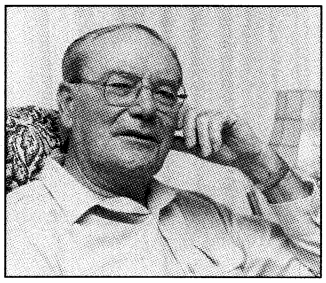


When I Think Back...

by Neville Williams

Arthur Spring - 2: Hands-on engineer, manufacturer and electronic organ enthusiast

Having traced Arthur Spring's progress from an admittedly casual student to a resourceful technician at the Breville Radio factory, we now encounter a bewildering series of events which recast him as chief engineer of a successful TV receiver factory. He went on to become a specialist transformer manufacturer in his later years, an electronic organ enthusiast — and currently, a welfare worker introducing fellow senior citizens to the computer age.

Perhaps at this point I should concede that to detail the Arthur Spring story in full would require a book, rather than a couple of articles in a magazine. It would also call for protracted question-and-answer sessions, to catalog a lifetime of memories and ensure that the story flows logically from one to another without awkward gaps.

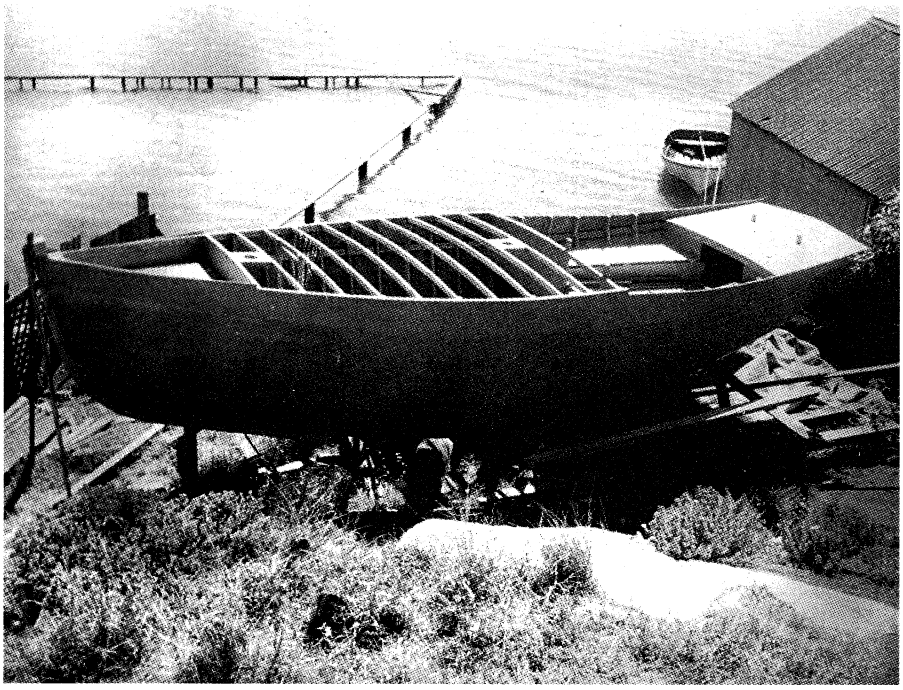
As it turned out, we had to make do with the exchanges that were practical between two old timers, in-or-around their eighties! Helpfully, though, Arthur did post me a simple chart to help clarify what happened to whom in the radio industry, affecting his career...

In the first of these articles, we left Arthur as a handyman/technician in the Breville factory at Camperdown, Sydney — near the Royal Prince Alfred Hospital. He had been involved in the production of pre-war Breville radio receivers and been active in the Company's wartime war effort, notably in the production of mine detectors for use in the African desert campaign and, later, in the Pacific island encounters.

He emerged from that era not as a recognised engineer but, as he put it: Breville's 'Mister Fixit' or their 'Get-things-done-Bloke'! As such, one might have found him conferring with management, engineers in the lab, operators in the workplace, and clients in the field.

In his spare time, he had an interest in the ARP organisation — citizens concerned with air raid precautions. Observing their activities, he realised that they were completely dependent on the telephone system, which was both stressed and vulnerable under wartime conditions. Could they be provided with a simple and hopefully inexpensive radio net operating on 33MHz, which the Department was prepared to authorise?

