



# When I Think Back...

by Neville Williams

## On organs – electronic and otherwise

The now ubiquitous electronic organ has been conceived and developed within the 55-odd years that I have been associated with the electronics industry. I've always been fascinated by them, not just in isolation but against a background of much older acoustic instruments – ranging from the humble harmonium to giant pipe organs like the one in the Sydney Town Hall.

At a personal level, I was encouraged to 'learn' the piano as a lad. But tiring of scales and exercises without sufficient other motivation, I invented so many excuses for not practising that my teacher finally gave up.

I emerged from the experience with the rudiments rather than the fundamentals of the art, at best able to stumble through the 'Chariot Race March' in a most un-Ben Hur-like fashion!

But left to my own devices, I later discovered that I could cope reasonably well with the chord music that generations of hymn writers had written for generations of adherents in small churches. In fact, there came the day when, in the absence of my mother, I was asked to play for a Sunday afternoon service in a typical country community hall.

It involved playing not the beer-stained Beale piano, but a portable Estey reed 'organ', of the kind beloved by one-time street evangelists: an abbreviated keyboard, no stops and a drop-down stand, fitted with two pedals connected by canvas webbing straps to the somewhat leaky bellows.

Playing it was a breeze, in more ways than one. As with other organs, notes sounded while ever the relevant keys were pressed, effectively concealing my limited digital dexterity. Given the humble nature of the music and the limited resources of the instrument, it was perhaps not all that surprising that several people assured me that I had "managed very well".

In fact, I was sufficiently encouraged by the experience to take up my grandmother's offer to play her beloved 12-stop Estey any time I liked – a traditional Victorian reed instrument if ever there was one, surmounted by a mirrored superstructure, with shelves for

hymn books and family whatnots. So began an interest that turned out to be a useful complement to a career in electronics.

As it happened, my younger brother followed much the same path to familiarity with reed-based instruments – variously described in their day as reed organs, 'American' organs or harmoniums.

A few years on, we were able to pick up unwanted reed organs for a proverbial song. They were often battered and unserviceable, but worth inspecting as a possible candidate for restoration to the

melodic kind of instrument we both hoped one day to find.

### Pipe organs

Brought up in the country, neither of us had been exposed much to pipe organs of any kind. They belonged to a world far removed from the small country – later suburban – churches which our family attended and in which we sometimes took a turn at playing.

In 1930, while I was still a student at Parramatta high school, Western Suburbs Cinemas had opened their 'Spanish' Roxy theatre in that suburb (now city) – complete with an 1850-pipe Christie organ and a much publicised resident American organist, Eddie Horton.

A class-mate Wilbur Kentwell, himself a young church organist of more than usual ability, struck up an acquaintance with Eddie Horton and was occasionally allowed to play the big



**A church organist at age 11, Knight Barnett was an original member of the staff of Sydney's pioneer radio station 2BL. He later became a featured organist on the Sydney theatre circuit and on Sydney radio, playing at eleven theatres including the Capitol and Prince Edward. He is pictured here in 1938.**

Christie – usually on Wednesday afternoons, when he should have been at sport! Wilbur later earned quite a reputation as a theatre, radio and recording artist but, at the time, his exploits were simply a topic for classroom – and staff-room – chatter.

However, I shall never forget the night, shortly after starting work at Reliance Radio in Sydney, that I went along to the Burwood Palatial theatre, to hear Knight Barnett at the organ. I was astounded by the virtuosity of the player, the resources of the instrument, and its massive, clean sound – in true stereo – from the pipes and effects ranged on either side of the proscenium.

At that point, I became an instant enthusiast of the theatre organ and an eager listener to on-air recitals by contemporary organists like Knight Barnett, Jim Williams, Paul Cullen and Norman Robins. I still have a Regal-Zonophone 78rpm record that I bought to check radiograms at Reliance Radio – Reginald Dixon's 'Blaze Away' and his memorable 'Parade of the Tin Soldiers'.

Even now, I have no difficulty in recapturing that early reaction, when I hear their modern-day counterparts like George Wright, Lyn Larsen and Melbourne's Tony Fenelon.

