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USER'S GUIDE   .

The speed controller has **Blackmoon**
High current capacity, both peak as
in continuous driving, and high efficiency. It is ideal
motor drive in which they are
required frequent switching of direction and
many variations of the load during the
operation as well as in systems that
They have   Engines   electric.

They are used high performance MOSFETS
do the switching and reverse direction
system, ensuring quick and low responses
temperatures to high currents. The board
has a break system (engine braking) that
ensures fast reverse.

The plate layout is thought to decrease the
temperature effects. In conjunction with a
sink located on the back plate,

the system ensures temperatures permissible
work correctly. This in order to be
applied   in   several   systems.

Are available, three different interfaces
communication: PWM, serial, analog, and
thus possible to perform various control
forms (computers, radios, robots, systems
analog, etc.). When used in a receiver
radio you can count on the BEC 5V
continuing to ensure the circuit
receptor and LEDs.

The control board becomes safe thanks to
implementing *fail-safe* (fail-safe system),
system that disables the load drive in
case of non-receipt signal when
failures occur, ensuring greater security to
user and the system.

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RC (PWM)

PIN 1	GND
PIN 2	5V *
PINO 3	SIGN

AUX

PIN 1	Calibration
PIN 2	RX (SERIAL)
PINO 3	ANALOG INPUT
PIN 4	BREAK
PIN 5	GND
PIN 6	GND
PIN 7	GND
PIN 8	GND

LEDS

IS	LED INTENSITY AND DIRECTION
STATUS	STATUS LED
POWER	LED POWER
EXT	LED OUTDOOR CONNECTION

CONNECTORS

V +	POSITIVE POWER
GND	POWER NEGATIVE (GND)
BAD	The OUTPUT
M_B	OUTPUT B
USB	USB CONNECTOR

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....   **CARE BEFORE STARTING** ....

• Ensure that the polarity and level of board power supply are correct. Connections

incorrect or that exceed the operating limits can lead to board your disposal. The positive and

the negative battery must be connected to **V + and** GND connector respectively.

• Ensure that the voltage levels applied to card falls in the specific levels in this manual,

7 to 30V continuous.

• **Check the** output connections so that they are not shorted. Short circuit causes

heating and can lead to permanent damage to **Blackmoon.** The load to be controlled must be

connected between the **M** connectors near the battery connector.

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....   TECHNICAL INFORMATION   . . .   bb ... .

	MINIMUM	NOMINAL	MAXIMUM	UNIT
Supply Voltage	7	24	30	V
Continuous operating current	-	-	70	THE
Overcurrent	-	-	150	THE
Peak current	-		240	
Voltage BEC		4,625		V
Current capacity of the BEC		100		bad
Control Interfaces		USB, serial, analog and RC		
The serial interface speed	-	9615	-	bps
Dimensions		51 x 71 x 25		mm
Weight	-	120	-	g
Resolution RC mode channel		11 bits		
Resolution of the serial or USB channel		14 bits		bits
Resolution of the analog channel		10 bits		

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....   BlackMoon SYSTEMS. .   . . . bb ... .

The Blackmoon has some systems
assist the user in using the plate and
their applications.

BRAKE   .

Connecting the jumper between pins 4 and 5
BRAKE system is activated. The brake uses
brake motor technique. So, the short system
circuits the output terminals when the plate
controlled or reversals of the bridge voltage
output is zero. On systems with this engine
behavior causes a screeching halt in
its rotation.

SOFT-STARTER   .

The soft-starter system creates a ramp of
duty-cicle values in order to make
the smoother the variation in output voltage. It is
function is generally used optionally
to smooth the acceleration engines. The *soft-*

starter can be enabled or disabled by
means of *software or* **BlackmoonController**
through serial communication (p. XX).

PROTECTION SYSTEM   .

The **Blackmoon** has protection system
for the load and the battery: the system
protection for overvoltage and under voltage
programmable. Setting lower limit and
higher for tension, prevents the load is
triggered tensions with harmful and
protect the power supply, the use case
batteries which can not be discharged
completely.

BEC   .

The BEC is able to feed receptors 4.5V,
therefore, no need for a battery to more
to feed the receiver. It is not recommended
use of servo motors. Servomotors
BEC can exceed the current limit.

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....   **COMMAND INTERFACES.**   ....

The **Blackmoon** has set standards for

operate in the RC mode. If you want to operate in a

the other two modes (analog or serial) must

change   at   Settings   fur   software

BlackmoonController.