The (unofficial) radio 'ham' in Arthur came up with simple prototype transceiver, fabricated from available bits and pieces, in a plywood and leatherette box measuring about 18(w) x 12(h) x 9(d) inches. The transmitter, using frequency modulation, called for a single 33MHz crystal, while the receiver used phase-locked loop circuitry, an adjustment knob and a centre-zero meter to ensure that it stayed on the net frequency. The loudspeaker doubled as a microphone.



The Spring brothers' schooner takes shape. Arthur still lives on the waterfront, but his preoccupation with electronics leaves him no time for maritime pursuits!

Simple, but effective

The ultimate in operator simplicity, the transceiver had an off-on switch and a press-to-talk switch. Being an FM system, the receiver would automatically lock onto the strongest network signal at any one time. It would be up to the common sense of the operator, if and when to break in.

Tested from the Camperdown factory

to a vehicle under the mass of tramway cables that encircled Central Railway station in those days, a pair of Arthur's prototypes provided clear communication free from hash. In another mobile test along the Pacific Highway, contact was maintained from Camperdown to as far north as Mount White, except when the vehicle was overshadowed by local topography.

As it turned out, the ARP lacked the will or the money to take up Arthur's suggestion; but word of the novel noise-free FM system reached the armed forces via Breville. They would be interested in a portable 'man-pack' version that could be set up wherever necessary and operate either from mains power or available vehicle batteries. This involved prototypes, rendered more bulky by the dual power supply and rolled-up power cables. They would also favour a proper microphone to provide better speech quality in a noisy environment.

In Melbourne, the RAAF set up a test with a 'base' unit on the roof of the Manchester Unity Building and a mobile station in a 'crash' boat on Port Phillip Bay. They obtained good coverage of the entire Bay area, extending to the Rip.

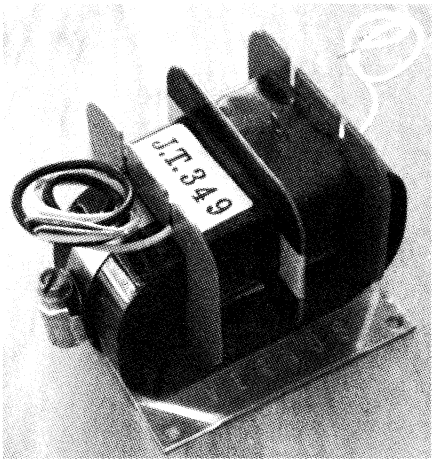
In Sydney, the Navy set up a base station in the Garden Island area and despatched a mobile on a boat headed inland along the Parramatta River. The system clearly outperformed the available Navy AM system but, says Arthur, "I made myself distinctly unpopular with the VIP observers by ridiculing the Navy equipment".

Don't shoot now!

But the most spectacular situation concerned the Army Unit manning the heavy calibre guns on Sydney Harbour's South Head. One of the Unit's regular exercises involved landing shells suitably close to a target on a moving barge out near the horizon. The barge was towed by a tug, which was supposed to keep in touch with the gunners via a radio link.

The trouble was that the tug was powered by two powerful Thornicroft petrol engines, whose ignition systems interfered seriously with the two-way AM talk channel. If the towline parted, the tug obviously could not venture back to recover it unless they were sure that the gun crews were completely aware of what they were doing...

Army radio techs knew that ignition suppressors would improve communication, but as sure as they fitted them, so surely would the tug captain remove them — because they allegedly compromised the performance of his beloved Thornicrofts.



A typical bobbin wound power transformer. Using high temperature Rola wire and a high stability bobbin, such transformers contributed markedly to the success of Precedent TV receivers.

The two-way FM system overcame the impasse by ignoring the ignition hash, although the acoustic noise from the engines aboard the tow vessel still rendered it less than ideal for either reception or transmission.

The demonstrations alerted the military to the potential of FM communication systems. But by that time, American equipment was to hand and there was less urgency for local initiative. Breville filled an order for a half-dozen or so prototypes, but that's about where the story ended.

At a purely personal level, post-war, Arthur joined forces with his brother and built a small schooner to take advantage of the nearby waterways. Presumably, it was a more successful venture than his abortive effort to build an electric car!

This was followed by a new house in 1952 — a clear indication that his salary was no longer only a few dollars per week, as it had been as a youth at Radiokes and Crown!

