

An ESC with Attitude

MRT VFX Electronic speed controller. by Dez Chand

The VFX ESC from MRT is a lot like the Tardis. You stare in wonder at its minuscule dimensions but once you get inside, the vast contents are quite astounding. How do they get it all in?

A box measuring 40x30x20mm would encapsulate the VFX while the shrew like 34g mass belies the heavy weight specification. Drive On Resistance is a mere 0.00125 Ohms, that's a lot of "0"s, while the Drive Current is over 550 Amps!

Sporting regenerative brakes with a selectable anti-lock feature, current limiters, current ramp between the two, adjustable start responses, an integrated FET choke and a simple one button set up procedure it's no wonder that the programming handset needs to be twice its size to tell it what to do. This VFX is an ESC with attitude!

Having a plug in programmer module ensures that the only hardware to endure the rigours of the track are the bare essentials, whilst at the same time allowing the information interface to be a size that is user friendly rather than infinitely fiddly. So you win both ways.

Dedicated Set-up

Some features have a dedicated set-up procedure, tuning in to your transmitter, setting current limiter 2 and selecting anti-lock brakes. All the other features are set at once by a single press of the data send button on the hand set. These include current limiter 1 (20-140 Amps), current ramp (off to 3 Amps/second), throttle damper, brake maximum, brake minimum and the start response (100% Damp to 100% Turbo). The only draw back of setting all six at once is that if you come back later to change just one function, then you had best check that none of the other five have moved from where you left them before pressing the button. It may be worth making a note of your settings over the first few meetings until you become familiar with each function and monitoring the results of each tweak.

1) Tuning in the VFX to your transmitter.

This is a simple procedure but first you must ensure that your throttle settings are all at nominal values and that the VFX is fully installed in the car with a motor connected up and ready to run with capacitors, Schottky diode and all. The motor is used to "Beep" confirmation signals to you so without it connected you won't get the message.

With the Tx turned on, the nicad pack connected and the programmer Set-up button held down the VFX power switch is turned on. When the motor "Beeps" after about one second release the Set-up button and the amber light will be steady while the red and green flash. Your neutral position is set so now move the throttle to fully forwards and then brake pressing the Set-up button at each extreme. First the green light will hold, then the red to indicate that full and brake positions have been set in turn, you are now in control of the VFX but if you normally run with a little drag brake at neutral you should continue holding down the set-up button after the initial turn on until you get a second "Beep" some five seconds after and the red and amber lights are flashing together to indicate that brake minimum now applies at the throttle neutral position, then release the button.

2) Current Limiters 1 & 2 and Current Ramp.

Fig 1.1 shows a high-low setting where L1 would be about 100 Amps, L2 about 30 Amps and the current ramp at Off or very low. This would give a really punchy feel coming out of turns before quickly taming the hungry motor to preserve battery capacity for a short twisty track with a high grip level.

Fig 1.2 shows a similar high-low setting but with current ramp set to a slow rate of change somewhere near maximum. This would give a similarly punchy feel with a longer run of power on corner exit for larger sweeping tracks with no

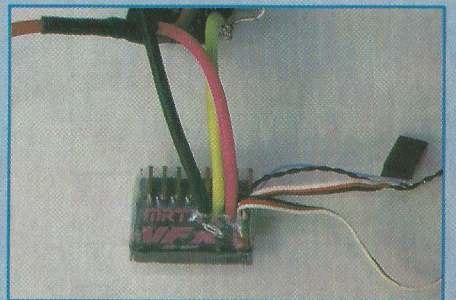
power sapping stop-start corners.

Fig 2.1 shows a low-high setting where L1 is down to around 25 Amps, L2 is up to 100 Amps and current ramp is almost off. This would suite a low grip situation and give good corner exit control shortly followed by a rush of power.