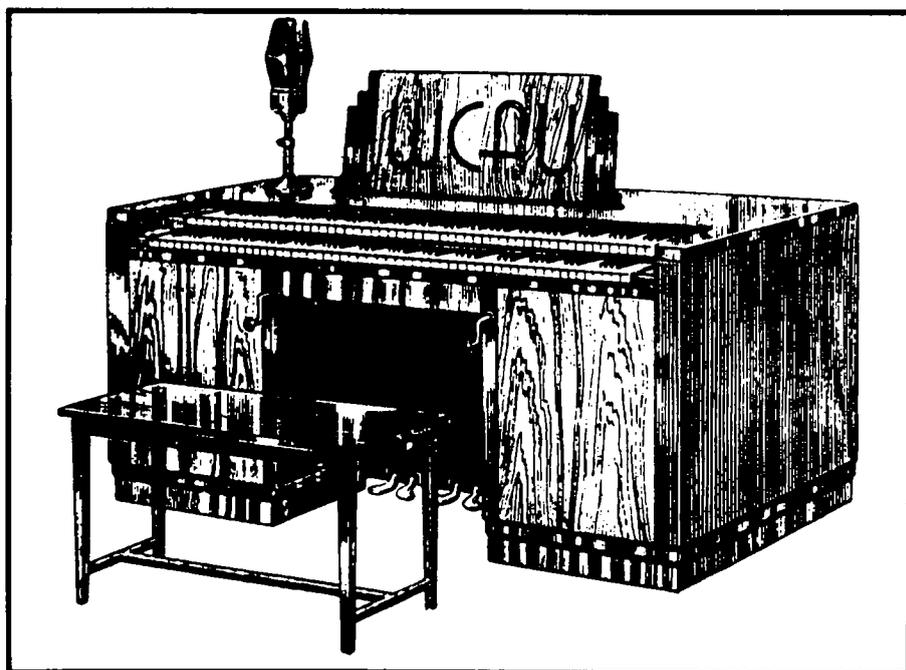
I was later to develop a different kind of regard for the huge 5-manual 9,000-odd-pipe classical organ in the Sydney Town Hall. Indeed, the most massive organ sound that I recall ever hearing was won from that same instrument by Marcel Dupre playing the Marseillaise! Yet, in the same recital, he coaxed from the organ the most delicate, lingering harmony that one could imagine in such an environment.

## A vain quest

But back home, like many of our humble counterparts in local church groups, my brother and I were for ever on the look-out for the unlikely, if not the impossible: a more pipe-like, less reedy reed organ that we could afford.

Somebody mentioned one in the headquarters of a fringe religious group, that was supposed to be available for little more than the cost of removal. It turned out to be a very bulky instrument with two manuals and pedalboard, and a separate electrically powered blower.

It was a traditional French instrument, we were told, that had been played by many well known organists and highly praised for its pipe-like qualities. Unfortunately, we had no way of



*Developed in the early 1930s at American radio station WCAU, this organ-like instrument derived its tones from patterns on a moving film. A later, more versatile model relied on holes in spinning discs placed between small lamps and phototubes.*

verifying this, because the blower wasn't working.

No less to the point, the building had been added to since the organ had been installed and there was no way of getting it out, except in pieces smaller than the manufacturer had originally envisaged. Enough said!

## Another find

We did, however, manage to get hold of a two manual reed organ shortly afterwards. Branded Aeolian, as I remember, it comprised, in effect, two fairly normal reed chambers, one mounted upside-down above the other. They were pumped by a common set of bellows and foot pedals, the manuals being pneumatically coupled by a forest of 1/4" (6.5mm) O/D rubber tubes. The existing tubes had long since perished, but we reckoned that it would be easy enough to fit new ones.

As we took delivery of the organ, my brother was already working out how he could replace the bellows with an electric blower and add a pedal clavier coupled through to the 16ft reeds. In fact, in an earlier burst of enthusiasm, he had already cut out and sanded a set of pedals, which were stowed under the bench in the garage.

But first, with the internal works of the Aeolian checked and repaired and the reed banks de-bugged, we faced up to the job of re-coupling the manuals,

armed with a large spool of black rubber tubing.

We set about the task late one afternoon, but decided to work on through the winter evening – in an unlined galvanised iron garage, with the help of a couple of lights and a single 1000W radiator. Pushing the tube-ends over rows of brass nipples was rough on the fingers but we got the job done, switched off the power and went our separate ways.

