

Multipurpose Electronic Sign

User's Guide

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TECHNOLOGIES

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1.0 INTRODUCTION

Thank you for purchasing a *Logic Rail Technologies* product! Please read all instructions prior to installing this board. **CAUTION:** The *Multipurpose Electronic Sign* (hereafter referred to as the **MES**) contains circuits which can be sensitive to electrostatic discharge. Store the MES board in its static protective bag until you are ready to install it. Avoid a build-up of static electricity and handle the board by its edges to minimize potential damage.

Electrical and Physical Specifications

Controller board dimensions:	3.3" W x 3.5" L x 1.0" H
Input Voltage:	6.3V - 16V AC or DC
Power Consumption:	≤ 200mA
Display module dimensions:	3.0" W x 1.0" L x 0.5" H
Display viewing area dimensions:	0.394" L x 1.5" W
Display filter dimensions:	0.75" L x 2.0" W
Display Cable Length:	12"

1.1. Functional Description

The MES provides an extremely versatile way to enhance the realism of your model railroad. Electronic signs are commonly found at banks, car dealerships, and theatres. Use of the MES is only limited by your imagination!

The MES consists of a controller board and a ten character display module. The MES has a built-in Fast Clock with speedup values from 1:1 to 15:1. The speedup is set via switchbank **SW1** (refer to Section 2.2). The time is displayed along with a pre-stored temperature. The time/temp feature has three scroll modes: up, down, or none. The scroll mode and scroll speed are pre-stored on the controller board. The time/temp feature is not displayed if the speedup is set to 0. The MES can display up to 8 pre-stored messages. Each message can be up to 60 characters in length. Messages with more than 10 characters are automatically

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scrolled from right to left across the display. Messages with up to 10 characters can be scrolled up or down or not at all. The scroll mode and scroll speed are pre-stored on the controller board. Each non-scrolling message is displayed for an amount of time (referred to as the message delay) that's pre-stored on the controller. Each message can selectively be displayed via switchbank **SW2** (refer to Section 2.2). Messages are alternately displayed with the time/temp feature. For example, if Messages #1 and #4 are enabled and the Fast Clock speedup is not 0, then the display would sequence as follows:

1. Time/Temp
2. Message #1
3. Time/Temp
4. Message #4

The sequence would then repeat. For the ultimate in flexibility we offer the **MES Developer's Kit**. This kit includes a cable to connect the MES controller to your IBM-Compatible Personal Computer's (PC) serial (RS-232) port. The kit also includes an easy-to-use software program which allows you to do the following:

1. Configure the Fast Clock's initial time
2. Configure the temperature to be displayed
3. Change the scroll type of the time/temp feature
4. Enter new messages
5. Set the scroll speed and message delay parameters
6. Set the display brightness level
7. Control the Fast Clock and messages from the keyboard

Most of the above parameters can be changed temporarily (while MES power is on) or permanently (stored on the controller).

1.2. List of Parts

The MES is comprised of the following parts:

- 1) Controller board
- 2) Display module
- 3) Display cable
- 4) Display filter
- 5) Display mounting hardware

1.3. Power Requirements

The MES requires an AC or DC power source rated between 6.3V and 16V with a minimum current supply of 200mA. The Controller board contains a +5VDC regulator circuit to supply the power required by the MES's components. The MES accepts AC or DC power through its power jack or DC power through the blue terminals labeled +V and **GND**. **You only need to make connections to either the power jack OR the blue terminals - NOT BOTH!** Wall transformers (such as our #WT1A or Radio Shack #273-1651) provide a convenient and inexpensive means of providing power. The mating connector on the wall transformer should be a 2.1mm (I.D.) x 5.5mm (O.D.) female type. If you choose to use DC power via the blue terminals take great care in matching the polarity (positive lead to +V, negative or ground lead to **GND**). Severe damage to the MES could result if power is applied incorrectly. You can also use the **auxiliary** DC output found on some commercial throttles provided the output (measured with a voltmeter!) does not exceed 16V. **NOTE:** We recommend that you do **NOT** use the **variable** DC output (i.e. track power) of commercial throttles. This output typically exceeds the maximum input voltage (16V) of the MES.

2.0 CONTROLLER BOARD

2.1. Connector Assignments

There are four separate connectors on the controller board. The blue terminal connectors labeled **+V** and **GND** are for DC power. The blue terminal connectors labeled **SPD**, **SET**, etc. are for Fast Clock control functions. Connector **J3** is for serial port connections to a Personal Computer (PC). Connector **J4** is for connection to the display. The connections for power and fast clock control are described below. Refer to Section 3.2 for instructions on how to make connection to **J4**. Refer to the **MES Developer's Kit User Guide** for more details on connecting your MES to a PC using **J3**.

