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THE GROWTH AND DEVELOPMENT OF ENTERTAINMENT TECHNOLOGY: A PERSONAL EXPERIENCE

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I started my interest in stage lighting when I was 14 years old, and it was sparked by an enthusiastic metalwork teacher at my secondary school when he started a new course for two hours a week in electronics. My father worked for the BBC and was always tinkering with radios and televisions at home and somehow I became interested and experimented too. When the electronics course started I found this considerably more interesting than French or Biology! Of course, this was not an examination subject but our forward-thinking school headmaster realised that introducing a practical subject could also help with the core physics and mathematics.

It so happened that the same master had built the school hall sound system and was also responsible for the installation of a small Strand Electric stage lighting system, a few years before. Like most teachers his workload was heavy and he wanted a few interested students to help. It was then, in 1966, that I realised that the entertainment business was where I wanted to work.

In those days no form of technical training existed, and my parents were of the opinion that theatre was full of those ‘funny people’; you needed to get a good set of qualifications, get set up for life and then see, they said! So that is what I did – but I continued to work on the school productions, looking after the sound and lighting.

When I left school at 18 I went on to



*Fig 1: The first lighting console I used, the Strand Junior 8
photo: Strand Archive.*

one of those ‘modern polytechnic things’ and took a degree in Electrical and Electronic Engineering. This was a four-year course and for the first three years it was a sandwich course which involved spending five months a year working in industry putting the theory into practice, absolutely essential for a practical person like me!

So the first year was spent in my Vauxhall Viva van with ‘Surrey County Council’ emblazoned on the side visiting schools, colleges and other council buildings sorting out problems with their Audio Visual Aids equipment. Great fun it was too, I got to meet people, was expected to diagnose and fix problems instantly and when more detailed treatment was required there was bunch of pipe smoking engineers back at base in Ewell who could teach you how to sort things out. These were halcyon days where valves were still common and those ‘new transistorised thingies’ were just getting into common use.

Then it was back to college and the second year of training. This was with BBC TV in their regional base in Cardiff in what then was an old church on the outskirts of the city centre just prior to the move to a purpose-built regional broadcasting centre in Llandaff where they are still located today. This was brilliant because I got to work in the studio, with lighting, with cameras, on outside broadcasts and generally went through all of the different TV aspects. This sparked a huge interest which continues today. The training

was well planned, was varied and critically developed my interest and converted the theory into practice, making me more aware of how important the classroom was in being more proficient with the practical aspects. For year three (1972) a friend found me an interesting opportunity with a local firm called Stafford King Controls. They were requiring a junior electronics engineer to help build some dimmers for a stage show in London. One week after I started the engineer left and the two owners presented me with a challenge. The show was *Jesus Christ Superstar* opening at the Palace Theatre in London’s West End on the 9th August. The dimmers were controlling fluorescent tubes built into the



Fig 2: Jesus Christ Superstar
photo: MCA Records Ltd.

stage floor, and the show lighting designer was the legendary Jules Fisher. This production was very successful, running for eight years with 3358 performances, becoming the world's longest-running musical at the time. Little did I realise that having built the dimmers I would continue to have to look after them for the entire run of the show! I had finally reached the West End just by being in the right place at the right time!

Over a recent dinner in the company of leading lighting programmer and designer Rob Halliday I asked him how he got into the business. He explained that because somebody was sick he went to the Thorndyke Theatre in Leatherhead that same day, worked the board and as a result developed a life-long friendship and working relationship with David Hersey!

Since 1972 I have spent my working life in the theatre and television industry, hidden in the background making sure that the technology works, planning buildings that can stage performances, trying to focus the enthusiasm of the young and of course trying to get to grips with new technology. Each decade has seen huge changes in the technology that we use to provide the infrastructure that allows the theatre to flourish. One of the best directors I ever worked with always maintained that no matter how good the artist was, "if you could not see or hear them then there was no show!"

In the 60s through to the 90s the sound track was operated on reel to reel tape machines usually Ferrograph, Brenell or the Revox A77 or B77s and the ever useful Emitape splicing block; jointing tape and razor blades were close at hand. In the 60s and 70s the profile and Fresnel spotlight had a large glass envelope lamp called a T1 500W or T6 1000 watt. The light was yellowish and yet we still managed to convey that hint of colour in the productions.

