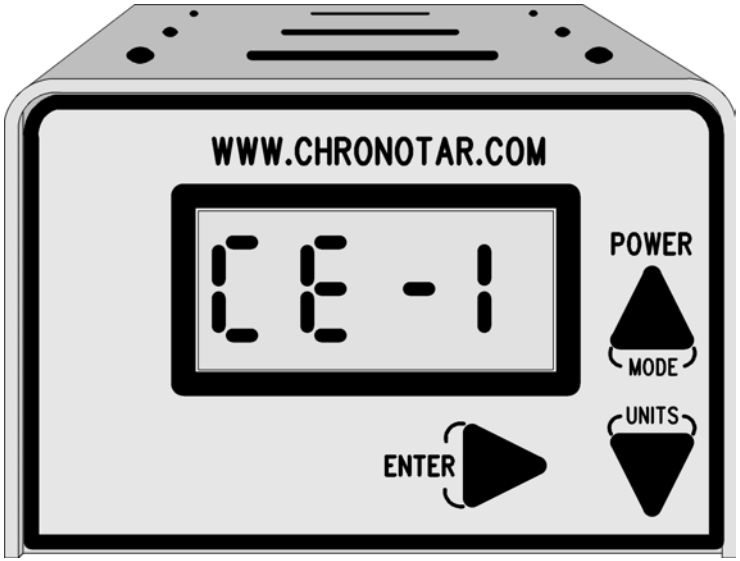
CHRONOTAR

CHRONOGRAPH

CE-1 MANUAL



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Version 1.00

Warning

Before you use this product you must follow all safety instructions as recommended by manufacturer of your firing device, no mater what that device may be. Irrespective of who the manufacturer of your firing device may be, you alone are ultimately responsible for using correct safety precautions. That is, no one else but you and you alone, is responsible for using correct safety procedures.

Liabilities

This product is a passive optical instrument. It does not emit any radiation in order to measure projectile velocities.

It is your sole responsibility to safeguard yourself and other people against any injury or property damage when firing projectiles near the unit or accidentally into the unit. You must also use correct safety procedures for your firing device.

This product relies heavily on complex hardware, software and operating system. Because of its complexity, a finite probability exists that a software module or a hardware component may fail to function properly. This failure may result in a loss or change of data which could produce erroneous velocity measurement. For example, a simple LCD-element failure may display number **8** as number **9** or **6**. There are thousands of possible failure modes; therefore this product is not a fail-save product. If fail-save velocity measurements are required, then this product must not be used without our written approval. Approval requests will be considered only if setup is based on “multi-chronograph-majority-vote” design and it must be accompanied by failure analysis.

We assume no responsibility for the injury to any person or persons whether be consequential or inconsequential as a result of using this product. We also assume no responsibility for the damage to any property or loss of profit as a result of using this product.

This product and all its associated hardware and software design are ©Copyright property of Chronotar Micro.

If you do not agree with any of the above statements then you must not use this product. Instead, you must return it immediately and intact to the place of purchase for a full refund.

IMPORTANT NOTES

Muzzle blast & noise control

User set muzzle blast & noise control provides reduction range settings from **00%** to **98%**. Unfortunately high muzzle blast reduction settings also reduce sensitivity. It is better to move the unit farther back rather then using muzzle blast control. For archery, paintball and all quiet devices use **00%**.

Flashing colon or decimal points

Flashing colon or decimal points indicate that the unit will ***no longer accept shots*** because environment conditions have changed. To remedy this it is necessary to turn the unit **Off** and **On** again; this forces the unit to recalibrate itself. If the conditions are really bad, then nothing will help. Please note that the unit will not accept shots unless it is calibrated again.

Splash Guards

Some units, CE-1A and CE-2A , will accept transparent guards, that are placed over the optical slots to ***protect*** against ***black powder*** and ***paintball*** debris. When you clean these do not scratch the surface because it will affect velocity measurements. If scratched, it must be replaced.

Reset shot count

CE-1 model counts shots from **1** to **10** as you shoot. When it reaches shot number **10**, all subsequent shots are then numbered as shot number **10**. To clear memory and start from shot number **1**, the unit must be turned **Off** and then **On** again. Turning the unit off clears the memory.

