



BY: ELECTRO-NUMERICS, INC.

Manufacturer of Sports Timing Clocks since 1976

MM-01

Milemarker Raceclock

Operating Guide

About Your MM01 Milemarker Raceclock

Congratulations on your purchase of the MM-01 *Milemarker Raceclock* by Electro-Numerics. The MM-01 is designed and engineered to exacting standards for reliability, long life, outstanding performance, and ease of use. To get the most from your MM-01, *please read this Operating Guide thoroughly.*

MM01 features:

Your MM-01 *Milemarker Raceclock* was designed to be used at mile-marker positions along a race course and has the following features:

- Ultra-Bright LED's - Visible in either bright sunlight or at night.
- 6-inch Tall Digits - Able to be seen from hundreds of feet away.
- 100% Solid State - No moving parts to wear out.
- Controls Built-in - No external plug-in keypad to worry about.
- Battery Powered - Can be placed anywhere on a race course.
- Light, Compact, Easily transportable - Weighs only 12.5 pounds.

Why Use LED's?

What makes the MM-01 *Milemarker Raceclock* and other Electro-Numerics **RACECLOCK** products unique is their use of Ultra-Bright LED's (Light Emmitting Diodes). These are similar to the LED's you see in the rear of newer automobiles as brake lights and in traffic signals. These LED's are extremely bright, easily visible in daylight, and consume little battery power.

Each digit is made up of seven separate segments, Traditional "flip digit" race clocks use electro-magnetic devices to hide or display each segment. This involves physically moving each segment back and forth from the "display area". Even though this type of display has been successfully used for many years and is extremely visible in bright sunlight, they have the disadvantage of being a mechanical device subject to wear and damage from mechanical shock.

The MM-01 *Milemarker Raceclock* uses LED's for each segment. Instead of physically moving a segment into the display area, the MM-01 simply lights a row of LED's. This process involves no moving parts so it is less "failure-prone" than traditional style electromagnetic clocks.

Why Use Milemarker Clocks, At All?

Even though most runners wear "running watches", clocks are often positioned at mile-markers during a race. There are many reasons for this:

- Runners get a "good feeling" about seeing their "official" split time.
- Many runners do not wear glasses or contacts during an event and cannot read a watch.
- Runners are always looking for the mile-markers so they can note their split times. It is not at all unusual for many runners to run by a traditional mile-marker without seeing it due to their position in the pack or just plain "poor visibility". When the MM-01 *Milemarker Raceclock* is positioned at a mile-marker, the bright-red display is clearly visible to identify the upcoming split long before the runners even get close enough to actually read the digits. That's why these LED's are used to supplement the brake lights on newer cars.

Clock Controls

Setting the MM-01 *Milemarker Raceclock* is a very simple procedure and takes only a few moments. The set-up procedure is performed using the four controls on the clock back. These controls (shown in **Figure 1** from left to right) function as follows:

Mode Set Switch: The Mode Set control is a rocker switch that directs the clock to operate in “normal” mode or “set” mode. When in use, the clock will be in “normal” mode. “Set” mode is used only to set the time being displayed. It is easy to determine when the clock is in “set” mode because one of the digits (the “currently selected digit”) will be blinking.

Digit Set Button: When the clock is in “set” mode, this button is used to set the “currently selected digit”. Each time this button is pressed, the “currently selected digit” increments by one. If this button is pressed-in and held, the “currently selected digit” advances at a rate of approximately two increments per second.

