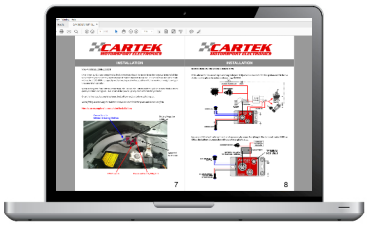
CARTEK
MOTORSPORT ELECTRONICS

SHIFT LIGHT (Club & OBD2)

INSTALLATION GUIDE



For the very latest information and extra installation advice go to:
www.cartekmotorsport.com/downloads

For off-road use only

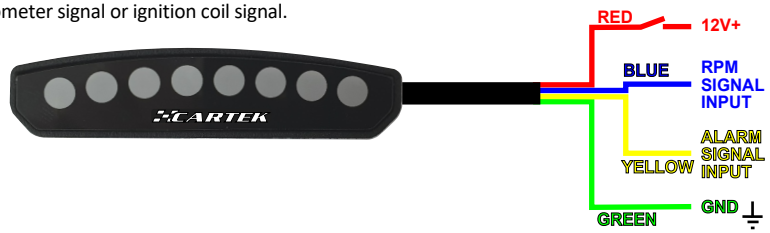
Made in UK

SHIFT LIGHT INTRODUCTION

The **SHIFT-LIGHT** from **CARTEK** is a dashboard mounted device that is designed to indicate to the driver the optimum time to shift up a gear to obtain maximum performance from their engine. The device contains 8 multi-coloured LEDs which form a display sequence that will commence at an engine speed prior to optimum and complete at precisely the optimum speed thereby giving the driver early indication to shift up before the rev limiter is reached or engine damage occurs.

SHIFT-LIGHT (Club) **CK-LS-CL**

Requires an engine speed signal to operate which can be any RPM output from an ECU (5V or 12V square wave), tachometer signal or ignition coil signal.



Shift Light (OBD2) **CK-LS-OBD**

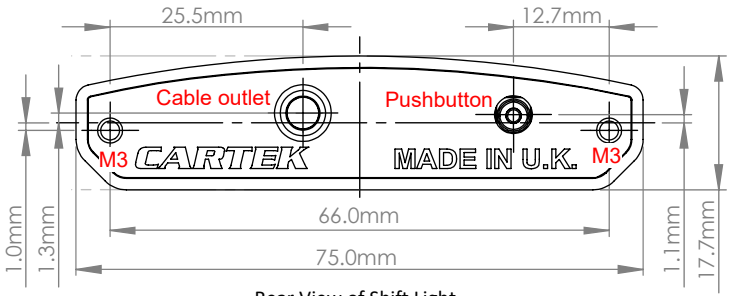
This version of the Shift Light can be plugged directly into the OBD2 port of the majority of vehicles fitted with this type of connector. It is supplied with a dedicated 1.5 metre OBD2 cable and connector to no additional wiring is necessary. On power up the Shift Light OBD2 will search for the correct OBD2 protocol.

When the engine is switched off, the Shift Light OBD2 will enter sleep mode to minimise battery consumption.

Please note that the Shift Light OBD2 will not work with OBD Splitters and cannot be hardwired into the vehicles electrical systems.

INSTALLATION

The Shift Light unit should be mounted securely on the dashboard where the LEDs can be clearly seen by the driver. Mounting can be by two M3 screws from the underside or two M3 screws from the rear of the unit. If mounting using M3 screws from the underside then please note the maximum thread depth is 8mm.



Rear View of Shift Light

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CONFIGURATION

After installing the Shift Light, and with power switched on, Configuration Mode can then be entered where the following settings can be checked or adjusted.

Configuration Mode is entered by pressing and holding the pushbutton on the rear of the unit for 2 seconds. All 8 LEDs will flash White during this time. Configuration Mode will commence when the display changes to 1 White LED. This single White LED will indicate that Configuration 1 can be entered by releasing the pushbutton. If you wish to go directly to another Configuration then simply continue to hold the pushbutton until the required Configuration number is displayed, e.g. 4 White LEDs represents Configuration 4, etc..