The PAR Can was new and so bright that most other things looked positively 'dim'. Shows were beginning to go out on tour, necessitating changes to equipment.

There was a need for amplified sound systems, and structures that could support the technical equipment. These included the invention of the truss corner block that enabled strong flown structures to be constructed. The lightweight PAR Can luminaire, powerful loudspeakers and generally more mobile equipment introduced considerable change to the world of entertainment technology. This required technicians to tour with the kit – technicians who



*Fig 3: The 1967
Revox B77*

photo: Brian Reeves.



*Fig 4: Dansette record player
photo Julie Lambert.*

could not only set up the equipment quickly but who were experienced enough to fix problems. We started to see the need for riggers who could look after suspending equipment, the noise boys and the sparkies. Each of these disciplines have grown into clear experience paths and therefore clear paths that only very recently are leading towards a degree of certification.

The past 25 years have seen considerable changes in equipment types and the range of facilities that these offer users. The expectation of members of the public has changed as the same technology has moved into the home. When I first started work the average home had a black and white or early colour TV; they often had a Dansette record player or even a radiogram and the cinema was often the source of their introduction to technology. The advent of colour television in 1969 introduced a significant change in public perception; theatre shows had to try harder to appeal to keep bums on seats, and movies had to become more adventurous.

Looking through the years demonstrates the way that technology has changed the way that shows are created and also helps to explain why getting the right start in the business is so critical. The mid 1960s really were where the major technological aspects of the entertainment business started to change rapidly. In this period the world of lighting started to see the advent of the thyristor dimmer. This allowed the physical size of dimmers to change as the resistance slider or motorised clutch gave way to a transistorised power control device called a thyristor. Dimmers no longer needed large dimmer rooms; they became portable.

Dimmers could also be controlled from a lighting console that could be some distance away. This allowed the operators to be located in a better viewing position, improving the show lighting. New lamp technology using different gas combinations allowed the lamps to get smaller. This improved the lumen efficiency, making lamps brighter and 'whiter'. This technology also allowed different 'spotlights' to be designed, making them smaller and lighter as well as enabling improved features to be added.

One such invention changed the world of stage lighting for ever. This was the PAR Can. From the mid 1970s this revolutionised stage lighting due to

its size, low weight, the different beam angles and the quality of the light – not to mention the low cost of the housing. PAR sources enabled high levels of controllable coloured and white light to be thrown onto a performance area with the minimum of weight and rapid rigging and focusing.



*Fig 5: PAR Cans,
photo: Total Fabrications.*

Items such as the PAR Can, the portable dimmer and the lighting console when linked with aluminium trussing made the touring lighting rig possible. Indeed a whole new way of lighting was spawned because the technology made it possible. This also needed lighting technicians to learn about these new techniques and generated new employment possibilities. If you take a look at some of the early 1960s concerts staged by the Beatles you can see that the sound systems comprised of Selmer or VOX valve powered amplifiers. Transistor technology allowed audio mixers and amplification systems to be reduced in size and again made portable. New materials for the cones and suspension of coils also allowed loudspeakers to be made more powerful.

Over the following years the advent of items such as radio microphones, very early digital mixing technology, the use of different sizes of magnetic tape, multi-track recording and playback capabilities and the later move away from the recording tape to other forms of media storage all allowed major changes to be made.

I remember my first introduction to digital editing in a studio in New York in the summer of 1990. I had produced a music tape for a commercial show in the UK. Some changes were needed and I found a studio, only to arrive to find no tape decks but a computer monitor. Not understanding the system, but knowing what I wanted, between the studio engineer and myself the new music track was produced rapidly!



*Fig 6: Vox Amplifiers
photo: Vox Amplification Ltd.*

Suspension systems have also passed



*Fig 7: The Light Console
photo: The STLD Archive.*

through many phases of development as have the motors that move them up and down and the standards which they have to comply with. The aluminium truss and the corner block made the first difference allowing ground supported structures to carry the touring technology to be rigged. This allowed lights to be positioned where required, allowed product launches to become theatrical events – indeed car launches of the 80s saw companies like Imagination in the UK stage some spectacular events.

The theatre benefited from early power flying systems that allowed increased loads to be supported and complex stage structures to be moved. Stage wagons and stage set pieces could be moved around and controlled with electronics allowing some of the larger shows to become quite spectacular.

