FREE*Wheel*

8 RELAY CHANNEL system

*user guide &
fitting instructions*

Thank you for purchasing FREEWheel!

FREEWheel, the most advanced wireless steering wheel system in the world.

Here's all the information you'll need.

CONTENTS	YOU WILL NEED
Relay Receiver with 0.7m loom, version 5+	*IP67-rated [OFF] / [ON] momentary switches*
Transmitter	*USB configuration software from www.blinkstop.co.uk*
Battery (3V CR2 lithium) and USB cable	*Wire strippers, soldering iron*
Optionally: button plate bundle comprising IP67-rated [OFF] / [ON] momentary switches, nut covers, button plate, spacer disc, decals	*Optionally: hook-and-loop or servo tape, heat shrink*

WARNINGS

Please check the contents and read the fitting instructions carefully before commencing

FREEWheel is rated for a maximum load of 10A per channel and MUST be used with additional relays for headlight circuit or other high current loads (additional relays not supplied).

DO NOT route the headlight wiring directly through FREEWheel or DAMAGE WILL OCCUR!

FEATURES

- *Wireless solution allows full push-button and paddle control with a detachable steering wheel*
- *Integrated BlinkSTOP functionality – smart indicator cancelling*
- *Integrated BeamSTOP functionality – smart headlight control*
- *Integrated IVA fog mode – inhibits and resets fog lights when headlights are turned off*
- *Supports two simultaneous button presses – includes indicator channel hazard modes*
- *Choice of momentary and latching switch behaviour for _all_ channels via USB configuration software*
- *Low or high-side switching of up to 10A at 12VDC using integral relays*
- *Lightweight, compact, efficient and cost-effective design*
- *Uniquely, lets you use your choice of buttons, paddles and mounts. No more being tied to a manufacturer's styling choices!*

TRANSMITTER

SPECIFICATION

Compact case in flame-retardant ABS plastic. Requires one 3V CR2 lithium battery. Weight with battery: 61g

Robust performance even at 2.65V. Unique transmitter ID prevents cross-talk from nearby kits.

No need to disconnect the Transmitter battery if the vehicle is off the road. The sleep drain of 0.9uA and 25mA drain per ~20msec button press allow over 6 million transmissions.

Tri-colour LED indicating performance state:

- *Green = Transmit OK. Transmission successfully received and acknowledged by the Receiver;*

- *Orange = Transmit Fail. Transmission not acknowledged by the Receiver. Possible causes are obstruction, lack of range or de-powered Receiver (e.g. vehicle ignition is off);*

- *Red = Low Battery <2.65V. Replace battery now.*

Transmission time of 6 milliseconds for a real-time response.

TRANSMITTER

INSTALLATION INSTRUCTIONS

Use of good quality, IP67 rated [OFF] / [ON] momentary switches is recommended, such as Multicomp's MCPAS6B2M1CE7, available from Farnell. Illuminated switches are not supported.

1. *Wiring*

DO NOT solder the switches while the Transmitter battery is fitted, as damage may occur.

The switches are all made to a common ground, so you can connect the ground wires as you wish.

If used*, Left / Right Indicators, Main Beam and Fog MUST be connected to the wires shown because this is matched by the relay control software. See* figure 1 *and* figure 2 *for suggested indicator and main beam wiring diagrams.*

When stripping the outer insulation, please take care not to damage the wires inside. Leave sufficient wire for future soldering of unused channels, and cover with heat-shrink.

Wire Colour	Function
BLACK	Ground
YELLOW	Ground
WHITE	Ground
ORANGE	Ground
RED	Ch1 or L Indicator
GREEN	Ch2 or R Indicator
BLUE	Ch3 or Main Beam
BROWN	Ch4 or Fog
GREY	Ch5
PINK	Ch6
CYAN	Ch7
PURPLE	Ch8

Transmitter wiring key

2. *Nut Covers (if supplied)*

*Fit the nut covers to the rear of the switches. It is deliberately a tight, push fit. The covers can be secured in place with a little hot melt glue **once all testing is complete**.*

3. *Attach the Transmitter to the Steering Wheel*

The Transmitter can be easily attached to the reverse of the wheel or button plate using hook-and-loop pads or servo tape.

