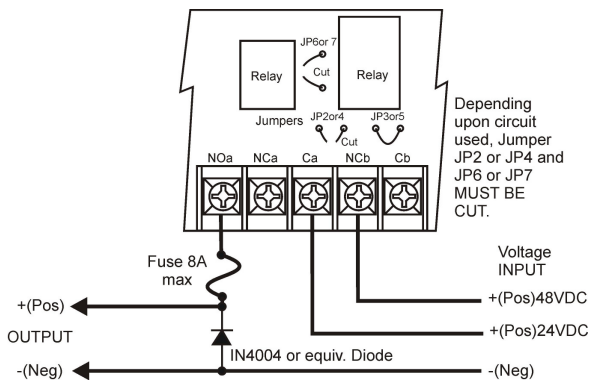
Wiring Figure 13: Reverse Polarity 24VDC Clocks.



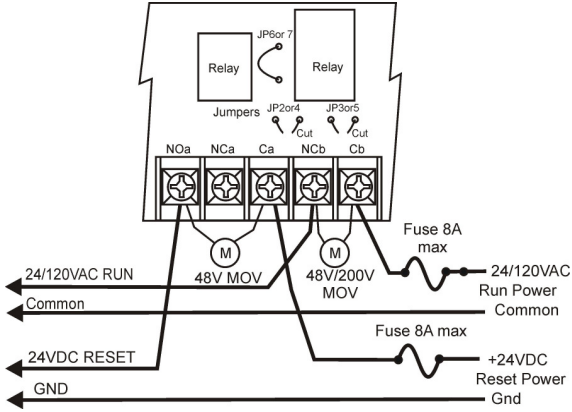
Wiring Figure 14: General wiring to Normally Open Reset output.
Can be used on any circuit number.



Wiring Figure 15: 3-wire minute impulse wiring.



Wiring Figure 16: Dual Voltage DC impulse Clocks.



Wiring Figure 17: Clocks with separate Run and Reset power sources.

Appendix E - Specifications

Primary Voltage:	120VAC @ 60Hz or 50Hz
Primary Current:	
No Load (no devices) =	150mA @ 120VAC/60Hz
Typical Load=	0.150A+Ckt Load @120VAC/60Hz
Circuit Outputs:	
Current Rating=	8A @ 120VAC.
Circuits 1&2=	One Form C, One Form A
Circuits 3&4=	One Form C
Serial Port 24VDC:	up to 100mA @ 24VDC Nominal
RS232 wiring distance:	
MC100-GPS=	30 Ft. (Standard)
MC100-GPS=	100 Ft. using shielded Low capacitance cable
LAN Connector:	RJ45 (with WeM-MC100)
Ambient Temp. Range:	32 to 95 Degrees Fahrenheit
Humidity:	85% Non-condensing max.
Mounting:	
Surface Mount=	12" x 12" x 4" Steel Box with hinged cover.
Flush Mount Kit=	Order 14" x 14" Trim (SF100)
Rack Mount=	5.25"H x 19"W x 10.5"D
Weather Proof=	7.25"H x 10"W x 4.5"D
Conduit Entry:	
Rack Mount=	No Conduit entry. All terminals accessible from back of enclosure.
Wall Mount=	2 Knockouts @ ½", top and bottom. 1 Knockout @ ½" center of back.
Weather Proof=	Combination Knockouts may be used on top, bottom, and right side only. Use weather proof fittings.