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1014-SCR

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Crossover Plus
with
4-Stage Timer

Instructions

The *Crossover Plus with 4-Stage Timer* 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 with 4-Stage Timer* has a 16 digit keypad for fast and precise entry of information into the unit while two illuminated multi-segment liquid crystal displays are used to display all relative information.

Contents:

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 with power disconnected from unit
- Large displays for easy reading of times
- Low voltage warning and full status indication
- Illuminated liquid crystal displays for both day and night use
- Dust & splash proof display lenses & key pad with detent (positive feel)
- 1 or 2 pushbutton, bump up or down, by-pass, over ride features
- Easy and fast selection or entry of all information even with gloves
- Self test mode on all displays functions
- Both Transbrake and Throttle control outputs
- Very high current output (20 Amps)
- Instant timing cycle reset

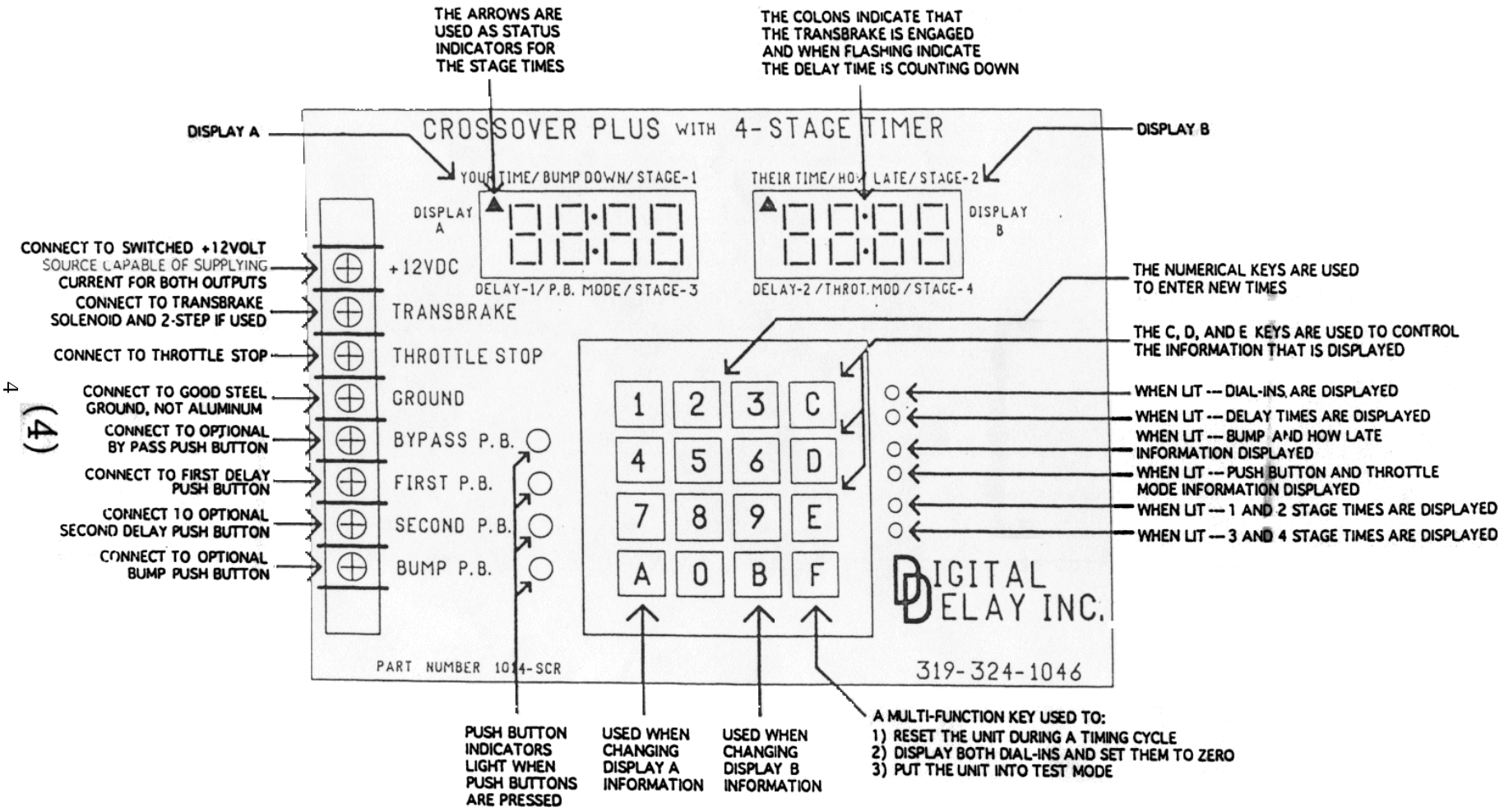
Applications:

