CED M2 Chronograph - How to Improve Your Range Sessions!

By David Price

A day at the range is a cherished experience for most of us who have limited time these days! As such, it is so frustrating when we experience problems, which prevent us from carrying out the goals we have set for ourselves during that time. I have found that the use of chronographs often falls under the "most frustrating" of times. All chronographs depend on one important factor! Cooperation of Mother Nature! They need good, balanced light conditions to provide the best, stable results. Of course, it is not always possible to visit the range midday, especially during the week or on perfect sunny days, for that matter. In addition to the importance of good balanced light conditions, chronographs can and often are affected by so many other variables as well. Muzzle blast, reflections (known as glints), static electricity, mobile phone transmissions, and sound waves are just a few of the other variables which are most often the culprits of a bad day at the range. Below I have compiled a list of variables, which often create problems when using a chronograph.

1. The chronograph could be damaged, in which case it needs to be repaired or replaced. Remember, chronographs are not bulletproof. They also do not always hold up to rough handling or dropping on hard surfaces either and they do not like being thrown into the trunk of your car unprotected! All electronics in today's world are made to be handled with care and respect, and they should be properly stored away in their original packaging or protective cases that are designed to store them.

To check if your chronograph is functioning, perform the following demonstration. Install a battery in the unit in your home. Plug in the 2 sensors (DO NOT MOUNT THEM ON THE BRACKET), but instead, place them (back to back so they are touching) together upright on a table or floor next to the main unit. Turn the main unit on! Take a flashlight and while holding it 3 - 4 inches above the top of the sensors, run it over the sensors (swipe it) as fast as you can! Remember to run it over the START sensor first! If you run it backwards, the results will not be accurate. If you do this correctly, you should get readings from 70 - 300 feet per second! Run the light over the sensors 5 to 6 times, then store the data by pressing the clear/reset button quickly. If you get data, the unit is functioning properly. Remember, the chronograph does not record velocities under 50 fps. Therefore, you must swipe the light across the sensors as FAST as you can!

2. Cloudy days - Often if the day is overcast or cloudy, and you are shooting small-caliber bullets (such as 223, Airsoft, 22 cal., etc.), you may not have enough sunlight for the sensors to read the projectile correctly. Remember that the smaller or faster a projectile is, the more light the chronograph needs in order to read it.

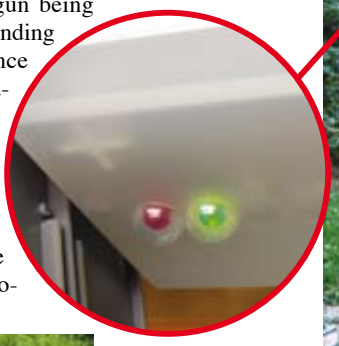
In cloudy, overcast environments, try removing the top white screens, using the sidearms as a visual marker for aiming. This should not be done on clear bright days that do not have clouds to naturally diffuse the light. On those days, you must use the top screens to properly diffuse the light entering the chronograph. If removing the top screens on cloudy days still does not work, then you do not have enough light to properly use the system. In those cases, plan your sessions for another day or time. Each branded chronograph varies with the amount of light it requires to function properly. This is due to the type of sensor used. Some chronographs, which read in lower-light conditions, can be less accurate, and are often subject to more interference from variables, such as mobile phone transmissions, electricity, static, etc. CED Chronograph systems are designed to eliminate these variables to a great degree! However, like all chronographs, they do need good balanced light. The key word here is "BALANCED." Any chronograph will produce inaccurate results if the light source is not balanced on both sensors evenly. Therefore, try to prevent the sunlight from being positioned at 6 or 12 o'clock (behind or directly in front of you) when in use. In these cases, the intensity of light is often greater on one of the sensors and not evenly balanced. When the sunlight is off to the extreme left or right side of you as it often is in early morning or late afternoon, try tilting the pan-head of the tripod to angle the top screens toward the light. Remember to shoot on an angle as well or you will end up replacing parts! It is important that the light is diffused through the top screens. If the light is entering from a sharp angle from the sides more than through the top screens, often the amount of sunlight under the projectile is equal to that above it and the chronograph is unable to detect any light drop from the projectile (the shadow of the bullet). Often, no reading is recorded in these situations. The best solution to cloudy days or evenings after the sun has set, is the use of a light source or the CED Infrared Screen Set. They are designed to provide balanced light, which eliminates the need for Mother Nature. I will mention though that when there is sufficient natural light to chronograph, you should not use both types of light sources together! A mistake that is often made is the assumption that if an Infrared Screen Set or incandescent light box is used on a sunny or cloudy day it will guarantee good results. But what can occur is that the natural sunlight may be directed onto one of the sensors unevenly, which then overpowers the artificial light source, creating an unbalanced amount of light on the two sensors, which in turn results in bad or no readings. Remember! BALANCED LIGHT.

