

PRO-CUBE®

INSTALLATION AND OPERATING MANUAL

Congratulations on your purchase of the most advanced combination delay box/timer unit available for today's precision drag racing. The **PRO-CUBE**® has been designed to give you unprecedented control of your reaction time and ET with a host of standard features, plus options for up to three general purpose timers, all in one super-compact unit that can be mounted almost anywhere. The precision available with these timers makes them perfect for controlling a variety of equipment including throttle stops, shifters, and multi-stage nitrous systems. You should read and understand this entire manual, including the warranty section beginning on page 8, before proceeding with installation.

STANDARD FEATURES

Cross-Over: Allows you to release the transbrake switch on a slower opponent's top bulb on a full open tree. The delay time is automatically calculated from dial-in and delay values you enter.

Second Hit: You can enter a separate delay for hitting the tree a second time. It's the same as having two delay boxes in one. This feature allows you to take two shots at the tree in long cross-over situations. You will launch on the faster of the two reactions.

Bump-Down®: This powerful feature allows you to improve late reactions by subtracting delay time after releasing the transbrake switch. You can program the amount of time to subtract, you can bump-down any number of times, and you can use it for either one or both hits on the tree. In addition, this feature can be used on Timer 1 during the run. If you have a throttle stop connected to Timer 1, the Bump-Down feature will allow you to correct for track conditions such as tire spin by reducing the stop time.

Flinch Protection®: Two different methods are provided for preventing red-light disqualification when you release the transbrake switch before the tree starts.

Run Info: If you use either the second hit or the **Bump-Down**® feature, information will automatically be displayed to indicate the difference in your reaction times for double-hits, as well as the number of times you bumped-down your reactions and the number of times TIMER 1 was bumped-down. This allows you to determine what your reaction(s) and E.T. would have been had you not used these powerful features.

Transbrake Output: High current output for use on all types of transmission brake, foot brake, and clutch release solenoids. Handles up to 25 amp load.

Line Lock Output: This output is activated and released simultaneously with the transbrake output but includes a blocking diode to prevent back feed into the transbrake circuit. It can be used in front wheel line lock applications or jumpered to the **Pro-Stage**™ or one of the timer outputs acting as a "launch control" when connected to a compatible throttlestop. Handles up to 2 amp load.

Transbrake Lockout: A built-in timer prevents activation of the Transbrake and Line Lock outputs for a programmed amount of time after the transbrake releases. This timer can be set from 0 to more than an hour. Transbrake activation is automatically re-enabled when the timer completes.

Pro-Stage™: This special output controls a **Pro-Stage™** compatible throttle stop during the staging process. Developed by Frank Hawley, the patented **Pro-Stage™** system¹ allows you to stage with your foot to the floor for both Pro tree and Full tree. Provides better driver concentration, more consistency, and reduced wear and tear on the engine and converter.

Output Protection: All outputs are fully protected against shorts and severe overloads by advanced electronic circuit breaker technology. Faulty outputs are indicated by flashing light on the front panel, allowing fast diagnosis and correction of system problems.

OPTIONS

- 1 Timer: 4 stages (2 on/off cycles), first on/off cycle adjustable from 0.000 - 9.999 seconds, second on/off cycle adjustable from 0.00 - 39.99 seconds. **Bump-Down®** can be used during the run to make minor adjustments to your settings.
- 2 Timers: Timer 1 is same as above. Timer 2 has 2 stages (1 on/off cycle) adjustable from 0.00 - 39.99 seconds.
- 3 Timers: All 3 timers have 2 stages (1 on/off cycle each). Timer 1 adjustable from 0.000 - 9.999 seconds, timer 2 and 3 adjustable from 0.00 - 39.99 seconds.

SPECIFICATIONS

Overall Dimensions (H x W x D):	4.3" x 4.7" x 2.95"
Weight:	1.3 lbs
Power Supply Voltage:	10 - 18 Vdc
Power Supply Input Current (no outputs activated):	0.08 Amps
Output Current, Transbrake:	25 Amps for 1 minute
Output Current, Line Lock:	2 Amps continuous
Output Current, Timers and Pro-Stage™ :	10 Amps continuous

INSTALLATION

1. Mount the unit in a convenient location where you can easily read the display and reach the front panel when strapped in the driver's seat.
2. Refer to the wiring diagram for electrical connections.