Next morning, I got a call from my brother, sounding utterly devastated. He'd just been down to look again at our handiwork: Alas, in the frosty, wee small hours, a lot of the rubber tubing had hardened, split and fallen off the brass nipples.

Fortunately, we were able to do it all over again with the then relatively new PVC tubing, which proved rather more durable. But the pneumatics could never be entirely trusted and we finished up leaving the back off the organ so that, if a tube fell off, one of us could reach around and replace it, surreptitiously or otherwise!

The novelty soon wore off, however, and the enthusiasm for adding a blower and pedal clavier cooled – the latter of necessity: a senior member of the family, fossicking around the garage for garden stakes, found a dozen or more bits of wood under the bench that were about the right length!

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## At last electronics

In the end, I/we finally came to the conclusion that, if one wanted a reliable and tolerably musical reed organ for the home or small church, the best course was to forget all the fancy notions and settle for a conventional, single-manual 16-stop Estey or a close equivalent.

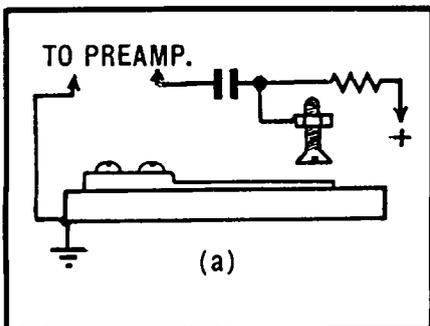
This we did, and it was the kind of small-church or cottage organ with which I tended to compare electronic instruments when they finally came within our grasp. It was scarcely a contest – but more about that later.

Electronic instruments, commonly heralded as 'pipeless organs', began to attract attention in the early to mid 1930's.

The US magazine *Electronics* for May 1934 reported an organ-like electronic instrument being demonstrated to visitors at the IRE convention in Philadelphia. Developed in the studio/laboratory complex of radio station WCAU in that city, it produced tones derived from photographic patterns recorded on continuously moving film loops.

In July 1934, the same magazine carried an article on a piano-like 'clavier' developed in a factory at Kalamazoo, Michigan. It used steel reeds which, when plucked, set up signal currents in adjacent magnetic pickup-up coils. Amplified and subjected to attack and tone control, frequency doubling and optional vibrato, a wide variation in sound timbre was said to be possible.

The WCAU enterprise was mentioned again in the July '35 issue of the *American Radio News*, with the development of a more practical organ, having two manuals and a row of stop tabs. The source signals for this model were produced by patterns of holes in spinning



*Illustrating the principle of electrostatic signal pickup from a reed. The principle was used in the Everett Orgatron in the 1930s but was seldom successful when added, handyman fashion, to existing reed organs.*



discs, strategically placed between rows of phototubes and 900 small light bulbs, switched on by the playing keys.

### The Everett 'Orgatron'

Coming nearer to home, and reality, the Baptist church in Auburn (Sydney) circa 1936, replaced their traditional two-manual reed Estey with an Everett Orgatron. This was after a recital in competition with the most obvious alternative at the time, the newly released Hammond.

Conforming to AGO (American Guild of Organists) specifications, the Orgatron was essentially a two-manual and pedal reed-based instrument, fitted with tiny brass screws which picked up electrical signals from the vibrating reeds by capacitive coupling. (See diagram). According to Everett, their design philosophy was to use air-driven brass vibrators (reeds) rather than oscillating valves to generate the basic tones, the vibrators being selected, tuned and voiced by time-proven methods.

The reed chambers were muffled, to minimise the direct sound output, while the screws were critically positioned relative to the vibrational mode of each reed to optimise the harmonic content for the desired voice. The signals were merged, selected and processed electrically, under the control of conventional stop tabs, expression pedal etc., and reproduced by amplifiers and loudspeakers.

I heard the instrument only once, in routine use but, while it seemed to be quite good, I did wonder whether it was chosen by the church as much as anything for its traditional styling and non-radical technology.

I gather that Estey and Wurlitzer also showed short-term interest in reed gen-

erators but, to the best of my knowledge, the approach won only interim acceptance and was soon overtaken by Hammond – and by a variety of other organs which relied on valve oscillators for tone generation.

