

## **Paper 9**

### ***Venture and Adventure: A Private Mapping Company in Australia 1959 to 2006 - the AAM Story***

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#### **ABSTRACT**

This paper explores the gestation, establishment and almost fifty years of development of AAM Surveys Pty Limited, a private Australian mapping and surveying company. Accounts of Ventures in business; and Adventures in taking on the unknown or the hazardous; are told. Modern experiences and those of the past are correlated. The tension between the surveyor/mapmaker's attraction to certainty and appetite for the unknown is touched upon. The fundamental sciences and disciplines of past and present; the nature of organisations; and the need for satisfaction of increasing human inquiry by mapping; are considered.

#### **BIOGRAPHICAL NOTE**

Peter Byrne is an Honorary Fellow of the Spatial Sciences Institute. He commenced surveying in 1959, enjoyed an interesting career and stood aside from his position of Managing Director of AAM Surveys Pty Limited in 2001. He has represented his profession as President of The Institution of Surveyors, Australia, and Vice President of The Federation Internationale des Geometres (FIG). His interest in the spatial sciences continues with occasional consultancies for AAMHatch Pty Ltd, co-owned by his old company. He is co-author of a paper on *Principles for Geospatial Professionals* and is taking that work forward in a developing workshop series. He practices as an arbitrator, mediator and conciliator in commercial, industrial and community disputes.

## ***Venture and Adventure: A Private Mapping Company in Australia 1959 to 2006 - the AAM Story***

*“You would be better off buying a pub”* (Thorn 1959)

*“Frankly, I think you would lose a lot of money if you set up a private photogrammetric show here in Australia.”* (Lambert, 1958)

### **Introduction**

This is a story that started with two men, surveyors, who decided to extend their vocation to the then emerging discipline of aerial mapping. The enterprise grew and attracted many younger people with similar vocations who went on to make it their life work. It is a story of human achievement in the period of national growth and development that followed World War II.

The paper has been written for presentation at a conference, the theme of which is 400 Years of Mapping Australia. The history of mapping is filled with stories of exploration, resolve, adventure, scientific enquiry and application, privation, doubt, mistake, triumph. Historically, mapmakers worked alone, unseen, largely unrecognised until too late. They were the ones who satisfied human inquisitiveness about the physical world. In this regard, nothing had changed much in the latter half of the twentieth century.

The paper is intended to honour the conference theme and so considers the work that was done ‘at the front’, the developments, not knowing what lay ahead, sometimes literally blazing the trail. And, as in many other accounts, those ‘back at base’ – the managers, administrators, scientists and technicians - the ones who found and managed the finances, without whom the enterprise would have foundered – are not included here. Other work (Barrie, 1992) honours their contributions.

That which follows is a short account of a privately owned mapping organisation that has not only survived longer than any other in Australia, but has prevailed.

Because of the impossibility of fitting the history of forty years of an organisation into 6000 words, detail of the AAM Story is limited to just two accounts each of Adventure and Venture.

### **Context: Australia 1959**

Australia in 1959 had a population of 10 million. Robert Menzies was Prime Minister. Many cars on the road were of British origin though the Holden had become popular. The people were becoming accustomed to migrants, displaced and disadvantaged people from

Europe. Asian faces were relatively few. Australia's 'White Australia Policy' was still substantially in place.

The great infrastructure project – The Snowy Mountains Scheme – was under way. Freeways were not yet apparent in the major cities, but were being planned. Large resource development projects were being considered. Wapet had yet to find oil on

Barrow Island. Agriculture was the 'sheep's back' of the Australian economy. Computers had arrived; they were to be found in universities and large institutions, not commonly available to the populace. That was about to change.

The surveying profession in Australia was largely represented by The Institution of Surveyors Australia (ISA). The main focus of ISA and its members was on land or property surveys. Members of the Australian Institute of Cartographers were mostly employed in government departments. Surveyors and cartographers who had contributed to the mapping campaigns associated with World War II, and others with higher educations in geodesy and photogrammetry, were making contributions to State mapping programs and engineering projects such as the Snowy River Scheme. State governments were setting up modern mapping establishments. The Royal Australian Army Survey Corps and The Division of National Mapping had commenced a program for the topographical mapping of the nation. The maps of much of the interior of the country were sparse 1:250,000 scale topographical sheets, based on a variety of origins. The Australian Map Grid and Height Datum were yet to be defined. One private aerial mapping company - Adastral - was well established from its genesis in pre-WWII years.

### **The Founders**

*"I have been chewing over an idea..... I feel that the time is ripe for the formation of a private firm.....specialising in air maps for projects, planning etc."* (Tait, 1958)

James (Jim) Tait and John K (Keith) Barrie, surveyors, were old friends who had worked together in Papua and at one time shared a bachelor flat in Sydney's Kings Cross. They were employed in senior positions in the colonial service in Malaya, now Malaysia and Singapore. With independence nigh, they were offered compensatory terminations. The idea of returning to Australia to start a small photogrammetric enterprise came from a shared interest in the modern developments in the emerging technology.

