PRO-SHIFT™

PS2 electronic gear shift

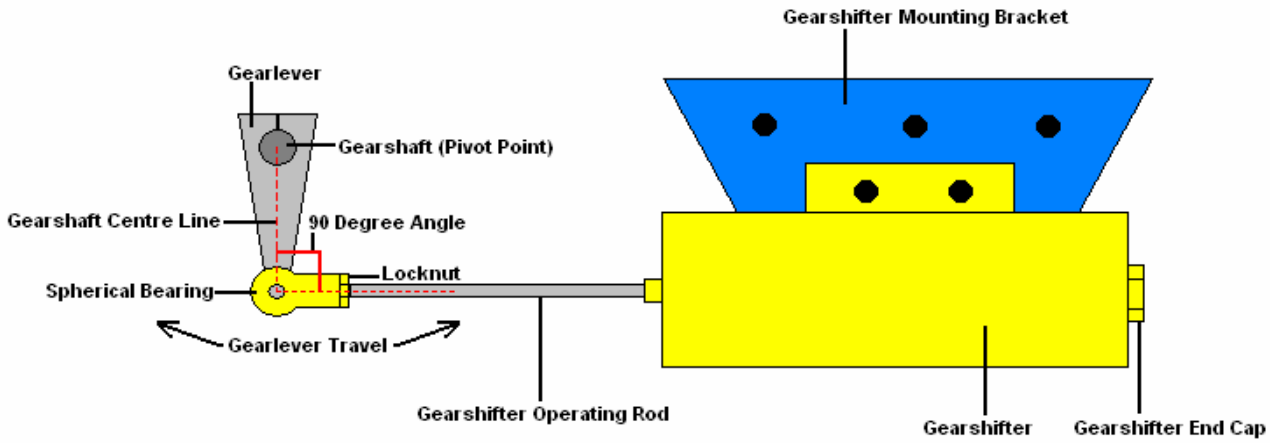
General Installation Set Up & User Instructions

It is very important that you take the time to read and follow these instructions.

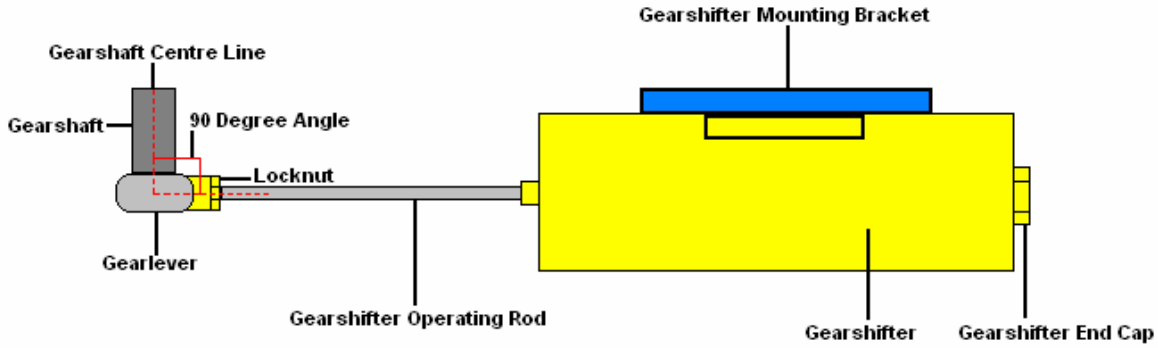
General Gearshifter Installation Principle for Sequential Gearboxes

For correct installation of your Pro-Shift PS2 Gearshift System you **MUST** ensure that the Gearshifter is fixed at a 90° angl e to the engine or gearbox's gearshaft centre line and when you attach the Gearshifter operating rod to the gearlever you **MUST** also ensure the gearlever is drilled so that the hole forms a 90° angle between the gearshaft centre line and the Gearshifter operating rod. This is necessary to provide optimum Gearshifter performance in both operating directions. See Diagram Below:

PSII Gearshifter Mounting Side Elevation



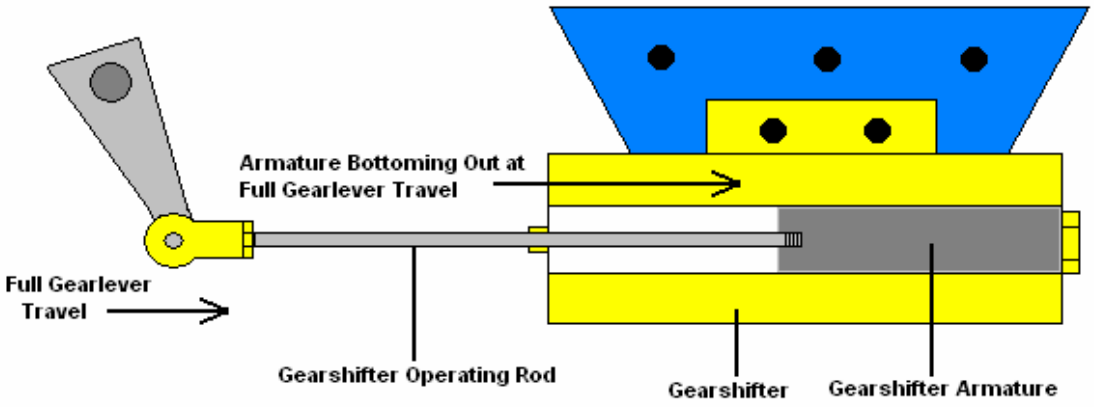
PSII Gearshifter Mounting Top Elevation



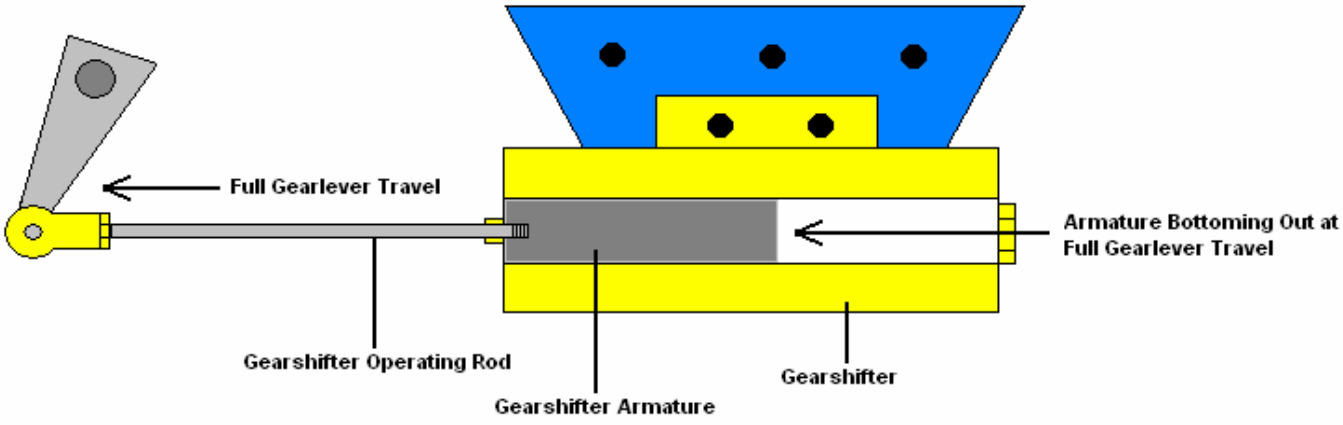
Note - Where possible all brackets, gearlever, wiring harnesses and bolts, along with digital imagery to aid fitting will be provided with our kits

Important - For optimum performance it is extremely important that the gearshifter armature (which is attached to the Gearshifter operating rod within the Gearshifter body) just bottoms out at full gearlever travel in both operating directions, By this we mean that the metal armature inside the Gearshifter housing touches down inside the Gearshifter body at full gearlever travel in each operating direction when the complete system is securely bolted to the vehicle and connected to the gearlever. This is shown in the diagram below:

PSII Gearshifter Cross Section - Inward Travel



PSII Gearshifter Cross Section - Outward Travel



If you have any doubts about your setup please contact Pro-Shift where a member of our staff will be happy to assist you as failure to do so could result in serious gearbox and/or engine damage which Pro-Shift cannot be held responsible for.

