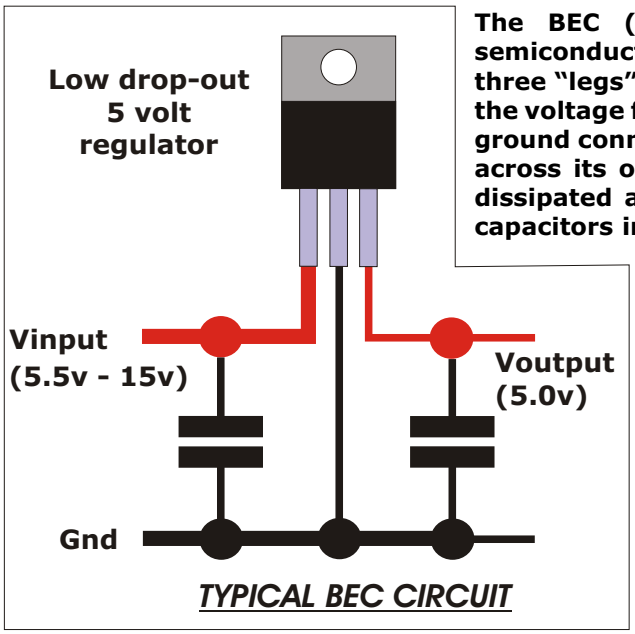
WHAT'S A 'BEC' AND WHY DON'T ACTION FIT THEM INTO THEIR SPEED CONTROLLERS?

