



Instruction Manual

SST-031

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1. Description

The SST controller is a basic, single direction motor controller for currents up to 30A. It contains a PIC microprocessor which allows it to be programmed in a variety of ways. It can also accept up to 4 external inputs to allow control from external sources.

2. Do's and Don'ts

Do

- **Do** read the instructions fully before installing.
- **Do** fit a motor suppression capacitor, and ferrite rings.
- **Do** twist the motor wires together if possible.

Do not

- **Do not** connect the battery wires to the wrong terminals [there is no polarity protection].
- **Do not** apply more than 5V to pin R.
- **Do not** allow water to enter the box.

3. Software

The SST can have a number of different functions depending on what software it is programmed with.

The software versions and functions available are as follows;

- P = Open loop PWM control using a potentiometer or voltage input.
- S = Softstart operation via an [optional] switch input.
- C = Closed loop RPM control using a hall effect or other sensor.

Any one of these versions can be programmed into any SST, instructions for this are in the programming section.

The versions listed can all be downloaded from our website, if you wish to modify the default settings, or to write your own programs they will serve as good starting points.

4. Wiring

This manual covers the wiring for the SST-031-P, and SST-031-S models only. The wiring for the SST-031-C version is more complex and is described in a separate addendum on the support / manuals page of our website.

The wiring for the SST-031-P is shown in figure 1.

If required, an ignition switch can be inserted in the red wire from the speed control pot.

The speed pot should be between 1k and 100k ohms.

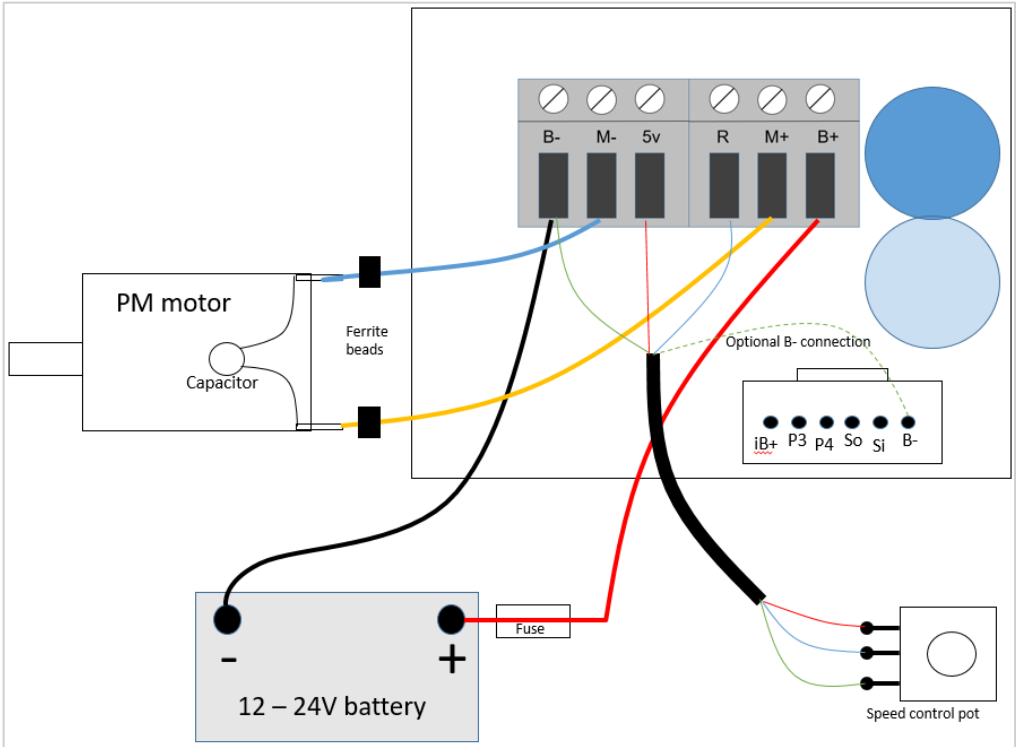


Figure 1 - SST-031-P wiring diagram

The wiring for the SST-031-S is shown in figure 2.

