Midwest Time Control

TIMELESS RELIABILITY SINCE 1988

Master Time Clock

MTC-6000

Users Manual

Midwest Time Control

Phone (918)272-9430
Toll Free (888)713-0373
FAX (918)272-9441

www.midwest-time.com
sales@midwest-time.com

TABLE OF CONTENTS

Rev. 1.1

GENERAL DESCRIPTION

The MTC-6000 is a Micro-Processor based Master Time Clock. The unit will provide synchronization for a wide variety of industry standard secondary wall clocks, payroll recorders, time & date stamps, and other time keeping devices.

The output circuits may be individually programmed for control of bells, lights, heating and air conditioning, and other devices which can be scheduled for operation based on the time and day. Programing for these circuits may be TIME ON - TIME OFF or TIME ON - DURATION. Programing can be by individual day, 5 day (Mon.-Fri.), or 7 day.

The clock time base, in normal operation, is synchronized with the 60 Hz AC power line. During power failures, the time base is accurately maintained by a back up battery powered oscillator. The back up battery system uses a lithium energy cell with a design life of ten years. The battery maintains timing and circuit programing during a loss of primary power.

Holidays may be programmed 12 months in advance. The Holiday feature will inhibit the automatic operation of the Output Circuits during a programmed holiday.

Automatic daylight savings time changes. (May be turned off)

Automatic updating of Impulse secondary clocks after a power failure. The MTC-6000 records the time of power failure and the current time. When power is restored, correction pulses are sent to the clocks.

All operator programing functions are easily performed from the front panel. A security access code prevents unauthorized programing changes.

INSTALLATION

1. As you unpack the clock, check for shipping damage to the carton or clock. Report any damage to the carrier.

2. The MTC-6000 is designed for mounting in a standard 19 inch rack.

3. The clock must be installed in accordance with all local wiring codes. The chassis ground connection must be connected to a good earth ground circuit. The terminal strip provided for external wiring connections is a pressure plate type, the terminals are rated for clamping two 12 ga. wires.

4. Synchronous Wired Secondary Clocks: A typical connection for 120 VAC or 24 VAC synchronous wired clocks is shown at Figure 2.

5. Impulse Secondary Clocks: Figures 5 & 6 show typical connections.

6. Before applying power to the Master Clock, assure that all wire runs to and from the output circuits and clock correction circuits are not shorted or grounded.
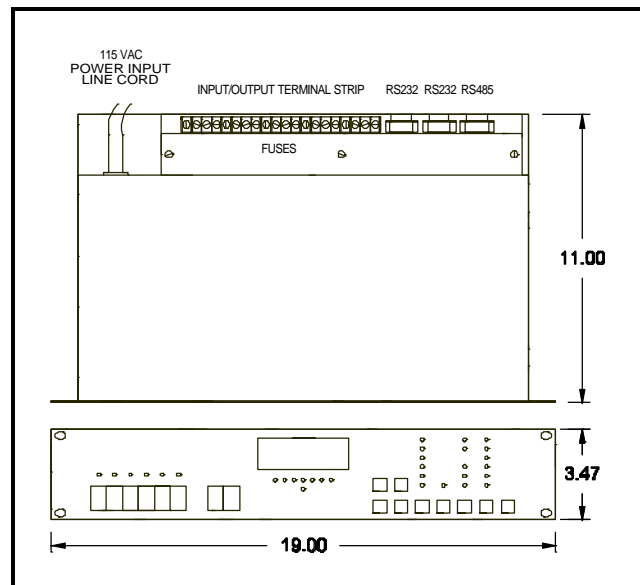
FRONT PANEL CONTROLS

1. The **ENTER** button is used to enter selected data into the memory. This button is active in the program mode.

2. The **CANCEL** button is used in the review mode to cancel programmed times and dates that are no longer needed. It is also used to exit the program mode and return the clock to normal operation.

3. The **AHEAD** and **BACK** buttons are used to increment the display to the time or date to be programmed. They are also used in the Review mode to observe multiple programmed times for the output circuits and multiple holidays. These buttons are active in the program mode.