Quick Reference

Adaptive Calibration

This unit must be calibrated after it is set up or light conditions have changed or it was relocated. Calibration is done by turning the unit ***off*** and then ***on*** with ***<POWER>*** key. Calibration is over when flashing is displayed. If a **decimal point** or **colon** appears, it indicates that calibration failed (see ***"Run Calibration"***). Calibration completion must be ***acknowledged*** by pressing ***<ENTER>*** key or else the unit ***will not work***. It will simply flash calibration results ***forever***. For example; flashing and indicates fluorescent lights overhead. If environment is ***unstable*** for a period of **60** seconds, or any ***key is pressed*** while calibration is active, then all calibration ***alarms*** are turned ***on***. You must try to calibrate again, fix environment problem or relocate the unit.

One Key functions

- ***<POWER>***–turn the unit on or off, unconditionally
- ***<UNITS>***—flip between meters and feet on the fly
- ***<ENTER>***—display the least significant digits

Two-key functions

This requires that you press two keys. Press and hold down first key and then press the second key while the first is held down.

- ***<ENTER*** + ***POWER>***–Display battery power level in %.
- ***<ENTER*** + ***UNITS>***—Set Muzzle blast control value

Three-key functions

This requires that you press three keys. Press and hold down first key and then press the second key while the first is held down, and finally press the third key while the first and second are held down.

- ***<ENTER*** + ***POWER*** + ***UNITS>***—Flip archery mode On or Off

USA and Metric display identifiers

When ***<UNITS>*** key is pressed display will identify units used.

- .mE.. Indicates Metric units are selected, **meters/sec**
- .FE. Indicates USA units are selected, **feet/sec**
- .08.. Two dots on each side of **08**, indicate Metric velocity
- .08. Absence of dots indicates USA units for velocity

Archery control

When archery mode is changed, the display will identify selected mode, which is either **on** or **off**.

- ArC0 Archery mode is turned off.
- ArC1 Archery mode is turned on.

Muzzle blast control

When muzzle blast control is changed, display will identify selected currently set range, which can be from **00%** to **98%**.

- nC00 Example of muzzle blast & noise reduction of 00%
- nC30 Example of muzzle blast & noise reduction of 30%
- nC80 Example of muzzle blast & noise reduction of 80%

Errors and alarms

Alarms are displayed as a flashing message. The message will flash for 10 seconds and then disappear. Pressing **<ENTER>** key makes the alarm disappear. **CH** models have advanced alarm control settings.

Flashing **dots** and flashing **colon** are special alarms that do not go away they indicate bad light conditions. These only go away if you fix the problem or turn sensors off, see***"Turn Sensors Off"***.

- Flashing ***colon***, sensors are off, unit will not accept shots
- Flashing ***decimal points***, calibration failed, bad conditions
- Flashing ***decimal points*** and/or **colon** requires recalibration
- Flashing ***last digit***, displayed number is greater then **9999.99** you must press ***<ENTER>*** key to see the rest of the number.

Battery Alarms

Battery alarms come on when battery voltage goes through the alarm threshold. After it has been acknowledged or it times out, the alarm stops. It only comes on again if battery conditions change or when reminder alarm comes on. These alarms come on when battery power drops below 35%; the unit will no longer calibrate properly or measure the velocities correctly.

- Prr3 Battery power level is low, performance will degrade
- Prr2 Battery power level is too low for detecting velocities
- Prr1 Battery is dead, only data and stats review possible

Chronograph Alarms

Chronograph alarms time out after 10 seconds or they can be cleared by pressing **<ENTER>** key.

- Crr1 Front sensor was missed
- Crr2 Rear sensor was missed
- Crr3 Rear sensor was missed
- Crr4 Possible muzzle blast
- Crr7 Crr8 Crr9 Possible EMI Interference

Displayed value has no decimal point

If there is no decimal point showing, even when **<ENTER>** key is pressed, then this implies that the decimal point is at the end of the display or beyond. For example; numbers **1000.00** to **9999.99** and **1000.000** to **9999.999** will have no decimal point displayed.

Calibration Status Results

Calibration status number is indicated by the flashing display that follows calibration completion. For example, if calibration status number was **+135** then the display will flash between CAL: and 135.

Indoors calibration status numbers

- From -450 to -511, fluorescent light overhead, or strong EMI.
- From -001 to -400, florescent and incandescent lights mixed.
- From +001 to + 350, functional range.
- From +400 to +511, too dark, must provide some light.

Outdoors calibration status numbers

- From -300 to -511, man-made interference nearby.
- From -001 to -250, EMI or bright sun (try diffusers).
- From +001 to +350, functional range.
- From +400 to +511, too dark, diffusers might help.
  This value may change from 495 to 511 when the battery power level exceeds 75%. Check battery power level.