4. *Battery Fitting and Removal*

Fit the CR2 battery to the transmitter. When fitting the battery, take particular care in removing the case lid and inserting the battery correctly, noting that the '+' end of the battery is nearest to the LED.

To remove the battery, carefully prise out the battery – it is deliberately a tight fit in the holder.

5. *IMPORTANT - Transmitter Testing*

Follow the USB configuration software installation instructions *to connect the Receiver to your Windows PC/laptop and to verify that your button presses for each channel are being sent by the Transmitter.*

USB CONFIGURATION SOFTWARE

INSTALLATION AND USEAGE INSTRUCTIONS

NOTE: DO NOT disconnect the USB power during programming or the chip memory may corrupt!

1. Software Installation

Connect the Receiver USB cable to the Windows PC. Windows 7, 8 and 10 are supported. Windows will auto-detect and install the FTDI Driver.

In the event the PC does not self-install the FTDI driver, download and install FTDI's VCP Virtual COM Port driver from: http://www.ftdichip.com/Drivers/VCP.htm

2. Identify the correct COM port used by FREEWheel

Open Windows Device Manager **[Start .. Run ..** *or* **Search .. and enter** **'Device Manager'].** *The port will disappear and reappear as you remove and insert the Receiver USB lead.*

Download, extract to Desktop and run the FREEWheel.exe program from the FREEWheel product Downloads tab at: http://www.blinkstop.co.uk/

3. Using the Software

Choose the correct COM port from the available drop list and click 'Connect'. The existing channel configuration and virtual relay states will be displayed (physical relays are not powered by USB).

Pressing steering wheel buttons connected to the Transmitter will illuminate the corresponding buttons and toggle or flash the virtual relay states on the software.

Select the desired smart features by checking or unchecking the Indicator, Main and Fog tickboxes. Unchecking the tickboxes will allow a free choice of momentary or latching behaviour.

To configure the channels, simply press the software switches and adjust the duration slider and click 'Program'. When successful, you will see 'Success' displayed.

To disconnect the Receiver from the USB software, press 'Disconnect' then 'Close'. Now you can safely disconnect the USB cable. Proceed to installing the Receiver.

RELAY RECEIVER

SPECIFICATION

Weight with 0.7m wiring loom: 464g.

Wiring loom uses 18AWG heat resistant, high temperature, thin wall wires with tinned copper.

Internal relays rated for maximum switching current 10A at 12VDC; supports low or high-side switching of loads.

Relays are open circuit by default at ignition **[ON]** *and are switched by the Transmitter.*

Channels are configured using the FREEWheel USB software *and have behaviour options of:*

- *ALL: momentary* **[ON]** *(Transmitter button follower);*
- *ALL: latching* **[ON]** */* **[OFF]** *with each separate Transmitter button press;*
- Channels 1 & 2: *indicator control;*
- Channel 3: *main beam function;*
- Channel 4: *IVA fog function;*
- Channels 5, 6 & 7: *inverted momentary function.*

RELAY RECEIVER

INSTALLATION INSTRUCTIONS

Inside the FREEWheel Receiver are the relays and 'low current circuits' that control the relay coils. The white pair from the receiver for each channel is the 'high current circuit' pair shown.

The white pair can be used to switch up to 10A and can be wired in parallel with the existing dashboard switches, or the switches can be removed, if preferred.

