

## INSTRUCTIONS

### **PRO-STAGE II**™ THROTTLE CONTROL SYSTEM

Congratulations on your selection of the **Pro-Stage II**™ Throttle Control System. This top quality unit utilizes twin precision pneumatic actuators for smooth, consistent throttle control, round after round. The use of two actuators allows you to set two different throttle settings, one near idle setting for staging with the **Pro-Stage**™ system, and another partial throttle setting for down-track E.T. control. Speed controls on the solenoid/valve body assembly give you precise control of throttle opening and closing rates to solve engine stumble and tire spin problems. All components of the system have been carefully selected for corrosion-resistance and long service life with very little maintenance.

The **Pro-Stage**™ system<sup>1</sup> is designed to improve driver concentration and reaction time consistency on both Pro and Full (bracket) trees. Control for this system is included in our complete line of **Pro-Cube**® delay box/timer units.

#### **BEFORE YOU BEGIN**

1. Read all instructions and make sure you understand the operation of the control before you modify your throttle linkage or change any settings or adjustments on the control.
2. Your car **MUST** have a positive throttle pedal stop such as a bolt or tubular brace fastened to the chassis. Lack of a solid pedal stop could result in consistency problems.
3. **SPECIAL NOTE:** Factory type throttle cables will **NOT** work. These cables were not designed for race applications. This system requires a quality after-market “Morse” style cable or solid “rod type” linkage. The linkage must support the weight of the air cylinders.
4. Remove the quick connect ball stud from the end of the throttle control and mount it in the uppermost hole in your carburetor throttle arm. Attach a “fish scale” to the ball on the throttle arm and measure the pulling force required to completely open the throttle. If more than 40 lbs of force is required the throttle control will not be able to fully open the throttle. Check for throttle return spring(s) that may be too stiff, binding linkage, or sources of friction. Do not continue until the throttle operates free and smooth with less than 40 lbs of pull force.
5. The female coupler on the end of the throttle control opposite the quick connect has #10-32 threads for compatibility with “Morse” cables and most “rod type” linkages. We also supplied a coupler with ¼”-28 threads if required.

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<sup>1</sup> Protected by US Patents 5,839,419 and 5,855,196

## INSTALLATION

1. Mount solenoid/valve body assembly. The solenoid assembly should be mounted with the 1/8" fittings (marked "A" and "B") pointing up or horizontal. Mount on firewall or deflector plate using the two holes in the rectangular valve body. DO NOT mount near source of extreme heat such as headers. O.K to mount on scoop tray or throttle cable extension bracket provided it does NOT interfere with throttle movement.
2. Connect CO2 supply from regulator to 1/4" swivel elbow attached to round solenoid. Connect 1/8" nylon tubing from ports on solenoid valve body to throttle control cylinders. Be sure to observe markings and connect port A to cylinder A and port B to cylinder B.
3. Adjust regulator output pressure to 100 psi. NEVER set the pressure higher than 120 psi.
4. Open the CO2 bottle valve and double check pressure at regulator outlet. Cylinder B on the throttle control should pull in. Test for leaks using soapy water.
5. Attach the throttle control to the quick connect ball previously installed on the carburetor arm. Have a helper sit in the car and press the throttle pedal firmly against the pedal stop in the wide open position. Now at the engine, pull the throttle wide open and align the throttle control threaded coupler with the throttle rod or cable, side by side. For cable type linkages, move the cable mounting bracket so that the throttle control can be threaded onto the cable. For rod type linkages mark the rod near the middle of the threaded coupler and cut the rod at this point.
6. Disconnect the throttle control from the quick connect ball stud on the carburetor. Screw the control onto the throttle rod or cable and reconnect to carburetor. Check to make sure that the carburetor is exactly wide open and the throttle control is not being pulled apart (overriding the pressurized cylinder) with the throttle pedal pressed firmly against the pedal stop. Adjust as required by screwing the throttle control in or out on the rod or cable. If you have an adjustable pedal stop this adjustment can also be made there. . CAUTION: DO NOT ADJUST THREADED ADJUSTER BOLT ON CYLINDER FROM FACTORY SETTING IN AN ATTEMPT TO MAKE THIS CRITICAL INSTALLATION.
7. Verify the throttle operates smoothly from closed throttle to full throttle and there's no interference with the carburetor, manifold, firewall, hood scoop, etc. Ensure all fasteners are secure.
8. Connect the black wire of the rectangular solenoid and either wire of the round solenoid to a good (steel) chassis ground. Do not connect the other solenoid leads at this time, temporary jumpers to a +12v source will be required during the following adjustment procedures.