Marginal calibration status results

- From +400 to +511 indicates marginal conditions.
- From -001 to -511 indicates bad conditions.

Calibration problems

If the unit takes too long to calibrate, (more then 50 seconds) this indicates that the battery is dead or there is interference nearby. Just in case you missed battery alarms, please check the battery power, see **Battery Power Level** function.

How the chronograph works

Our chronograph is based on optics and it does not emit any harmful radiation, such as a radar chronograph would.

The principle of operation is very simple; two optical sensors look through the slots on top of the unit. The two sensors are located deep down in the box. When the bullet passes over the first sensors it blocks the light that shines down through the first slot.

When this happens a clock is started. When the bullet passes over the second slot, which is the rear slot, then the clock is stopped. The internal computer knows the exact spacing between the front and the rear slot therefore it can calculate the speed of the bullet using the elapsed time. The elapsed time tells the computer how long it took the bullet to travel from first slot to the last slot. This is how most of the chronographs operate.

Getting Started

This device is an optical instrument, therefore dust and dirt will affect its operation. We strongly recommend that you treat it with the same respect as you would a digital camera.

Unpack the unit and install a new **9-Volt** battery.

Battery voltage must not exceed ***10*** Volts at any time, because this may ***destroy*** the unit.

If the unit does not start, remove the battery then press and hold down ***<POWER>*** key while you count from ***1*** to ***30.*** Then release the key and install the battery again. If this does not work then ***check battery voltage***. See ***"Troubleshooting"..."Dead unit"***

The unit detects shots **properly** only if the battery voltage is **above 7**-Volts. Below **7**-Volts the performance is reduced. Most chronographs appear dead if the battery voltage drops below **6.5**-Volts whereas our unit still functions but not within specified performance.

Please note: when battery power alarms come on
It is necessary that you replace the battery because the unit will no longer detect shots as intended.

Battery power alarms: 

Errors & Alarms

The unit uses a multitasking operating system and it continuously monitors all important parameters, such as light conditions, battery status, missed shots etc, while you are shooting. When something goes wrong, it reports the error by flashing a message on the display. Below are some of the possible messages that may be displayed. Urgent or Serious messages have to be acknowledged by pressing ***<ENTER>*** key. Less serious one will flash for a while and then disappear.

Battery

Battery level is continuously monitored and the following errors are displayed, indicating Power Errors. The message is displayed only once, it is redisplayed again if the conditions change.

Power level has dropped below 7.0 Volts. The unit's performance will degrade. Consider replacing the battery.

Power level has dropped below 6.0 Volts. The unit will still function but the results will not be accurate. You must replace the battery.

Power level has dropped below 5.3 Volts. The unit will still function but only for data retrieval and review. The battery is considered DEAD.

Please note that data retrieval and review section still functions with crisp clear display, even when the battery is considered dead. However we recommend that you do not use the unit because below 3.95 volts you will begin to lose you data.

Do not ignore these alarms because when power level is below 30% the unit may fail to calibrate, and will not detect shots properly. Even if the unit works, the velocity values may be incorrect. The display and the keyboard will still work when the power level is below 01%.

Velocity Errors

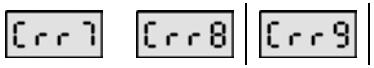
The unit will attempt to differentiate between real shot and muzzle blast or external interference. Because this is a low cost unit the detection of muzzle blast and external interference is not always 100% effective. Therefore here we have provided a limited alarms that indicate when a shot has been misread,

Front sensor missed, interference or muzzle blast.

Middle sensor was missed.

Rear sensor missed.

External interference or muzzle blast detected.



External interference.

Calibration Failure

When calibration fails because operator terminated the process or the conditions are bad, all decimal point on the LCD will start to flash. To remedy this you must try again by turning the unit off and on again. If this does not work, then you must read the section on **<Calibrating the Unit>.** You may have to remove the source of problem or provide sufficient light. Calibration will also fails if battery alarms are ignored and power level is below 35%. If the battery power is low calibration may fail.

Setup Failure

Every time you fire a shot the unit takes about 0.3 seconds to test and verify that there are no environment problems. If severe environment changes have been detected that will degrade performance, then the colon starts to flash. The unit will refuse to take more shots until you recalibrate it and correct the problem. The only way to fix this is to run calibration again by turning the unit off and on. The unit will now perform a thorough test to verify that you can still use the unit with considerable reliability.

