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FUTURE

Words **Jeff Ruggles** Photography **Matt Woods**

Ralf Grafe's stunning Mini is proof that modern technology and Minis can mix in perfect harmony.

On paper, Ralf Grafe and the Mini seem to be at complete odds with each other. One is an experienced hardware and electrical engineer working as a business administrator at a world-renowned telecommunications company, while the other is the product of an era when home computers and mobile phones were no more than fantasies. Delve a bit deeper though, and you can see why these opposites have attracted.

The Mini's spartan spec is just crying out for a few more creature comforts and German enthusiast Ralf has certainly done just that with the build of his stunning Mini Estate. We've already seen evidence of Ralf's talents in *Mini Magazine* — he's one of the 'three musketeers' who designed the Ultimate Mini Squirt (UMS) programmable SPi ECU featured back in December 2008. This car, however, takes things to the next level.

Faxe machine

Ralf cheerfully claims the finished car is better than he expected, but things weren't always so rosy. The story begins over five years ago, when he approached Detlev 'Faxe' Wassong armed with an eBay-purchased Mini 1000. President of the Ultimate Mini Club, Faxe is the man behind renowned German specialist Faxe Racing and owns top class Minis including a stunning 1430 MPi. "I asked Faxe for the most advanced parts," remembers Ralf. "He asked me what it was for and I said I wanted to build a car like his one day. He saw my car and told me to stop investing!"

Luckily, Faxe did offer an alternative. "He told me of a friend who was building a 1978 Clubman Estate with a roundnose, but had lost motivation," says Ralf. "It was painted Porsche Blue with a silver roof, was fully welded and came with wheels and frames. Faxe said it would be →



"This car takes things to the next level"

Classic

Bought as a completed rolling shell, Ralf soon discovered the front needed to come off.



COMPUTERISED MINI

perfect for me as all I had to do was put it together. So I bought it for 2500 Euros."

Unbeknown to Faxe and Ralf though the Estate wasn't quite the bargain it first appeared to be. "The bonnet was one inch too long and didn't fit," recalls Ralf. "I tried another genuine bonnet, but had the same problem. It turned out the front end had been fitted without the teardrop mounts, and bent to fit. Then I went to the back of the car and discovered putty and surfacer 1.5-2cm thick everywhere — on the floor, the sides and the roof. There was about 30 kilos in all. After we took it all off, we saw that some places had been welded very badly. We had to start again from scratch, so we made the decision to make something out of it."

