

# Elizabeth Parker: Flexible Working

By **Sam Inglis**

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**Elizabeth Parker is one of Britain's best-known composers of music for television, and is renowned in the business for her ability to complete projects to the tightest of deadlines. Sam Inglis visits her unique personal studio to find out how she does it...**

As the BBC's famous, but increasingly redundant Radiophonic Workshop tottered into the '90s, its employees were perhaps the only composers in the world who still had staff jobs. Though resources had been cut to the bone and morale was low, they could at least count on a regular wage — until the unit was axed altogether in 1996, forcing its staff to compete in the cut-throat world of freelance television music. Among the composers enjoying new-found freedom, but also new-found insecurity, was Elizabeth Parker, a veteran of 18 years at the Workshop during which she scored innumerable BBC series, including the classic *Blake's Seven* and *The Living Planet*. Now working from her own highly individual studio in Long Ditton, in the London suburbs, Elizabeth clearly has no regrets about the change in her circumstances, and a quick glance at her list of credits over the last couple of years shows up major series such as the BBC's *The Human Body*, and a move into film soundtracks with a commission to write new music for a rerelease of *Monty Python And The Holy Grail*. So how does she keep ahead in an increasingly demanding TV production market? The key, it seems, is flexibility.

"Since leaving the BBC I've been able to work for Channel 4, Channel 5, ITV, all the channels, and the one thing I've tried at every point to be is utterly reliable and professional," she explains. "Obviously the music is the only thing that really matters, but people need to know that they can come to you on the Tuesday and have something back for the programme on the Thursday, if for some reason they've forgotten, or they suddenly find they need some music. I don't mind doing that, I quite like the adrenalin rush of having to worry about it, and knowing that they're trusting me to do something nice for their programme. And so that does happen quite often, especially with people I know, who know I can do it. It's amazing how many people forget about music until the very end. They forget about it, and then they only have two and sixpence to pay for it!

"People want the music yesterday, and if you're working on documentaries they want to know that you're going to get it right, and so I go to a briefing, come away, have my ideas and send them to them within three or four days, just so they know what I'm thinking of. Then they can say 'No, that's not what I want,' or 'Yes, it's on the right lines.' I had an example last week: I'm working on a programme for Channel Four about doctors in the Third Reich, and the experiments they did, and I'd had a very quick chat to the director, and I got totally the wrong idea, so I took along a CD on Thursday, and it wasn't right. I could tell as soon as we started to properly talk about it, so I said 'OK, I'll come up with something else.' So I came home, had another idea on Friday, finished it off on Saturday, and he got it on Monday morning. He didn't realise he was going to get a CD then, but he listened to it, rang me up and said 'Brilliant, that's absolutely right.' So now the rest of the project is easy. But it was essential for that to happen, for him to be able to trust me, and know that I was going to get it right.

Otherwise, he was going to start worrying. Now he's totally behind me, and it's going to be a really good programme, but you have to have that kind of response if you want people to trust you.

"To keep going on your own, as a composer of music to picture, is quite hard, because there are so many competing interests. People can download stuff off the Internet if they want, and TV people are just desperate for producers to use library music. I did the music for *The Human Body* two years ago, and I sent in a very late demo VHS. I was hauled in to have a chat, and the producer said that I'd got the job, and that it was really on the strength of the video. And he hauled open two drawers cram-packed with demos, and said 'These are all the people who've written to me wanting to do the music for this series.' I'd just, literally at the last minute, thought 'Oh, I'd better put something in for that.' But there were drawers and drawers of demo tapes — how do you make a mark? I don't know. What I would always say to young composers is if you've got a chance to work with young film directors, that's the way to do it, because those film directors at film school are going to go on and do other things, and hopefully go into television."

## Radio On

Of course, 18 years' experience at the Radiophonic Workshop has been valuable in providing Elizabeth both with the skills to work so fast, and with the contacts necessary to get commissions. The influence of the BBC is also clearly apparent in her own studio, which was originally designed by the Radiophonic Workshop's Peter Howell, and has been extensively developed by another ex-colleague at the BBC, Rupert Brun, who kindly agreed to talk me through some of the technical thinking behind its design.