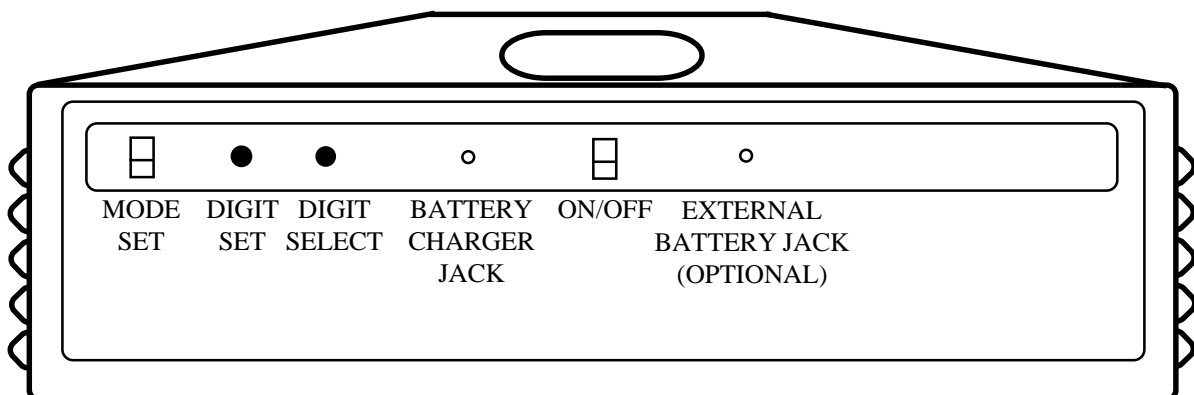
NOTE: This button operates a bit differently when the *1's of seconds* digit is blinking. When the *1's of seconds* digit is the “currently selected digit”, each press of this button sets the *1's of seconds* to zero. If this button is pressed-in and held when the *1's of seconds* digit is the “currently selected digit”, the *1's of seconds* digit is set to zero and the clock stops counting until the button is released. This capability can be used to perfectly synchronize the MM-01 with another clock or with the starting pistol.

Digit Select Button: When the clock is in “set” mode, this button is used to select the digit you wish to set. Each time this button is pressed, the “currently selected digit” (the blinking digit) moves. For example, if the *1's of seconds* digit is blinking and this button is pressed, the *10's of seconds* digit becomes the blinking digit. If this button is pressed and held, the blinking digit moves from right to left at a rate of approximately two moves per second. When the *1's of hours* digit is blinking and this button is pressed, the blinking digit returns to the *1's of seconds* position.

On/Off Switch: The On/Off control is a rocker switch that controls whether the clock is “powered-up” or off. When you “power-up” your MM-01, it will begin counting at 0:00 (with the *10's of minutes* and the *hours* digits blanked).

Normally, switching the clock on at the time the starting pistol is fired is sufficient for the accuracy of a mile-marker clock. However, if “fractional second” accuracy is required, the procedure described in the NOTE above can be used to perfectly synchronize the *1's of seconds* count with the official race timer.

Figure 1
Rear View of Clock



Clock Operation

Generally, milemarker clocks are placed at their proper locations on the race course before the race begins. The individuals responsible for setting the clocks usually rides in a vehicle ahead of the runners. This vehicle is positioned in front of the starting line and is normally manned by two people: the *driver* and the *clock setter*. When the starting pistol is fired, the *clock setter* starts a stop watch and the *driver* pilots the vehicle to the first mile-marker clock.

The *clock setter* gets out of the vehicle and performs the following procedure:

- 1) One hand is placed on the **ON/OFF switch** while the other hand holds the stop watch.
- 2) When the stop watch reaches an even 10-second point, the **ON/OFF switch** is toggled to start the clock.
- 3) The **Mode Set Switch** is toggled to place the clock into “set” mode.
4. The **Digit Select Button** is pressed once to make the 10’s of seconds digit blink.
5. The **Digit Set Button** is pressed until the correct digit is displayed in the blinking position.
6. Steps 4 and 5 are repeated until all the digits are properly set.
7. The **Mode Set Switch** is toggled back to the “normal” mode.

Then the clock setter returns to the vehicle and is driven to the next clock.

The above procedure is most often used to set milemarker clocks. However, the procedure you use may be different based on your own requirements. For example, if “fractional seconds” accuracy is required, you may decide to manually set the *1’s of seconds* digit to zero (instead of powering-up the clock at an even 10-second point).

Also, instead of using a vehicle, you may wish to pre-position multiple clock setters at the mile-markers and use cellular phones or walkie-talkies to communicate the time.

Positioning Your Clocks

You’ll find that your MM-01 *Milemarker Raceclocks* are clearly visible to approaching runners. However, as the runners get to within 10 or 20 feet of the clock, the digits appear less bright (you’ve also probably noticed this phenomenon as you approach digital “warning signs” on the highway). The reason for this effect is that in order to obtain maximum brightness, the LED’s are constructed to be fairly directional. Each LED appears brightest when viewed from within 30°s of the direction it is pointing.