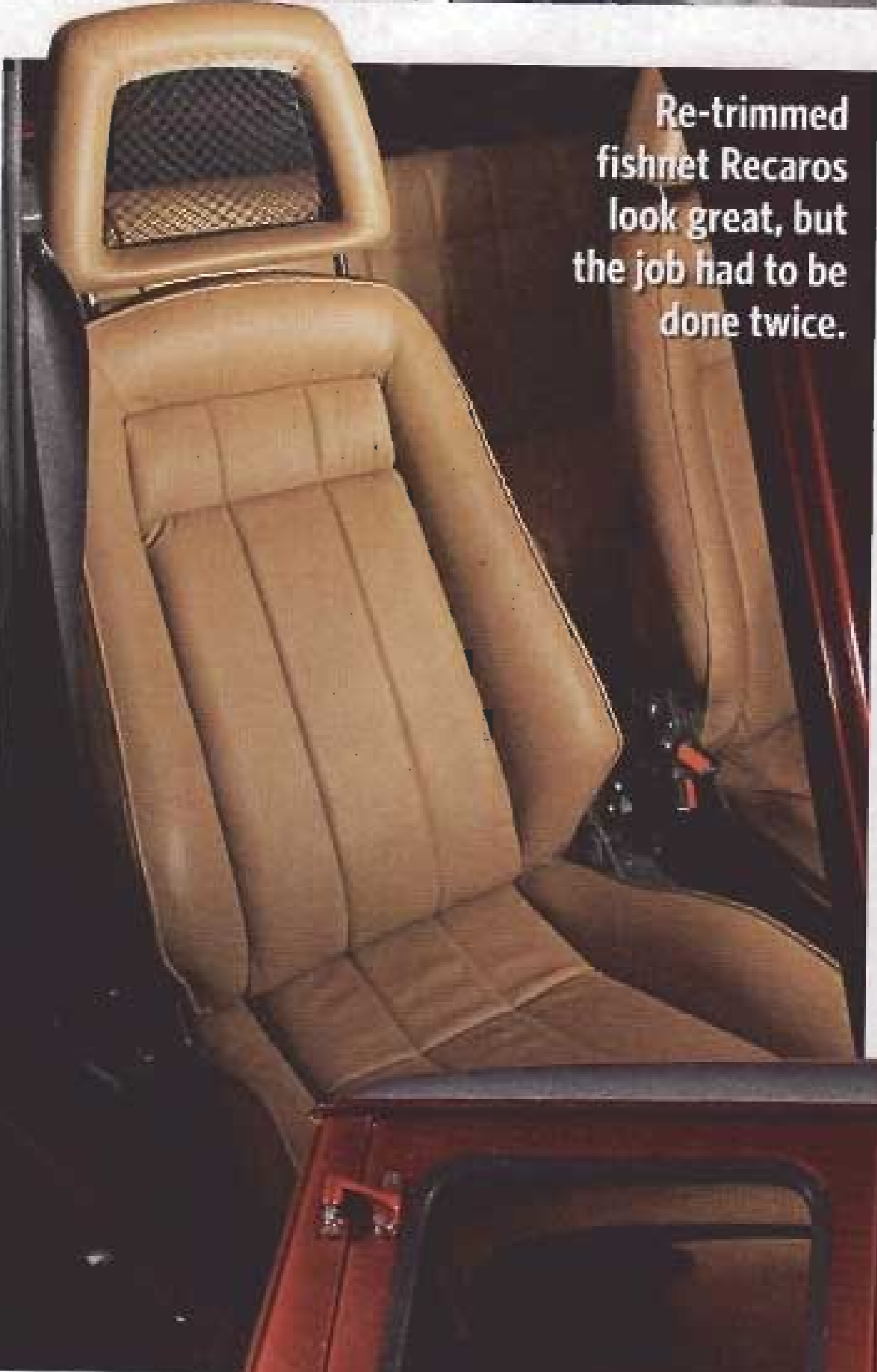
Ralf admits he's not really one for bodywork, so he looked to fellow Ultimate Mini Club member Holger Boborowski — aka Bobo — for inspiration. Bobo owned and built a stunning purple/gold flip painted saloon (featured in issue 169) and as a paint specialist he knows a thing or two about making Minis look great.

Hard Grafe

As well as sorting the front end, the extensive bodywork preparation saw many hours spent trimming the rear doors to make them fit absolutely perfectly. Lots of time also went into the wheel arches, which are the same type as fitted to the German-market Silverstone and Silver Bullet special editions. Originally designed to house 13-inch wheels, they've been re-modelled to fit perfectly around 10s and mounted further down the body to give the impression the car is even lower than it actually is. Combined with the Potenza 7x10 wheels, which were purchased early in the build, the stance is absolutely perfect.

With Bobo on the case, the paint job was never going to be a quick blow-over. Instead the car was treated to two layers of silver basecoat, six layers of stunning candy red and then topped of with two coats of clear lacquer. This has created a stunning finish, which is enhanced by a smattering of chrome fittings including a wide slat grille, an enamel Cooper bonnet badge and an ultra rare Innocenti Mini T full-length rear bumper. The latter was purchased during the IMM at Longbridge from a trader who's actually Ralf's neighbour in Germany!

Judging from the high standard of finish it's clear why Ralf labels Bobo a "genius". But there's so much more to this car than external beauty. Ralf's experience with the SPi system led him down the same route for this car, but the engine isn't just lifted out of some Rover Cooper — far from it. Instead he's gone for a fully-balanced Faxe Racing 1430 unit, which features short crown 73.5mm Omega pistons, lightened, fully polished and balanced genuine Cooper S.



