Pro Pace Clock and Shot Clock

User Guide

Colorado TIME SYSTEMS®

F891 Rev. 0406

Colorado Time Systems

Corporate Office
1551 East 11th Street
Loveland, CO 80537 USA

Sales - 1-800-279-0111 or +1 970-667-1000

Service: 1-800-287-0653 x256 or +1 970-667-1000 x256
FAX: 970-667-1032

Web: www.coloradotime.com
Email: customerservice@coloradotime.com

Part Number F891 Rev. 0406

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Introduction

Thank you for purchasing a Colorado Time Systems Pro Pace Clock/Shot Clock.

Introduction

This introductory chapter describes physical features of your Pro Pace Clock/Shot Clock. Subsequent chapters describe how to set up and use your Pro Pace Clock/Shot Clock in a variety of ways.

Pace Clock Operation

Chapter 2, beginning on page 5, describes how to physically set up single or multiple Pro Pace Clocks for basic pace clock operation.

Water Polo

Chapter 3, beginning on page 7, describes using the units for Water Polo, primarily as shot clocks, but also for displaying game time.

Training Modes

Chapter 4, beginning on page 9, describes the training modes, including what the mode does and which other devices are needed for the mode.

How to Set Intensity

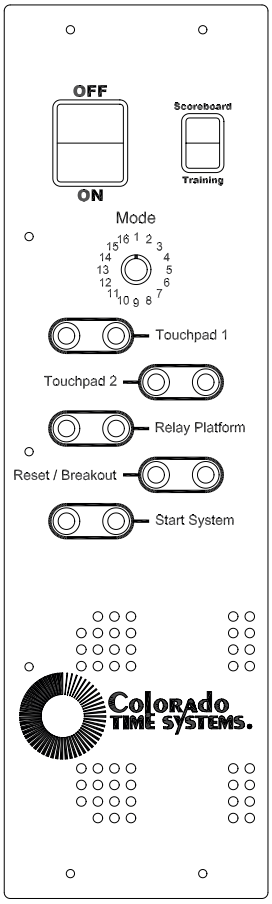
Use the Mode switch on the front panel to set the intensity of the LED digits as follows:

Intensity

When a Pro Pace Clock is turned on, the clock will first display **in** for Intensity. While **in** is displayed, the Mode switch adjusts the intensity of the display. Eight levels of intensity are available, from 1 (low) to 8 (high). These same settings can also be selected from 9 (low) to 16 (high).

Mode

After the Mode switch has been in the same intensity setting for 4 seconds, the clock will display the firmware revision, and then the current mode. At this point, the Mode switch changes the mode. The Mode switch will change *only* the mode until the clock is turned off and then on again.



Front panel

Physical Connections

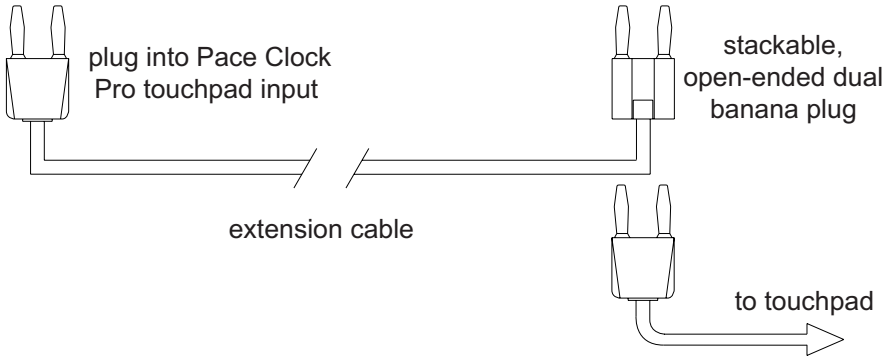
Scoreboard/Training

When the switch is set to scoreboard, and the clock is connected to a timer or controller through the quarter-inch phono plug (RS-232) or the round 4-pin connector (RS-485), the pace clock will display controller/timer channel information. Select which scoreboard module to display using the 16-position mode switch.