Ensure that when the Gearshifter is fitted, the operating rod runs freely throughout its travel and does not foul or bind on the Gearshifter exit hole (remember that the gearlever will usually run through an arc).

General Torque Settings

Please ensure that when your Pro-Shift PS2 Gearshift System is fitted **ALL** Nuts and Bolts are tightened to the appropriate torque settings listed below.

6mm Bolts/Nuts, 10Nm – 7ft/lb

8mm Bolts/Nuts, 22Nm – 16ft/lb

24mm Gearshifter End Cap, 61Nm - 45ft/lb

If the Gearshifter end cap is removed for any reason when it is replaced you must apply thread lock before refitting as this will prevent it from working loose in the future.

Gearshifter Travel Set Up

Step 1 - Ensure that the Gearshifter is securely mounted to the vehicle via the Gearshifter mounting bracket and the engine is switched off.

Step 2 - Loosen the locknut on the Gearshifter operating rod which is screwed into the spherical bearing.

Step 3 - Ensure the vehicle is in neutral then elevate the drive wheel(s), rotate and manually engage a gear (1^{st} or 2^{nd} no matter which).

Step 4 - Secure the gearlever whilst engaged at full gearlever travel then adjust Gearshifter operating rod by screwing it into or out of the spherical bearing (depending on which direction is required), until you feel a resistance as the Gearshifter armature bottoms out (this is the metal armature located inside the Gearshifter body that is attached to the Gearshifter operating rod). This should be set **ONLY** to happen at full gearlever travel, then tighten the locknut onto the spherical bearing to retain this setting.

Step 5 - Following the same procedure manually engage the gear in the opposite direction and check that the Gearshifter armature also just bottoms out again at full gearlever travel in this direction.

When the armature ‘bottoms out’ in both operating directions at full gearlever travel with no binding of the Gearshifter operating rod then the Gearshifter travel is correctly set up.

Note – If you have any doubts about the Gearshifter travel setup or alignment then **DO NOT** use the vehicle, contact Pro-Shift immediately and our staff will be happy to assist you. Failure to do so could result in serious gearbox and/or engine damage which Pro-Shift cannot be held responsible for.

Safe Operating Temperatures

Although the Gearshifter can safely operate at temperatures of up to 100 degrees C, it is imperative that the Gearshifter is run as cool as possible to give optimum performance. If your application is likely to get overly hot we strongly recommend that cool air is ducted to the Gearshifter as this will improve performance and reliability.

Reasons for the unit needing direct air ducting can include the following:-

- When the vehicle is fitted with an aero floor package or fairing and has little or no internal airflow to the Gearshifter
- When the Gearshifter is enclosed in a hot engine bay or cab and has little or no airflow
- When the vehicle is being used in a hot environment or country
- When the Gearshifter is located near the engine, coolant pipes, exhausts or other hot components

If you are in any doubt then please contact Pro-Shift who will advise you on the best course of action.
Overheating can lead to a component failure which is not covered by any form of warranty expressed or implied.

Do not repeatedly operate the Gearshifter when the vehicle is stationary or when the system is being bench tested as this could lead to the unit overheating which in turn could result in component failure.

If you need any further advice then please do not hesitate to contact Pro-Shift where a member of our staff will be happy to assist you.

Gearshifter Wiring

Gearshifting may be operated by push buttons or paddles on different vehicles but for ease of identification in this document they will be referred to as Switchgear

Pro-Shift PS2 Gearshift Control Unit (GCU) Fitting

• Position the Pro-Shift GCU in a convenient place with easy access to the adjustable operation timer screws and then spot through the box base with a 5mm drill. Open out holes with a 9.5mm drill. Insert rubber rawl nuts and fix down box securely with the two 2x5mm csk. screws provided.

Control Harness – 1.5mm Cable (As shown on page 16)

• The control harness needs to be routed from the GCU along the vehicle's chassis to the switchgear, switched power feed and the common 12 volt coil feed (located between the ECU and coils).

