A Life in Electronic Design Engineering.

I knew Terry Pratchett in the early 1980s, before he was famous. He was a Press Officer for the Central Electricity Generating Board, based at their Bedminster Down HQ. Towards Bristol from there, the first pub you get to is the Cross Hands. Opposite the pub was my electronics shop, the first shop in Bristol coming in on the A38 from the south west. Terry had a fascination with electronics, he was probably my best ever customer. At this time I was looking for electronic design work but opportunities were sparse, and the shop covered my 'bread and butter' over lean periods between irregular telecomms design projects that came my way from a company in Essex.

An early contract I picked up through the shop was working in a design team on a project to create the world's first talking herbicide application system (don't ask)! This was in the very early days of electronic speech synthesis, and I never could get the hang of assembling sequences of 'phonemes', the "ch", "ut", "ff" sounds, to make anything much resembling intelligible speech. This changed when I took on Jan, a well educated Scot, a speech therapist, also qualified in electronics. She soon had the thing chatting away, ponderously but quite clearly, with an appealing Aberdonian lilt. Terry was tickled pink by this and commissioned us to design a talking doorbell for him. This was to respond to presses of the bell-push with a randomly selected, daft, greeting such as "Share and Enjoy", except on Sundays, when the only response was to be "F*** Off!".

I took on some other customer design projects including metal detectors, navigation lights for microlight aircraft, sports time recorders, programmable controllers, and hand warmers for hot air balloon pilots.

Running a small shop takes a lot of effort for small returns. I once drove my mini over-night, all the way to Cambridgeshire, for an auction of surplus industrial electronics. I came back with far more stuff than a mini was designed to carry, amongst which was a consignment of red LEDs which I got for a fraction of the proper price. Not such a bargain as it transpired. Some LEDs worked, some didn't, but many of them flashed. This caused Mr Pratchett much mirth, and he insisted on buying the lot for twice what I had paid. He had a young daughter who was about 5 or 6 at the time. He filtered out the flashers and decorated her bedroom ceiling with them so that she could enjoy the stars twinkling at night. The rest, working and not, he gifted back to me – mixed.

As design engineering work drifted in it became more difficult to maintain the shop and I had to choose. I closed my shop with little regret (except losing touch with Terry), and went back to Uni to finish my degree in Digital Systems Engineering.

Between ongoing telecomms projects, I spent the next thirty odd years working with other engineering professionals in electronic design for a variety of industrial and

military projects, large and small. The nature of these tended to be at the leading edge, the bleeding edge, of technology, which was always very stimulating. I feel lucky to have worked through these times of rapid technological advance, where everything was always new, exciting and challenging.

Team engineers generally shared similar status, with each of us contributing our own particular specialism. Mine was, more often than not, "Logic Design" (best subject at Uni). Teamwork! There was rarely anyone wearing a "Team Leader" badge, rather we were led by "The Spec" – the specification, document property of the client. Conflict within a team was rare, almost always arising from difference in interpretation of The Spec, and always resolved in the most gentlemanly manner.

Negotiated amendments to The Spec often ironed out any wrinkles. Like the time on one military project, the client complained about the 'up' and 'down' volume control buttons. On pressing them both together, sometimes the volume went up, sometimes it went down, and at other times, nothing happened. I suggested that pressing them both was quite daft, and perhaps they shouldn't be doing it. After all, there was no mention in 'The Spec' of what was to happen in such cases. We agreed on an amendment to The Spec to formalise, that when both were pressed, nothing should happen. This was a minor, 'Level 1' change, which would have added probably a few hundred pounds to the contract total (details in the small print). Took five minutes to fix – kerching!

I'll never forget one serious conflict from decades ago. This was on a project with 'safety' as top priority, one of those where "if you get this wrong people will die"! This team had a 'safety specialist' assuming responsibility for all matters safety, it was he who sought to 'lock horns'. The detail is lost, but what happened next shaped the rest of my career. Against my better instinct, we engaged in a frank and thorough exchange of views, during which my appreciation of the point I wrongly assumed he was trying to emphasise, diminished. This was only going to end with one of us turning away, backing down being no admission of defeat, more a recognition that, for the time being at least, argument had achieved as much as it was going to. It was he who turned, but his parting words laid a worthy blow, and they remain ringing in my ears to this day –

<p align="center">"Good luck explaining that to the coroner".</p>

This happened on a Friday. It ruined my weekend. Later the truth of what he'd been trying to convey began to dawn, and I returned to share a long, civilised, almost friendly conversation. His real argument went beyond the safety, safe use and safe operation of the engineering output we were working towards, as vital as that was. That was just working to "The Spec", which we were demonstrably on course to satisfy or surpass in this instance. Beyond this, he emphasised, we shared a joint responsibility, a duty of care, for the well-being of our own, and each others, careers and professional reputation and integrity. Beyond just working to the safety 'spec',

we needed to do so in a way that could be demonstrated. In the Coroner's Court, if it ever came to it (which, fortunately, it never did).

Over the years, all those teams. Money was always good but seldom mentioned. We were motivated more by a shared a passion for the technology and the constant pushing back the boundaries, discovery of the new. Sometimes a new team would be like a school reunion, other times all new faces. Teams from three to maybe a dozen or so members, but along the way we all got to know the odd individual to be avoided like the plague. I will never forget T.W., one particular serial pain. A short contract came up offering payment of one thousand pounds a day. Sounds fantastic, but it involved 'on-site' work somewhere awful, budget hotel life gnawing the soul, and with T.W. having already signed up it was proving difficult filling the team. I remember turning down the offer, saying "Grand-a-day? You'll need to pay a lot more than that to get anyone to work with T.W!" This wasn't personal. One idiot is all it takes to ruin a good project for the whole team.

Now retired, I'm making progress building a loco I promised to build some years ago. With the great help of Andy from Bristol SMEE, this is moving on rapidly now and promises to resemble the 'Baby Deltic' prototype. This will be driven by radio control and powered by petrol inverter-generator or batteries. This, loco '5914', will be my last.