In **ALL** cases, additional relays **MUST** be used for the headlight circuit or other high current loads above 10A (not supplied).
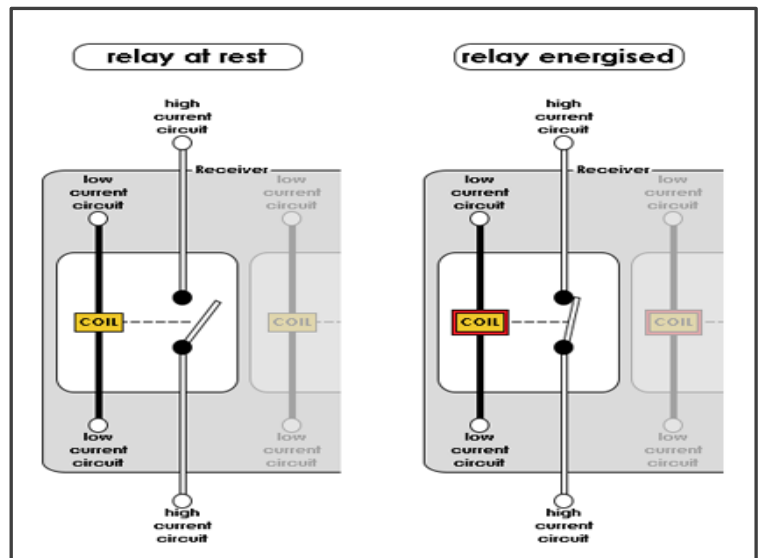
1. *Wiring*

Identify a fused, ignition-switched circuit that can be used for the power supply to FREEWheel. The FREEWheel Receiver draws little current (<500mA typically), so will not increase the circuit load significantly.

Identify a suitable Ground connection, ideally direct to the vehicle chassis. Identify the existing circuits and schematics. These will be critical to successful installation. See figure 1 and figure 2 for suggested indicator and main beam wiring diagrams. Some vehicles as standard do not provide high beam flashing unless headlamps are **[ON]** (e.g. Westfields), so use the elements of the diagrams applicable to your vehicle.

Choose a cool location for the Receiver inside the car, with minimal (metal) obstructions between Receiver and Transmitter. Behind the dashboard is normally an ideal place.

With the vehicle battery disconnected, connect Receiver Power and Ground to the previously identified wires.

Label	Wire Colour	Function
-	BLUE	Headlight 12V sense
-	GREEN	Brake Light 12V sense
-	RED	12V Ignition Power
-	BLACK	Vehicle Ground
1	WHITE	Ch1 or Left Indicator relay PAIR
2	WHITE	Ch2 or Right Indicator relay PAIR
3	WHITE	Ch3 or Main Beam relay PAIR
4	WHITE	Ch4 or Fog relay PAIR
5	WHITE	Ch5 relay PAIR
6	WHITE	Ch6 relay PAIR
7	WHITE	Ch7 relay PAIR
8	WHITE	Ch8 relay PAIR

Receiver wiring key

2. *Receiver Testing*

Re-connect the vehicle battery and check the relays can be heard to click when the steering wheel Transmitter buttons are pressed.

Check that the Transmitter light is reliably GREEN on button presses. ORANGE means that there is a probable obstruction to two-way communication. You can test the range of the system using this light for indication.

Once you have reliable communication between Transmitter and Receiver, connect the Windows PC to the USB connector and use the FREEWheel software to configure the channels, if you have not already done so (see USB configuration software). The software will show the live state of the relays and button presses.

*Now **disconnect the vehicle battery** and complete the installation of the desired integrated functions.*

INTEGRATED BlinkSTOP FUNCTION

CHANNELS 1 AND 2 SET TO [INDICATORS]