But electrostatic pickup certainly caught the imagination of frustrated reed organ owners, and articles appeared in various magazines suggesting how the idea might be applied in existing – and usually ageing – instruments. In practice, most individual attempts along these lines proved abortive.

Apart from anything else, in a home or small church, the direct sound from the reeds would still be prominent, largely defeating efforts to superimpose a better sound electrically.

Again, the scope for inserting pick-up screws in an existing reed chamber was usually limited and the harmonic structure of the derived signal largely a matter of chance. Add to this problems of mal-tuning and intermodulation, and the end result was more likely to resemble the sound of an indifferent accordion than a pipe organ!

### Hammond's approach

But to get back to Hammond: An American company founded by Laurens Hammond, it was known early-on for its electric clocks. However, Hammond had been fascinated from boyhood by church pipe organs and, as a graduate engineer, saw the need for an instrument that would be more affordable and easier to instal and maintain.

His well-proven synchronous clock became the starting point for his own answer to the problem – an electronic organ built around a set of electro-mechanical tone generators. The sys-

tem, as illustrated, was the subject of patents applied for in January 1935 and granted in January 1936 – the same year in which the instrument was released to major markets, including Australia.

It involved the provision of eighty or more cam-shaped or toothed tone wheels, spun in groups at constant speed by a mains powered synchronous motor. A magnetised polepiece carrying a pick-up coil was positioned close to each tone wheel, such that a continuous waveform was generated across the coil as the teeth passed the pole-tip.

A separate tone wheel was provided for each frequency component required by the organ, the rotational speed and the number of 'teeth' being selected to bring its output frequency as close as mechanically possible to the required musical pitch. As well, the geometry of the teeth and pole tips was so arranged as to generate a predominantly sinusoidal waveform.

Drawbar attenuators, calibrated 32ft, 16ft, 8ft, 5-1/3ft, 4ft, etc., made available various harmonic pitches, allowing the synthesis of many different 'tone colours' – so that pressing any key would produce a composite or 'sum' signal, as determined by the drawbars. This was fed to an amplifier system controlled by an expression pedal, and optionally embellished by chorus, tremolo, attack, decay, reverberation and so on – effects which tended to multiply with each successive model.

While the use of harmonic drawbars seemed totally logical to Hammond engineers and technically-minded musicians, it tended to confuse and alienate others accustomed to thinking in terms of traditional drawknobs or stopkeys, voiced and preset by the organ builders.

## The early Hammonds

The first Hammond which I heard to advantage was an early model installed in the then-new studios of Sydney radio station 2CH, and frequently played by Des Tanner. Yes, it sounded somewhat 'electronic', but by no means unpleasantly so. And if it lacked the harmonic complexity of a pipe organ, it was far more pipe-like and listenable than any reed instrument I had ever encountered.

Being much less expensive and far easier to install than a pipe organ, later and more highly specified models found their way progressively into concert halls, large churches, theatres, resorts and radio/recording studios around the world.

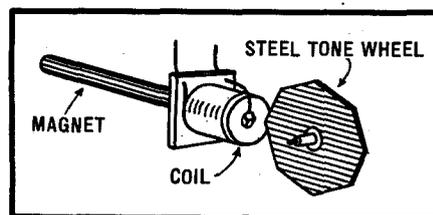
An odd copy of the *Hammond Times*, which ended up in my files, features a Hammond organ with orchestra at the

Hamburg Opera House (Germany), at radio studios in Warsaw and Poznan (Poland), at the Sacred Heart Cathedral in Broken Hill (NSW) and the Savoy theatre in New Lambton (Newcastle, NSW) – played at the time by Wilbur Kentwell. These, plus hotels and entertainment centres in various countries, and accomplished organists touring with a Hammond.

According to the Theatre Organ Society, other resident organists featuring on theatre Hammonds in the Sydney/Newcastle area in the 1930s and '40s included Jim Williams, Les Waldron, Ron Boyce, Iris Mason, Peter Rowe, Geoff Robertson, Stanfield Holliday and Des Tanner.

For smaller churches and private homes, the spinet models also proved popular, being notable for their reliability, freedom from tuning worries and the 'roundness' of their sound.