To represent this graphically, **Figure 2** shows a milemarker clock positioned beside a 10-foot wide road. The 30° cone has been shaded-in so you can easily see where approaching runners will view the clock at its brightest. Notice that the clock has been angled slightly to allow more of the cone to be within the path of the approaching runners.

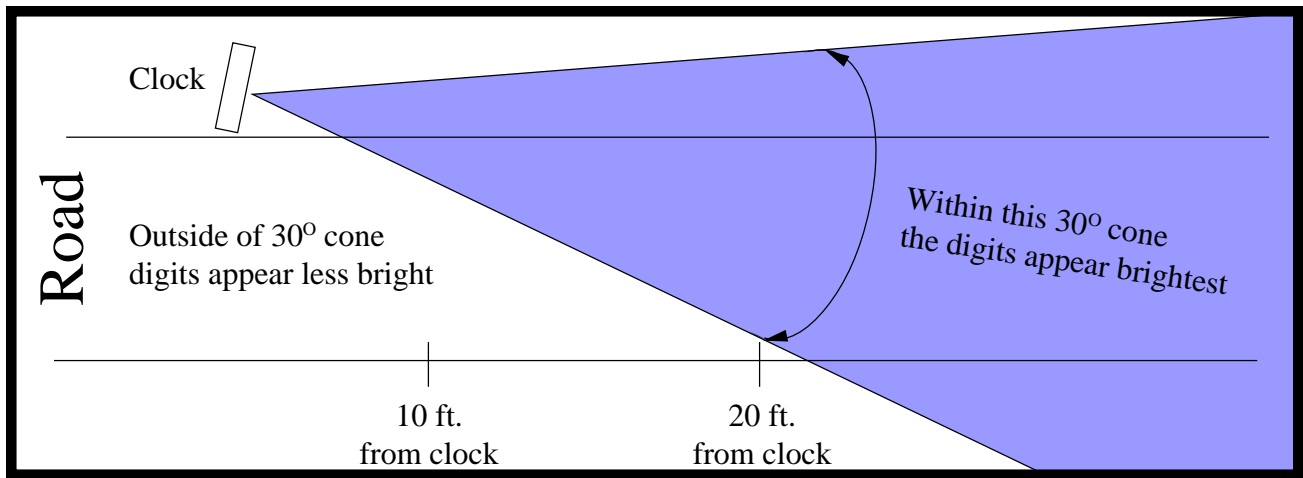


Figure 2. Clock Positioning

Also notice the digits will appear less bright to runners on the far left of the road when they approach to within 20 feet of the clock. Even these runners will be able to read their split times with adequate accuracy, however, this factor can be minimized with a bit of careful clock positioning.

So far, only the clock's horizontal positioning has been discussed. However, this 30° phenomenon applies to the vertical positioning as well. While not nearly as noticeable, the vertical effect can be minimized by positioning the clock at eye-height (about 5 feet). This should present no problem if you mount your clock on an adjustable tripod.

[Mounting Your Clock on a Tripod](#)

The MM-01 *Milemarker Raceclock* was designed to be mounted on a standard 1 3/8 inch diameter "speaker stand". If you already have such a stand, you may certainly use it instead of our optional tripod. However, note that any device mounted on such a stand remains free to spin around on its mount. A standard "speaker stand" has no provision to "lock" its device in the direction you desire. This is fine for a speaker that is mounted indoors, but a race clock intended for outdoor use is subject to the elements and it would be unacceptable to allow the wind to move your clock from its proper viewing angle. To solve this problem, we have provided a "keying" notch at the base of the tripod mount on the underside of the clock. This "keying" notch has been sized to properly fit over a standard 1-1/2 inch hose clamp to secure the clock in whichever position you set. We include a hose clamp with each clock so you can use any standard 1-3/8 inch speaker stand and still be able to lock your clock in position for the proper viewing angle. Just position the hose clamp 3-1/8 inches from the top of any suitable speaker stand (as shown in Figure 3) and lower your clock onto the hose clamp for a secure, "keyed" mounting.

