

When I Think Back...

by Neville Williams

Dr Ernest Benson: A brilliant career in electronics, academic and practical - 1

Such is the history of electronics that most of its pioneers became involved at an elementary level and gained expertise mainly by practical experience. But a few, like the late Dr Ernest Benson, concentrated first on gaining an initial foundation in physics, maths and electrical engineering — resulting in an exceptional appreciation of both the theory and the practice of electronic equipment design.

Having known 'Ern' or 'Ernie' Benson as a personal friend over many years, it was a shock to hear of his death and to read the notice in the *SMH* a couple of days later:

BENSON, John Ernest — August 2, 1989 (suddenly) at home (D.Sc.ENG) loved husband of Mavis

Ern had been an esteemed member of the Institution of Radio & Electronics Engineers (Aust), and an obituary was published in the *IREE Monitor* for March 1990, contributed by his fellow engineer, Neville Thiele. It was reprinted, with due acknowledgement, in the July 1990 issue of this magazine.

Then why this belated instalment of 'When I Think Back', in January 1996? Mainly because the memory of Ern Benson lives on, and embraces far more than could be conveyed in a one-page obituary. There were episodes in his career that I can personally recall and, with the passage of time, it is now possible to merge them with the published obituary, without embarrassment or conflict with the personal recollections of his family.

So here is the story of the Ernest Benson who will be remembered by many old-timers in the electronics industry, and by another quite separate group affiliated with the Anglican Church of Australia. Much of the information, and most of the illustrations have been made available by his wife Mavis and with the cooperation of his sons, both of whom are medical practitioners.

John Ernest Benson was born in Ryde, Sydney, on March 7, 1911, the only son of John Ernest and Lilian Benson. His father was an orchardist and property owner, as were his grandfather and great-grandfather. So it was that Ernest junior spent his boyhood in a farming environment, with cows to be milked, a horse and sulky, fuel stove and grate, and kerosene lamps. The family had to wait patiently for the gas to be connected — and even longer for electricity!

Come Sunday and the Benson family

would put on their 'Sunday best' and head off to St John's Anglican Church at North Ryde, where his father was Sunday School Superintendent. Young Ernest attended St John's until the age of 12, when he linked up with the larger Anglican church of St Anne at Ryde.

At a personal level, this provided a link when we met in later life. My parents also attended church each week in their Sunday best; my father too was Superintendent of the 'bush' Sunday School in Bargo, and I had been one of



Fig.1: A young John Ernest Benson poses on the family pony with his 'kid' sister Ruth Lilian, his junior by 15 months. They grew up in the 'bush' that once encompassed Sydney.

the kids. To the 'sceptics', we were both accepted as incurable 'wowsers'!

The 'bushie' fringe

If Ern's rural background seems inconsistent with his suburban address, one must allow for the fact that Ryde at the time was very much on the city fringe. Beyond it lay what was then Sydney's 'food bowl' — a pattern of rolling hills, orchards, market gardens, dairies, poultry farms, family farms and timber mills, punctuated by tracts of native bushland as yet uncleared.

Ern's years at the Ryde public school would appear to have been a mixed bag, with a teacher problem costing him an extra year. However, when he finally sat for what we then called the 'QC' (Qualifying Certificate), he gained admission to the Sydney Technical High School in Albion St, Paddington. This was in 1925.

It was a tedious return journey from his home each day by foot, train and tram, but it was obviously the right kind of school for his temperament. He appears to have skipped second year and sat for his Leaving Certificate in 1928, earning a Teachers' College Scholarship deferrable over five years. For extra measure, a University Exhibition entitled him to be enrolled in the Faculty of Engineering, commencing in 1929.

This he took up, but after two years of Engineering, he transferred to Science and graduated with a B.Sc. in 1932, continuing his studies to completion in November 1933.

From December 1933 to February 1934 he did Honours Research under Dr Geoffrey Builder and Dr David Martin, in the Radio Research Board in the Electrical Engineering School. His Honours Thesis was titled 'The Cathode Ray Oscilloscope in Radio Research'.