There are **4** settings that can be adjusted for **Shift Light OBD2** and **6** settings for **Shift Light Club**:

Configuration Menu	LEDs Displayed	Description
1	1	**LED Brightness Level (Shift Light Club & OBD2)**
2	2	**LED Shift Light Pattern (Shift Light Club & OBD2)**
3	3	**Shift Light Pattern Start RPM (Shift Light Club & OBD2)**
4	4	**Shift Light Pattern Finish RPM (Shift Light Club & OBD2)**
5	5	**RPM Signal Input Filtering (Shift Light Club only)**
6	6	**Pulses per Crank Shaft Revolution (Shift Light Club only)**

Note 1:
Each Configuration is described in more detail below. Any changes to a Configuration are saved immediately. There are 3 ways to exit the current Configuration Menu:

1. Switch power off (or remove OBD2 connector for OBD2 versions)
2. Press and hold the pushbutton for **2** seconds, and release when the LEDs are flashing.
3. Press and hold the pushbutton for **4** seconds. Doing this will go back to the Configuration menu selection as above, starting from the next Configuration Menu item.

Factory Reset
If you wish to go back to the factory/default settings then a 'Factory Reset' needs to be performed. To do this, switch power OFF to the unit (for OBD2 units, unplug the OBD2 cable) then, while pressing and holding the pushbutton, switch power back ON (re-connect OBD2 cable). The outer LEDs will display Blue. Continue to hold the pushbutton until the outer LEDs begin flashing, which will indicate that the default settings have been restored. The pushbutton can now be released.
Factory/default settings are as follows:

1 - LED Brightness Levels: **Mode 1 (Maximum brightness), Mode 2 (Half Brightness)**
2 - LED Shift Light Pattern: **Pattern 1 (Blue + Red display)**
3 - Shift Light Pattern start RPM: **2,200 RPM**
4 - Shift Light Pattern end RPM: **8,200 RPM**
5 - RPM Signal Input Filtering: **Filter 1 (Minimal filtering)**
6 - Pulses per Rev: **2 (Two sparks per crankshaft revolution)**

For Shift Light OBD2 units, this 'Factory Reset' may be required if you intend to install onto another car.

CONFIGURATION SHIFT LIGHT CLUB & OBD2

Configuration 1 - Brightness:

There are two adjustable brightness levels which allow you run the shift light in a Day brightness mode and a Night brightness mode. To toggle between the two brightness levels press the rear button momentarily. Four LEDs will light up momentarily on the left if you are in Brightness Level 1, and 4 LEDs will light up momentarily on the right if you are in Brightness Level 2. To adjust the brightness in Level 1 and Level two please go into configuration mode 1 by pressing and holding the rear button for 4 seconds. Release the button when the first LED has lit up. Four white LEDs on the left will now be displayed indicating you are in brightness level 1. A single press of the rear button will change this brightness level (9 to choose from). Once you are happy with the brightness level press and hold the rear button for 4 seconds until 4 white LEDs on the right light up. You are now in Brightness level 2. Once you have chosen your brightness level then refer back to Note 1 to either exit configuration or move onto the next Configuration Menu

Brightness Level 1
(Default brightness = Max)

Brightness Level 2
(Default brightness = Half)

Configuration 2 - Shift Light Pattern:
On entering Configuration Menu 2, the LEDs will demonstrate the current selected Shift Light pattern. Subsequent quick presses of the pushbutton will cycle through each of the 6 available Shift Light Patterns below:

Pattern 1 - Linear

Pattern 2 - Linear

Pattern 3 - Linear

Pattern 4 - Linear

Pattern 5 - Converging

Pattern 6 - Converging

Once you have chosen your Shift Light Pattern then refer back to **Note 1** to either exit configuration or move onto the next Configuration Menu.

