DIRTY TRICK

ARX540 1/4 SCALE MOTO CROSSER FROM AR RACING

By designing and manufacturing high performance option parts for the popular but fragile Radio Shack Ricky Carmichael range of electric MX bikes that proved popular in the USA, AR Racing of Italy soon had enough components to assemble their very own 'ready for radio' bike, and the ARX540 was born. I first clapped eyes on the machine at Nuremberg 07 when the designer searched me out and insisted I come see their latest creation, and I was utterly smitten at first glance. To prove it wasn't just a pipe dream, the demonstration video of the bike in action hooked spectators by the eye sockets, this thing was a missile and soaked up the rough and tumble with a hunger. Weighing in at 3.25 kg ready to run with a 6-cell NiMH pack installed, the ARX540 can turn really sharp by achieving 32 degree lean angle on its flexible crash bars that allow it to traverse virtually any terrain.

Grass and AstroTurf suit the tyres best, but wet mud can offer sufficient grip too

With NiMH in it was fun; with LiPo it was lighter and easier to wheelie

Alloy swing arm and chain final drive, GRP tyres were keen to get involved with the project

Paint the body and complete the final assembly before installing your choice of propulsion system and radio

All alloy steering head is very strong. Steering is very direct for good direction changes at speed

COMING AT YA!

The ARX540 comprises a 2 mm thick laser cut aluminium chassis and seat loop, sandwiching alloy headstock mounts for a twin lever steering system, mounting CNC alloy swing arm at the rear and alloy upside down forks at the front and suspended by a fully adjustable oil filled damper at the rear and spring loaded forks a the front. The ARX540 is available in two versions, assembled or as a nut and bolt kit. Ours arrived as an assembled chassis, with unpainted bodywork and a comprehensive sticker set that reduced the amount of work required to achieve a professional appearance, sorry TelsShells, you don't get your hands on this one!

GETTING DRIVE

The alloy motor mount also serves to protect the primary drive gears from dirt, almost surrounding the tiny pinion and helping extend its working life. The primary drive ratio is 7/56 in a coarse 32DP pitch to absorb the rough terrain, to take the knocks of the drive train and not be too badly affected by ingesting loose grit and dust in the thick of the action. The final drive sprockets in a 9/32 ratio pull on a 048 chain measuring 410 mm in length, the same pitch and width as that used on the Nuova Faor bikes, but nearly twice as long!

TYRES

GRP already include a fine range of tyres for the on road bikes, so they were approached to make specific tyres to suit the ARX and the soft rubber offers extra grip on all surfaces, helping the bike self right after coming to a halt on its flexible crash bars. The tyres aren't glued to the rims, as the revs they will attain to reach maximum speed will be relatively low, and having them just stretched over the rims makes for much easier tyre changes. The rims match the tyre section at the sides with a thick rubber insert wrapped around the centre section to give a little compression and surface contour adhesion to improve grip without over flexing the large section tyres.

REAR AXLE AND GYRO

The rear axle is restrained by a grub screw in each side of the swing arm, to prevent the wheel migrating forwards and reducing chain tension, which would result in a thrown chain and mangled links.

Delrin slider and piston glide inside long alloy fork legs

Primary drive is course. Layshaft mount has third leg for strength, and double as footpegs

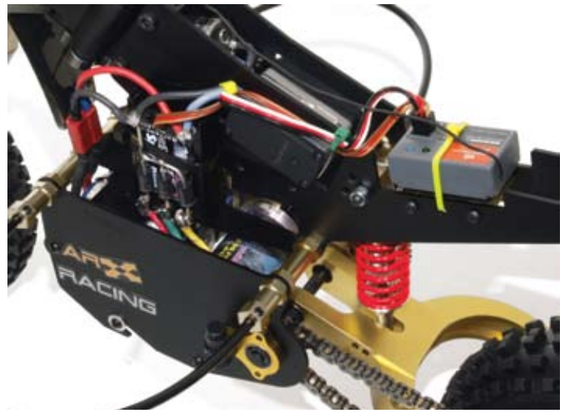
Compress the forks fully before nipping up the axle clamp grub screws to ensure parallel fork alignment

The layshaft bearing mounts have a third leg which initially appears to simply hold the foot peg mount but it's also there to spread the load and stress across a larger area of chassis plate and reduce the tendency for the extreme leverage of the long swing arm to bend the aluminium side plates.

