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## 1020-SCR

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Crossover Plus SCR  
Part # 1020-SCR

Instructions

The *Crossover Plus* is the latest in a full line of electronic racing products from Digital Delay, Inc.. Designed to be more reliable and user friendly than any other multi-function delay box on the market. The *Crossover Plus* has a 12 digit keypad for fast and precise entry of information into the unit while a single illuminated multi-segment liquid crystal display is used to display all relative information.

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# Features, Applications, and Specifications

## Features:

- Discrete solid state I/O (input - output) construction
- Microprocessor controlled timing with accuracy to 0.0001 of a second
- Retains all numbers even when power is disconnected from the unit
- Large display for easy reading of times
- Low voltage warning and full status indication
- Illuminated liquid crystal display for both day and night use
- Dust & splash proof display lens & key pad with detent (positive feel)
- 1 or 2 pushbutton, bump up or down, and recovery
- Easy and fast selection or entry of all information even with gloves
- Self test mode on all display functions
- Programmable back-light intensity control
- Very high Transbrake current output (20 Amps)
- Instant timing cycle reset

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## Applications:

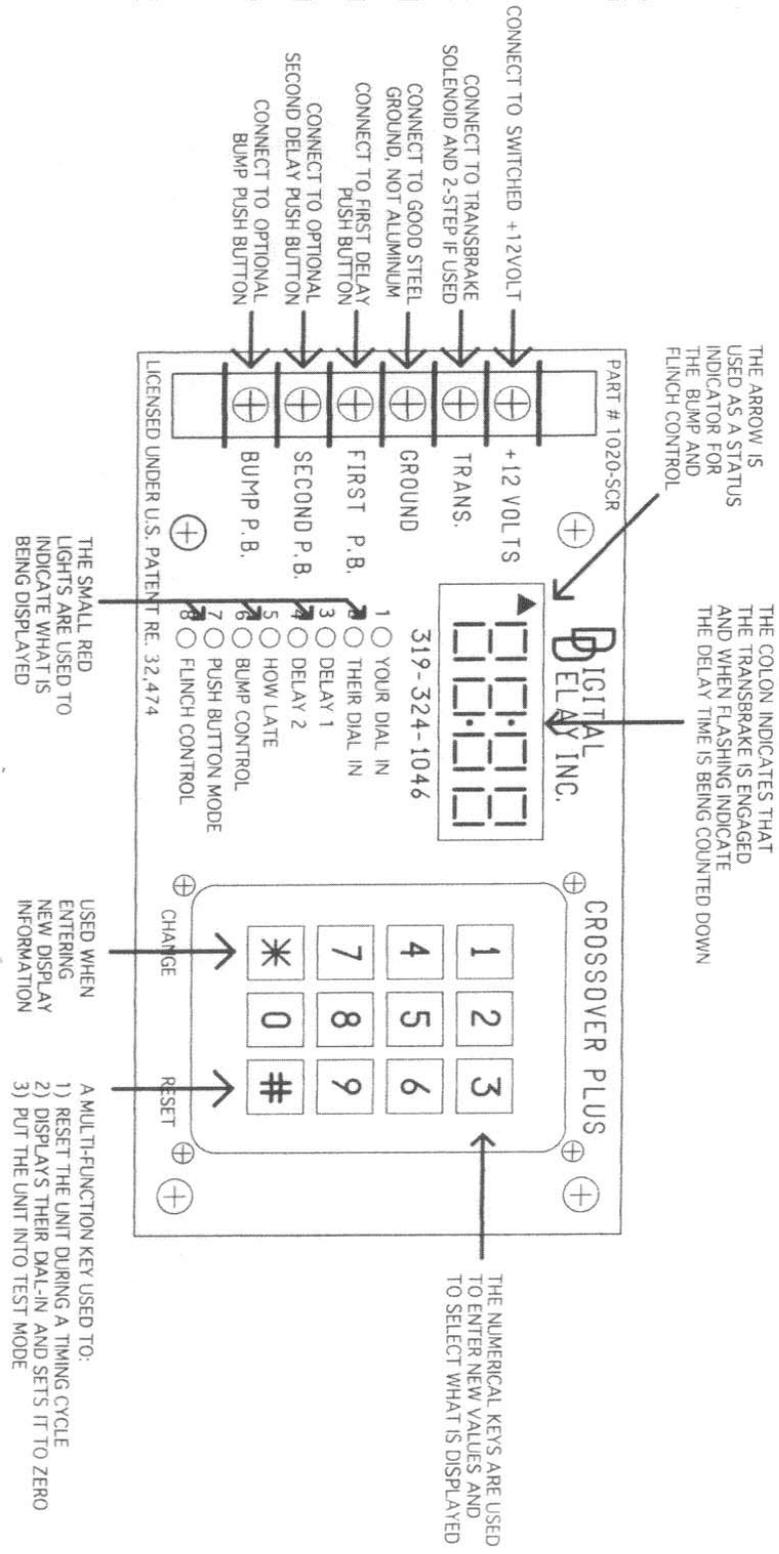
- Controls Transbrake Solenoids
- Controls 2, 3 and 4-Stage Timers
- Controls 2-Steps