Power

(use only if you're not using the power jack with a wall transformer!)

+V Positive Voltage Supply. This terminal should be connected to the (+) side of your DC power source.

GND Ground. This terminal should be connected to the ground or common side of your power source.

Fast Clock Control

SPD(0-3) Fast Clock Speedup. Normally you would use the switches on board the controller to set the speed (see section 2.1) of the fast clock. However, you can optionally use a set of external switches to set the speedup remotely. In this case you **MUST** leave the on board speedup switches (on **SW1**) in the OFF position.

SET Fast Clock Set Mode. When this input is connected to ground the Fast Clock will operate in Set Mode if running. This input is used to rapidly preset the Fast Clock to a specific time. An

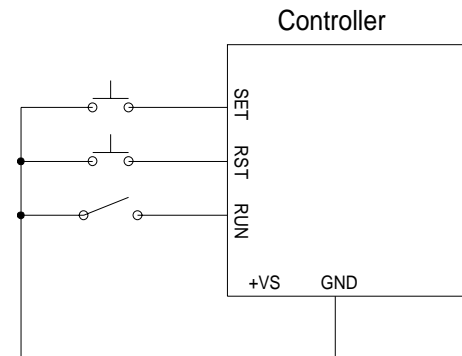
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external SPST pushbutton switch may be optionally used here. This function is duplicated on switchbank **SW1**.

RST Fast Clock Reset. When this input is connected to ground the Fast Clock will be reset to its initial time. The initial time is stored on the controller board and can only be changed by *Logic Rail Technologies* or through use of the **MES Developer's Kit**. An external SPST pushbutton switch may be optionally used here. This function is duplicated on switchbank **SW1**.

RUN Fast Clock Run Mode. When this input is connected to ground the Fast Clock will begin running. An external SPST toggle or slide switch may be optionally used here. This function is duplicated on switchbank **SW1**. When this input is left floating (unconnected) and the associated switch on **SW1** is OFF the Fast Clock will be stopped/paused.

An example of typical MES wiring is shown below:



2.1. Switch Assignments

There are two switchbanks on the controller board. The switchbank labeled **SW1** controls some of the Fast Clock functions. The switchbank labeled **SW2** controls which stored messages are displayed. Each of the switchbanks is defined below.

SW1

Switch #	Name	Function
1	SPD3	Speedup bit 3
2	SPD2	Speedup bit 2
3	SPD1	Speedup bit 1
4	SPD0	Speedup bit 0
5	SET	Clock Set Mode
6	RST	Clock Reset
7	RUN	Clock Run
8	PROG	Reserved for future use. Leave in OFF position.

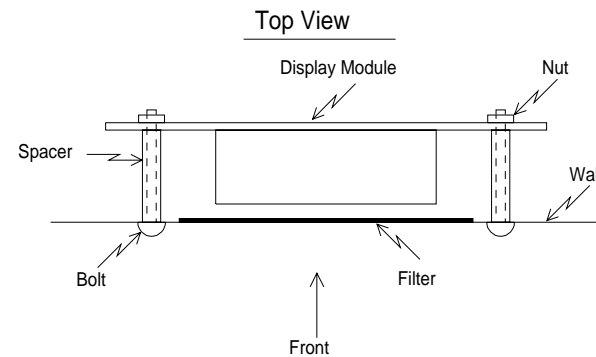
SW2

Switch #	Function
1	Message 1 Enable
2	Message 2 Enable
3	Message 3 Enable
4	Message 4 Enable
5	Message 5 Enable
6	Message 6 Enable
7	Message 7 Enable
8	Message 8 Enable