The greatest period of innovation in the entertainment business was probably during the eighties and nineties. The world of lighting saw the invention of a universal data protocol that allowed lighting data to be sent down a single cable rather than heavy and unreliable analogue multicore cables. DMX changed the world of lighting for ever; indeed the recent launch of the Remote Device Management for DMX and the Architecture for Control Networks via Ethernet will take this one stage further with a bi-directional interchange of data speeding up programming dramatically.

The use of computerisation was first seen in lighting control in the days of Fred Bentham's Light Console when large number of levers were replaced with the analogue fader console with a number of presets. Whilst the analogue desk offered better remote control and better presetting it still restricted the number of lighting cues that could be operated in quick succession. The ability to memorise lighting cues and to replay these in a user controllable sequence changed lighting control for ever.



*Fig 8: 2007 Avab Congo 3000
photo: ETC Europe Ltd.*

These consoles revolutionised lighting control in the theatre, in TV, in rock and roll and in all the different aspects of lighting control. Indeed, today a computerised console is the norm even for school drama stages. The early consoles cost many many thousands of pounds. Today such a console cost just a few thousand!

The sound world has been using digital technology for some time but not univesally like the lighting world. I suppose the last five years have seen the digital audio mixer become more readily available due to the cost becoming more managable. We have also seen the sound manufacturers attempt to produce their equivalent of DMX. We have now got a number of digital sound processing systems such as Cobranet, Ethersound and others. Early systems caused problems of latency (time delay) perhaps getting them an initaly poor name but recent improvements appear to have resolved these issues.

Loudspeaker and associated amplification technology has gone through huge changes. Walking around the 2007 ProLight + Sound Show in Frankfurt in March 2007 one sees the sound world is now full of line arrays in all shapes and sizes, allowing sound to be focused and directed just like light. Trusses now come in all shapes and sizes and have become universally accepted as part of the entertainment industry, indeed we expect to see them and designers like to show them off. But it is in the world of electrical and electronic engineering that the biggest revolution has come.

Entertainment Technology Press is a wonderful source of information about the industry and the developments, with many well known industry



Fig 9: 2006 Midas XL8 console, photo: the author.



Fig 10: d&b audiotechnik J Series photo: the author.

figures writing books. With the likes of Richard Cadena looking at *Lighting Technology*, Chris Higgs looking at *Rigging Systems*, Robert Bell chatting to some of the technological pioneers in lighting technology – not to mention one other father figure! This legend is Francis Reid. One of his titles, *Yesterdays Lights* is a wonderful walk through the 1950s to 1990s of theatre lighting. One of the topics I picked flicking through this book is his introduction to one of the major technological changes the industry has had to cope with.

Francis wrote in January 1985: “Now something of a quantum leap in lighting technology has been taken by Vari-Lite, produced to meet the requirements of the music industry who have financed its development and can afford to use it in their productions ... I have been in the habit of saying, that the only truly breakthrough luminaire developments in my thirty years of theatre have been the PAR Can and the direction diffuser. I am now happy to add the Vari*Lite to that list.”

What Francis was referring to is the ability to make a light source move, change colour, change beam size, dim and to project images. Indeed, Vari*Lite was the first. The industry is now serviced by many companies producing



Fig 11: When it all comes together: the 2005 Eurovision Song Contest in Kiev with lighting design by Per Sundin, photo: Louise Stickland.

moving lights and virtually every show uses them in some form or another. Moving lights can be completely remotely controlled, removing the need for luminaires to be manually focused and coloured using celluloid gel material placed in front of each lighting fixture.

In summary, the entertainment business is a very high user of technology; we push the boundaries all the time, we innovate, we experiment and most importantly we rely on technicians, product designers, lighting and sound designers, riggers and a whole depth of different disciplines when we come to make a show. That means we need trained people who not only understand the art but also the engineering, understand materials, are experienced with structures and electricity and understand acoustics.

The industry offers immense opportunities for a long term career. Indeed, if you look at some of the most respected theatre consultants in the world you will see that many of them started by working as a technician in the theatre.

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The author is projects director for LSI Projects, a UK-based company working on major theatre, concert hall and TV studio projects worldwide. He is currently supervising the lighting installation for the newly-built studios in Glasgow for BBC Scotland. He has written three titles for the Entertainment Technology Press series with his fourth, a Followspot Handbook, about to be published.