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## Specifications:

- Input Voltage Range: 10 to 16 Volts DC
- Dial-In Time Range: 00.00 to 99.99 seconds in .01 increments
- Delay Time Range: 0.000 to 9.999 seconds in .001 increments
- Flinch Time Range: 0.000 to 0.999 seconds in .001 increments
- Push Button Input Current Draw: 0.1 Amps. at 12 Volts
- Transbrake Output Current: 20 Amps.
- Operating Temperature Range: 0 to 150 degrees F

# Quick Reference Diagram



NOTE: FOR MORE COMPLETE DETAILS REFER TO THE TABLE OF CONTENTS ON PAGE 2

# The Terminal Strip

**+12VDC Terminal:** Connect the +12VDC terminal to a switched +12 Volt source with enough amperage capable of driving the transbrake. (Using an in-line fuse just large enough to handle the current draw of the transbrake solenoid, *normally 15 Amps.*, is recommended.)

**Transbrake Terminal:** Connect the Transbrake terminal to the Transbrake solenoid. Connect the low side of the 2-Step, the red wire, here if used.

When entering new information into the unit, there must be a number (0-9) in every valid space on the display or the transbrake terminal will not function.

**Ground Terminal:** Connect the Ground terminal to the Neg. terminal on the battery or to a good steel ground, not aluminum.

**Button-1 Terminal:** In single Push Button Mode the push button connected to Button-1 terminal is used to control the primary delay and the secondary delay in sequence. In dual Push Button Mode the push button connected to Button-1 terminal is used to control the primary delay only.

**Button-2 Terminal:** In single Push Button Mode the push button connected to Button-2 terminal is used to control the recovery if turned on. In dual Push Button Mode the push button connected to Button-2 terminal is used to control the secondary delay only.

**Tap Terminal:** If taping up or down is desired connect a push button to the Tap terminal. This allows you to subtract or add a programmable amount of time from the first delay time started every time the Tap Push Button is depressed.

**Note:** In single Push Button Mode the Tap Up or Down only affects the primary delay and has no effect on the secondary delay.

# The Display

The display on the *Crossover Plus* is used to display all of the information that is stored in memory, as well as information entered on the keypad. There are eight red L.E.D.s to the left of the keypad. Starting from the top and going down the text that is to the right of the last lit L.E.D. corresponds to the information being shown on the display. For example if the last L.E.D. lit is next to the text “How Late” (#5) the Display would be showing the How Late information.

## Other special functions of the display are:

**Low Voltage Indication:** The numbers on the display will flash when voltage to the unit is below the recommended minimum of 11.5 Volts.

**Transbrake-Colons:** When the transbrake is engaged the colon will turn on. When the delay timer starts counting down the colon will flash.

**Recovery Arrow:** When the Recovery information is being displayed, and the arrow is shown the Recovery is on. If the arrow is not being displayed the Recovery is off.

**Tap Arrow:** When the Tap information is being displayed and the arrow is shown, the unit is set in tap up mode. If the arrow is not shown the unit is in tap down mode.

**Decimal Point:** When displaying times, the decimal point will move to the correct position for the time displayed. When displaying Tap Control or Push Button mode information the decimal point will not be displayed.

# Setting the Back-light Intensity

To set the back-light Intensity press the 9 key on the keypad. The left most digit will show the current setting. To change the setting, press the \* key on the keypad followed by the new setting (1-9). The smaller the number, the dimmer the back-light will be.

## The Keypad

The keypad is made up of 12 keys, 10 numerical and 2 function keys, that control all the information pertaining to the Crossover Plus. The numerical keys 1-9 are used to view information stored in memory. Also when used in conjunction with the function key \* the numerical keys 0-9 are used to enter new information. The function key # has three separate functions described below.

### Selecting Displayed Information

The numerical keys 1-9 are used with the text next to the small red L.E.D.s to select the displayed information. This is done by pressing the number on the keypad that corresponds to the number for the text of the desired information. For example, to display the “Delay 1 time” the 3 key would be depressed. Pressing the 9 key will turn off all the red L.E.D.s and bring up the back-light intensity setting.

### Function Key \*

The function key \* is used with the numerical keys for entering new times or modes. For example to enter a new Delay 1 Time, first press the 3 key on the keypad to bring up the current stored Delay 1 Time. Next press the \* key on the keypad, the display will go blank indicating it is ready to accept a new Delay 1 Time. Use the numerical keys to enter the new Delay 1 Time into the unit, leading zeros must be entered. As the numbers are entered they will appear on the display indicating the number was accepted and stored into memory. Once a new value is started it must be completed before any other function of the delay box will work.

If an error is made while entering, press the \* key to erase the last digit entered. This can be repeated as many times as necessary until the display is blank.

### Function Key #

The function key # controls three separate functions.

- 1) If pressed during a delay cycle, the delay cycle will be cancelled and the unit will be reset. This constitutes a master reset for the delay cycle.
- 2) If pressed while the unit is not running a delay cycle, “Their Dial-In” will be displayed and set to all zeros, making sure the next run is not on the previous opponent’s Dial-In.
- 3) If the # key is held down while the power is being turned on, the unit will go into a special test mode. This is described in Testing of the Unit.