Both men had already experienced a full professional life beyond their Papua days. Jim Tait had served with the Survey Corps as an officer through the war years. Keith Barrie had served in the Middle East and later in the Z Special Unit, the forerunner of the Special Air Service, experiences of which have been separately recorded.(Barrie, 1994) After the war, both enlisted in the Malayan Survey Service.

Keith Barrie set about gaining a qualification in aerial photogrammetry from The International Training Centre for Aerial Survey at Delft, the Netherlands, between

February 1958 and February 1959. During this period and into most of 1959, the partners continued their considerations and investigations of their project, communicating by letter.



JK (Keith) Barrie



James (Jim) Tait

### First Steps

*“Now the A8. Having decided to go through with this thing, I say order it now”*  
(Barrie 1958)

Barrie and Tait Pty Limited was established on 22 September 1959. ISA did not consider a company to be a suitable business structure for a professional firm, yet the advice of Gordon Thorn, the company’s first accountant and financial advisor, was taken. The issue of operating as a company was later resolved with ISA. In 1962 the name was changed to Australian Aerial Mapping Pty Ltd.

With no immediate prospects for work, Keith Barrie and Jim Tait set up office in a rented basement underneath a restaurant at 778 Pacific Highway, Gordon, on Sydney’s north shore. The first stereoplottor – a modern high-order Wild A8 from Switzerland - was purchased for 9000 pounds (about A\$200,000 current equivalent) in December 1959 with no paying work in sight. Both partners found interim income, Keith Barrie undertaking real property surveys for other organisations and Jim Tait staying employed with the City of Sydney. Later, they jointly did control surveys for the NSW Lands Department.

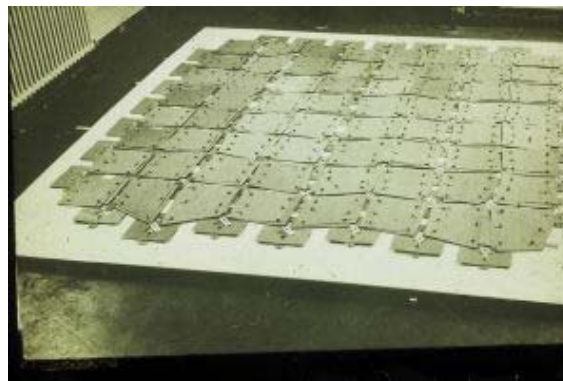
Both men had young families, were establishing homes and were rapidly working their way through their limited capital. Keith Barrie sold 1400 BHP shares that had been under-performing, retaining others that were considered sound. The others soon

diminished in value as BHP soared. He remarked “*this demonstration of financial sagacity has not yet been forgotten on the domestic front*”.(Barrie 1992)

It is not recorded, however it can be reasonably assumed, that Christmas 1959 was not lavishly celebrated in the Barrie and Tait households.

### Take Off – 1960

The work started to appear in the first half of 1960. The first of the Sydney freeway programs led to large-scale stereo-plotting contracts. Extensive expansion of Sydney led to the Green Valley project and surveyors and engineers started to recognise the benefits of modern, large scale photogrammetry. This, too, was the year in which the company started its relationship with the Division of National Mapping, doing adjustments of large blocks of aerial photography. In this regard, it needs to be remembered that computers and adjustment programs were not readily available and ground control surveying was still a very expensive exercise. For the aerial surveyor, the critical problem and object of most effort, was that of managing the cost of mapping by minimising expensive ground control surveys without unacceptable loss of map accuracy. This was done by modelling the aerial photographs to deduce the orientation of those photographs without surveyed reference points, using the process of aerotriangulation. Keith Barrie had brought a Jerie Block and Strip Adjustment Analogue Computer with him from Delft. Housed in four large boxes it consists of hundreds of mechanical parts – splines, springs, templates, plates and more. When assembled it emulated, almost free-from-friction, the measured block of photography. A remarkable invention, shown in the images below, it was used successfully by Barrie and Tait for the few years between its acquisition and the availability of early computer solutions. The equipment is largely intact, waiting for an enthusiast to recreate adjustments as a teaching aid!



The Jerie ITC Analogue Computer c1963 for Height (left) and Positional (right) Adjustment of Blocks of Aerial photography.

The problems were many – finding and financing staff for an uneven and uncertain workload, finance for more equipment and answering the question “how can we get our basic aerial photography?” This question was a serious one when asked in the context of the day. Adastra, with considerable aerial photography resources, was substantial, well known and well-connected. Barrie and Tait Pty Ltd was unknown to all but some of the surveying community. Keith Barrie recalled (Barrie 1992) himself and Jim Tait being ushered in to see the Coordinator General in Brisbane and announced as “a couple of blokes from Adastra.”