Through the serial port or USB it is possible

to control:

  ☐ The control mode between serial / USB,

     analog or through the RC connector
  ☐ Activation and soft-starter Times
  ☐ Manual calibration of the read values

     RC
  ☐ PWM frequency
  ☐ operating voltage range
  ☐ polarity and intensity of the voltage at

     charge

....   **INTERFACE RC**   ....

To use this interface is necessary that the

card is configured in this mode. This is the

default mode of manufacture. You must connect

one of the channels of your receiver in **RC** Connector

(Pin 1: **GND,** pin 2: **+ 5V,** pin 3: **SIGNAL).** Affair

Pins 2 and 6 of this connector on the board where

They are **RX** and **GND** respectively.

Sending commands and configuration for

Blackmoon via serial interface is via

5 bytes. In order to be sent *the* byte

open communication, then send the *byte*

CONFIG that says about the parameter

will be set after the **DATAH** and *bytes*

Date-based which contains the value for each parameter

and transmitting lock *byte*.

VALUE	NAME	DESCRIPTION
0x30	ACOM	opens communication
0x35	FCOM	closes communication

CONFIG	NAME	DESCRIPTION
00	RST	parameters restoration
01h	FHAB	habilitáveis functions
02h	RMAX	maximum radio
03h	RCEN	radio center
04h	RMIN	minimum radius

need to calibrate the signal values (see

p. 1).

05h	CSS	*soft-starter* configuration
06h	FPWM	frequency PWM
07h	VMAX	maximum voltage
08h	VMIN	undervoltage
09h	SDC	sense and *duty-cycle*

Connector RC

....   INTERFACE   SERIAL   ....

To use it first make sure the serial mode

that the sign outside configured **in** serial mode.

Connect the data transmission cable to

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RST: PARAMETERS RESET

If desired the plate to return

values of the original setting board must

be sent in both *bytes* and Date-based DATAH

the values 55h.

> So that the reset command to take effect
> you must disconnect and reconnect the
> the power circuit.

FHAB: FUNCTIONS HABILITÁVEIS

DATAH

Unused

BIT 7   BIT 0

bit 7-0   Unused

Date-based

| - | - | - | - | - | - | C1 | C0 |

BIT 7   BIT 0

bit 7-2   Unused
bit 1-0   **C2 C0**   Control mode
             10 - analog

The permissible range for the **RMAX parameters, RMIN** is from 1600 to 4400. The values are aligned right, so the eight bit less

significant should be allocated in the **Date-based and** most significant in **DATAH.**

RMAX: RADIO MAXIMUM

DATAH

Most significant bits of the set value of the RMAX

BIT 7   BIT 0

Date-based

Bits of the set value of the RMAX

BIT 7   BIT 0

RCEN: RADIO CENTRO

DATAH

Most significant bits of the set value of RCEN

BIT 7   BIT 0

Date-based

Bits of the set value of RCEN

BIT 7   BIT 0

01 - Serial
00 - RC (PWM)

RMIN: RADIO MINIMUM

DATAH

Most significant bits of the set value of RMIN

BIT 7							BIT 0

The minimum time values (RMIN), central

(RCEN) and maximum (RMAX) of the signal must be

calculated according to the equation:

Date-based

Bits of the set value of RMIN

BIT 7							BIT 0

$$DATAH: Date\text{-}based = time \ [ms] \times 2000$$

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CSS: *SOFT-STARTER* CONFIGURATION

bit 7-0   Unused

DATAH

-	-	-	-	-	-	-	ATVSS
BIT 7							BIT 0

bit 7-1   Unused
bit 0   **ATVSS**   *soft-starter* activation
          1 - enables the *soft-starter*
          0 - disables the *soft-starter*

Date-based

-	-	-	-	-	SS2	SS1	SS0
BIT 7							BIT 0

bit 7-3   Unused
bit 2-0   **SS2: SS0**   *soft-starter* speed
          111 - 0,4s
          110 - 0,467s
          101 - 0,56s
          100 - 0.7s
          011 - 0,933s

          010 - 1,4s
          001 - 2,8s
          000 - unusable

Date-based

-	-	-	-	-	FS1	FS0
BIT 7						BIT 0

bit 7-2   Unused
bit 1-0   **FS1: FS0**   voltage control
          10 - 250Hz
          01 - 1000Hz
          00 - 4000Hz

The voltage value **VMAX** for the parameters and

VMIN can be calculated using the equation:

$$DATAH: Date\text{-}based = Voltage \ [V] \times 10$$

VMAX: MAXIMUM VOLTAGE

DATAH

most significant bits of VMAX setpoint

BIT 7							BIT 0

If the *soft-starter* is enabled, any
change in value of the acceleration speed. O
ATVSS *bit* must be **set** to 1. If **0, the**
acceleration ramp is disabled.