Elizabeth originally joined the Radiophonic Workshop at the height of its importance: "I did Fine Arts and Music at the University of East Anglia, and at the time they were thinking of running one of the first electro-acoustic music courses in the country at postgraduate level, so they said to me 'Look, we'll fund you, would you like to try it out?' Trygg Tryggvason, who used to work for Decca, was running it along with Tristram Carey [*composer and co-founder of EMS*]. I'm not sure I got on terribly well with Tristram Carey, because we had a big EMS Synthi 100, and he was telling us how to make music, you know 'You put a pin in here, and you put a pin in there, and you get a wave, and then you can alter it,' and I was thinking 'This isn't music! This isn't what I want to do!' I always had this idea that I could make electronic music sound more musical.

"I went to the BBC as a studio manager, because that was the way in to the BBC — it was either that or secretarial, but I got in as a studio manager — and then I got an attachment to the Radiophonic Workshop, because I thought it would be an interesting place to work. Then, all of a sudden, somebody left in the middle of *Blake's Seven*, and I was up for the job. They said 'You haven't done much television, do you think you can take on a major BBC science-fiction series?', and I said 'Yes, of course I can!' That was a baptism of fire! It was a wonderful training ground. I did *Blake's Seven*, and *The*

*Living Planet*, among other things. Amazingly, jobs like that just went to whoever got into the office first in the morning!"

## The Downward Spiral

As studio technology and electronic music-making equipment became more affordable in the '80s and '90s, however, the Radiophonic Workshop began to look like an expensive anachronism. Things might have turned around had fresh blood from the dance scene been drafted in, but staff turnover remained non-existent, and the introduction of the BBC's internal market put such a high cost on the Workshop's services that producers could no longer justify using them. "It cost an awful lot more than someone in their back bedroom," explains Rupert, "because the studios at the BBC were very, very highly specified. They were pin-quiet, they had air-conditioning ducts about two feet square so as to get the low-velocity airflow through, they were fantastic and totally overspecified for the job that was being done. I mean, there was on-site engineering support 12 hours a day, seven days a week, but that sort of thing costs an absolute fortune, and with all the BBC overheads as well, there's no way it could compete with what somebody could do at home in a room like this."