The industry, postwar

Australian radio manufacturers, meanwhile, were busily trying to come to grips with the postwar era. Government orders had been curtailed or cancelled, former employees had to be accommodated, along with new technology and new production methods; and beyond the immediate future lay the challenge of television, pencilled in for the mid 1950s.

Down in Melbourne, Harold Coles, a cousin of THE Coles family, was contemplating the future of Eclipse Radio, which he owned. As Arthur mentioned, and I as personally recall, Eclipse had a reputation for quantity rather than quality. Rather than attempt a revolution, I gather, Harold Coles sold out to Sir Arthur Warner's Radio Corporation — the Astor Group.

With the capital so available, Harold Coles turned to Sydney and decided, with a partner, to set up a new company with the intention of producing radio sets and black & white TV receivers for the mass market. Borrowing his partner's name, it was registered as A.W. Jackson Industries. Where and how it would be set up remained open questions.

In the meantime, Breville was also trying to reorganise its affairs, conscious that they had no overseas links with major TV companies to whom they might turn for guidance. Bill O'Brien had split the company into two — the manufacturing arm and Breville Wholesalers — presumably to gain a tax or trading advantage. There was also vague talk of reorganising the manufacturing arm as a cooperative, involving staff.

Looking back, Arthur recalls a climate of instability, which wasn't helped when Noel Smith resigned as chief engineer to accept a position with Philips. There were rumours of Bill O'Brien also quitting. Finally, following the Christmas holiday period in 1955, came the news that Breville Radio had been taken over by A.W. Jackson Industries under Harold Coles.

Jackson Industries

Under the new management, Breville personnel continued to produce radio chasses to current designs. Some were marketed as Breville and others supplied interstate to be installed in cabinets carrying other brandnames. But dominating the scene was the big question: what about television?

At about that stage, Harold Coles posed this question to 'Mister Fixit', Arthur Spring. Whether he was ready for it or not, Arthur realised that effectively, he was being re-cast into the role of Chief Engineer.

On the tape, Arthur confessed that at the time, he had no 'hands-on' experience with television or TV sets. He had read about them in technical magazines, of course, and he had picked up reactions and opinions from fellow technicians. But as with the old Breville set-up, Jackson Industries had no overseas affiliates on whom they could rely for background information.

Nevertheless, on one memorable day,

Arthur was summoned to the management office to meet a group of VIPs from Pye (UK) who were interested in A.W. Jackson's plans. Since the Australian TV system would have much in common with the British, Pye might be able to offer advice, supply key components, etc.

A sticking point was reached when the Pye group made it clear that they regarded the use of a conventional power transformer as wasteful. They were bulky, heavy, expensive and an unnecessary source of heat in the cabinet.

Said Arthur: "Having produced my share of transformerless AC/DC radio sets in my day, I knew how unpopular they were in Australia. The potentially 'hot' (live) chassis had to be totally enclosed to prevent possible contact; spindles had to be isolated, as also did external connections (aerial, earth, pick-up, loudspeaker, etc. Servicemen and testers hated them!"

Mains transformers

"We finally had to agree to differ, but the visit did prompt me to take a closer look at the question of power transformers. Rather brashly, perhaps, I insisted that I'd rather live with a physically hot transformer than an electrically hot chassis!"

To date, the factory had relied mainly on Henderson transformers and while they were reliable, they were certainly bulky and relatively expensive. But as it happened, Rola Australia chose that critical moment to announce the release of Rola high temperature enamelled winding wire, featuring a much higher temperature tolerance with much less risk of inter-layer breakdown. Arthur checked and found that the ratings were genuine, as distinct from over-zealous advertising.

No less to the point, news arrived of a product called 'Black Grylon', which was an opaque grey mouldable nylon with an unusually high temperature stability— good for moulding bobbins.

Now promoted to Chief Engineer, Arthur set about designing a transformer bobbin which could support a layer-wound primary in one section and secondary windings in the other — all wound with high temperature Rola wire. The result was a relatively compact transformer, easy and cheap to make and with ratings adequate for a B&W TV set.

Yes, it ran 'too hot to touch', but well within ratings for the wire and bobbin. It was, in fact, subjected to deliberate overload but without trauma. Conscious of the irony, Arthur recalled that, some time later, Jackson Industries supplied similar transformers to Pye Australia!