## **OPERATION and ADJUSTMENTS**

The top actuator, cylinder B, MUST be used for the most closed throttle setting and MUST be adjusted first. The adjuster for cylinder B has been factory preset to provide maximum stroke (approximately 2.5"). This will allow the carburetor to close to its idle setting when the **Pro-Stage**™ function is activated during the staging process. Unless you want a higher engine RPM while staging, no adjustment of cylinder B is required and you can proceed to cylinder A adjustment. A near idle (idle +100-200RPM in gear) setting is recommended for use with the **Pro-Stage**™ system during the staging process

### **ADJUSTMENT OF CYLINDER B, *Pro-Stage*™ THROTTLE SETTING**

1. If you want a higher than idle engine RPM setting when **Pro-Stage**™ is activated, disconnect the quick connect on the carburetor throttle arm and loosen the lock nut for the cylinder B adjuster with a 9/16" wrench.
2. Activate the **Pro-Stage**™ function by applying 12v to the round solenoid. This will exhaust cylinder B (cylinder A remains exhausted) and allow the cylinders to be fully extended. Press the throttle pedal firmly against the pedal stop in the wide open position.
3. Screw in the cylinder B adjuster and test fit the actuator assembly back onto the carburetor until the desired throttle opening or engine RPM is achieved. Note that this results in shorter cylinder stroke but does not change the overall length when the cylinder is pressurized. Therefore, the wide open throttle adjustment is not affected.
4. Never screw out on the adjuster from the factory setting. When pressurized (at full throttle), the piston inside cylinder B must be in contact with the adjuster bolt. If the adjuster is screwed out so that, internally, the piston does not contact the adjuster, the wide open throttle setting will be incorrect and the actuator will not work properly. If you can't reach an idle setting even at maximum stroke, you will have to move the throttle ball stud closer to the pivot on the carburetor throttle arm.
5. Tighten the lock nut on cylinder B and deactivate the **Pro-Stage**™ function by removing 12v from the round solenoid.

### **ADJUSTMENT OF CYLINDER A, E.T. CONTROL THROTTLE SETTING**

Cylinder B MUST be adjusted first. Do not proceed unless the previous adjustment has been completed. Cylinder A will always be set for more throttle opening than cylinder B.

1. Loosen the lock nut on cylinder A using a 9/16" wrench and apply 12v to the rectangular solenoid. This will exhaust cylinder B and pressurize cylinder A.
2. Press the throttle pedal firmly against the pedal stop in the wide open position. Check the amount of throttle opening. A good starting point is about ¼ throttle.

3. Disconnect 12v from the rectangular solenoid. This exhausts cylinder A and allows easier adjustment.
4. Screw in on the adjusting bolt for less throttle or screw it out for more throttle. You may note that this is backwards from the way cylinder B is adjusted.
5. Reconnect 12v to the rectangular solenoid and repeat the procedure until the desired throttle opening is set, then tighten the lock nut on the adjuster and disconnect 12v from the solenoid.

### SPEED CONTROLS

The solenoid/valve body assembly includes two adjustable speed controls that govern how fast the throttle actuators open and close. These controls have been factory preset for fastest operating speed, both opening and closing. DO NOT change these settings unless you have to in order to solve a problem such as tire spin or engine stumble. If you have to slow down the operating speed, adjust the one required to solve the problem, and don't slow it down any more than necessary.

1. Throttle Opening Speed: This speed control is located on the brass hex fitting attached to the round solenoid. It governs how fast the cylinders are pressurized for opening the throttle. Turn the screw in (clockwise) to slow the opening rate. This control can be used to prevent engine stumble on the starting line when coming off the **Pro-Stage**™ idle setting, or tire spin when coming off the stop down-track. The range of adjustment is all the way in to approximately 1/2 turn out.
2. Throttle Closing Speed: This control is located at the port marked R2 on the valve body attached to the rectangular solenoid. It controls how fast cylinder B exhausts and closes the throttle during E.T. control. Turn the screw in (clockwise) to slow the down-track throttle closing rate. In rare cases, it can be used to solve chassis unloading problems. The range of adjustment is all the way in to approximately 1 turn out. Be sure to tighten the locknut after making any adjustment.
3. The speed control at port R1 on the valve body is factory set. It regulates how fast cylinder A exhausts and should NEVER be adjusted.

### WIRING

Both solenoids should already be connected to chassis ground. Connect the red wire (rectangular solenoid) to the timer used for controlling your E.T. Connect the remaining wire on the round solenoid to the **Pro-Stage**™ control unit. We recommend using our **Pro-Cube**® delay box/timer unit which includes **Pro-Stage**™ control in addition to optional timers. Use 18 awg or larger wire for making these connections.

## **RECOMMENDATIONS FOR CONTROLLING E.T.**

Everyone has their own theories regarding when to apply the stop, how much stop (throttle closure), and how long to leave it on (in the closed position). The following recommendations will give you a place to start, based on our own racing experience.

When to apply the stop: The reaction of most cars (time required to break the starting beam at launch) is 0.3 seconds or less. To guarantee the car is at full throttle for fastest vehicle reaction, do not activate the stop less than 0.3 seconds after launch. Our suggestion is to wait 0.4-1.0 seconds after launch before activating the stop. This will allow the car to initially accelerate hard where track conditions and residual brake drag can cause consistency problems.

How much and how long: Don't apply the stop for less than 1 second (duration). This will ensure enough time for the actuator to fully close before reopening. In order to have a consistent throttle stop ratio, the goal is to set the throttle stop setting were the car does not accelerate nor decelerate while it is activated. For most applications, this RPM setting for the throttle stop is around 3600-4000RPM (loaded against the converter). Your application may vary, call for suggestions.