The bike is stabilised by a gyroscope inside the rear wheel, driven using a patented gear system. An internal ring gear drives smaller planetary gears that rotate the flywheel mass at a ratio of 5:1 so the heavy flywheel will be doing 5,000 rpm helping stabilise the machine over rough ground. There is a clutch mechanism inside the fly wheel so that accelerating from a dead stop isn't effected and the flywheel only gets driven once the rear wheel has attained a certain speed, the bite point of which can be adjusted by the insertion or removal of a series of grub screws in each clutch shoe, adding or removing weight for an earlier or later bite point. I always fire the machine up and rev it right out to over speed the gyro before launching, which helps improve punch and acceleration (oh yeah and wheelies!)

Stability assured. The gyro is driven at 5:1 ratio via gears

Twin clutch shoes delay flywheel engagement to



M.troniks brushless and Spektrum radio installed

BODYWORK

With the Pro-Line rider figure you get a pre-painted robust rubber dolly, choose either red or green highlights. Although heavier than the lexan rider figures favoured by the road racing formula, he will take more knocks and keep on smiling. The handlebars mount not to the steering but to the front of the main chassis brace directly behind the steering, in this way the fixed rider figure cannot effect the steering mechanism yet he has something firm to hang on to, and he needs it, he's in for a bumpy ride!

The three-piece body set comprises a seat and tank unit in one, a front mudguard that extends rearwards, and a front number plate to offer the head bearings a little protection. Moulded in 1.5 mm lexan they take the knocks really well, by being flexible they simply move aside in a crash. An aerial mount is included if you intend running 40 MHz but as I went for 2.4 GHz I could literally just lay the aerial along the chassis and still achieve a usable 50+ metre range.

I'm glad I didn't bother masking the seat to spray it black and the rest of the body a different colour, because by the time I'd applied all the decals all I could see of the painted area was the seat anyway so my choice of black worked a treat! Hopefully there will be a range of colour schemes available in the near future but there's nothing stopping you painting the lexan your favourite colour scheme and declining to use the sticker set for that individual look.

QUARTER SCALE?

I was sceptical of the quarter scale specification so I looked up the wheelbase of the full size KTM motorcycle, upon which the bodywork is obviously based, and it is listed as 1,461 mm, which compared to the 370 mm wheel base of the ARX540 equates to a quarter, so I stand convinced of their choice of scale. Hysterically the rider works out to a little chap standing just 4 feet 6 inches; he sure has a lot on his plate to control this beast!

REAR SUSPENSION

The gold anodised, CNC machined alloy swing arm is a real piece of art, strong enough to survive the craziest of stunts. Offering a 4.7:1 shock ratio in the forward hole and 4:1 ratio in the rear hole, with the upper shock mount position offering three different angles which determine the rising rate, and a choice of between 160 and 190 mm ride height.

TOP TIP

With a deft application of the dremel I cleared access for my ball headed 2 mm driver to get to the grub screw for easier adjustments.

The rear shock is 85 mm between eyes and is based on a Revo shock, I think this one is a GPM unit, and hence the piston is retained by circlips and not secured with a nut on a threaded shock shaft like the genuine Revo shocks, I'll have to keep my eye on that and swap to a genuine Traxxas shock if it gives me any trouble. With just 20 mm of stroke and a 4:1 ratio means the shock will absorb 80 mm of wheel travel. With enormous shock loads it's little wonder the rod end has been swapped for a metal terminal in place of the moulded one, good move AR Racing!

FRONT SUSPENSION

The upside down front forks have a whopping 73 mm stroke, required to tackle the off road terrain and big jumps. They are assembled dry, with large internal Delrin spacers and sliders to spread the load, because any lubrication would simply attract dirt and increase the wear rate. Plus for off road use the dampening required would be so very light as to render it pointless anyway. An O-ring on the stanchion acts as a bump stop and there is another inside the main slider holder to act as an extension stop, removing the sudden shocks of reaching either extreme of travel.