Troubleshooting

Dead Unit

If nothing happens when you replace the battery then you check the following. Measure the battery voltage. Make sure the battery is installed correctly and not reversed.

To make sure the unit boots up properly, remove the battery and then press and hold down the **<POWER>** key for 45 seconds.

The battery voltage must be at least 4.6 Volts. The unit will not function as a chronograph with such a dead battery, it may only be used for data retrieval and stats review.

The battery may measure way over 4.6 volts on the voltmeter when measured without a load. When installed, the load may bring the voltage below 4.6 volts. A typical characteristic is a quick black display which suddenly disappears.

It must be noted that the chronograph will not detect velocities properly if the battery voltage is below 7.00 volts, under 10-mA load. The unit will begin flashing power level alarms

Flashing Decimal Point

If all **decimal points** are flashing, this means that the unit will not detect velocities unless it is calibrated again. The calibration is done by turning the unit **off** and **on** again.

Flashing Colon

When **colon** is flashing this means that the environment is not suitable for velocity measurements. You must recalibrate the unit. If sensors have been turned off, flashing colon will stop after you begin stats or shots review.
The unit will however remind you every 60 seconds that it needs to be calibrated again. The reminder will be flashing colon which can be suppressed for another 60 seconds by a simply executing stats or data review.

CE-1 & CE-2 Features

CE series chronographs are next generation intelligent chronographs that provide unique new features with a simple user interface. There is one key for each simple function.

Features for **CE-1** model

- Housings are temperature matched using a single large die.
- Digitally compensated temperature expansion, +/-0.001 inch.
- Ambient temperature is recorded, internally, with every shot.
- Sensors are precision mounted with a proprietary process.
- Remembers shots, even when turned off.
- Auto power shut-off after 30 minutes of inactivity.
- Battery Power level meter, displayed in % power left.
- Digitally selectable muzzle blast reduction from 00% to 90%
- True archery mode that is digitally selectable.
- Extensive alarm and error messages.

Features for **CE-2** model,

- It has a 40-shot memory.
- Memory string can be cleared or un-cleared.
- Individual shots can be deleted or un-deleted.
- Data recovery for accidental reset.
- Shots may be reviewed one by one, separate from Stats.
- Statistics may be review one by one, separate from Shots.
- Real time statistics permits Stats view as you shoot.
- Stats provided are; Low, High, Average, Extreme Spread, Standard deviation, Percent Standard Deviation and Total Number of shots in the string.
- Uses Adaptive Calibration for environment testing.

This chronograph has digitally selectable "**true archery**" mode, the very first such device on the market. You can switch from normal mode to archery mode, and vice versa, by simply pressing a few keys. On the other hand, competing chronographs must change electronic components to produce a quasi archery mode. Their archery units have severe limitation at low speeds. And if you need archery and regular unit then you must buy two of their units, one of each operation.

One of our units replaces two of theirs. Therefore you no longer have to carry two units round. Also, our chronograph gives you a true archery mode that is able to measures velocities from **2.00** to **9999.99** feet/sec.

Specifications

Computational Range	1.00 to 80,000.00	Feet/Sec
Applications Range	**2.00** to **9,999.00**	Feet/Sec
Accuracy, Low speed 6.0" above the sensors 2.5 f/s to 999 f/s	**0.3**	%
Accuracy, High speed 6.0" above the sensors 999 f/s to 10,000 f/s	**0.5**	%
Clocking Frequency	**24,000,000**	Hz
Shooting Area Low speed range, 2.5 f/s to 999 f/s	**60**	Inches Square
Shooting Area High speed range, 1000 f/s to 10,000 f/s	**20**	Inches Square
Operating Temperature Battery > 7.0 Volts	**- 20** to **+ 70**	Degrees Celsius
Operating Temperature Battery > 7.0 Volts	**- 4** to **+ 158**	Degrees Fahrenheit

Warranty

This product is warranted against all manufacturing defects for the period of 5 years. If the product is found to be defective please return it directly to us for repair or replacement.

CHRONOTAR.COM

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Returning the unit

Before returning the unit, you must give us a call to obtain return Instructions *or visit our website and click on* Returns *menu. You can also contact us vial email at return@chronotar.com.*

Technical support

If you have any problem with the unit, even a minor one, please let us know. You can either, call us, email a note to help@chronotar.com, or contact us directly via our website. Just click on Contact Us *menu.*

Main Website
http://www.chronotar.com