CARTEK
MOTORSPORT ELECTRONICS

POWER DISTRIBUTION MODULE

PDM-8C

USER MANUAL - BETA VERSION **REV 0.91**

MOTORSPORT IS DANGEROUS.
THIS PRODUCT IS DESIGNED FOR MOTORSPORT USE ONLY AND SHOULD NOT BE USED ON ROAD/STREET VEHICLES OR ON PUBLIC HIGHWAYS.
NO WARRANTY IS MADE OR IMPLIED REGARDING ANY CARTEK PRODUCTS TO PROTECT USERS FROM INJURY OR DEATH.
USER ASSUMES ALL RISKS.

16/02/26

CONTENTS

INTRODUCTION

The **CARTEK PDM-8C** is an 8 channel Power Distribution Module (PDM) that is specifically designed to replace relays, fuses and circuit-breakers thereby simplifying a vehicle's wiring system. All outputs are fully protected against accidental short-circuits and over-current with user selectable current limits.

The PDM-8C features 8 outputs in total of which:

- 2 x high-current outputs with a maximum current limit of 40 Amps each - recommended 30 Amp continuous.
- 4 x outputs with a maximum current limit of 20 Amps each - recommended 15 Amp continuous.
- 2 x outputs (optimised for wiper motors) with a maximum current limit of 15 Amps each - recommended 10 Amp continuous.

Outputs can handle nominal inrush spikes without causing the output to trip. For high inrush loads there is also the option of Soft-start.

Note: *The connector contacts provided (AT62-201-16141) are rated to 13 Amps at 125°C by the manufacturer however testing has shown that the temperature only increases by 20°C above ambient with a load of 20 Amps. For maximum performance we recommend using Gold 14AWG or 16AWG crimps, AT62-209-1631 or AT62-201-1631.*

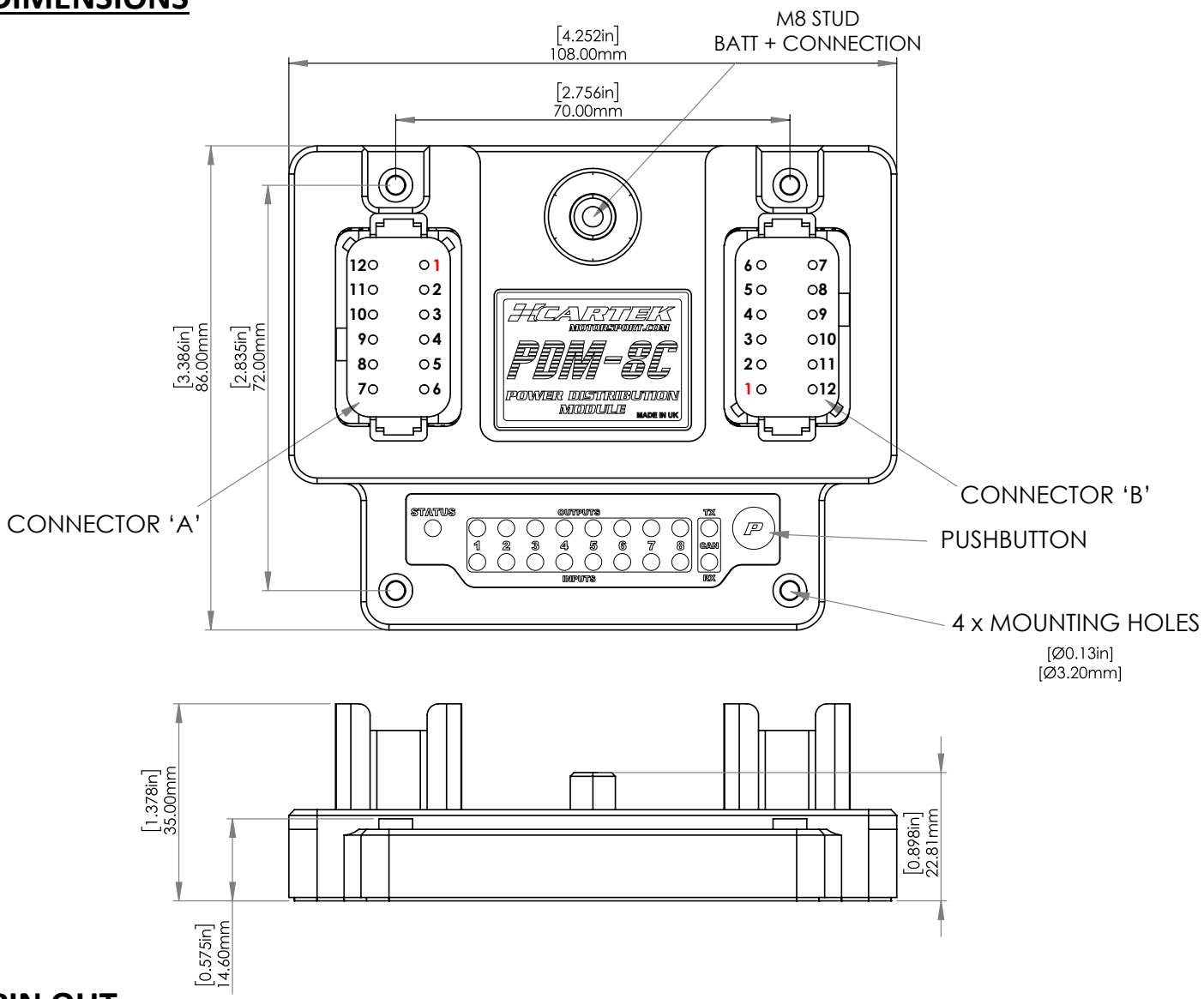
The **CARTEK PDM-8C** has also been designed with a choice of preset functions which allows timed output controls for use by Fuel Pumps, Rad Fans, Heated Screen etc. It also features a choice of dedicated logic functions to control Headlights (side lights/low beam/high beam) and Wipers (slow and fast speed). Outputs can be activated by the configurable input pins, or by receiving CAN messages. The PDM-8C also features 3 Auxiliary inputs which can be configured with a range of modes such as Ignition input, Wiper Park input, Headlight Flash input etc.

