

## **NRAO ONLINE 9: Darwin 31RS (Radar Station), 1942**

### **Characterising the role of the RAAF and RPL at Darwin 1942**

A chronic conflict ensued in the years 1942 to the 1990s within the Australian radar community: who and to what degree were the RAAF and the CSIR Radiophysics Laboratory responsible for the fiasco of 19 February 1942 with the unusable 31 Radar Station at Darwin?

A number of the more official histories placed the blame on the RAAF. Examples are Mellor (*Australia in the War of 1939-1945, The Role of Science and Industry*, p. 435, 1958): "When attempts were made, they [the RAAF crew] failed even to get the set on the air. While they were still trying to get it working the Japanese made their first raid on the town." Mellor also added: "It is fair to say that it was not due to a lack of technical competence on the part of the radiophysicists but rather to their inability to convince the Services of the potentialities of radar."<sup>1</sup>

Two decades later Schedvin (his history of the CSIR from 1926 to 1949, 1987, p. 263) also preferred the Piddington version of the story, emphasising the RAAF's negligence. But he did point out that the RAAF colleagues close to Pither claimed that the last consignment of the radar station at Darwin did not arrive until February 21, 1942, two days after the attack,[RAAF

The obvious inference was that no blame should be attached to the RAAF for the absence of air on the 19<sup>th</sup>. Radio-physicists claim that the complete set arrived in the second week of February, probably around 10<sup>th</sup> or 11<sup>th</sup>. They [RAAF personnel] were not competent, however, to assemble complex electronic equipment, and were not able to get the set working in the admittedly short time before the first raid ... There is no hint in the RAAF commentary of late or incomplete arrival.

Thus, the RAAF was likely culpable according to Schedvin.<sup>2</sup>

The contentious article by Wallace Crouch in the *Daily Telegraph* of 14 Feb 1967, just before the 25<sup>th</sup> anniversary of the attack, 19 February 1967 contributed to the conflict. Crouch had interviewed Piddington. (See Additional Note 1 for a full text of the article). A restrained but

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<sup>1</sup> Minnett and colleagues criticised Mellor in (Boffins,1999, p. 442) Mellor: "When attempts were made, they [the RAAF crew] failed even to get the set on the air. While they were still trying to get it working the Japanese made their first raid on the town." As we will see this assertion is not correct.

<sup>2</sup> Earlier Moran (see also NRAO ONLINE 11) also promoted the Piddington version of the Darwin events, likely influenced by his interviews with Piddington.

definite response from Pither followed in a letter to the *Daily Telegraph*, published on 17 February 1967, the day before the 25<sup>th</sup> ceremony in Darwin:

In Darwin to unveil on Sunday a memorial to RAAF wartime radar, I read with the greatest interest Wallace Crouch's article on the first air radar in Darwin on February 19, 1942. It is most unfortunate that the article has minor errors which detract from its worth, and I would like to correct them.

The article says that Dr Piddington believed that if he had, been in Darwin at the time of the first raid his newly installed radar unit could have provided adequate warning, but "RAAF experts hurriedly trained", were unable to grasp its intricacies. The fact is that the last Dakota-load of radar equipment, including the all-important aerial [in fact only the dipoles], arrived in Darwin two days AFTER the bombing.

About a week later, the radar was complete, but its performance was poor and Dr. Piddington was immediately called to Darwin to get it working. While he was getting there, the RAAF technicians located the fault - a defective aerial feeder cable - and had the station working fairly well by the time he arrived. Nevertheless, they were extremely grateful to have the designer on hand to extract the last ounce of performance from it.

From that time onwards the radar was an all-important part of the defence of Darwin, and as others were installed the RAAF organisation, together with the fighter aircraft of the US Air Force and the RAAF, achieved the defeat of the Japanese raids on Darwin. As the one who had the responsibility for the radar defence of Australia in those days, and who had constant contact with Dr Piddington and his team, I have the greatest admiration for the job they did. As he says, they worked night and day to produce the first air warning radar ever used in Australia. It was a completely Australian effort.