- Controls Transbrake Solenoids
- Controls Starting Line Throttle Stops
- Controls Throttle Stops
- Controls Nitrous Solenoids
- Controls 2-Steps

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
- Stage 1 and 2 Time Range: 0.000 to 9.999 seconds in .001 increments
- Stage 3 and 4 Time Range: 00.00 to 99.99 seconds in .01 increments
- Transbrake Output Current: 20 Amps.
- Throttle 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 both the transbrake and the throttle stop at the same time.

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

Throttle Stop Terminal: Connect the Throttle Stop terminal to any device that you want controlled by the stage times.

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

Bypass Terminal: Connect the Bypass terminal to an optional push button. This allows you to activate any device that is connected to the Transbrake terminal without running a timing cycle. An example of this would be vehicles that require the transbrake solenoid to be engaged when backing up the vehicle. The bypass terminal can also be used as an override if you flinch in single Push Button Mode at the starting line. Simply press and hold the bypass push button and go off your bottom bulb, avoiding the red light due to flinching.

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 this terminal is disabled and has no affect on the operation of the unit. In dual Push Button Mode the push button connected to Button-2 terminal is used to control the secondary delay only.

Bump Terminal: Connect to the Bump terminal an optional push button. This allows you to subtract or add a programmable amount of time from the first delay time started every time the Bump Push Button is depressed. One second after the transbrake releases, the Bump Push Button will override the throttle control if pressed.

The Displays

There are two displays, A and B, that are used to show all relative information about the *Crossover Plus with 4-Stage Timer*. Each display can display up to six different times or mode settings.

Display A: The six shown on Display A are Your Time, Delay 1 Time, Number of Bumps, P.B. mode, Stage 1 Time, and Stage 3 Time.

Display B: The six shown on Display B are Their Time, Delay 2 Time, How Late Time, Throttle Mode, Stage 2 Time, and Stage 4 Time.

There are six red L.E.D.s to the right of the key pad. The information being displayed corresponds to the text that is to the right of the lit L.E.D.. For example if the L.E.D. next to the text "Dial-Ins" was lit, Display A would be showing Your Time and Display B would be showing Their Time.

Other special functions of the displays are:

Low voltage indication: The numbers on both displays will flash indicating the voltage to the unit is below the recommended 11.5 Volts.

Transbrake-Colons: When the transbrake is engaged both colons will turn on and when the delay timer starts counting down both colons will flash.

Stage Time-Arrows: When stages 1 and 2 are being displayed both arrows will turn on. When stages 3 and 4 are being displayed both arrows will flash. If stage 1 or 2 is counting down, the arrow for that stage will turn on. If stage 3 or 4 is counting down, the arrow for that stage will flash.

Bump Arrow: When the Bump information is being displayed and the arrow in Display A is on, the unit is set in <u>bump up</u> mode. If there is no arrow the unit is in <u>bump down</u> mode.

The Keypad

The keypad is made up of numerical and function keys that are used to control the information that is either entered or shown on the displays. The numerical keys 0-9 are used only to enter new times. The function keys A-F are used to control different functions of the unit.

Function Keys A and B

The function keys A and B correspond to displays A and B respectively and are used with the numerical keys when entering new times. For example to enter a new time into Display A, press the A key on the key pad. Display A will blank out indicating it is ready to accept a new time. Next use the numerical keys to enter the new time into the unit, leading zeros do not have to be entered. As the numbers are entered they will appear on the display indicating that the number was accepted and stored into memory.