When the switch is set to training, the training mode that is selected using the 16-position mode switch will be displayed. The various training modes are described in Chapter 4 beginning on page 9.

Input Modes

Most of the various training modes require input from one or more of the following: touchpads, relay platform, pushbutton or start system. Plug the device(s) providing the input into the proper connector(s) on the front panel.



Cabling for far end touchpad input

Most input connections are self-explanatory.

Pushbuttons

For all input connectors, a pushbutton operated by a human judge may be connected to provide input; however, some precision in timing will be lost. The pace clock records to a hundredth of a second, but a human with a pushbutton can't come close to that level of accuracy!

Touchpads

There are two touchpad inputs to allow for touchpad input from both ends of the pool. The touchpad inputs are connected to the same internal signal, so it makes no difference which one is used.

To take input from touchpads at both ends of the pool, plug the touchpad from one end of the pool into either touchpad input on the Pro Pace clock. Plug the touchpad from the other end into the other touchpad input, using an extension cable (CTS SJ series) with a stackable, open-ended dual banana plug.

Battery

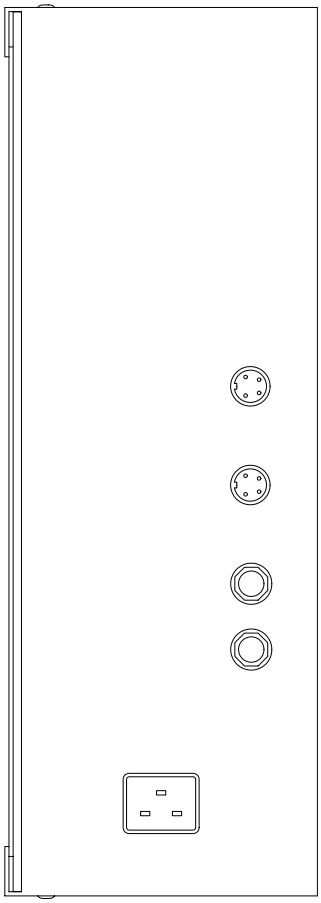
An internal battery can supply power to the pace clock. A fully charged battery will run the unit for a minimum of 6 hours. Leave the unit plugged in overnight to fully charge the battery after use. The battery charges any time the unit is plugged in to AC power.

Horn

The internal horn is controlled by a CTS timer connected to the unit, and requires no user intervention, other than selecting the proper setting on the mode switch, as described in the Water Polo chapter, beginning on page 7.

Legs

The pace clock includes legs. If you would like to use the legs, attach them with the hardware included to the threaded mounting holes in the bottom of the pace clock.



Side panel

Data cable connections

On the right end panel, there are four data cable connectors and a power receptacle. The upper two data cable connections are round, 4-pin connectors for RS-485; the lower two are quarter-inch phono connectors for RS-232.

AC Power connection

The power receptacle accepts a standard power cord for 110 VAC. If 220 VAC is required, the power supply can be modified at the factory. Modified units are labeled accordingly.

2

Pace Clock Operation

Standalone Pace Clock

For simple pace clock operation, turn the Pro Pace Clock on. Set the Scoreboard/Training switch to Training, and set the Mode switch to 2. The pace clock will display 02 (for mode 2), and then reset itself to :00 and begin counting up. After displaying 59:59, the display rolls over to :00.

Pace Clocks in Series

Without Timer or Controller

To run a series of pace clocks without an external controller, set the Scoreboard/Training switch on the front panel of the first pace clock to Training, and set the Mode switch to 2. Set the other pace clock(s) to Scoreboard and Mode 2. Connect the pace clocks with data cables using the round 4-pin (RS-485) connectors. All connected pace clocks will display the same information.

Turn the pace clocks on with the power switch on the front panel. The pace clocks will begin counting up from zero, displaying time as minutes and seconds. After displaying 59:59, the displays will roll over to :00.

With Timer or Controller

A pace clock or series of pace clocks can be controlled using a CTS timer or pace clock controller. The pace clock(s) will display the information that is sent to the scoreboard module corresponding with the mode switch setting.

