



From *Vworp Vworp!* Magazine, Issue Six, 2023

Where does a time machine go?” Brian Hodgson asked himself. “Does it shoot up in the air? Does it go...

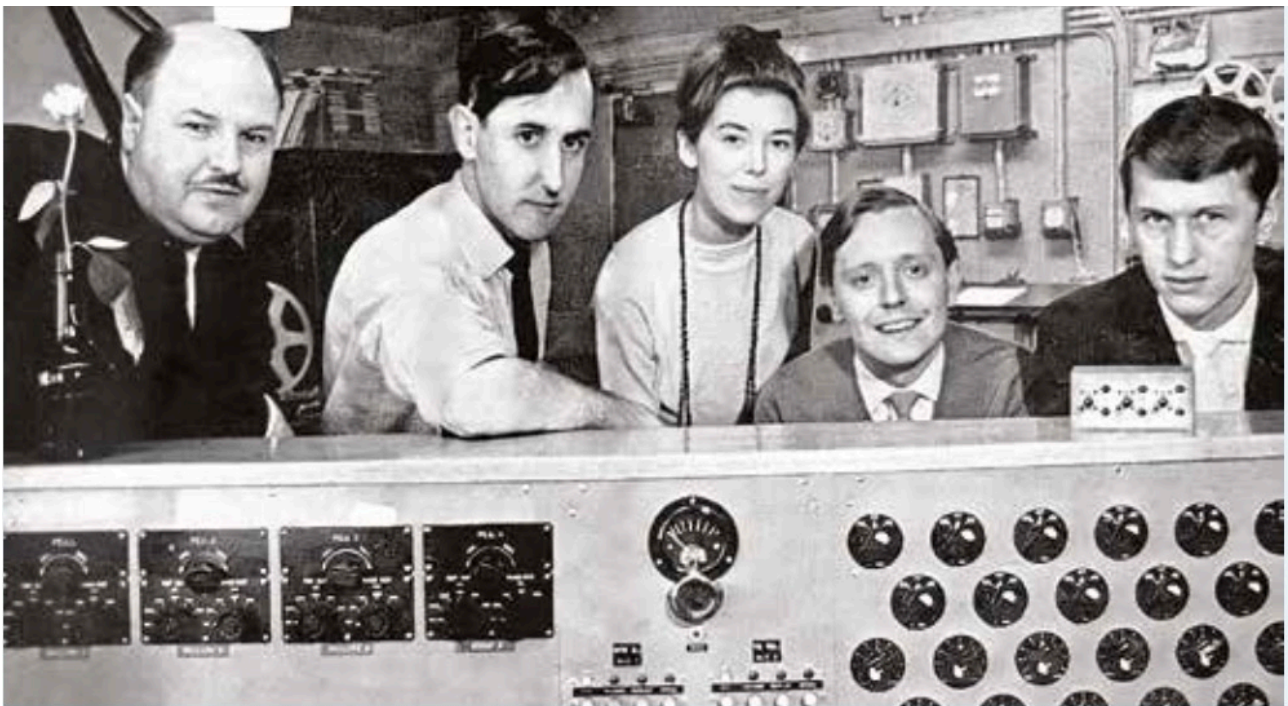
The end result for that very first episode of *Doctor Who* in 1963 - the quintessential wheezing, groaning sound of a dematerialising TARDIS - is still in use 60 years later.

Hodgson was one of the original sound designers at the legendary BBC Radiophonic Workshop, which had been blazing a trail in its field since 1958 (see the biographical interview with Hodgson on previous pages). The Workshop played a pivotal role in shaping *Doctor Who* since the show’s inception, contributing to everything from its edgy soundscapes to the iconic theme tune. With tape as their only recording medium, the team painstakingly created cutting-edge electronic effects and music from bizarre in-house samples and a small arsenal of secondhand, repurposed analogue devices, well before the common use of synthesisers.

“We were doing it the hard way. It was inspiration, luck, happy accidents,” says Hodgson. “The Radiophonic Workshop was unique. There was no other place in the UK that was doing it. Some of the universities had electronic music studios in their music courses, but

there was nothing making sound and music like that for television programmes or radio.”