The operational use of the radar in the hands of many hundreds of RAAF men and women was also a completely Australian effort and there can be few better examples of Australians using their own resources in the interest of Australian defence.

On Sunday, the 25th anniversary of the first bombing raid on Australian soil, I will unveil a memorial on the site of the original radar. Dr Piddington and many other veterans of those days have been invited, but unfortunately very few can afford the time or the money to make the trip. Nevertheless, a great many citizens of Darwin have accepted the invitation, and we will establish the first monument on Australian soil to the defence of Darwin.

A.G. Pither (Air-Commodore), Riversdale Court, Hawthorn, Melbourne, Victoria.

In 1999, Minnett, Alexander, Cooper and Porter (Boffins, p. 442) pointed out that the letter is mainly correct; most of the aerial was lying on the ground on 19 February 1942 and the final shipment arrived 21 February 1942. Minnett et al continue:

The aerial, once in position, still had to be matched and phased. According to Pither, the radar system began operating about the end of February, but its performance was poor: "We could not get any signals or pick up our own planes within half a mile."<sup>3</sup> He claimed that Piddington was called immediately to Darwin to get it working. In fact, another two weeks passed as [RAAF personnel], Harry Hannam, B.L. Glassop and J. Scott], struggled to adjust the aerial and two raids in that period arrived undetected. Inexperience had resulted in substantial delays, which need not have occurred if Pither had acted promptly at the beginning of March.

The delay continued, but finally some activity occurred. White heard of the difficulties at 31RS and sent Jack Piddington and Brian Cooper to Darwin, arriving about 18 March after a two day civil air flight from Sydney to Brisbane to Darwin. Cooper praised the RAAF crew<sup>4</sup> ("had done well ... under the circumstances") but "had had great problems with the matching and phasing of the array", the infamous "Impedance Measuring Set" (IMS) or "buggery bar", invented by Pawsey. (Chapter 9 and ESM\_9.2) Cooper continued:

It took us two or three days to go through the matching and other adjustments and on 20 March during this period, a small group of Japanese aircraft flew in and bombed the airfield. By 22 March, the station was fully operational, and a large raid was detected by the radar. The bombers were intercepted by US fighters, 20 miles out to sea and dispersed with losses.

A complementary text was provided by Evans (1970, RAB p.189) with a text likely provided by Piddington in 1942, see Additional Note 2 .

In contrast to the Pither claims about the status of 31RS on 19 February 1942, a different conclusion was reached by Fred White. He and D. Kimpton published a promotional book from 1976, *Surprise and Enterprise, Fifty Years of Science in Australia*, describing the history of CSIR and CSIRO. White had been the wartime Chief of RPL in the post-Martyn era and later Chair of CSIRO from 1959 to 1970. The key text about Darwin 1942:

Towards the end of 1941, it became obvious that air attack would be the real danger to Australia and a group of scientists under Jack Piddington worked at top pressure to improvise an air warning system based on the ShD system but modified to provide the maximum possible range without using more power. Thanks to the background of ShD

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<sup>3</sup> Lockwood (Douglas Lockwood, *Australia's Pearl Harbour: Darwin 1942* (Melbourne: Cassell Australia, 1966, p. 147

<sup>4</sup> Boffins, p. 443.

experience, the first experimental equipment was produced in only 5½ days late in 1941 ... One of the first production models was sent to Darwin in February 1942. RAAF technicians were installing it when the Japanese staged their devastating bombing raid on the morning of the 19th. Piddington and his team flew to Darwin and assisted in getting the set operating by the morning of the 22<sup>nd</sup> [of March!], just in time to detect another Japanese bombing force. It was intercepted and scattered 32 kilometres off the coast.

Thus, White accepts that the radar set was not installed on 19 February 1942.