To control a single pace clock or a series of pace clocks with a CTS timer or pace clock controller, set the Scoreboard/Training switch to Scoreboard. Connect one pace clock to the timer at the timer's scoreboard output port, or connect it to the pace clock controller. Use a data cable with either a round 4-pin (RS-485) connector or a quarter-inch phono connector (RS-232), whichever your timer or controller supports. If you are connecting multiple pace clocks, connect the

pace clocks to each other with the same type of data cable used to connect to the timer or controller.

Turn the pace clock(s) on with the power switch on the front panel.

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Water Polo Operation

Mode Switch Setting	Use
4	Shot Clock
2	Game Clock
6	Time Out Clock

Setting up Shot Clocks

On both shot clocks, set the Scoreboard/Training switch to Scoreboard, and set the Mode switch to 4. Connect one shot clock to the timer through the scoreboard output port with a data cable using either the round 4-pin (RS-485) connector or the quarter-inch phono connector (RS-232), whichever your timer supports. Connect the shot clocks to each other with the same type of data cable.

Using Shot Clocks with a scoreboard

If you are also displaying game information on a scoreboard, there are two ways to connect both the scoreboard and the shot clocks to the timer.

1) Connect the first shot clock and the scoreboard to the timer using a splitter at the timer, or

2) Connect the first shot clock to the timer, connect the second shot clock to the first, and connect the scoreboard to the second shot clock with data cables.

Turn on the shot clocks with the power switch on the front panel. To operate properly, the CTS timer must be set to display Channel 02

(shot time) on Module 03. This is the default setting. The CTS timer will automatically start and stop the shot clocks and sound the horns. See your CTS timer Water Polo software manual for more information about shot clocks.

Using a Pace Clock/Shot Clock to display game time

A third pace clock/shot clock can be used to display game time. To operate properly, the CTS timer must be set to display Channel 01 (game time) on Module 01. This is the default setting.

On this third clock, set the Scoreboard/Training switch to Scoreboard, and set the Mode switch to 2. Connect it, in whatever order is most convenient, to the series of shot clocks using a data cable of the same type as the data cables connecting the shot clocks and the CTS timer. Turn it on with the power switch on the front panel. The CTS timer will automatically start and stop the game clock and sound the horn at the end of each period. See your CTS timer Water Polo software manual for more information about game time.

Using a Pace Clock/Shot Clock to display time out time

A pace clock/shot clock can be used to display the amount of time remaining in a time out. To operate properly, the CTS timer must be set to display Channel 05 (time out time) on Module 05. This is the default setting.

On this clock, set the Scoreboard/Training switch to Scoreboard, and set the Mode switch to 6. Connect it, in whatever order is most convenient, to the series of shot clocks using a data cable of the same type as the data cables connecting the shot clocks and the CTS timer. Turn it on with the power switch on the front panel. The CTS timer will automatically start and stop the time out clock. See your CTS timer Water Polo software manual for more information about time out time.

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Training Modes

Mode #	Mode Description	See Page #
1	Lap counter	9
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10, 11, 12, 13, 14	Single Lane Timer (1, 2, 3, 4 or multiple laps)	14
15	Mid-race Timer	16
16	Test Mode	17

Lap counter

Mode 1

Equipment required:

Touchpad required; start system or pushbutton can be used to reset the clock.

Set up:

Connect the touchpad to either Touchpad input. If using a start system or pushbutton for resetting the display, connect the start system or a pushbutton to the Start System input, or connect a pushbutton to the Reset/Breakout input.

Operation:

The clock displays 01, indicating mode 1. The display will flash, and then show 0, indicating 0 laps completed. Each valid touchpad hit will cause the display to count up by 1.

A start input (either a start signal from the start system or one click on a pushbutton connected to the start input) or a double click on a pushbutton connected to the reset/breakout input will reset the counter to 0.

Simple Pace Clock

Mode 2

Equipment required:

None required for basic operation; start system or pushbutton can be used to reset the clock.

