

Winches

Yet more protection comes from the remnants of the Scorpion winch bumper, which was originally designed to take a low-line design. Given that Les now has a Warn 8274 at each end, you'll appreciate that something has had to give – these winches are many things, but low-line is not one of them.

The long-suffering bumper has in fact been chopped up not once but twice, because before going over to the 8274s Les had a PTO-driven Superwinch H14 on it. 'An awesome winch,' he says, 'but it meant I had no drive assist. I'd already remade the bumper to fit the H14, though, so I just had to cut it to bits again and make it fit the 8274.' The mount for the rear winch, meanwhile, is a full custom job which lives under the tray between the rear chassis rails.

The 8274 is a pretty impressive winch straight out of the box, but as the challenge scene has progressed many people have found ways of improving it still further for this particularly extreme form of recovery. Les is no exception, having tweaked both units for greater reliability.

For starters, there are grease nipples on the bearings so that the mud they can safely be assumed to have collected after each event can be pumped back out again. Each winch also has an aluminium block and a drain plug in the bottom of its casing, and a filler in the top housing. 'I used wading plugs as they have the flange to allow a copper washer to be used,' explains Les, 'to allow quick oil changes following each dunking session.'

In addition, the circlip on the main shaft has been secured by three allen bolts, located by drilling and tapping the brake, to ensure it won't let go in the sort of frankly silly situations Warn never intended the winch to be used for. Given that challenge events can now see vehicles almost literally hanging off their winch lines, that's no ill reflection on the 8274 or any other unit, but for exactly the same reason you want to do absolutely everything you can to avoid the sort of catastrophic failure that could, as Les puts it, 'send you into freefall.'

Ultimately, anyway, the winches will be getting uprated shafts from Giggiepin to do away with the need for any such mods. The same company has already provided its uprated pads for the winches' brakes – something else that's a very good idea when your truck's doing a good impersonation of a pendulum.

Both units are fitted with raised breathers and spooled with Marlow synthetic rope, with thicknesses of 12mm at the front and 11mm at the back. There's nothing clever going on to let them run at extreme angles, unless you count Les' policy of 'just keeping everything out of the way so it doesn't rub' as being clever – which, anyone who knows anything will tell you, it is.

Electrics

Sticking with the winches for a moment, when we photographed the vehicle its 8274s were still on their original 12-volt, 2.4hp Warn motors. Nothing wrong with that if all you need to do is rescue yourself and your mates once in a while when your green laning gets sabotaged by a tractor or a neglected drain, but for challenge competition at the highest level Les found them wanting. The words 'rice pudding' were mentioned, which is definitely not a scientific assessment but certainly speaks volumes about his views.

Not to worry, with the 2009 British Indoor 4x4 Show coming up, he was all ready to replace the 8274s with Warn's newer model, the 9.5xp. But then the exchange rate went down the toilet and the winches' price went through the roof, so a total rethink was due.

Now, a brief reminder that Les is a highly trained, qualified and experienced sparky who knows exactly what he's doing with all things electrical. Put another way, trying this at home is, in his words, 'not for the faint-hearted.'

Back to the time of our photoshoot: the winches are running a dedicated alternator, one of two 90-Amp units on the vehicle (the second looks after everything else). Simple, but, as we've heard, not effective, at least not enough for Les. Enter stage left a brace of Optima Yellow-Tops, run in series to provide 24 volts and therefore over-volting the newly fitted 12-volt Bowmotors. Over-volting, Les explains, is all down to Ohm's Law; for those of you currently wishing you'd paid more attention in school, this is the one that says current is proportional to voltage and inversely proportional to resistance.

Put another way, if you double the voltage you double the current. 'Volts jolts, current kills,' says that cheerful old aide-memoire (you know, the one you'd remember if you'd been paying attention at school), so be afraid. 'A word of warning,' says Les himself. 'Not all motors are built the same. Many won't take this, and will fry themselves if you try it. And it does also mean that the motors need stripping more often and the carbon blowing out. You can over-speed the motors, too, so you need to pulse them in and out under no-load conditions.'

