

CAN



# FREEWheel

CAN  
system

user guide &  
fitting instructions

*"So eager to order this! Need to ditch my steering wheel umbilical as soon as possible!"*

*"Installation was really straight forward ... and the configuration software worked well"*

*"All installed and tested, works perfectly, insanely pleased :D"*



*"I cannot recommend the kit enough"*

*"my favourite upgrade yet.. get one."*

*"Absolutely amazing.. I'll be sure to recommend your product as it really is a fantastic piece of kit"*

*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

FREEWheel CAN Receiver and Transmitter  
Battery (3V CR2 lithium) and USB cable  
Optionally: 0.7m loom or connector & pins  
Optionally: Easyfit Transmitter assembly or  
button plate bundle comprising IP67-rated  
OFF / [ON] momentary switches, nut covers,  
button plate, spacer disk, decals

### YOU WILL NEED

IP67-rated OFF / [ON] momentary switches  
USB configuration software from [www.blinkstop.co.uk](http://www.blinkstop.co.uk)  
Wire strippers, soldering iron (not Easyfit)  
Optionally: hook-and-loop or servo tape, heat shrink

### WARNINGS

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

**FREEWheel CAN systems have no internal switching capability and are designed to be used with a separate power distribution unit or ECU (not supplied).**

### FEATURES

- Wireless solution allows full push-button and paddle control with a detachable steering wheel
- Integrated BlinkSTOP and BeamSTOP functions – smart indicator cancelling and headlight control
- Integrated IVA fog mode – inhibits and resets fog lights when headlights are turned off
- Integrated racing features – two rainlight modes and Flash-to-Pass headlight mode
- Supports two simultaneous button presses – includes indicator channel hazard mode
- Uniquely, lets you use your choice of buttons, paddles and mounts. Don't be tied to a manufacturer's styling choices!
- Wireless switching of up to ten CAN outputs to your power distribution unit / PDM
- Option to add two variable output (0 – 11 CAN) channels for variable control
- Ultimate performance from a 10ms / 100Hz broadcast rate
- Ultimate compatibility from seven, simultaneous CAN message formats (LSB, MSB and bit masking) with free selection of base address, bus speed and identifier length
- Flexibility – set all channels as momentary and handle behaviour within a connected PDM or choose the Receiver's integrated features and latching abilities via the USB configuration software

### TRANSMITTER INSTALLATION

#### 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 allows 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.



#### EASYFIT TRANSMITTER INSTALLATION INSTRUCTIONS



Easyfit Transmitter is supplied preassembled and configured to your specification.

The Easyfit Transmitter is pre-drilled to support standard 50 to 50.8mm, 70mm and 74mm PCD steering wheel bosses. The rear plate can be detached from the Transmitter and used as a guide to gently drill through the spacer disk, if required. Use a 6mm HSS drill bit with light pressure and low speed, with the parts securely clamped.

### PIGTAILED 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, Fog and Rainlight **MUST** be connected to the wires shown because this is matched by the control software.

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.

#### 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.

Wire Colour	Function
BLACK	Ground
ORANGE	3V Potentiometer Live Ref
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 or Rainlight
YELLOW	Ch9 Pot1 Signal
WHITE	Ch10 Pot2 Signal

**Transmitter wiring key**

### TRANSMITTER BATTERY & TESTING INSTRUCTIONS

#### 1. Battery Fitting and Removal

Fit the CR2 battery to the transmitter battery housing, noting that the '+' end of the battery is nearest to the LED. As the battery is deliberately tightly fitted in the holder, exercise care when removing.

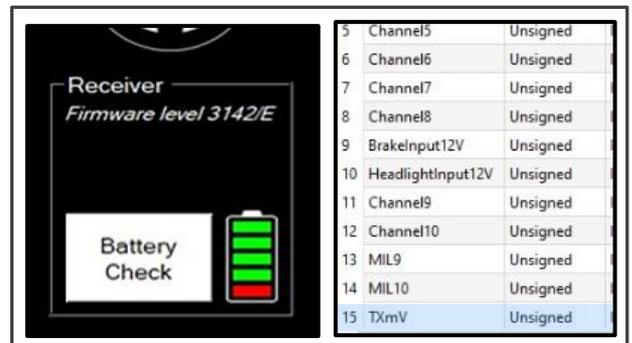
#### 2. IMPORTANT - Transmitter Testing

Follow the Receiver Configuration Software instructions to connect the Receiver to your Windows PC or laptop and to verify that your button presses for each channel are being sent by the Transmitter.