Keith Barrie & John Chinchin, Agricultural Field Day c1963. In the early days of AAM contour mapping for keyline plan projects was a source of business.

### A Company Grows

In the latter half of 1960 the work started to flow. Some of the early commissions were associated with the planning for freeways in Sydney. Through its history, the detailed mapping of urban areas for infrastructure planning, design and implementation has been an important part of the company’s business.



Office Scene c 1965.  
Note the EK5 digital recording device in the foreground.

By 1964 the company had proved its ability in high precision urban mapping such that it embarked on opening an office in Melbourne to support the Melbourne & Metropolitan Board of Works extensive sewerage program. Simultaneously, AAM had found a place for itself in the about-to-emerge iron ore mining of the Pilbara region of Western Australia. The founders, still very much 'hands-on', were stretching themselves between the then operations centre in a Gordon basement, the installation of tons of photogrammetric equipment into a Melbourne office in Little Collins Street, and a little known region in north west Australia.

The Pilbara project gave the start to an important part of AAM's pioneer work and development. This is dealt with in more detail later.

1964 was the year in which the idea of a national company began to take shape. Soon after, bases were established in Perth and Brisbane.

### **The Pioneer Projects**

By 1960, Australia was increasing its development of infrastructure, particularly that relating to land transport. In 1962, consulting engineers Gutteridge, Haskins and Davey (GHD), and then Maunsells, showed interest in the potential of aerial survey in designing the western end of the Indian Pacific standard gauge railway through the Avon Valley, east of Perth. AAM responded and impressed the engineers with what could be achieved. This was in spite of AAM being not able to get stable diapositive copies of state aerial photography, having to make good with paper prints. The reason for refusal of supply of diapositives is not recorded, however this passage gives a reminder that the relationship of the private and public mapping sectors was not an easy one for some decades.

The advantages of aerial photogrammetry to route location and design were beginning to be appreciated by forward-looking engineers and planners.

### **The Hamersley Iron Project**

At about this time, the Rio Tinto Corporation and Consolidated Zinc Corporation were undertaking extensive explorations for iron ore in the Pilbara district of north west Australia. Extensive deposits had been found. In 1962 the two companies merged to form Conzinc RioTinto of Australia Limited (CRA). CRA was keen to exploit the high grade deposits and was considering transport options for the 250 kilometre journey from Mount Tom Price mine to the port of Dampier. Combinations of aerial ropeways, conveyors and railways had been considered. Rail was chosen.

Because of its previous railway work, and through association with Kevron Photographics, AAM was invited to consider how it could assist in the location of a railway line in then unmapped terrain, some of it rugged and inaccessible. On 1 October



1962, the Chairman of CRA, A.J.Keast, convened a meeting which was attended by Geoff Davey of GH&D, George Hills, Managing Director of Central Engineering Services, Kevin Radford of Kevron Photographics, Ken Seimens of Adastra Aerial Surveys and Keith Barrie of AAM. The purpose of the meeting was to discuss options for a railway route location.

Keith Barrie recalled “*the CRA team was keen to do the location by flying over the terrain in a light aircraft, noting the route possibilities from that platform. I think both Geoff Davey and myself scotched that idea, pointing out that stereoscopic examination of aerial photos by expert locators was a far more rational procedure*”. (Barrie 1992)  
The decision was made to do an initial high level aerial photo coverage, to use that to refine the route and then do low-level photo coverage for the final design. The work was tendered in two parts, starting with the high level photography. Adastra won the tender. Further involvement by AAM may have looked remote. However, Keith Barrie was not yet finished.

During the early discussions, Barrie had taken an interest in more than the surveying and mapping. He had become interested in the problem of locating an alignment of stringent grade parameters, without the aid of existing maps. He had already discussed the subject with Frank Gosden, a surveyor and locator with The Department of Main Roads, NSW, who was considering an early retirement. Gosden’s ability to locate transport routes from aerial photographs was highly regarded by those who knew or worked with him. He agreed to take the challenge. By early 1963 he was making early route appraisals on the Adastra high level photography, aided by barometric elevations measured by Perth surveyor Malcolm Nicholas. The location work of 1963 segued into a mapping and design exercise. In early 1964, a large operation assembled in Roebourne to begin the route location and detailed topographical mapping on which the railway would be designed. Frank Gosden along with Keith Barrie, Jim Tait, Malcolm Nicholas, Kevin Radford – all to become prominent figures in Australian surveying and mapping – took part.



Frank Gosden



Frank Gosdens's location of the route achieved the critical and stringent alignment parameters, one of which was a maximum, compensated, grade of 0.33% against the loaded trains. It has been subject to few and minor variations in the subsequent 40 years. The railway was built in record time and the project was considered highly successful. The client's objective of being the first exporter of iron ore from the region was achieved. This did not come without drama. At one stage in 1964, seeds of doubt about the engineering feasibility of one section of the Gosden location arose in the client's New York office. Experts were called in. The writer remembers helping a party of visiting consultants who were experiencing difficulties after they had become lost. Gosden was able to refute the damaging reports, taking longitudinal sections of alignment from Sydney to the client's office in Melbourne to allay the fears. The design was completed in 1964. Construction of the railway, mine operations and port commenced in early 1965. The first shipment of iron ore was in August 1966 – a remarkable achievement considering the remoteness of the area and the engineering challenges.

