

CHAPTER 14

The Great Adventure

The next six months from May 1955 were the most dramatic in my career, covering the transition from public service to private enterprise - but I was so busy that there was little opportunity for the more significant changes to sink in. Sure, I had been busy like this before, especially during the radar developments in World War II when I had to work night and day to meet deadlines, but this was work I enjoyed as never before - and the thrill of facing unexpected difficulties and finding ways to overcome them was an experience never to be forgotten.

In a sense it was all an adventure into the unknown. At that stage the success of commercial TV in the USA and Canada had been well established, but commercial TV had not yet begun in England and public acceptance of BBC television had been slow and uncertain. The established services were in monochrome. Colour TV was limited to a few special programmes in the USA and no colour standards had been determined for 625 line television.

There was no doubt whatsoever that overseas equipment could be obtained to provide in Melbourne a television station with any degree of facilities required, but the equipment was costly. The one indeterminate factor was the rate of public acceptance

and the degree of accompanying commercial sponsorship which could be expected in Australia.

Therefore it was natural that the HWT should approach the question of capital investment with due caution. The stakes were high, and the financial returns uncertain.

Of the first four commercial TV licences granted on April 18th, 1955, three had been issued to new companies, formed as consortia of several existing organisations specifically to provide a TV service. The licence granted to HWT was the only one to go to a single well-established firm. In due course the required new company was formed, called Herald-Sun TV Pty Ltd.

The HWT licence application had proposed the conversion to TV studios of an existing company building in South Melbourne and the establishment of a TV transmitter on a site purchased by the company on Mount Dandenong. The application included a proposed list of equipment, prepared in collaboration with AWA Ltd of Sydney, and an estimate of the proposed staff required.

When I first visited the proposed studio site with Keith Cairns on April 20th my heart sank. On the north-east corner of Dorcas and Wells Streets stood a single storey brick cottage, and embracing this on the north and east sides was the L-shaped two storey brick building

intended for conversion to TV studios. This building had originally served as a garage for Herald vehicles, after which it housed the activities of Herald Gravure printers until they moved into premises in Burwood Road, Hawthorn. In 1955 it was being used as a warehouse for books and magazines and was largely empty.

The ground floor area comprised about 12,000 square feet. About three quarters of this had a ceiling height of about 23 feet, and the remainder comprised two floors with some penthouse accommodation at roof level. The high ceiling area had accommodated printing presses, whose foundations were still there. There were large ink-tanks in a small adjoining basement. The main entrance was in Wells Street, with a goods entrance in Dorcas Street. The building was backed by Wells Lane on the north side and by single-fronted cottages to the east.

The building was old and reasonably solid, but the first impression gained was one of neglect and decay. Reasonably close to the city, it was well served by roads and public transport - but it was obvious that the task of conversion to television studios was going to require imagination and considerable ingenuity. A proposed studio tower, for RF links incoming from outside broadcasts and outgoing to the Mount Dandenong transmitter, also had to be accommodated on the site.

As soon as the TV licence was granted, the Herald set about providing temporary office accommodation for TV planning activities on the first floor of this building, with wood and glass partitions, adequate lighting and necessary office furniture - accessible from Wells Street.

To begin with there were four of us. Keith Cairns, our Manager, began his career as a journalist and after four years as Chief of Staff in the Sun News Pictorial he went overseas in 1953 to study TV in Britain and the USA. On his return he assisted Bert Pacini in TV planning. Keith was 42, a year my junior.

Lyle Lloyd had completed a diploma in radio engineering at RMTC after his discharge from the RAAF. He had married a young English girl, Valerie, whom he met when training with EMI at Hayes. Lyle was 30 and a great enthusiast. He loved working with equipment and had been well tutored in the policy aspects of the HWT during his three years at radio 3DB with Max Hooper.

The fourth member of the team was Janet Salmond, who had worked as a secretary in the Herald office since leaving school at MLC. Her spare-time hobby was basketball, and she brought youth, enthusiasm and exceptional ability as a shorthand typist and as a very diplomatic secretary to Keith Cairns. Jan was not yet 21.

As it was intended that Lyle Lloyd and I should travel overseas to investigate current TV practices and discuss orders for equipment, it was necessary to make arrangements for the planning work to continue during our absence. Accordingly it had been arranged that Ted Allen, Chief Engineer of radio 4BK, Brisbane, should come to Melbourne on loan, to work with us. It was envisaged that, if his company should eventually obtain a commercial TV licence in Brisbane, Ted would become their TV Chief Engineer. 4BK was associated with the HWT and Ted had been their Chief Engineer for 11 years and also Assistant Manager for the last 12 months.

Ted flew down to Melbourne for preliminary discussions, and on Saturday May 7th, the day after I ceased duty with the ABCB, I had lunch with him at the Society Restaurant in Bourke Street. I took to Ted immediately. He had a logical approach and a keen sense of humour. He was very diffident about his ability to hold the fort while Lyle and I were overseas. I told him we were all "learning the ropes", and I would be happy for him to learn with us. Ted returned to Brisbane to make arrangements to move down with his wife Marjorie for an extended period.

Keith, Lyle, Janet and I moved into our temporary Dorcas Street offices on May 24th, and Ted joined us in July.

The ABCB allocated channel 2 to the ABC television stations, with the call signs ABV-2 for Melbourne and ABN-2 for Sydney. Channels 7 and 9 were allocated to the commercial stations by drawing lots, resulting in -

HSV-7 for Herald-Sun TV Pty Ltd
 GTV-9 for General Television Corporation
 ATN-7 for Amalgamated Television Services Pty Ltd &
 TCN-9 for Television Corporation Ltd

All these stations were to have a maximum effective radiated vision power of 100kW. The frequency allocation of Channel 7 was 181-188 Mc/s, horizontally polarized.