Colin MacKinnon (1993, *The Installation of 31 Radar Station, Darwin, 1942, see below*) has given a brief history of two of the main contributors:

Ed Simmonds<sup>5</sup> and Norm Smith both served in the RAAF during WW2 as sergeant radar mechanics and between them had wide experience in the installation and operation of Australian and overseas radars. Feeling that existing books inadequately covered the RAAF's radar efforts in WWII, they started collecting material in 1988, producing *Radar Yarns ( Being Memories and stories collected from RAAF personnel who served in ground based radar during World War II)* in 1991. This book contains a brief history of RAAF ground radar and a collection of anecdotes from surviving radar personnel, including several who helped install the radar station at Darwin, a potpourri of people, places and pleasantries.<sup>6</sup>

The history of RAAF radar has been enriched and modified by the vast material collected by Simmonds and Smith; as they suspected a number of aspects of the history had been misrepresented by the existing accounts. The Roy MacLeod volume of 1999 ("The 'Boffins' of Botany Bay: Radar at The University of Sydney, 1939-1945" conference in February 1998) made extensive use of material by Ed Simmonds and Norm Smith, with 23 citations to his publications. Not surprisingly, first-hand accounts from eye-witnesses provided a new view of the events of 1942.

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<sup>5</sup> Ed Simmonds (1922-2009), later in his career an Australian National University Facilities Engineer, active in the design of infrastructure at the Siding Springs Observatory. See *Radar Returns*, Simmonds's obituary, October 2009.

<sup>6</sup> Simmonds also produced *More Radar Yarns* in 1992; later, he published a history of allied air warning radar in the Pacific war from Pearl Harbour to the Philippines in 199, *Echoes over the Pacific*, [Simmonds and Smith, 1995], 254 pages). Two additional volumes are edited by Simmonds and Smith. *RAAF Radar in World War II: Pictorial No.1 and No.2* from 1992. In addition a newsletter was published from 1995 to 2009 with fascinating contributions - *Radar Returns*- with two to four editions per year. (Subtitled "Echoes from the Past and Present" and later "Signals and Echoes for Radar Veterans"). The first editor was Pete Smith and the last Warren Mann. All these publications (including the books by Simmonds and Smith) are available on a web site associated with Radar Returns. The web site is only to be used for reference purposes. <http://www.yumpu.com/en/document/view/4149151/radar-returns>

Another key figure in the RAAF history was a younger participant, Colin MacKinnon (MacKinnon, C., Simmons, E. and Mann, W. (2009). "The installation of 31 Radar Station, Darwin, 1942 : an investigation by Colin MacKinnon June 1993 with a postscript and additional material by Ed Simmons." Radar Returns, Williamstown, N.S.W)<sup>7</sup>. Warren Mann wrote in 2009:

Colin MacKinnon was born only a few months before the Darwin raids. As an engineer and amateur radio buff, he became deeply interested in the wartime development and use of radar and, in the 1980s and 90s, working with Ed Simmonds and others, made a significant contribution to the gathering of its history from the primary sources that were still available, though diminishing rapidly. Sadly, Colin died in 2004 after a long illness, aged 63.

In the 1980s and 1990s as aging WWII veterans began to record their histories of radar in the RAAF, Simmonds, Smith and MacKinnon interviewed many of the major participants in the Darwin radar events of February 1942 (Minnett et al, *Boffins*, p.440-41, quoting Simmonds and Smith). These included Pilot Officers Harry Hannam and Bruce Glassop, John Scott—radar mechanic, Bill Couper, Errol Suttor, Pilot Officer Ed Hull (later in 1942, site commander of 31RS) and the key participant F.H. ("Hal") Porter.<sup>8</sup> Hannam and Glassop were in charge of the installation in the days before 19 February; Hull was available to assist, but in the end he was required to dig trenches,

Minnett et al (*Boffins*, 1999, p. 441) "RAAF radar resources were fully stretched and the Japanese were rapidly advancing south, but Pither ignored the offer [of assistance, made by White to the RAAF already on 24 December 1941] and the partly-trained team was sent off to the RAAF's first remote site, far from technical support or advice."