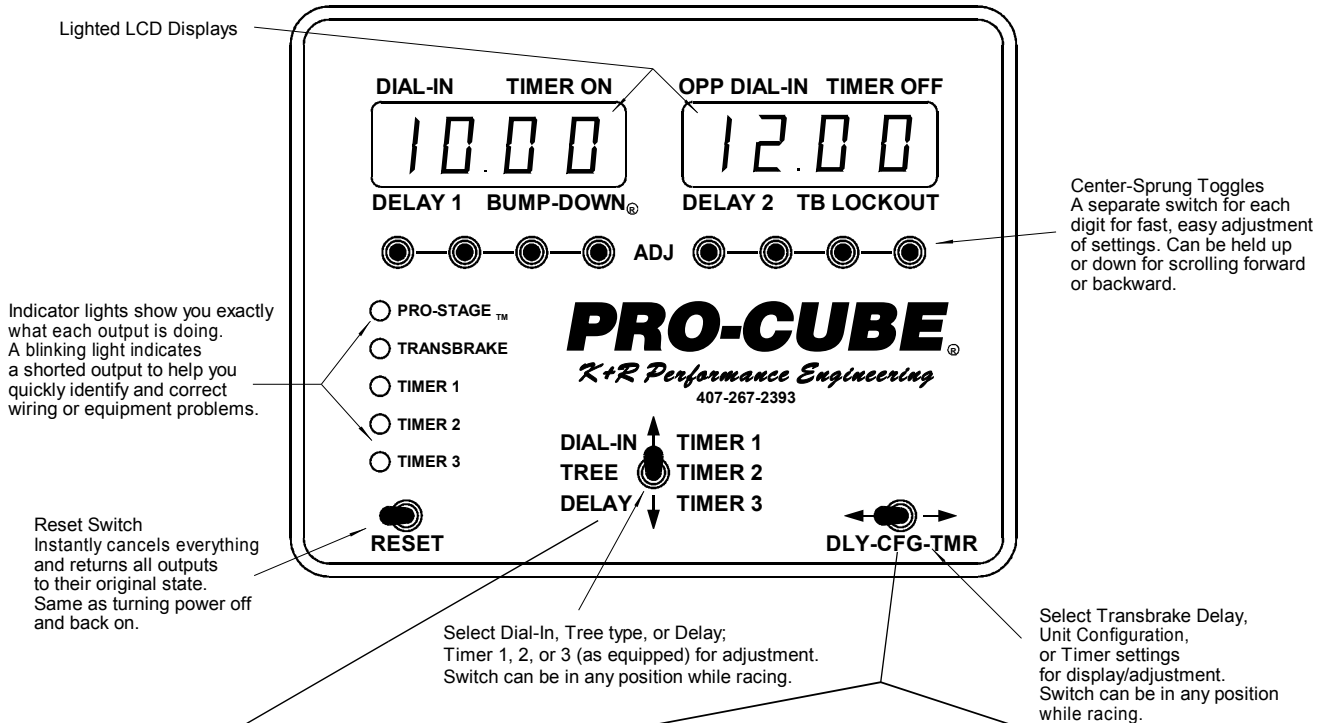
! Important

3. IN ORDER TO DAMPEN VIBRATION, THE UNIT MUST BE MOUNTED USING THE THREE RUBBER MOUNTS LOCATED ON THE BACK. SUFFICIENT CLEARANCE SHOULD BE MAINTAINED ALL AROUND THE UNIT SO THAT IT DOESN'T VIBRATE AGAINST ANY SURROUNDING METAL. NOTE: RUBBER MOUNTS ARE NOT REMOVEABLE.
4. FOR THRU-DASH INSTALLATIONS ALLOW CLEARANCE BETWEEN DASH AND UNIT AND USE FIRM RUBBER MOLDING TO FILL THE GAP. THE UNIT MUST FIT SNUG IN OPENING.
5. ALWAYS COMPLETELY DISCONNECT THE UNIT BEFORE ANY WELDING IS DONE ON THE CHASSIS.

¹ **Pro-Stage™** is protected by US Patents 5,839,419 and 5,855,196.

HOW TO SELECT AND CHANGE SETTINGS

Two three-position switches are used to select the various screens. These switches may be left in any position while racing, they simply select what is being displayed. The table below shows the content of each screen and the factory default settings for a fully equipped unit. Some screens may be blank (dashes) depending on the number of timers installed in your particular unit. Use the adjustment (ADJ) switches just below the displays to change settings. There is one switch for each digit in the display. Note: Changes to any of the settings are automatically and permanently saved four seconds after making the change. The decimal points in both displays will blink to indicate when the save operation is performed. If power is turned off or the unit is reset within four seconds after making a change, those changes will not be saved.