Ern Benson graduated Bachelor of Engineering in Electrical Engineering (B.E.) with First Class Honours, in 1934. Ironically, all this study in Ern's home was done under gaslight, presumably from one of the original coal gas conversion plants that sup-

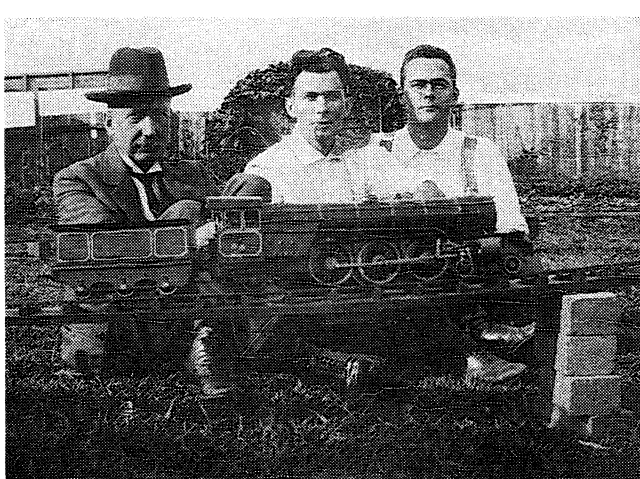


Fig.2: An old 'Box Brownie' photo of a live steam scale model of the 'Flying Scotsman' loco — An early indication that Ern Benson had an aptitude for practical work as well as 'book learning'. Ern Benson is at right.

plied Sydney. The electricity mains did not reach the Benson home in Arthur St, Ryde until 1939!

Professional hobbyist?

To this point, one might be excused for assuming that the former 'farm lad' had gravitated into the compleat academic — preoccupied by 'why so' rather than 'how to'. But in fact, while pursuing his very successful studies at 'Tech High' he had joined a school hobbies

family home 'Mascotte', in Arthur Street. The project culminated in a 'grand opening' attended by Ken Nicholls and C.A. ('Sammy') Coulson, their one-time metalwork teacher from Tech High.

I knew none of this until I read the notes supplied by Mrs Mavis Benson. But it helped explain why I had come to regard Ern as a very practical engineer, ready to come up with ideas but no less prepared to back them up with practical examples. More about this later.

As it happened, 1934 — the year that Ern gained his honours degree — was a carry-over from the 'great depression' and appropriate vacancies were few and far between. He accordingly decided to take up the deferred teachers college scholarship, which was still valid — and emerged with a 2A Certificate from the Dept of Education, a Dip.Ed. from the University of Sydney and a letter from the Director of Education commending him for 'a meritorious college career'!

Classroom or lab?

Ernest did his practical teaching at Sydney Technical High, his old school, and duly received notice of his appointment to the High School at Lithgow, a mining town and rail centre on the western fringe of the NSW Blue Mountains.

However he apparently had mixed feelings about a teaching career and was still pondering the situation when he received a



Fig.3: The Ern Benson that we knew at IREE meetings and other trade functions — and often plied with technical questions. Like fellow engineer Fritz Langford-Smith, he was also very active in Anglican Church affairs — from Sunday School teacher to a member of synod.