Here's a Mini that's so computerised, one day it'll drive off on its own accord.



Filler, 1.5-2cm thick, was discovered all over the body — around 30 kilos in all.



Once the filler had been stripped, Ralf found much of the welding wasn't up to standard.

LSP2
LSP3
LSP1
LSP4



“On the dyno we’re already above 100bhp and on the highway we’re more than 115mph, but I’ll remain conservative”

con rods with ARP bolts, a lightened, crossdrilled, wedged, balanced Ni-tempered crankshaft, reground to 84.3mm stroke, MED rally head and 1.5 ratio roller tip rockers. This is good for well over 100bhp but it’s still refined thanks in part to the gearbox, which is a Helical item with the addition of a 2.95 final drive. “This is a highway runner. It’s built for speed not acceleration,” says Ralf, justifying his decision not to go straight-cut. “I will take it apart every season to check it.”

To enable the fitment of the injection, the wiring loom has been taken from a '96 SPi car and modified to suit, while the original fuel tank has been modified to include a custom-made small catch tank and an Audi A4 one-piece pump. Ralf wanted it to look as stock as possible, but had to modify the inlet pre-warming system to accept a new copper water pipe as the centre tube of big bore LCB would not fit under the standard SPi inlet manifold. He’s also increased the throttle body bore size to 44mm, but admits he will

have to go bigger again as it’s too small for the engine spec and doesn’t provide enough air over 5500 rpm. “The inlet manifold especially turned out to be the significant bottleneck. Currently Klas Bergold, one of the other fellows behind the UMS, is building a modified inlet manifold from stainless steel, to overcome this hurdle,” says Ralf.

Unsurprisingly there’s no place for the stock Rover MEMS ECU, which has been discarded in favour of the UMS item and allows Ralf to tinker with the fuelling, ignition and idle as he sees fit. “On the dyno we’re already above 100bhp, and on German highways we’ve seen more than 115mph, but I’ll remain conservative unless we’ve unleashed all missing horsepower, because of that inlet manifold issue.”

Consoling himself

Now for the really clever bit. The car is basically installed with its very own computer, run by an Intel Atom microprocessor, which Ralf reckons

is ideal for a car as it offers excellent performance but doesn’t use much power. The motherboard and power supply are built into the space under the rear seat, while it’s all controlled via a single 8-inch colour touch screen mounted in the centre of a dash panel layered with carbon-fibre.

Amongst its functions is an engine management console, which allows log files of engine data to be taken while driving. An application can then analyse where fuelling has been rich or weak, and with adjustment Ralf is able to get the mixture and ignition timing closer and closer to the suggested ideal until he gets it spot on — all of this while driving on the road! What’s more, the amended ECU data automatically downloads to his home server as soon as he enters his garage. Pretty trick, eh?

The screen also incorporates a computerised speedo and rev counter designed to resemble the classic Smiths designs. Most impressive though is a full →

COMPUTERISED MINI

Windows 7 media centre, catering for music, DVB-T television and video — even slideshows of restoration photos. “My friend has copied 100 episodes of *The Simpsons* via USB to the hard disk,” says Ralf. “Now I can just watch away!”

Basically it's got the lot, including a wireless internet connection so Ralf can use email and catch up with his friends on the German Mini Forum (when parked and having a Wi-Fi connection!).

In fact, the only things it doesn't take care of are some warning lights necessary for German regulations and the fuel gauge, which are both located where the ashtray would normally sit. The latter has a microprocessor of its own and involved more trickery, with Ralf programming in his own resistance values to get the gauge to read right. Ralf's original plan was to install a Riley Elf-style three-piece dash, but due to the sheer amount of electrics

in the car it just wouldn't fit.

Ralf won the Sound Off at IMM '09 with his Mini Silver Bullet, so it's fair to say he knows plenty about ICE. Two years of development, work and testing together with the German sound genius Dr Heinrich Weber has gone into this car, which features a subtle yet brilliant install. “Everything is driven by two Kenwood amplifiers built in the 1980s, which I believe are the best amps built. I was looking for them for a long time as they are very rare,” says Ralf.