• **12v Switched Feed (Red Cable)** - The small red cable in the Pro-Shift control harness needs to be connected to a 12 volt switched feed within the vehicles wiring harness that is live when the vehicle's ignition switch is turned on. Once the cable is identified, simply strip approximately 12mm of insulation from it and solder a 100mm long piece of red cable to it. Wrap the joint with insulating tape and fit a female bullet connector which in turn connects to the male bullet connector on the Pro-Shift harness.

• **Upshift/Downshift Feed to Switches (Orange and Yellow Cable)** - These connect to the corresponding cables on the vehicle's switchgear.

• **Switchgear Earth/Ground (Black Cable)** - It is very important that this cable is connected to the battery negative or good chassis point. This means do not use the handlebar, yoke or any other indirect connections. If attached to the chassis, it must be a solid clean part directly on the chassis.

• **Negative Supply to Pro-Shift (Black Cable)** - The small black cable in the Pro-Shift harness can either be connected to a clean solid part of the chassis or preferably straight to the battery negative.

This point is emphasised because a poor earth/ground connection can make subsequent fault finding more complicated and time consuming. A good connection first time alleviates these problems.

Ignition Inhibit (Grey/White Cables)

The ignition inhibit (cut) connections are usually made near the ignition coils where there are normally multiple coil feed cables that can traced back to a single 12v common feed cable.
To identify these cables use a multi meter to check if, with the ignition switched on, the coil feed cables all carry 12 volts. Once identified these cables can usually be traced back to a single point in the harness where the cables become one, this cable should then be cut. If the coil feed cables do not common up to a single cable then they will have to be cut and joined together to create the required common 12v coil feed.

Next fit a female bullet connector to the cut part of the cable leading towards the ECU (electronic control unit) and then fit a male bullet connector to the cut part of the cable leading towards the coils. The Pro-Shift PS2 harness can now be connected with the White cable – ECU (female bullet connector) and the Grey cable – coils (male bullet connector). Always run the Pro-Shift White cable towards the ECU and the Grey cable towards the coils as these cables are dedicated and will only work correctly when connected this way around.

Note - Care must be taken to ensure that only the coil feeds are interrupted, as some vehicles power auxiliary items such as fuel pump or ECU from the same 12 volt supply as the coils. Check this with the appropriate circuit diagram. As a general guide the common coil feed colours that need to be cut are usually:

Honda – Black - White
Kawasaki - Red
Suzuki - Grey
Yamaha - Red - Black

Testing the Gearshift Control Harness

Once the control harness is connected the ignition interrupt can be checked. Before doing this ensure that the Gearshifter is disconnected by separating the white plug on the power harness where it connects to the Pro-Shift PS2 GCU and ensure that the vehicle is in neutral.

Step 1 - Turn on the ignition switch, the Gearshift Control Unit (GCU) should now display – LH green LED (power on 12v), RH yellow LED (power on 9v) and the LH yellow LED (Ignition).

Step 2 - Start the engine and allow it to warm up to its correct running temperature. Then raise and hold the engine at a constant speed of approx 2500 rpm.

Step 3 – For testing the upshift circuit, press the green upshift button or pull the RH paddle and you should then hear the engine speed dip momentarily (this signifies that the ignition interrupt is operating). At the same time the LH yellow LED will `blink out` indicating the ignition interrupt time. When doing this the RH green upshift LED will also flash to indicate upshift operation time.

Step 4 – For testing the downshift circuit, press the red downshift button or pull the LH paddle and when doing so the RH red Downshift LED will flash to indicate downshift operation time. Also, the LH red blipper operation LED will blink momentarily to indicate the downshift blipper operation time, please ignore this if your vehicle is not fitted with the Pro-Shift downshift blipper.

See GCU diagram on Page 15 for more details.

Power Harness - 2.5mm Cable (As shown on page 16)

- **12v Power Supply (Red Cable)** - This should be connected directly to the battery positive terminal and fused. This provides the high current supply for the Gearshifter.

Note - DO NOT connect the main power feed to the main switch on the vehicle as there can often be “electrical noise” generated at this switch when other electrical devices are also connected to this point, this can send errant and unwanted signals to the PS2 GCU which could cause unwanted switching. Also ensure that you use the correctly rated fuse supplied as using any fuse other than the one supplied with the system can lead to operating problems or failure.