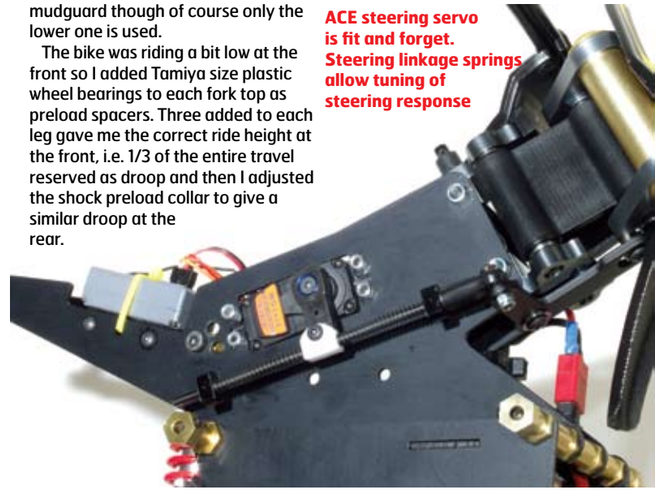
The upper and lower triple clamps or 'yokes' as we know then in the UK are identical. The front of each yoke contains a mounting for the racing number plate that helps deflect dirt away from the steering head, and they both supply a mounting for the front mudguard though of course only the lower one is used.

The bike was riding a bit low at the front so I added Tamiya size plastic wheel bearings to each fork top as preload spacers. Three added to each leg gave me the correct ride height at the front, i.e. 1/3 of the entire travel reserved as droop and then I adjusted the shock preload collar to give a similar droop at the rear.

TOP TIP

Tighten the top fork clamps but only just nip the lower yoke fork clamps and thread lock in place, or the piston slider will jam as it reaches full compression, the tube diameter is such a good fit that any constriction here will pinch the internals.

ACE steering servo is fit and forget. Steering linkage springs allow tuning of steering response



Unique battery layout. LiPo would weigh less, fit and perform better, especially 3S. A battery cover needs fabricating

TOP TIP

Don't try and unscrew the fork top caps before undoing the top triple clamps or you stand the risk of stripping the thread as it will be under extra clamping force.

STEERING

The ARX steering system might seem strange at first glance, with two almost parallel levers connecting the forks via their triple clamps to the chassis frame, because when you consider the leverage offered by the long forks and the beating it's looking forward to you soon realise why it's imperative to share the load across 8 bearings rather than the usual two bearings on a single headstock pivot.

The ARX steering linkage is a vast improvement over the Radio Shack Ricky bike, with an NF style long link and twin spring arrangement as favoured by the on road R/C bikers. The steering requires a servo horn 30 mm long to achieve the almost straight line push-pull action required, and hence at least 5 kg.cm torque and preferably metal geared to cope with all the shock loads. To this end I fitted an ACE 1313 servo which has 12 kg of torque and will be more than adequately perform this role. I'd rather slightly over specify a servo, fit and forget, than push my luck with a lesser servo and probably have to replace it several times a year. The steering has no form of steering damper as the front wheel needs to react quickly to the ground over which it is travelling, with an extreme rake angle of 27 degrees and loads of trailing castor the stability is built in; a steering damper would simply slow the rate of direction change.

QUICK SPEC

Class: 1/4 Off Road Motorcycle
Type: Chassis Kit Electric
Manufacturer: AR Racing, Italy
Price:
AR01 (Kit) £389 RRP
AR02 (Assembled) £435 RRP

DISLIKES

No engine representation
No sealed radio box
No battery protection
Some sharp chassis edges

LIKES

Tough and sturdy
All alloy chassis
High grip GRP tyres
Responsive Steering mechanism
Alloy forks and Swing arm
Metal Yokes
Fully ballraced, even the steering
Effective Gyro with delaying clutch

POWER PACKED

The space for a power pack between the alloy chassis plates, their cross braces and the motor at the rear measured 78 x 54 x 40 mm, and as none of my existing LiPo packs fitted this space I re-cut some 4200 mAh NiMH cells in a 3+3 format to get me going. In the mean time I sourced some 2S 3000 mAh 'Revolution' LiPo to fit from Aurorra Ltd, but more of which later.