Set up:

If using a start system or pushbutton for resetting the clock, connect the start system or a pushbutton to the Start System input, or connect a pushbutton to the Reset/Breakout input.

Operation:

The clock displays 02, indicating mode 2. The display will flash, display :00, and begin counting up, showing the time as minutes and seconds. After displaying 59:59, the display will roll over to 00:00. A start input or a double click from the reset input will reset and start the clock.

Pace clock with Cumulative Splits

Mode 3

Equipment required:

Touchpad required; start system or pushbutton can be used to reset the clock.

Set up:

If using a start system or pushbutton for resetting the clock, connect the start system or a pushbutton to the Start System input, or connect a pushbutton to the Reset/Breakout input. Connect the touchpad to either Touchpad input.

Operation:

The clock displays 03, indicating mode 3. The display will flash, display :00, and begin counting up, showing the time as minutes and seconds.

At each valid touchpad hit, the display shows the time of the touchpad hit (cumulative split) in seconds and hundredths (SS.HH). Meanwhile, the running time continues internally. Following the cumulative split display the clock will resume displaying the running time as minutes and seconds. Once the running time is above a min-

ute, the time of the touchpad hit is shown alternating between seconds and hundredths (SS.HH) and minutes and seconds (MM:SS).

A start input or a double click from the reset input will reset and start the clock any time the running time is displayed.

Pace clock with Lap Splits

Mode 4

Equipment required:

Touchpad required; start system or pushbutton can be used to reset the clock.

Set up:

Connect the touchpad to either Touchpad input. If using a start system or pushbutton for resetting the clock, connect the start system or a pushbutton to the Start System input, or connect a pushbutton to the Reset/Breakout input.

Operation:

The clock displays 04, indicating mode 4. The display will flash, display :00, and begin counting up, showing the time as minutes and seconds.

At each valid touchpad hit, the display shows the time of the touchpad hit (lap split) in seconds and hundredths (SS.HH). The running time is reset to 0 at the touchpad hit, and continues running internally. Following the lap split display, the clock will resume displaying the running time as minutes and seconds.

A start input or a double click from the reset input will reset and start the clock any time the running time is displayed.

Relay Exchanges

Mode 5

Equipment required:

Touchpad and relay judging platform (RJP).

Set up:

Connect the touchpad to either Touchpad input. Connect the RJP to the Relay Platform input.

Operation:

The clock displays 05, indicating mode 5. The numbers on the display go blank, leaving the colon and rightmost decimal lit. The clock is waiting to record a relay exchange.

RJP input times are recorded, and the first touchpad hit is recorded. For a legal relay exchange (the touchpad hit occurred before the relay takeoff), the display shows the relay exchange time in seconds and hundredths (SS.HH). For an illegal relay exchange (the

touchpad hit occurred after the relay takeoff), the display shows the difference between the two, preceded by a minus sign. If no valid RJP input is detected within 2 seconds of a touchpad input, “Err” will be displayed on the clock.

The clock displays the exchange time for 10 seconds, and then automatically resets itself for the next exchange.

Start Reaction

Mode 6

Equipment required:

Start system or pushbutton, and touchpad for backstroke starts or RJP for starting block starts. Optional pushbutton for reset.

Set up:

Connect the start system or a pushbutton to the Start System input. For backstroke starts, connect the touchpad to either Touchpad input. For starting block starts, connect the RJP to the Relay Platform input. If you would like to use a pushbutton to reset the clock after a start has been recorded, connect a pushbutton to Reset/Breakout.

Operation:

The clock displays 06, indicating mode 6. The numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a start input. The start input starts the clock and the display counts up in hundredths of a second for 2 seconds. All touchpad or RJP inputs detected during this time are recorded, and the last one recorded is displayed at the end of the 2-second window.

The start reaction time (the difference between the start input and the swimmer’s departure) is displayed until the clock is reset with a double click from the Reset/Breakout input, or a new start input.

If a start input is received and no RJP or touchpad input is detected within 2 seconds, the clock will display “Err.”

Turn Speed

Mode 7

Equipment required:

Touchpad

Set up:

Connect the touchpad to either of the Touchpad inputs.