Hodgson, who became the Workshop’s studio manager, was aided by Dick Mills. Mills became an integral part of the Workshop’s creative team, though was initially sent over as a recording engineer “to plug up any circuits, sharpen the chinagraph pencils and lift up heavy things like razor blades,” as Mills puts it. He assisted Delia Derbyshire in the creation of the *Doctor Who* theme, and has the distinction of the most credits in the history of the show due to his involvement in its sound for the entirety of the classic series. He and Hodgson became longtime collaborators, “joined at the hip as far as *Doctor Who* was concerned.”



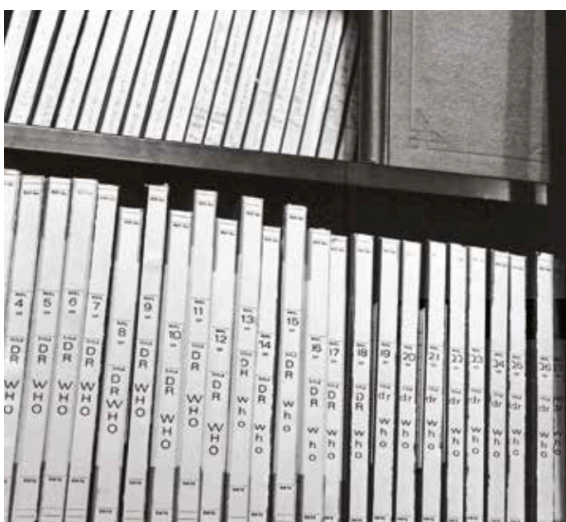
Sound wizards Desmond Briscoe, Dick Mills, Delia Derbyshire, Keith Salmon and Brian Hodgson in Room 12 of the Radiophonic Workshop at the BBC's Maida Vale studios in London (1965).

Hodgson and Mills were called in to meet with *Doctor Who* producer Verity Lambert before production of the show began. “It’s obvious that she was pleased to have got our custom, because that was a big reassurance,” Mills says. “Before any script was written she knew she was going to have out-of-this-world needs, out-of-this-world sound and atmospheres, so she got those.”

Famously, it was the strings of a gutted piano that provided the basis for the TARDIS dematerialisation. Though the exact origins of the piano in question are a mystery- Hodgson recalls it as a ten-shilling purchase from a Sunday school, and Mills as an old piano destined for the landfill from the lobby of a tennis club - once the stringed frame was muscled out, it became a useful addition to the workshop's toolkit. "You could use it like a harp, or throw things at it, or twang the strings," Mills says.

Both gents agree that Hodgson's mother's front door key trailed up and down the strings created the distinctive TARDIS effect. Hodgson had initially discovered this technique while working on an episode of the BBC anthology series *Suspense* called *The Survivors* (transmitted 15 July 1963) which took place on a stranded ship. They made "loads of echoes. It really sounded as though you were in the hold of a ship," says Hodgson.

For his effects in imagined , Hodgson technology based on different principles to our own and then tried to make all the sounds based on that". Ultimately the phrase 'the rending of time and space' is where Brian took his inspiration for the TARDIS takeoff.



After the string effects were committed to tape, "we sped them up and slowed them down to get different pitches. Remember, there were no synthesisers, no computers, nothing. You create a sound and then you put on a tape echo, and so it goes BANG... bang... bang... bang... and disappears. If you reverse that, it starts to come towards you. We'd put the feedback

on, then we'd turn the sound round... and then put the feedback on again. So we ended up with a sound approaching and a sound going away. On the video there were strange cloudy things wafting around, I just kept adding feedback until it became a sort of ethereal wind. That was the planet Skaro's atmosphere. I used that everywhere."

In *Doctor Who*'s early days, the Radiophonic Workshop had the extra challenge of being a pre-production department. The incidental music, background atmosphere and sound effects were all pressed onto vinyl records to be played live during the filming of a scene. During filming, "if anything went wrong, you couldn't fix it, you had to go back to the beginning again. There were no drop-in and drop-out recordings or multi-tracks," says Mills. "It was a live recording which was then broadcast at a later date!"

Working from only a script and the input of the directors and producers, the Radiophonic Workshop's effects often did double-duty as a mask for the sounds of the physical production.

"In the early days, a sliding door was a sheet of hardboard being slid by six burly guys out of camera range," says Mills. "You wouldn't want to broadcast the sound that that actually makes," so it was disguised with sound effects.