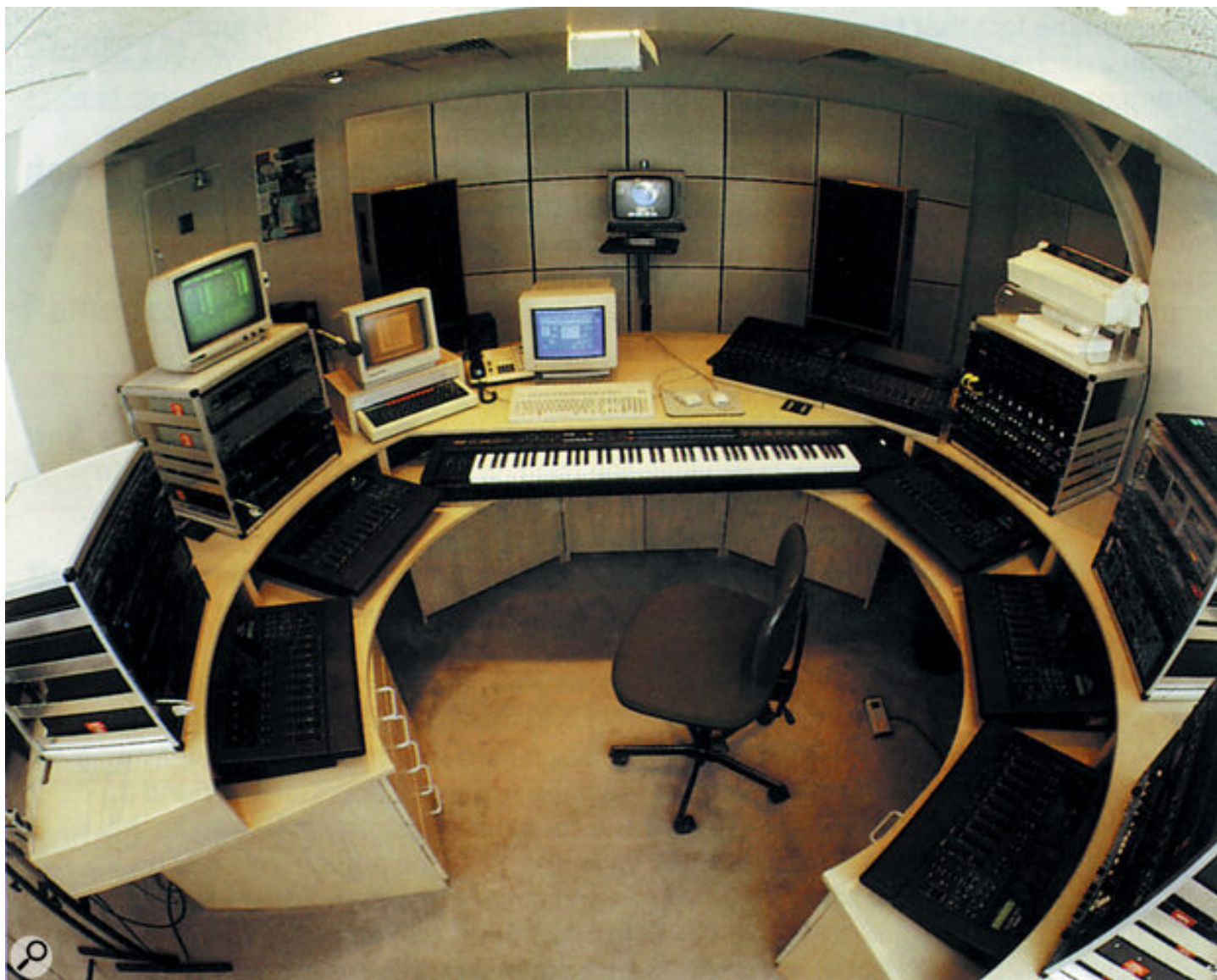
"It was wonderful," says Elizabeth. "If anything went wrong you just picked up the phone and an engineer, or two, came down within a minute. And if you needed something, you just got it. If I wanted a new synthesizer, I'd go to my boss and say 'Hey, this is really great, any chance of getting it?' and it would arrive. In fact, six of them would arrive, one for each studio. But then it got to a phase where no money was spent at all, because there was no money. So by the time the Workshop actually closed we had a lot of very old gear and we were definitely past our sell-by date. And the worst thing was that I was there right until the very end, and it was horrendous, it was horrible. It was just so sad because it had been such a great place. I think people probably thought I'd never manage on my own, because I'd had this instant support, but it's been fantastic, and Rupert's been absolutely fantastic in getting it working. The first year I spent scared out of my wits!"

## Bringing Work Home

When the Workshop closed and Elizabeth decided to set herself up as a freelance composer, she needed her own studio. Since her livelihood would depend on that studio, however, she couldn't afford to wait months for it to be constructed, nor to see it go down for weeks at a time as it was upgraded. In the beginning, therefore, the studio was set up in exactly the same way as Peter Howell's own, since this design had been tried and tested. Since then, it has evolved under Rupert's watchful technical eye into a very personal studio which reflects Elizabeth's own ways of working. "It's nice working with Elizabeth," says Rupert, "because a lot of people, when they talk to you about a studio, they come to you with a shopping list of kit they want, whereas Liz comes to me and says 'I want to be able to do this, how do I do it?' And that's much more satisfying, because I think you cannot build a good studio unless you start from what you want to do, how you want to do it, and how you want to feel about it when you're doing it. Do

you want it to look hi-tech, do you want it to look relaxing, do you like software or do you want knobs? So many people seem to skip that stage and go straight to the shopping list of kit, and then wonder why it doesn't quite gel. If you do start from there, very often the choice of equipment and how to connect it together just falls out of that. And that's one of the reasons I enjoy doing this sort of work, because you're thinking about what you want to be able to do. There's a sort of evolutionary path to where we want to get to that allows her to keep working all the time, because you can't stop for two months whilst everything changes."

## In The Round



The studio furniture as it was originally installed in the BBC's Radiophonic Workshop, with Yamaha DMP7 digital mixers submixing each small group of sound modules.



Elizabeth Parker's studio, showing the horseshoe-shaped desk that was rescued from the BBC Radiophonic Workshop. The thought paid to routing during the construction means that all the wiring is hidden, yet easily accessible if need be.