Operation:

The clock displays 07, indicating mode 7. The numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a touchpad input (typically hand touch). All touchpad releases detected during the next 3 seconds are recorded. The last one recorded (departure) is displayed at the end of the 3-sec-

ond window, showing the time it took for the turn (the difference between the two).

The clock displays the turn time for 10 seconds, and then automatically resets itself for the next turn.

Breakout Time

Mode 8

Equipment required:

Start system, and breakout timer or pushbutton.

Set up:

Connect the start system to the Start System input, and connect the pushbutton or other breakout timer to the Reset/Breakout input.

Operation:

The clock displays 08, indicating mode 8. The numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a start input. The start input starts the clock and the display counts up in hundredths of a second until a breakout input is detected.

The breakout time (the difference between the start input and breakout input) is displayed until the clock is reset with a double click from the Reset/Breakout input, or until a new start input starts the clock from zero.

Start Reaction and Breakout Time

Mode 9

Equipment required:

Start system, breakout timer or pushbutton, and touchpad or relay platform.

Set up:

Connect the start system to the Start System input, and connect the pushbutton or other breakout timer to the Reset/Breakout input. Connect the touchpad to either Touchpad input or connect the RJP to the Relay Platform input.

Operation:

The clock displays 09, indicating mode 9. The numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a start input. The start input starts the clock and the display counts up in hundredths of a second for 2 seconds. All touchpad or RJP inputs detected during this time are recorded, and the last one recorded is displayed at the end of the 2-second window. The clock continues to count internally while it displays this time (start reaction time). Running time resumes on the display, until a breakout/reset input is detected. The breakout time is then displayed

until the clock is reset with a double click from the Reset/Breakout input or a new start input.

Single Lane Timer

Modes: 10, 11, 12, 13 and 14

1, 2, 3, 4 or multiple laps with optional Start Reaction Time and optional Relay Exchange Time

Equipment required:

Start system or pushbutton, and touchpad; relay platform for start reaction time from starting block starts; pushbutton for timing more than 4 laps

Set up:

Connect the start system or the pushbutton to the Start System input, and connect the touchpad to either Touchpad input.

For start reaction time from starting block starts, connect the RJP to the Relay Platform input. For start reaction time from backstroke starts, inputs from the touchpad that is already connected will be recorded and used.

For mode 14 (multiple lap timing), connect a pushbutton to the Reset/Breakout input.

Operation:

The clock displays 10, 11, 12, 13 or 14 indicating the mode. These modes are the same except for the number of touchpad inputs expected. In all five of these modes, the numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a start input. The start input starts the clock and the display counts up in seconds.

Single Lane Timing: Start Reaction

The first option in all five modes is start reaction time. All touchpad or RJP inputs detected during the initial 2 seconds from start input are recorded, and the last one recorded is displayed at the end of the 2-second window. The start reaction time (the difference between the start input and the swimmer's departure) is displayed, after which the display resumes counting up in seconds.

If there are no touchpad or RJP inputs during the 2 seconds after the start input, the display simply continues to count up in seconds.

Single Lane Timing: Lap Timing (& Length Timing)

For lap timing, this assumes that the touchpad is at the same end of the pool as the starting blocks, and therefore the swimmer swims to the other end and back before touching the touchpad. Length timing can also be done, with a touchpad at each end of the pool: one connected to the Pro Pace Clock at Touchpad 1 and the other at Touchpad 2 (see page 3 for cabling this option).

At each valid touchpad input, the display shows the time elapsed since the start input (cumulative split), alternating between seconds (MM:SS) and hundredths (SS.HH). If the elapsed time is less than a minute, the display will not alternate; it will show the time in SS.HH format.

In mode 10 (single lap timing), the display shows the first elapsed time until a reset or new start input is detected.

In mode 11 (two lap timing with splits), running time continues internally while the display shows the cumulative split. The display then resumes running time until a second touchpad input is detected, indicating a second lap completed. This final time is displayed until a reset or a new start input is detected.