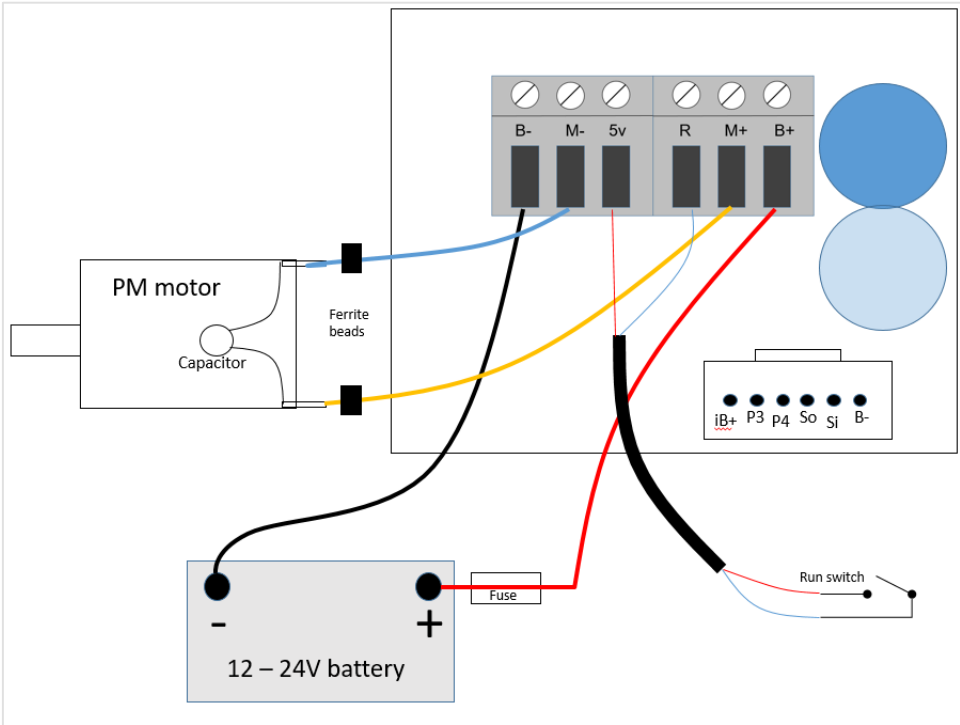


Figure 2- SST-031-S wiring diagram

5. Power Connections

We recommend 2.5mm² cable for the battery and motor wires, the connectors can take up to 4mm² if required.

Motor Wiring

Keep the motor wires close together, and if possible twist them together. We recommend fitting a 10nF 100V disc ceramic motor suppression capacitor across the brushes of the motor. Ferrite rings should also be fitted on the motor wires to reduce electrical noise. See the knowledgebase on our website for more information on noise suppression.

If the motor rotates in the wrong direction, swap over the M+ and M- wires.

Battery Wiring

The SST mosfets are not protected against a reversed battery, connecting the battery the wrong way round will damage them. The rest of the circuit is protected.

Keep the battery wiring as short as possible.

Battery Circuit Breaker

A circuit breaker or fuse should be fitted in the battery wiring. The rating should be just above that of the motors normal operating current.

A battery isolator switch should also be fitted to provide an emergency disconnection capability. In some applications such an isolator is a legal requirement.

6. Control Input

Once installed, the SST only requires a voltage on Pin R to start the output.

6.1 P software

With the SST-031-P software, 0V corresponds to 0 output, 5V corresponds to full output [B+]. There is a linear response between 0V and 5V.

The voltages required for starting and maximum speed, and also the ramp up, and ramp down times can be easily changed by modifying the appropriate parameters in the software.

6.2 S software

With the SST-031-S software, the controller will ramp from zero to full speed when a voltage greater than 2V is applied to pin R. Figure 2 shows this voltage being supplied by a switch from the 5V pin.

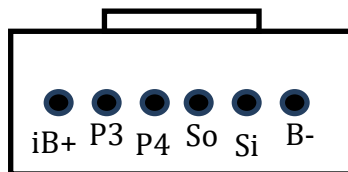
The start voltage, ramp up, and ramp down times can be easily changed by modifying the appropriate parameters in the software.