Colin Bednall, who had been on the Royal Commission on Television, was recruited from the *management* of the *Melbourne Argus Newspaper* to become General Manager of GTV-9. He had been a contemporary of mine at Saints in Adelaide. Alec Raz became Manager of TCN-9 and Jim Oswin Manager of ATN-7. The aim of all companies was to begin regular programme transmissions by about the end of 1956.

In assessing our requirements for equipment and studio design, my experience during the 1951 overseas trip proved invaluable. In the Report on that trip I had stated -

"Good engineering design can result in staff economy. This applies particularly to studio building layout, equipment layout, equipment and scenery standardisation and remote control of equipment."

and

"16mm film offers considerable advantages in lower

and

"The use of similar cameras and camera control equipment for studio and OB work can result in greater flexibility in the employment of equipment and greater economy in maintenance."

and I had listed among "avenues of economy" -
"Selection of equipment requiring the minimum of operating personnel"

and

"The concentration of studio, scenery construction and scenery storage facilities at one location and on one level, to minimise cost and time of handling scenery."

In the light of these guidelines and the requirements of the ABCB "Provisional Standards for the Technical Equipment and Operation of Television Stations" - particularly in relation to some quantities - Lyle and I began to tackle the design of our television station.

The Equipment

A detailed list of equipment, with prices, had been submitted for approval by AWA Ltd. As a subsidiary of HWT, we were obliged to order the bulk of our equipment through AWA - who had supplied all radio equipment to the parent company's radio station 3DB for many years, and with whom the HWT had a long standing relationship. AWA were Australian representatives of both Marconi's and RCA.

The AWA list comprised mostly Marconi equipment and differed in many respects from that included in the HWT licence application of December 1954. Obviously it represented a later stage in Marconi equipment development, but it still fell short of the ABCB

requirements. It provided for only one studio, with two cameras and very limited audio equipment, only one Vidicon film transmission chain (made by RCA), a master control mixer without cameras, and very limited test equipment. No standby transmitter or studio equipment was included except a standby synchronising generator.

During the next six weeks Lyle and I worked flat out knocking this list into acceptable form, examining the published characteristics of every item of equipment - assessing its suitability for our requirements and the essential quantities. Our main objectives were achieving efficient, reliable and economical operation at a cost as low as practicable.

We did not doubt the quality of Marconi equipment, but it had to be of a type that could be operated by minimum staff and in combinations which would provide the most effective and reliable production and service.

The dual representation by AWA of Marconis and RCA sometimes proved embarrassing when these two companies manufactured similar items of equipment in competition. From time to time we were invaded by sales representatives from these companies, anxious to convince us of the relative merits of their products. As our order was to be the first order for television equipment for Australia, and the forerunner of many orders in the

future, it was regarded as highly important by each manufacturer.

On May 11th Lyle and I were taken to lunch by Jack Davis of AWA and Cliff Slaybaugh of RCA at the Windsor Hotel. In the evening we had dinner with John Telfer of AWA, Keith Cairns and Cliff Slaybaugh at Menzies Hotel. Discussions with Jack Davis continued for three days. These were the first of many such mealtime discussions. We ate well and drank well. On one occasion I had a session with Jack Davis and an RCA representative in one room at Menzies while Lyle was having a session with John Telfer and a Marconi representative in another room of the same hotel. It was a case of the right hand not knowing what the left hand was doing. AWA attempted to represent both manufacturers without offending either - sometimes this was difficult. Lyle and I reached the conclusion that in many respects we knew more about the requirements of commercial TV than AWA did - and in some respects more than Marconis; because although Marconis had supplied a great deal of equipment to the BBC they lacked experience in the requirements of commercial TV. They knew very little about American TV practices, which were designed to provide TV services with far greater economy in staffing than practised by the BBC.

We eventually decided to recommend appropriate quantities of Marconi equipment for the transmitter, the OB unit and the studios, with the exception of -

Studio camera pedestals
Studio audio consoles
Telecine (film transmission) camera chains
Telecine projectors
Microwave sound and vision relay links
Passive reflector for studio/transmitter relay path
Rotatable mounting for microwave relay receiver
Certain studio lighting equipment and some test equipment.

Studio camera pedestals made in the USA were more mobile and more capable of single-man operation than those offered by Marconis.

We agreed that AWA, who had made audio consoles for many years, should make those we required for our studios.

In the case of telecine chains, Marconis had offered RCA Vidicon camera equipment, but the British 16mm film projectors offered were quite unsuitable - the ones initially offered had arc-lamp illumination, which was unheard-of for 16mm TV film transmission. We kept our options open on this item.

Marconis were manufacturing microwave relay equipment for vision only, with an output of only 100mW, having limited range, with separate sound relay equipment. This we considered inadequate for reliable relay to Mount Dandenong or OB work. AWA advised us that RCA were developing a 1W sound-plus-vision microwave link, but could not give a firm delivery date. This was unacceptable. But Les Faudell told us that Raytheon in

the USA were already manufacturing 1W combined sound and vision microwave links, and his company (Television Engineering Pty Ltd) were prepared to import them for us if the necessary dollar allocation could be obtained from the Australian Government. We applied for dollar allocation for two Raytheon links, manufactured in Boston, and a passive reflector - but in case this was not granted in the time available we decided to order one Marconi 100mW link and a sound link.