4. The **MODE** button is used to select the functions to be programmed or reviewed. An illuminated indicator will show the selected mode. Each time the MODE button is pressed, the next indicator in sequence will be illuminated. The Time Set function allows the setting of current time, day, month, date and year. The Holiday function allows setting of holiday dates. The Duration, On and Off modes are used to program the output circuits. The Erase mode is used to bulk erase all programmed memory times and dates except the current time and date. The MODE button is active in the program mode.

5. The **REVIEW** button is used in conjunction with the MODE button to check the programmed times and dates. The review button is a push ON push OFF control, it must be turned OFF to advance the MODE function. It is active in the program mode.

6. The **SELECT** button is used with the mode function to program the month, date and year in the Time Set mode, and the beginning and ending month and date in the Holiday mode. The SELECT button is also used in the review mode to observe the beginning and ending dates of holidays. This button is active in the program mode.

7. The **CIRCUIT** button is used in the Duration, On and Off modes to select the output circuit to be programmed. It is active in the Duration, On and Off modes.

8. The **DAY** button is used in the On and Off modes to select the appropriate day or days for programing the output circuits. It is used in the Time Set mode to set the current day of the week.

9. The **IMPULSE SECONDARY CORRECTION** switch is used as an aid for initial synchronization of secondary impulse clocks. Placing the switch in the RAPID position causes the clocks to advance to the 58th or 59th minute at a rate of 30 steps per minute. Returning the switch to the OFF position returns control of the secondary clock to the Master. Placing the switch in the HR/MIN position causes the clocks to advance at the rate of 30 steps per minute until the switch is returned to the OFF position. This switch is active in the program Time Set mode. This switch must be in the OFF (center) position except while advancing the Impulse Secondary Clocks.

10. The **WIRED SYNC SECONDARY CORRECTION** switch is used as an aid for initial synchronization of secondary wired synchronous clocks. Placing the switch in the HOUR position sends one hourly correction signal to the secondary clocks. Placing the switch to the 12 HOUR position sends one 12 hour correction signal to the secondary clocks. Move the switch to OFF to return secondary clock control to the master. This switch is active in the program Time Set mode. This switch must be in the OFF (center) position except while advancing the Wired Synchronous secondary clocks.

11. The **CIRCUIT CONTROL** switches are provided for manual control of the output circuits. The OFF position turns the output circuit OFF regardless of the programing. The AUTO position

places that output circuit under control of the program. The ON position places that output circuit ON regardless of the programing.

PROGRAMING

1.   SET UP

After the initial installation, the clock must be tailored for the desired operation. All setup is done from the front panel using access codes and the display.   The following options are programmable:

    Daylight Savings Time ON or OFF (Default is ON)
    12/24 Display (Default is 12 Hour format)
    Synch-Wired Clock Type (Default is Midwest Time Control Clocks)
    Impulse Clock Type (Default is 59 minute, no 12 hour correction)
    BAUD Rate (Default is 9600 BAUD)

2.   SECURITY ACCESS CODE

A Security Access Code must be entered before a time set, a program change, addition or review. The code is a simple and easily remembered front panel button sequence (ENTER, BACK, CANCEL and AHEAD). When these buttons are pressed in the correct sequence, the Time Set indicator will illuminate. Program changes can be made any time the program indicators are illuminated. To leave the Program mode, press the CANCEL button. This restores the unit to normal operation. The Program Control mode will time out automatically 90 seconds after the last button is pressed. This prevents leaving the clock unattended in the program mode. A Program Indicator must be illuminated during all programing operations.

For units equipped with the RS232-COM Options, the program mode may not be accessed while the unit is communicating with a remote device.

3.   SET CURRENT TIME & DATE

Note: The AHEAD/BACK buttons reset the seconds counter to zero as the button is released. This feature can be used to accurately synchronize the Master Clock with other timekeeping devices.