	DLY <input checked="" type="radio"/>	CFG <input type="radio"/>	TMR <input type="radio"/>
<input checked="" type="radio"/>	YOUR DIAL-IN 10.00	OPPONENT'S DIAL-IN 12.00	INTERFACE (DOUBLE HIT) MODE inFc dUAL (2 TRIGGER SWITCHES)
<input type="radio"/>	FULL/PRO TREE SELECT (TIMER VERSIONS ONLY) FULL TREE	TIMER 1 MODE n OFF	TIMER 2 MODE n OFF (NORMALLY OFF MODE)
<input type="radio"/>	DELAY 1 1.000	DELAY 2 1.000	BUMP-DOWN AMOUNT 0.010
		TRANSBRAKE LOCKOUT DELAY 120	TIMER 1 ON 1.000
			TIMER 1 OFF 2.000
			** TIMER 2 ON 3.00
			** TIMER 2 OFF 4.00
			** TIMER 3 ON 5.00
			** TIMER 3 OFF 6.00

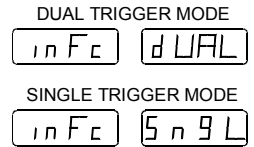
** APPLIES TO 3 TIMER VERSION ONLY **

INITIAL SETUP

Single vs Dual Trigger Interface Mode:

The **PRO-CUBE**® allows you to “hit” the tree twice and launch your vehicle on the quicker of two reactions. If you want to take advantage of this double-hit capability, you have the option of using two separate trigger (transbrake) switches or a single switch. If you choose not to use the double-hit capability, you only need one transbrake trigger switch connected to the **TRIGGER 1** terminal.

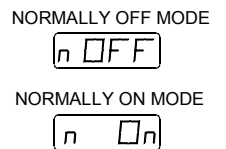
Select either Single or Dual trigger interface mode using any right-side ADJ switch. The amount of cross-over time you have between the first and second hit will determine whether it’s best to use one switch or two. Using Single Trigger mode to hit both top bulbs is generally not recommended unless you’re at least 1.5 seconds faster than your opponent. Hitting both top bulbs with two separate switches in Dual Trigger mode doesn’t require as much cross-over time. In Dual Trigger mode, **TRIGGER 1** is always used for the first hit, and **TRIGGER 2** for the second hit. In Single Trigger mode, **TRIGGER 2** is ignored.



Another important difference between these two modes involves the *Flinch Protection*® feature. Simply stated, flinch protection can prevent you from red-lighting when you accidentally release the trigger switch before the tree starts. If this occurs using Dual Trigger mode, just press the same trigger switch again and the delay that was started unintentionally will be reset. The delay will be restarted when the trigger switch is released. In Single Trigger mode, however, the delay is not reset by pressing the switch again. In this mode a known red-light situation can only be prevented by pressing and holding the **TRIGGER 1** switch until the bottom of your tree. Your vehicle will launch instantly when the trigger switch is released.

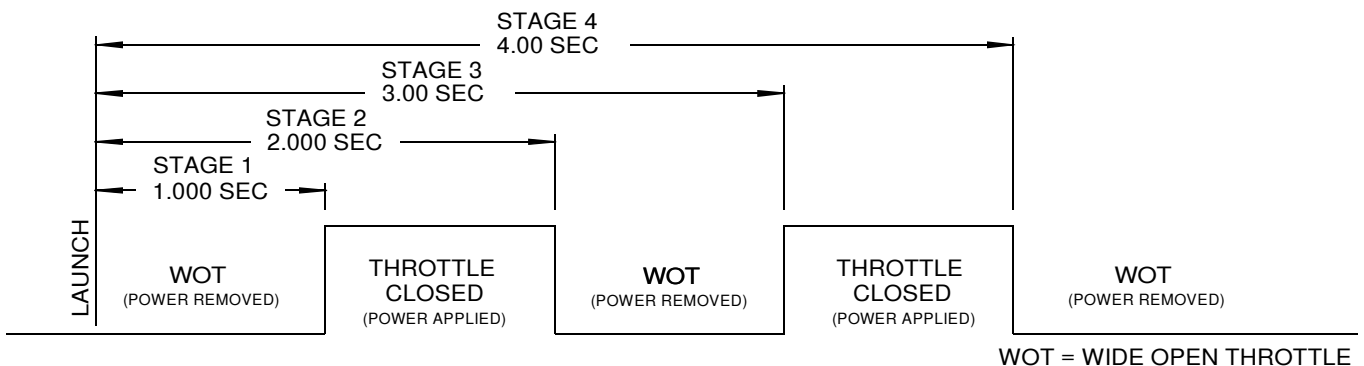
Timer Output Configuration:

Except for the 3 timer version, Timer 1 is a 4-stage output that can be cycled on and off twice. If you want to cycle this timer on and off just once, use either pair of settings and set the other pair to 0. In the 3 timer version all three timers have 2-stage outputs that can be cycled on and off once each. For compatibility with all types of equipment, Timers 1 and 2 can be configured for either “normally off” or “normally on” mode. Timer 3, however, is fixed in “normally off” mode for most common equipment and cannot be changed. Configure the timers as required for your equipment using the front panel switches.