Each channel has an input and output status LED with additional diagnostic data available through the CAN data stream. All configuration of the PDM-8C can be completed through the use of the integrated push button and observing LED flash patterns (so no external software is required). The PDM-8C can also be configured through CAN messages.

GENERAL SPECIFICATION

Size:	L = 108mm (4.35in), W = 86mm (2.75in).
Weight:	220g (0.49lbs).
Construction:	One-piece solid resin moulding, protected against dirt and water.
Battery Positive terminal:	M8 stud.
Connectors:	2 x 12 pin TE/Amphenol DT06-12SB.
Operational Voltage:	8V - 18V.
Current consumption:	60-200mA typ.
Selectable output current limits:	5,10,15 Amps (2 channels optimised for wiper motor control). 5,10,15,20 Amps (4 channels). 10,20,30,40 Amps (2 channels). All output current limits feature additional in-rush protection.
Soft-start:	Soft-Start setting available on each output to limit high current in-rush
Total current output:	120A maximum.
Selectable input types:	Active Low, Active High, Edge Triggered, PWM control. Inputs have internal 4k7 pull-up resistor to Battery positive.
CAN Bus baud rates:	125,250,500,1000 Kbps (default).
Selectable CAN Base ID:	0x030,0x140 (default),0x250,0x360,0x470,0x580.
Operating temperature:	-25°C - +100°C
Storage temperature:	-40°C - +125°C

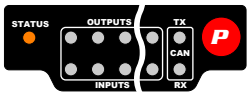
DIMENSIONS



PIN OUT

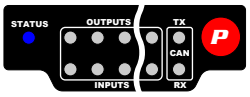
Pin Number	CONNECTOR 'A'	CONNECTOR 'B'
1	Ground	CH5 Output
2	CH1 Output	CH5 Output
3	CH2 Output	CH6 Output
4	CH3 Output	CH7 Output
5	CH4 Output	CH8 Output
6	CAN-Lo	CH8 Output
7	CAN-Hi	AUX2 Input
8	CH4 Input	CH8 Input
9	CH3 Input	CH7 Input
10	CH2 Input	CH6 Input
11	CH1 Input	CH5 Input
12	AUX1 Input	AUX3 Input

OVERALL STATUS LED



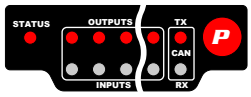
Status LED is Orange:

Power is applied but Ignition input is OFF. All outputs will remain OFF.



Status LED is Blue:

Power is applied and Ignition input is ON. All outputs can be activated.

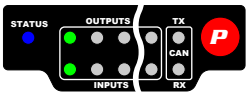


Status LED is flashing Red:

All outputs have shutdown due to major error. See 'Fault Diagnostic' page for more information.

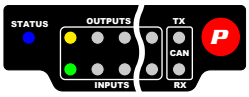
Status	LED Colour
PDM powered / Ignition input OFF.	Orange
PDM powered / Ignition input ON.	Blue
Battery/supply voltage too low (<8V)	Red (2-Flashes)
Battery/supply voltage too high (>18V)	Red (3-Flashes)
Over temperature limit (>85°C)	Red (4-Flashes)
Maximum total current exceeded.	Red (5-Flashes)

INPUT/OUTPUT STATUS LED



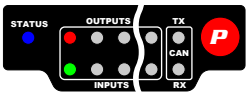
Channel 1 Input is active.

Channel 1 Output is ON.



Channel 1 Input is active.

Channel 1 Output current is too high.

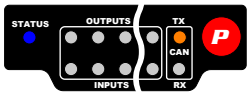


Channel 1 Input is active.

Channel 1 Output has shutdown due to over-current.

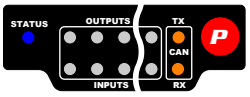
Status	LED Colour
Input/Output is Active	Green
Output is in over-current phase	Yellow
Output Shutdown	Red (flashing)

CAN-BUS STATUS LED

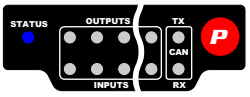


CAN Bus data is being transmitted.

No CAN Bus data is being received.



CAN Bus is transmitting and receiving data.



No CAN Bus data is being transmitted or received.

Possible connection error or baudrate/address mismatch.

Status	LED Colour
CAN Receive (RX) is Active	Orange
CAN Transmit (TX) is Active	Orange
No CAN Activity	Off

ERROR RESET

If an over-current error occurs on a channel then this error can be reset by simply turning that channel OFF then ON again via the input pin or CAN message. The error can also be reset by pressing Pushbutton 'P' or by turning Ignition Input OFF.

If a major error occurs then this can only be reset by turning all channels OFF, or by pressing Pushbutton 'P', or by turning ignition input OFF, or by sending a reset message via CAN.

OVER-CURRENT PROTECTION

Each output on the Power Distribution Module has 8 available settings for over-current protection:

Channels 1,2,3,4, 6,7 (Standard current):

Setting	Current Limit	Setting	Current Limit
1	5 Amps	5	15 Amps
2	5 Amps with Soft Start	6	15 Amps with Soft Start
3	10 Amps **(default)**	7	20 Amps (Channels 1,2,3,4 only)
4	10 Amps with Soft Start	8	20 Amps with Soft Start (Channels 1,2,3,4 only)

Note: Channels 6 and 7 are optimised for wiper motor control and therefore have a maximum current limit of 15 Amps.

Channels 5,8 (High current):

Setting	Current Limit	Setting	Current Limit
1	10 Amps **(default)**	5	30 Amps
2	10 Amps with Soft Start	6	30 Amps with Soft Start
3	20 Amps	7	40 Amps
4	20 Amps with Soft Start	8	40 Amps with Soft Start

Note: There are 2 output pins for each high current channel. Only 1 output pin needs to be used if the maximum current limit is set to 20 Amps. For 30 Amps + you must use both output pins.