CONFIGURATION SHIFT LIGHT CLUB & OBD2

<u>Configuration 3</u> - Shift Light Pattern <u>START</u> RPM:
There are two methods available for setting the Shift Light Pattern **<u>start</u>** RPM. This can be done by either using the pushbutton to enter an exact required RPM value, or running the engine at half the required engine speed.

3.1) Shift Light Pattern <u>start</u> RPM using the pushbutton (Engine must be stationary)

Firstly, consider the actual engine speed (RPM) that you wish the display to start. This RPM value will be entered as separate numbers, i.e. 10,000, 1,000, 100 and 10. Any RPM value can be entered up to 19,990 RPM in steps of 10 RPM. Perhaps write the required speed onto a piece of paper, e.g. 5,500 RPM = 0550.

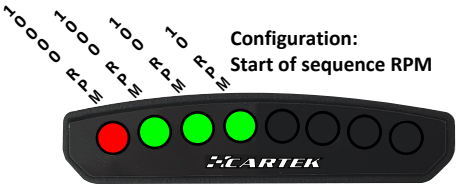
On entering Configuration 3 when the engine is stationary, the display will show one Red LED followed by 3 Green LEDs on the **left** side of the display. This will be displaying the current 10,000RPM setting. Static, (no flashing) will represent 0x 10,000, 1 flash will represent 1x 10,000, etc. Quick presses of the pushbutton will allow the value to be adjusted, however, only two values are available, 0x 10,000 and 1x 10,000.

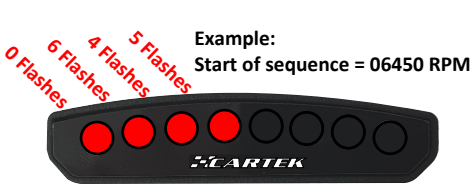
Pressing and holding the pushbutton for a minimum of 4 seconds will cause the configuration to move onto the next RPM factor, 1,000RPM. This value can be adjusted with quick presses of the pushbutton which will result in the value incrementing, e.g. static, (no flashing) will represent 0x 1,000, 9 flashes will represent 9x 1,000 (9,000).

Pressing and holding the pushbutton again for a minimum of 4 seconds will cause the configuration to move onto the next RPM factor, 100RPM. This value can also be adjusted with quick presses of the pushbutton which will result in the value incrementing.

Pressing and holding the pushbutton again for a minimum of 4 seconds will cause the configuration to move onto the last RPM factor, 10RPM. This value can similarly be adjusted with quick presses of the pushbutton which will result in the value incrementing.

If you now want to set the Higher RPM Limit hold down the push button for a minimum of 4 seconds until you move onto the next Configuration Menu (4) as shown by 5 White LEDs, or to exit the Configuration Menu refer back to **Note 1.**





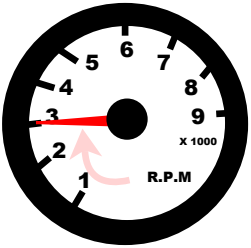
3.2) Shift Light Pattern START RPM using tachometer (Engine must be running)

This method of setting the display sequence **start** RPM will require the engine to be run at half the preferred speed. This means the engine does not need to be driven at high RPM but make sure the engine is up to normal running temperature before commencing this procedure.

To indicate that the Shift Light is waiting to measure and store the engine speed for the pattern **start** RPM, the four LEDs on the **left** side will flash Green. At this point the driver needs to hold the engine speed at **half** the required RPM. When the driver is satisfied that the engine is running at half of the required speed, the pushbutton should be quickly pressed. The Shift Light will measure the engine speed, double it, and store it in memory as the Shift Light Pattern **start** RPM value. This will be acknowledged by the four LEDs changing to Red.

Note:
If the 4 LEDs on the left side do not flash while the engine is running, or a pattern as described in 3.1 is seen, then this would suggest that the Blue RPM Input wire has not been connected to a suitable RPM signal.

Example:
For 6,000 RPM to be stored, hold engine speed at 3,000RPM.



Raise and hold revs to half of required speed.

Press pushbutton on rear whilst holding revs.

Shift light start sequence RPM now stored.