INSTRUCTIONS FOR OPERATION

An indicator can be toggled **[On]** and **[Off]** with each press of your steering wheel push-button.
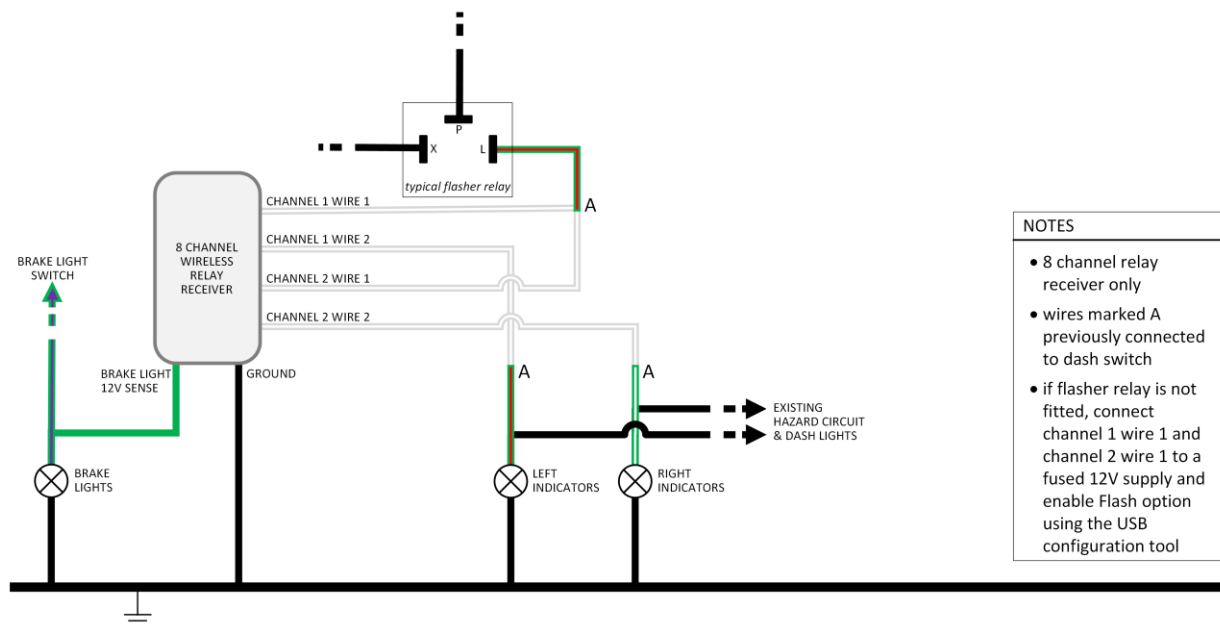
Toggling an indicator to **[On]** begins a cancelling timer. Indicating will auto-cancel once the timer has elapsed (6 to 30 seconds, user-configurable via the USB configuration software). Indicator auto-cancelling is inhibited while the brakes are pressed, and afterwards for a short time so that the indicators can remain on in traffic or while waiting to turn.

To change indicator, push the opposite button once. The current indicator will cancel, and the opposite indicator will toggle to **[On]** and begin flashing. The cancelling timer will reset.

Flash rate can be controlled by FREEWheel at 90 flashes per minute, or by your flasher relay (user-configurable).

To use the Hazard function, push both buttons together at the same time. To cancel, press either button.

FIGURE 1 // SUGGESTED INDICATOR WIRING PLAN

NOTES

• 8 channel relay receiver only

• wires marked A previously connected to dash switch

• if flasher relay is not fitted, connect channel 1 wire 1 and channel 2 wire 1 to a fused 12V supply and enable Flash option using the USB configuration tool