#### 3. Battery Voltage

With the Receiver connected to your Windows PC or laptop and communication with the Transmitter established, approximate battery strength can be checked using the Receiver Configuration Software.

A more precise voltage can be obtained from the CAN signal in message TXmV, within the All\_Compact\_U8 frame in Byte 6 (scaling x10, offset 1000mV). The default is 3000mV until active communication starts. A suitable alarm value is 2700mV.



## RECEIVER CONFIGURATION SOFTWARE

### INSTALLATION AND USAGE 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

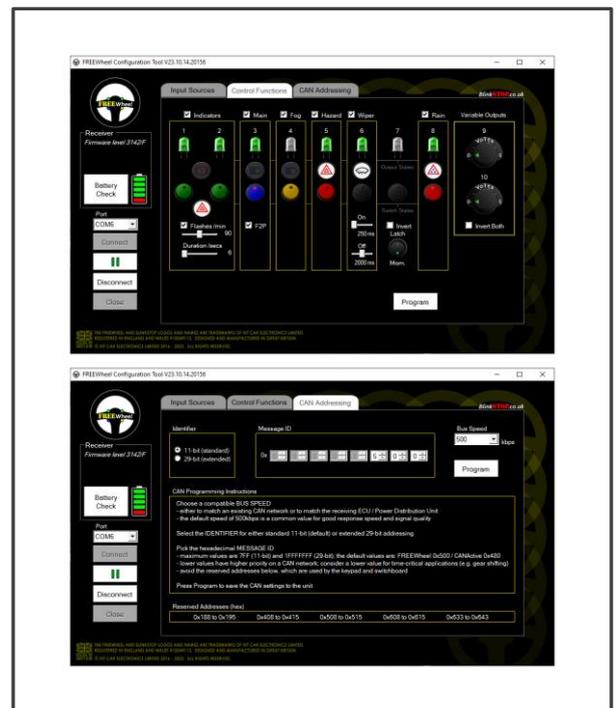
Open Windows Device Manager [**Start .. Run .. or Search .. and enter 'Device Manager'**]. The port will disappear and reappear as you remove and insert the Receiver USB lead.

Download, extract to Desktop and run the FREEWheel.exe program from the Downloads page at: <https://www.blinkstop.co.uk/shop/downloads>

#### 3. Using the Software

Choose the correct COM port from the available drop list and click 'Connect.' The existing channel configuration and virtual switch states will be displayed.

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



### CHANNEL MAPPING CONFIGURATION

#### 4. Select the Input Sources tab to map the channels

Follow the on-screen instructions to assign channels to individual buttons.

### CHANNEL BEHAVIOUR CONFIGURATION

#### 5. Select the Control Functions tab to set the channel behaviours

If using a PDM or similar, to control the channels, set all channels to momentary behaviour.

If using our integrated features, select the desired smart functions by checking the tick boxes and adjusting the duration sliders. Unchecking the tick boxes will allow a free choice of momentary or latching behaviour. Details of individual features can be found towards the end of these instructions.

Once done, click 'Program'. When successful, you will see 'Success' displayed.

Continue to CAN Configuration.

### CAN CONFIGURATION

6. Select the CAN Addressing tab and configure the Receiver CAN communication

Message ID: This is the Base Address in hexadecimal. The default is 0x500 (1280 decimal) with 11-bit (standard) Identifier. Follow the instructions on the CAN Addressing tab to set the Receiver communication to match your intended CAN-connected node (ECU / PDU / dash etc).

Once done, click 'Program'. When successful, you will see 'Success' displayed.

To achieve two-way communication, you will also need to configure your existing CAN node. If your node accepts industry standard .dbc CAN database files, you can use file KCE\_WirelessCAN.dbc from the Downloads page at <https://www.blinkstop.co.uk/shop/downloads>, otherwise configure your node with the data below.

For best performance, the FREEWheel Receiver uses a 10ms (100Hz) broadcast rate.

For best compatibility, the FREEWheel Receiver outputs its CAN message in seven simultaneous standard formats [see CAN messages table and individual message illustrations, following]. Pick the most suitable format and set your existing CAN node accordingly.