- **Harness Main Supply to Gearshifter (Yellow and Blue Cables)** - These two cables are to be connected to the corresponding Gearshifter cables. Once Gearshifter direction of travel has been established for correct operation the blue must be connected to the upshift cable and the yellow to the downshift cable.

  Note - The Gearshifter up and downshift cables are not flagged on delivery as the Gearshift operating directions will vary on different gearboxes.

- **Auxiliary Earth/Ground (Black Cable)** – This is for the Gearshift Control Unit (GCU) and should be taken directly to the battery negative connection or a good clean part of the chassis.

- **Electric Downshift Blipper Feed (Green Cable)** - This is only applicable on systems fitted with the electric downshift blipper. For Blipper fitting and testing instructions please turn to the end of this document (where included).

Gearshifter Ground/Earth

This also needs to be connected to a good clean chassis ground/earth point (remove any paint or anodizing) because if this connection is poor the Gearshifter will exhibit one of the following symptoms - no Gearshifter operation, intermittent, lazy or underpowered operation.

The Gearshifter ground/earth can be identified as the longest black cable exiting the Gearshifter body, but if you are not sure you can use the following procedure to check:

Step 1 - Take a multi meter and set it to 200 Ohms resistance.

Step 2 - Put the negative probe on any of the 3 black Gearshifter cables and the positive probe on each of the remaining 2 cables in turn and note the readings.

Step 3 - If the 2 readings from these cables are within +/- 3 Ohms of each other then these are the 2 gearshift operating cables and the third is the ground/earth.

Step 4 - If not then move the negative probe to the next cable and repeat the procedure until you get the desired result as mentioned in Step 3.

Step 5 - Once you identify your ground/earth and the upshift/downshift operating cables we strongly recommend that you flag them with the appropriate coloured tape, i.e. Blue for upshift and yellow for downshift as this will prevent them from becoming mixed up in the future.

Note – The Gearshifter up and downshift cables are not flagged on delivery as the gearshift operating directions will vary on different gearboxes.

A Full wiring harness diagram can be found on page 16

Driving/Riding Tips

You will find that getting the best out of your Pro-Shift PS2 System is a skill that will require a little time, patience and practice to fully master.

Note - The Pro-Shift PS2 System is not an automatic clutch system so when engaging a gear whist the vehicle is stationary please ensure that the clutch is depressed (disengaged) when the button/paddle is pressed as failure to do so would be dangerous.

Upshifting

• We suggest that at low speed running it is advisable to use a slight “lift” or easing of the throttle when Upshifting particularly between 1st and 2nd gear so that the gearshift operation is smoother, you may also use the clutch although it is not absolutely necessary. Upshifting will be factory set to the Right Hand Paddle or the Green Button.

• Upshifting can also be carried out very smoothly by using ‘level’ throttle openings.

• When upshifting is triggered at full or wide throttle openings you will find that the gearshifts are considerably smoother and almost seamless.

Downshifting

• When Downshifting you **MUST** use the clutch unless your vehicle is fitted with the Pro-Shift Downshift Blipper which will negate the need to use the clutch whilst the vehicle is in motion. Downshifting will be factory set to the Left Hand Paddle or the Red Button. Where applicable the Downshift Blipper will be factory set so if adjustment is required we strongly recommend that you contact Pro-Shift directly where a member of our staff will be happy to assist you.

Note - Although it is possible to achieve multiple downshifts in a very short period of time with the clutch disengaged Pro-Shift does not recommend this practice because it is essential to match road speed to engine speed and failure to do so could easily result in engine over-rev, with the increased possibility of engine failure or crashing.

We strongly recommend that the driver/rider only downshifts one gear at a time unless they are very experienced and competent in using their Pro-Shift PS2 System.

Upshifting/Downshifting Problems – With the Pro-Shift PS2 System set up correctly as stated in this document you should not encounter any gearshifting problems (e.g. missing gears, hitting false neutrals, etc.) However, if you do, stop using the vehicle immediately and contact Pro-Shift where our staff will be happy to assist you. Failure to do so could result in serious gearbox and/or engine damage which Pro-Shift cannot be held responsible for.