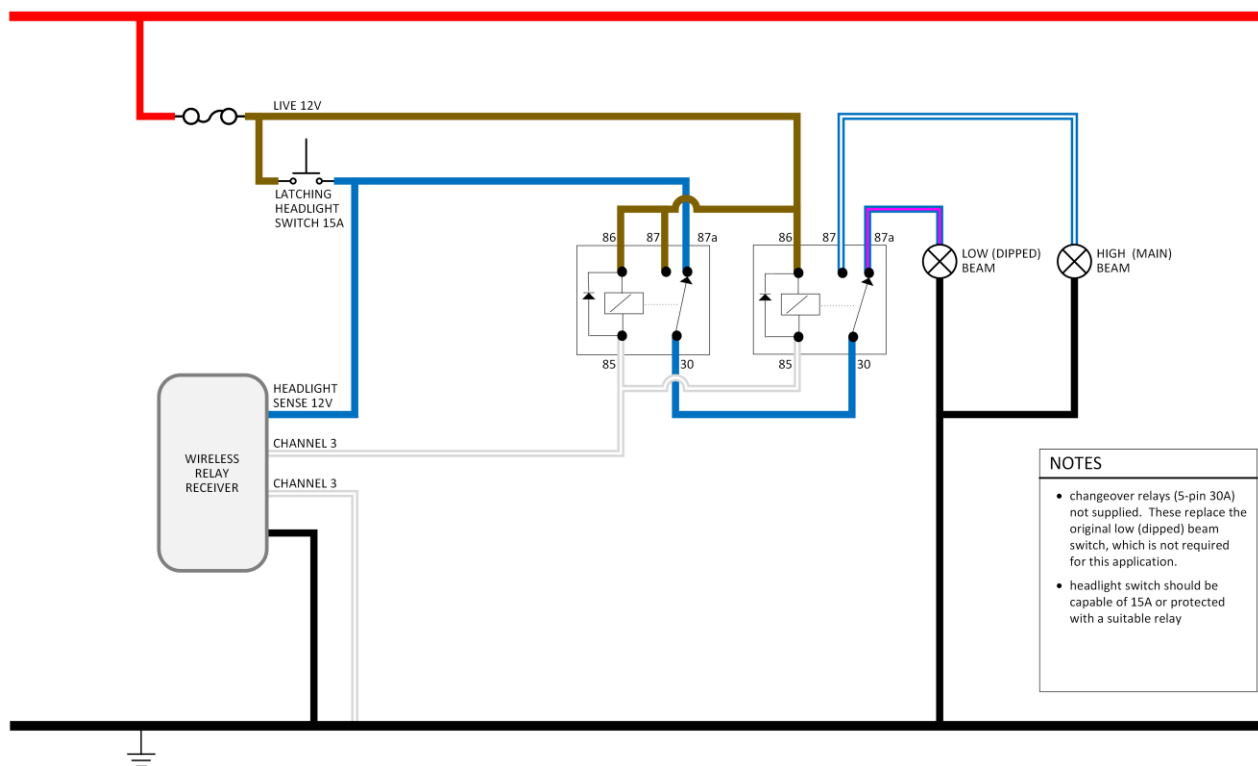# INTEGRATED BeamSTOP HEADLIGHT FUNCTION

CHANNEL 3 SET TO [MAIN]

INSTRUCTIONS FOR OPERATION

*BeamSTOP allows full control of headlight main (high) beam and dipped (low) beam with a momentary **[On]** push-button, so is particularly suited to steering wheel applications.*

*If the headlights are **[Off]**, BeamSTOP allows the main beam to light for the duration of the button press. This makes it useful for giving a warning flash to other road users when needed.*

*If the headlights are **[On]**, BeamSTOP allows each button press to alternate between latched-dipped and latched-main beam.*

FIGURE 2 // SUGGESTED MAIN BEAM WIRING PLAN

LIVE 12V

LATCHING
HEADLIGHT
SWITCH 15A

86   87   87a   86   87   87a

LOW (DIPPED)
BEAM

HIGH (MAIN)
BEAM

85   30   85   30

HEADLIGHT
SENSE 12V

CHANNEL 3

WIRELESS
RELAY
RECEIVER

CHANNEL 3

NOTES

- changeover relays (5-pin 30A) not supplied. These replace the original low (dipped) beam switch, which is not required for this application.
- headlight switch should be capable of 15A or protected with a suitable relay

INTEGRATED FOG LIGHT 'IVA' FUNCTION

CHANNEL 4 SET TO [FOG]

INSTRUCTIONS FOR OPERATION

*Channel 4 can be used as an auto-cancelling fog light channel. When the headlights are **[Off]**, the fog light will automatically cancel and is inhibited from operation.*

WIRING

*When the steering wheel button is pressed, to ensure the fog light will only activate if the headlights are **[On]**, connect the blue headlight sense wire, as shown in* figure 2.

INVERTED MOMENTARY FUNCTION

CHANNELS 5, 6 AND / OR 7 SET TO MOMENTARY [INVERTED]

INSTRUCTIONS FOR OPERATION

Channels 5, 6 and 7 can be used as inverted momentary switched channels, i.e. normally closed. Each channel can be configured independently and will always be open at power up, with normally closed behaviour starting once power-on checks are completed (<50ms).

WIRING

No additional wiring is necessary.

BlinkSTOP.co.uk

Contact:

info@blinkstop.co.uk

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