On the day of the Japanese attack, key evidence has been reported by a number of WWII RAAF witnesses interviewed by Simmonds and Smith. From Minnett et al (*Boffins*, p.442):

Without the dipoles, the aerial structure was useless and until had been fitted, it could not be hoisted on the supporting mast. The aerial structure was still lying on the ground when the Japanese raid occurred [quoting L. Collier in *Radar Yarns* p 22-3]. It was therefore impossible for the RAAF men to complete the assembly of the station before the raid.

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<sup>7</sup> Also available on the web site described in FN 6.

<sup>8</sup> Porter, as a 19 year old, posted to 31RS at a Pilot Officer, was a participant in the 1998 Boffins conference, author of *Adventures in Radar: A Story of the Secret War on Australia's Northern Frontier*, 1988).

The dipoles for the reflector arrived on 21 February 1942 from Richmond, two days after the Japanese attack. Fred Hull, a passenger in this third aircraft (DC2/DC3) from Richmond, told Simmonds about viewing the burning remains of much of the city of Darwin as they landed.<sup>9</sup> **LOWE COMMISSION 1942**<sup>10</sup>, **Official Investigation of the Darwin attack, Australian Government 1942**

[https://ntl.nt.gov.au/system/files/uploads/.../D11\\_NTL-10070-83913-3.pdf](https://ntl.nt.gov.au/system/files/uploads/.../D11_NTL-10070-83913-3.pdf) *version submitted to the Australian Parliament on 5 October 1945, an abridged version of the 1942 report*

Commission of Inquiry concerning the circumstances connected with the attack made by Japanese aircraft at Darwin on 19<sup>th</sup> February, 1942

On 3 March 1942, less than two weeks after the Darwin bombing, the Lowe commission was set up “to inquire into and report on all the circumstances of the attack” (*Boffins*, 1999, p.444). Justice Charles J. Lowe (later Sir Charles) was the commissioner. The terms of reference included degree of inter-Service cooperation. The commission sat in Darwin (left Melbourne 4 March) from 5 to 10 March; 70 witnesses were interviewed in secret. Later the hearing resumed on 19 March 1942 in Melbourne with 30 witnesses; the proceedings were finished 25 March. An interim report was issued on 27 March 1942 with the final report on 9 April 1942. (An additional report was presented to the Australian Parliament after the war, see above.) Madsen, White and Martyn were interviewed in Melbourne, Madsen and Martyn twice. Martyn was a strange choice; he was already discredited (since March 1941 with the affair of Ella Horne) in early 1942 and no longer Chief of the Division of RPL. Later in 1942, he would leave RPL to work on Operations Research for the Army.

Many personnel from the Army and especially the RAAF commands were interviewed. Many of these officers were ill-informed or even confused about radar. Even the Army representative, Major General Blake, Commander of the 7<sup>th</sup> Military District, was well up to date on Shore Defence, but unaware of any possible air-warning radars. He thought that were no “instruments of that kind in Darwin on the 19<sup>th</sup>”. The Air Force was also confused. Air Commander D.E.L. Wilson (in charge RAAF North-West) told the commission that the AW set was too large to be shipped by air. He told the commission that the set now at 31RS had arrived a few days before his testimony date of 5 March. Wilson even claimed on 6 March that the radar had tracked a plane to a distance of 75 miles; this achievement was only to occur after

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<sup>9</sup> *More Radar Yarns*, (p.141, Fred Hull, Radar Technical Officer): “When some distance from Darwin you could see smoke still rising from the city. We eventually landed and found transport to Dripstone Caves [31RS] where we met Harry Hannam and Bruce Glassop who were anxiously awaiting the equipment to complete the installation.”