3.0 DISPLAY

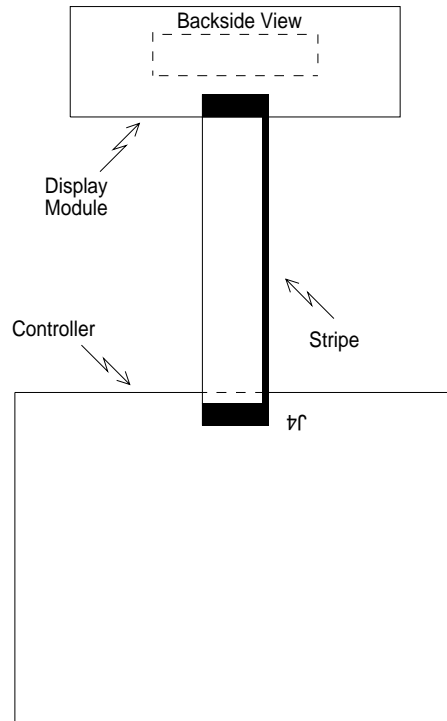
3.1. Installation

The display module should be placed in an appropriate model building or sign structure. There are many fine model railroad buildings which are suitable. You can also scratchbuild a "stand-alone" sign structure which can then be placed on top of a building or on the ground. If you're mounting it inside a building then you should carefully cut out a 0.375" H x 1.5" W area for the sign to show through. The display module should be mounted behind the opening. An appropriately colored display filter is included to dress-up the opening. The display module is mounted using the enclosed #4 bolts, nuts, and spacers. Place the enclosed mounting template over the front of the opening. Temporarily tape it in place and mark the two mounting holes on the front of the building. Remove the template and carefully drill the two holes using a 1/8" bit. The filter should be mounted from the rear of the opening (trim if necessary so that the mounting holes are clear) using white glue or a plastic-compatible cement. Be careful not to get glue in the area that will be displayed! After the glue has dried mount the display module by first inserting the bolts through the front of the building. Next place the spacers onto the shaft of the bolts. Place the display module (the top of the module is indicated by our name across it) over the ends of the bolts and secure with the nuts. Hand-tighten the nuts - using a wrench may damage the module. The heads of the bolts can be painted or covered with a "cap" made of styrene to dress it up. A top view of the final assembly is shown below.



3.2. Cable Connection

The display cable plugs onto the back of the display module and onto the top of the controller board. First connect the cable to the display module by carefully placing the module on its face. Insert one of the plugs onto the matching pins on the back of the display module (the pins should be towards the bottom of the display module. When plugged onto the display module's pins the cable should extend downward. Make sure the stripe is on the righthand side as you're looking at the back of the module. Next, plug the cable onto the controller board (connector **J4**). The cable should be plugged onto **J4** such that the stripe on the cable is on the righthand side (assuming you are holding the board such that **J4** is on top). The connections are illustrated below.



4.0 OPERATION

Upon power-up the MES controller will run through a self-test. Then, the entire display will be lit. Next, the version number of the MES's firmware (MES Control Program) will be displayed (e.g. **MESCP V3.0**). The MES will then display the time/temp and/or messages as dictated by the switchbank and external switch settings.

4.1. Messages

Each of the eight pre-stored messages can be enabled (displayed) individually. To display a message simply throw the appropriate switch on switchbank SW2 to the position marked ON or CLOSED. If there is no pre-stored message corresponding to that number, then nothing will happen.

4.2. Fast Clock

The Fast Clock is controlled via switchbank SW1 and any external switches (not provided). You can control the Fast Clock remotely with just a Single-Pole Single-Throw (SPST) switch for the RUN/STOP mode.

The first step in controlling the Fast Clock is to determine which speedup value you wish to operate with. There is no right or wrong fast clock speedup to use. It can vary from scale to scale and user to user. If you actually want to operate your railroad "by the clock", some points to keep in mind are: 1) the distance between stations; the longer the distance, the lower the speedup can be. 2) switching time; it doesn't make sense to choose a high speedup if your switching crew is totally overwhelmed by the clock and they can't enjoy their work! 3) train speeds; the faster you run your trains, the faster you'll need to run the clock in order to make distances appear longer. 4) average operating session length; if you expect to complete an entire day's work in a three hour operating session, then you'd better choose a speedup of around 8. For a detailed discussion of fast clocks and their usage

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consult the book **How to Operate Your Model Railroad** by Bruce A. Chubb. You may want to try operating your layout a few times with different speedups to assess which is most fitting.

The speedup is set by using switches 1 - 4 on switchbank SW1 (referred to hereafter as SW1-1 - SW1-4) as shown in the following table or via a set of external SPST switches. **NOTE:** If you decide to use external switches then you **MUST** have the on-board switches (SW1-1 - SW1-4) in the **OFF** position. If **ALL** speedup switches (external and on-board) are in their **OFF** position then the time/temp feature will **NOT** be displayed - only messages will appear! The Fast Clock must be in **STOP** mode (RUN input not connected to ground and RUN switch, SW1-7, OFF) to change the speedup.