In mode 12 (three lap timing with splits), running time continues internally while the display shows the cumulative split. The display then resumes running time after displaying each cumulative split until the third touchpad input. This final time is displayed until a reset or a new start input is detected.

In mode 13 (four lap timing with splits), running time continues internally while the display shows the cumulative split. The display then resumes running time after displaying each cumulative split until the fourth touchpad input. This final time is displayed until a reset or a new start input is detected.

In mode 14, running time continues internally while the display shows the cumulative split. The display then resumes running time after displaying each cumulative split until a single Reset input is detected. The clock then stops timing after the next touchpad hit. This final time is displayed until a reset or a new start input is detected.

Single Lane Timing: Relay Exchange Timing

All Single Lane Timing Modes with multiple laps (or lengths, if length timing is being done) have optional relay exchange timing capabilities at each touchpad hit before the final one.

The first touchpad hit (cumulative split) is recorded, disabling the touchpad and starting a 2-second window. During the 2-second window, RJP input times continue to be recorded. After the 2-second

window expires, RJP input will be disabled and the cumulative split will be displayed.

If a valid RJP input was detected, the display will then show the relay exchange time. For a legal relay exchange (the touchpad hit occurred before the relay takeoff), the display will then show the relay exchange time in seconds and hundredths (SS.HH). For an illegal relay exchange (the touchpad hit occurred after the relay takeoff), the display shows the difference between the two, preceded by a minus sign.

If no valid RJP input is detected within 2 seconds before or after a touchpad input, only the cumulative split will be displayed on the clock, as described in the Lap & Length Timing section above.

Mid-Race Timing

Mode 15

Mid-race timing is designed to time the middle portion of a race, eliminating both the start and the finish. It can be done with touchpads at both ends of the pool, or only at one end.

1) With a touchpad at one end only, the timing will include one lap and three turns.

2) With a touchpad at each end, the timing will include one length and two turns.

Equipment required:

Start system or pushbutton, and touchpad(s).

Set up:

Connect the pushbutton to the Reset/Breakout input, or connect the start system or a pushbutton to the Start System input. If using one touchpad, connect it to either Touchpad input. If using touchpads at both ends of the pool, connect the touchpad from one end of the pool into either touchpad input on the Pro Pace clock. Plug the touchpad from the other end into the other touchpad input, using an extension cable (CTS SJ series) with a stackable, open-ended dual banana plug (see page 3).

Operation:

The clock displays 15, indicating mode 15. The numbers on the display go blank, leaving the colon and the rightmost decimal lit. The clock is waiting for a touchpad input (first hit of turn). The first touchpad input starts the clock, and the display begins counting up in hundredths of a second. The touchpad input is inactive for 3 seconds after the first hit, to allow the swimmer to exit the pad.

The clock records the next touchpad hits. The last one recorded (push off) is compared with the initial touchpad touch and the difference between the two is displayed.

With a touchpad at one end, this is the time it took the swimmer to make an initial turn, swim down the lane, turn at the other end, swim back and complete the turn at the end with the touchpad.

With a touchpad at each end, this is the time it took the swimmer to make an initial turn, swim down the lane and complete the turn at the other end.

The clock displays the mid-race time until the clock is reset with a double click from the Reset/Breakout input, or a start input.

Test Mode

Mode 16

Equipment required:

Depends upon testing.

Set up:

Follow specific instructions from CTS customer service representative.

Operation:

The clock displays 16, indicating mode 16. It will then cycle through a digit test. Note that the decimal after the third digit is never used, and will not light during the digit test.

Input ports can also be tested. When an input port receives a signal the clock shows which input port was triggered, as shown:

Touchpad	PAd
RJP	rJP
Start	StArt
Reset/Breakout	rESET

Sales: **1-800-279-0111 or 1-970-667-1000**
Service: **1-800-287-0653, x256 or 1-970-667-1000**
FAX: **(970) 667-1032**

Web: www.coloradotime.com
Email: customerservice@coloradotime.com

Colorado Time Systems
1551 East 11th Street
Loveland, CO 80537 USA