

HOW TO

INSTALL A PC IN A CAR

DOES YOUR CAR STILL COST MORE THAN YOUR STEREO? REDRESS THE BALANCE WITH AN IN-CAR COMPUTER

Installing any equipment in a car is not for the faint-hearted – even Michael Knight had to get Devon to do it for him. There's basically two ways of doing it: slinging in your new kit with the wires hanging everywhere; or stripping the interior and routing all the cables properly. Okay, so you can always argue that you're just 'testing it all out' with the former approach, but you'll only achieve anything worthwhile with the latter.

This will involve clearing out as much space as possible in your car and finding all the possible spaces you can hide your kit. However, it's difficult to know where these are. The problem is that Haynes manuals don't always give you the full details on the construction of the car's interior, and often contain comments such as 'remove the back seat' rather than pointing you in the direction of the retaining bolts. But don't worry, just take your time and study how it all clips and bolts together, and if you're still stuck you can always ask someone on www.mp3car.com to give you some pointers.

When you've gutted the prime installation areas, such as the boot, the underneath of the rear seats and behind the dashboard, you'll want to measure up any likely cubbyholes and draw a diagram of them (see wiring diagram). You need to plan how you're going to run wires from all sorts of places, such as the car battery and ignition, to the PC, as well as from the PC to all your output and input devices.

Take the time to think about how you want to interact with your PC – do you want to dock a PDA, MP3 player or phone into the system? If you add these things at the end then you'll end up with a hack job, so plan it all from the start.

POWER PROBLEMS

The one place you can't afford to make a hack job is the power harness. There are a number of different places where you can take energy from your car's power supply for your PC, but there are a few problems that you'll have to deal with. The first and most insipid one is the feedback noise from the alternator. If you've ever installed an aftermarket

Steve's homebrew setup – keeping it simple has given the system a factory-fitted look. He's even using the original stereo unit



stereo into a car then you'll have probably encountered this problem before – it's that evil whining hum that comes through your speakers as you accelerate.

There are two ways to get round this. The first and best option is to find a perfect grounding point, and the only way to be sure about this is to run some thick cable (about 10 AWG) directly from your battery's positive and negative terminals to your PSU. If you can't manage this, though, or can't be bothered, then you need to test your grounding point, maybe the cigarette lighter socket, with a multi-meter. Basically, you need the minimal amount of resistance between your grounding point and the negative terminal of your battery, as a perfect connection means no feedback.

If you can't get a perfect connection then you're in a bit of trouble, though, as you then need to remove the noise on your power lines. The standard method of doing this is to use a suppressor, which is essentially a capacitor that smoothes the noise from your lines, although this won't always do the job. In fact, if you ask for one from a good shop,

the salesperson will usually try to dissuade you. Also, telling them that you're taking the power from the lighter socket may cause them to have a seizure, so just say your car's a rustbucket to make them feel better. Now all you need is something to plug that DC supply into.

GETTING SUPPLIED DC-AC-DC

There are a number of different ways to get ATX power to a PC from your 12V car power supply. You can either take the DC current, use an inverter to transform it into an AC supply, and send the AC power to a standard PSU. Or, alternatively, you can take the power directly from the DC supply, and use a specialised DC-DC PSU to power your ATX board.

The first route is the most obvious, as we're used to powering computers from an AC supply, but there are still a number of complications involved in this process. You need to use an expensive, power-hungry inverter to change the DC current to AC, and this won't make a nice clean sine wave either. Instead, it will pulse square waves to the highest fidelity it can

TIME TO COMPLETION:
TWO WEEKENDS

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

LADDER OF DIFFICULTY

ESCAPE FROM:

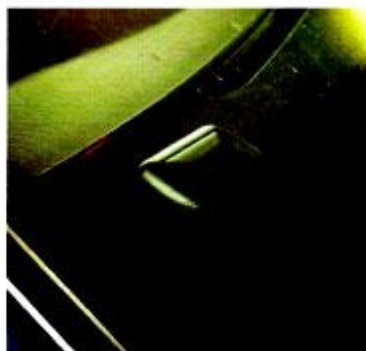
COLDITZ

THE TAXMAN

BROADMOOR

YOUR OTHER HALF

RESPONSIBILITY



Is it a bird, is it a plane or is it a matchbox? No, it's a GPS unit - innocuous, and in plain sight

produce, which is generally not much like a sine wave at all.

You'll also still be faced with the problems naturally inherent in a car power supply, such as unstable voltages, high current and being stuck with a standard car battery. This means the car might not kick out a full 12V (in fact, it's sometimes as little as 6V) when you start it, which is the exact time you'll want your computer to start up. This can stop the whole shebang powering up properly, but you may be able to counteract this by adding a large capacitor or battery in-line to smooth out the supply.