Some of those early Hammonds are still soldiering on, tonally bland by comparison with modern solid-state instruments but distinguished by the fact that, with their sinusoidal tone structure, mis-



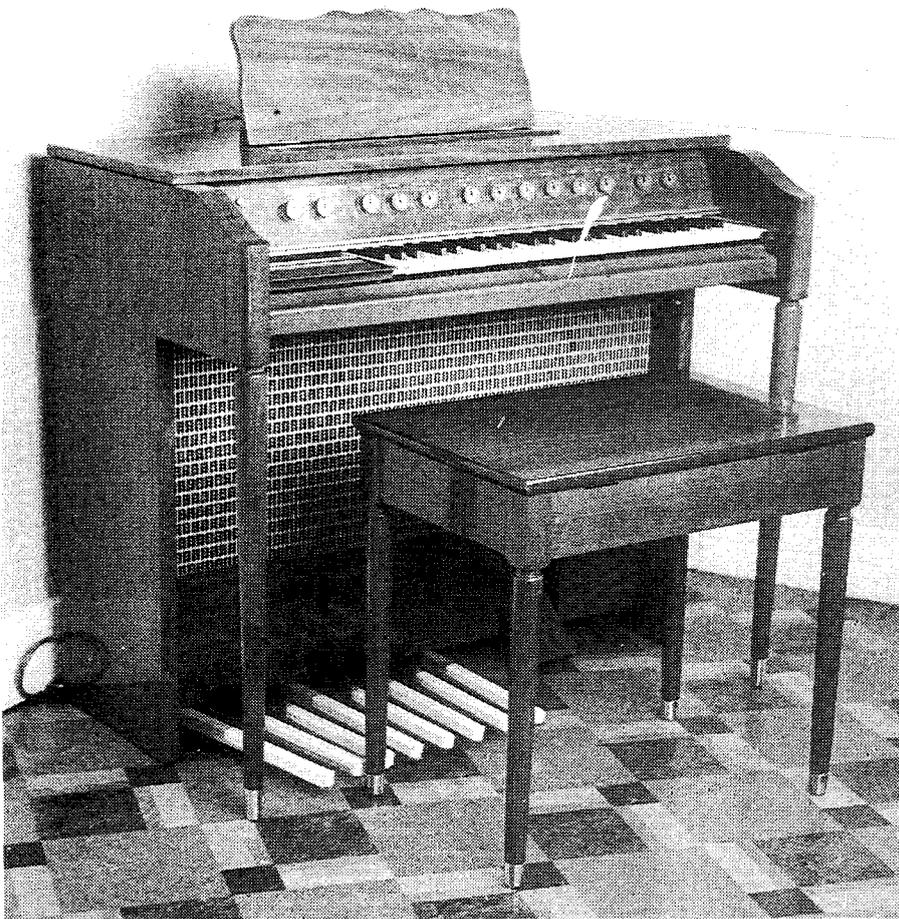
**The Hammond principle involving a magnetic pick-up coil adjacent to a spinning tone wheel. The serrations could be cam-like flats for very low frequencies, and actual teeth for high frequencies.**

takes by inexperienced players are never quite as noticeable as on an instrument with a more prominent harmonic structure.

But all that is now history. The tone wheels have given way to crystal locked solid-state signal sources, and even the Hammond name has changed hands. Sad, even if sentimentally so!

## Building one's own

Such was the appeal of the early Hammonds that the idea of building one's own grabbed quite a few organ



**The Stromberg-Playmaster kit organ, described in this magazine during 1961-2. Small electronic organs like this took over from reed instruments, showing the way for bigger and better spinet models which are now routine in homes and small churches.**

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enthusiasts – particularly electronics engineers with mechanical skills, and vice versa.

The first in the Sydney area, to my knowledge, was built in the late 1930s by Neville Oates, an engineer at Stromberg-Carlson, who was subsequently involved in that Company's belated and abortive venture into electronic organs.

Encouraged by his success, a group of engineers and enthusiasts addressed themselves to the same task, pooling their resources to organise the necessary bits and pieces in job lots. One member of the group was a friend from the old Reliance Radio days, Ray Tonks; another was Ernest Benson (now Dr Benson, retired), a senior AWA engineer.