One of the pre-production prototypes, this 'Vernus II" organ still stands in the Spring music room. Having acquired a controlling interest in Jackson Industries, Philips decided against proceeding with production.

Obviously proud of his 'baby', Arthur mentioned that a couple of his competitors later tried to copy the design for their own TV sets — but not very successfully. One omitted to use high temperature wire; the other tried to cut costs by winding the layers at blinding speed. Both ran into problems, whereas the original Jackson transformers 'just never failed'.

Screen size debate

One other area where Jacksons encountered difficulty was in relation to the size of the picture tube. Suppliers, and particularly Philips in Holland, were well stocked with 17-inch (diagonal) types, along with the relevant scanning components. As a result they were doing their level best to persuade Australian manufacturers to launch in this format.

Admiral, on the other hand, was determined to go for a 21-inch picture and Arthur Spring was one of those who foresaw — correctly — that they would dominate the market if they did so. He accordingly prevailed on Jacksons to follow suit. Contrary to dire warnings, they managed to get all the 21-inch tubes they needed, some being imported and others manufactured locally.

As far as the circuit configuration was concerned, most of the early developmental work was handled by two people — Arthur himself as Chief Engineer and a backup technician/wirer (the late) Reg Carroll.

Three-metre 'breadboard'

In the absence of an overseas affiliate, Arthur pored over as many circuits as he had access to in magazines and company literature. One of the things that intrigued him was the number of elaborations in the various designs that seemed to be superficial, but still adding to the valve count.

Arthur's own philosophy was that valves tended to deteriorate from the day they were switched on, and that every valve included in a design was a potential source of ultimate failure — and a potential reason for a service call. Since Jackson Industries' receivers were intended to be both price-competitive in their own right and sold as 'other-brand' chasses, they simply could not afford to be trouble-prone.

Arthur's work plan involved a prototype which was a string of modules ranged along a table in the lab, adding up to a complete TV receiver. It was three-odd metres long, with a tuner at

one end, picture tube and loudspeaker at the other and power supply somewhere in the middle...

When they came across an interesting circuit, they had the option of building it up and lashing it into the prototype on the table. Arthur's lasting impression from this exercise was that American companies were more practical than their European counterparts in balancing performance against complexity.

In his taped interview with the ABC's Stephen Rapley, Arthur said that the above research was culminated when Jackson's three-metre long 'breadboard' prototype was compressed onto a flip-up chassis in a cabinet that was commensurate with the overall dimensions of the picture tube and loudspeaker...

In the process, Jacksons had to come to grips with printed circuit technology based on photographic rather then silk screen printing, and complemented with precision punching.

They deliberately avoided using valve type rectifiers in the power supply, because of limited life, and opted instead for Westingouse selenium flat packs. These proved relatively reliable — although, if and when they *did* break down, they produced an abominable odour.

A few months down the track, Noel Smith made an important contribution to the project. Noel had been transferred by Philips to Eindhoven in Holland, but had kept in touch with Arthur Spring at a personal level.

In a letter, he mentioned that Philips had 40-gallon drums full of the newer silicon rectifiers, surplus to their needs. Within their ratings, they were fine but, used in European transformerless designs, they were vulnerable to spikes on the power mains. In Jacksons' receivers with their transformer-fed voltage doubling power supply, they would probably be trouble-free. Such, indeed, proved to be the case.

Another exercise in caution paid off when Arthur realised that their horizontal oscillator stage was sensitive to any hint of grid/cathode leakage in the oscillator valve. Since the manufacturer could not take adequate precautionary measures, Arthur arranged to check all batches on receipt with the option of returning any that were suspect.

Jackson Industries ultimately outgrew the original Breville premises and moved into a new factory erected on a former Dunlop rubber site in the Crescent, Annandale.

Extremely reliable

Marketed mainly under the brand name 'Precedent', Arthur claims that the receivers had a reputation for reliability, attributable in large degree to their uncomplicated circuitry and their limited parts count. Servicemen liked them for the same reasons and for their ease of access. They were widely used in cabinets carrying store brands.