STEP	PRESS	INDICATION	COMMENT
1		TIME SET	Enter Security Access Code
2	MODE	TIME SET	
3	AHEAD/BACK		Set Current Time (Note PM Ind)
4	SELECT	MONTH	
5	AHEAD/BACK		Set Current Month (1=Jan. 12=Dec.)
6	SELECT	DATE	
7	AHEAD/BACK		Set Cur. Date
8	SELECT	YEAR	
9	AHEAD/BACK		Set Cur. Year, 01=2001
10	DAY		Set Cur. Day of the week
11	CANCEL		Return to normal operation

4. SET HOLIDAY SCHEDULE

Note: Each Holiday must be programmed with a beginning and ending month and date. Beginning and ending dates can not be the same.

STEP	PRESS	INDICATION	COMMENT
1		TIME SET	Enter Security Access Code
2	MODE	HOLIDAY, BEGIN, MONTH	
3	AHEAD/BACK		Set month of holiday (1=Jan. 12 = Dec.)
4	SELECT	BEGIN, DATE	
5	AHEAD/BACK		Set date for first day of holiday
6	SELECT	END, MONTH	
7	AHEAD/BACK		Set month of holiday ending
8	SELECT	END, DATE	
9	AHEAD/BACK		Set date for first day of normal operation
10	ENTER		The display will blank momentarily
11	CANCEL		Return to normal operation

A total of ten holidays may be programmed by repeating steps 3 thru 10. All holiday starting and ending dates must be within the next twelve calendar months. Operation of the output circuits is inhibited During holidays.

5. OUTPUT CIRCUIT PROGRAMING

All output circuit programs entered will remain in the memory until cancelled.

All output circuits with a programmed ON time must have a programmed OFF time or DURATION.

Assume circuit 1 is to ring a bell for 10 seconds Monday thru Friday at 8:00 AM, 12:00 Noon, and 4:00 PM.

STEP	PRESS	INDICATION	COMMENT
1		TIME SET	Enter security access code
2	MODE	DURATION	
3	CIRCUIT	CIRCUIT 1	
4	AHEAD/BACK		Set display to 10 (Range = 1-59 Sec.)
5	ENTER		Display will blank momentarily
6	MODE	ON	
7	DAY	MO,TU,WE,TH,FR	
8	AHEAD/BACK		Set time to 8:00 AM
9	ENTER		Display will blank momentarily
10	AHEAD/BACK		Set time to 12:00 Noon (PM Ind. ON)
11	ENTER		Display will blank momentarily
12	AHEAD/BACK		Set time to 4:00 PM
13	ENTER		Display will blank momentarily
14	CANCEL		Return to normal operation

4

Circuit 2 is to turn on a light at 7:45 AM Monday and off at 5:15 PM Monday.

1		TIME SET	Enter security access code
2	MODE	ON	
3	CIRCUIT	CIRCUIT 2	
4	DAY	MO	MO = Monday
5	AHEAD/BACK		Set time to 7:45 AM
6	ENTER		Display will blank momentarily
7	MODE	OFF	
8	CIRCUIT	CIRCUIT 2	
9	DAY	MO	
10	AHEAD/BACK		Set time to 5:15 PM
11	ENTER		Display will blank momentarily
12	CANCEL		Return to normal operation

Circuit 3 is to turn on the outside lights at 6:00 PM and off at 10:30 PM every day.

1		TIME SET	Enter security access code
2	MODE	ON	
3	CIRCUIT	CIRCUIT 3	
4	DAY	SU,MO,TU,WE,TH,FR,SA	
5	AHEAD/BACK		Set time to 6:00 PM
6	ENTER		Display will blank momentarily
7	MODE	OFF	
8	CIRCUIT	CIRCUIT 3	
9	DAY	SU,MO,TU,WE,TH,FR,SA	
10	AHEAD/BACK		Set time to 10:30 PM
11	ENTER		Display will blank momentarily
12	CANCEL		Return to normal operation

When programming multiple functions, step 1 is only necessary at the beginning of the first program and step 12 at the end of the last program.