The Power Distribution Module will constantly monitor the current of each output while it is ON. Each current limit setting can also handle in-rush:

- If the output current is greater than 3x the selected current limit then the output will shut down immediately. The output status LED (and CAN diagnostic data) will indicate that the output has shut down due to over-current.
- If the output current is greater than the selected current limit setting but less than 3x the selected current limit then the output will remain on for a limited period of time before turning off. The higher the exceeded amperage, the quicker the shutdown. Therefore each output can accept moderate current spikes and inrush current. The output status LED (and CAN diagnostic data) will indicate when it is in this over-current phase. This provides users with a warning that the current flowing through an output maybe exceeding the selected current limit.
- If the total current from all active channels exceeds 120 Amps then all outputs will shut down.

SOFT-START

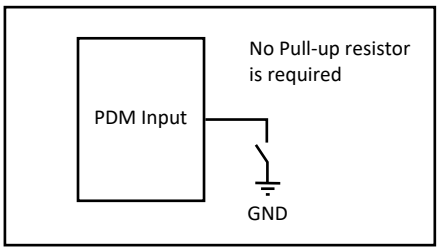
If the connected load draws too much current when initially turned on and causes an over-current shutdown then it is recommended to use a soft-start setting. This feature will turn on the output gradually over a very short period of time thereby reducing any high inrush current. Soft-start can be used for any inductive loads such as radiator fan, electric motor, electric pump, or xenon lights.

Note: Soft-start does not operate when an input type is set to PWM.

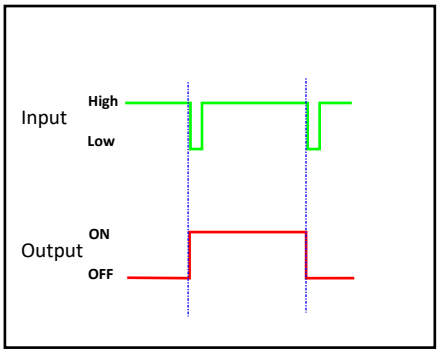
INPUT TYPES

Each Input on the Power Distribution Module has 6 available options:

Setting	Input Type	Setting	Input Type
1	Active Low **(default)**	4	Active High
2	Edge Trigger (Without Memory)	5	Always On
3	Edge Trigger (With Memory)	6	PWM Input

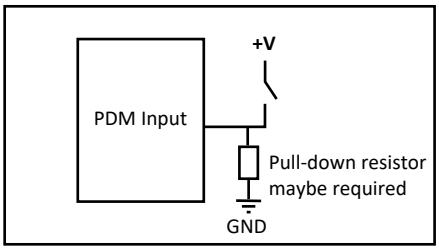


1) Active LOW (default) GROUND SWITCHED SIGNAL
The channel output will be **ON** whenever the Input Signal is at a **low** level (below 2.0V). When the input is driven high (above 3.0V) or left open-circuit the output will be **OFF**.
Note: A 4k7 pull-**up** resistor to Battery + is internally connected to each channel input pin.



2) Edge Trigger (Without Memory). GROUND SWITCHED SIGNAL
The channel output will switch **ON** only when the Input Signal voltage falls from a high level to a low level and will switch **OFF** only on the next occurrence of a falling signal. This is for use with momentary pushbutton switch inputs where the output will 'latch' ON and 'latch' OFF.
Note: A 4k7 pull-**up** resistor to Battery + is internally connected to each channel input pin.

3) Edge Trigger (WITH Memory). GROUND SWITCHED SIGNAL
Same as above (2) but the status of the output is saved to memory such that on power-up the Output will always return to the previous ON or OFF



4) Active HIGH. BATTERY + SWITCHED SIGNAL
The channel output will be **ON** whenever the Input Signal is at a **high** level (above 2.0V). When the input is left open-circuit the output will be **ON**.
Note: If the output is required to be **OFF** when the input is left open-circuit then a pull-**down** resistor needs to be installed between the channel input pin and chassis/ground. This resistor value will need to be between 1K ohms and 1.5K ohms.

5) Always ON.
The channel output will be permanently **ON** except when the Ignition input is OFF or when there is an over-current error. No input connection is required. An over-current error can only be reset by pressing Pushbutton 'P', by turning Ignition input OFF or sending CAN Bus reset message.

6) PWM Input/Output.
The Output will directly follow the Input without any filtering or switch debounce. This can be used for PWM input signals at maximum frequency of 200hz.
Note: To manage heat build up it is recommended to drive the input at 100hz maximum and output current of 15A maximum if using for a long period of time.

CAN Inputs

All channels can also be activated by receiving a CAN message but the Input type must be set to Active Low or Edge trigger.
For more information go to the CAN-Bus Messaging chapter.

OUTPUT FUNCTIONS

Each output on the Power Distribution Module has 6 standard functions as well as functions specific to controlling lights and wipers on dedicated outputs:

Setting	Output	Function	Setting	Output	Function
1	All outputs	Input Controlled **(default)**	7	1	Side/Tail Light
2	All outputs	Flashing (1Hz)	7	2	Low Beam
3	All outputs	Timer ON (5 Mins)	7	3	High Beam
4	All outputs	Timer ON (10 Mins)	7	4,5,6,7,8	Spot Light
5	All outputs	Overrun (5 Mins)	8	6	Wiper Slow Speed
6	All outputs	Overrun (10 Mins)	8	7	Wiper Fast Speed
			8	1,2,3,4,5,8	Washer Pump

STANDARD FUNCTIONS

These functions are available on all outputs:

1) Input Controlled (default) The channel output will switch ON and OFF according to the status of the input.

2) Flashing (1Hz). When the channel output is switched ON it will flash at a rate of 1Hz.
Example use: Direction indicators.

3) Timer On (5 Minutes). The channel output will switch ON and OFF according to the status of the input but will only remain on for a maximum time of 5 minutes. Example use: Heated Screen

4) Timer On (10 Minutes). The channel output will switch ON and OFF according to the status of the input but will only remain on for a maximum time of 10 minutes. Example use: Heated Screen

5) Overrun (5 Minutes). The channel output will switch ON and OFF according to the status of the input but will remain on, after being switched off, for an additional 5 minutes. Example use: Radiator Fan.