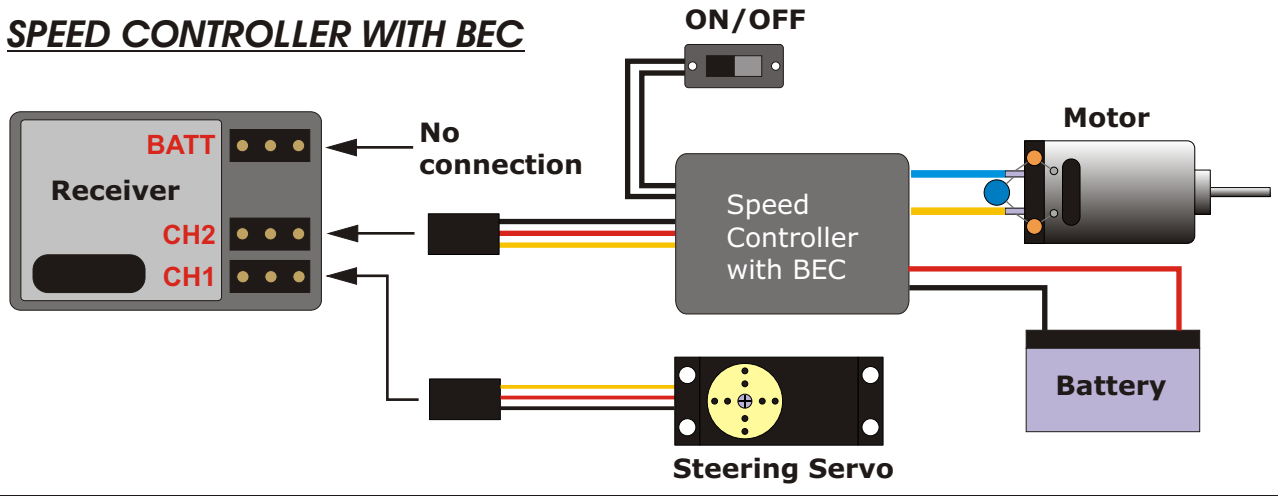


TYPICAL BEC CIRCUIT

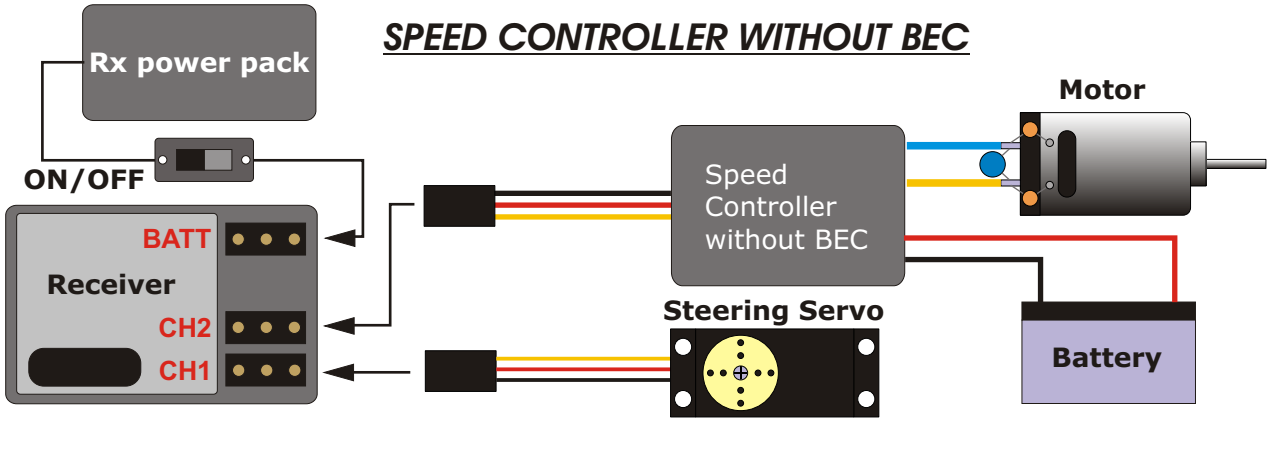
The BEC (Battery Eliminator Circuit) is based on a small semiconductor called a regulator. It looks like a transistor, with three "legs" referred to as the Input, Ground and Output. This has the voltage from the main drive battery applied across its input and ground connections, whereupon it gives forth with a lower voltage across its output and ground connections. The "spare" power is dissipated as heat through the metal tab. There are a couple of capacitors in there to calm things down, and that's about it. It's a useful device in that it doesn't matter how flat your main battery becomes (up to a point...), the output voltage from the regulator remains within a very close tolerance. The most useful type of regulator is a "low drop-out" type, which only requires an input voltage of about 0.5v higher than the output one. If your BEC doesn't have that then you'll need a supply of at least 2v higher than the required output. If the input drops below the threshold voltage required by the regulator then the BEC stops.....dead. This can cause problems unless you keep the main drive battery well charged-up.

Historically, BEC was an essential fitting to electronic speed controllers which were intended for model car use. These little beasts need to be as light as possible in order to perform competitively, and the additional mass of a separate Rx pack is unacceptable. Many of the present so-called "marine" speed controllers seem to be precious little more than model car controllers with the word "car" crossed out! Some even have a half-speed reverse and a delay between selecting reverse and it changing the direction of the motor just what you don't need if you're using the thing for a bow-thruster.

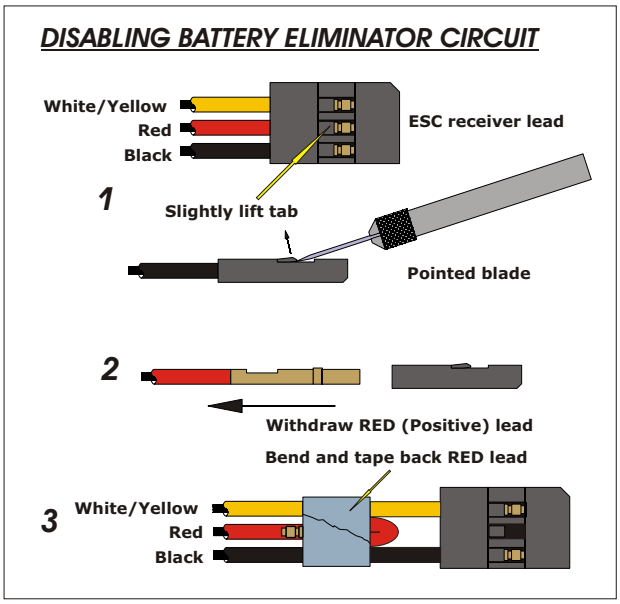
SPEED CONTROLLER WITH BEC



SPEED CONTROLLER WITHOUT BEC



Except for fast electric model boats (which are every bit as exotic and current-hungry as model cars) BEC is of questionable benefit in model boats. In fact, in my experience that's just the bit that causes the most problems, in so far as often you can't see just from looking at it whether or not an ESC has BEC fitted and, even if it is clear, you can't see whether or not it's ON or OFF. When you need a digital voltmeter to answer that question for certain then I reckon it's time for a re-think. IMHO it's better to have a separate BEC unit so at least you can see that it's there. That way if you don't want BEC then simply don't fit one in circuit - easier and less mind-numbing than having to pull little sockets out of plug shells to disable the thing.