FPWM: FREQUENCY PWM

The frequency of the PWM is set by the two
Date-based least significant bits of the *byte.*

DATAH

Unused
BIT 7   BIT 0

Date-based

Bits of the set value of VMAX
BIT 7   BIT 0

VMIN: MINIMUM TENSION

DATAH

Most significant bits of the set value of VMIN
BIT 7   BIT 0

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Date-based

Bits of the set value of VMIN
BIT 7   BIT 0

The permissible range for the parameters
VMAX and **VMIN** is 70 to 300 (7 to 30V).
Any amount above or below the range
It will approximate the permissible value more
close. The values are aligned right,
Therefore the eight least significant bits
They should be allocated in the rest **Date-based** and
in **DATAH.**

Date-based

bits of the set value of the *duty-cycle*
BIT 7   BIT 0

To set the *duty* values should be
take into account the following equation:

$$DATAH: Date\text{-}based = \frac{Duty\ cycle\ [\%]}{100} \times 4000$$

The *duty-cycle* values are limited to 96%
therefore   values   higher   what a3840   for
DATAH: Date-based are saturated in 3840.

SDC: MEANING AND DUTY-CYCLE

The most significant bit for that **DATAH**
parameter sets the drive towards
charge.

DATAH

SEN   bits of the set value of the *duty-cycle*
BIT 7   BIT 0

SERIAL PROTOCOL   .

The protocol for serial data transmission is
consists of 5 *bytes.* These **should** always be
sent sequentially. The first and last
byte are opening and closing of
Transmission respectively.

First it should be sent *byte*

Bit 7   **SEN:**   Bridge sense

              1 - Right Direction

              0 - reverse

bit 6-0   most significant bits of the *duty-cycle*

opening, the value of the parameter (SETUP) to be changed after the data (DATAH: Date-based) and then finally the *byte* closing.

OPENING	CONFIG	DATAH	Date-based	CLOSING
30h	variables			35h

Table 1 - Transmission Sequence

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...   **INTERFACE ANALOG**   **:**

To use the Blackmoon in analog mode first ensure that it has been set the desired mode. Then connect a pot with a value of between **10k** Pins 3 and 7 of the **AUX** connector.

Half tour to the extreme pot will increase the *duty-cycle* proportionally. For each direction with relative to the central position, the polarity of the motor It will be different.

By varying the pot resistance will be proportionally varied the voltage averaged over the load connected to the output **Blackmoon.**

VISUAL INDICATORS
.. .

The board has four LEDs for signaling (see p. 1).

☐ POWER: it indicates that the board is properly connected to any voltage source.

☐ INTENSITY AND DIRECTION: indicates polarity and chain tension on the load

☐ STATUS: provides information about the functioning of the board.

Next to LED POWER There endings on the board for external LED drive. It comes 4,6V

this continuous output and there is no need to limit the LED current, the board already has a

1kΩ resistor in series with the output.

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The STATUS LED has different behavior depending on the card control settings:

Control via PWM interface (RC):

The LED remains active during operation
Normal plate. The brightness will have burst
slow (0.15 Hz) when the input PWM signal
is incompatible or any signal loss.

Control via the analog interface:

When **Blackmoon** is operating in order
analog, the LED stays on.

RC calibration:

When the input values are CR
being calibrated, the brightness will have burst
Fast (6 Hz).

Outside the voltage range:

If the system is working out of
voltage levels, such signals, the brightness
possess rapid flashing (6 Hz).

....
Calibration Mode RC (PWM). .. ...
... .

The Blackmoon comes originally calibrated with

standard compatible with the majority of receptors

RC available. Eventually,

user can   do   re-calibration   the

ROUTINE FOR CALIBRATION
.

1. Insert the *jumper* between pins 1 and 5 of

AUX connector on the bottom front

left of the plate (see p. 1).

parent following a few steps. The data
calibration are stored in memory

permanent, ie once calibrated is not

necessary to restart your card, making

calibration again. Stored data

above shall be valid until

calibration performed again or are

restored the defaults

2. Connect *the* card.

3. Wait for the STATUS LED indication. This one
should flash quickly.

5. Tour the input signal sometimes
from minimum to maximum

> **Obs .:** If mixing on radio tour
> all the channels involved.

6. Remove the *jumper.*