**Note:** Kvaser Database Editor 3 is recommended for viewing CAN .dbc files and is freely available from <https://www.kvaser.com/download/>

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

Proceed to CAN Receiver Installation.

### CAN MESSAGES

Message	Contents	Format	Address / default
All_Compact_U8	All signals	8-bit Unsigned compact industry standard (e.g. AiM)	Base Address 0x500 hex / 1280 dec
Ch1_4_U16LE	channels 1 - 4	16-bit Unsigned Little Endian / LSB First (e.g. EMtron)	Base Address +11 0x50B hex / 1291 dec
Ch5_8_U16LE	channels 5 - 8	16-bit Unsigned Little Endian / LSB First (e.g. EMtron)	Base Address +12 0x50C hex / 1292 dec
Ch9_10_U16LE	channels 9 - 10	16-bit Unsigned Little Endian / LSB First (e.g. EMtron)	Base Address +13 0x50D hex / 1293 dec
Ch1_4_S16BE	channels 1 - 4	16-bit Signed Big Endian / MSB First (e.g. Syvecs)	Base Address +1 0x501 hex / 1281 dec
Ch5_8_S16BE	channels 5 - 8	16-bit Signed Big Endian / MSB First (e.g. Syvecs)	Base Address +2 0x502 hex / 1282 dec
Ch9_10_S16BE	channels 9 - 10	16-bit Signed Big Endian / MSB First (e.g. Syvecs)	Base Address +3 0x503 hex / 1283 dec

#### CAN messages

Messages & Signals

Layout

Bit Positions

Name	ID Decimal	Frame Format	DLC	TX Node	Comment	Attributes
1 All_Compact_U8	1280	Standard	8	WirelessRec...	10ms Unsigned 16 bit Little Endian [Base+11]	
2 Ch1_4_U16LE	1291	Standard	8	WirelessRec...	10ms Unsigned 16 bit Little Endian [Base+11]	
3 Ch5_8_U16LE	1292	Standard	8	WirelessRec...	10ms Unsigned 16 bit Little Endian [Base+12]	
4 Ch9_10_U16LE	1293	Standard	8	WirelessRec...	10ms Unsigned 16 bit Little Endian [Base+13]	
5 Ch1_4_S16BE	1281	Standard	8	WirelessRec...	10ms Signed 16 bit Big Endian [Base+1]	
6 Ch5_8_S16BE	1282	Standard	8	WirelessRec...	10ms Signed 16 bit Big Endian [Base+2]	
7 Ch9_10_S16BE	1283	Standard	8	WirelessRec...	10ms Signed 16 bit Big Endian [Base+3]	

Signals of Selected CAN Message

Name	Type	Byteorder	Mode	Bitspos	Length	Factor	Offset	Minimum	Maximum	Unit	Comment	Values
1 Channel1	Unsigned	Intel	Signal	7	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
2 Channel2	Unsigned	Intel	Signal	6	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
3 Channel3	Unsigned	Intel	Signal	5	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
4 Channel4	Unsigned	Intel	Signal	4	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
5 Channel5	Unsigned	Intel	Signal	3	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
6 Channel6	Unsigned	Intel	Signal	2	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
7 Channel7	Unsigned	Intel	Signal	1	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
8 Channel8	Unsigned	Intel	Signal	0	1	1	0	0	0	1 Bin	0 Open Circuit	Open Circuit=0, Closed Circuit=1
9 BrakeInput12V	Unsigned	Intel	Signal	23	1	1	0	0	0	1 Bin	1 Input High	Low=0, High=1
10 HeadlightInput12V	Unsigned	Intel	Signal	22	1	1	0	0	0	1 Bin	1 Input High	Low=0, High=1
11 Channel9	Unsigned	Intel	Signal	32	8	1	0	0	0	255 Dec	Analogue	Low=0, High=255
12 Channel10	Unsigned	Intel	Signal	40	8	1	0	0	0	255 Dec	Analogue	Low=0, High=255
13 MIL9	Unsigned	Intel	Signal	24	8	1	0	0	0	11 Dec	Analogue MIL switch	
14 MIL10	Unsigned	Intel	Signal	56	8	1	0	0	0	11 Dec	Analogue MIL switch	
15 TxmV	Unsigned	Intel	Signal	48	8	10	1000	1000	3500	Dec	Transmitter battery voltage	