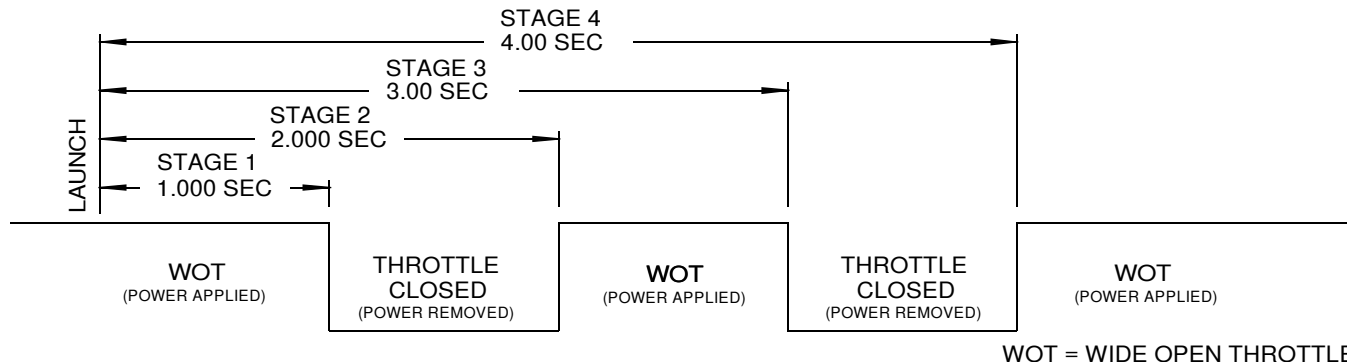


Note that the first on/off cycle of Timer 1 is adjustable in 0.001 (one thousandth) second increments for very precise control. Timers 2 and 3 and the second on/off cycle of Timer 1 are adjustable in 0.01 (one hundredth) second increments for extended down-track range (up to 39.99 seconds). Note the decimal point location while setting timer values.

The diagram below illustrates a 4-stage pneumatic throttle stop application using Timer 1 in the default “normally off” mode and factory settings for each stage. Note that the setting for each stage represents time into the run, measured from launch.



In the following diagram, Timer 1 has been configured to operate in reverse “normally on” mode for compatibility with throttle stop equipment that requires power to hold the throttle open.



Bump-Down ®:

One of this unit’s most powerful bracket racing features, **Bump-Down** ® allows you to correct for late reactions by subtracting delay time after releasing the trigger switch. This feature can also be used to subtract time from stages 2 & 4 of **TIMER 1**. Program the amount of time you want subtracted from the delay (or **TIMER 1**) each time the bump-down switch is pressed. Range for this value is 0.000 - 0.099 seconds. The bump-down time settings are independently set for “Pro tree” and for “Full tree” run programs.

Transbrake Lockout Timer:

To prevent accidental re-engagement of the transbrake after launch, a lockout timer is built-in to disarm the transbrake and line lock outputs for a programmed period of time. The factory setting is 120 seconds, but you can program it to any value up to 3999 seconds. The displays will show all dashes (- - -) during the lockout delay and no changes can be made until the lockout timer completes. The **RESET** switch can be used to manually override this delay and allow the transbrake to be reactivated (after backing up from burnout, for example). The transbrake lockout time settings are independently set for “Pro tree” and for “Full tree run programs.

OPERATION

The **Pro-Stage**™ System:

The **Pro-Stage**™ system requires a compatible (pneumatic) throttle control adjusted to hold the engine to near idle with the throttle pedal in the full throttle position. The system reduces the amount of work you have to do on the starting line and minimizes the amount of time the engine is at full throttle. By eliminating part of the work, your concentration on the tree is improved and your reactions are more consistent. By minimizing the amount of time the engine is at full throttle, less heat is generated in the engine and converter which should also result in greater consistency. Furthermore, mechanical stress potentially caused by deliberate misfire RPM limiting devices is also reduced.

The output is activated by tapping the **PSTG/BMP** switch as you roll up to the starting line and prepare to stage. You can then put your foot to the floor (in the wide open position) as the engine is held to near idle by the throttle stop. On a Pro tree, the throttle stop will automatically release and bring the engine wide open as soon as the transbrake switch is pressed. On a full tree, the engine will remain on the stop at near idle until you release the transbrake trigger switch. Wide open throttle (WOT) will be further delayed by any cross-over time to keep the engine at low RPM until your side of the tree is activated. With the **Pro-Stage**™ system, high engine RPM will be limited to a short and consistent amount of time before launch.