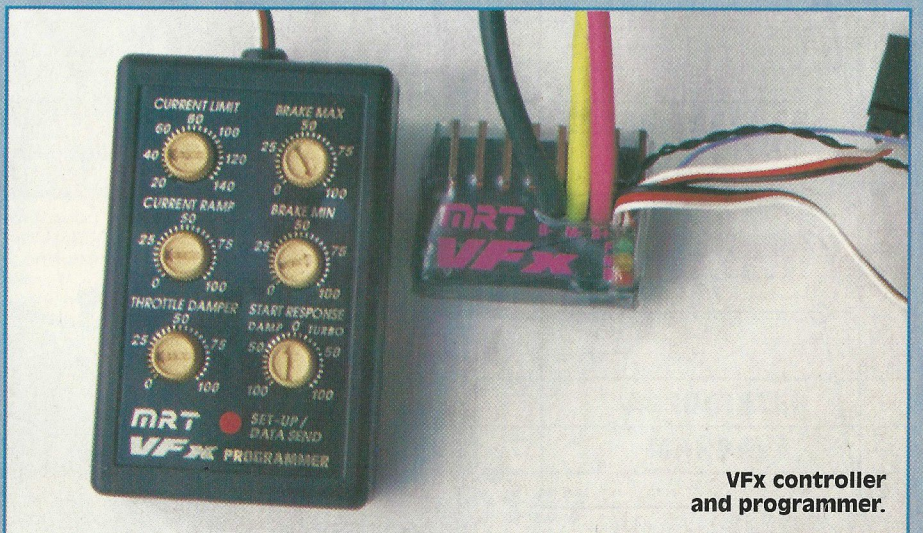
Fig 2.2 shows a similar low-high setting but with current ramp set to a slow rate of change somewhere near maximum. This would suite a very slippery scenario like a 2wd on-road car in damp conditions or for very extended run times because by the time you've held full throttle long enough get into the 100 Amp region the acceleration should be over and the load on the batteries reduced anyway.

Fig 3 shows a linear setting where L1 and L2 are set to identical levels so current ramp does not apply what ever it is set to. This will give a traditional current limiter feel but you must remember to reset L2 each time you adjust L1 or you will be bringing the ramp into effect one way or the other.

Having decided which system you desire and having set up current limiter 1 along with ramp and all the others with your first press of the set-up button you move on to set current limit 2. Re-



The VFX is at present awaiting it's own case, so at present comes "shrink wrapped". This speedo controller proves "size isn't everything"



VFX controller and programmer.