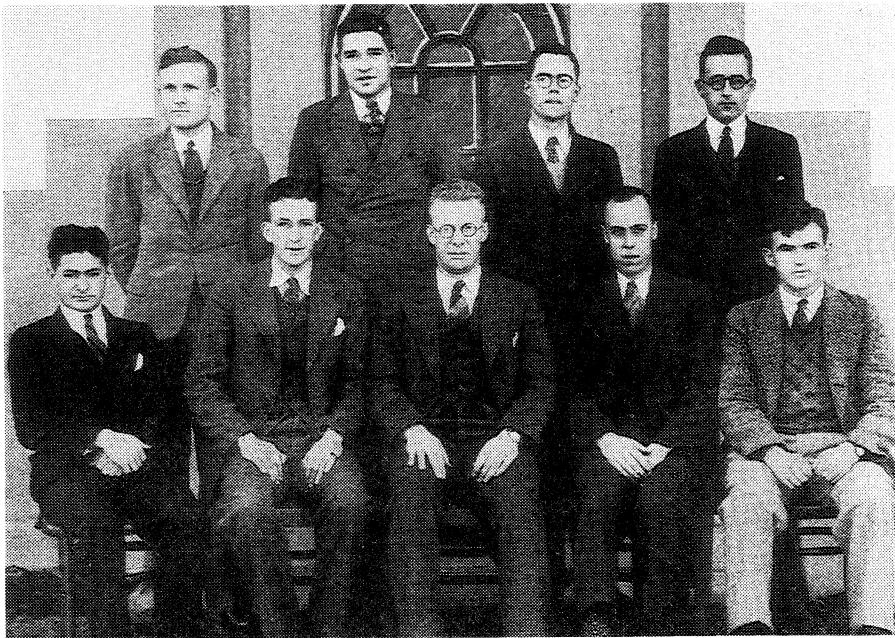


Fig.4: From EA files, AWA Research Lab staff in the 'good old days'. (L-R, standing): C.A. Saxby; G.R. Walters; J.E. Benson; H.A. Ross. (Seated): F. Maynard; R.M. Huey; Dr G.Builder; H.J. Brown; D.M. Sutherland.

call from his former mentor, Dr Builder. Dr B. himself had accepted a position with the Research Laboratory at AWA in Ashfield, and needing qualified support staff, had remembered young Ernest Benson. I gather that it didn't take young Ern long to make up his mind! This was in 1934.

At the time, there was considerable debate about the need for more accurate frequency control of AM broadcasting stations. In the early days of broadcasting, many transmitters used tuneable L/C master oscillators, adjusted to the best ability of 'techs' and inspectors — often without precision frequency meters! Listeners would notice aberrations and would protest *en masse* to the PMG Dept when ostensibly isolated stations appeared to edge too close to an adjacent channel.

The Government accordingly decided that all broadcasting stations should convert to crystal frequency control, thereby motivating AWA to document the problem and develop expertise in the production of precision crystals and crystal oscillators. This was at a time when crystalline quartz had to be sliced in certain planes, cut into rectangular wafers, then manually ground and/or etched to a critical thickness until each individual wafer exhibited a natural piezoelectric oscillation at a nominated frequency, when mounted in a suitably designed plug-in crystal holder.

It was a tedious task, with each crystal a one-off product, priced accordingly. How different from the present-day scene when tiny, precision crystals are used by the thousand in tuners and transceivers, and by the tens of thousands in accurate timepieces, ranging from ornate clocks to — almost literally — 'two bob' watches!

All about crystals

So it was that in December 1934, Ern Benson found himself in Dr Builder's Research Lab charged with the responsibility of clarifying the needs of broadcasters and the appropriate response of AWA in terms of advice and equipment. For several weeks, he spent long evenings in the lab listening to broadcast stations and tabulating the frequencies on which they were actually transmitting.

This led to ongoing work on crystals and their applications, culminating in a paper prepared for the IRE World Radio Convention (Sydney, 1938) entitled 'Precision Frequency Control Equipment using Quartz Crystals' by Dr Geoffrey Builder and J.E. Benson.

Unfortunately, although listed, the paper does not appear in my bound copy of the *Convention Proceedings* and I was denied a first-hand account of the work to that point. I gather, however, that Builder and Benson investigated various modes of vibration in quartz

crystals and their further applications in remotely controlled receivers.

By 1945 Ern Benson had written some 10 further papers on these subjects, which were submitted to the Sydney University for an M.E. degree. This he gained with First Class Honours and the University Medal.

Ern was a natural writer and for the same reasons would no doubt have emerged as an outstanding teacher had he chosen that career. He had a natural ability to sense how best to introduce a given subject, and the sequence in which new and interdependent facts should be presented.