The wiring diagram shows a typical installation using the **PRO-CUBE™** to control a dual cylinder throttle stop **Pro-Stage II™** system for starting line and ET control. Though it is possible to use a single cylinder throttle stop for both, the dual cylinder approach allows two different throttle settings, one for near idle on the starting line and the other for down track ET control (usually ¼ to ½ throttle).

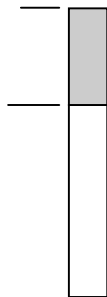
NOTE: TO PREVENT ACCIDENTAL REACTIVATION OF THE **Pro-Stage™** DURING THE RUN, THERE IS A 15 SECOND ACTIVATION LOCKOUT OF THE **Pro-Stage™** FROM THE TIME THE TRANSBRAKE RELEASES. SIMPLY USE THE **RESET** SWITCH TO CLEAR THIS LOCKOUT IF YOU HAVE ACTIVATED THE TRANSBRAKE JUST BEFORE STAGING.

Crossing-Over and Interfacing:

When you enter a slower opponent's dial-in, it is assumed that you want to "cross-over" and trigger off your opponent's top bulb. If you do not want to cross-over, simply set the opponent's dial-in to 0.00 (or any number less than or equal to your dial-in). The diagram below illustrates a typical cross-over application in which both **DELAY 1** and **DELAY 2** are activated.

TRIGGER SWITCH IS RELEASED
ON OPPONENT'S TOP BULB.
CROSS-OVER DELAY STARTS.

CROSS-OVER DELAY ENDS
AND DELAY 1 STARTS
AUTOMATICALLY.



TRIGGER SWITCH IS RELEASED
ON DRIVER'S TOP BULB.
DELAY 2 STARTS.

DELAY 2 FINISHES FIRST AND LAUNCHES
CAR. TRANSBRAKE LOCKOUT DELAY
STARTS AUTOMATICALLY.

The second delay (**DELAY 2**) is used only if you hit the tree a second time. In Dual Trigger mode **DELAY 2** is controlled by **TRIGGER 2**.

In Single Trigger mode press **TRIGGER 1** switch and release it to start **DELAY 1**, press and release it again to start **DELAY 2**.

The **PSTG/BMP** switch is used for the **Bump-Down®** function as well as to activate the **Pro-Stage™** output. You can hit the **PSTG/BMP** switch any number of times to reduce the delay and improve your reaction. Each time you bump-down, the programmed amount of time is subtracted from either your first hit (**DELAY 1**) or the second hit (**DELAY 2**), whichever occurred last.

Run Information:

If you hit the tree twice or use the **Bump-Down®** feature, reaction time information and bump-down counts will be automatically displayed approximately 15 seconds after you launch. The reaction time display will indicate which side of the tree you launched on as well as the difference in your reaction times. The quicker reaction is indicated with 0000 in the window its corresponding dial-in, and the differential (slower reaction) is displayed with its corresponding dial-in. The bump-down display simply indicates how many times you bumped down. The bump-down count for the transbrake release is displayed in the left window and the bump-down count for **TIMER 1** is displayed in the right window. The reaction and bump-down information displays alternate about every four seconds until you clear it by using the **RESET** switch. Since the information is not saved, you may want to record it for future reference.

EXAMPLES

Example 1:

Your dial-in is 9.30, your opponent's dial-in is 10.92. Your delay time is 1.035 seconds and you're using two trigger switches in Dual Trigger interface mode. Enter 9.30 for your dial-in, 10.92 for your

opponent's dial-in, and 1.035 for both **DELAY 1** and **DELAY 2**. The difference between the dial-in's (cross-over delay) will be automatically calculated and added to **DELAY 1** (1.035). Stage your car and depress both trigger switches. The transbrake will be activated. Release **TRIGGER 1** when the opponent's tree starts. Release **TRIGGER 2** when your tree starts. You will launch on the quicker reaction. If your reaction time was quicker on your tree by 0.009 seconds the display will show 0.000 in the left window, and 0.009 in the right window for reaction time information. A bump-down count of 0 will appear every 4 seconds in each window indicating that you did not use the feature.

Your time slip indicates your actual reaction time was 0.515. This was your reaction time to your side of the tree. The reaction time information indicated you were 0.009 slower reacting to your opponent's tree, so your actual reaction to your opponent's side of the tree would have been: $0.515 + 0.009$, or 0.524.

Example 2:

You're using Dual Trigger interface mode. After staging, the starter takes longer than usual to start the tree and you flinch, releasing the trigger switch too soon. Just press the switch again and release it when the tree starts. If you're late, use Bump-Down to correct for it. (In Dual Trigger mode, the delay timers are reset whenever the trigger switches are depressed, and started over when released.)