The choice of brushed or brushless is left up to you and two different motor mounts are included, to suit any motor spindle length, a nice touch I thought. As with most bikes, access to the motor isn't as simple as on most four wheeled models so I didn't fancy the maintenance schedule of a brushed type motor, especially on a heavy machine like this one that will be doing continual stop start manoeuvres over dusty and rough terrain, so I fitted a brushless M.troniks Gen Ride system with a 4400 Plasma motor, which is well proven in the R/C bike world, with good factory back up and totally waterproof into the bargain.

DRIVE TIME

If you check out www.radioracecar.com and visit the video links page you'll see for yourself what fun we had with the ARX540 on a grass track. With a 6-cell NiMH pack and 4400 kV motor, the bike was measured over a flying 20 metre course, achieving an actual 20 mph, which for a vehicle of this weight designed for tight twisty off road circuits is about right, but I can't help wonder how much more fun it would be on a 3-cell LiPo like the one on the www.armodelling.com video, wheelies galore!

I checked the end points of the M.troniks speedo and they were fine, so I went through set up and found the motor was set to minimum punch, so I swapped that for the maximum setting and went for another run. While I was tinkering with the M.troniks Genesis ESC set up I reset the auto battery cut off voltage, as it defaults to a 3-cell LiPo setting (a hint perhaps?) Also, while in the work shop I set about some plastic tubs to fashion a battery protector, added a rear mud guard to act as a shock deflector, and glued two pieces to the swing arm where the chain run might otherwise chew into the aluminium if it runs a bit too slack. Call me pedantic, fussy if you will, but the ARX540 swing arm is just too pretty to let it get damaged. The battery pack sits right behind the front wheel and therefore at risk from flying stones and grit, so I decided it needed a deflector shield and a simple sheet of plastic tucked inside the chassis braces worked a treat.

Back on track, to my obvious joy, the performance was transformed, with the bike pulling wheelies from slow corners, hoisting the front wheel aloft with good stabs of power from tight turns when sufficient grip was available, on grass, AstroTurf and damp sticky mud, though not so well on a dry dusty or gravel track. Next I fitted the 2-cell 3000 mAh 7.4 V Revolution LiPo and the bike was now under the 3 kg mark and much livelier for it too. The reduced weighed coupled with the increased punch brought new life to the ARX540, tight turns and lots of throttle would produce pleasing wheelies and jumps could be taken with confidence if you reserved a little throttle to bring the nose back up and correct the flight as you took off. It improved to a measured 25 mph, which was much better but how fast would this be with a 3-cell LiPo, I will just have find out soon, but it will mean I have to glue the tyres on!

We ended up with our jump ramps 12 ft apart and still managed to pin the landing with a very satisfying down ramp glide, I was made up!

My local rally cross AstroTurf track at Baginton, delivering a completely new driving experience on a track I know well, and after a 10 minute run with the 3000 mAh LiPo installed, my Cell Pro charger revealed the pack was still at 25% capacity so well above the 6 V cut off safety zone for a 2-cell LiPo. I'm sold. With the flying balance lead on the Aurorra LiPo I don't even need to remove the pack to recharge. All my NiMH cells can be re cut into stick packs to fit my cars again, they won't be going back in the bike that's for sure, they weigh too much and deliver too little. The chain stretched slightly so needed re-tensioning after six runs but that is to be expected with a new chain with so many links, it should stabilise after this and not need adjusting so frequently. Amazingly the rear axle stayed in place thanks to its grub screw adjusters, and the layshaft remained unbent, despite the ordeal of more crashes than we could fit into a hour long 'out takes' blooper video!!

DIRTY THOUGHTS

Well finally, thanks to AR Racing and the fabulous ARX540 you can get your R/C bike kicks without having to travel to one of the few large scale circuits around the country, just pick a park or rallycross track somewhere and have an absolute blast! RRCI

CONTACT

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Available in the UK from Formby Models, but for more information about AR RACING products visit www.armodelling.com