6. REVIEW AND CANCEL

Note: programmed holiday dates and output circuit days and time may be cancelled while in REVIEW by pressing the CANCEL button while the date, day or time to be cancelled is displayed. Do not attempt to leave the program mode while the REVIEW Indicator is ON, the CANCEL button is used in the REVIEW mode to cancel programmed dates and times. To leave the program mode when in REVIEW, press the REVIEW button to extinguish the REVIEW Indicator, then press the CANCEL button.

REVIEW OUTPUT CIRCUIT PROGRAMING

1	TIME SET		Enter security access code
2	MODE	DURATION	
3	REVIEW	REVIEW	
4	CIRCUIT	CIRCUIT 1, 2, 3, 4, 5, or 6	Any programmed duration will be displayed.
5	REVIEW		Review off
6	MODE	ON	
7	REVIEW	REVIEW	
8	CIRCUIT	CIRCUIT 1, 2, 3, 4, 5, or 6	
9	DAY	SU, MO, TU, WE, TH, FR, or SA	Programmed ON times will be displayed for each day. Multiple ON times may be checked by using the AHEAD or BACK button at each day.
10	REVIEW		Review off
11	MODE	OFF	
12	REVIEW	REVIEW	
13	CIRCUIT	CIRCUIT 1, 2, 3, 4, 5, or 6	
14	DAY	SU, MO, TU, WE, TH, FR, or SA	Programmed OFF times will be displayed for each day. Multiple OFF times may be checked by using the AHEAD or BACK buttons at each day.
15	REVIEW		Review off
16	CANCEL		Return to normal operation

When reviewing the output circuit program, the scheduled event times are displayed in chronological order, not in the order programmed.

REVIEW HOLIDAYS

STEP	PRESS	INDICATION	COMMENT
1		TIME SET	Enter Security access code
2	MODE	HOLIDAY	
3	REVIEW	REVIEW, BEGIN, MONTH, DATE	Holiday Starting month and date is displayed
4	SELECT	END, MONTH, DATE	Holiday Ending month and date is displayed
5	AHEAD	BEGIN, MONTH, DATE	Next Holiday Starting month and date is displayed
6	SELECT	END, MONTH, DATE	Holiday Ending month an date is displayed
7	REVIEW		Review off
8	CANCEL		Return to normal operation

Repeating steps 5 and 6 will display all programmed holiday beginning and ending dates.

7. BULK MEMORY ERASE

STEP	PRESS	INDICATION	COMMENT
1		TIME SET	Enter security access code
2	MODE	ERASE	
3	ENTER		The display will show :88 for approx. 5 seconds. The mode will revert to Time Set with the current time and day displayed. All user programmed events will be erased except the current time, day and date.
4	CANCEL		Return to normal operation.

8. MEMORY FULL

An attempt to program times and dates in excess of the memory capacity will be indicated on the Display by a :99. This indication appears with the first program attempt in excess of the memory capacity.

9. LAMP TEST

The lamp test is a method of turning on all of the front panel indicators except Circuit Status. This test provides a simple test to indicate proper circuit operation. Press the following front panel buttons in sequence; (ENTER, BACK, CANCEL & REVIEW). All front panel indicators except circuit status will illuminate. Press CANCEL, indicators will return to normal condition.

10. DAYLIGHT SAVINGS TIME SELECTION AND 12/24 DISPLAY SELECTION

A special access code is required to set the Baud Rate. The code is a four button sequence which must be entered in the correct order (ENTER, BACK, CANCEL, DAY).

When the access code is entered, the display will indicate the current status of the daylight savings time and the 12/24 display. To change the Daylight Savings Time selection use the AHEAD button.

    0:       enables Daylight Savings time to the current legislated dates.
    1:       disables the Daylight Savings Time correction.

To change the 12/24 Display Selection use the BACK button.

    :0   12 hour display format
    :1   24 hour display format

When the desired selections are indicated, press the ENTER button.

11. BAUD RATE SELECTION

For units equipped with a communications port (RS232 or RS485 Options) the baud rate must be set. The available baud rate settings are 1200, 2400, 4800 and 9600. The rate set at the Master Clock must match that of the communicating device.