Almost as a matter of course he became the Editor of the *AWA Technical Review*, issued by the Research Laboratory and circulated to technical professionals in the local electronics industry and to contacts overseas. In a sense, it was a companion publication to *Radiotronics* and its related publications, devoted to valve applications under the guidance of Fritz Langford-Smith, a fellow professional engineer/author. Sourced from the same holding company, both publications did much to reinforce the image of AWA as a research organisation as well as being a manufacturer and a merchant!

A notable tribute

In his obituary (*EA* July 1990, p.16) Neville Thiele records that Ern Benson edited *AWA Technical Review* for 27 years, until he retired from AWA in 1975.

Referring to one of Ern's papers published in the IRE (Aust) *Proceedings* on the colorimetric principles of television (July-Aug, 1951) Neville Thiele modestly describes it as a 'lifelong model for at least one young author, for writing a technical paper'.

Meanwhile, at a personal level, I myself had joined AWA in 1936 and became a small cog in what was then a very large wheel. In the A.W. Valve Co. lab, I/we were only metres from where Ern Benson worked in the cottage-size 'Research' or 'Standards Lab' — call it what you will.

But we might as well have been in another world. We in the AWV lab reported for duty at the same time as most others in the Ashfield complex, arrived in the same buses or competed for parking places in the adjoining streets. We knocked off about the same time each evening and poured out through the same gates, scanned by the

same uniformed security staff.

The research lab team, on the other hand, seemed to 'do their own thing', giving the impression that they were answerable to Head Office in the city rather than being an integral part of the organisation at Ashfield. Over the years, they came and went, as if by remote control.

Shortly after starting work at AWW, my attention was drawn to someone who had just pulled up in his car in the drive outside the Research Lab. "That's Ern Benson", I was told. "He's been specialising in quartz crystals".

Ern was conspicuous, not for his face or figure, but for the fact that the upper half of his torso was protruding from a 'Baby Austin' car. As I remember, it was classified officially as the 'Austin Seven', having a tiny seven horsepower motor. At the time it was the smallest — and lightest? — mass produced car on the road. Some called it the 'motorised pram'...

Memorable vehicle

From then on, Ern Benson and/or his car became a familiar sight to me in the environs of the Ashfield complex. He seemed almost to relish the contrast between his tiny two-seater and the 'Gee Whiz' vehicles used by some of his peers. One, I remember, drove a French Delarge, weighing allegedly three tons! (Was my mind playing tricks when the name Don Connolly flashed before me?)

I mentioned Ernest and his Baby Austin to his wife Mavis, and suggested that he seemed almost to be making a statement of some kind. Said she: "I'm not sure about that, but he certainly continued to drive the Austin Seven until the mid-fifties. He reckoned he had the last laugh during the war with his Austin 'beetle', when motorists were rationed to a few gallons a month". She continued:

"Ernest used to drive his beetle to university, much to the good-natured amusement of this fellow students. On one occasion he came out of lectures, to find it on top of the steps of the P.N.R. building!" She didn't finish the story, but went one better by finding a picture of the original 'Ern-mobile', photographed outside their home with an exact duplicate owned by a friend.

Ernest's work with crystals led to a paper prepared in association with Ms Edna Dash entitled 'A Compact Piezoelectric Chronometer'. Despite the adjective 'compact' the finished clock used a standard 19" (48cm) wide panel, just on 1-metre high.