The passive reflector, not obtainable from Marconis, was to mount at the top of the proposed studio tower, to reflect, in the direction of the Mount Dandenong transmitter, the microwave relay signal sent up to it from the studio building. This we decided to do in order to avoid the necessity of technicians climbing the studio tower to adjust or maintain the microwave transmitter. For the same reason, we desired to mount an OB microwave receiver at the top of the studio tower on a rotatable mounting, remotely controlled from the studios below - so that this could be turned to receive incoming OB signals from any direction without having to climb the tower (except for maintenance attention). Such a rotatable mounting was available from America but not from Marconis. We requested AWA to order one from Houston Fearless in Los Angeles, together with pedestals for our studio cameras.

We required two microwave links between the studios and Mount Dandenong, as a precaution against failure of one during transmission - this was our life-line! I saw no reason why the passive reflector should not be used for both signals. Experience proved this to be quite satisfactory.

We decided to keep our options open regarding some of the studio lighting equipment, pending further investigations overseas; and some test equipment. Lyle and I completed our draft of the equipment list on June 13th. Broadly the equipment proposed provided for -

- An OB van with 3 cameras
- Two live studios with 2 cameras each and more elaborate audio equipment than proposed by AWA (who had listed only one studio)
- Two vidicon film transmission cameras (AWA had listed only one).
- Two 16mm film projectors to be selected (AWA proposal was unacceptable).
- One "Telop" opaque card projector and two slide projectors.
- One set of microwave relay equipment
- One complete sound and vision broadcast transmitter
- Kliegl extensible pantograph suspensions for studio lighting.
- More extensive test equipment than proposed by AWA.

but including no standby equipment except a spare synchronising generator.

The two 16mm film projectors were subject to later selection when we went overseas.

Two microwave 1W relay links and a passive reflector were to be ordered from Raytheon subject to a dollar

We intended the control room of the smaller studio to serve as a master control room also.

The Marconi TV cameras were available with either 3" or 4.5" Image Orthicon camera tubes. The 4.5" tubes were a new development and had been subject to some adverse criticism. Some users had reported that they suffered severely from microphony, displaying fine horizontal bands in the picture as the result of any accidental mechanical or acoustic shock. We decided to ask for the 3" tubes, knowing that 4.5" tubes could be substituted later if this trouble was overcome (and if they gave superior performance) by changing the deflection yokes in the cameras.

The list was then passed to the printers and we received the first proofs four days later. It took another four days to check and correct these - they were in great detail - and on June 22nd the Herald Board approved the equipment purchase in principle, subject to a detailed examination by Mr Phil Jones, General Manager of the Herald. Next day we had a torrid session with Phil Jones, in which we succeeded in justifying all our departures from the original AWA recommendations for equipment. He finally approved our list in toto.

To have \$250,000 worth of equipment approved by one man in less than a day was a completely new experience

for me, and my first shock appreciation of the difference between private enterprise and public service procedure. It was miraculous! Keith Cairns and I spent the next two days assembling the multitude of sheets comprising the list, in the form of a firm order on AWA. The company's covering letter of July 7th emphasized the importance of delivery and installation of the equipment in time for the 1956 Olympic Games to be held in Melbourne. AWA had promised priority in delivery - the main items to be ready ex works in December 1955.

In September, Ken Owens from Marconis came to Australia for discussions on the TV equipment to be supplied through AWA to the Herald and also to the ABC and to Amalgamated Television Services in Sydney - whose order followed ours in many respects.

Early in July, Lyle departed for the USA to spend several months gaining operational experience at TV station WEWS in Cleveland, Ohio, by arrangement between the Herald and James Hanrahan. Lyle's wife Valerie continued on to England to stay with her parents, Mr and Mrs Draffin at the London suburb of Uxbridge, until the end of the year when Lyle was due to move to Britain to spend time at the Marconi factory. During Lyle's absence overseas, Ted and Marjorie Allen occupied his flat, which was a convenient arrangement.

Colin Fraser, formerly Deputy Chief of Staff at the Herald, joined the HSV-7 team to become Programme Manager, and followed Lyle to gain TV experience at WEWS and later at US and British studios.

Norm Stuckey of the Sun photographic staff joined as a news-film specialist, and Robin Clarke, a young Melbourne engineer came to work with us as an assistant to Ted Allen during my projected visit overseas.

I gave Lyle a list of things I would like to know more about, especially in the operational and maintenance field, and I looked forward to joining him later in Cleveland.