A special security access code is required to set the Baud Rate. The code is a four button sequence which must be entered in the correct order (ENTER, BACK, CANCEL, BACK).

When the access code is entered, the display will indicate the current Baud Rate. To change the Baud Rate, use the AHEAD button. When the desired rate is indicated, press the ENTER button.

EQUIPMENT WARNING

Remote equipment controlled by this clock should have a warning sign to indicate that the equipment is remotely controlled. Primary power should be removed from that equipment prior to any maintenance or repair operations.

SECONDARY CLOCK CONTROL

The MTC-6000 Master Time Clock controls and synchronizes a wide range of secondary clocks. It will control one variety of Minute Impulse Clocks and one variety of Synchronous Clocks simultaneously. The Time display is used to select the clock types. The Minutes side of the display is used to select the Synchronous-wired clock type and the Hours side of the display is used to select the Impulse clock type.

1. Synchronous Wired Secondary Clocks

The MTC-6000 Master Clock will synchronize a variety of industry standard Synchronous Wired secondary clocks. The unit may be programmed by the user for the following clocks:

Note: The clock selection code is set to 0: 0, at the factory.

Synchronous Clock Codes

CODE	CLOCK TYPE	CORRECTION
: 0	Midwest Time	Hourly-8 Seconds @ XX:57:54, Twelve Hour-14 seconds 5:57:54
: 1	Standard	Hourly-35 seconds @ XX:59:25, Twelve Hour-12 minutes @ 5:12:00
: 2	Standard W/Aux	Hourly-35 seconds @ XX:59:25, Twelve Hour-12 minutes @ 5:12:00, Run Motor power is removed from XX:59:00 to XX:00:00
: 3	National Hourly	Hourly-35 seconds @ XX:00:00
: 4	National 12	Hourly-25 seconds @ XX:00:00, Twelve Hour-25 minutes @ 6:00:00

Simplex wired synchronous, Cincinnati D10 and Cincinnati D12 wall clocks use Code :00.

Code :01   Does not correct the second hand for these clocks.
Code :02   Requires the use of the highest numbered output circuit. Place the Circuit Control switch for this circuit to the AUTO position.
Code :03   The second hand on these clocks is not correctable.
Code :04   The second hand on these clocks is not correctable.