A few cautions should be noted when mounting your clock on a tripod stand. Generally, tripods are fairly reliable and provide a stable mount for your clock, however, high winds have been known to tip over and damage tripod-mounted clocks. During windy conditions the tripod legs should be spread as far apart as possible for maximum stability. If severe winds are expected, you should drive a tent stake into the ground on the upwind side of the tripod and secure the tripod leg to the stake with a cord or duct tape.

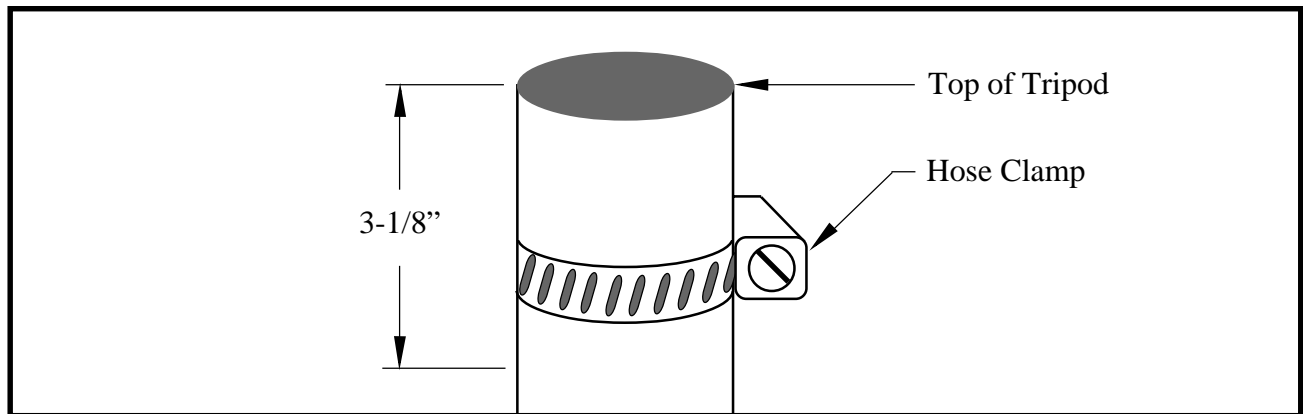


Figure 3, Hose Clamp Mounted on Tripod

When the tripod must be positioned on concrete, asphalt, or some other surface where a tent stake is impractical; you can place a sandbag, cinder block, or some other heavy object over the upwind leg. Electro-Numerics encourages you to include a hammer, duct tape, cord, tent stakes, sandbags, etc. as part of your race course setup gear.

[Using Your Clock in Inclement Weather](#)

The MM-01 *Milemarker Raceclock* is not “waterproof”. The louvers above the side-vents and the polyethylene case allow the clock to be somewhat “water resistant”, however, the MM-01 can be damaged if water is permitted to get inside.

If you suspect that rain may be present during a race, you should protect your clocks with a waterproof covering. We recommend covering each clock with a clear plastic garbage bag (clear 39 gallon “yard bags” work fine). After placing the bag over the clock, pull the excess plastic towards the back and underside of the clock so the clock face is covered by only a single, wrinkle-free, layer of plastic. Then, using masking tape to hold the excess plastic in position and keep it from flapping in the wind. The clock digits will remain perfectly visible through the clear plastic and the clock controls will continue to be accessible as well.

[Charging the Batteries & Operating on External Batteries](#)

The MM-01 *Milemarker Raceclock* is designed to be operated from its internal batteries or from an external 12V “car” battery if equipped with the External Battery Cable Option. When fully charged, the internal batteries will provide over 10 hours of continuous operation. This duration is adequate for most racing events. With the External Battery Cable Option and connected to an external automobile 12V battery the operating time will be greatly extended. Note that when the external battery is connected to the clock, that the internal batteries are disconnected and will remain at their present charge level.

External Battery Cable Option. This option must be factory installed and provides an additional jack at the rear of the clock and a cable with battery clips to connect to your 12V battery. This option does not supply an external battery.

The Battery Charger provided with the MM-01 has been specifically designed to charge your clock’s internal batteries. To charge the batteries, you simply need to plug the charger cable into your clock’s “Battery Charge” jack (see Figure 1) and then plug the charger into a convenient AC outlet. The clock cannot be operated when the battery charger is plugged-in.