If an error is made while entering, press the appropriate A or B key to erase the last digit. This can be repeated as many times as necessary until the display is blank.

Function Keys C, D, and E

The function keys C, D, and E are used to select what information is shown on the displays. The corresponding six red L.E.D.s, two for each key, indicate when lit, what information is being displayed. For example, if the Dial-Ins are wanted and the First and Second Stage Times are being displayed, the C key would be pressed to display the Dial-Ins. If the C key was then pressed again the Delay-1 time and Delay-2 time would replace the Dial-Ins.

Function Key F

The function key F controls three separate functions.

1) If pressed during a timing cycle, the timing cycle will be cancelled and the unit will be reset. This constitutes a master reset for the timing cycle.
2) If pressed when the unit is not running a timing cycle, the Dial-Ins will be displayed and set to all zeros, making it ready for new Dial-Ins before next run.
3) If the F key is held down <u>while</u> 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 Times

To set a new Dial-In time into either Your Time or Their Time press the C key until the Dial-In times are being displayed. To enter a new number press the corresponding letter key (A or B) to the display containing the Dial-In time to be changed. The selected display will go blank indicating the unit is ready to accept the new Dial-In time. Enter the new Dial-In time using the numerical keys, leading zeros do not have to be entered. For example if 9.90 for a Dial-In time is desired 990 would be entered on the key pad. As the numbers are entered they are shown on the display, indicating the numbers are accepted and entered into memory. If a mistake is made while entering the number, depressing the corresponding letter key (A or B) for the display again will erase the last digit entered. This can be repeated as many times as necessary until the display is blank.

Setting Delay Times

To set a new delay time into either Delay 1 or 2 press the C key until the delay times are displayed. Then follow the same procedure for entering a new number as instructed in setting new Dial-In times.

Setting Stage Times

To set a new stage time into any of the stages press the E key until the stage time to be changed is displayed. Then follow the same procedure for entering a new number as instructed in setting new Dial-In times.

Setting Throttle Mode

To set the Throttle Mode press the D key until the Throttle Mode is shown on Display B. Display B will show a “0101” or “ 1010”, to switch to the opposite setting press the B key once. A “0” means zero Volts out and a “1” means 12 Volts out. In racing terms this is also referred to as “0” normally open, “1” normally closed. (“0101” means off/on/off/on)

Setting Push Button Mode and the Push Button Interrupt Time

To set the Push Button Mode press the D key until the Push Button Mode is shown on Display A. The left most digit shows "1" or " 2" to indicate which Push Button Mode the unit is in, when in 1 Push Button Mode, the *First P.B.* starts both the primary and secondary delays. When in 2 Push Button Mode, one or both push buttons can be used in any sequence, the *First P.B.* starts the primary 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, Button 1 and Button 2 push button inputs are disabled. To change either the Button Mode or the Interrupt Time first press the A 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 Button Mode with a 10 second Interrupt Time. If no Push Button Interrupt Time is wanted enter "00" after pressing a "1" or "2" for the Push Button Mode.

Setting and Displaying the Bump Information

To display the Bump information press the D key until the Bump information is shown on Display A. 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 Bump push button is pressed. To change the number, press the A key and enter the new number (1-9). To switch between the bump up modes press the A key followed by the B key, then the number desired (Arrow on means bump up, no arrow means bump down). The two right digits show the number of times the Bump push button was pressed. The Bump time will only affect the first delay time started.

How Late

To display the How Late information press the D key until the How Late information is shown on Display B. If the transbrake is released on Delay-2 (4-Digit) the left most digit will display an "8", if not, it will be blank. The remaining digits display the How Late time. 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.

NOTE: Both How Late and Bump information is stored in memory until a new How Late or the Bump number replaces it.