The Studios

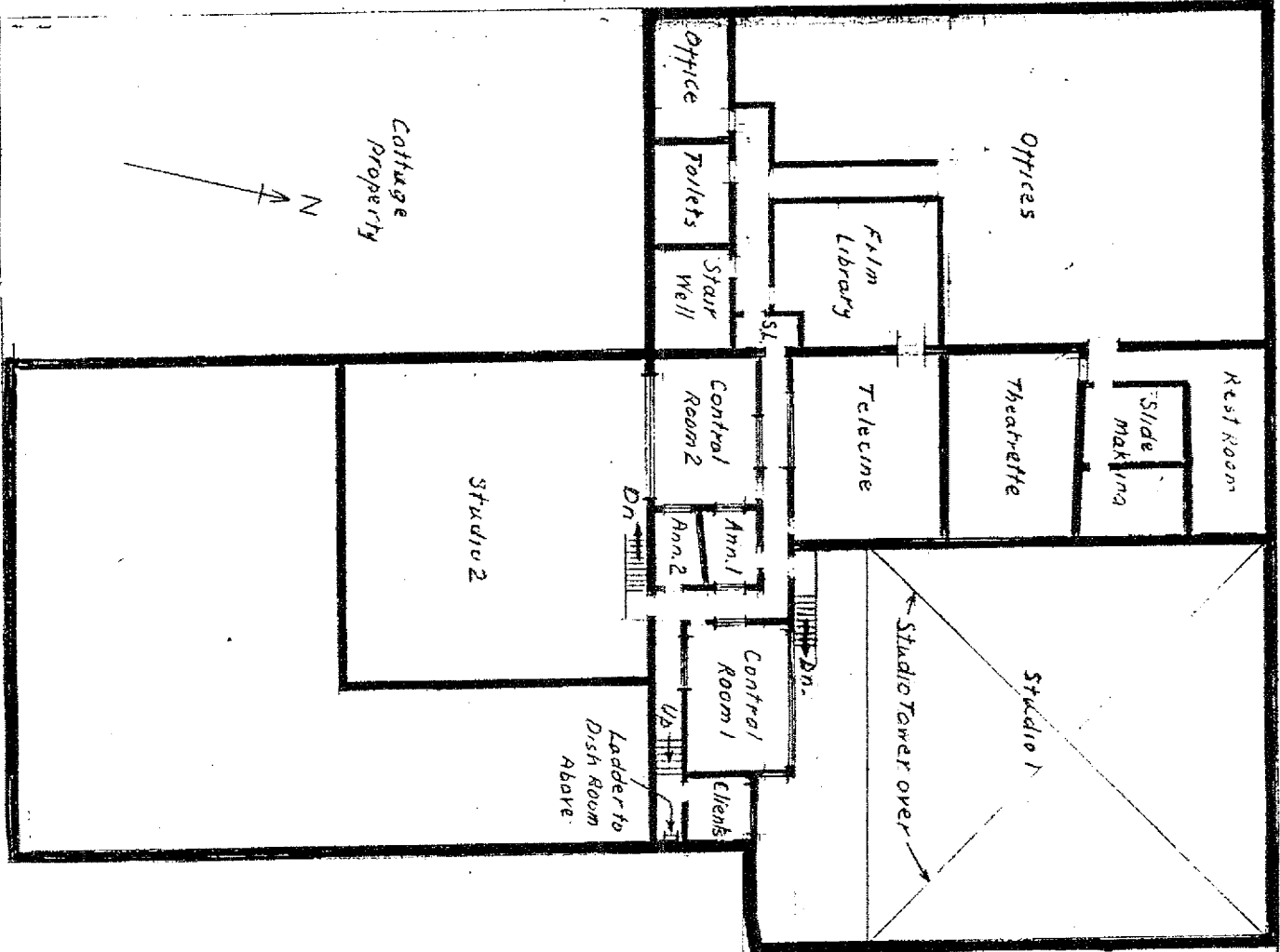
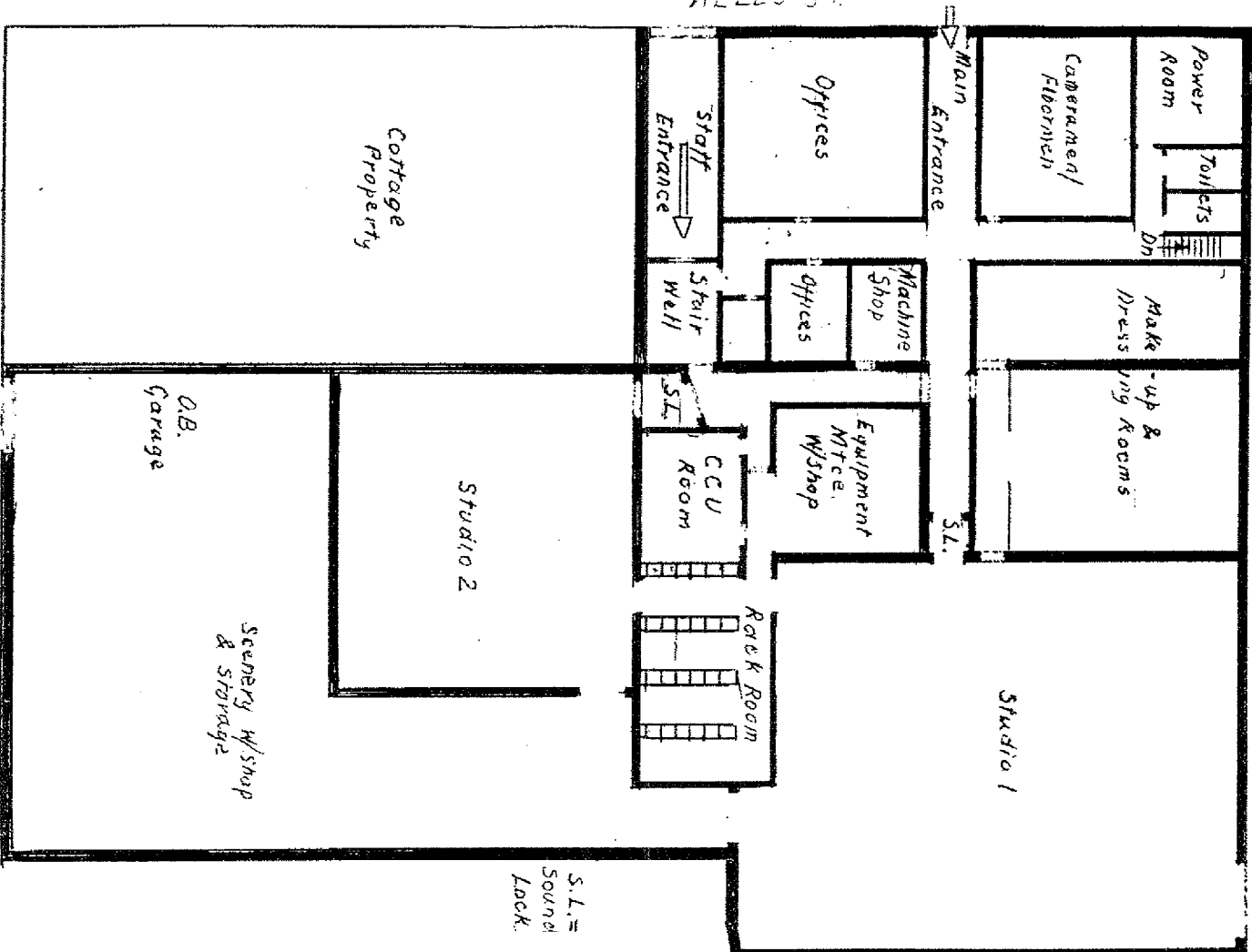
Tompkins and Shaw, architects to the Herald, were able to provide dimensional drawings of the existing South Melbourne building. We had initial discussions with Max Shaw and Ake Jodell, one of his staff, who was to become a close associate and friend of mine for the next twenty years. Ake was born in Sweden. His father had been associated with the development of the Electrolux motorless refrigeration system. He was a very capable young architect and I learned to respect his advice and opinions, but at that stage he knew nothing about the design of television studios. I briefed Ake with information I had obtained from my 1951 trip and reading.