Example 3:

You're using Single Trigger interface mode. You hit the cross-over bulb and press the transbrake switch again to hit your top bulb, but your finger slips off the button before your tree is activated. To avoid the pending red-light, just depress and hold the transbrake switch until the bottom of your tree. (In Single Trigger mode the **Flinch Protection**® feature will not release the transbrake if the switch is depressed.) Release the switch near the bottom of your tree for instant launch.

Example 4:

You're racing a Pro tree and equipped with a throttle stop. You're in "Pro tree" run mode with times set in **TIMER 1** to control the throttle stop, and you have the bump-down set for .020. When the car launches you feel the tires spin. When the throttle stop comes on the first time, you tap the bump-down switch once. You still feel you're not going to be able to "run the number". The throttle stop comes on again and you tap the bump-down twice. After the run the display shows 0 in the left window and 3 in the right window, indicating you bumped-down **TIMER 1** a total of 3 times. So you subtracted .020 seconds from stage 2, and .040 seconds from stage 4 of **TIMER 1**.

TIPS FOR ADVANCED RACERS

1. If you bracket race and also Pro tree race, use the Full/Pro tree select feature to store your delay and timer settings for each type of racing. In Pro tree mode "Pro" is displayed where you would normally set dial-in times. (This feature is purely for convenience and is available in timer versions only.) Note: This allows two totally different "Run programs".
2. Use a timer with the **Pro-Stage**™ system to setup a "programmed dump" near the finish line. Connect a jumper wire from the **Pro-Stage**™ to the Timer output so that the timer can also activate the **Pro-Stage**™ throttle stop. The **Pro-Stage**™ throttle setting is at near idle which will provide quick deceleration and make it virtually impossible for a faster opponent to judge a slim victory.
3. Use a timer for extremely accurate shifts. Set the timer for "normally off" mode and adjust the ON time for when you want the shift to occur (this may require a little experimentation). Add 1 second to the ON time and use that for the OFF time to send a 1 second pulse to the shifter.
4. Want two shots at the tree without crossing-over? Set the unit for Dual Trigger mode and hook up both trigger switches on your steering wheel. Set **DELAY 1** and **DELAY 2** for the same delay time. When you stage, press both trigger switches, one with your left hand and one with your right.

Release them both when your tree is activated. One hand will be a little faster than the other, possibly giving you a few thousandths better reaction time.

If you need an additional timer, contact tech support and arrange for an economical upgrade.

TROUBLESHOOTING

The front panel includes an indicator light for each output. These lights give you direct indication of whether the corresponding output is off or on. A flashing light indicates a shorted or overloaded output. If this occurs, first disconnect the output and cycle the unit again, watching the indicators. If the output operates normally while disconnected then the problem is in your wiring or equipment.

If the unit operates erratically when the engine is running, and normally when the engine is off, check for sources of electrical interference. The **PRO-CUBE**® is designed to tolerate extreme interference but the ignition coil, spark plug wires, and ignition unit are powerful sources of RF interference and a minimum distance of 12" is recommended. If you're using solid core spark plug wires, replace them with an RF suppressive spiral core wire set.

TECHNICAL SUPPORT

Contact: ***K&R Performance Engineering, Inc.***
Telephone: 423-614-7778

WARRANTY

We at K&R Performance Engineering Inc. warrant to the original purchaser the products manufactured by us to be free from defects in material and workmanship under normal use and service, for which it was intended, but only if it has been properly installed and operated. Our obligation under this warranty shall be limited to the repair of any product or products which may thus prove defective under normal use and service, for which it was intended, within two (2) years from the date of installation by the original purchaser, and which our examination shall disclose to our satisfaction to be thus defective. Any defect affecting operation of the unit will be repaired at no charge. You will be billed only for shipping. Damage caused by severe vibration and metal-to-case contact or restricted movement due to improper mounting is NOT covered.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON OUR PART, AND WE NEITHER ASSUME, NOR AUTHORIZE ANY OTHER PERSON TO ASSUME FOR US, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS PRODUCT. THIS WARRANTY SHALL NOT