6.3 C software

With the SST-031-C software closed loop RPM control is possible. Full details of the wiring for, and features of this version are on our website.

7. Auxiliary Connector

The SST has an auxiliary connector that gives access to the following;



- Serial in & Serial out on the microprocessor. These are used for flashing the device. Serial out can also be used to connect a display.
- Pins 3 & 4 on the microcontroller that may be required for more advanced programming. See the Picaxe manual for more details.

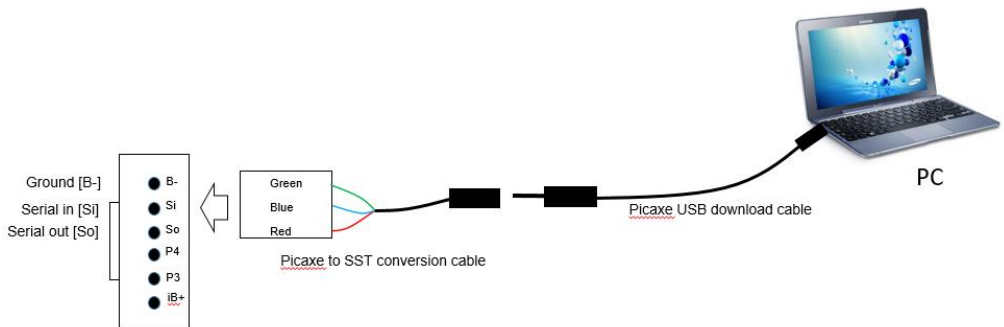


- iB+ is an ignition input.
If link A on the PCB is cut, then applying B+ to this pin wakes up the controller [30mA required].

8. Programming

To change variables in the software, or to program user code into the SST-031 the following is required:

- A PC with Picaxe development software installed [see www.picaxe.com/software].
- A Picaxe USB download cable [AXE027].
- A Picaxe to SST conversion cable.



The programs for the different versions are written in BASIC and can be downloaded from the software tab on the SST product page on the 4QD website. Release notes with a full explanation of the parameters are available.

It is straightforward to change these parameters even with little programming experience.

For those wishing to write more complex functionality, the Picaxe manuals give comprehensive information on the functions available in this chip.

For those who don't wish to program parameters themselves, 4QD can set these to your requirements for a small charge.

Custom software can be written for special projects.

9. Mounting

The aluminium box acts as a heatsink for the switching transistors inside, and should provide enough cooling for most applications. If the box gets uncomfortably warm to the touch during operation, extra cooling should be provided. This can be achieved by improving the airflow over the box, mounting it on a metal surface, or by painting it matt black.

Water Resistance

The box lid and cable entry grommets are not sealed, if the SST is likely to get wet these points should be sealed with silicon.

10. Switching Frequency

The default switching frequency is set at 20 kHz, this is a good compromise between efficiency and audible noise. Reducing the frequency will reduce the switching losses and therefore increase the current carrying capacity of the SST. Guidelines will be made available on the website.

11. Service

In the event of any problem please contact us before returning a suspect SST. Please include a completed returns form with the returned SST [see website]. Details of service charges are on the website.

Warranty

All our SST models have a warranty against defective manufacturing for 12 months from the date of shipment. The warranty doesn't cover damage caused by incorrect installation.

12. Specifications

Nominal voltage range V	12 - 24
Minimum / maximum voltage V	10 – 35
Motor current A [max]	50
Motor current A [continuous]	30 [depends on mounting / cooling]
Current limiting	No
Regen braking	No
Dimensions [mm]	60 x 55 x 30
Weight [g]	100
Power connections	Screw down terminals
Control inputs	0 – 5V
Reverse polarity protection	Partial [not mosfets]
Overvoltage protection	No
Ramp times	Adjustable via software
P software	Default = 1s
S software	Default ramp up = 7s, ramp down = 2s
C software	Depends on configuration
Power down state (motor)	Diode
Heatsink	Box
Switching frequency	Default 20 kHz [adjustable via software]