By the late 1960s, video machines allowed them to move into the realm of post-production. "We joined the modern age, where we were actually given a recording of the edited episode," giving them a clear idea of exactly what was required for any particular scene. "It's much better that way, there's no wasted effort, but you have to work a lot harder for a shorter period of time."

Over time, the staple sounds of the TARDIS only really changed "if it looked different on the screen. We wanted to reinforce to the fans who knew everything about what each rivet hole really did," Mills says. "I would try to keep a remnant, and it may only be a remnant, of the original sound, so it's still the TARDIS even if you scrape the paint away. And it depends how much time you've got. If it's a brand new bit of equipment within the TARDIS then you can do what you have to," a combination of "expediency" and "sheer mad invention".

Though he would later return, Brian Hodgson left the workshop to establish his own studio in 1972. Mills took over his position as studio manager and would be in charge of the "special sounds" for *Doctor Who* until it was cancelled in 1988. The Radiophonic Workshop was officially dissolved in 1998.



In the interim, Mark Ayres, who'd composed incidental music for *Doctor Who* during the Seventh Doctor's run, rescued a treasure trove of old Radiophonic Workshop tape spools slated for disposal at the BBC. "They were all going to be thrown out in the skip in the road at one time," Mills says. "Mark Ayres heard of it and he got in touch with us... I spent many months with Mark compiling this and they were taken to a BBC library warehouse."

By the time *Doctor Who* was revived in 2005, taste, technology and business practices had changed significantly. Paul Jefferies was the last BBC in house sound designer for *Doctor Who* when he was brought on board in 2004.

Jefferies had grown up watching Jon Pertwee and Tom Baker on Saturdays. "People say they used to hide behind the settee, but I think that's rubbish because you can't get behind the settee! ... It was the sound that really did it, that really scared you. It wasn't the pictures - the pictures but the sound got under your skin. You were more likely to put your hands over your ears than over your eyes, I think."

Before production began on the show's revival, Jefferies wasn't given much of a brief on the sound design from producers Russell T Davies and Phil Collinson. "I'd seen some documentaries about the Radiophonic Workshop, which had included Brian [Hodgson], so I knew that the TARDIS materialising and dematerialising was done on a piano which they had in the workshop," says Jefferies. "I dismantled our piano at home and started experimenting with that before the show really started shooting... but I couldn't really reproduce anything he'd done."

When filming finally got underway, Jefferies asked the producers whether they wanted him to attempt to recreate the TARDIS sounds. "They said, oh no, no, it's got to be exactly as it was. I did use some of the sound recordings that I'd made, but that was sort of lopped off. You couldn't tinker with something like that."

Mark Ayres presented Jefferies with CDs of the archival sound from the classic series. Though for effects like the TARDIS and Daleks



Jefferies sourced material directly from the old samples, often he was just trying to get the flavour.

“The real crucial thing with sound design is making sure the sound is believable, and matches the pictures. Whatever preconceived notions you might have beforehand, you’ve just got to look at the pictures and see what that brings to the fore.

Paul Jefferies, photographed in his cutting room in 2013. He was *Doctor Who*'s sound effects editor and sound designer from 2005 to 2013.

“When we first saw the pictures of the TARDIS, we thought, this is so unlike anything that had been before. Not only was the design very different but the way it was shot was very different. Before, it had been more a television studio-type setup with multi-cameras. The kind of lighting you have for that tends to be bright and blasted,” he says. “But when we saw the TARDIS that Russell had come up with, it was like a cave, like a cathedral, and there were dark places. And because it was being lit for a single camera, it was very mysterious. We automatically started thinking of big, echoing sounds. It was an organic TARDIS, it wasn't regular surfaces. The TARDIS has a character, and it's alive, and we had to include that into the sound effects we were making for it.”

For the TARDIS's ambient interior background hum, Jefferies utilised a sample from Brian Hodgson's original dematerialisation “growl” as I called it- or ‘Vworp’ as you call it,” Jefferies said. “Slowing it down, several octaves down the keyboard... I made the background out of that. It would change all the time. I could play three or four different notes right down in the bass to get this breathing sound... You could record different versions of it in sympathy with what was going on in the action.”