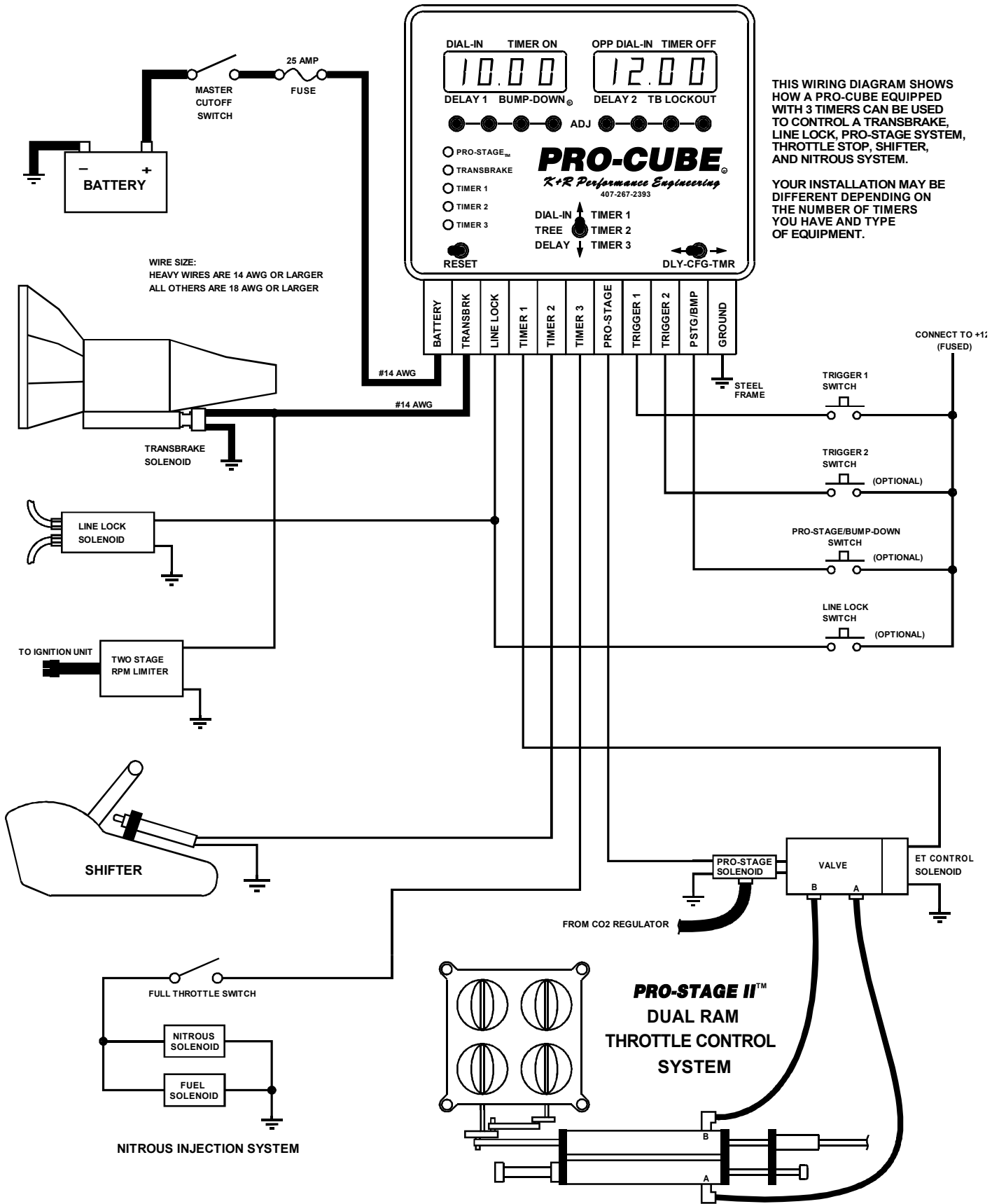
APPLY TO THIS PRODUCT OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. WE MAKE NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY US. THE TERM "ORIGINAL PURCHASER" AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON OR ENTITY WHO ORIGINALLY PURCHASED THE PRODUCT. THIS WARRANTY SHALL APPLY ONLY WITHIN THE BOUNDARIES OF THE CONTINENTAL UNITED STATES.

Original Purchaser must notify K&R Performance Engineering, Inc. of a breach of warranty within thirty (30) days after discovery thereof, but not later than the guarantee period; otherwise, such claims shall be deemed waived. No allowance will be granted for any repairs or alterations made by the Original Purchaser without K&R Performance Engineering, Inc.'s prior written consent. No person, firm, or corporation is authorized to assume for us any other liability in connection with the sale of these goods.

This warranty shall not apply to any K&R Performance Engineering, Inc. product, or parts thereof, which has been repaired or altered, without K&R Performance Engineering, Inc.'s written consent, outside K&R Performance Engineering, Inc.'s factory, or altered in any way so as, in the judgement of K&R Performance Engineering, Inc. to affect adversely the stability or reliability of the K&R Performance Engineering, Inc.'s product, or has been subject to misuse, negligence, or accident, or has not been operated in accordance with K&R Performance Engineering, Inc.'s printed instructions or has been operated under conditions more severe than, or otherwise exceeding, normal use for such product.