(*Editor's Note: I can confirm this. In the 1960s and early 70s I had a second job in TV servicing, and just about every technician I came across was full of praise for Arthur Spring and his Precedent sets — plus scorn for some of the overcomplicated and less reliable competing models!*)

In fringe areas, Arthur admitted that the horizontal locking was marginally less positive than that of some more complicated designs. But having checked out many such situations, he was satisfied that, overall, Precedent receivers offered very good value and a good picture by comparison with other brands.

Reflecting on the factory at Annandale, Arthur added the observation: "Much of the success of Jacksons at Annandale was due to the dedication of Alan McKeown as Factory Manager; to the enterprise of Vince Quirk as General Manager, the assistance given me by mechanical engineer Arthur Mears, by draftsman Arthur Nobbs and also George Hughes (a former member of the *EA* staff)."

What happened?

So what happened to Precedent as a brand, and to A.W. Jackson Industries? Black and white television peaked and

Arthur Spring's experimental organ, tidy but never 'finished'. Because his wife is a trained pianist, it is fitted with a full piano lower keyboard with access to electronic piano as well as organ voices.

reached a stage where TV desperately needed colour to retain its audience appeal. But colour would involve a major technical revolution that could stretch many local manufacturers to their limit.

As Chief Engineer of Precedent, Arthur Spring looked with dismay at the likely valve count and parts list of a colour receiver — and realised that the 'keep it simple' philosophy that had worked so well for B&W TV wouldn't work with colour. His verdict to Harold Coles was that he wouldn't even try to design a colour set until he had access to appropriate solid state devices.

Harold Coles didn't like what he had heard, and repeated history by selling Jackson Industries to Sir Arthur Warner's Radio Corporation in 1968.

But that arrangement didn't last either. In a push to expand, Philips took over Radio Corporation, only to be obliged to rationalise its affairs in 1970. In liquidating its redundant subsidiaries, a number of well known companies disappeared off the register — including Eclipse Radio and A.W. Jackson.

Personal trauma

In the meantime, Arthur Spring had been through his own private hell. In 1964, his wife Myrtle died suddenly of a heart attack. Arthur was devastated, and suddenly the Breville/Jackson story didn't seem to matter quite as much.

Then in 1965, Arthur met and married Liese-Lore, who helped him 'remake his life'. It was not an overstatement, and the two are still sharing life's ups and downs.

In his taped memoirs, Arthur said he could possibly have obtained a position with Philips. But he felt no enthusiasm for moving interstate, nor for the prospect of administration or 'paper shuffling' for the remainder of his career. His interest was still in designing and creating electronic products.

He tells how he arranged with two of his former associates to attend the auction which sold up the equipment from the former Jackson Industries' factory, around 1972. They came away with enough of the machine shop tooling and enough of the transformer winding equipment to set up two small companies: (1) Mayall Metal Manufacturing Co, of Marrickville, under the control of Jackson's former machine shop supervisor; and (2) Jones Transformers Pty Ltd, of Birrong, under his counterpart from the transformer winding section.

Arthur Spring in his late 70s, still absorbed in electronics. His current ambition is to synthesise organ tones more effectively by adopting digital and computer technology, particularly in the area of sustain and reverberation.

Arthur was their mentor.

At the very least, they thought, they would be able to offer spares for Jackson/Breville products. In practice, with minimal overheads, their products attracted the attention of Dick Smith Electronics and other component suppliers. Over the next 19 years a very high proportion of their output went straight to the DSE warehouse at North Ryde.

By the end of that time, Arthur was well into his seventies, and he decided that enough was enough — a decision that also placated his doctor. Mayall Metal and Jones Transformers closed in 1990/91. But Arthur Spring himself certainly didn't shut down; the move gave him more time to ponder what had been — almost — a lifetime interest: electronic organs!

Electronic organs

Like the writer, he had been through the stage of using the family vacuum cleaner to 'pump' a vintage reed organ, and sought in vain to win a gratifying sound by way of an amplifier and electrostatic pickup from the reeds. He found, as I found, that the end result was to magnify its imperfections!

Like myself, he had also inspected Ernie Benson's Hammond organ counterpart — but reasoned that 'there must be an easier way'.

He had considered and rejected the master oscillator/divider system, preferring the Conn Company approach of having a separate oscillator for each note. That way, he reasoned, every note in a chord would be independent of the others in terms of phase, as happens with a pipe organ.