Speedup	SPD3	SPD2	SPD1	SPD0
15:1	ON	ON	ON	ON
14:1	ON	ON	ON	OFF
13:1	ON	ON	OFF	ON
12:1	ON	ON	OFF	OFF
11:1	ON	OFF	ON	ON
10:1	ON	OFF	ON	OFF
9:1	ON	OFF	OFF	ON
8:1	ON	OFF	OFF	OFF
7:1	OFF	ON	ON	ON
6:1	OFF	ON	ON	OFF
5:1	OFF	ON	OFF	ON
4:1	OFF	ON	OFF	OFF
3:1	OFF	OFF	ON	ON
2:1	OFF	OFF	ON	OFF
1:1	OFF	OFF	OFF	ON
no time	OFF	OFF	OFF	OFF

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Upon power-up the Fast Clock is reset to an initial time. This time is pre-stored on the controller board. The clock can be manually reset via switch 6 on switchbank SW1 (SW1-6) or by connecting the RST input to ground. If the RST input is used then it must be floated (not connected to ground) and SW1-6 must be OFF for the clock to operate. This is summarized in the following table. The clock can be reset at any time, it is not necessary to have the clock in STOP mode.

Function	RST input	SW1-6
Operating	floated	OFF
Reset	floated	ON
Reset	Ground	OFF
Reset	Ground	ON

The clock starting time can be changed manually from the pre-stored initial time. This can be done via switch 5 on switchbank SW1 (SW1-5) or by connecting the SET input to ground. If the SET input is used then it must be floated (not connected to ground) and SW1-5 must be OFF for the clock to operate with its appropriate speedup. This is summarized in the following table.

Function	SET input	SW1-5
Operating	floated	OFF
Set	floated	ON
Set	Ground	OFF
Set	Ground	ON

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The SET mode does not take effect unless the clock is in the STOP mode. The following steps should be taken to set the clock. The example assumes you want to set the time to 8:30am.

- 1) Turn all eight message enables (SW2) OFF
- 2) Place the clock in STOP mode (RUN switch OFF and input floated)
- 3) Flip SW1-5 to the ON position or ground the SET input
- 4) Place the clock in RUN mode (RUN switch ON or input grounded); the time will rapidly change
- 5) When the displayed time hits 8:00am, place the clock in STOP mode
- 6) Flip SW1-5 to the OFF position and make sure the SET input is floated
- 7) Set the speedup (SW1-1 - SW1-4) to 15
- 8) Place the clock in RUN mode
- 9) When the displayed time hits 8:30am, place the clock in STOP mode
- 10) Set the speedup to the desired value
- 11) Turn ON the desired message enables
- 12) Place the clock in RUN mode when ready!

5.0 TECHNICAL SUPPORT

Please direct any questions about the use of this product to *Logic Rail Technologies*. You can contact us as follows:

email: info@logicrailtech.com

phone/fax: (281) 251-5813

mail: 21175 Tomball Parkway

Suite 287

Houston, TX 77070

Include as much detail as possible about your usage (e.g. power supply type and voltage & current rating). Comments and suggestions are always welcome.

6.0 REPROGRAMMING MESSAGES

If you do not have the **MES Developer's Kit** you can have your messages reprogrammed by *Logic Rail Technologies*. We will perform this service free-of-charge. However, we ask that you pay for return shipping and handling (\$8.00 in the U.S. and Canada; \$10.00 outside the U.S. and Canada - payable in U.S. funds only!). To take advantage of this service carefully pack the controller board back in its original packaging (static bag and cardboard box). Enclose it with bubble wrap or styrofoam peanuts in a larger cardboard box. Enclose a clear description of the new messages you want reprogrammed (message number and text) using the enclosed MES configuration worksheet. Allow 2 weeks for processing from the time you send the package to us.

7.0 WARRANTY

This product is warranted to be free from defects in materials or workmanship for a period of one year from the date of purchase. **Logic Rail Technologies** reserves the right to repair or replace a defective product. The product must be returned to **Logic Rail Technologies** in satisfactory condition. This warranty covers all defects incurred during normal use of this product. This warranty is void under the following conditions:

- 1) If damage to the product results from mishandling or abuse.
- 2) If the product has been altered in any way (e.g. soldering).
- 3) If the current or voltage limitations of the product have been exceeded.

Requests for warranty service must include a dated proof of purchase, a written description of the problem, and return shipping and handling (\$8.00 inside U.S./\$10.00 outside U.S. - U.S. funds only). Except as written above, no other warranty or guarantee, either expressed or implied by any other person, firm or corporation, applies to this product.