6) Overrun (10 Minutes). The channel output will switch ON and OFF according to the status of the input but will remain on, after being switched off, for an additional 10 minutes. Example use: Radiator Fan.

HEADLIGHT FUNCTIONS

These functions are available on specific outputs only:

- **Side/Tail Light (only available on output 1)** The channel output will switch ON and OFF according to the status of the input. The output will also turn on automatically if either outputs assigned Low Beam or High Beam are on.
- **Low Beam (only available on output 2)** The channel output will switch ON and OFF according to the status of the input. This channel can also be switched on by the Headlight Toggle Input or Headlight Flash Input (see **AUX Inputs)**.
- **High Beam (only available on output 3)** The channel output will switch ON and OFF according to the status of the input. This channel can also be switched on by the Headlight Toggle Input or Headlight Flash Input (see **AUX Inputs**).
- **Spot Light (available on outputs 4,5,6,7,8)** The channel output will switch ON and OFF according to the status of the input but ONLY if High Beam is on (see above). If the High Beam output is not on then the Spot Light output will not turn on. Therefore the Spot Light output will also turn off automatically when High Beam is switched off.

WIPER FUNCTIONS

These functions are available on specific outputs only:

- **Wiper Slow-speed (only available on output 6)** The channel output will switch ON and OFF according to the status of the input. The channel can also be switched on by the Wiper Toggle Input or Single Wipe Input (see **AUX Inputs**). If you are using a 1-speed wiper motor then use this channel and function, do not use Wiper Fast-speed (Output 7).

- **Wiper Fast-speed (only available on output 7)** The channel output will switch ON and OFF according to the status of the input. The channel can also be switched on by the Wiper Toggle Input (see **AUX Inputs**). Only use this channel for 2 speed wipers.

- **Wash Pump (available on outputs 1,2,3,4,5,8)** The channel output will switch ON and OFF according to the status of the input. When the output is on it will also automatically activate the Wiper Slow-speed output and this will remain on for 2 seconds after the Wash Pump output is switched off.

Note 1: The Wiper Park input must be enabled and connected when using any of the Wiper functions (see AUX Inputs). If the Wiper Park input is not connected, or not configured correctly, then the wiper output will not turn off at the correct position. If your wiper motor does not have a Park output signal then use a 'Standard' function to control the wiper motor.

Note 2: The PDM has built in logic so that only one speed can be activated at any time. For example if both Wiper Slow-speed and Wiper Fast-speed inputs are active then only Wiper Fast output will be activated.

Note 3: When turning off Wiper Fast-speed the PDM will activate Wiper Slow-speed for a short period of time before turning off the Wiper motor completely.

AUX INPUT MODES

The PDM-8C has 3 Auxiliary Input pins (AUX1, AUX2, AUX3) that offer the following functions:

Setting	Aux Function	Input Signal	Setting	Aux Function	Input Signal
1	No Function	N/A	7	Hazard Input Edge Driven	Active Low
2	Master Shutdown **AUX 1 default**	Active Low	8	Remote Wiper Toggle	Active Low
3	Ignition Input	Active High	9	Remote Wiper Single Wipe	Active Low
4	Wiper Park Input Lo **AUX 2 default**	Active Low (Falling edge)	10	Remote Headlight Toggle	Active Low
5	Wiper Park Input Hi	Active Low (Rising edge)	11	Remote Headlight Flash **AUX 3 default**	Active Low
6	Hazard Input Lo	Active Low	12	Spot Lamps Enable	Active High

Active Low Signal = Active when input voltage is below 2.0V (e.g ground signal). An internal pull-**up** resistor is automatically connected when and a function with Active Low input signal is selected.
Active High Signal = Active when input voltage is above 3.0V (e.g +5V or +12V). An internal pull-**down** resistor is automatically connected when and a function with Active High input signal is selected.

AUX FUNCTION DESCRIPTIONS:

- **No Function -** The Aux Input is disabled and has no function.

- **Master Shutdown** - All outputs are shutdown while the Aux Input is activated by an active low signal. Outputs will only become active when the AUX Input is at a high level or unconnected. An internal pull-**up** resistor is automatically connected to the AUX Input pin. With this configuration the AUX Input can be connected to a ground-switched Ignition OFF signal, e.g. Motorsport Battery Isolators.

- **Ignition Switch Input -** Outputs will be active only when the voltage on Aux Input pin is at a high level (greater than 3.0V). All outputs are shutdown while the AUX Input is at a low level (lower than 2.0V) or unconnected. An internal pull-**down** resistor is automatically connected to the AUX Input pin. With this configuration the IGN Input could be connected to +12V Ignition Switch.

  Note: The Engine Stop output signals from CARTEK Battery Isolators are compatible with either Master Shutdown or Ignition Input setting.

- **Wiper Park Input -** This input is required when using any Wiper function and can be set to either Active Low or Active High depending on wiper motor type. Most wiper motors output an Active Low Signal for the park position.

- **Hazard Input -** All channels that are set to Flashing(1Hz) will automatically flash while the AUX input is grounded.

- **Remote Wiper Toggle Input -** This input allows both Wiper Slow and Wiper Fast outputs to be controlled from a single input signal (e.g steering wheel pushbutton). The input must be ground-switched and the pushbutton type must be momentary.

  The Wiper Toggle operation is as follows:
  - Button press 1 = Wiper Slow Active
  - Button press 2 = Wiper Fast Active
  - Button press 3 = Wiper Slow Active . . . .

Each single press of the pushbutton input will toggle between Wiper Slow and Wiper Fast. **To turn off the Wipers press the pushbutton continuously for 2 seconds.**

AUX FUNCTION DESCRIPTIONS (Continued):

- **Remote wiper single wipe -** A brief grounded signal on the Aux Input will cause the Wiper Slow output to operate for one wiper cycle, sometimes referred to as a 'Flick Wipe'.

- **Remote Headlight Toggle -** This input allows both Low Beam and High Beam outputs to be controlled from a single input signal (e.g steering wheel pushbutton). The input must be ground-switched and the pushbutton type must be momentary.