Though the TARDIS interior was very different in the revival, it still had inadvertent ties with Hodgson's original maritime effects. "The TARDIS became more creaky, sounds like from the hull of a ship," Jefferies says. "The levers that they crank up and down, some of them came from old submarines or changing points of railways."



There were many alterations made to the sounds of the TARDIS. Rather than reuse the classic electronic warble of the TARDIS doors, Paul decided that the sound should reflect the battered exterior of the old girl. He recorded the creak of his glass-paned downstairs toilet door at home to get the feel "of an old, decrepit door where the putty's gone around the glass."

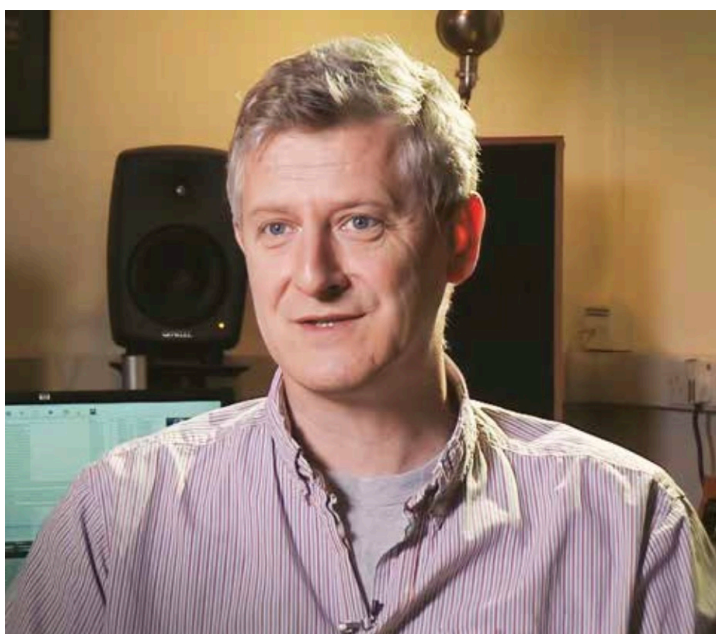
The dark, cathedralesque interior of the TARDIS when *Doctor Who* returned in 2005.

But in many cases, they just couldn't beat the old classics. "There's something about them, isn't there?" Jefferies said. "You can't put your finger on where the sound has come from, so that's what makes it so durable I think." The original dematerialisation "is the crucial sound, really... It starts off with a bass drum, and then a big gap. We edited it, cut the bass drum off, moved it up. I put another bass drum beneath it to add extra weight to it, a few little tricks like that. It's a mono sound from the 1960s, on tape, so you're trying to make it a bit more 5.1 with some stereo element to it, what we call 'sweeteners' — we were sweetening it up a bit."

From the Ninth Doctor onwards, the "dematerialising/materialising sound would be heard inside the TARDIS as well as outside. It was a matter of synchronising this growl to go with the column going up and down in the middle of the console... which was a big challenge because with the continuity it would jump up and down all the time. It was a lot of work for each scene to look like it was actually synchronised."

Freelancer Harry Barnes took over from Jefferies after Matt Smith's Doctor regenerated, and was sound designer up through Jodie Whittaker's regeneration in *The Power of the Doctor*.

"I have to give [Paul Jefferies] credit, he kicked it off," Barnes says. "He laid the foundations for what I would say would be a hybrid of the original sound effects and his own interpretation, which I then took on board and added my layers to."



Jefferies' successor, Harry Barnes, being interviewed for *Doctor Who Extra* in 2014. His final episode was *The Power of the Doctor* in 2022.

Much like Mark Ayres had done with Jefferies, Barnes had a couple of days sitting with his predecessor. Jefferies talked Barnes through the sound design of the show, including the "legacy" sounds from the classic series, even handing over the CDs of sound clips that Ayres had presented him with.

"I was much more cinematic," Barnes says. "I wanted it big and beefy, so that's what I did. I started to layer my own stuff on. But, especially when you're talking about the TARDIS, very little has changed... There are elements that weren't in the original, but actual takeoff and landing, that's how they were in the original series.

"I love the legacy sound effects. They're of a different era and you don't hear anything like that any more... The Dalek guns, for example, elements of that are still from the original. They're

sacrosanct; you're not allowed to change those. You've got to have that original 'jiiiiiiing!', when it all goes skeletal, but for a modern audience it's too weak." He and Jefferies both fortified that effect. "You still have the original sound, but you have something modern, so modern audiences just won't go, 'What is that?!'"