Frank Gosden is fondly remembered in AAM and by clients with whom he worked as a man of great insight and knowledge. One of his abilities was being able to mentally absorb the morphology of natural terrain on which he would imagine geometric alignments. He had an unusually high level of understanding of terrain, hydrology, soil characteristics, construction methods and civil design - all of which he could correlate simultaneously. This required an unusual level of concentration. His rare skill of gaining a three dimensional appreciation of terrain from aerial photographs without the aid of even a pocket stereoscope earned him the nickname "old swivel eyes" from field assistants. He could estimate vertical grades with the aid of scant height information. A modest man in all ways, he won the respect of all those who had an appreciation of railway engineering. His ability to rapidly reduce the pathway between two points to a narrow strip of terrain saved clients considerable cost and, more importantly, time. His written reports were models of clarity and succinctness – nothing omitted or superfluous, adjectives sparse and considered. He went on to do many other locations with AAM.



Frank Gosden (left) Locating  
The Hamersley Railway, 1964

Keith Barrie on Reconnaissance  
Hamersley Ranges, 1964

The Hamersley project was such a success for CRA that expansion came soon after. Frank Gosden's reputation had started to become a burden to him. He was called upon more and more to consider railway routes. His admirers did not understand the intensity of the work. He reminded them more than once that he was not a worker of miracles.

In 1967 AAM was asked to locate and design a 100 kilometre extension of the Tom Price to Dampier railway so that the high grade haematite deposits of Paraburdoo could be exploited. The terrain posed considerable challenge through its short distance and great difference in elevation. Early estimations by the client indicated that the desired grade against the load could not be 0.33% and would more likely be about 0.4%. Gosden was again asked to work under extreme pressures of time and sparse topographical information to see what could be done. He was aware that his judgements on the alignment and grades were to influence early orders for locomotives and rolling stock. The stringent grades against the load of the previous exercise were to be relaxed from 0.33% to 0.42% and dual locomotives used for the haul. A rapid and rough preliminary mapping exercise was conducted and, on that basis, Gosden advised that a route which complied with the steeper grade was just possible. To his consternation, the client took this to mean that the project could proceed. In the following year, with the aid of more accurate mapping, Gosden refined and settled the route. The author recalls him saying "as I brought the alignment up to the critical watershed, the hair was standing up on the back of my neck. I had used all the track length that I could find. It came in within two vertical feet of that estimated the year before." So the burden of success became heavier for Gosden as his early judgements, made on information that would be considered scanty today, continued to be validated.

To add further context to this small passage of engineering lore, the writer recalls (Byrne 2002) that, in 1968, he met Lang Hancock, the prospector and soon-to-be-tycoon who held the Tom Price and Paraburdoo mineral leases, on the track between the two sites. Each knew the other by name. Hancock, with other potential iron ore developments, had developed an interest in railways, some attributing him with expertise in route location. He asked about the route design and was told of the successful development of a ruling grade of 0.42% against the load. He was not impressed with this and responded by stating that 0.33% should have been achievable. The writer replied with the observation, borrowed from a Gosden response to an earlier doubter of the grade, that "the lesser grade could have been achieved but it would have required a long tunnel, and that a tunnel was thought unwise, being very expensive to construct and acting as a drain in the wet season". Hancock drove away without response. The writer was immediately aware that the exchange had probably brought a tenuous relationship to an end; and that there are times in life when it is wise to suppress a comment, regardless of how very, very, apt it may seem to be at the time.

These projects were largely responsible for the making of AAM, engendering a confidence to take on other challenges. AAM has gone on to being given the responsibility for the mapping and surveying of most of the heavy haul railway routes of the north of Australia – over 3000 kilometres, not all of which were built, in Western Australia and Queensland.

In later years, as engineers caught up with surveyors' computer modelling capabilities, AAM's location role diminished, but was not extinguished. What was lost in the location phase was more than compensated by the increase in surveying and mapping as demand for higher accuracy and shorter delivery times increased.



Hamersley Iron Railway. White Peak, Near Dampier, in Background

This part of AAM's history started in 1963 with Keith Barrie who, ever inquisitive, looked beyond the 'how' to the 'why'. The second CRA tender was never called. The work flowed naturally to those who had made the effort to understand and find solutions for the underlying, rather than stated, objectives.



Lady Annie to Gulf of Carpentaria Railway  
Tellurometer Survey. 1969 (AAM 1969)

### South East Asia

Considering the earlier careers of Barrie and Tait, it was inevitable that AAM should venture into South East Asia.