Assuming you're not now lying down in a darkened room with a damp towel over your eyes, read on. The Optimas' combined output goes to a military four-pole isolation switch from a Bedford MK, which, logically enough, is set out with two poles for the front winch and two for the rear. Both are wired in using 70mm TQ cable (maximising current carrying ability and minimising voltage drop), via Albright solenoids, each with a second 70mm feed running back to the negative terminal.

As well as remembering that Les is an electrician, don't forget all those years he spent in the TA. Both are reasons why he's not terrified of auto-electrics, nor even 24-volt auto-electrics, the way us mere mortals have every reason to be. It also explains why, on top of all its other virtues, this truck truly is a masterclass in sparky work.

Check out the switching system for the winches, for example. Both ends of the vehicle show a full set of external controls for each of the 8274s, so that the co-driver can operate the rear unit from the front and vice versa. To save confusion, the local winch at each end is operated by a large control box, while the remote is on a toggle switch. Needless to say, there's a full set of internal controls, too.

Allowing the crew to monitor the condition of the system, an in-cab LED is wired to light continuously when the winch control is resting and flash when power is being sent to the Albright. 'That way,' explains Les, 'I know when the switch is pressed that power is getting to the solenoid. No flashing LED means the switch isn't working; a flashing LED but no click from the solenoid, or if the winch doesn't work, means the switch is okay but either the solenoid or the winch has had it.'

When it comes to the other kind of lights, Les uses military indicators and a set of rear work lights which are wired in on their own switch rather than being carelessly plumbed in to the reversing circuit. Rear lights are tucked well away to avoid damage, while the number plate light is as high as it'll go on the back of the cage. They weren't fitted at the time of our shoot, but he also has a set of X-Lights for the roof – and true to form, these are wired so they can come on with the main beam when off-road or, when in on-road mode, revert to a completely separate switch away from the headlamp controls.

You'll have worked out by now that when it comes to electrics, Les is one for the belt-and-braces approach. And even though he describes the dashboard as having been 'knocked up in pure bodgit style,' the fact that there are two 60-Amp fused feeds running to it, with all the accessories fused down individually beyond this, shows that he's not too bad at hiding his light under a bushel, either.

Said accessories include gauges for exhaust gas temperature, turbo boost, fuel and voltage, as well as a rev counter and Brantz trip meter. There are master switches for the ARB compressor, too, as well as on-board air (from an air-con compressor) and the winch controls. Another LED on top of the dash lets Les monitor this system by showing that there's power to the switch – if it goes out, it's because the fuse has let go.

There's also a map light and LED internal light, as well as a full set of auxiliary controls for

Les used 70mm Tri-rated cable for the winches on his truck. Overkill? Read this, which is all in his words, and decide for yourself...

Based on a 12-volt system, here's a bit of maths regarding cable size in relation to volts drop. First, maximum recommended current-carrying capacity for 90°C Tri-Rated cables, designed to run hot, of differing core thicknesses:

25 mm	183 Amps
35 mm	226 Amps
50 mm	274 Amps
70 mm	351 Amps

Now, volts drop for these cables, expressed in millivolts per amp per metre:

25 mm	1.85 mv/A/m
35 mm	1.35 mv/A/m
50 mm	0.99 mv/A/m
70 mm	0.68 mv/A/m

So, for example, assuming 300 Amps and a 4m cable run yield the following voltage drops:

70 mm	0.81 volts
35 mm	1.62 volts

Obviously, the voltage drop becomes higher with a higher current draw. Assuming 450 Amps, again with a 4m cable run:

70 mm	1.22 volts
35 mm	2.43 volts

This all means that your 12-volt winch, with a nominal 12-volt supply, could actually only be getting 9.57 volts at the motor. That's using 35mm cable; with 70mm, it would be getting 10.78 volts.

This is only for comparison, and obviously you will hopefully have a bit more than the nominal 12 volts available. But after a fair bit of winching, you may not!