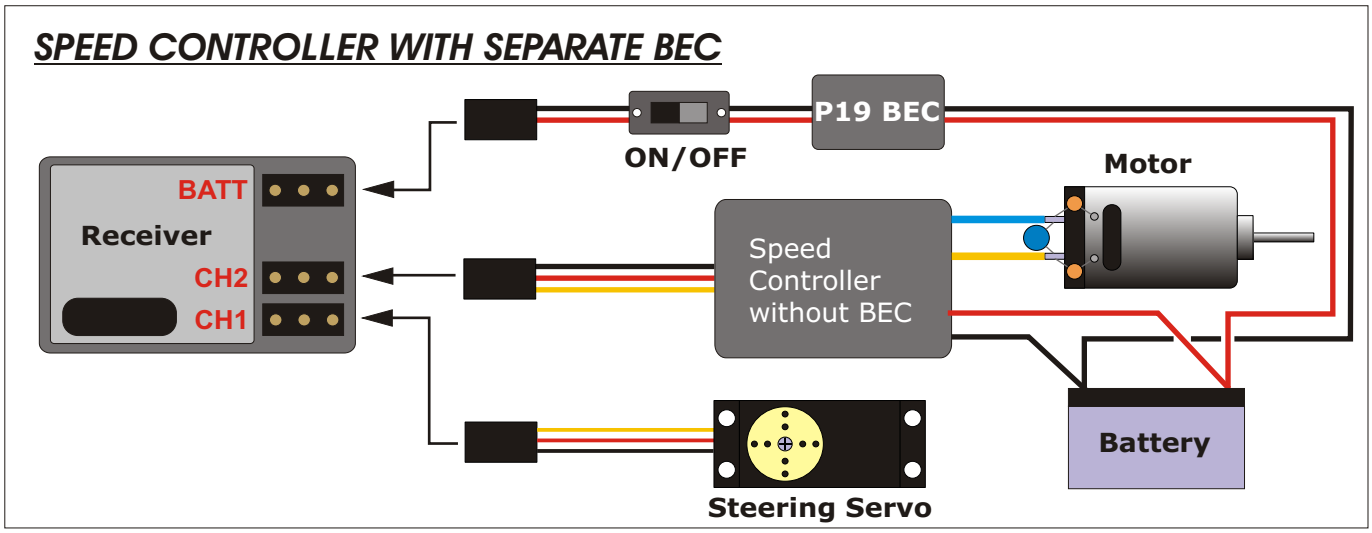


Now for Dr Wombat's Technical Treatise on the matter.....

"Two reasons for not fitting BEC into our speed controllers and mixers.....

First the easy one - space & power - there is enough juice flowing in that thing already. BECs are usually linear regulators so they will generate heat depending on the load and the supply voltage. The more load or the higher the supply the more heat that is generated. On 12V systems for every Watt delivered by the BEC it dissipates 1.4W. On 24V that is closer to 4W. For example, on a 12V system at 500mA a 5 volt x 1A BEC is dissipating getting on for 3.5 Watts of power - a significant power increase to be handled by such a little box - realistically we would need to get another heat-sink in there, close to the main electronics. This would make it a swine to assemble and compromise its reliability.

Second, the more technical one - running a BEC from the ESC means that you are effectively running it on a "dirty" power supply because the noise from the motor is imposed on it and this can break through to the receiver. You can compensate for this somewhat by using capacitors and filters, but this is going to limit the effect only. I suspect this is why my AZIZ will not run smoothly once it gets a certain distance from the shore i.e. the reduced RF level combined with glitches on the power supply cause the RX to drop out periodically (Dave's Note: Tim's Aziz uses an ESC with integral BEC; he's since learned his lesson and designs his own now!). Better to use a separate BEC and have it connected as close as possible to the main battery terminals. P92 gives a simple way of distributing the power, but keep the main battery cables as short as possible and as thick as possible.
If you connect up the outputs of multiple BECs you are asking for trouble - the outputs are never the same and the highest ones will pump current into the lower ones causing lots of heat generation.



A separate BEC is not as convenient as one built into the ESC, but I feel that technically it is a better solution - it allows you more flexibility in the way you segregate power".

(Well, which one of us are you going to argue with first??!!)