By 1970, the level of activity brought on by the mining boom of the sixties had subsided. By this time AAM had many more competitors and the volume of work to sustain all companies was inadequate.

AAM already had a South East Asian connection through the Malaysian consulting engineer Steen Sehested and Partners, which was for a time a co-owner of the Melbourne operation.

Indonesia had begun to re-establish itself after the upheaval of the sixties and the Sukarno – Suharto transition. Foreign investment, including mining interests, had re-commenced. It seemed like the right time to investigate the possibilities for a company such as AAM. Keith Barrie and the writer made their first appraisal trip in 1971. The results were not encouraging. The problems were many. Other European and USA companies of greater substance had similar ambitions.

In 1972, AAM was contracted by The Snowy Mountains Engineering Corporation (SMEC) to undertake surveys and training for an AIDAB-funded major road development project in Kalimantan Barat – the Kalbar Project. The project commenced in late 1972 and continued until 1978. During this period, about twenty surveyors represented AAM on the project.

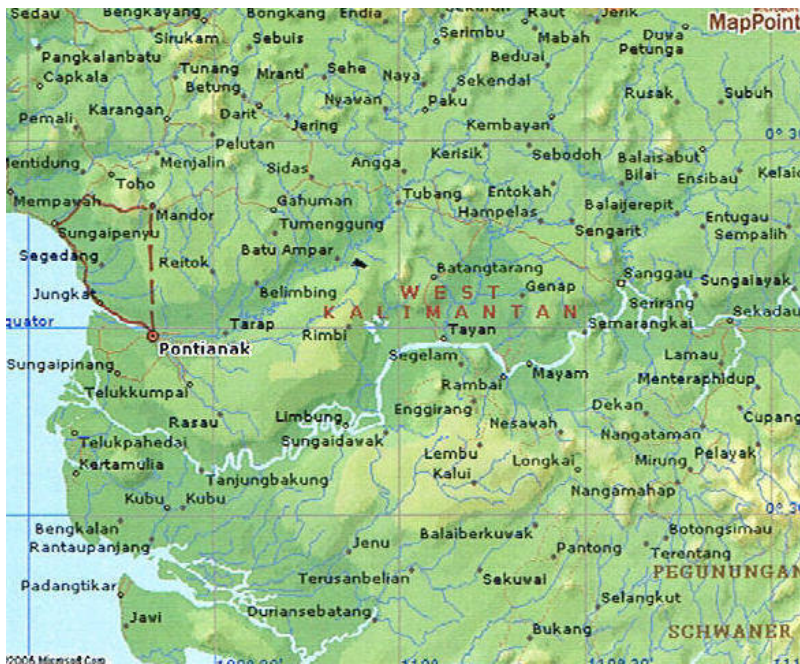
This gave AAM the confidence to set up in Indonesia, which it did as a joint venture with DJ Dwyer and Associates, a Sydney firm of consulting engineers undertaking housing developments for LJ Hooker. So Barrie and Dwyer was born. The mapping and surveying business was successful after a time, however the level of involvement in engineering was disappointing. Barrie and Dwyer was not to last beyond 1978. The scandals of the mismanagement of the national petroleum corporation, Pertamina, had caused loss of business confidence and investors left the country. That, and the difficulty experienced in recovering some large debts, made the operation unsustainable. Barrie and Dwyer was closed down.

The Indonesian experience introduced AAM people to new forms of adventure. The business risk lay to large degree in not being part of the society, having alien status. In retrospect, the physical risks taken were considerable, such were the conditions and remoteness of sites of work from assistance. Surveyors would go to remote areas of Sumatra, Borneo or Irian Jaya without the luxury of pre-arranging accommodation, transport, labour or logistics, confident in their ability to find them as they went. Once out of the provincial cities and towns, living was basic and supports few. An incident illustrating this theme has been recorded by those who took part:

The events took place while engaged on the Kalbar Project between Pontianak and Mandor in West Kalimantan in 1973. A direct road between the towns was being considered. Such a road would reduce the travel time between Pontianak, the regional capital, and the inland region. The section was known to be swampy, but it was to be surveyed and geotechnically evaluated regardless. Keith Gore, a surveyor from New Zealand, was undertaking the survey, a distance of about 25 kilometres.

Access was possible only by foot. Passage was slow and constantly wet, progress hindered by tree roots under the water. All supplies were carried in along the line. At night, camp would be on platforms erected where the work stopped. The survey had reached the half way point.





Kalimantan Barat, Pontianak to Mandor Survey, 1973.