Back in 1942, I remember visiting Ern Benson's home to look at his finished organ, in the company of R&H science writer Calvin Walters – an amateur pianist with a ready repertoire of popular tunes. Ern had the console and loud-

speakers set up in the lounge room and the tone generator mechanism in the basement, with signal cables coming up through the floor. As I write this, it is still working, 47 years on!

Not surprisingly, my brother and I decided that this is what we'd really been looking for. I supplied the good intentions; he set to work to stamp out a couple of hundred mild steel discs for the tone wheels – but that's about as far as we got.

Talking with him during the preparation of this article, he remembered where the pile of steel discs had finally ended up: as counterweights for the home-made tilting door on his garage!

### The Stromberg/Playmaster

My ultimate venture into organ building was much less adventurous. Faced with a downturn in the production of TV receivers, Stromberg/Carlson A'asia had reached agreement with Thomas organs in the USA to build and market their basic single-manual model in Australia.



**The organ which convinced the writer of the futility of building one's own: the GEM C-150. With an excellent array of preset voices on both manuals, accessed by tabs, it even included a set of Hammond-like drawbars for the upper manual.**

Production had barely got under way when the Company was faced with closure and, as Editor of *Radio, Television and Hobbies*, I was asked whether we would like to present the organ as a home construction project – to absorb the inventory of components which Stromberg-Carlson had purchased.

We took up the offer and the project was covered in a series of articles in the magazine beginning in December 1961. In fact, I/we went one better, by adding extra facilities and voices not provided in the original instrument.

With a price tag well below market prices at the time, quite a few of the organs were built by readers for private use or for installation in small churches. Simple though they were, they were invariably preferred to the existing reed organ.

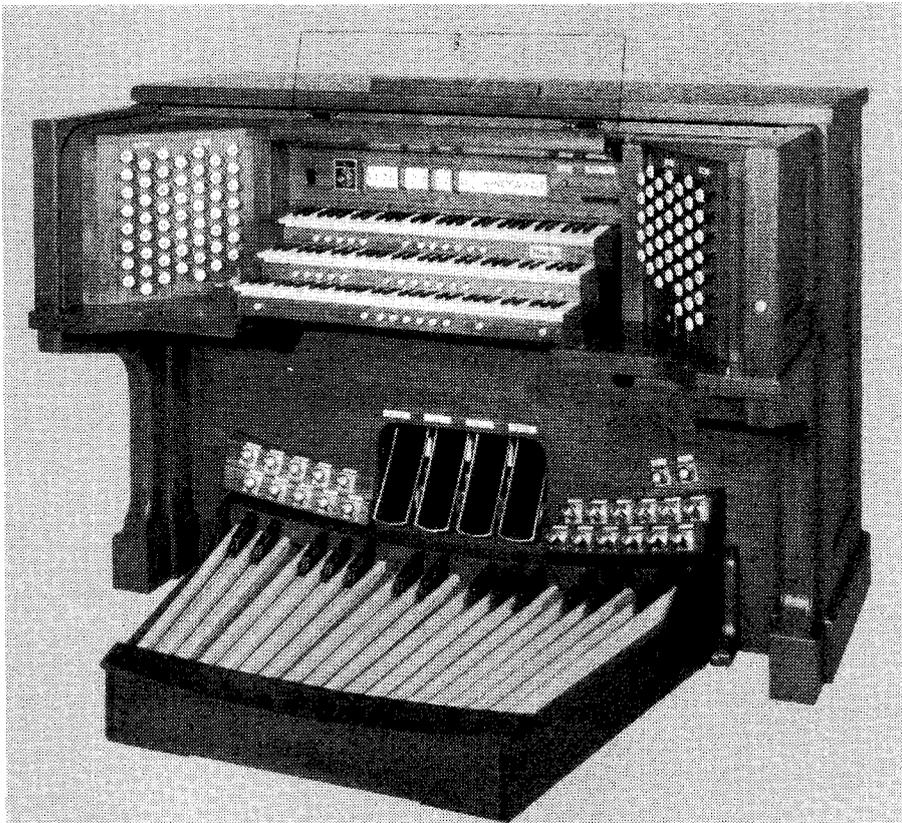
Electronic organs have since become routine in small churches and the homes of amateur organists; a reed organ, still in place, is a now real curio. Why else would I spend an hour in a relative's home in the Shetland Islands, re-activating enough reeds in their long-silent organ to play a few tunes from the kirk hymnbook? Or talk my way into playing few chords on an organ similar to my late grandmother's Estey, in the Wingham (NSW) Town Museum?