The Headlight Toggle operation is as follows:

- Button press 1 = Low Beam Active
- Button press 2 = High Beam Active
- Button press 3 = Low Beam Active etc

Each single press of the pushbutton will toggle between Low Beam and High Beam. **To turn off the Headlights press the pushbutton continuously for 2 seconds.**

- **Remote Headlight Flash -** A grounded signal on the AUX Input will cause the Headlight output to flash. The input must be ground-switched and the pushbutton type should be momentary. A single press of the pushbutton will flash the headlights 3 times. If the pushbutton continues to be pressed then the headlights will continue to flash until the pushbutton has been released. By default only High Beam will flash, however you can select which lights flash in Configuration Menu 5. The Flash frequency can also be changed in Configuration Menu 6.

- **Spot Lamps Enable -** This input is only required when not using the High Beam function. This function will allow the Spot Light function to be activated only if the Aux Input is active. An internal pull-**down** resistor is automatically connected and the input signal is active high only.

INSTALLATION

The PDM should be mounted in a cool area of the vehicle and secured in place using all four mounting holes. The PDM is designed to withstand a high degree of shock and vibration so it can be mounted direct to chassis without the need to use vibration absorbing rubber mounts.

BATTERY POSITIVE CONNECTION

Power to the PDM is via the M8 electrical stud base. This should be connected directly to the positive terminal of the car battery using cable that is capable of handling the maximum total output current when all channels are activated.

CONNECTORS

All other connections are via the 2 x 12pin Amphenol AT04-12PX connectors. To connect to this, use the AT06-12SB housing and AT62-201 crimps supplied. The crimps are suited for 20-16 AWG wire only and can handle 20 Amps continuously at 60°C or less. The higher the temperature the less current the crimps can handle (manufacture specifies 13 Amps at 125°C). Wire size must be compatible with the crimps and capable of handling the maximum output current.
NOTE: When attaching the crimps onto the wires, always use the crimp manufacturer specific tool.

GROUND CONNECTION

Pin(1) must be connected to chassis/GND at all times. 16 AWG wire is recommended.
NOTE: If you are driving an output through PWM then you should make sure the connected load also shares the same ground connection as the PDM.

INPUT CONNECTIONS

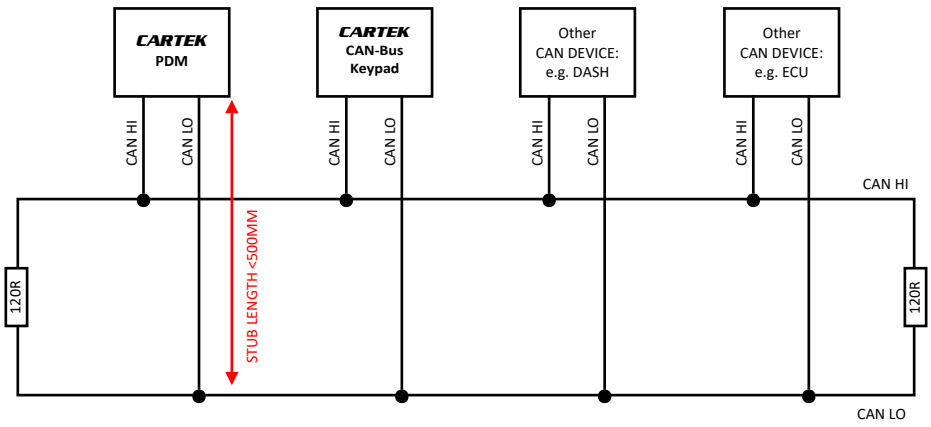
The inputs are only low current signals therefore 20 AWG wire can used.

OUTPUT CONNECTIONS

The output current will dictate the wire gauge to use. Typically with high quality wire (TYCO spec 55):
5-10 Amps = 20AWG
15-20 Amps = 16AWG

CAN BUS WIRING

The CAN-Bus should consist of two wires twisted together (0.5-1 twist per cm), with 120R terminating resistors at each end of the bus. CARTEK PDMs do not have an internal terminating resistors. The maximum length of the bus is 16 meters and maximum 'stub' length is 500mm.



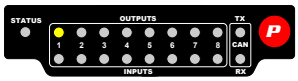
CONFIGURATION

There are two methods available for configuring the PDM-8C:
Configuration using the Pushbutton (see below).
Configuration using CAN messages (see page 18).

CONFIGURATION using Pushbutton

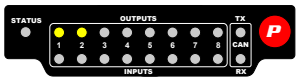
To enter Configuration Mode, press and hold the pushbutton '**P**' for 2 seconds. After this time, the user can select any one of 7 menus by observing the Yellow LEDs and releasing the pushbutton when the required menu is displayed.
Configuration Mode is exited by pressing and holding the pushbutton until all LEDs display Purple or by simply removing power from the device.

Menu 1 - 1 LED



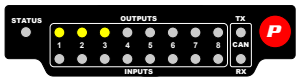
Current Protection

Menu 2 - 2 LEDs



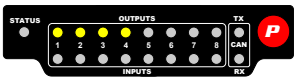
Input Type

Menu 3 - 3 LEDs



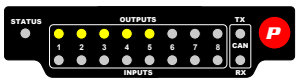
Output Function

Menu 4 - 4 LEDs



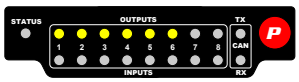
AUX1, AUX2, AUX3 Input Type

Menu 5 - 5 LEDs



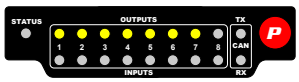
Remote Flash Options

Menu 6 - 6 LEDs



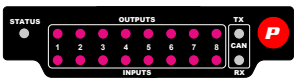
Lights Flash Frequency

Menu 7 - 7 LEDs



CAN-Bus Configuration

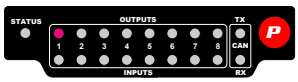
Menu Exit



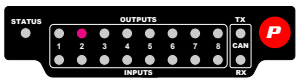
OVER-CURRENT PROTECTION (MENU 1)