<sup>10</sup> Based on Minnett, Alexander, Cooper and Porter (*Boffins*,1999), p. 444-448. Also Schedvin (1987, p.263) and Evans (1970, p. 88-95).

March 22! Air Vice Marshall W.D. Bostock <sup>11</sup> was even antagonistic in his reaction to the RPL boffins.

Lowe asked if he thought that there was “no dynamic interest” on the parts of the Chiefs of Staff in procuring radar sets before war with Japan:

Bostock: I would not, the Chiefs of Staff and everybody concerned used the utmost efforts to get the sets.

Lowe: If it is said that the urgency of the need was stressed by the civilians rather than the Chiefs of Staff, do you agree?

Bostock: No, I do not. The publicity was more apparent from the civilians [RPL scientists].

In the end, Wing Commander Pither, the RAAF officer in charge of radar, was not called as a witness. Colin MacKinnon (*The Installation of 31 Radar Station, Darwin, An Investigation*, 1993, p. 39-42) asked seven rhetorical questions about the disaster in the installation of 31RS, each quite relevant to the multiple controversies of Darwin 31RS. For example, MacKinnon posed question 6:

**Question 6: Why didn't Pither or the radar officers on site give evidence at the Royal Commission?**

Conclusion: Their evidence would certainly have clarified the events but would also have been a damning indictment of the RAAF Commander and his staff in Darwin. One is left to speculate as to whether the high-ranking RAAF officers decided not to involve the lower ranks, and so minimise personal embarrassment and career damage. No mention is made in the Royal Commission evidence that it was actually the US Army Air Force which got the aerial erected and supplied the power unit. As it was, the actions of RAAF personnel after the bombings left much to be desired and drew scathing criticism from the Royal Commissioner, but the high ranking officers escaped with their reputations only bruised. They claimed that confusion amongst low-ranked officers led to the “evacuation” drama. However, it would have been hard to find a similar scapegoat for the obvious lack of assistance provided to the radar crew, given the secrecy of radar and the direct responsibility held by the senior officers.

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<sup>11</sup> At the Lowe Commission, Bostock represented the Chief of the RAAF, the British Air Chief Marshall Sir Charles Burnett (1882-1945); he had been appointed by Menzies in a controversial appointment in 1939. The fact that a British officer was chosen instead of an Australian had caused resentment. Also starting in October 1941, Burnett had a strained working relationship with Arthur Drakeford, the new Minister of Air, a member of the new Curtin government. At the time of the Lowe Commission, it was clear that Burnett was on the way out. In May 1942, he returned to the UK.

Of course, only one person could have told the story, Pilot Officer Harry Hannam, and he was not asked to testify. The commission did interview Group Captain F Scherger, senior staff officer at Area Headquarters in Darwin. From the interviews with the RAAF airmen who had been at Darwin, his testimony indicated a measure of uncertainty in his assessment of the status of 31RS on 19 February 1942.

White's testimony was straight forward. His statements were substantially in agreement with Madsen and Martyn. RPL was to design radar for Australian use. "It was not the function of the laboratory to **produce** [only to design] equipment for that purpose." He was asked if anyone from RPL went to Darwin: "Not at the time of shipment; it was entirely in the hands of the Air Force." [From a time interval of 75 years, it is now difficult to understand why RPL did not send some of their personnel to Darwin.]