Where Pro-Shift PS2 System Is Used For Racing

You may find as you become more familiar and competent in the use of your Pro-Shift PS2 System that it is desirable to decrease the ignition cut time. This can be achieved by following the procedure described below.

It is advised that the ignition cut time adjuster screw should only be moved between quarter and half a turn at a time.
To increase the ignition cut time, turn the adjusting screw clockwise, doing this will lengthen the ignition cut time and smooth out the Upshift if you feel it is a little 'harsh'.
To decrease the ignition cut time follow the same procedure as above only turn the adjusting screw anti/counter clockwise.

For further details please refer to the diagram showing the PS2 Gearshift Control Unit (GCU) on page 15.

Note - If you follow the procedure described above you will reach a point where the Pro-Shift PS2 System can no longer achieve "flat upshifts". When this point is reached we suggest you turn the ignition cut screw 1-2 turns clockwise to lengthen the cut time slightly. This will provide the optimum "flat upshift" time. All timer adjuster screws are 20 turn units but have no stop at either end of their travel, so be very careful to count how many turns you have moved them from their default factory settings.

The Upshift and Downshift timers are factory set and it is extremely rare that these will need adjusting. If the duration of the solenoid operation is set too high then there is an increased likelihood of the solenoid overheating which in turn can lead to component failure. If you are in any doubt then please contact Pro-Shift for further advice.

We are happy to provide personal trackside support and setup, please contact Pro-Shift for further details.

Maintenance

Your Pro-Shift PS2 System should require little or no maintenance throughout a seasons running unless it has been removed and replaced incorrectly aligned, or used in exceptional circumstances and it has been subjected to ingress of foreign substances, e.g. grit, sand, excessive water, etc. Should this be the case then we recommend that you mark the Gearshifter unit for alignment and travel (this is necessary to retain the correct alignment and travel settings of the Gearshifter) before carefully removing it. When removed you should wash the unit out using contact cleaner (to be sprayed inside the Gearshifter operating rod outlet hole) until the armature located inside the Gearshifter travels freely inside the unit. Allow the contact cleaner to dry and then spray a small amount of silicone spray inside the unit (via the Gearshifter operating rod outlet hole). Do not use releasing spray oils or water repellent sprays as these will attract dirt and eventually clog up the Gearshifter which can lead to component failure gearbox and/or engine damage. Having followed this process carefully the Gearshifter unit will now be ready for refitting, (please remember to tighten the Gearshifter unit to the correct torque settings as listed on page 4) and providing it is realigned and set up for travel correctly it will work as before.

If the Gearshifter end cap is ever removed then thread lock **MUST** be applied when it is refitted to ensure that it does not come loose during use (please refer to torque settings on page 4). It is advisable to check the tightness of the Gearshifter end cap at regular intervals to ensure that it does not come loose as this **WILL** affect Gearshifter travel which in turn could lead to gearbox and/or engine damage which Pro-Shift cannot be held responsible for.

Important Note

Incorrect refitting of the Gearshifter could cause the vehicle to miss gears or to hit ‘false’ neutrals and if this happens then stop using the vehicle immediately and contact Pro-Shift who will be happy to help you locate the problem and advise on how to correctly refit your Gearshifter.
Failure to do so could result in serious gearbox and/or engine damage which Pro-Shift cannot be held responsible for.