To meet the ABCB requirements we had to provide two production studios with adequate sound isolation and acoustic treatment and with associated control rooms. Film transmission equipment had to be accommodated, and microwave relay transmitting and receiving equipment. Garage accommodation had to be provided for an OB van.

The multitude of rack-mounted sound and vision equipment associated with the generation of studio and film programmes had to be housed, with space for maintenance - in addition to office accommodation and areas for scenery storage, art-work, make-up, film handling, film storage and emergency power plant.

It was decided that the main production studio should be located at the north-east corner of the L-shaped building - where it would be well isolated from traffic noise and adjacent to Wells Lane, with a 10ft x 12ft high door for delivery of production material, including motor cars. The smaller production studio should be in the southern leg of the building, together with storage space for scenery and "props" and garage accommodation for an OB van with access from the existing Dorcas Street goods entrance.

The remainder of the accommodation required should be fitted into the existing two stories forming the west leg of the building.



DORCAS ST.
Ground Floor

Scale
0 4 8 12 16 20 24 ft.

First Floor

However, the space proposed for the main studio had a width of only 40ft, east of the two storey part of the building. This was quite inadequate, as a minimum dimension of 50ft is required for major live camera production work. Fortunately a 13ft wide cottage fronting Wells Lane on the east side of the building was available. This was acquired and demolished. By demolishing also part of the north and east walls of the Herald property we obtained sufficient space to build a 50 ft wide studio.

The general format of the studio accommodation then began to emerge. Across the centre of the high ceiling part of the building, running from west to east, would be a new 20ft wide two storey brick structure. On the upper floor of this would be the two studio control rooms - separated by a dog-leg passage - one with a window overlooking the smaller 1200 sq.ft studio to the south, and the other with a window overlooking the main 3000 sq.ft. studio to the north. Between the two control rooms there would be two announce booths for "unseen" announcements, with windows giving sightlines to the control rooms. Narrow staircases would descend from each control room to the associated studio, for easy access by production staff.

On the ground floor below would be located the camera control units and all rack-mounted equipment -

with cabling rising up through the ceiling to the control rooms above. There would be a passageway through this rack-room, between rows of racks, leading from one studio to the other - with sound-proof doors - so that cameras could be moved rapidly from one studio to the other as required for production or emergency replacement.

Beyond the eastern end of the new structure would be an access aisle, for scenery from the storage area to the main studio, and above this would be a small viewing room overlooking that studio (for clients). Above that again, a dish-room at roof level to accommodate the microwave link transmitters sending programme to Mount Dandenong. The scenery storage area would have 12ft high doors providing access to both studios near the eastern centre of the site.

In the existing first floor space of the building, adjacent to the control room area, would be the film transmission (telecine) room and below this would be a maintenance area adjacent to the rack room and camera control units.

Dressing and make-up rooms for artists would be located at ground floor level adjacent to the west side of the main studio, with passage access to the small studio past the maintenance area.

The electric power switching room would be at the north-west corner of the building adjacent to the SEC mains running down Wells Street. An emergency power generator would be housed in the old ink-tank basement.

The film handling and storage, and office accommodation would take up the remainder of the existing two-storey section.

This general layout was developed in collaboration with Max Shaw, who was happy to accept our requirements - based largely on my experience of commercial TV practices in the USA - and who prepared the necessary architectural drawings with Ake Jodell.

Ted Allen threw himself wholeheartedly into the development of the studio plans with me. Although we sometimes had heated arguments with the architects over small details, these never lasted long and our working relationship was generally very happy.

We needed a draftsman to prepare our non-architectural drawings, and Lyle recommended a young Englishman who had worked with him at EMI and had migrated to Australia with his wife. We engaged him as a draftsman in August.

I felt we had arrived at a satisfactory use of an unpromising site, which should result in the economical use of staff and equipment.

The proposed layout offered a number of important advantages -

1. Grouping all camera control units together would facilitate use of different combinations of cameras.
2. The passage between studios would permit different groupings of cameras and allow rapid replacement of a faulty camera.
3. The location of announce booths would allow their use with either control room.
4. The proximity of telecine and the control room for the main studio would facilitate the use of the other control room as master control.
5. The American type pedestals for studio cameras would allow each to be moved and operated by one person.
6. The location of the rack room and camera control units below the studio control rooms would simplify installation cabling.
7. The location of the OB garage would enable the OB van to be used as a control room for the smaller studio when required, and in the preliminary training of staff.
8. The use of a passive reflector and a rotatable mount on the studio tower would simplify adjustment and maintenance of microwave relay terminals and minimise man-hours lost in climbing the tower.