All\_Compact\_U8

CAN Messages & Signals
All Signals
Node List
Communication Matrix

**CAN Messages**
+ - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

**Signals of Selected CAN Message**
+ -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel1_S16BE	Signed	Motorola	Signal	8	16	1	0	0	1	
2	Channel2_S16BE	Signed	Motorola	Signal	24	16	1	0	0	1	
3	Channel3_S16BE	Signed	Motorola	Signal	40	16	1	0	0	1	
4	Channel4_S16BE	Signed	Motorola	Signal	56	16	1	0	0	1	

Ch1\_4\_S16BE

CAN Messages & Signals
All Signals
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Communication Matrix

**CAN Messages**
+ - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

**Signals of Selected CAN Message**
+ -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel1_U16LE	Unsigned	Intel	Signal	0	16	1	0	0	5000	
2	Channel2_U16LE	Unsigned	Intel	Signal	16	16	1	0	0	5000	
3	Channel3_U16LE	Unsigned	Intel	Signal	32	16	1	0	0	5000	
4	Channel4_U16LE	Unsigned	Intel	Signal	48	16	1	0	0	5000	

Ch1\_4\_U16LE

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Messages & Signals | All Signals | Node List | Communication Matrix

**CAN Messages** + - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

Bit Positions

	7	6	5	4	3	2	1	0
0								
1								
2								
3								
4								
5								
6								
7								

Byte Number

**Signals of Selected CAN Message** + -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel5_S16BE	Signed	Motorola	Signal	8	16	1	0	0	1	
2	Channel6_S16BE	Signed	Motorola	Signal	24	16	1	0	0	1	
3	Channel7_S16BE	Signed	Motorola	Signal	40	16	1	0	0	1	
4	Channel8_S16BE	Signed	Motorola	Signal	56	16	1	0	0	1	

**Ch5\_8\_S16BE**

Messages & Signals | All Signals | Node List | Communication Matrix

**CAN Messages** + - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

Bit Positions

	7	6	5	4	3	2	1	0
0								
1								
2								
3								
4								
5								
6								
7								

Byte Number

**Signals of Selected CAN Message** + -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel5_U16LE	Unsigned	Intel	Signal	0	16	1	0	0	5000	
2	Channel6_U16LE	Unsigned	Intel	Signal	16	16	1	0	0	5000	
3	Channel7_U16LE	Unsigned	Intel	Signal	32	16	1	0	0	5000	
4	Channel8_U16LE	Unsigned	Intel	Signal	48	16	1	0	0	5000	

**Ch5\_8\_U16LE**

CAN Messages & Signals | 
 All Signals | 
 Node List | 
 Communication Matrix

**CAN Messages** + - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

Bit Positions  

	7	6	5	4	3	2	1	0
0								
1								
2								
3								
4								
5								
6								
7								

**Signals of Selected CAN Message** + -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel9_S16BE	Signed	Motorola	Signal	8	16	1	0	0	255	
2	Channel10_S16BE	Signed	Motorola	Signal	24	16	1	0	0	255	
3	MIL9_S16BE	Signed	Motorola	Signal	40	16	1	0	0	11	
4	MIL10_S16BE	Signed	Motorola	Signal	56	16	1	0	0	11	

C9\_10\_S16BE

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CAN Messages & Signals | 
 All Signals | 
 Node List | 
 Communication Matrix

**CAN Messages** + - Layout < > \*

	Name	ID Decimal	Frame Format	DLC	TX Node	Comment
1	All_Compact_U8	1280	Standard	8	WirelessReceiver	10ms U8 [Base Address from config tool]
2	Ch1_4_S16BE	1281	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+1]
3	Ch1_4_U16LE	1291	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+11]
4	Ch5_8_S16BE	1282	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+2]
5	Ch5_8_U16LE	1292	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+12]
6	Ch9_10_S16BE	1283	Standard	8	WirelessReceiver	10ms Signed 16 bit Big Endian [Base+3]
7	Ch9_10_U16LE	1293	Standard	8	WirelessReceiver	10ms Unsigned 16 bit Little Endian [Base+13]

Bit Positions  

	7	6	5	4	3	2	1	0
0								
1								
2								
3								
4								
5								
6								
7								