Refer to figure 2 & 3 for Code :00, :01, :03 & :04 connecting diagram. Refer to figure 4 for Code :02 connecting diagram.
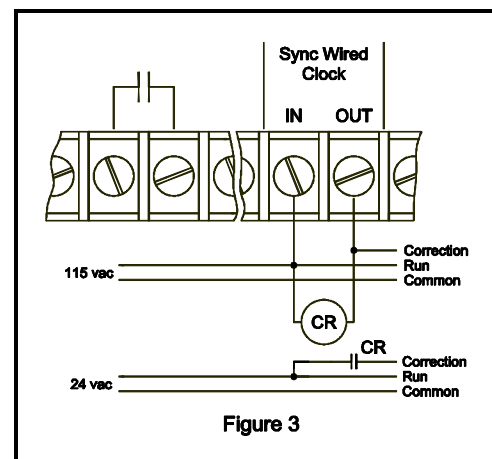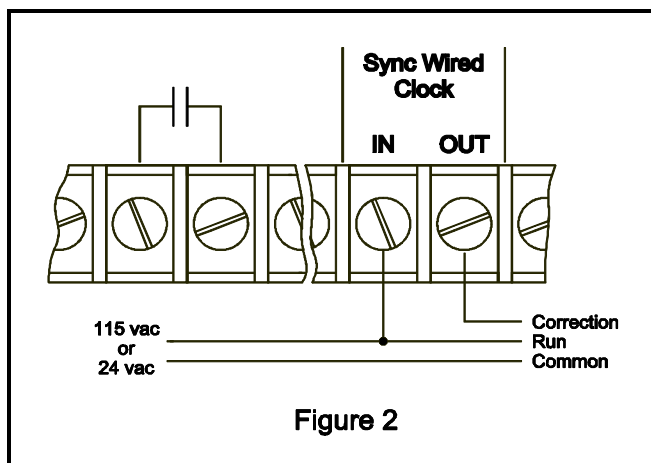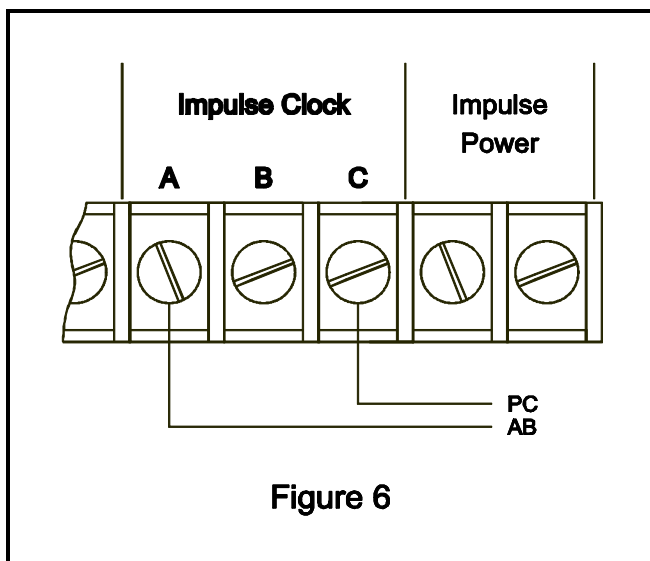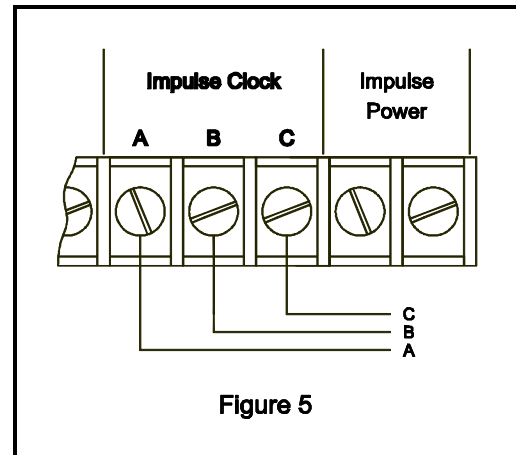
8

<u>Impulse Clock Codes</u>

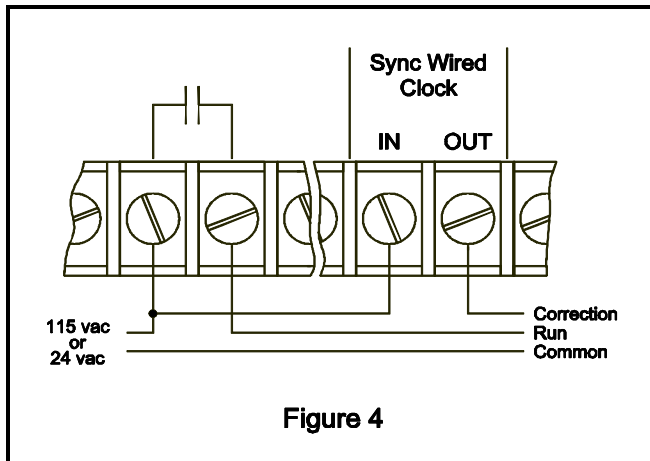| CODE	CLOCK TYPE	CORRECTION
0:	ASC-3 or ASC-4 Midwest Time	59th Minute 2 Wire reverse polarity or 3 wire
1:	ASC-6 Midwest Time	59th Minute 2 Wire reverse polarity 12-hour correction @ 5:00
2:		58th Minute
3:	Special	No Rapid correction Pulses or Polarity Reversal
4:	Lathem	59th Minute 2 Wire reverse polarity 12-hour correction @ 6:00
5,	Bi-Polar	Each minute pulse is the opposite polarity of the previous pulse

Refer to figure 6 for connection of 2 Wire Reverse Polarity Minute Impulse Clocks; (58th Min.), (59th Min.) or (59th Min. with 12 Hour Update).