However, this still leaves you with an inherent problem with the car battery. Car batteries are designed to give a large kick to the starter motor until the car starts, and then let the alternator take care of the car's power requirements. They also aren't designed to be fully discharged, so you can kill them if you leave your PC on while the car isn't running. This is a major pain in the butt, and it's not the kind of problem you need if you have to get to work. You can, however, fix this by attaching a 'deep cycle' battery, or a UPS to your car PC's power circuit. Both will remove the problem of low power on startup, and the UPS can also be used to trigger hibernation.

GETTING SUPPLIED DC-DC

But why trigger hibernation when a good purpose-built car PC PSU, such as the £150 OPUS 150W PSU from www.opussolutions.com (see Kitt out your car, p96), can easily set it to suspend to RAM instead? This isn't the only bonus of using a dedicated DC-DC supply either. Since the car is running around 12V DC, and the PC also requires 12V DC, it uses considerably less power than an inverter too. A good PSU should have inputs to take a permanent live signal from the car battery, and respond gracefully to a trigger input from your car's ignition

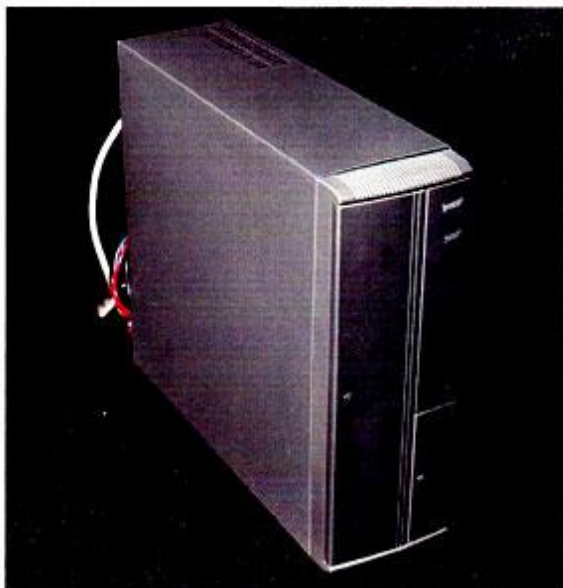
system. This allows it to power up and down with the rest of the vehicle's electronics systems.

Okay, so £150 for a PSU is a lot of cash, but don't forget that a UPS will also set you back £100, and then you have to add on the cost of your PSU too. However, if your in-car PC isn't going to need much power, there are cheaper options, such as the 60W car PSU kit from www.kustompcs.co.uk, which is a powerboard designed with vehicle computers in mind. This can also send a shutdown signal to your box, allowing it to drop into hibernation. On the upside, these take up far less room than the large Opus models, but on the downside they offer an extremely minimal amount of power and don't come in a case either.

WIRING IN AUDIO AND VIDEO

When you've laid out your power cabling, you can then spend some time thinking about hooking up your audio and video connections, although there are a couple of things to bear in mind here. The most important one is to keep your audio, video and power cabling separate from each other. Again this is due to interference, as it's very easy to collect signal noise in a car, so keep a close eye on how you wire and how good your connections are.

However, where you connect your computer's audio line-out is up to you. Steve (see p96) decided to wire the audio through his car's stereo head unit, giving him full control over his audio from a factory-fitted unit, and he didn't have to mess about with his existing audio system either.



This small form factor case holds almost all the kit

Alternatively, though, you could ditch your head unit and use an amp instead. This will improve sound quality and give you some extra space on your dashboard for other in-car computer gadgetry. On the downside, though, this will also mean adding a lot of extra wiring to your system, and giving control over volume to the PC. What's more, amps require a very good battery, not necessarily an over-specified battery, but a new, high-quality model. This is also true of adding extra electronic equipment in general. You want your car and its PC to start first time, every time, so any drives, amps and computers will all bleed power from your starter, as will the video screens.

Mounting those touch-screens is tricky too, and very few people make fully integrated consoles for their vehicles. The simplest way is to use a dashboard or vent mount, making the screen simple to unplug and take with you if you're leaving your car in a dodgy area. However, there are some very innovative mounting methods on www.mp3car.com, with some people even running wires underneath the ceiling upholstery to roof-mounted units. Check out the site, as it's well worth a look for inspiration.

But in the excitement of designing your own KITT, don't forget that you'll want to plug devices into your PC too, so allow space for these and their wiring. You can plug in just about anything, from GPS to GPRS, and iPods to iDucks, and you can even stream Internet radio - the applications are endless. Spoil that car, just don't change the outside; leave that to the Max Power crew.

Josh Blodwell

STEVE GOODMAN'S CAR PC BASIC LAYOUT