In August the Herald-Sun TV Pty Ltd company was formally incorporated with 637,000 shares held by the HWT and 112,500 held by Associated Newspapers Ltd, London.

The Studio Tower

In the December 1954 application by HWT for a TV licence it was stated

"A self-supporting steel tower of approximately 200ft in height will be erected on top of the studio building to carry the antennae for the studio-transmitter microwave link and also the antennae for the reception of signals from the outside broadcast unit."

and

"Special surveys have established that line of sight exists from this point to the proposed transmitter site on Mount Dandenong, and that no interference would be caused by the existence of the adjoining Shrine of Remembrance."

The Shrine of Remembrance being in the Domain, just across St Kilda Road.

A survey of the proposed studio-to-transmitter path had been made by Messrs Meudell Gillespie and Co, showing the spatial relationship of the top of the Shrine to this path - assuming a tower height of 200ft above street level. At that time frequencies for microwave TV relay links had not been determined.

It was known that frequencies to be allocated for microwave links between TV studios and Mount Dandenong would be in the vicinity of 7000 Mc/s, and calculations showed that the Shrine of Remembrance would be well outside the first Fresnel Zone at such frequencies for the proposed studio-to-transmitter path - a necessary condition for satisfactory transmission free of adverse reflections from the Shrine.

The proposed tower height of 200 ft was considered satisfactory for OB reception above surrounding buildings with the limits of building height then determined by the South Melbourne Council. However there were two problems to be solved - how to accommodate such a tower on the studio site and to obtain the necessary permission for its erection from the South Melbourne Council.

To accommodate the tower I proposed that it should straddle the main production studio. As we required a

clear ceiling height of about 23ft for studio lighting equipment and air conditioning ducts, and as this studio was to be 50ft wide and 60ft long, this meant that the tower would have to stand on four vertical legs about 25ft high - with no bracing between the legs on one side.

This was discussed with Tompkins and Shaw and with Johns and Waygood, who pronounced the plan feasible and undertook to design the tower with an overall height of 225 ft and with cross bracing between the vertical legs on the north, west and east sides only. The legs were to be built into the new solid brick walls of the studio and the steel roof-truss of the studio was to become an integral part of the tower. Massive reinforced concrete footings were to be provided below the studio floor level.

At the top of the tower there was to be a 10x12 ft platform and surrounding railing, with provision for attaching the passive reflector at the south-west corner. There was to be a railed walkway surrounding the tower at the 101ft level, with a ladder and protective enclosure on the west side of the tower providing access to this walkway, to the topmost platform, and to another walkway just below that at the level of the bottom of the passive reflector. The 101ft walkway would provide mountings for some OB relay terminals not requiring the full height of the tower.

The proposed rotatable mounting for a 6ft paraboloid (or "dish") for DB reception was to be mounted at the centre of the top platform, with the associated control and signal cables housed in a duct beside the access ladder.

Keith Cairns approached the South Melbourne Council for approval to erect the studio tower. There was a good deal of debate among Council members but eventually approval was given and a contract for the supply and erection of the tower was placed with Johns and Waygood on October 6th, stipulating completion by the end of February 1956.

The passive reflector, to be ordered through Raytheon in the USA, was 12ft high and 8ft wide, faced with a sheet of perforated aluminium on a tubular duralumin frame. It was to be supported at the base by a single pivot, and at the top by a V shaped outrigger - so that it would be tilted downwards. Its orientation was to be adjusted by turnbuckles in two wire stays to the top corners, and its tilt was to be adjusted by a large horizontal screw securing the bottom pivot point.

If the transmitting "dishes" of the main and standby studio-to-transmitter relay links could have been mounted vertically below the passive reflector, on the east side of the tower which faced Mount Dandenong, the adjustment of the passive reflector and the transmitting dishes

would have been simple. However, the tapered framework of the tower, rising from its 50ft square base, made this arrangement impossible. The transmitting dishes had to be located in the small 7x12ft "dish room" at roof level, immediately south of the south-east leg of the tower. This room was to have a fibreglass roof, transparent to the microwave signals.

This arrangement meant that calculation of the necessary orientation and tilt of the passive reflector, in relation to the microwave beams rising from the transmitting dishes below, presented a most complex problem. This was so because the upward microwave beams and their reflections towards the Mount would not be in a common vertical plane, and also the upward beams would not be in a plane perpendicular to the line of sight from the top of the tower to Mount Dandenong.

It was necessary to determine the correct angles of orientation and tilt to ensure that the passive reflector (and the transmitting dishes below) could be suitably mounted and adjusted to send the signals in the right direction to Mount Dandenong. Without this angular information, adjustment of the system would have been well nigh impossible, or at the least extremely laborious and akin to finding the proverbial "needle in a haystack".

I evolved a geometric method of determining these angles, requiring extremely accurate drafting and employing a system involving the measured rotation of groups of members to bring them into coincidence in various planes, vertical and horizontal. I was disturbed to find that our new draftsman had done no mechanical or structural drafting work - he was essentially a circuit draftsman, but as such he could place lines on paper with commendable accuracy using the large drawing board and drafting machine we had purchased.

To ensure correct sequence of drafting moves I personally directed the necessary geometric construction, and saw that accuracy was maintained throughout. Ted Allen was somewhat sceptical of this procedure, and doubted the accuracy of geometric construction in obtaining the answers we arrived at for the orientation and tilt of the passive reflector - namely orientation 31.3 degrees from the north-south building line and 48.3 degrees tilt from the horizontal. Mr Jaeger, the tower design engineer of Johns and Waygood, was also sceptical of our results.