But home construction of electronic organs of any description is now a rare exercise – despite the efforts of Jim Rowe, a few years back, to re-ignite interest. The simple fact is that the economics of developing and presenting a design and marketing the necessary components is totally against it.

At a stage when I might well have proceeded, personally, to build something more pretentious than the Stromberg/Playmaster, Grace Bros came up with an Italian-made solid-state GEM (Generale Ellettromusica) organ. Apparently based on build-it-yourself circuitry devised by Philips, in Eindhoven, it was attractively priced and very well voiced for church and home use. What's more, I could have one immediately. So I said "yes", took out my wallet and put my soldering iron away!

The GEM has since given place to a more modern Technics, with electronic rather than mechanical keying, electronic chorus and tremolo, and various other refinements. But that, in turn, is 'old hat' to what small churches and amateur organists can acquire nowadays, if they are prepared to loosen their purse strings a bit.

Incidentally, one of the reasons Jim Rowe was looking into electronic organ design in the 1970s was because he'd



*From my files, this 1983 model Allen digital computer organ ADC 8000 employs an AGO standard drawknob console and provides the equivalent of 78 stops or 94 ranks, with 'no unification or duplexing'. Without being alerted, few would be aware of the difference in sound between it and a large pipe instrument.*

come to realise that he'd never get around to using the pipe ranks that he'd once bought and stacked in the loft! If, as Editor, I couldn't find time to build a more pretentious electronic instrument, I can't imagine how one would ever get around to tackling a pipe organ!

### **Cinema organs again**

When large luxury theatres were overtaken by the television era, the old Wurlitzers and Christies were unceremoniously ripped out, to clear the way for wide-screen multi-theatre complexes. The organs would have become so much junk, had it not been for the intervention of enthusiasts who bought them for a fraction of their original cost and somehow managed to store them against the day when they could be rebuilt.

Without being able to quote actual figures, a lot of them certainly have been rebuilt, and are variously available again for regular use or special occasions.

In my own area, the big Christie that was once the pride of the Parramatta Roxy is currently being refurbished and re-installed in the new Hills Centre at Castle Hill, Sydney. Donated to the

Centre by its rescuers, they claim that, when complete, it will be the largest surviving Christie in the world.

No less interesting is another old Christie currently installed in the Epping (Sydney) Baptist Church. Obtained originally from the nearby Eastwood theatre, the church re-installed at the time as much of it as seemed appropriate to their requirements.

Recently, faced with the need to refurbish the instrument, they decided to return it as near as possible to original specifications and to take advantage of extra ranks which had become available.

Built, in the first instance, by a manufacturer of classical organs, Christies have considerable potential in that role. In the hands of an organist like Cliff Bingham, the refurbished Epping instrument performs as a Christie always did. But equally, in periodic recitals by well known concert organist David Rumsey, it assumes a totally different personality.

But this has not come cheaply, and it never does. It takes a lot of money - \$200,000 in the case of the Roxy Christie - to 'adopt', refurbish and re-install a big pipe organ. This is just for

essential materials and professional services. Even then, it would be impractical in most cases but for a huge number of 'person-hours' donated by supporters and enthusiasts.

Meanwhile, the most pretentious electronic organs, like the big computer-based Allens, have overtaken small pipe instruments and are getting ever closer to the sound of their large acoustic counterparts. Somewhere down the track, pipe organs too may become a rarity, if not a curio.

But it will take a bit of getting used to. Listening to a well-played pipe organ, large or small, the organist is seen intuitively as an accomplished 'musician'. Playing a traditionally styled electronic, the point can still be conceded. But standing alongside someone playing a big Yamaha, with its row upon row of computer-like buttons and lights, the lingering mental image is of a musically gifted technician.

I have a sneaking suspicion that it's the extension of an image that dogged Des Tanner and Wilbur Kentwell, in the tone wheel Hammond era! An image that was encapsulated in a remark made by our former Editor John Moyle: "It's like playing your own amplifier!"