The most immediately striking feature of the studio is the unique horseshoe-shaped desk, which allows the solitary composer on a wheeled office chair instant access to every piece of equipment. This originally used to be Elizabeth's desk at the Radiophonic Workshop, and was rescued from the skip for the princely sum of one pound when it closed. These desks were introduced in the Workshop's last refit in 1988 — an event which was covered in *SOS* February 1989 — and originally housed seven Yamaha DMP7 digital mixers, five of which served as submixers spaced at equal distances along the surface to minimise cable lengths from the various sound sources. The DMP7s are long gone, but their replacements include a Yamaha O1V which acts as the studio's main mixer, a Promix 01 which serves as a submixer, and a Spirit Folio analogue desk which is part of the studio's interesting MIDI-controlled audio routing system. This uses the guts of an Akai router, modified to work with a Peavey PC1600 MIDI controller rather than the original Akai control surface. There's also a completely separate routing system for timecode, which was built from scratch by Rupert.



Some of the studio's vital specially built components. The buttons on the Peavey PC1600 are used to control the routing system for record/replay devices, while the black box behind it is Rupert Brun's timecode router. The monitors were also custom-built.

These routing systems typify the distinctive BBC approach to studio engineering held by both Rupert Brun and Peter Howell: rather than make do with commercial equipment that doesn't quite meet a studio's needs, they choose to build their own, or butcher other systems, as Rupert explains: "The best thing in the world is if you can go down to the shops and buy, for a sensible price, exactly what you want. But if you can't, you say 'OK, can we find the bits to make it?' I'm very proud of the fact that we've now got a studio where there's no plugging necessary to operate it and there's no cables kicking around. There is a jackfield, and Liz does use it occasionally, but it's primarily there as an engineering tool.

"The Akai routers were fantastic value for money, really good, but the hardware controller they sold to go with them was user-antagonistic in the extreme, absolutely dreadful to use. So we realised that although they had a special hardware controller with a great big four-pin XLR cable between it and the routers, it was actually talking MIDI protocol — at a different voltage level, but it was actually MIDI. And Peter Howell realised that you could use the buttons on the Peavey MIDI controller to control the router. In a way it's a bit of a waste, in that it's also got all these MIDI faders that we just don't use. But it means that Liz never has to plug anything.

"The audio devices — all the samplers, synthesizers and so on — all go straight into the Yamaha mixers, but the router does the record/replay devices. Whilst you can build a studio so that each sampler, sequencer and synth comes up on one channel and leave it there, with record devices, sometimes you want them to record the output of the studio, and sometimes you want to copy from one to another, so that's the area of a studio that you're constantly having to replug normally, and so that's the bit that's on the routing matrix. Every record/replay device is on the router along with the Spirit Folio, which acts as a copy mixer, so that you can adjust level and EQ on the way whilst making a copy if you want. For example, if you need to make a copy of something and adjust the level of it, you can do that through this separate subsystem while still carrying on composing on your main mixing desks and your audio equipment. All the record/replay goes via the router, and the monitoring of course,

because that's the other area you constantly want to change — you sometimes want to listen to the output of your studio and sometimes to the output of the DAT machine or CD-R, or whatever — so the record/replay and the monitoring goes via the router, and everything else is pretty much hard-wired."



The Spirit Folio mixing desk is used for making level and EQ adjustments when copying from one record/replay device to another, or when sampling.

There can't be a composer or an engineer working with sound for picture who hasn't had reason to curse timecode and the attendant problems it can bring. Rupert's home-made timecode router is designed to eliminate the most common of these, as he explains: "Once you get a lot of timecode kit, a lot of people struggle with how to handle it all. You can't just connect all the inputs to all the outputs, because everything gets loaded down and two things try talking at once, so you actually need a timecode routing system which will allow you to say 'This is the master, and I want to send it here, here and here.' It's kept completely separate from the audio routing system, for two reasons. One is so that you get a different control surface, which is a tactile thing — you know whether you're doing audio or timecode, and keep the control surfaces separate. And the other is the sound engineering reason that timecode has a horrible habit of breaking through if it can, so keeping it in a completely separate system solves that problem. You can buy timecode routing systems, but they're generally dubbing-theatre sized, they're very big and very expensive. What was needed here was small and simple, and I couldn't find a commercially available router that was suitable. It's very simple, it's just a selection of cross points and a square matrix of push buttons. You've got 'from' and 'to', and if you want to go from the Mac to the ADAT you push the button that says 'From the Mac to the ADAT' and time goes from the Mac to the ADAT."