CURRENT LIMITS AND RAMPS EXPLAINED

FIG 1.1

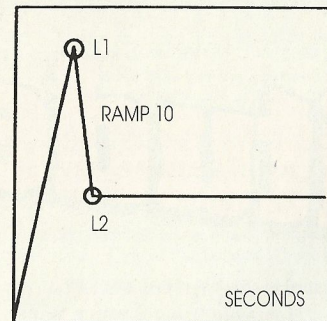


FIG1.2

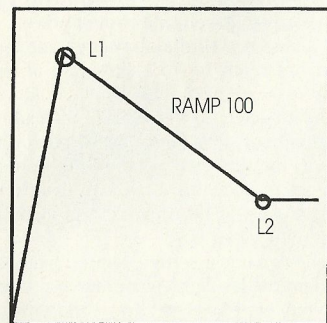


FIG 2.1

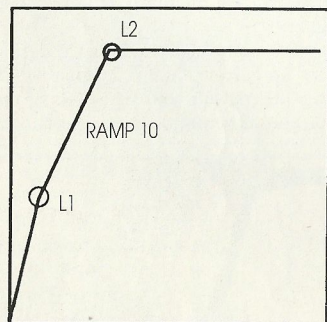


FIG 2.2

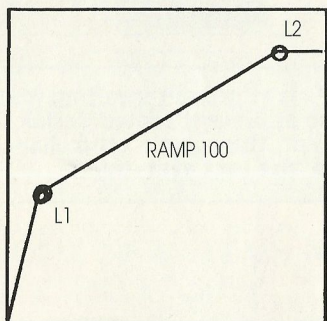
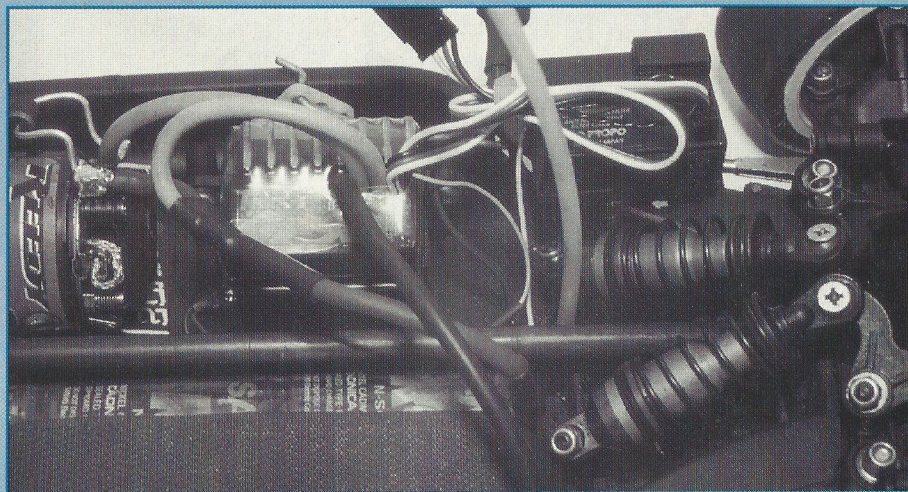
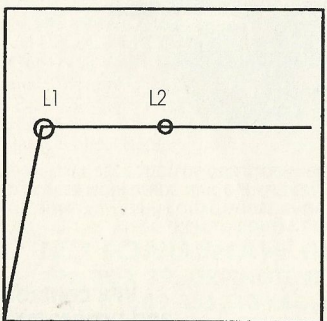


FIG 3



Lost in a Predator DTM.

dial the current limit pot to the level desired for L2 then press and hold the set-up button this time until the motor "beeps" and the lights turn off one at a time and back on again before releasing the button.

To check that I had got the hang of it correctly, yes I know it sounds simple but I'd had a long day OK?, I set up something radical like in Fig 2.2 with L1 & L2 at the extremes and current ramp on maximum and went out for a play coming in evenly couple of laps to change the settings gradually towards those in Fig 1.1. At first, sure enough, it drove like a pussy cat crawling out of the turns and taking the entire length of the straight to reach maximum speed, it would surely have done a seven minute run. As I passed through a linear condition and approached a high-low setting I could see and feel the punch coming back as the car fought for grip coming out of the turns until at the other end of the scale and it would wheel spin at every opportunity before calmly stomping down the straight. From the instructions it wasn't clear whether the graphs would apply each time the throttle was backed off or the one curve was dragged out over the full five minute run.

From my experimenting I came confirm the former so now you too can drive like the top guys with their fancy thumbs that know all about acceleration versus duration using the ramp feature to match the complexity of the circuit. Tight & twisty = low ramp, fast & sweeping = high. The levels of L1 & L2 are determined by the balance of power and duration you are looking for.

3) Anti Lock Brakes.

Any time you feel the car becoming unstable under braking through a change in grip levels, track temperature or precipitation, the simplest change to make is to turn on your anti lock brakes. With the programmer connected again, hold down the set-up button until the motor

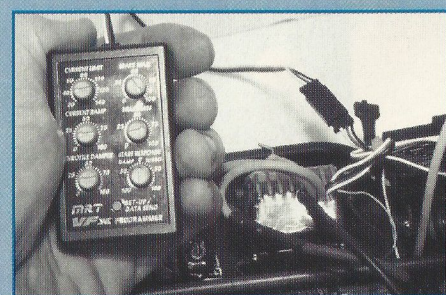
"beeps" and all the lights extinguish and re-light. Still holding the button down will after a further five seconds produce a double confirmation "beep". The lights will then toggle on and off every couple of seconds leaving the red light on then off to indicate whether anti lock brakes are active. If you want them on release the button with the red light lit, it's as simple as that. Next time you go out and steam head long into a turn with the brakes on, the Vfx will sense when the motor is slowing below a pre-set limit and momentarily release the brakes to prevent the wheels locking before reapplying the brakes and having another look. This all takes place in the blink of an eye so with a high grip level you should see no change at all but as soon as the amount of deceleration demands more grip than is available you will hear the wheels jittering as you come into the turn. This is the anti lock working hard trying to maintain traction to meet your retardation request. If, however, you would normally use the brakes to help the car turn in with a little tail out over steer than you will be better suited to leaving the anti lock feature turned off. Note. Setting the anti-lock brakes sounds similar to selecting neutral brakes, yeah? Well its not, see, because to get to neutral brakes you had to hold down the set-up button before turning the Vfx on, so entering the initial set up programme. Selecting anti lock brakes can be done any time just by plugging in the handset with the Vfx already on, see ?

4) Throttle Damper.