On selecting Menu 1 the user can now select the required Channel to adjust by pressing and holding the pushbutton again and observing the LEDs:

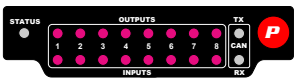
Ch1 Amps



Ch2 Amps



Menu Exit



When the LED indicating the required channel is illuminated, then release the pushbutton.
This LED will now flash to indicate the stored setting and subsequent presses will adjust and save the new setting.
There are 8 options:

Channels 1,2,3,4, 6,7: (Standard Current)

Setting	Nominal current Limit	Setting	Nominal current Limit
1	5 Amps	5	15 Amps
2	5 Amps with Soft Start	6	15 Amps with Soft Start
3	10 Amps (Default)	7	20 Amps (Channels 1,2,3,4 only)
4	10 Amps with Soft Start	8	20 Amps with Soft Start (Channels 1,2,3,4 only)

Channels 5,8: (High Current)

Setting	Nominal current Limit	Setting	Nominal current Limit
1	10 Amps (Default)	5	30 Amps
2	10 Amps with Soft Start	6	30 Amps with Soft Start
3	20 Amps	7	40 Amps
4	20 Amps with Soft Start	8	40 Amps with Soft Start

When the setting has been adjusted press and hold down the pushbutton to move on to the next channel, or to exit configuration mode keep pressing until all LEDs display purple.

INPUT TYPE (MENU 2)

On selecting Menu 2 the user can now select the required Channel to adjust by pressing and holding the pushbutton again and observing the LEDs:

When the LED indicating the required channel is illuminated, then release the pushbutton.
This LED will now flash to indicate the stored setting and subsequent presses will adjust and save the new setting.
There are 7 options:

Setting	Input Type	Setting	Input Type
1	Active Low (Default)	4	Active High
2	Edge Trigger (without memory)	5	Always On
3	Edge Trigger (with memory)	6	PWM driven
		7	CARTEK reserved (Ch4 Input only)

When the setting has been adjusted press and hold down the pushbutton to move on to the next channel, or to exit configuration mode keep pressing until all LEDs display purple.

OUTPUT FUNCTION (MENU 3)

On selecting Menu 3 the user can now select the required Channel to adjust by pressing and holding the pushbutton again and observing the LEDs:

When the LEDs indicating the required channel are illuminated, then release the pushbutton.
This LED will now flash to indicate the stored setting and subsequent presses will adjust and save the new setting.
There are 6 or 7 options:

Channels 1,2,3:

Setting	Output Function	Setting	Output Function
1	Input driven (Default)	5	Over-run (5 mins)
2	Flashing (1Hz)	6	Over-run (10 mins)
3	Timer On (5 mins)	7	Lights (Side/Tail = Ch1) (Low Beam = Ch2) (High Beam = Ch3)
4	Timer On (10 mins)	8	Washer Pump

Channels 4,5,8:

Setting	Output Function	Setting	Output Function
1	Input driven (Default)	5	Over-run (5 mins)
2	Flashing (1Hz)	6	Over-run (10 mins)
3	Timer On (5 mins)	7	Spot Light
4	Timer On (10 mins)	8	Washer Pump

Channels 6,7:

Setting	Output Function	Setting	Output Function
1	Input driven (Default)	5	Over-run (5 mins)
2	Flashing (1Hz)	6	Over-run (10 mins)
3	Timer On (5 mins)	7	Spot Light
4	Timer On (10 mins)	8	Wiper (Low speed = Ch6) (High speed = Ch7)

When the setting has been adjusted press and hold down the pushbutton to move on to the next channel, or to exit configuration mode keep pressing until all LEDs display purple.

AUX1, AUX2, AUX3 FUNCTIONS (MENU 4)

On selecting Menu 4 the user can now select the required AUX Input to adjust by pressing and holding the pushbutton again and observing the LEDs:

AUX1 Input function | AUX2 Input function | AUX3 Input function | Menu Exit

When the LED of the required Aux Input is lit then the pushbutton should be released. This LED will now flash to indicate the stored setting and subsequent presses will adjust and save the new setting.
There are 12 options:

Setting	Aux Function	Input Signal	Setting	Aux Function	Input Signal
1	No Function	N/A	7	Hazard Input Edge Trigger	Active Low
2	Master Shutdown **AUX 1 default**	Active Low	8	Remote Wiper Toggle	Active Low
3	Ignition Input	Active High	9	Remote Wiper Single Wipe	Active Low
4	Wiper Park Input Lo **AUX 2 default**	Active Low	10	Remote Headlight Toggle	Active Low
5	Wiper Park Input Hi	Active High	11	Remote Lights Flash **AUX 3 default**	Active Low
6	Hazard Input Lo	Active Low	12	Spot Lamps Enable	Active High

REMOTE LIGHTS FLASH OPTIONS (MENU 5)

On selecting Menu 5 the LED will now flash to indicate the stored option and subsequent presses will adjust and save the new setting.

Remote Lights Flash Option | Menu Exit

There are 4 options:

Setting	Headlight Flash Option	Setting	Headlight Flash Option
1	Flash High Beam only (Default)	3	Flash Spot Lamps only
2	Flash Low + High Beam	4	Flash Spot Lamps + High Beam

When the setting has been adjusted hold down the pushbutton until all LEDs display purple to exit configuration.

LIGHTS FLASH FREQUENCY (MENU 6)

On selecting Menu 6 the LEDs will now flash to indicate the stored frequency and subsequent presses will adjust and save the new setting.

Lights Flash Frequency | Menu Exit

There are 5 options:

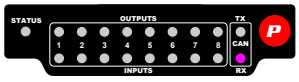
Setting	Lights Flash Frequency	Setting	Lights Flash Frequency
1	1Hz	4	4Hz
2	2Hz	5	5Hz
3	3Hz (Default)		

When the frequency has been adjusted press and hold down the pushbutton to move on to the next channel, or to exit configuration mode keep pressing until all LEDs display purple.