## Power Up

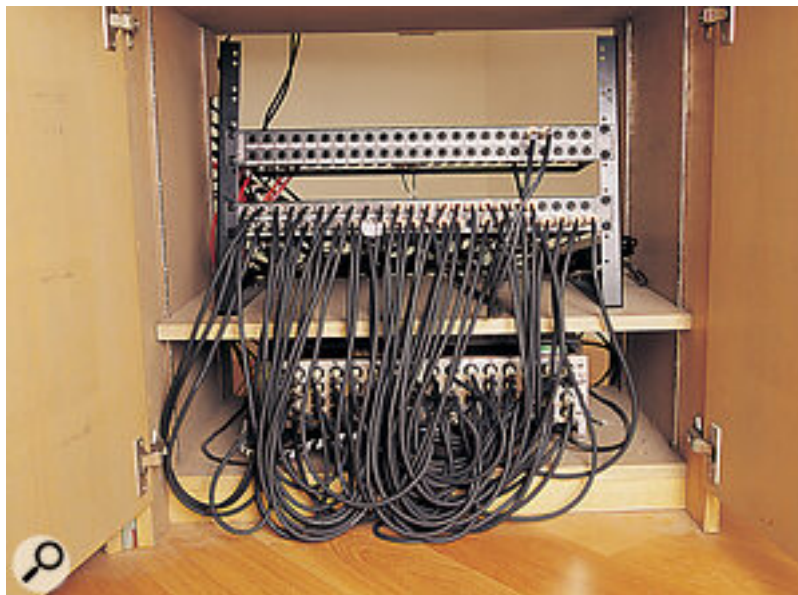
The most recent major upgrade has seen the studio's ageing Apple Power Mac 7600 replaced with a spanking new dual-processor G4, with a simultaneous move from Opcode's apparently defunct *Studio Vision* sequencer to MOTU's *Digital Performer*. Elizabeth has nothing but praise for the latter, and their UK distributor Musictrack: "We waited around with *Studio Vision* for so long, wondering what was going to happen to it, and hoping and hoping and hoping. I was desperate, because I didn't think there was any alternative but for me to go over to *Logic*, and I really didn't want to do that. Twice I'd been through it, and it just didn't work for me, it didn't click at all. And then, when Peter Howell said 'Allow yourself three months to learn it,' I was thinking 'I'll have to use *Studio Vision* for my actual work, and spend my evenings learning *Logic*!' Whereas with *Digital Performer*, we got it in on Tuesday and I actually got a commission while it was being installed. So I started work on Wednesday, and on Monday the music was dubbed.



The main rack of sound sources includes (from top) MOTU MIDI Timepiece AV synchroniser and MIDI interface, Emu Proteus 2 and 3 modules, two Roland S760 samplers, and a recently added Emu XL1 sound module.

"Robert [*Elizabeth's husband and manager*] said 'We've got to get a new computer, because that one's going to go down, and then you're going to be sunk.' So we did this enforced changeover, and I think we probably did it in the nick of time, because with *Studio Vision* and the 7600, given that I'm working so much at the last minute, I would have been putting myself in a high-risk situation if I'd had it go down and had someone

say 'Sorry, we only do G4s now.' What I was worried about with *Studio Vision* was that I knew that I did things in a completely eccentric way, and I thought that I'd never be able to manage to do the same with *Digital Performer*, but I'm already finding that I have my own ways of doing it. I've never gone to bed reading manuals before!"



The studio's patchbay and the Akai router are usually kept out of sight, since they don't need to be touched except when installing new equipment.

The new G4 is used for MIDI sequencing and for recording any audio that goes into Elizabeth's soundtracks, and there are plans afoot to digitise videos and work with picture inside *Digital Performer*. At present, although the video appears in a window on the Mac's impressive Apple Cinema Display, this is effectively serving only as a television monitor for replay from the VHS machine, which serves as timecode master: "All we do at the moment is run the picture on the screen at the moment through Adobe capturing, but I haven't actually learnt how to sync it all up, because I just haven't had time. Also I've got to sort out the problem that if I have eight programmes on the go, that takes a heck of a lot of hard disk space if I put each programme in, so I've got to work out a way of storing them all.