# Setting Dial-In and Delay Times

To enter a new Dial-In or Delay Time, first press a numerical key (1-4) on the keypad to bring up the current stored time. Then press the \* key on the keypad. The display will go blank indicating it is ready to accept a new time. Next use the numerical keys to enter the new four digit time into memory, leading zeros must be entered. As the numbers are entered they will appear on the display indicating the number was accepted and stored into memory. Once the \* key is pressed all four digits must be entered before any other function of the delay box will work.

If an error is made while entering, press the \* key to erase the last digit entered. This can be repeated as many times as necessary until the display is blank.

## Setting the Recovery

To enter a new Recovery Time, first press the 8 key on the keypad to bring up the current Recovery Time stored in memory. Then press the \* key on the keypad. The display will go blank indicating it is ready to accept a new time. Next use the numerical keys to enter the new three digit time into memory, leading zeros must be entered. As the numbers are entered they will appear on the display indicating the number was accepted and stored into memory. At any time after pressing the \* key and before entering the third digit, pressing # will either turn on the Recovery along with the arrow in the display or turn both off. Once the \* key is pressed all three digits must be entered before any other function of the delay box will work..

If an error is made while entering, press the \* key to erase the last digit entered. This can be repeated as many times as necessary until the display is blank.

## How the Recovery Works

For the Recovery to work, the Crossover Plus must be in Single Push Button mode with the Recovery turned on and have a push button connected to the Second Push Button Terminal. If the Recovery is on and the push button connected to the Second Push Button terminal is pressed, after the primary delay or secondary delay was started and before the Transbrake has released both the primary and secondary delays will be canceled. When the push button is then released the Recovery time starts counting down to zero. When the count reaches zero the transbrake will be released.

## How Late

To display the How Late information press the 5 key on the keypad. The right three digits display the How Late time. The left most digit will display an “8” if the transbrake released on Delay-2 (4-Digit). The left most digit will be blank if the transbrake released on Delay-1 (Crossover). For example if the number displayed is “8.012” and your reaction time was .510 on the time slip, add the How Late time to the .510 for a total reaction time of .522 on the crossover delay.

## Tap Up/Down

To display the Tap information press the 6 key on the keypad. The left most digit shows the programmable time (1 to 9 hundredths of a second) to be added to, or subtracted from the delay time every time the Tap push button is pressed. The right two digits show the number of times the Tap push button was pressed the last time it was used during a timing cycle. The Tap time will only affect the first delay time started. To change the programmable time press the \* key on the keypad. The left most digit will now be blank and the unit can be switched between the Tap Up and Tap Down modes by pressing the # key (arrow on means uump up, no arrow means tap down). After selecting the desired Tap Up or Down mode enter the new number (1-9) for the programmable time.

**NOTE:** Both How Late and Tap information are stored in memory until a new How Late or the Tap number replaces it.

## Setting Push Button Mode and the Push Button Interrupt Time

To set the Push Button Mode press the 7 key on the keypad. The left most digit will be either a “1” or “2” to indicate which Push Button Mode the unit is in, when in Single Push Button Mode, the *First P.B.* starts both the primary and secondary delays. When in dual Push Button Mode, one or both push buttons can be used in any sequence. The *First P.B.* starts the primary delay and *Second P.B.* starts the secondary delay. The two right digits show the programmable amount of time (00 to 99 seconds) that after the transbrake releases, *First P.B.* and *Second P.B.* push button inputs are disabled. To change either the Button Mode or the Interrupt Time first press the \* key, then enter a “1” or “2” for the Push Button Mode followed by a two digit number representing the Push Button Interrupt Time. For example “1 10” would indicate single Push Button Mode with a 10 second Interrupt Time. If no Push Button Interrupt Time is wanted, after pressing a “1” or “2” for the Push Button Mode enter “00” for the interrupt time.

# Wiring and Testing the Unit

The *Crossover Plus* has a built-in test mode for the displays, the small red L.E.D.s, and the push button inputs. To put the unit into the test mode hold the function key # down while power is being turned on to the unit. About one second after the power has been turned on, the # key can be released and the unit will go into a test mode and stay in the test mode until any key is pressed at which time the unit will go back to normal operating mode.

While in test mode:

- 1) The display will start at "0000" and count up, adding "1111" to the number shown on the display every half second.
- 2) While the numbers are counting up, the decimal points will switch back and forth between "00.00" and "0.000" while the arrow and colon flash.
- 3) The eight red L.E.D.s will flash back and forth every half second.
- 4) The transbrake outputs will be off during the test.
- 5) The three push button inputs can be tested. First disconnect all wires going to the three push button inputs. Next take a piece of wire, connect one end to ground, then touch the other end to each of the three push button inputs. As the inputs are touched by the wire the display will stop counting and the red L.E.D.s will turn on 2 light for *First P.B.*, 4 for the *Second P.B.*, or 6 for the *bump P.B.*