3. Snow or wet surfaces - If you place the chronograph over ground area which is covered by snow (white) or quite wet (water), the reflection of the sunlight is often bounced back up toward the sensors, creating too much bright light under the projectile. This in turn prevents the sensors from seeing (detecting) a light drop (shadow) of the bullet. In essence, the reflection cancels the ability of the chronograph to read the projectile passing over it. When this happens, it is called a "glint" and it will often create a false reading or no reading at all! This is a problem faced by ALL chronographs.

4. Muzzle Blast – This is often the greatest problem for chronograph users after light issues. Muzzle blast often will trigger a sensor to record a reading in addition to the projectile itself, which results in either an inaccurate reading or no reading at all! Some high-powered rifles with fast velocities create significant muzzle blasts, and in subsonic (slower velocity) guns, the blast can often reach the sensors before the projectile does. There is no fixed distance that can be given to ALL types of weapons since there are so many variables, which create different degrees of muzzle blast. To find the best distance for each gun being used (specifically rifles), try extending the chronograph to its full distance (20 ft. of shielded cable are provided with each CED Chronograph) and then move closer until you determine for that specific weapon the point where muzzle blast becomes a problem. Record that distance for each gun for future use and efficiency of your chronographing sessions.

A muzzle blast screen is ideal for those users who have a location of use where it is feasible. A simple piece of plywood is positioned upright with a base that stands slightly higher and wider than the chronograph screens. Cut a 4" diameter opening in the plywood, aprx. 2-3" directly above the sensors for the bullet to pass through. The muzzle blast itself will then be dissipated onto the plywood, preventing it from causing problems to the chronograph itself. I will point out here that plywood is the best type of material to use. If plastic is used, it tends to shatter when hit by a stray bullet and is much harder to patch or repair. If metal is used, the ricochet of a misdirected bullet can result in safety issues. Wood tends to absorb the bullet and is easy to patch.

5. Indoor Range use – The kiss of death for any chronograph will be the often-used fluorescent lights provided at indoor shooting ranges. Fluorescent lights flutter and provide a type of light that does not allow chronographs to properly read (detect) projectiles passing over them. For high-speed performance systems such as the CED M2 Chronograph, it can actually pick up the fluttering of the fluorescent lights, which can trigger false readings from the light itself. All chronographs require incandescent light sources or that of the CED Infrared Screen Set, which was specifically designed to provide stable balanced light to CED Chronographs.



Other problems associated with indoor ranges, especially those that are narrow or have low ceilings, are muzzle blasts (detailed above in #4) and sound waves. In such cases where sound waves bounce off the ceilings and walls returning back into the chronograph itself, interference in proper readings can occur. In such cases, it may be necessary to relocate to another location for your chronograph use.

6. Archery - When arrows are shot over the M2 chronograph, the arrow velocity is displayed correctly but that velocity display can be followed by an E0 (Missed Start Sensor) or E1 (Missed Stop Sensor) error. The M2 chronograph sensors send out their gating pulse when the light is blocked by the nose of the projectile. In this case the nose of the projectile is the arrowhead. When an arrow is shot over the M2 chronograph, the arrowhead first blocks the light over the Start Sensor. This causes the M2 chronograph to start timing. As the arrow travels over the M2 chronograph sensors, the arrowhead eventually reaches the Stop Sensor. This causes the M2 chronograph to calculate and display the velocity. The M2 chronograph now takes a short amount of time to reset and get ready to capture the next Start Sensor event. (The M2 chronograph does this very rapidly as it is designed to capture velocities from automatic weapons.)

What will happen with arrows depends on several factors:

a. lighting conditions (direction and intensity)
b. the length and velocity of the arrow
c. the opacity of the fletching
d. the relative position of the fletching due to arrow rotation

As the arrow shaft travels over the chronograph, part of the light to the sensors is blocked. As the fletching travels over the sensors, the fletching may block more of the light, (depending on factors 1, 3 and 4), causing the sensors to send out another event pulse. The signals caused by the fletching may hit the chronograph at different stages of its reset cycle, depending on the arrow velocity and arrow length. This can cause the chronograph to detect a signal from one sensor but not from the other sensor. We believe that this will most likely show up as an E0 (Missed Start Sensor) error but, depending on the lighting conditions, as well as the opacity and position of the fletching as it occludes the sensors, an E1 (Missed Stop Sensor) error can occur. The users should be aware that the velocity displayed by the chronograph is correct. It is the velocity reading taken from the arrowhead crossing the sensors. The E0 and E1 errors are informational. They state that an error occurred but they do not cause the last valid velocity measurement to be erased.

I hope that the information I have provided helps each of you to have a more pleasant and successful day at the range with your chronograph system. Remember, understanding the functions and features that each chronograph provides is vital to getting the most from each session and use. Take time to read the manual and to understand how to use the system properly. It will greatly benefit you in the long run and save you all kinds of frustrations along the way! Good shooting!