Refer to figure 5 for connection of 3 Wire Minute Impulse Clocks: (58th Min.) or (59th Min.).

To select the code, enter the special four button access code (AHEAD, CANCEL, BACK & ENTER) in that sequence. The Digital Display will indicate the code numbers. The BACK button will select the desired synchronous-wired correction code. The AHEAD button will select the desired impulse clock correction code. Press ENTER and the unit will be restored to normal operation. The unit will automatically return to normal operation 90 seconds after the last button is pressed with the last code displayed on the digital indicator being the selected code.

Figure 2

Figure 3

Sync Wired Clock

IN   OUT

115 vac
or
24 vac

Correction
Run
Common

Figure 4

Impulse Clock   Impulse Power

A   B   C

C
B
A

Figure 5

Impulse Clock   Impulse Power

A   B   C

PC
AB

Figure 6

MAINTENANCE

There are a limited number of field maintenance items in the MTC-6000.

Fuses - Located on the PCB under the insulating cover. The ratings are listed on the back cover.

Impulse Relays   Midwest Time Control Part No. 530001-02

Note: The life of the Impulse Relays will be determined by the number of Impulse Clocks connected. At the rated contact load (10 Amp.), the relay contacts should last more than 1 year. The relays are socket mounted and may be easily replaced. The relays should be set up for scheduled replacement approximately once per year to avoid failure at an inopportune time.

Back Up Battery: The battery is a Lithium Energy Cell with a design life of 10 years. The symptoms of battery failure will be a loss of time or programing during a power failure. If this occurs, contact your dealer for replacement instructions.

SPECIFICATIONS

Power requirements   115 VAC, 60 HZ, 15 Watts Max.
Program Capacity   2691 Events
Holidays   10 Holidays (Holidays may be multiple days)
Operating Temp.   0 to 60 Deg. C
Storage Temp.   -30 to 75 Deg. C
Humidity   95% non-condensing
Weight   12 Lbs.

OPTIONAL EQUIPMENT

Serial Communications Option - This option provides a 2 RS232 ports and an RS485 port. This is a factory installed option.

One RS232 port is used to communicate with a computer. The computer time is synchronized with the Master Clock. The output circuits may also be programmed from the computer terminal.

One RS232 port is used to communicate with a NIST Telephone Modem Clock. The Master Clock Time is synchronized with the NIST Clock and this clock is synchronized with the National Bureau of Standards Time.

The RS485 output port designed to communicate with Midwest Time Control's Digital clocks and to synchronize the time in multiple computer installations.

The MTC-6000 Master Clock is a microprocessor based unit controlled by software. It is a very versatile unit that can be adapted for a wide range of special applications. Consult your dealer or the factory for special requirements.

NOTES:

12

WARRANTY

Midwest Time Control warrants the MTC-6000 Master Clock to be free of defects in materials and workmanship for a period of one year from the date of delivery to the purchaser. This period may be extended to one year from the date of delivery to a distributors vendee, however in no event will the warranty be extended for more than one year from the date of installation or two years from the date of shipment from the factory whichever is sooner.

We also warrant that if operated properly, the unit will operate within the advertised specifications for the stated warranty period. Excluded from this warranty are fuses and socket mounted relays. These are considered normal maintenance items.

The liability of Midwest Time Control under this warranty shall be limited to repairing or replacing a unit proved to be defective and returned to us with transportation charges prepaid within the stated warranty period.

This warranty is in lieu of all other warranties, express or implied and constitutes all of our liabilities to the purchaser or user. We assume no liability for consequential damages, for anticipated or lost profits, incidental damages or loss of time or other losses incurred by the purchaser, user or any third party in connection with the product covered by this warranty.

This warranty will be void for any product with defects which have been caused by abuse, neglect, improper installation, unauthorized repair or modification.

For return authorization under this warranty, contact;

Customer Service Department

Midwest Time Control

Toll Free
(888)713-0373
Phone (918)272-9430
FAX (918)272-9441

www.midwest-time.com
EMAIL: midwest-time.com

Midwest Time Control
TIMELESS RELIABILITY SINCE 1988