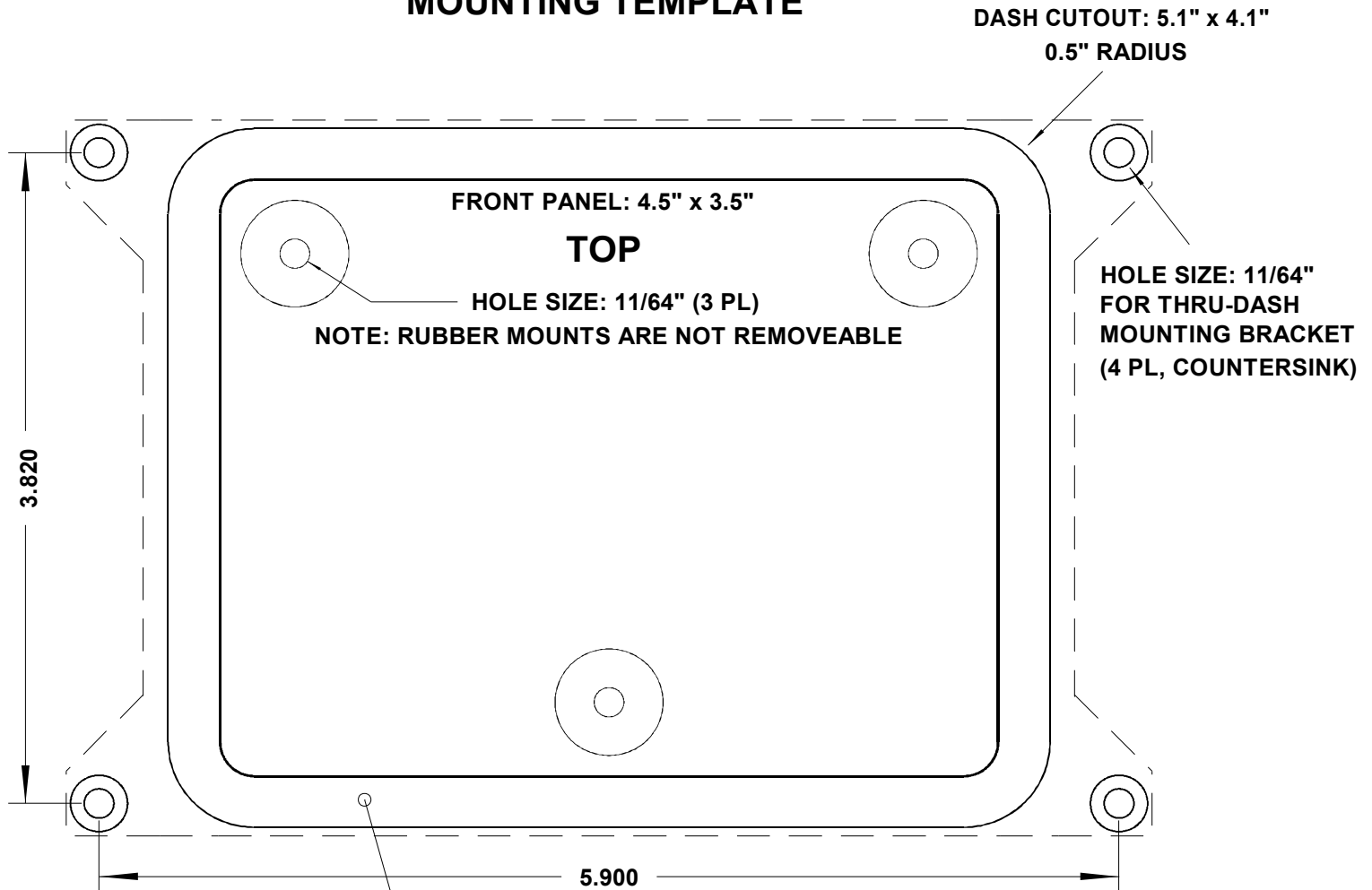
K&R Performance Engineering, Inc. shall not be liable for any injury, whether to person or property, or for any damages, whether direct, indirect, consequential, or special, or any other damage resulting from the use, or misuse, of this product. Any injury or damage so incurred will be limited to the original purchase price of the product.

The **PRO-CUBE**® is protected and licensed under the following US Patents:
Re: 32,474; 4,784,099; 5,600,185; 5,642,712; 5,839,419; 5,855,196



Wiring Diagram – Complete System (3 Timer Version)

MOUNTING TEMPLATE



IMPORTANT!

FOR THRU-DASH INSTALLATIONS, ATTACH RUBBER GASKET TO PRO-CUBE TO FILL GAP AND PREVENT METAL-TO-METAL CONTACT WITH DASH. UNIT MUST FIT SNUG IN DASH OPENING.

ORDER OUR INSTALLATION KIT FOR FAST, EASY THRU-DASH MOUNTING. KIT INCLUDES A BEHIND THE DASH MOUNTING BRACKET, GASKET, AND SCREWS.