In its day it was a revolutionary con-

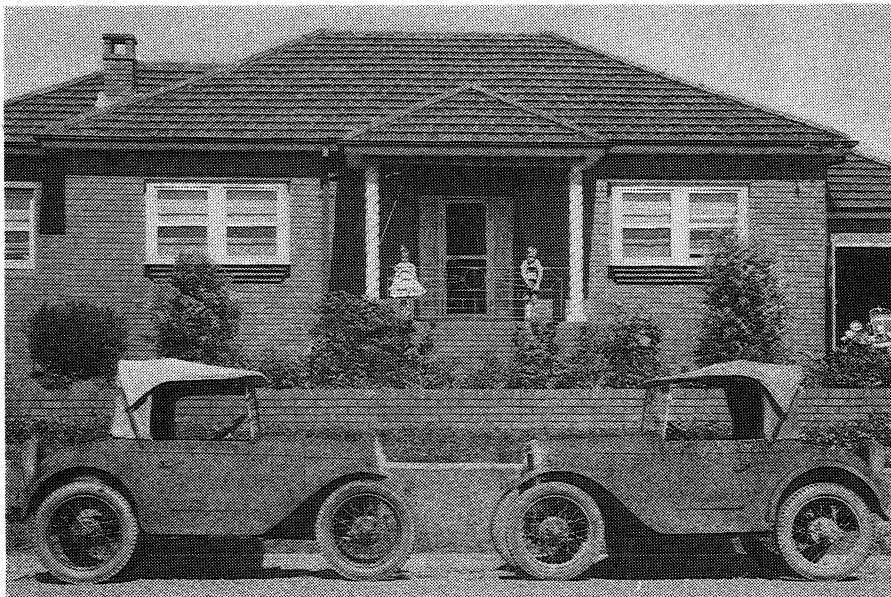


Fig.5: Two identical 'baby' Austin Sevens, the one on the right being the one which carried Ernest Benson to university and to work at Ashfield up to the mid 1950's. During the war years, they would make a little petrol go a long way!

cept, but such has been the progress with solid-state technology that I am wearing on my wrist an el-cheapo digital watch which my wife bought for me when I entered hospital over 12 months ago. It is waterproof, runs from an inbuilt cell, displays the year and date on demand, shows the time — which is still spot-on after 14 months — and it cost around 10 dollars. (Not worth pinching!)

Christmas chimes

That Ern Benson did not have a one-track mind became evident in 1940, when worshippers heading for the Christmas Morning service at St Anne's Anglican Church at Ryde were amazed to be greeted by the sound of a carillon, emanating from the normally mute stone tower.

It transpired that the Rector (Mr Stubbin) and Ernest Benson had 'got their heads together' and set up a public address system in the tower, fed from an amplifier, a phono pickup and a selection of records carrying chime music. To both rector and congregation, the sound brought just the right atmosphere to the occasion.

Then in 1943, the parishioners made a presentation to Mr Stubbins to commemorate the 21st anniversary of his induction as Rector of Ryde. He, in turn, handed the cheque back to the Church wardens to be used towards the purchase of a set of orchestral chimes.

It fell to the lot of Ern Benson to translate the gesture into a reality, beginning with the purchase of a set of tubular bell chimes from the Premier

Drum Co (UK), suitable for keyboard operation. Ernest himself devised the mechanism and constructed the keyboard in memory of his mother, Ethel Benson. A fellow parishioner, Mr L. Vincent constructed the console.

Electronic pickup from the tubular bells and an amplifier feeding loudspeakers in the tower completed the installation. The loudspeakers were AWA public address flared horns, fitted with multiple drivers. The installation was dedicated on February 27, 1944 by Archbishop Howard Mowll.

AWA subsequently commercialised the design and installed an electronic chime carillon in about 25 churches, including Lithgow, Singleton, Scone, Hurstville, St Matthew's at Manly, and the Roman Catholic church at Darlinghurst. One was even shipped to Bombay in India. An AWA model was also installed in St Anne's, and the Benson original was presented by the Church to the Cathedral of the Holy Spirit at Todoma in the Diocese of Tanganyika — half a world away.

Special occasions

At a professional level, the Chime Carillon was played at the Melbourne Town Hall by Professor Bernard Heinze. Also by Professor D.R. Peart, Professor of Music at Sydney University, from an installation in the AWA tower atop their Head Office building at 45 York St, Sydney; the occasion was the birth of Prince Charles. How time passes!

Broadcast on short wave over Radio

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Australia, the Melbourne performance was heard by Garth Major of the Antarctic Research Expedition on Macquarie Island. Reception was verified by cable to the AWA Melbourne office.