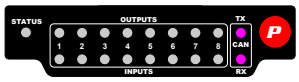
CAN BUS CONFIGURATION (MENU 7)

On selecting Menu 7 there are then 2 Sub Menus to choose from by pressing and holding down the pushbutton again and observing the LEDs:

CAN Base ID



CAN Baud Rate



CAN BUS BASE ID (Sub Menu 7.1)

On selecting Sub Menu 7.1 the LED will now flash to indicate the stored CAN Base ID and subsequent presses will adjust and save the new setting.
There are 6 Base ID options:

Setting	CAN Base ID	Setting	CAN Base ID
1	0x030	4	0x360
2	0x140 (Default)	5	0x470
3	0x250	6	0x580

When the CAN Base ID has been adjusted press and hold down the pushbutton to move on to the next CAN Sub Menu, or to exit configuration mode keep pressing until all LEDs display purple.

CAN BUS BAUD RATE (Sub Menu 7.2)

On selecting Sub Menu 7.3 the LED will now flash to indicate the stored CAN Baud Rate and subsequent presses will adjust and save the new setting.

Setting	CAN Baud Rate	Setting	CAN Receive Base ID
1	125KB/s	3	500KB/s
2	250KB/s	4	1 MB/s (Default)

When the CAN Baud Rate has been adjusted hold down the pushbutton until all LEDs display purple to exit configuration.

CONFIGURATION using CAN messages

All configuration settings can be checked and adjusted via the CAN IDs listed below (0x640h - 0x643h).
To adjust a configuration setting, send a valid data byte to the relevant byte within the required CAN ID. A configuration setting will only change if the data byte sent is valid, i.e. within a preset range, and is not '0'. On receipt of a valid configuration setting, the LEDs will illuminate Orange to confirm receipt of new configuration setting(s). However, the new settings will only become accepted when the user presses the Pushbutton 'P'. Data byte values are the same as the Menu settings described in '**CONFIGURATION using Pushbutton**' section.

Note: If only one byte is to be adjusted then send '0' to all remaining data bytes within the message ID.
After data is sent to any of the Configuration IDs then all configuration settings will transmitted using IDs: 0x644h - 0x647h.
Note: To check the current Configuration Settings without making any adjustments then simply send '0' to all data bytes to any of the Configuration IDs.

CARTEK PDM-8C Configuration IDs (Receive+Transmit)

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7	
0x**640**h **Configuration Data** Receive / Set	8	**Set Ch1 Amps** setting	**Set Ch2 Amps** setting	**Set Ch3 Amps** setting	**Set Ch4 Amps** setting	**Set Ch5 Amps** setting	**Set Ch6 Amps** setting	**Set Ch7 Amps** setting	**Set Ch8 Amps** setting	See **Menu 1** page 13
0x**641**h **Configuration Data** Receive / Set	8	**Set Ch1 Input type** setting	**Set Ch2 Input type** setting	**Set Ch3 Input type** setting	**Set Ch4 Input type** setting	**Set Ch5 Input type** setting	**Set Ch6 Input type** setting	**Set Ch7 Input type** setting	**Set Ch8 Input type** setting	See **Menu 2** page 14
0x**642**h **Configuration Data** Receive / Set	8	**Set Ch1 Output Function** setting	**Set Ch2 Output Function** setting	**Set Ch3 Output Function** setting	**Set Ch4 Output Function** setting	**Set Ch5 Output Function** setting	**Set Ch6 Output Function** setting	**Set Ch7 Output Function** setting	**Set Ch8 Output Function** setting	See **Menu 3** page 15
0x**643**h **Configuration Data** Receive / Set	8	**Set Lights Option** setting	**Set Lights Flash Frequency** setting	**Set Aux (1) Function** setting	**Set Aux (2) Function** setting	**Set Aux (3) Function** setting		**Set CAN Base ID**	**Set CAN Baud Rate**	
		See **Menus 4, 5, 6** page 16						See **Menus 7.1, 7.2** page 17		
0x**644**h **Configuration Data** Transmit	8	Output/Read **Ch1 Amps** setting	Output/Read **Ch2 Amps** setting	Output/Read **Ch3 Amps** setting	Output/Read **Ch4 Amps** setting	Output/Read **Ch5 Amps** setting	Output/Read **Ch6 Amps** setting	Output/Read **Ch7 Amps** setting	Output/Read **Ch8 Amps** setting	
0x**645**h **Configuration Data** Transmit	8	Output/Read **Ch1 Input type** setting	Output/Read **Ch2 Input type** setting	Output/Read **Ch3 Input type** setting	Output/Read **Ch4 Input type** setting	Output/Read **Ch5 Input type** setting	Output/Read **Ch6 Input type** setting	Output/Read **Ch7 Input type** setting	Output/Read **Ch8 Input type** setting	
0x**646**h **Configuration Data** Transmit	8	Output/Read **Ch1 Function** setting	Output/Read **Ch2 Function** setting	Output/Read **Ch3 Function** setting	Output/Read **Ch4 Function** setting	Output/Read **Ch5 Function** setting	Output/Read **Ch6 Function** setting	Output/Read **Ch7 Function** setting	Output/Read **Ch8 Function** setting	
0x**647**h **Configuration Data** Transmit	8	Output/Read **Lights Option** setting	Output/Read **Lights Flashing** setting	Output/Read **Aux (1) Function** setting	Output/Read **Aux (2) Function** setting	Output/Read **Aux (3) Function** setting		Output/Read **CAN Base ID** setting	Output/Read **CAN Baud Rate** setting	

Example: Set Ch3 Amps setting to 20A only:

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
0x640	8	0	0	7	0	0	0	0	0

Example: Check all configuration settings:

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
0x640	1	0							

Note: If there is more than one CARTEK PDM on the CAN network then each one must have a different Base ID set.

CONTROL using CAN messages

All PDM channels can be controlled through CAN by sending messages to the Base ID. Each channel will turn ON when the PDM receives a data byte with a value greater than 0.
AUX1-3 inputs can also be controlled by sending CAN messages to Base ID +2 except when the AUX function is set to 'Master Shutdown', 'Ignition Input' or 'Wiper Park'.
Error situations can be reset by sending CAN messages to Base ID +2 as well as performing a full Power-Cycle reset.