Madsen was then interviewed for a second time. (*Boffins*, 1999, p. 447)

In the earlier stages of 1940 and 1941, no instructions had been received by the Laboratory that priority was to be given or that even research was to be carried out on warning station equipment. In effect, the first indication from the Board of the necessity of such work did not occur until quite late in 1941 and the efforts which have then been made, which had obviously become an emergency, were brought about through no neglect on the part of the staff of the Radiophysics Laboratory ... It was for the Services to indicate [the order of priority]. .. Professor White, as [acting, in most of 1941] Chairman, took the responsibility of pressing the Services through the Board to take a little more active interest in this matter of air warning and put up specific propositions to them ... **I think it was at that stage that he [WHITE] began to realise that something had better be done ... whether the laboratory was instructed or not. I think the evidence would indicate that the laboratory was considerably ahead of an instruction definitely to proceed. [Thus RPL had attempted to influence strategic decisions within the Australian Military.]** (our emphasis)

However, even by late 1941, "the Services have indicated that they have considered the development of air warnings in Australia as an urgent problem."

Martyn's testimony was mainly correct but he did exaggerate his own role in the events of late 1941. On **10 October 1941, "he informed the board that research on an Australian model early warning set had commenced in the Laboratory."**<sup>12</sup> (our emphasis) After Pearl Harbour:

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<sup>12</sup> Mackinnon et al(1993, p.14 and page 27) has suggested that the activities in September-October 1941 were no more than "paper exercises" with no hardware constructed. For example, Alexander (1945, RP 207/3, "History of the Development of the Australian LW/AW Equipment") wrote: "On 17 September 1941, the Radiophysics Laboratory undertook to investigate the possibility of local manufacture of an air warning set, having a range of 100 miles...Very little effort was directed towards this project in view of the commitments on the ShD [Shore Defence] and GL [Gun Laying] sets.



“I speeded up [Piddington started on his own initiative, later supported by White] preparations in Laboratory for immediate trial of new type Australian model early warning set.” He then arranged with Brigadier Whitelaw to install the set experimentally at Dover Heights. By 13 December 1941, an experimental set was working satisfactorily and in continuous use.

The report of Justice Lowe’s commission on 27 March 1942 was critical of the RAAF:

It is essential in order to use the defence equipment available that early warning be obtained of enemy approach ... It is obvious from what has been said that the Air Station was ill prepared to resist the raids on 19th February. The desirability of installing radio location at Darwin had been discussed by the Radio Physics Research Board [sic, RAB] of which the Chiefs of Staff were members, as early as November 1940 and again in August and September 1941. An installation of the type used in Great Britain was at all these times available but it was only on the last date that a decision was taken to erect another unit, which was described in evidence as “make shift” at Darwin. **But even then the question of implementing the decision was apparently treated with a leisureliness out of keeping with the urgency of the occasion.** (our emphasis)

The RAAF really had to bear the brunt of the criticism of Commissioner Lowe; only in the last months of 1941 had the RAAF finally realised the importance of air-warning. Previously, the RAAF shared the collective Service mentality that air-warning was not needed in Australia. CSIR and RP escaped substantial criticism; from the perspective of 2021, clearly the Radiophysics Laboratory should have played an active role in the planning and execution of the transportation of the 12,000 or more pound AW set from Richmond Air Station to Darwin in a small DC2 (or DC3). Also, the provision of trained personnel for the phasing of the radar aerial should have been planned from the beginning. The mutual animosity between Piddington and RAAF was regrettable; both CSIR Radiophysics and the RAAF were at fault as they failed to cooperate in January 1942. As we discuss in chapter 9 and ESM\_9.5, cooperation did flourish the following year as Pither, Worledge (NSW Government Railways) and Pawsey began a semi-official project to develop the final successful Light-Weight/Air-Warning radar.

Simmonds (*Radar Returns*, July 2006, p.6) has summarised his impressions of possible conclusions that Lowe might have drawn in 1942 if he had interviewed the military participants in the attack who were familiar with the circumstances in Darwin on 19 February 1942, such as Pither, Hannam and Glassop.

Ed Simmons, 2006:

**It is unfortunate that this event was the start of animosity between RPL, and the RAAF but there were some faults on both sides.** (our emphasis)

(1) RPL failed to appreciate the fact that the AW aerial and tower were not designed to be transported by air. It seems that Dr Piddington over-reacted.