The larger of the two — a Kenwood KAC-1021 — runs two low frequency Monacor Carpower Pulsar-10 Neodymium speakers mounted each side of the load area, which at just 11cm deep are an ideal solution when there are room constraints. For the mid and high frequencies a Kenwood KAC-921 was used, driving two speakers each side of the rear seat, a pair

under the dash and four tweeters mounted in carbon mouldings on the windscreen pillars. Each speaker is positioned in the optimum place, and has its own closed enclosure. “The goal was for it to be powerful and high quality but almost invisible,” says Ralf.

Placing a microphone on the driver's seat, Ralf used a laptop and professional sound analyser software (ARTA) to work out what frequency each speaker was giving. This has allowed him to set the tailor-made passive crossovers and level of each speaker perfectly, giving the impression of the car being four metres wide. “Most people just guess on the stereo and spend enormous amounts, but you don't need to,” says Ralf. “All info on equipment used and how to build is available free of charge on my web page (www.m1n1.de), so anyone is cordially invited to copy,” he adds.

“I'm not really a creative - I'm just an engineer”



Techno whizz: see Ralf's range of neat gadgets at www.m1n1.de.



Considering the amount of technology and gadgets in here, the plush interior is remarkably uncluttered.



The custom rear seat covers the companion bins and is flanked by subtle but powerful speakers.



Warning lights and custom fuel gauge.



Note the carbon!



Surf or drive?



The Smiths-style speedo and rev counter combo is just one of the touch screen's many functions.

Before you start thinking that's an end to the trickery, it's not. The engine start button is integrated into the alloy gear knob, but it does more than that. Hold the button down for three seconds and it switches on the ignition and starts the computer system, while hold it for another three and it stops. With the system on, a light push is all that's required to start the engine, or stop it. While the engine is starting, the LED ring around the switch flashes, and when it's running it stays on constantly. Apart from the actual switch itself the whole thing cost less than 10 Euros to build, with Ralf doing the programme for the microprocessor himself. "The reason for developing this was to get rid of the ignition key, its lock and the steering column housing, which didn't fit the style of the car." The steering column assembly was taken from an MPi Mini, as that helped to remove the light switch from the centre console and is of better quality than the SPi version. A second wiring loom was stripped and

cut in pieces, so every cable which had to be extended has the correct colour. All modifications have been fully documented in every detail in a new Owner's User Guide. "In the unlikely case the car should be sold some day, the next owner won't have a problem working it all out," says Ralf.

Go go gadget

The heater control is also modified. Annoyed with the noise of the blower, Ralf devised a small circuit that allows the heater to have five different settings, adding an element of comfort missing from the original design. This is just one of several clever gadgets Ralf has designed, which includes a speed signal generator for the ECU, a knock detector and a neat light switch saver module (not yet fitted).

Despite all the gadgets the car's interior remains classy and understated. The job had to be done twice to get the quality right, but tan leather now dominates and has been used to trim the dash rails,

steering column cowl, gear and handbrake gaiters, the door cards, headlining and much more besides. It's also been used to re-cover the rear seat and those gorgeous fishnet Recaros. The archetypal mile-deep carpet, a raid steering wheel and alloy door furniture complete the job nicely. Although Ralf says he's still got some tinkering to do...

The understated look continues outside, but there are a few extra little custom touches we particularly like. Those Potenza wheels have been treated to awesome bespoke conical centre caps, made to fit using custom adaptors after it was discovered the first generation of Potenzas had a bigger centre bore. The rear numberplate is the same backlit 3M foil plate as used on the VW Phaeton. Ralf found the 1430-reg number three years ago, and he had to keep dates on his calendar to ensure he kept it as you can only reserve a plate for six months at a time. Even the indicators and rear lights have been modified — they've now been

COMPUTERISED MINI




The 1430 engine is fuelled by single point injection and can be mapped from inside the car. Note the cool bonnet gas struts too.

converted to run self-made High-Power-Automotive LEDs.