Keith Gore reported: (Attwater, Gore, Vines, 1999, 2006)

*On the night of 26 August we camped on dry ground, sparing us the job of erecting a platform.*

*In the morning, Mahjed, a labourer, woke first to cook breakfast on a small “gaz” cooker. As the gas bottle was empty he had to attach a new one - a process of screwing a bottle onto a pointed valve, breaking the seal in the process. In spite of previous reminders, Mahjed did this, near to a naked flame and proceeded to try and blow us up. The resulting explosion burned a hole in my mosquito net. I made a hole in the other making a rapid exit.*

*Mahjed had serious burns to his legs and torso. He was in no condition to walk out. I instructed the labourers to cut down as many trees as they could to allow a helicopter to land. I headed south to a creek and hired a perahu from a logging crew to paddle me out to the Pontianak – Sungai Pinhu road from which I caught a mini-bus to Pontianak.*

*The SMEC administrator arranged a military helicopter for the next morning, the 28<sup>th</sup>. I expected a Bell 206. Instead I was shown a Sikorsky – “jolly green giant” – and on asking the pilot how much room he needed to land, he pointed to a spot half way down the runway. I knew we would not be landing to pick up Mahjed. We flew out and managed to find the clearing, but could not get near the ground.*

*The next day, the 29<sup>th</sup>, I retraced my steps to the site, carrying a radio and axes to widen the clearing for the Bell 206 expected the next day. Ted Attwater, meanwhile, had walked*

*in from the north with one of the labourers. Next day, the 30<sup>th</sup>, we cut frantically with small axes with bush-hewn handles. Later in the day, our hands bleeding, we learned by radio that the helicopter was no longer available.*

*On the morning of 31<sup>st</sup> I again walked out to find the logging crew to carry Mahjid by stretcher and perahu to arrive at the hospital, six days after the accident. By this time he had huge blisters over both thighs and one side of his chest and stomach. In spite of our expectations of 6 months in hospital, he was out in 2 weeks. His rapid recovery was probably due to his blisters being intact because of enforced lack of movement, the sterile environment of the swamp and his lack of resistance to antibiotics.*

Ted Attwater later noted that the helicopter was 'unavailable' because of a celebration in Kuching. The dignitaries who went to the party flew over the clearing. Attwater's further comments on this by-play have not been recorded.



Accommodation: Field (left) and Village (right). Kalimantan Barat c1974

Fraught situations were not uncommon. The writer was involved in a project in Sumatra in which local labourers absconded from the riverbank camp at night and got lost in the forest, nearly perishing. Their surveyor went to their village to inquire of their whereabouts and was held until they, fortunately for all, turned up the-worse-for-wear. In the early eighties, separatist guerrillas kidnapped a survey party in Irian Jaya, first putting a bullet through their helicopter. One of the surveyors, a Javanese, but not obviously so, felt fortunate to survive with nothing other than a serious bout of malaria. The JMR satellite receivers were not recovered. The project was abandoned.





River Travel: Keith Gore Travelling by Perahu (left) and Boat (right). Kalimantan Barat c1974

Despite their privations, those involved in the difficult and remote areas say today that their experiences were rich, their understanding of the world and their ability to adapt enhanced, their outlook on life widened permanently.



Cross-River Travel: a Kampung Footbridge (left) and Making The Best of a Failed Bridge (right). Kalimantan Barat 1973

AAM continued its association with Asia in later years by providing technical support to an Indonesian company, largely in mapping the emerging coal fields of East Kalimantan. In 1990, AAM established a small operation in Bangkok. This too, despite much promise, proved to be unsustainable and was abandoned in a management buy-out in 1994.

### Development Milestones

It is only in retrospect that the developments of an organisation can be seen clearly. At the time, activities can be too intense to allow those making the progress and the changes to reflect on their achievements.

In 1963 AAM acquired a set of Tellurometers – a long range microwave distance measuring system, the first electronic distance measurement equipment in the Australian private sector. This was the instrument, a South African invention, that allowed Australia to get on with its national mapping ambitions – having the potential to measure very long distances and avoid the need to triangulate, the classical but time-consuming geodetic surveying method that depends on fixed points high on the terrain. For a small operation such as AAM the investment was significant. AAM relied on the various improved models of Tellurometer for twenty years until they were eventually made redundant by other technologies culminating in GPS.



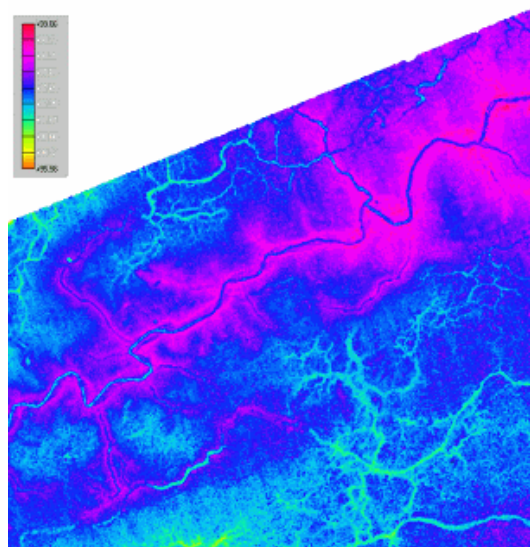
Tellurometers: Peter Byrne with Model MRA1, 1964. Andrew Porteous with Model MRA3, c1975

In the same year, the company embarked on the volume measurement by aerial photogrammetry and digital recording of the Port Kembla iron stockpiles. There are still vivid memories of late night dashes between Gordon and the IBM computer facility with 5 channel paper tape records as the deadline for delivery loomed. This innovative venture used digital recording well before its use in the mainstream.