Commercial production of the carillon has since been terminated by AWA by reason of reorganisation and rising labour cost. The installation at St Anne's in Ryde is still functional. It was silent for a while for lack of an experienced player, but the role has since been filled — again — by Mavis Benson on Sunday mornings, in memory of her husband.

A practical advantage of the electronic carillon, she says, is that, unlike their traditional counterpart, the loudness can be moderated — out of consideration for neighbours who may want to sleep in on Sunday mornings! The observation reminded me of an alleged conversation between two neighbours in an unspecified English village:

"Beautiful bells aren't they?"

"Sorry — I can't hear you!"

"I said: the bells are beautiful — so much a part of the English tradition."

"I'm afraid it's no use. I can't hear you for those (adjectival) bells!"

Taste of the future

I round off this first instalment with a reference to the first occasion on which I walked into the Epping Baptist Church, reportedly the largest Baptist

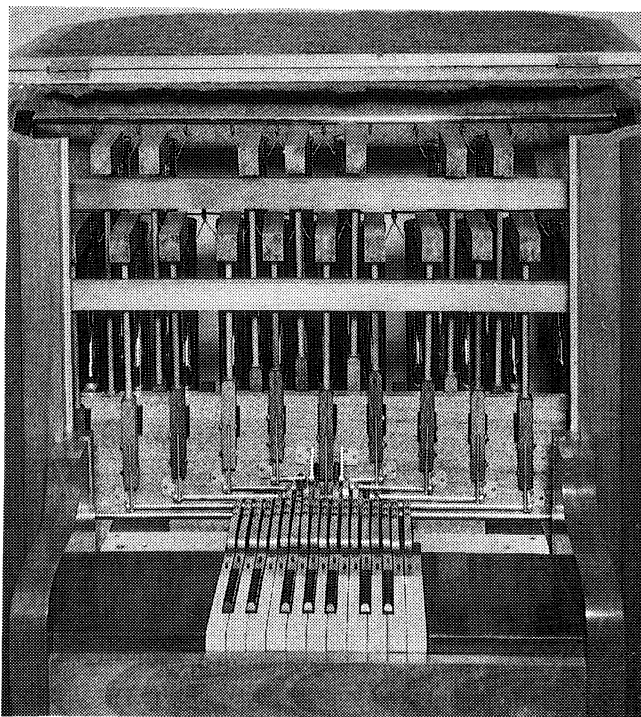


Fig.6: The 'works' of Ern Benson's keyboard carillon installed and still operating at St Anne's Anglican Church in Ryde, NSW — played by his widow, Mavis. The design was commercialised by AWA.

church in Australia. It was full to the doors, but I was immediately impressed by the effectiveness of the PA system. It was crystal clear, with not a hint of feedback and with the voice appearing to come from the rostrum area.

A quick glance around revealed only one sound source — an oddly shaped enclosure bracketed into the area where the front wall merged with the ridge of the peaked ceiling. It was fairly large, but too far above the normal line of sight to be intrusive.

A tall narrow fret down the inner face of the enclosure betrayed the presence of (probably) four fairly large loudspeakers; it was clearly intended to project its wedge-shaped sound column towards the audience in the rear section of the auditorium.

Underneath, the sloping base of the enclosure carried a second, shorter column, focussed on the forward pews. Down below the enclosure was the platform carrying the pulpit and supplementary microphones, clear of the wedges of sound emitted by the columns above.

Textbooks tell us that human senses indicate to us the source of sound in the horizontal plane — left/right and front/back. We are much less sensitive in the vertical plane. The congregation at Epping Baptist simply accepted that the sound was coming from where the action was; they had no urge to quibble that the preacher was 'doing his thing'

50 feet in the air.

At the end of proceedings, I remarked to a church officer that "Whoever specified the PA system knew what he was doing!" His reply: "He's a local man from St Anne's at Ryde. You might know him — Ernest Benson."

Yes, Ernest Benson certainly *did* know what he was doing. He was to mastermind sound systems in some of the most important buildings in Sydney and Canberra!

(To be continued) ❖