

ProChrono Plus operating instructions

****WARNING****

When using the ProChrono Chronograph, it is your responsibility to provide safe conditions for discharging your firearm. Proper eye and ear protection must be used, along with a suitable backstop. Your firearm must be aligned in the middle of the guide rod shooting area in order to avoid hitting the ProChrono chronograph and causing a dangerous ricochet. Deflection shields are NOT to be placed in front of the ProChrono, as they may cause a projectile to ricochet toward the shooter or bystanders.

Velocity readings obtained with the ProChrono Chronograph should not be used to obtain cartridge combustion pressure. In order to avoid possible injury when using reloaded ammunition, make it a standard practice to watch for excess pressure indications.

Competition Electronics, Inc., assumes no liability for any property damage or personal injury which may result from the improper use of this product.

BATTERY INSTALLATION

The recommended battery for proper operation of the ProChrono chronograph is a 9-volt ALKALINE battery, such as the coppertop Duracell, or equivalent. The dual battery compartment is located on the bottom of the ProChrono chronograph and its cover is removed by pushing the tab toward the battery cover and lifting. Make sure the power switch on the left side of the ProChrono is in the rear position, which is off. Simply snap the battery connector onto the battery and place the battery in the compartment that the battery connector is in. Replace the battery hatch cover.

GENERAL OPERATION

The ProChrono chronograph operates on the principle of measuring the time it takes for an object to travel from the first projectile sensor to the second projectile sensor. The sensors, mounted internally in the case, gather light through the two slits in the top of the case. If you can imagine looking up at the sky thru a tube, you will see what the sensors see. The only light they see is what is directly above them. Any light blockage caused by an object passing over them is converted to a signal which is detected by the ProChrono.

The elapsed time between the sensors is converted to velocity and is displayed on the LCD screen on the front of the ProChrono.

OUTDOOR LIGHTING SET-UP

The ProChrono chronograph may be mounted on a camera tripod or set on a table. Mount the diffuser hoods on sunny or very bright days using the following procedure. Mount the white diffuser to the black side shields by inserting the four black latches into the four holes in the diffusers. First insert the two latches on the end of the black shields into the holes furthest away from the end of the diffusers. Then push the diffuser holes toward the other two latches until the latches are inserted into the diffuser holes. Insert the 3/16 guide rods into the V notches in the black side shields. Insert one of the 3/16 guide rods mounted on the diffuser hood into one of the holes in the ProChrono next to the sensors. To get the correct angle to insert the other guide rod in the hole on the opposite side of the case, the diffuser material will be just about flat.

The muzzle of a pistol should be 5-10 feet away from the ProChrono, 10-15 feet with a rifle. The distance is not critical, but must be far enough away to keep from blowing apart the diffuser hoods with the muzzle blast.

IMPORTANT: Check the boreline-to-scope distance, and aim the crosshairs on the scope that much higher than the middle of the shooting area.

A bow can be used one arrows length away, just so the arrow can leave the bow completely before it travels over the ProChrono. If you are not back far enough, the velocities will be too low and will be inconsistent.

To chronograph shotgun loads, stand back at a distance of 5 feet from the muzzle of the gun to the front of the ProChrono. If you stand farther away, the shot spreads out causing inaccurate velocity readings. Also, the wad will separate from the shot column and may hit the ProChrono. The velocity obtained will be slightly higher than factory specs. The ProChrono measures the velocity of the first pellet which is going at a slightly higher velocity than the mass.

HOW THE PROCHRONO WORKS

Turn on the ProChrono by moving the power switch on the side of the case toward the display. The display should read '8.8.8.8' for about 3 seconds and then go to ready (rdY). Move back 10 feet and fire a shot. The display will

show your velocity and will hold it until the next shot. If a duplicate velocity occurs, the period in the display marked 'Duplicate' will appear. If the third velocity is also the same, the period will disappear. The period will alternate on and off for as long as duplicate velocities occur.

LOW BATTERY INDICATION

The ProChrono has a low battery indicator built into the unit. If the battery is nearly dead, the period marked 'Low Battery' will appear on the display. The battery should last for about 20 hours under continuous use.

PUSH BUTTON CONTROL

The push button on the side of the case next to the switch will control 13 functions. If you push the button once (1), it will display 'n0', indicating the number of shots are to be displayed in two seconds. If you push it again (2), the average velocity is displayed two seconds after the message 'AVeR'. On the next button push (3), reset occurs two seconds after the message 'rES'. This clears the number of shots and average velocity. To undo the reset, push the button again (4). The messages 'Und0', 'rES', and 'rdY' are displayed at two second intervals indicating the reset has been cancelled. On the fifth button push (5), the message 'dP' is displayed and the shot memory will be 'dumped' to the printer after a 2 second delay if an optional printer is present. NOTE: The clear LED on the side will transmit infrared data to the optional printer. NO LIGHT WILL BE VISIBLE.. After it is done printing, the message 'rdY' will be displayed. On the sixth button push (6), the messages 'rPrn' and 'rdY' are displayed and the last velocity will be reprinted. Push the button again (7) and you will delete the current velocity from the average velocity and the memory. The message 'dEL' is displayed. To undo the deleted velocity, push the button again (8). The messages 'Und0', 'dEL', and 'rdY' are displayed at two second intervals. On the ninth button push (9), the high velocity is displayed after the message 'Hl' and a two second delay. On the tenth button push (10), the low velocity is displayed after the message 'LO' and a two second delay. On the eleventh button push (11), the extreme spread of velocity is displayed after the message 'ES' and a two second delay. On the twelfth button push (12), the standard deviation of velocity is displayed after the message 'Sd' and a two second delay. On the thirteenth button push (13) and higher, the velocity is displayed after the shot number and a two second delay. You can fast forward to the function you want by pushing the button at intervals 2 seconds or faster. It will skip undo reset and undo delete when fast forwarding. For example, push the button 5 times quickly to go to reprint.