**Signals of Selected CAN Message** + -

	Name	Type	Byteorder	Mode	Bitpos	Length	Factor	Offset	Minimum	Maximum	Unit
1	Channel9_U16LE	Unsigned	Intel	Signal	0	16	1	0	0	255	
2	Channel10_U16LE	Unsigned	Intel	Signal	16	16	1	0	0	255	
3	MIL9_U16LE	Unsigned	Intel	Signal	32	16	1	0	0	11	
4	MIL10_U16LE	Unsigned	Intel	Signal	48	16	1	0	0	11	

Ch9\_10\_U16LE

## CAN RECEIVER INSTALLATION

### SPECIFICATION

Weight with/without 0.7m wiring loom: 165g/112g.

Wiring loom uses 8-pin sealed, genuine TE connector and 18AWG heat resistant, high temperature, thin wall wires with tinned copper.

The CAN Receiver provides industry standard CAN 2.0 messaging with a choice of seven message formats for the widest possible compatibility. Bus speeds of 250, 500 and 1000 kbps are supported with a free choice of Base Address to accommodate any other CAN devices present.

Your receiver will be internally terminated with a 120Ω resistor if agreed prior to manufacture. A sticker will show if the resistor is fitted [ 120Ω YES ] or not fitted [ 120Ω NO ]. You may therefore need to complete your CANbus with the addition of a suitable resistor.

Digital channels 1 - 8 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 with Flash-to-Pass feature
- Channel 4: IVA fog function
- Channels 5, 6: inverted momentary function
- Channel 5: single button hazard function
- Channel 6: intermittent wiper function
- Channel 7: flash function
- Channel 8: rainlight race function

Channels 9 & 10 are variable (0 to 255) signals and include a discrete 0 to 11 signal on MIL9 and MIL10 output if the Kit Car Electronics' Mil-spec rotary switch is used.



### CAN RECEIVER INSTALLATION INSTRUCTIONS

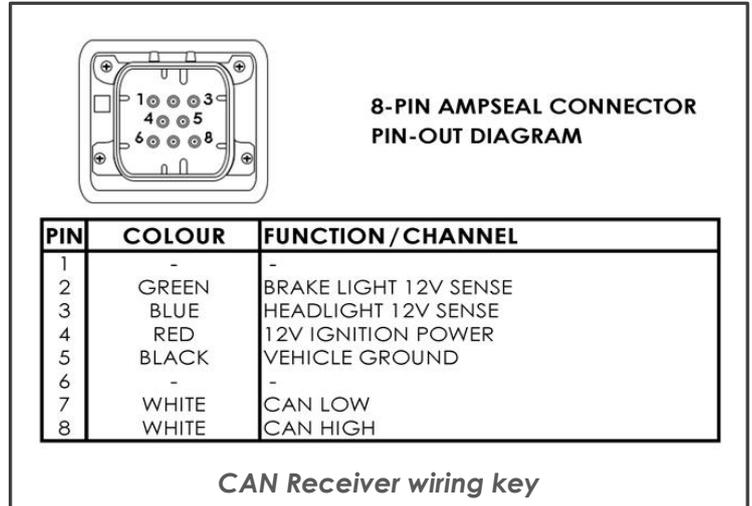
#### 1. Wiring

Identify a fused, ignition-switched circuit that can be used for the power supply to FREEWheel. The FREEWheel Receiver draws little current (<50mA), so will not increase the circuit load significantly.

Identify a suitable Ground connection, ideally direct to the vehicle chassis.

To use FREEWheel's smart indicator, high beam or fog IVA control logic, connect the brake light and/or headlamp sense wires. Otherwise, these connections are not required.

Connect CAN HIGH and CAN LOW wires to your vehicle CANbus. It is **essential** that suitable twisted pair wiring is used.



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.

#### 2. Receiver Testing

Re-connect the vehicle battery. Check that the transmitter light is reliably GREEN on button presses and continues to flash twice a second while ignition is ON. 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 Receiver Configuration Software). The software will show the live state of the switching and button presses and the Transmitter battery voltage status.

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 is toggled ON (CAN signal alternating TRUE and FALSE) and OFF (CAN signal FALSE) with each press of your button. Flash rate is configurable to your choice of 60, 75, 90, 105 or 120 flashes per minute.