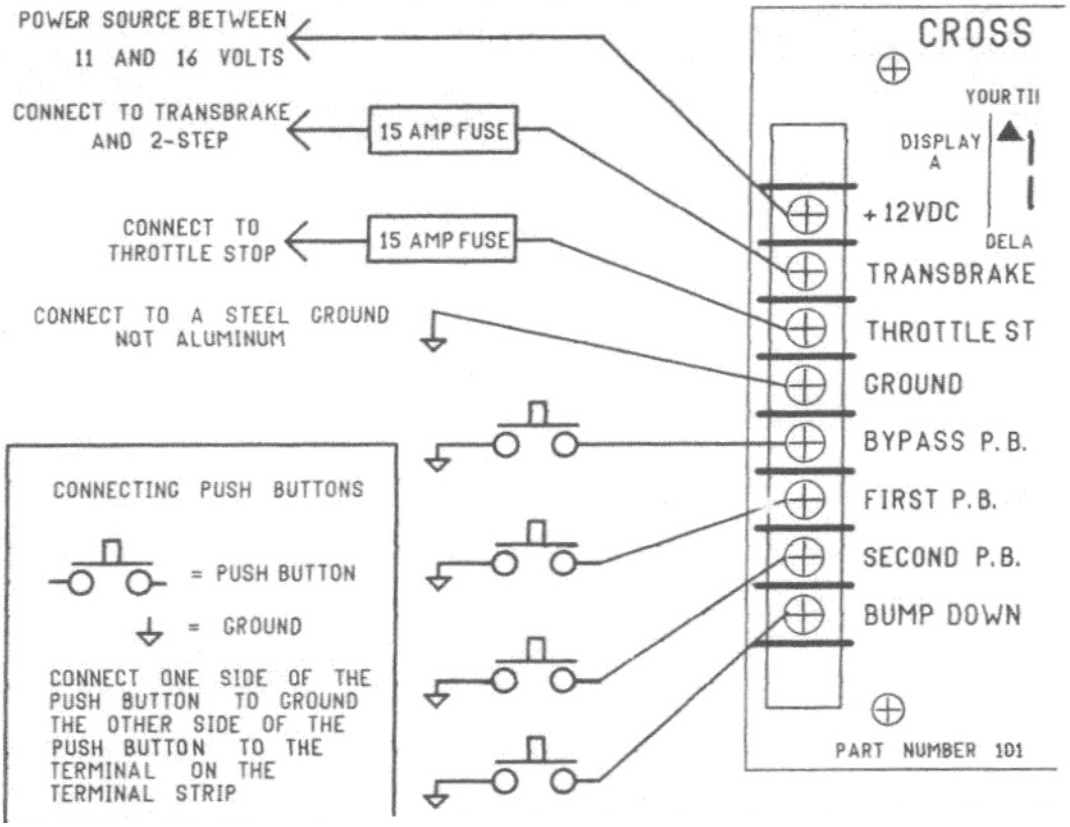
Wiring and Testing the Unit

To test the four push button inputs and the four yellow L.E.D.s, disconnect all wires going to the four push button inputs. Next take a piece of wire, connect one end to ground, then touch the other end to each of the four push button inputs. As the inputs are touched by the wire the corresponding yellow L.E.D. should light.

The *Crossover Plus with 4-Stage Timer* has a built-in test mode for the displays and the red L.E.D.s. The function key F is held down while the power is being turned on, the unit will go into a test mode and stay in the test mode until the F key is released.

While in test mode:

1) The displays will start at "0000" and count up, adding "1111" to the number shown on both displays 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 both the arrows and colons will flash.
3) The six red L.E.D.s will flash back and forth every half second.
4) Both the transbrake and throttle outputs will be off during the test.



Explanation of the 4-Stage Timer

This is to help the racer understand the 4-Stage Timer when controlling a throttle stop. The 4-Stage Timer can also be used to control other timed devices, nitrous, or timing retarders.

Stage 1 represents when the throttle stop turns on. Stage 2 represents the amount of time (duration) the throttle stop will stay on. Stage 3 represents when the throttle stop will turn on the second time during the run. Stage 4 represents the amount of time (or duration) the throttle stays on the second time. Both Stage 1 and Stage 3 start counting from the release of the transbrake. Stage 2 starts counting after the amount of time set in Stage 1 is completed. Stage 4 starts counting after the amount of time set in Stage 3 is completed.

Possible 8.90 S/C pass

Timer 1= 1.000
Timer 2= 2.000
Timer 3= 08.00
Timer 4= 00.50