## **MAINTENANCE**

1. Twice a year you should lubricate the system by turning off the CO2 bottle valve, disconnecting the ¼" supply line into the solenoid assembly and placing 2 or 3 drops of light oil or air tool oil into the solenoid fitting. DO NOT use solvent based oil.
2. Periodically check throttle linkage for smooth operation and verify all locknuts are secure.

## **WARRANTY**

We at K & R Performance Engineering are doing our part to restore quality and pride in American made products. It is with this goal in mind that we proudly offer a full one year parts and labor warranty against design, defective materials, and workmanship under normal service use conditions. Any defect affecting operation will be repaired free of charge and promptly returned.

**K & R PERFORMANCE ENGINEERING SHALL NOT BE LIABLE FOR INJURY, CONSEQUENTIAL, OR ANY OTHER DAMAGE RESULTING FROM USE OR MISUSE OF THIS PRODUCT. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED.**

## **TECHNICAL SUPPORT**

Contact: *K + R Performance Engineering, Inc.*  
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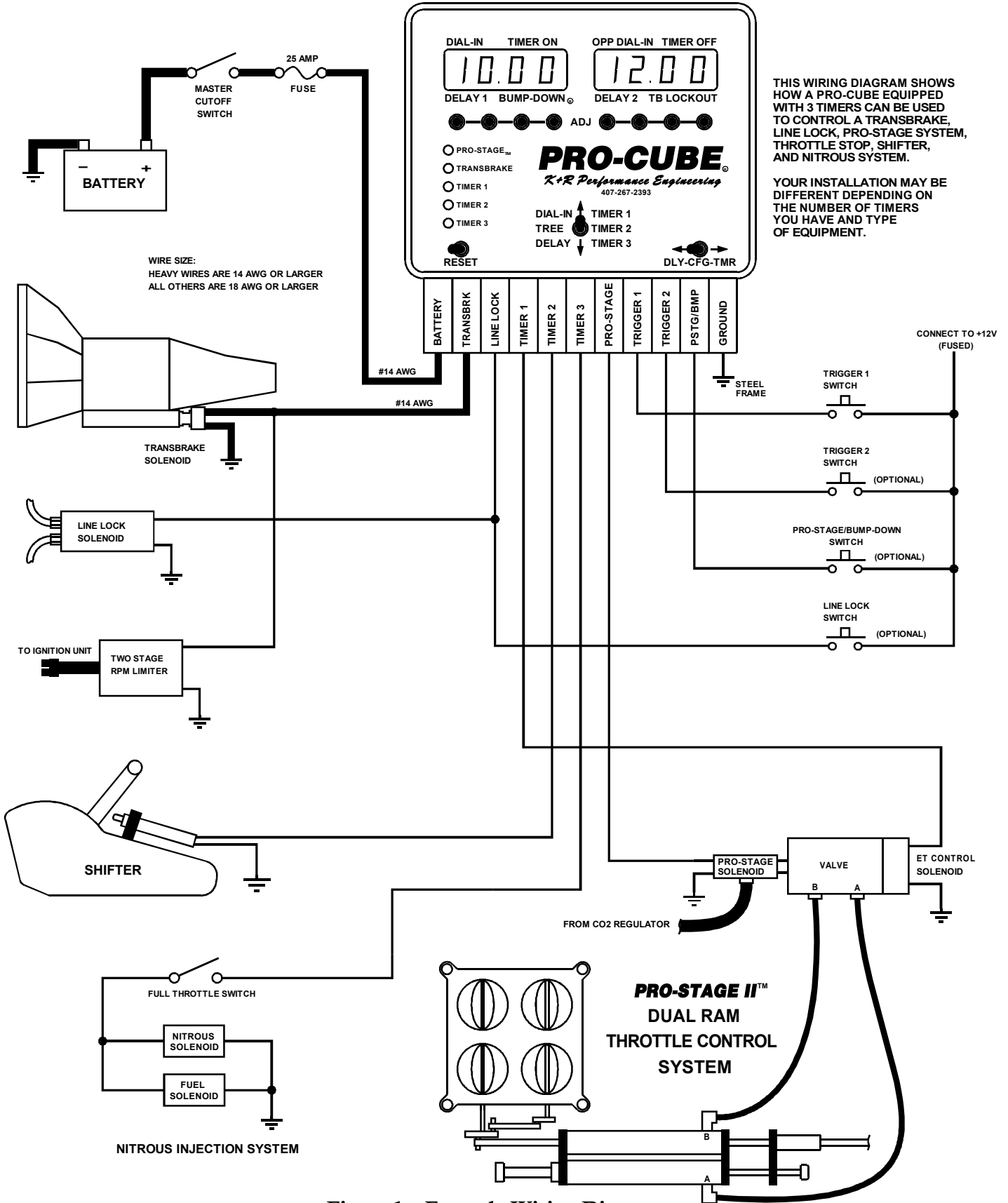


Figure 1 – Example Wiring Diagram