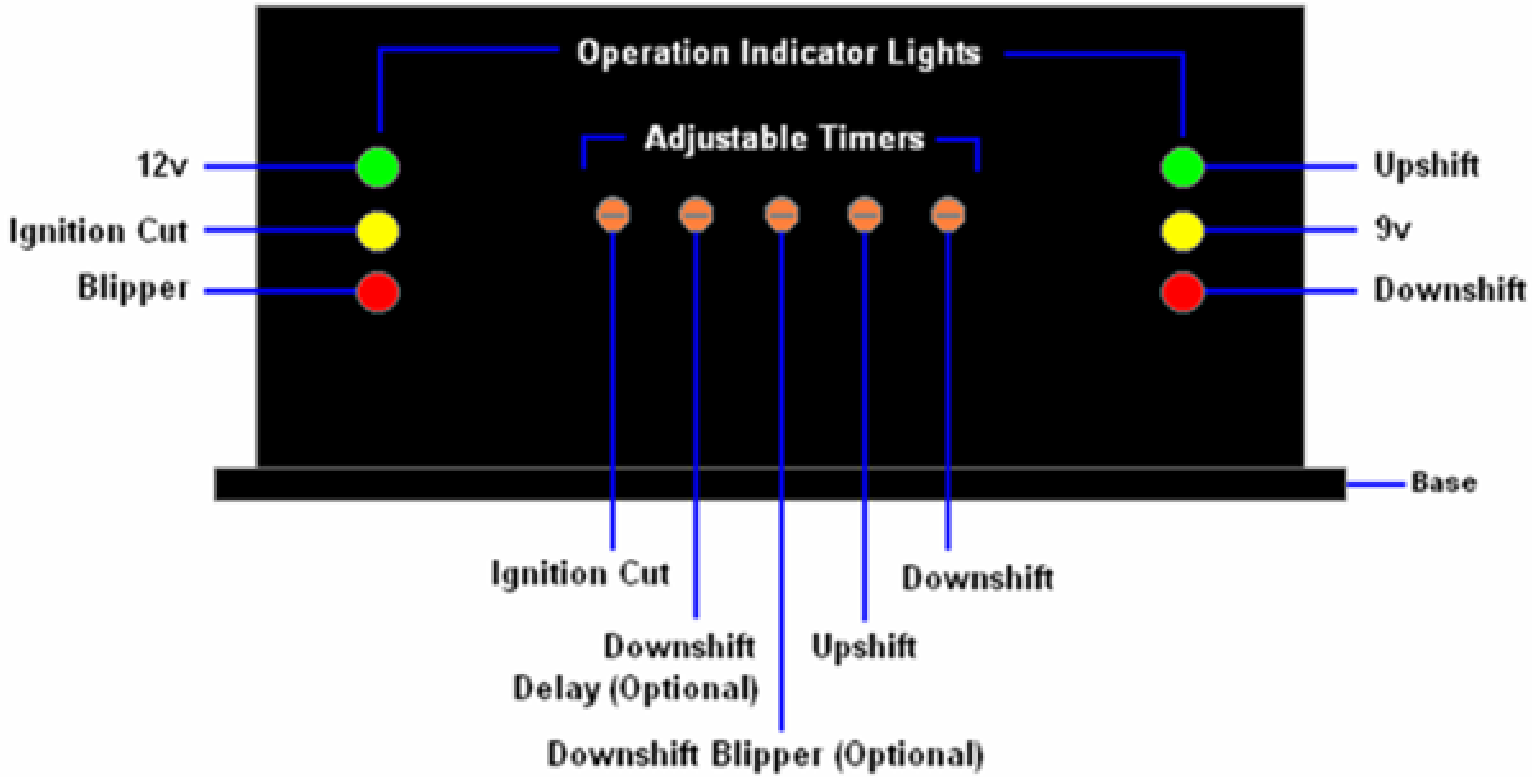
Note - Pro-Shift Staff are here to assist you and will gladly answer any of your queries or maintain your PS2 System for you should you prefer.

Thank you for choosing the Pro-Shift PS2 Electronic Gearshift System.

Warranty

Pro-Shift and its associated designs, components and services are intended for use in high speed, high performance motor racing. They are sold without warranty, express or implied. There are risks associated with Motorsport that may result in property damage, serious injury or even death. As such, the customer voluntarily accepts and assumes all such risks, dangers and damages incurred in the use of previously mentioned designs, components and services and by acceptance of this shipment hereby **RELEASES, WAIVES, DISCHARGES AND COVENANTS NOT TO SUE PRO-SHIFT TECHNOLOGIES LTD. OR ANY OF IT'S AFFILIATIONS.**

Pro-Shift PSII Gearshift Control Unit (GCU)



Timer Adjustment - Clockwise = Increase in Operation Time
Counter/Anti-Clockwise = Decrease in Operation Time

Note - All Pro-Shift control units will arrive with a base set up so normally this will not require any adjustment.

Pro-Shift PSII Wiring Harness