CARTEK PDM-8C Control IDs (Receive)

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Base ID (Receive)	8	Channel (1) Control ON / OFF	Channel (2) Control ON / OFF	Channel (3) Control ON / OFF	Channel (4) Control ON / OFF	Channel (5) Control ON / OFF	Channel (6) Control ON / OFF	Channel (7) Control ON / OFF	Channel (8) Control ON / OFF
Base ID+2 (Receive)	8	Error Reset	Power-Cycle	AUX (1) Control	AUX (2) Control	AUX (3) Control			
Base ID+12 (Receive) (CARTEK Reserved)	8	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel	For use by: CARTEK CAN Switch Panel
Base ID+13 (Receive) (CARTEK Reserved)	8	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver	For use by: CARTEK Wireless Transceiver

Example: Channels 1 + 4 to be activated (Base ID = 0x140):

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
0x140	8	1	0	0	1	0	0	0	0

CAN messages can also be sent to the PDM to reset any tripped outputs or to perform a Power cycle to Base ID+2.
Example: Trip Reset:

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
0x142	1	1							

CARTEK PDM-8C Status IDs (Transmit)

ID	DLC	BYTE 0	BYTE 1	BYTE 2	BYTE 3	BYTE 4	BYTE 5	BYTE 6	BYTE 7
Base ID									
Base ID+3 (Transmit)	8	Channel (1) Output Status	Channel (2) Output Status	Channel (3) Output Status	Channel (4) Output Status	Channel (5) Output Status	Channel (6) Output Status	Channel (7) Output Status	Channel (8) Output Status
Base ID+5 (Transmit)	8	Channel (1) Measured Input Voltage	Channel (2) Measured Input Voltage	Channel (3) Measured Input Voltage	Channel (4) Measured Input Voltage	Channel (5) Measured Input Voltage	Channel (6) Measured Input Voltage	Channel (7) Measured Input Voltage	Channel (8) Measured Input Voltage
Base ID+6 (Transmit)	8	Channel (1) Measured Output Current	Channel (2) Measured Output Current	Channel (3) Measured Output Current	Channel (4) Measured Output Current	Channel (5) Measured Output Current	Channel (6) Measured Output Current	Channel (7) Measured Output Current	Channel (8) Measured Output Current
Base ID+7 (Transmit)	8	Channel (1) Input Status	Channel (2) Input Status	Channel (3) Input Status	Channel (4) Input Status	Channel (5) Input Status	Channel (6) Input Status	Channel (7) Input Status	Channel (8) Input Status
Base ID+8 (Transmit)	8	Total Output Current	Battery Voltage	Internal Temperature	Aux(1) Input Voltage	Aux(2) Input Voltage	Aux(3) Input Voltage	PDM-8C Product Code (0x8C)	Error Status

CAN Transmit Data Formats

Name	Type	Byteorder	Length	Multiplier	Offset	Data
CH() Amp Setting	Unsigned	Motorola	1	1	0	AMP Setting: 1-8 (as set by Configuration Menu 1)
CH() Input Setting	Unsigned	Motorola	1	1	0	INPUT Setting: 1-6 (as set by Configuration Menu 2)
CH() Function Setting	Unsigned	Motorola	1	1	0	FUNCTION Setting: 1-6 (as set by Configuration Menu 3)
CH() Input Status	Unsigned	Motorola	1	1	0	**0**=Inactive, **1**=Active
CH() Output Status	Unsigned	Motorola	1	1	0	**0**=Inactive, **1**=Active, **2**=High-Current, **3**=Over-Current Error.
CH() Input Signal Voltage	Unsigned	Motorola	1	1	0	Value = Volts e.g. 49 (0x31) = 4.9V
CH() Output Current	Unsigned	Motorola	1	1	0	Value = AMPs e.g. 12 (0x0Ch) = 12A
Total Output Current	Unsigned	Motorola	1	1	0	Value = AMPs e.g. 12 (0x0Ch) = 12A
Battery Voltage	Unsigned	Motorola	1	1	0	Value ÷10 = Volts e.g. 142 (0x8E) = 14.2V
Internal Temperature	Unsigned	Motorola	1	1	0	Value = °C e.g. 20 (0x14) = 20°C
AUX Input Voltage	Unsigned	Motorola	1	1	0	Value = Volts e.g. 49 (0x31) = 4.9V
AUX Mode Setting	Unsigned	Motorola	1	1	0	AUX Mode Setting: 1-6 (As set by Configuration Menu 4)
Error Flag Status	Unsigned	Motorola	1	1	0	**1** (0x01h) = Battery Voltage is too Low. **2** (0x02h) = Battery Voltage is too High. **3** (0x04h) = Temperature is too High. **4** (0x08h) = Total output current is too High. **5** (0x10h) = Any individual output current is too High. **6** (0x20h) = Ignition input is OFF.

A DBC File with all the CAN Transmit information can be downloaded at **www.cartekmotorsport.com/downloads**

FACTORY RESET

The pushbutton can be pressed at anytime to reset any over-current errors or to enter the configuration menus.
The pushbutton can also be used to reset all configurations back to factory/default settings. This is done by firstly disconnecting power, then pressing and holding the pushbutton while power is then re-applied. Keep pressing the pushbutton until the all LEDs display Blue, then release the pushbutton.

The factory/default settings are:

Current Protection on all channels:	10A (Setting **3 - standard current outputs, Setting 1 - high current outputs**).
Input Type on all channels:	Active Low (Setting 1).
Function on all channels:	Input Driven (Setting **1**).
AUX1 Function:	Master Shutdown (Setting **2**).
AUX2 Function:	Wiper Park Input Active Low (Setting **4**).
AUX3 Function:	Remote Lights Flash (Setting **11**).
CAN Base ID:	0x140 (Setting **2**)
CAN Baudrate:	1Mb/s (Setting **4**)
CAN data transmission rate:	100Hz