The throttle damper can be used to help tame the less conservative throttle jammers among us who get carried away mid race and forget all about driving smoothly and end up dumping prematurely through over enthusiasm. The Vfx is here to help you maintain your good intentions, with the throttle damper set to 0 or off you are totally in control (allegedly) but with it up to 100% the rate of damping is such that you can quickly dab the throttle on and off mid corner and the damper will over ride your instruction maintaining a steady acceleration. Somewhere in the middle is a happy medium between power and duration that is a fine line we all cross occasionally but now you can have it maintained with minimal effort from your grey matter.

5) Brake Max./Min.

These two dials can tune the retardation of your car to a fine degree and anyone in the real world of racing will explain to you how they place as much emphasis on the brakes as on acceleration when they are looking to shave vital seconds from lap times. Brake Max. determines the outright braking effort at full stick while Brake Min sets the level of punch from the



The programmer in connected and "talking" to the speedo.

VFX SET-UP SHEET

DATE	L1 AMPS	L2 AMPS	CURRENT RAMP	A.L.B. ON/OFF	BRAKES MIN/MAX	THROTTLE DAMPER	START RESPONSE	COMMENTS AFTER USE...
8.9	20	140	100	ON	20/100	100	0	SOFT 9 MINS
9.9	80	40	25	ON	30D/80	40	50 TURBO	BALISTIC 5 MIN
10.9	140	100	0	OFF	10D/100	OFF	100 TURBO	DUMPED 3.5 MIN

neutral position (unless it is already set to neutral drag of course) so you can get straight into the serious braking region. You can set a low neutral level and slow reliably into every corner without having to throttle back and save the serious stuff for when you want to dive up the inside into a hairpin. Changing the level throughout the day will help you match the changing grip levels and keep you one step ahead of the game if something drastic happens (you did bring a broly, right?).

6) Start Response.

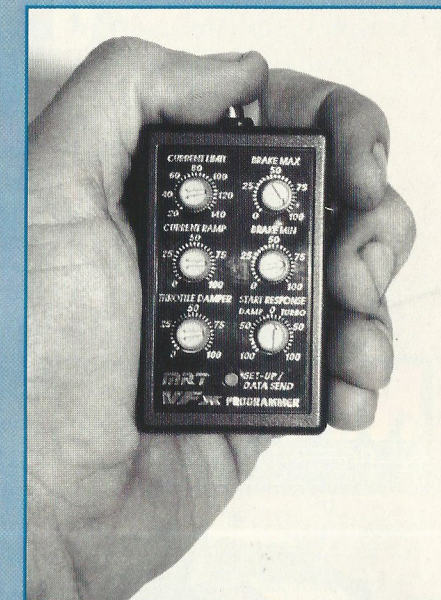
Selecting anywhere from 100% Damp to 100% Turbo on the programmer handset you can predetermine how your car will go when the flag drops and the bullshit stops. If the grip is down and you over step the mark the resulting wheel spin could leave you facing the other nine cars that did manage a good start and good odds you won't be taking any further part in proceedings or will be rejoining at the back of the field after the start line marshal has dug your car out of the next field and everyone has stopped laughing.

To avoid this nightmare the Start Response allows you to pre-select an over ride current limiter that will work only the first time you press the loud pedal and relinquish command to the other two current limiters when you back off into turn one. By running your car up to the start line

and holding it there on the brakes for four seconds will generate a signal "beep" to let you know on the rostrum that Start Response is armed and ready for action. Should you make a false start for what ever reason (sneak in a practice start) simply holding the brakes on again will reset the function if you have a further four seconds to spare. The level you require will depend on the grip available and how your particular car handles the power off the start line. Obviously you don't want to crawl off the line and throw away the advantage you built up with your qualifying runs so do a bit of practice in order to find an acceptable level and take a note for future reference.

State of the Art

The impressive specification of the Vfx brings the state of the art technology within easy reach of any serious race addict but if you can already judge the perfect point when the wheels are about to lose traction by spinning or locking, you can determine and meter the precise throttle demands to balance power against duration, and make a perfect start every time no matter what the weather conditions then I guess you will only be impressed by the Vfx's supreme efficiency and be left to marvel the appreciative lack of physical mass. Shame really.



Take care not to change any of the parameters you are happy with, always check your last set-up when using the programmer