- (2) W/Cdr Pither may have selected the wrong officer to install 31RS but he had no officers who had trained on or even seen an AW or an IMS beforehand
- (3) The RAAF may have failed to take advantage of the offer by RPL to assist in the establishment of the station, but failure to do this had no effect on the outcome on 19 February 1942.
- (4) None of the three RAAF mechanics who were attached to RPL and could have assisted in the manufacture of the prototypes were included as members of the installation party. The RAAF should perhaps have insisted that an appropriately knowledgeable person from RPL be involved actively in the installation.

Additional Note 1

### **“Tragic Irony of the First Air-raid that flatted Darwin” February 1967 , 25th Anniversary**

Crouch , Wallace “Tragic Irony of the First Air-raid that flatted Darwin”. *Daily Telegraph* – Sydney Tuesday 14 Feb 1967. P 27

When 118 Japanese aircraft caught Darwin completely off guard on February 19, 1942, killing 243 people there was an air-warning radar unit in the city but it wasn't working.

It is a bitter memory for Dr John H Piddington, a top Australian scientist and developer of Australia's first radar. The air-warning unit, Australia's first was developed by a team of 'backroom boffins' led by Piddington, a civilian.

RAAF technicians who had installed the radar at Dripstone Caves a few miles north of Darwin, days before the raid were still fiddling with the set when the first waves of Japanese bombers roared in.<sup>13</sup>

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<sup>13</sup> Thus the radar station was completed but not functioning according to Piddington. However, in October 1949, Piddington wrote a technical memo RPR 98 “Some Air-Warning Radar Used in Australia and the Islands”. All three sets [AW] were completed by 4<sup>th</sup> February 1942 and handed over to the RAAF for installation at Port Kembla, Darwin and Port Moresby.... The AW set which had been flown to Darwin was damaged in transit and two Radiophysics Laboratory officers were sent to repair and adjust it. This was done by about 11am on Sunday, 23<sup>rd</sup> March [the date is uncertain- see above, 22 March was a Sunday] just in time to detect and approaching raid at a distance of 85 miles.

The RAAF experts, hurriedly trained at Richmond (NSW) had no manuals to guide them and were unable to grasp the intricacies of operating the set.

Piddington's team - the men who could work the radar - were in Sydney, unaware that the set was in Darwin.

And behind a veil of secrecy RAAF chiefs made no effort to fly the scientists there to get the set functioning.

As the 25th anniversary next Sunday of Darwin's first and disasterous [sic] air-raid approaches, it brings with it to Piddington the thought that if he had been in the city on the day its people might have had adequate warning.

Within days of the first raid Piddington and a fellow scientist, Mr Bruce [sic, BRIAN] Cooper, were rushed to Darwin, got the radar working, and in subsequent raids on Darwin, the effectiveness of the set resulted in Allied fighters having adequate warning to intercept the Japanese raiders far out to sea.

## **FIASCO**

Dr Piddington, a quietly spoken, trim figured man of 56, is now principal Research Officer of the CSIRO's Radiophysics Division of Sydney University [sic CSIR] and one of Australia's leaders in space research.

His disclosures about the wartime fiasco at Darwin add to the unhappy picture of events there on February 19, 1942 that Darwin journalist Douglas Lockwood described in a recently published book, *Australia's Pearl Harbour*.

Lockwood labelled it "Darwin's Day of Shame", when the savage Japanese attack produced a reaction of chaos and panic, culminating in drunken soldiers looting houses and shops, and attempted 'dictatorship' by military police and mass desertion by Australian servicemen.

Even without its radar working, Darwin got a 30-minute warning of the impending raid - flashed from coast-watchers on Bathurst Island - but due to the messages being delayed Darwin's sirens wailed simultaneously with the first bombs falling on the wharves and ships.

However, Piddington believes if he and Mr Bruce [sic Brian] Cooper had been there to work the radar on February 19 it could have given Darwin a vital margin of warning - the set had a range of 100 miles.

