



THE
ENGINE
ROOM
**CAR
CLINIC**

SPIRE GT-R

TROY ROBINSON LOOKS AT ANDY GRICE'S SPIRE GT-R TO SEE WHETHER THIS TRACK DAY TOOL IS AS GOOD AS IT LOOKS ON PAPER



CAR CLINIC

In Car Clinic we take a PPC reader's modified car and assess it in the workshop and on the track to see how it could be improved. Want to see your car here? E-mail kev@ppcmag.co.uk

→ The Spire you see before you is one of the original demonstrator cars built by Martin Keenan, the car's creator, so in chassis terms it's an early evolution. For the last few years Andy and his two sons have owned the car and used it purely as a track-day machine completing over 20 days with almost perfect reliability.

This reliability has been an important factor as Andy has pretty much looked after the car on his own and runs it on a tight budget. The original spec included a standard Audi 80 four-pot engine united with its original transaxle-gearbox and carb. As you would expect the super reliable Audi soaked up the track-day abuse and required very little in the way of maintenance.

At least that was the story until the engine finally cried enough at Donington in October last year. Andy admitted that he knew it needed some attention, but it had been so reliable he thought naah – it'll be alright. It wasn't.

Spookily the new engine and gearbox was sourced and installed extremely quickly so personally I think it was all part of Andy's plan to get some more grunt in the back of the car – he just needed an excuse to do it sooner rather than later.

One of the current engine options for the Spire is



ON THE ROLLERS

From talking to Andy it sounded very much like a fuelling related problem so we decided to weld a lambda boss into the exhaust to allow us to take quick and accurate fuelling readings. Compared to a traditional gas analyser, which takes about 10 seconds to display what's actually happening in the engine, the lambda reader responds in around 200 milliseconds – ideal for diagnosing faults without having to hold the engine in a potentially detrimental state while the gas analyser does its thing.

The gas analyser does provide more information as it displays four gas readings simultaneously, carbon monoxide, carbon dioxide, oxygen and hydrocarbons. This extra info is really useful when trying to diagnose

emissions related problems or to pinpoint a mechanical fault, but we were pretty confident the engine was healthy so decided the speed of the lambda reader would be more useful.

Although the engine would start, idle and even pick up crisply when the throttle was blipped it would not take any load at all. After repeatedly stalling the engine just trying to get the rollers moving we eventually got the engine up to 5k rpm and got some load on the dyno to hold the revs. The fuel readings were all over the place, flicking from lean to rich and back again in the blink of an eye. A quick inspection of the fuel supply highlighted the problem. The fuel pressure regulator had been plumbed incorrectly. The Kawasaki fuel rail is the type that doesn't have a fuel

return which means the regulator has to be T'd into the main fuel line allowing excess fuel to circulate back to the tank while maintaining the desired pressure in the main feed line.

The regulator had been fitted in line with the main feed meaning it couldn't regulate the fuel pressure at all. While quickly re-plumbing the regulator we also noticed the car didn't have a swirl pot which is essential to ensure uninterrupted fuel supply when cornering with an injected engine. Although this needed some attention at a later date it would not cause a problem on the rollers so we cracked on with getting some power figures.

The engine would now pull away smoothly with very little throttle and the fuel readings were much

more stable. The throttle response was much better and a power run recorded 170bhp@9602rpm and 101.3ft/lbs of torque @ 7770rpm. This is a bit lower than Kawasaki claim for this engine but bike engines by their very nature have already had every last ounce of power wrung out of them by the manufacturer. So they're very sensitive to small changes like removing the standard air box, induction length and particularly exhaust. The manifold and system on this car are less than ideal and are the most likely culprit for the loss of power. I don't think Andy and the lads will be too worried though as this engine is 80bhp up and nearly 100kgs lighter than the old Audi lump, so to say performance will be enhanced would be a bit of an understatement.



Spire is a track-day tool with limitless grip. In the dry.

the Kawasaki ZX either in 1200 or 1400cc guise. so all it needed was a quick call to Paul Nightingale who owns Spire Sportscars and a complete engine and gearbox with ECU, loom, throttle bodies, Sierra diff, prop shaft all ready to go for

less than £2500. The chassis modifications required to accommodate the engine and new diff were also carried out by Spire just leaving Andy to sort out the plumbing etc.

Before coming to Northampton Motorsport for the Clinic the car did

get a brief run out at Brands Hatch, but only managed a few laps before a chronic misfire halted proceedings. With this in mind we thought we'd start by strapping the car on the rollers to see if we could get to the bottom of the problem.



Troy checks the Spire onto the corner scales.



Spire on the scales is just over 521kg.



Digi read out reveal Spire's diet.

ON THE SCALES

After finishing on the rollers we got the car onto the scales to have a look at weight distribution and wheel alignment. The car tipped the scales at 521.5kg and with Andy on board the balance of the car was pretty good.

	139kg	177.5kg
→ FRONT	124.5kg	164.5kg
Total:	605.5kg	Cross weight 50.1%



Tyres were best suited for road.

SUSPENSION GEOMETRY

Measuring the wheel alignment highlighted a few minor issues with the geometry which ideally need to be sorted to get the best out of the chassis. On the rear suspension there was a camber discrepancy with the right rear camber showing 1 deg 10 minutes of negative camber but the left rear had only 6 minutes of negative camber. Negative camber is important on any performance car as it combats the suspension's tendency to become progressively more positive in camber angle as the car body rolls during cornering.

While negative camber means that when travelling straight ahead only the inside portion of the tyre is in contact with the road, as soon as the car enters a corner the wheel and tyre become more upright and ideally the whole of the tyre is then in contact with the road giving maximum grip. Clearly the amount of camber will vary with suspension and tyre type but generally between 1 and 2 degrees works well. With the left rear wheel showing only 6 minutes of negative camber the wheel is already almost upright, when cornering the wheel will begin to lean outwards and only the outside edge of the tyre will be in contact with the tarmac reducing grip.