Toggling to ON begins a cancel timer. Indicating will auto-cancel once the timer has elapsed (6 to 30 seconds, user-configurable). If suitably connected, auto-cancelling is inhibited during brake press and briefly afterwards so that the indicators 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 CAN signal will begin alternating TRUE and FALSE. The cancelling timer will reset.

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

WIRING: If cancel-inhibit is required, connect the 12V brake sense wire to the brake light circuit.

### 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 if suitably connected.

If the headlights are OFF, the main beam CAN message will be TRUE for the duration of the button press. If the headlights are ON, each button press will toggle the CAN message between TRUE and FALSE.

If Flash-to-Pass is enabled, a half-second press will trigger 5 seconds of rapid toggling of the CAN message.

WIRING: Connect the 12V headlight switch sense wire to the headlight switch circuit.

### 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 suitably connected and the headlights are OFF, the fog light CAN message will be set to FALSE regardless of button press state.

WIRING: Connect the 12V headlight switch sense wire to the headlight switch circuit.

## HAZARD FUNCTION



CHANNEL 5 SET TO [HAZARD]

### INSTRUCTIONS FOR OPERATION

Channel 5 can be used as a single button hazard channel and requires channels 1 and 2 to be configured for the BlinkSTOP indicator function. The indicator CAN signals will be concurrently toggled TRUE and FALSE with each press of a single button; flash rate is controlled by the FREEWheel BlinkSTOP flash setting.

NOTE: To comply with UK MOT/IVA requirements, hazard lights should be operable by a single lit button when the ignition is off, therefore this feature is recommended for off-road use.

## WIPER FUNCTION



CHANNEL 6 SET TO [WIPER]

### INSTRUCTIONS FOR OPERATION

A short press will toggle the CAN message between FALSE and latched TRUE. A one-second press will trigger an intermittent TRUE / FALSE with the durations configurable to 250ms, 500ms, 1s, 2s, 4s, 7s and 10s. A subsequent one-second press will cancel the intermittent mode and return to the previous state.

## INVERTED MOMENTARY FUNCTION



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

### INSTRUCTIONS FOR OPERATION

Channels 5 and 6 can be used to invert the CAN message, i.e., normally TRUE.

## FLASH FUNCTION



CHANNEL 7 SET TO [FLASH]

### INSTRUCTIONS FOR OPERATION

Channel 7 has a useful flashing function. A short press will cycle the CAN message TRUE and FALSE at 1Hz. A subsequent short press will cancel the flashing mode and return to the previous state.

### INTEGRATED RAINLIGHT RACE FUNCTION



CHANNEL 8 SET TO [RAINLIGHT]

#### INSTRUCTIONS FOR OPERATION

Channel 8 can be used as a racing mode rainlight. A short press of the steering wheel button will latch the CAN message to TRUE and a longer, one-second press will trigger the 'Rain Hazard' 4Hz flashing mode. A subsequent one-second press will cancel the Rain Hazard mode and return to the previous state.

### POTENTIOMETER CHANNELS



CHANNELS 9 AND 10 & OPTIONALLY MIL9 AND MIL10

#### INSTRUCTIONS FOR OPERATION

The Transmitter supports 2Hz sampling of two independent 10kΩ potentiometers.

With ignition ON, pressing any of the channels 1 to 8 momentary switches initiates communication, and the green Transmitter LED will flash at 2Hz to show successful two-way messaging. The eight digital channels will each trigger a transmission immediately on button press, independently of the 2Hz potentiometer transmission frequency.

The Transmitter LED will automatically power down when the vehicle ignition is powered OFF.

**WIRING:** Fit a 10kΩ potentiometer or a Kit Car Electronics' Mil-spec rotary switch to each Transmitter potentiometer channel as illustrated.

The Receiver unit will output a digital (0 to 255) CAN message value proportional to the position of the potentiometer, or a discrete 0 to 11 signal MIL9 and MIL10 for the Kit Car Electronics' Mil-spec rotary switch.



3V – orange (REF)  
channel 9 or 10 – yellow or white (SIG)  
ground – black (GND)



**GUARANTEE**

All our products come with a two-year guarantee, except our batteries which have a five-year guarantee.

**RETURNS & EXCHANGES**

You can return many of our products within 14 days from delivery, however customised goods and bespoke hardware, firmware and software cannot be returned or exchanged.

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