"I know that I've got a sync track, so I take the timecode readings, and I have a sort of cues list. And that's another thing about *Digital Performer* which is brilliant — their marker system is lovely, very comprehensive. So I have all my cues listed and I'll write the music to that. If I've got a VHS striped with timecode I'll use that to run the sequence when I'm laying down the mix, but when I'm just working, often I'm going back over a piece time and time again, and I've got really quick at putting it in manually — I can get it virtually frame-accurate just playing the VHS and starting by hand."

## From Palette To Performer

With her background in electronic music and sound design, it's no surprise that Elizabeth Parker tends to work directly in the arrange page of her sequencer, rather than writing out a complete score on paper or in the score editor: "I was taught to compose in the conventional way, and I did orchestration and everything like that, it's just that I haven't used it really. Sometimes I'll start by sketching out a theme on paper,

but if it's more sound design, or if it's more amorphous, I'll go straight into the sequencer, get a palette of sounds and start to use those. It's half and half, really. You work out what is going to be wanted and then you build it up from there. I've just done a *Wildlife On One* feature about the praying mantis, which is all music, but music sound design. The idea is to link it with Bruce Lee, so there's a Chinese feel, and lots of very sharp 'fteeooooow' sounds — I used the Emu XL1, because it's got some really funky dance sounds, and also some really neat sounds that go across the keyboard where you can add and subtract extra drums from your rhythm track. Whereas I'm doing another natural history programme about sharks, and the Roland XV5080's got some wonderful sweeping sounds, and those were the basis of that.

"Quite often I'll get a soloist in for a part, and I record them in here. In fact I had a girl sitting here the other day for *Meet The Ancestors*, which is a series about digging up old bones. She was sitting here with her crumhorns and her special pipes and things and she sat here, and I just plugged a mic into the desk and we recorded it and it was fine. It's actually not a bad acoustic, and it was really easy. If I'm using a soloist, usually I'll record them first, and then write the music around them.

"It depends what the project needs, but probably, if people wanted a great big orchestral score they wouldn't come to me, unless it was someone I'd always worked for. And with the sort of prices you get for writing music these days, I cannot afford a studio. And that's sad. If I have the money, I have gone into Essential Music in the centre of town and they will do it, and I'm thinking of using BBC studios again, because I think that they are very competitively priced now! I'll go back to trying to use them, because they've got fantastic gear in them."

An ex-BBC composer hiring the BBC's own studios herself, to work on the music for the BBC's own television programmes — that's the kind of flexible working and flexible thinking on which success in the world of TV music now depends. Elizabeth Parker has that sort of thinking in spades, but even when meeting the most ridiculous demands and deadlines, she's completely inflexible in one sense: the music that leaves her studio is never allowed to fall below the highest standards...

For more information, visit Elizabeth's web site at [www.elizabeth-parker.co.uk](http://www.elizabeth-parker.co.uk)

## Reinventing The Grail

"I've just finished doing some music for the re-release of *Monty Python And The Holy Grail*," says Elizabeth. "It's a lot of background music, incidental stuff. We tried rewriting all the music — Terry Jones wasn't very happy with the original music, because a lot of it was just De Wolfe library music. But it's become such an integral part of the film that I almost talked myself out of a job, because I said 'You can't change that, everybody knows it!' It's a very interesting case in point, because they'd used library music that was really not written with the film in mind at all, and it works brilliantly — quite often because it's a complete contrast to what you might expect. They did have a sort of cod-medieval score written before, but Terry found that it wasn't

quite what he was looking for, so they used a lot of library music. And he'd thought that it would be nice to have a new score, but ultimately even though what I did was very close, it just wasn't the same, and there's something about the original music. So what I've done is given him some new music for places that didn't have music before, which he wanted to improve the dramatic impact."

## The Universe Of Masters

Until recently, there was only one medium TV composers ever had to use to deliver their finished masters: timecoded DAT. As the broadcasting industry switches over to both real-time digital editing and surround sound, however, Elizabeth Parker is finding that this is another area where flexibility is essential: "I'm finding that producers want music on CD almost all the time now. What I do is I actually master from the Mac onto DAT, and then Rupert's set it up so I can just go straight onto CD here, so I've got my library of all my stuff on DAT, but because everyone's editing on Avids now, they just put the CDs straight into the Avid. I have to ask now 'Do you want it on timecoded DAT, or do you want it on CD?' With timecoded DAT they know they can just put it straight into the programme, but CD is often useful if you're doing music before any video has been cut properly, because you give them a whole load of stuff, and they can just put it in and lay it where they want, which is quite nice and quite creative for them. And it usually means they end up using more music! With other programmes I would end up doing a master DAT, laying the pieces of music onto the DAT with timecode behind them.