While I was overseas, a few months later, Ted constructed a scale model - with a mirror representing the passive reflector and small lights representing the transmitting dishes. He obtained exactly the same results as those given by my geometric construction. Mr

Jaeger calculated the necessary angles by trigonometry.

He also obtained the same results.

I received news of these verifications from Ted when I was in the USA. My geometric method had been vindicated, and we felt able to approach the installation of our passive reflector with confidence.

The Transmitter Tower

In the HWT application for a TV licence it had been stated -

"On approximately one acre of land already owned by the Company on Mount Dandenong we would erect a modern, brick, fire-resistant transmitter station capable of housing equipment and emergency plant"

and

"Soil tests of the area confirm its suitability as a site capable of withstanding the stresses of the 400ft self-supporting tower, plus high gain antenna, we propose to erect."

The application gave the results of a survey of projected coverage, prepared by AWA, based on the assumption of 100kW effective radiated power from an omnidirectional aerial at a nominal frequency of 195 Mc/s. Service to Geelong was regarded as an important requirement.

At the time the licence was granted the ABCB had already determined Mount Dandenong as the required location for Melbourne TV transmitters. The PMG's Department had acquired a site adjacent to the Herald

property, which was on an area known as Barnes Lookout. The Herald site was in an unrivalled position to serve Melbourne, with land falling away very steeply in the direction of the city. The site was in the shape of a blunted triangle, with the PMG property sharing the 417ft long northern boundary. Both properties were bounded at the eastern end by Eyre Road which branched off Ridge Road (leading to the Mount Dandenong summit) and terminated at Barnes Lookout (now re-named Burke's Lookout).

A small 3-room weatherboard cottage occupied the upper part of our site, close to Eyre Road.

The PMG's Department's plans provided for the erection of a self-supporting tower to transmit the National programme service of ABV-2, in the 63-70 Mc/s allocation. To avoid mutual interference, the ABCB required that the HSV-7 and ABV-2 radiators should be at different heights. This determined the minimum height of the HSV-7 tower, which was fixed at 324ft. The surmounting 16 stack high-gain radiator to be supplied by Marconis was 72 ft high, giving an overall height of 396 ft.

A decision had to be made as to whether we would provide a self-supporting tower or a guyed mast, which would be considerably cheaper.

On the highest ground, the Herald site was only about 120ft wide. If a guyed mast were to be erected there, two guys could be anchored on the Herald property, but a third would have to be anchored in the adjoining PMG property. I went to see Jim Wilkinson, my old colleague in the PMG Radio Section at Jolimont, who was responsible for coordinating the provision of all radiator structures for the National broadcasting and TV services. On examination, Jim found that, with the suggested HSV-7 guyed mast, the guy anchored in the PMG property would interfere with the incoming microwave relay programme signal from the projected ABV-2 studios at Ripponlea - a southern suburb of Melbourne. A guyed mast was therefore unacceptable.

So we asked Johns and Waygood to design a 324 ft self-supporting tower with a platform at the top, having provision for mounting the 72ft high 16 stack Marconi radiator. The tower was to have an intermediate walkway at the 112 ft level on the side facing Melbourne. An access ladder, suitably guarded, was to be provided on the opposite side. The Johns and Waygood design called for a 55ft square base, with buried reinforced concrete footings within an 82ft square area.

Marconis had supplied a horizontal polar radiation diagram for the radiator, which showed four clearly defined major lobes at 90 degrees apart. As it was desired to provide the best possible service to Geelong,

58 miles distant with two thirds of the path over the water of Port Phillip Bay, it was decided to orient the tower so that one of these major lobes would point in the direction of Geelong.

Examination of maps and the surveyed plan of the transmitter site showed that the footings of the proposed tower could just be contained within the site boundaries when the tower was so oriented at the highest part of the site.

Lyle had determined the desirable size of a rectangular brick building, about 40x90ft, to house the transmitter, with separate rooms for maintenance, staff kitchen and possible future telecine equipment for late-night programming. A small second floor penthouse was to be provided on the western side to house the microwave receiving dishes (for programmes incoming from the South Melbourne Studios) behind a large perspex window.

From the contoured survey plan of the site, I made the necessary earthwork calculations to allow for the levelling of a 90ft square area for the tower, and the use of the spoil to form a 50ft wide terrace at a slightly lower level on the downward slope towards Melbourne. Max Shaw was happy for the proposed transmitter building to be constructed on this terrace, with a loading area at the south end to be connected to

Eyre Road by a service road skirting the base of the proposed tower.

The first job at the site was to move the existing weatherboard cottage 180ft to a position just below the proposed terrace and near the north boundary. This was done without appreciable damage to the cottage, which was to be the home for a transmitter engineer. On September 26th bulldozers began the levelling operations. It was necessary to remove six eucalypts to make room for the terrace.

A surveyor was engaged to stake the position for the tower centre and the lines of sight in the direction of Geelong and in the direction of the Studios. Excavation for the tower footings then commenced and the pouring of 200 ton of concrete began on November 2nd. The contract for the tower had been placed on August 25th.

Due to interaction between the direct radiated ray and the ray reflected from the intervening ground, the received signal strength from a TV radiator fluctuates as you move away from the transmitter - passing through a series of peaks and nulls which are particularly pronounced at short distances from the transmitter. At the Channel 7 frequency this would have meant a poor service to nearby districts such as Lilydale, Croydon, Ringwood, Bayswater and Boronia which lie only 3.5 to 7 miles from the transmitter site.