With all these unique details the usual mods like suspension and brakes are almost forgotten, but these have been upgraded too. Mini Sport alloy four-pots and vented discs aid stopping, while the suspension is fully adjustable and includes adjustable trumpets and shortened Spax dampers. Certainly it's pretty low — Ralf can't even squeeze a toy Playmobil figure between the ground and the bottom of his German-made Bastuck exhaust.

After nearly five years of work the almost completed car was able to make its show debut at the IMM in Bavaria last year, where it was arguably the most popular Mini there. However, with the

bodywork, paint and engine build largely the work of friends; Ralf refuses to take the credit. "It's not really my project. I had help from people more experienced than me. I'm not really creative — I'm an engineer. The other guys are the creative ones."

We can't help but think Ralf is being a little modest about his achievements. Retaining its timeless character and classic looks, he's created a powerful yet refined Mini that will cruise comfortably on the motorway and has enough entertainment to keep hordes of eager enthusiasts occupied for hours on end. If that's not proof that modern technology and Minis can mix in perfect harmony, we don't what is. 

TECH SPEC

BODY Restored 1978 Mini Clubman shell converted to roundnose including inner wings, modified inner wing to accept Audi A6 fan, tubbed rear arches, front panel modified to clear oil cooler, modified Silver Bullet arches, stainless wide slat grille and front bumper, Mini T full width rear bumper, enamel Cooper bonnet badge, black screen inserts, door mounted mirrors, led indicators with clear lenses, VW Phaeton backlit rear plate, repainted Candy Red with silver roof.

ENGINE Fully-balanced Faxe Racing 1430 unit, short crown 73.5mm Omega pistons, lightened, fully polished and balanced genuine Cooper S con rods, ARP bolts, lightened, crossdrilled, wedged, balanced Ni-tempered crankshaft, reground to 84.3mm stroke, MED rally head, SW10 camshaft, MED Rally Special cylinder head, 1.5 ratio roller tip rockers, oil cooler, single point injection with modified inlet, modified 44mm throttle body, UMS programmable ECU, modified fell tank with tailor made catch tank, Audi A4 pump, Radtec alloy radiator, Audi A6 fan, large bore LCB, catalyst, stainless Bastuck exhaust, 95/96 SPi wiring loom with big fuse box.

TRANSMISSION Helical four-speed gearbox with 2.95:1 final drive ratio, central oil pick-up pipe.

SUSPENSION Dry rubber cone suspension with adjustable trumpets, shortened Spax dampers, adjustable front tie-rods, rebuilt subframes with new bushes and mounts all round.

BRAKES Vented discs with four pot Mini Sport callipers (front), spacer drums (rear), braided hoses, adjustable bias valve.

WHEELS AND TYRES 7x10 Potenza alloy wheels with Yokohama A032R 165/70R10 tyres.

INTERIOR On board computer with power supply and motherboard under rear seat, single panel carbon-fibre-layered MDF dash with 8-inch touch screen with engine management controls, speedo and rev counter, Windows 7 media centre and wireless internet access, warning lights and LED fuel gauge in ashtray panel, MPi stalks, alloy gearknob incorporating start button, five-speed heater control, custom ICE install with two shallow 10-inch Monacor Neodymium high-power woofers concealed each side of load bay, Monacor High Grade mids each side of rear seat, mids in custom pos under dash, four Dayton Neodymium tweeters on self-developed Plug-N-Play windscreen pillars, Kenwood KAC-1021 and KAC-921 amps mounted in spare wheel well, Raid steering wheel, alloy door furniture, alloy pedal extensions, grey carpets with extensive sound deadening and Cooper mats, Recaro seats on custom frames re-trimmed in tan leather together with rear seat, door cards, dash rails, gear and handbrake gaiters, steering column cowl and speaker enclosures.



Engine starter is located on the gearknob. Trick.

Wi-Fi for Minis!

Silver Bullet arches have been remodelled to suit the profile of 10-inch wheels.



LSP2

LSP3

LSP4

LSP1

LSP4

LSP1

LSP4

LSP1

LSP4

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