"Timecode is still necessary for your 5.1 mixes, too. Andre Jacquemin, who does the Monty Python stuff, rang me up and said 'We're going to be mixing in 5.1, so can you mix it onto separate tracks?' Then I rang Rupert, and said 'Do you think we ought to invest in a Dolby system?' and basically Rupert said 'Well, no, because that's the final mastering stage, and you wouldn't want to do that in your studio.' What I have to do is put everything on separate tracks so it can go into the final mix and they can put things where they want. You're separating the bass, the rhythm, the strings, and the effects, so that you have complete control at the very end of the mix when the narration and all the foley stuff are added — instead of having to pull the whole of the track down when the narration comes in, you can just pull down the stuff that conflicts with it. And with the praying mantis programme I'm doing for *Wildlife On One*, we're doing the same thing, we're splitting off the tracks so that that can have a really special mix. These days they're taking that much care with TV soundtracks, certainly on some natural history programmes."

There is no universally accepted standard for 5.1 masters. Elizabeth makes hers on timecoded ADAT, but often finds herself needing to bring the ADAT machine itself into post-production studios that are only equipped with Pro Tools or Tascam multitracks. "Say I've got 30 tracks," explains Elizabeth, "I divide them into how they're going to go onto the ADAT, so I'll have all the strings maybe going onto ADAT tracks one and two, percussion onto three, rhythm onto four and five, and so on, and then I'll offload them

onto ADAT at the level that they were in the stereo mix. So basically, when it gets mixed down they won't have to do a lot of internal mixing — all the tracks will be at the right level, it's just they can get rid of the rhythm or whatever if they want to."

## Favourite Gear

- Emu Proteus 2 and Proteus 3 sound modules.

Elizabeth: "You see them almost everywhere. I think they're about 10 years old now, but they're jolly good basic bits of kit."

- Emu XL1 Xtreme Lead sound module.
- Roland S760 sampler (x2).

Elizabeth: "I do masses of sampling, and I can work them backwards. They've got all the expandability, so they've both got mice on them, and they've got the extra memory. I don't have a dedicated drum machine, I tend to use either sampled kits or put my own together as a patch."

- Roland XV5080 sound module.

Elizabeth: "I think this is my first experience of a JV-series module, and the range of sounds is fantastic. It took me a while to get my head round, though. I couldn't work out how you could change the patches — you have to do it in the Part menu rather than the Patch menu! It's actually quite confusing, and the manual isn't terribly good. I've got the extra sample memory in, and I'm going to connect my old magneto-optical drive so that I can load samples into it. I've got 240 magneto-optical discs, and I just felt that I needed to get onto Zips, because I felt that the new samplers would probably be using Zips rather than MOs, and I didn't want to get left out on a limb. I load them onto the MO and then save them on Zip, so I'm building up everything as a library on Zip."

- VHS video recorders (x2).

Elizabeth: "It means I can make copies very quickly, and at the moment I have a TV on top so that I can play VHSs very easily. I only ever record on the top one; the left-hand track of the VHS will carry the dialogue, and the right-hand has timecode, so it will run the sequencer."

- TC Electronic M2000 multi-effects.

Elizabeth: "This transformed my mixes when I first got it, it's brilliant. It's not just reverb, I don't know what it does to the sound, but it does something nice!

- Denon cassette recorder.

Elizabeth: "I still have to send things on cassette sometimes, and it's very cheap, it's only 50p a cassette — just for demos."

- Spirit Folio mixer for record/replay devices.

Rupert: "There are a number of reasons why we use this little Spirit Folio, one of which is price, but the other is that the EQ on it is absolutely lovely, an absolutely beautiful-sounding EQ. You could spend an awful lot more money and not get EQ that's as sweet as that, it's gorgeous."

Elizabeth: "It's incredibly useful. If I've got a sample on DAT, and I'm not terribly happy with the sound, or I just want to make it more topky or whatever, it's really easy, I don't have to go through the main desk or anything."