The rear toe also showed a small but significant difference side to side but unlike the camber the toe was not adjustable on the Spire's suspension set up. This is unusual in cars of this type as the double wishbone set up makes building in adjustability fairly easy. Having no adjustment means that the fabrication of the chassis and wishbones must be spot on if the alignment is going to be correct. It also means that any minor tweaks to suspension components or even the chassis as a result of a fender bender can't be compensated for. Andy did say that on later models the rear wishbones do have this adjustability and that he has these on his wish list. With the front alignment all looking good we had a good look around the

rest of the car. As I said earlier the car is run on a budget with reliability and safety the two overriding factors, so although the car is well put together there is no bling or hi-tech gizmos on this car. The running gear like so many component cars, draws heavily on the Ford parts bin with Sierra hubs and brakes sitting on the Spire fabricated rear up rights, whilst at the front again Sierra uprights, hubs, discs, calipers and steering rack are all used. The beauty of a car that weighs only 5 or 600kgs is that suspension and brake components that were designed to stop an 1100 kg tin top can easily cope even when thrashed hard round the local circuit and are cheap and easy to get hold of. Talking of cheap and easy the rubber on this car is definitely more road than race with all four corners sitting on 195/50 15 Pirelli stunners. Creative thinking by the Pirelli marketing team me thinks. Again Andy stressed he

wanted the car to be safe and the Pirellis gave a balanced level of grip making the chassis communicative and progressive rather than hanging on to the last millisecond and then suddenly letting go.

One thing that did catch my eye was the unusual pedal layout on this car. Looking into the foot well I could see that the rear arm of the front lower wishbone picks up right next to the throttle pedal and that the pedal had been deliberately curved to miss the wishbone mounting point. This caused two potential problems firstly the bend in the pedal left virtually no room to adjust the brake bias bar and more importantly a heavy front impact could potentially lead to the wishbone entering the foot well area with the obvious consequences. The current chassis have been redesigned in this area to place the wishbone mount away from the driver's feet and allow easy brake bias adjustment.



The Spire factory car is a real beauty.



Double wishbone rear suspension.

ON THE TRACK

I knew it would be an interesting morning when I met up with Andy again at Mallory Park, partly because it was wet and with 170bhp on tap the Spire was always going to be lively but also because this would be the first time the car would be driven with the new engine performing properly. Just to make things even more interesting Paul Nightingale had brought along the

factory demonstrator with its 300bhp supercharged ZX14 engine and paddle shift to try as a comparison.

Driving across the bumpy Mallory paddock I was surprised how easy the clutch was when trundling in first gear, bike engine cars are often very snatchy and the clutches either in or out making them awkward in traffic. Although this is purely a track machine it gave the impression it

would be easy to live with on the road. Once on the circuit the engine felt really strong and for a bike engine quite torquey. Like all bike motors though, the Kwacker really got going above 8k rpm and sounded glorious as it revved towards the shift point at 11k. The next gear comes with an almost imperceptible lift of the right foot combined with a sharp tug on the gearlever and the engine is back on its way to

11k. The soundtrack that is definitely fantasy F1.

But the grip level h was anything but F1 with the relatively skinny rear tyres almost immediately struggling in the wet conditions. I'm sure the car would feel much better in the dry but I can't help but feel that tyres that were probably okay with the old 90 brake Audi lump desperately need an upgrade.

Another part of the car shown up by the change in engine was the brakes. After a couple of acclimatisation laps I braked a bit later and harder into Gerrard's and the rear immediately locked up and pitched the car into a spin. Fortunately the car ended up harmlessly on the edge of the gravel and I drove it out and return sheepishly to the paddock.

Andy admitted that in 20 track-days he has never had to change the front pads but has changed the rears three times. As I had thought at the workshop, the bias bar position was to a large degree determined by the position of the bent throttle pedal which was limiting its forward adjustment. Again with the much heavier Audi engine and box the rearward bias was manageable. I went out again and did around ten more exciting laps before the coolant temperature began to creep up and up and it was time for a rest to let things cool down.

While Andy's car was cooling it was time to try Paul's demonstrator. As you would expect this car has all the toys including the same ZX 1400 motor but with a supercharger that boosts power to just under 300bhp, the car also has a mechanical

paddle shift system linked to the gearbox through a clever cable system. Generally the demonstrator had higher spec dampers, a much bigger spoiler, bigger brakes and most importantly 235 section Toyo Proxes at the rear and 195/50 15s at the front. Despite the considerable extra power the demonstrator felt really well balanced and immediately inspired the confidence to push on even in the slippy conditions. The paddle shift required a firm pull to ensure a clean change but after a bit of practice almost flat shifts were possible. After 15 or so laps I reluctantly pulled in.

Andy's Spire had cooled down so a quick change and it was back on track, after another 5 laps the engine just didn't feel as crisp and through the long right hander at Gerrard's almost sounded as if it was on 3 cylinders. Rather than press on and possibly damage something I decided to get back to the paddock and check things out. Andy and I checked the basics and all looked well. Andy mentioned fuel and I suddenly remembered about the lack of a swirl pot. We refilled the tank and the engine again felt sweet and strong.

Although Andy left with a list of things to sort out he was happy that the morning was a good shake down for the car. Some new tyres, a bit of work on the brakes, a swirl pot and bigger rad are all that's needed to make this a seriously quick track-day machine. Although the factory car was stunningly quick, Andy's car was not far behind in terms of fun or sheer speed and represents great value for money.

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SPIRE GT-R
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