More recently, he has admitted to being less passionate about the concept than he had been. Like it or not, the use of a crystal locked master oscillator and a solid-state divider chip has so simplified tone generation, while also eliminating the need for tuning, that the method is hard to reject.

In recent years, Arthur has spent countless hours fiddling with phase, attack, decay, reverberation, and so on in the control-amplifier-loudspeaker chain, achieving a commendably Wurlitzer /Christie presence in a domestic music room. For him, now, the agonising question is whether he could do even better by resorting to digital/computer processing.

While Arthur confesses to a personal difficulty in playing an organ with more than one finger at a time, he does claim to have 'a good ear' when it comes to

analysing the tonal content of an organ's sound. In casual conversation, the observation provides a lead-in to an anecdote from his primary school days.
The young lady teacher, I gather, decided to organise a junior choir for a school function. One by one, the kids were summoned to the front of the class and bidden to sing the opening lines of their favourite song, hymn or nursery rhyme. When Arthur's turn came, she broke in with: "You're no good. You're tone deaf!"
Says Arthur: "I wonder what she'd say if she could know that the tone deaf kid, as an adult, had spent a goodly proportion of his evenings tuning and voicing electronic organs, and experimenting with loudspeaker systems for them?"

Nearly 80, still busy!

Nor was his interest in organs confined to a hobby level. When contemplating areas of possible expansion for Jackson Industries, Arthur had organs very much in mind. In fact, in laying out the new Jackson factory, referred to earlier, he had envisaged how certain areas could be re-allocated to provide the space and environment for evaluating electronic organs and other audio products.
He had also shared his interest with Sir Arthur Warner, who backed him to the point where the Jackson team designed and produced a batch of 25 pre-production 'Vernus' prototypes. One of them currently graces the Spring music room — a typical instrument for the home or suburban churches, with staggered 42-note keyboards and a 13-note pedal clavier.
When Philips took over, they conferred with the Eindhoven Management — who liked the instrument, but decided that it didn't fit in with their worldwide marketing plan. The prototypes were sold and Peter Held was left lamenting. He was the organist who had been nominated to demonstrate the instrument.
(Ironically, engineer Neville Oates of Stromberg-Carlson had a similar dream to bolster *his* ailing Company, but they never got beyond a few factory models and stock of surplus 'bits' — which were sold to hobbyist/readers of this magazine to be used in building up as the *EA* 'Playmaster' Electronic Organ. That left organist Bob Swann similarly out on a limb!)
As for Arthur's own present instrument, he describes it as 'not user friendly'. It has been the testbed for numerous experiments, and has never really been 'finished'. A musician could play it and like what he heard, but might well be taken aback when he/she searches for other voices!

Computers too

Ah yes — computers. Back in the 1980s, Arthur was conscious that he was reasonably well informed about analog circuitry but knew little about digital techniques and even less about computers. For him the way to learn was the practical approach and, issue by issue, he plodded in the footsteps of Jim Rowe culminating in the construction of an elementary computer.
His next step was to buy a small Apple computer, which appears to have been a developmental model immediately preceding the Apple II series — commonly credited as being the world's first commercial personal computer.
About that same time I myself had bought an Apple IIc with Appleworks software, and I remember chatting with Arthur on the phone one day about our respective Investments. Even then, a different approach was evident. I was using mine principally as a word processor, with database and spreadsheet on call. But Arthur had plunged into programming and I remember switching on my 'BeeModem' to see whether it would translate the characters from Arthur's computer onto my screen. It did.
Much later, the Hunters Hill Council decided that it would be a good idea to set up a facility to introduce interested senior citizens to the computer age. For starters, they provided the space and a '386 PC.
Arthur was a senior citizen, he was certainly interested, and within a short time he became one of the moving spirits behind the initiative. In particular, he discovered that as local business people re-equipped with the latest hardware and software, many were happy to make surplus units available gratis to a 'good cause'.
Arthur didn't pretend to be a computer technician, but he did know enough to couple serviceable units together to make a serviceable whole. So the senior citizens of Hunters Hill now have access to 286, 386 and 486 PCs by courtesy of the Council, local business people — and one of their own number who has been in the 'wireless game' for over 60 years!
FOOTNOTE: Arthur assures me that he is very happy to share thoughts with people of like interests. Readers who are interested in contacting him can do so by writing c/- the Electronics Australia office — but please include a stamped, addressed envelope. ❖