- Yamaha Promix 01 and O1V digital mixers.

Elizabeth: "Originally the studio just had the Promix 01, and we've just added the O1V because we wanted more inputs, because the 5080's on the O1V, and also because I was worried that the Promix might start to go down at some point, in which case we'll just get another O1V. All the inputs from the synthesizers come into the 01. The O1V is the absolute master. The 01 comes up on this fader, so you've got all the benefits of the nice effects and so on that the O1V has."

Rupert: "We take the S/PDIF out of the 01 into the digital in on the O1V. You have to do a bit of flipping around to get the input to come up on a fader rather than straight into the master."

- Custom-built nearfield monitors (see Monitoring box).

## Earthing Secrets



Rupert Brun, a former colleague at the BBC, assisted Elizabeth in developing the technical side of the studio.

One of the key factors in studio design, according to Rupert Brun, is ensuring that mains wiring is properly earthed, since this affects not only the safety of the studio but its sound: "A lot of this equipment has unbalanced inputs and outputs, and with long cable lengths, hum could potentially be a problem. The important thing is to sort out the mains earthing so as to make sure you get a very low earth-loop impedance, which is the impedance from substation to your socket and back again. The IEE Wiring Regulations standard for domestic wiring on a 32 Amp ring main with a 32 Amp fuse is  $1.09\Omega$ , which is designed to be low enough that that under a fault condition of the most dangerous type, where the live wire becomes connected to the exposed metal case of a piece of equipment, the fuse will blow in less than 0.4 seconds.

For a recording studio, though, to avoid hum, taxi pickup, buzzes, splats and clicks, you've got to really get the earth-loop impedance down below about  $0.5\Omega$  — in Liz Parker's studio we achieved a figure of under  $0.4\Omega$ . And to achieve that, it's no good just using standard mains cable, because that's designed to have a low impedance at 50Hz, and won't have a low impedance at the higher frequencies generated by modern digital audio equipment and computers, up around 10kHz and beyond, so you have to have very specially selected cable, configured as a star arrangement so as to avoid earth loops. If you do that, you're nine-tenths of the way to getting a very clean output.

"The important thing is to get as many strands as possible. You need a large cross-sectional area to get the earth-loop impedance down at 50Hz that's needed for safety, but in order to get low impedance at the higher audio frequencies, and the sort of frequencies of hash that digital equipment can put out, you need many hundreds of strands, because the higher frequencies travel more along the surface of the strand than inside the thickness of the copper. The more strands you have, the more surface area you have, and the more you can soak away high-frequency sounds. The exact specification of the cable you need will depend upon the details of each specific installation, such as the precise over-current characteristics of the protection device you're using, whether it's a fuse or miniature circuit breaker, so you can't just recommend one type of cable for all studios. In fact, this is one area of studio design which is best left to a qualified engineer, especially as the correct earth loop impedance is vital for safety and can only be measured using specialist (and very expensive) test equipment!

"The other thing we've done in Liz's studio is to put the computer on an uninterruptible power supply, not only for the obvious protection that gives the computer from fluctuations in the mains, but because it will also isolate the rest of your earthing distribution from the hash which the computer can put out back down its mains lead."

## Monitoring

Elizabeth: "The monitors were designed by an ex-colleague at the BBC called Jason Vincent-Newson, and they are fab. He lent them to me while I was still at the Radiophonic Workshop, and I just said 'I can't give them back!' Originally I had Rogers LS5/8s, which have an enormous hump in the middle, so everything sounded really odd, and you'd do a piece of music, and you'd hear it go out, and think 'Oh my God, I didn't mix it like that!' It was because the speakers had actually given me the wrong information, whereas when I hear something on these speakers I can put it through the TV monitor and it'll still work. They're lovely. It's an accurate sound, and when you know it's going to go into a big studio or whatever, you need to know that the actual basic mix, no matter what they put it on to, is actually there."

Rupert: "They have an incredible bass extension for such a small cabinet. It's easy to make small speakers that deliver a lot of bass, but to get that extension..."

"There's a second TV which is only used to display the information from the Roland samplers, which means that there's a speaker in there which isn't doing anything, so that's hooked up to the monitoring router, to check how the mix will sound on a small TV."