Additional push button operation

The quickest way to reset the ProChrono is to push the button quickly three times. Do not push the button again, because you will undo the reset.

After you finish with a string of fire, you may print the string of fire by holding the optional HP printer so the LED on the printer is opposite the clear LED on the side of the ProChrono and about 2 inches away. Then press the push button four (4) times until you see 'dP'. When 'rdY' appears, all the information is sent to the printer.

POWER DOWN MEMORY

After the ProChrono is turned on, the last shot string is still in memory. Before you turn it on however, you may want to cover the front sensor to ensure the ProChrono doesn't accidentally register a velocity caused by fluorescent lights. This would clear the memory. You may review the velocities at this point. You may also dump the memory or reprint the last velocity with the statistics to a printer. If you shoot over the ProChrono, the velocities will be reset and a new shot string will occur. If you desire to keep the last shot string and add to it, simply reset the unit and then undo the reset. The memory will hold up to 50 shots.

ERROR INDICATION

The ProChrono provides error indication by turning on the first period from the right side of the display marked 'Error'. An error occurs when the velocity is below 56 feet per second or the second sensor does not pick up the object.

Muzzle blast is another cause of errors and can be corrected by moving back a few feet further. Radar sites, TV stations and radio stations, electric fences or any other electrical noise generators can cause errors.

OPERATING CONSIDERATIONS

The ProChrono operates best on cloudy days. If you look up at the sky through

a rectangular tube, you see what the projectile sensor sees. On a sunny day, the amount of light coming through the tube is actually less than on a cloudy day, because the clouds diffuse the light and redirect it straight down into the projectile sensor. This is the best condition for the projectile to cast a good shadow on the sensor. The diffuser hood, actually simulates a cloud above the sensor. That's why it's advisable to use the diffuser hoods on sunny days or any lighting condition. The diffuser hood does not have to cast a shadow on the slot to work properly.

The second problem experienced with sunny days is the sun reflecting off the projectile. These reflections can cancel out the shadow, as well as cause bad velocity readings. Using the diffuser hoods will eliminate most reflection problems. If reflection problems persist, the best solution is to operate the ProChrono in the shadow of a building or opaque wall. Trees, however, do not provide a good solid shadow. Make sure the projectile sensors still have a clear view of the sky, but the projectile path over the sensors is in the shadow. This way, the sun can't reflect off the projectile, but the maximum amount of light from the sky is still available to operate the sensors. Another option is to blacken the projectile with a black marker. This greatly reduces reflections.

WARNING

When using sabots or gas checks, there is a chance they may depart from the projectile path and hit the ProChrono. This usually damages the display.

ADDITIONAL DIFFUSERS AND GUIDE RODS

Additional packs of 2 diffusers and 4 wire aiming guides are also available.

INDOOR SET-UP

The ProChrono will operate indoors using the optional indoor lighting setup. A tubular incandescent (filament) bulb and socket with cord mounted in a custom designed cardboard hood is provided along with extra length wire aiming guides.

OPTIONAL INFRARED PRINTER Hewlett Packard HP 82240B

Prints shot no., velocity and average velocity after every shot. Works best

with optional custom designed cardboard printer mount.

OPTIONAL REMOTE CONTROL

For displaying results from a distance without the need to walk back and forth. It consists of an 1/8" jack, 25 ft. of wire and a box with a normally open push button switch.

STANDARD DEVIATION (Sd)

If for example you have a standard deviation of 10 fps with an average velocity of 1000, 68% of the shot you fire will fall within 990 to 1010 fps. If you double the 10 fps standard deviation to 20 fps, 95.4% of the velocities will fall within 980 to 1020 fps. The more shots you fire, the more accurate the standard deviation. A minimum of 5 shots is needed and more would be desirable.

EXTREME SPREAD (ES)

To get the Extreme Spread, the lowest velocity is subtracted from the highest velocity.

METRIC/FEET PER SECON SELECTION

To convert from feet per second to meters per second, simply hold down the side push button then turn the ProChrono on. Hold down the button until the display shows "rdy". You will be in the opposite mode at this time. If you are expecting feet per second, and the velocity is approximately 1/3 of what you expect, you are in the meters per second mode.