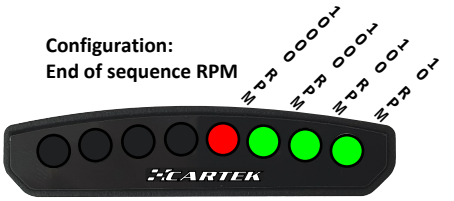
If you now want to set the Higher RPM Limit hold down the push button for a minimum of 4 seconds until you move onto the next Configuration Menu (4) as shown by 5 White LEDs, or to exit the Configuration Menu refer back to **Note 1.**

CONFIGURATION SHIFT LIGHT CLUB & OBD2

Configuration 4 - Shift Light Pattern END RPM:
As with Configuration 3, the same two methods are available for setting the Shift Light Pattern **end** RPM: Entering the specific engine speed value using the rear pushbutton, or running the engine at half the required engine speed.

4.1) Shift Light Pattern end RPM using the pushbutton (Engine must be stationary)
This procedure is identical to Menu 3.1 but the LEDs are now displayed on the **right** side of the Shift Light. Follow the same instructions as Configuration Menu 3.1 to check or adjust the **end** RPM value.

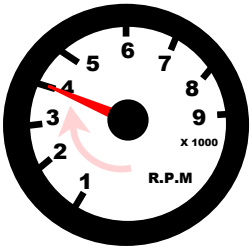
Configuration:
End of sequence RPM



Example:
End of sequence = 10,500 RPM

4.2) Shift Light Pattern END RPM using tachometer (Engine must be running)
This procedure is identical to Menu 3.2 but the LEDs are now displayed on the **right** side of the Shift Light. Follow the same instructions as Configuration Menu 3.2 to set the **end** RPM value by running the engine.

Example:
End of sequence = 4000 RPM (8000 RPM will be stored)



Raise and hold revs to half of required speed.

Press pushbutton on rear whilst holding revs.

Shift light end sequence RPM now stored.

CONFIGURATION SHIFT LIGHT (CLUB) ONLY

Configuration 5 - RPM Signal Input Filtering :
There is a choice of two filters for the input RPM signal:
Filter 1 is suited to clean, electronic / ECU RPM signals and suits modern, high revving engines.
Filter 2 is suited to RPM signals taken from the negative side of the ignition coil which can be electrically noisy and is especially suited to older, lower revving engines and historic cars with contact breaker style ignition systems.
On entering Configuration Menu 5, the LEDs will display the current selected filter by illuminating Blue LEDs, i.e. 1 Blue LED = Filter 1, 2 Blue LEDs = Filter 2. Subsequent quick presses of the pushbutton will toggle between the two filter choices.

Configuration 6 - Pulses per Rev :
On entering Configuration Menu 6, the LEDs will display the current number of Pulses per Rev (sparks per crankshaft revolution) by illuminating Yellow LEDs, e.g. 2 Yellow LEDs = 2 Pulses per Rev. Half a pulse is shown by a flashing yellow LED, e.g This value can be set from 0.5 to 8, so almost all engine configurations are catered for, e.g. a typical 4 cylinder, 4-stroke engine creates 2 pulses per crankshaft revolution. 2 Pulses per Rev is the default value, and many ECUs use this ratio irrespective of the number of cylinders.

Subsequent quick presses of the pushbutton will increment the Pulses per Rev value.

Once you have selected the correct Pulses per Rev value then refer back to **Note 1** to either exit Configuration Mode or move onto the next Configuration Menu.

ALARM INPUT (Club Shift Light Only):
The Shift Light Club is also equipped with an alarm input connection. This can be used to alert the driver of a problem with the car such as engine over-heating or oil pressure loss.
The input is a simple 0v switched input. This means that to activate the alarm, the Yellow wire must connect to GND perhaps by a thermo-switch, pressure-switch, relay or Open-Collector transistor switch. On detecting an alarm signal on the Yellow wire, all 8 LEDs will flash Orange and will continue to do so until the signal is released.

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