The battery charger's "Power On" light will be lit whenever the charger is plugged into an AC outlet. In addition, the battery charger's "Fast Charge" light will be lit when the charger is actively charging the clock's batteries. When the "Fast Charge" light goes off, your clock's batteries are fully charged and the charger should be removed.

As a general "rule of thumb", you can expect your MM-01 to take approximately two hours to recharge for each hour of battery use. For example, if your clock was powered-up for one hour during a 5K run, you can expect it to take about two hours for the batteries to fully recharge. Note that it can take over 20 hours to fully recharge your batteries if they have been completely discharged. Make sure you provide adequate time to fully charge your clocks before each event.

Leaving the charger plugged in after the "Fast Charge" light has gone out will not charge the batteries any further. In fact, leaving the charger connected after the batteries have been fully charged can reduce the lifetime of your batteries, therefore we recommend that you unplug the charger after your batteries are charged. After reaching a full charge, your batteries will remain at a fairly high output capacity for over two months. However, for the highest output capacity, we recommend you charge your clocks shortly before you intend to use them. It does not take long to "top off" the charge if your clocks have been sitting for several weeks since they were last fully charged.

Your clock cannot be operated while its batteries are being charged. Protection circuitry has been included to automatically disable the clock when the battery charger is plugged in.

Specifications

Display: The display consists of five 6-inch tall digits. This allows the clock to count to 9:59:59 before rolling over to 0:00:00. Each 6-inch digit consists of 35 Ultra-Bright LED's (7 segments with 5 LED's per segment). In addition, there are two colons built from LED's to separate the hours from the minutes and the minutes from the seconds.

Electronics: Internally, the MM-01 *Milemarker Raceclock* uses a microcomputer to monitor the time-base and control all clock functions. A precision quartz crystal provides a precise time-base to assure that the clock remains accurate to within one second ... even after operating for over nine hours.

Power: The MM-01 contains rechargeable batteries that power the clock for over 10 hours from a single charge. An AC-powered battery charger is provided so the clock can be recharged from any convenient 120-volt, 60Hz AC outlet.

Case: Molded impact-resistant polyethylene, black color.

Dimensions: 31-inches wide x 11-inches high x 5-1/2 inches deep.

Weight: 12.5 lbs.

Options:

Optional stands and carrying cases are covered by the same one year warranty as our clock.

TS03 (Tripod Stand): Our optional tripod stand is anodized aluminum with polycarbonate fittings. It's a quality tripod, rated to hold over 100 lbs.

MM-01C (Carrying Case): A rugged ATA-designed case to protect your clock during transport and shipping.

MM-01-EBO (External Battery Cable): Allows connection to an external 12V automobile battery. Includes a plug-in power cable and battery clips.

ONE YEAR LIMITED PRODUCT WARRANTY:

Electro-Numerics Incorporated warrants these products to be free of defects in material and workmanship for one year from date of shipment to original customer. This warranty on materials and workmanship may be considered as unconditional provided that, in the opinion of Electro-Numerics, the equipment has not been mechanically, environmentally or electrically abused and has been installed, maintained and operated within the limits of rated or normal usage.

Defective products must be sent, transportation charges prepaid with notice of the defect, to our plant in Temecula CA.

This warranty is limited, at the option of Electro-Numerics, to repair, replacement, or an appropriate credit adjustment not to exceed the original equipment sales price. All warranty freight charges are F.O.B., our plant, Temecula, CA. Electro-Numerics assumes no liability in connection with the sales of its products beyond that stated above and is not responsible for any incidental or consequential loss or damage which might result from a failure of any Electro-Numerics' product.

SERVICE:

Products being returned for service should be sent, freight prepaid, to Electro-Numerics, Inc., 42213 Sarah Way, Temecula, CA, 92590, U.S.A. to the attention of the Repair Department with a full description of the problem or reason for return. All items sent in for service are subject to a minimum evaluation charge of \$60.00 in the event that the product is found to be out-of-warranty or, if under warranty, not in need of additional service. Out-of-Warranty service and repair charges will be quoted on a case-by-case basis. All repaired products will be shipped to you F.O.B., Temecula, CA.

ELECTRO-NUMERICS, INC.

For Product Assistance, Call

800-854-8530 (U.S.A.)

Web Site: **www.Raceclock.com**

- Milemarker Raceclocks
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