Meanwhile, in Melbourne, aerial photogrammetry had gained acceptance as a tool for creating high precision maps for sewerage design – a major undertaking in that city for the next twenty years. Dick Cleaves, who had been given the task of opening and running the Melbourne operation later became a pioneer of digital mapping, creating the vision for and managing the development of a very early digital system, using micro-computers, the forerunners of personal computers. The AAM system was used for fifteen years but was overtaken by systems from north America and given up in 1993 for an imported system, purchased from the Leica company which was represented by Brian Nicholls. Nicholls is now general Manager of AAMHatch Pty Ltd, of which more later.

Other boundaries broken in the sixties and seventies included using aerial photogrammetry for cadastral surveys and shallow water bathymetry. The nineties saw AAM, with The Queensland Department of Natural Resources, develop, prove and put into regular operation, airborne GPS control of aerial photography – another Australian ‘first’. The system drastically reduced the amount of ground survey needed for mapping. The development heralded other advancements which were to have profound effects on the mapping sciences. In 1997, AAM undertook a major feasibility study of Airborne

Laser Scanning (ALS) or Light Detection and Ranging(LiDAR). Soon after a capability was established and in 2001 the first equipment in the region was acquired. This is referred to in another context later. That, together with the transition into digital photogrammetry and digital aerial photography, completed the transition to a capability which could not have been imagined forty years earlier. Being able to ‘see’, measure and understand, for the first time, the complex drainage system in a Murray River redgum forest gave new satisfaction to the mapmaker’s inquisitive nature.



Hypsometric Rendition of the Complex and Subtle Drainage in the Barwon Redgum Forest, Murray River (interpreted accurately for the first time by LiDAR). (AAMGeoscan 2000)

## **Turning Points**

A reflection on any life will reveal turning points – those occasions on which decision or chance changed direction and fortune forever. So it is with any company, any Venture or Adventure. There are moments of losing courage and confidence and not proceeding to betterment, or failure, whichever hindsight might reveal. And there are the times when courage is found to support visions and dreams. The full context of these decisions, the debate, even the drama of the moment, is not commonly revealed in physical records and so the feelings of the time are lost.

Two events of venture, forty years apart, are recorded here.

## **Venture, 1960**

This venture is from the time of establishing the company. Barrie and Tait had not fully considered having to acquire their own aerial photography. It soon became clear that a sustainable working relationship with Adastral was not feasible; other possible liaisons

had been considered and abandoned (recorded in some detail but beyond the scope of the paper) and there was an increasing need for high quality imagery for large scale engineering projects. Only one modern aerial camera was available in the Australian private sector – a Wild RC8 bought by Kevron in Western Australia in 1959 or 1960.

AAM was on a fast and bumpy journey. Within one year, the founders were having to consider entry to the world of aviation and photographic laboratories. They had come to terms with the fact of not being able to be ‘in’ aerial mapping without having their own aerial photographic operation, and set about rectifying the situation. Cost of entry into this field was as serious as it is now. Ironically, within a few years, this would become a burden when others entered the mapping field without aerial capability. Soon after, government organisations separated tender competitions into photography and mapping. As a result, pioneers such as Adastra and AAM lost the advantage of their investment, feeling that they were subsidising their new competitors.

The decision was made: *AAM placed an order with Wild for an RC8 camera on 11 June 1960. The camera was shipped from Heerbrugg on 17 July”* (Barrie 1992)



Keith Barrie and Jim Payens - doing what aerial photographers do - look at the sky. Bougainville c 1966

### Venture, 2001

AAM directors had supported a substantial study of a new technology – Airborne Laser Scanning (LiDAR) – which promised to yield accurate terrain definition beneath tree cover and change forever the nature and potential of terrain mapping and modelling. The study, designed and managed with typical tenacity by David Turton, had been fruitful. The trials had been mostly successful. The feasibility was proven, potential clients were enthusiastic. The decision to invest more than US\$1 million in the technology had been made. The order for the purchase had been placed in early September 2001. A directors’ meeting was scheduled for 14 September 2001. The minutes of that meeting record:

*Proceed or Delay?*

*Concerns about the events of the past few days (the terrorist attacks in New York and Washington) and their likely collateral effect on trade had been expressed by some directors. The question was rightly put: is it prudent to increase AAM's level of indebtedness at this time of uncertainty?*

*The decision to proceed as previously agreed was unanimous. (AAM Surveys, 2001)*

(Also recorded is that on the day, AUD 1 equalled USD 0.52. It descended below USD 0.50 in the following ten days!)