But it's important to find the balance. "There have been little embellishments that Paul started and I added to, but... you have to respect the past, otherwise the fans will go mad," Jefferies says. "The thing is, it's OK for the people who love *Doctor Who*, but if you want new kids coming into it, they've got different standards from the kids of the 90s even."

"Every time there's a new Doctor, there's a new TARDIS. With Peter Capaldi I added a few changes but I did keep some back from Matt Smith. And when we went to Jodie [Whittaker], it changed massively, I changed the whole lot, apart from materialisation/dematerialisation, the classic stuff. All the backgrounds changed, all the atmospheres changed, all the mechanics of the TARDIS changed. It was very steampunky... and the atmospheres were much more organic."

For example, in the Flux series "the TARDIS was going through a load of different things. I was allowed to deviate." Barnes found software that allowed him to use his own voice to alter the original effects, and also integrated whale cries and other creature vocalisations into the sounds of the TARDIS.

"Paul said to me when he passed it over that the TARDIS will react to what's happening," Barnes says. "Then I'd build up a bank as I was working on the series, like 'TARDIS sad', 'TARDIS happy', 'TARDIS angry'. And that was all new, really, I created a lot of that... but you'd always have that core sound that I'd inherited."

As he settled into the post, Barnes started throwing in aural Easter eggs during the Capaldi era, such as the classic door-opening sound. "I used that a few times when it wasn't the right place and it wasn't the right TARDIS, just to put it in and play around... I didn't do it very often, but once I got more comfortable with the genre and not upsetting people, you could put little things in there and people got pleasure from it."

Later, Barnes had the honor of recreating the soundscape of Hartnell's TARDIS in the Twelfth Doctor Christmas special *Twice Upon a Time*. He leaned heavily into the Radiophonic Workshop samples, such as "the original door-opening 'bing', and the observation screen. The way the TARDIS reacted then, which was very much synthesiser-y, quite old fashioned, I liked that."

Despite the changes over the decades, another constant has remained for Doctor Who sound designers: the gruelling schedule.

During Brian Hodgson's tenure, they "often got the edited episode on a Friday to be completed, music and sound, for a dub on Monday afternoon, often four days if we were lucky. It was always a rush," he says. "However, the shows after the revival of the series were much more complex and production values had gone up in standard. Also the equipment was much more complex."

With only two weeks to work on any given episode, both Jefferies and Barnes appreciated the show as a challenge like no other.

Working on Doctor Who was "just about the best really," Jefferies says. "You can be doing Victorian England with Charles Dickens or Elizabethan England with William Shakespeare, or in the future, or on another planet. I did Upstairs Downstairs... but I got so bored so quickly because it's just the same, episode after episode. With Doctor Who, it's always different. It used to scare the living daylights out of us because you'd go to a spotting session" - a preview of the video and its audio cues - "and you'd come out exhausted from what you'd seen; 'How am I going to do that?!'"

After swapping stories with Jefferies at the 2013 Doctor Who at the Proms, Hodgson says "they had the resources we could only have dreamed of, and thought nothing of combining 20 or more different ingredients to make a single sound."

From that encounter, Jefferies said there was "mutual admiration, I think. [Hodgson] appreciated what we were doing, he couldn't do it, and we admitted that we couldn't do what he had done. It was such a different experience. We're completely different animals, really."

And while technology has in many ways made the sound designers' job easier than in the early days of the Radiophonic Workshop,

perhaps something has been lost in the craft. “I think people get bogged down on computers,” says Barnes. “I’m not a technical whiz-kid- it’s the emotion, it’s the drama. This is what I liked about the TARDIS, that it’s a character, and building in the characteristics of the TARDIS, the emotional aspects of it, of how it reacted to good and bad... You don’t need a plugin for that, you just Need the right sound and the right emotion.”

And how do the original sound designers feel about the methods used in Doctor Who today? “I was going to say it’s all too easy, but we would say that, wouldn’t we?” says Dick Mills. “It’s like somebody asking me, who’s your favourite Doctor Who - I say the one that’s in the post at any one time because they’re ideal for the present moment. It’s no good harping back and it’s no good wishing forward. You’ve got to go with what you’ve got in front of you.”

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