Further, because of the height of the Mount Dandenong radiator (approximately 2360ft above sea level) and the curvature of the earth, both Geelong and the area to be served around Melbourne would be well below the horizontal as viewed from the radiator. The 16 stack Marconi radiator was to produce a relatively flat horizontal beam, and the received signal strength in the areas to be served would be improved if the beam could be tilted slightly downwards.

In the RCA publication "Broadcast News" for September/October 1952 there were two papers dealing with methods of providing null-fill and beam-tilt to overcome such problems and improve the service from very high radiators. These methods involved the unequal splitting of power between the upper and lower halves of a multi-stack radiator to provide a degree of null-fill, and differential phase adjustments between the upper and lower halves to provide beam-tilt. Power splits from 50:50 down to 70:30 were quoted for typical applications and beam-tilts of the order of one degree below the horizontal.

Marconis supplied a vertical polar diagram of signal strength from their 16 stack radiator, which showed how pronounced the nulls would be at short distances with channel 7 frequency and horizontal polarization. Null-fill was obviously desirable.

Johns and Waygood advised that their tower had been designed to deflect not more than 0.8 degree under a high wind loading of 35lbs per square foot. Taking this into account, with the depression of Geelong and Melbourne below the horizontal as viewed from the radiator height, I found that a beam-tilt of one degree would be desirable to provide optimum service in a variety of wind conditions.

Both measures obviously required separate feeders for signals to the upper and lower halves of the radiator. Separate feeders also offered advantages in permitting switching to provide emergency service under fault conditions.

Ted Allen and I discussed these questions with Ken Owens and John Telfer in Melbourne on September 10th. It was agreed that a 70:30 power split and a one degree tilt was desirable, and I confirmed this by letter to AWA on September 14th. On October 4th I wrote to the ABCB requesting approval of this modification to our proposed radiation pattern, with supporting technical argument. I supplied a copy of this letter and argument to AWA on October 7th, but it was not till two months later that AWA advised us that Marconi had been proceeding with the manufacture of a 50:50 power distribution transformer. They said a 70:30 transformer would involve "extra drawing work" and some increase in cost. This was our first example of the incredible delays we were to

experience in the transfer of information between Australia and overseas. We eventually obtained what we had requested, but the delay was infuriating.

The original list of Marconi equipment included a 3.25" rigid copper coaxial feeder to the radiator. This was covered by our order in July, but on August 25th AWA advised us that it could not be supplied until late 1956. This was completely unacceptable, as we required to commence test transmissions in mid-1956. Marconis offered to supply twin Styroflex feeders (of 3.125" diameter) as a substitute, with adequate power-handling capacity. Styroflex was a semi-flexible coaxial feeder having a continuously extruded outer aluminium sheath, manufactured by Felten and Guilleaume in Cologne, West Germany. We had no alternative but to accept this substitute, and requested AWA to obtain drawings of the fittings necessary to support it on the tower.

On September 10th Marconis undertook to supply details regarding the minimum angle of bend, preferred method of installation, length capable of being self-supported, fittings for hauling and methods of termination. We also asked for details of repair capabilities in the event of damage to this cable, and characteristics of a repaired joint. In return we undertook to supply drawings of the tower.

In order to facilitate repair of any damage to the Styroflex cable in its vertical run, we proposed that it be taken up inside the tower and adjacent to the access ladder - so that it could be slackened-off towards the tower centre for repair. This arrangement was shown in Johns and Waygood drawings of the tower supplied to AWA on September 15th. We proposed to run the feeders above ground from the transmitter building to the base of the tower, and again requested information about the Styroflex on October 18th.

Time was running short for me in Melbourne. I was due to go overseas on October 22nd.

Ted Allen and I discussed air conditioning of our proposed studios with Max Shaw and engineers of W.E. Bassett and Associates on October 19th, and next day I discussed with Fred Kempson the possibility of our recruiting young engineers from the RMTC Communications Diploma course and young technicians from their Radio Technicians course when we began operations in 1956. The first ABCB examination for the TVOCP was to be held in December 1955, and thereafter each quarter. We needed interest and enthusiasm, as well as technical qualifications.

I had conducted my last lecture in the Television Studios Techniques classes at RMIT on September 13th, and I had to resign from the post of secretary of the

Television Society of Australia because of pressure of work. Fred Kempson took over from me, and did a sterling job.

Now the time had come for me to join Lyle Lloyd overseas. I had to leave Ted Allen with the responsibility of negotiations with AWA, Tompkins and Shaw, Johns and Waygood, W.E. Bassett and Associates, and others in Melbourne. My task for the next four months was to make many essential investigations and enquiries regarding the supply of equipment and current practices in the USA, Canada, Britain and Europe.

Ted and I were to engage in the most voluminous technical correspondence - largely with Ted asking questions and my finding answers - with telegrams and phone calls on urgent issues. I was to keep carbon copies of all my letters written overseas, so that I could correlate Ted's reactions to the information I sent him. The last four months of collaboration had given me complete confidence in Ted, and he was to do a magnificent job during my absence. So well did he keep me informed of developments, it was almost like being in two places at once.

Keith Cairns left on October 18th for San Francisco with Colin Fraser and Jack (J.C.) Waters, Editor-in-Chief of the Herald - bound for WEWS and later Britain.

I flew to Sydney on the morning of Friday October 21st 1955, and had lunch with Norm Stuckey, who was gaining experience with Phil Budden at Commonwealth/Filmcraft Laboratories. I had discussions with Phil, and with John Telfer and Jack Davis of AWA. Jack and his wife took me to dinner and next morning I was farewelled at Mascot Airport by Norm and Jack Davis.

So began my second circuit of the globe!