So the direction of the company was again changed, the opportunities for its people improved, a new service introduced to the community, a moment again blandly recorded in a file. Those few words, imagined in the context of the times, may faintly evoke the drawing in of a breath.

**The Next Adventure**

The mapping business is capital and technology-intensive. There have been mergers and buy-outs of substantial companies since the mid eighties. AAM Surveys had considered two mergers and had been approached to sell, but had declined all possibilities because of cultural differences considered to be too great. Not so far mentioned in this account is the ownership and succession plan that AAM had developed. The company was owned by its employees. The interests of the owners and the interests of the workers were almost identical, lessening the chance of a decision that could disadvantage the workers.

In October 2003 AAM Surveys entered a new phase of its existence by co-creating an equally - owned joint venture with Hatch Associates – an international engineering consultancy which had absorbed BHP Engineering and BHP Land Technologies, ironically one of the very early clients, and later competitors, of AAM. The new company, AAMHatch, has grown rapidly, bringing to fruition the directors' vision of the whole being greater than the sum of the parts. The operational, vocational and professional adventures continue for the people, now over a wider spectrum of technology and geography. The passage from the analogue/numerical solutions of 1960 to the digital of 2006 has been made complete with a recently commissioned digital aerial camera.

The adventures of contending with barren, hostile, bewildering or challenging environments - natural, human or built - will be there for those who are game. Again a base has been established in South East Asia, this time in Kuala Lumpur.

Venture and Adventure still. The more things change .....

With that, AAM Surveys continues as an investment company – its chief asset being half of AAMHatch. Brian Brumby, AAM Surveys' fourth Managing Director, is Managing



Director of AAMHatch. And AAM Surveys Pty Limited is still wholly owned by employees.

### Reflection

In writing this paper the recollections and thoughts of colleagues have been sought. Inevitably the question: “what has it been that has allowed AAM to remain the longest established mapping company in Australia?” was put.

The answers include:

- AAM had a vocational culture which embodied the values of its founders;
- The company worked hard on its structure, sensibly separating ownership from management and developing a succession plan; and
- The company valued higher education and technological inquisitiveness.

The author agrees with all of these, and suggests another.

AAM set itself apart from most of its contemporaries with its foundation in geodesy as well as photogrammetry. The history of many early mapping companies has been that their roots were in aviation, or photography, or cartography, or photogrammetry (only). AAM was founded by two surveyors who were unusually well grounded in geodesy and error theory. The culture emanating from this has allowed AAM to have been as much a part of the engineering community as the mapping community. Without that foundation of geodesy and error theory, later developments of airborne GPS and application of airborne laser scanning would not have been possible. In 2006, any organisation involved in modern surveying and mapping would be unwise to operate without a sound foundation in geodesy.

So it was for map makers and explorers of the time before the second half of the twentieth century. They, too, were unlikely to prevail without a sound foundation in the sister disciplines of geodesy: astronomy and cartography.

The AAM story provides a contemporary example of the tension between the need for certainty and the desire to take on the unknown. The best surveyors are those who value certainty, leave little to chance. Yet to create an enterprise that goes beyond the known, an appetite for the risk is also necessary. As organisations progress along the path of their life cycle, the tensions between competing needs and values provide some of the energy required for advancement. Managers seek order as they manage, leaders tolerate ambiguity and risk as they lead. Nothing changes in this respect.

And so it surely was for the early map makers.

### Acknowledgement

I am indebted to the many AAM people with whom I have worked, planned, worried, conferred, celebrated, commiserated and fought. Through all of those exchanges, I was

allowed a rich career, full of experience and opportunity to learn. I hope that they have forgiven me my mistakes, lapses and misjudgements.

This story would not exist but for the founders, who had the sight and took the early risks. I acknowledge their pluck and tenacity; and their enlightened minds and big hearts which let them tolerate mistakes made by young people, such as I.

**Disclaimer**

This paper should not be considered an official history of AAM Surveys Pty Limited. It is the work of one person, albeit in the company for longer than most of the many hundreds of others, but one person nonetheless. As with many other accounts of the past, the reader should consider that it (the past) has been viewed through the narrow lens of the writer's particular interests – one slice through a complex community, many of whom deserve mention. Regardless of that, the paper has been checked for errors of fact by some of its current and recent directors. It is not possible to discern whether errors of fact have been not recognised, or forgiven.

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**Picture Acknowledgements**

Pages 4,5,6 & 7      AAM Surveys collection  
Page 8              Elizabeth Gosden  
Page 9, 11            AAM Surveys collection  
Page 13              Encarta  
Page 14 & 15      Keith Gore collection  
Page 15              AAM Surveys collection  
Page 16              Scanning the Horizons, AAMGeoscan, 2001  
Page 17              AAM Surveys collection

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