Dr. Piddington's association with radar research goes back to his pre-war student days.

Born in Wagga, where his father was a wool-classer, he went to Sydney High School, then Sydney University where he was a brilliant student with an exceptional capacity for maths.

He got his B.Sc. with 1st class honours, his BE, and finished with the University Medal for Engineering.

A travelling fellowship took him to Cambridge University, where he got his Doctorate of Philosophy. There he studied physics at the Cavendish Laboratory under Sir Edward Appleton, Nobel prize winner for physics in 1947.

The great Lord Rutherford was still head of the Laboratory in Piddington's time there.

Piddington became absorbed in the comparatively new science of radio physics, using radio waves as his tools of trade. Inevitably, he became involved in the then hush-hush development of radar.

In 1937 he did radar research for the British Air Ministry [Cavendish Laboratory] using an early television transmitter borrowed from Alexandra Palace in London.

Back in Australia in 1938, he joined the Radio Research Board, under the Chairmanship of Sir John Madsen, chief executive officer of the Council for Scientific and Industrial Research (forerunner of the CSIRO). [sic Chair of the Radio Research Board of the CSIR]

Dr Piddington says: "Many of the top military brass were relying on Britain to supply us with radar once it had been developed there. But the group of us scientists were determined to make our own long-range plans we had the men and the knowhow."

## **EFFECTIVE**

The Navy and the Air Force were fairly indifferent to the potentialities of radar - they regarded it as a newfangled contraption still in the realm of fantasy.

The Army, however, was most interested - specially Colonel, later Major-General, J.S. Whitelaw, then in command of the coastal defences along East Australia.

In great secrecy, Piddington and his colleagues built Australia's first radar unit- a cumbersome but effective set fitted with valves specially flown out from the U .K.

"In those days we needed a radar valve with an output of about 10 kilowatts - equivalent to what a broadcast station used.

"We got one which flashed a radio signal for ten-millionth of a second, then shut down for 25th of a second, then flashed again.

"Today's radar sets burn a megawatt - a thousand kilowatts."

The team's first radar set was installed in a concrete block house at Dover Heights and linked for fire control with the batteries of 9.2 inch artillery guns lining the coast north and south of Sydney.

"It worked well. On practice shoots we could follow on the radar screen the bleep of the shell in flight, then the splash in the sea. It had a 15 mile range," says Dr Piddington.

Piddington's success with the sea-ground radar resulted in the British Army rushing him to Malaya, Burma and Hong Kong to install similar shore battery sets there.

But when the Japanese stormed over these places these were the guns which were pointing the wrong way.

News of the Pearl Harbour attack galvanised Piddington's team into action.

They - and by then the RAAF bosses - realised that the immediate threat to Australia and New Guinea was air attack and Australia didn't have a single Air-Warning radar.

"On the night of December 7, 1941, myself, Cooper and 12 others set to work. By the following Saturday night we had developed a prototype -set - a bit rough and ready, but with a 100 mile range under good weather conditions, and transportable in a Dakota aircraft. It weighed about 1000 lb. against the first 40-ton ones the Americans had come up with. The set was put together so hastily that normal safety covers were left off and high tension wires carrying 10,000 volts were a hazard to the scientists."

In tests over Sydney, the cumbersome radar set detected planes 60 miles from the city - but they were Allied, not Japanese.

A local electronics firm was given a crash order to build three sets to be dispatched as fast as possible -under the orders of the Chief of Air Staff, Air Commodore [sic] Sir Charles Burnett - to Darwin, Port Moresby, and Port Kembla.

## **REELED**

On February 5, 1942, the first set off the assembly line was flown to a site at Darwin chosen by Wing Commander (Air Commodore, recently retired) A.G. Pither, who was the new Director of Radar at RAAF Headquarters.

"Pither formed a unit, No 31 Radar Station, to man the radar, but the young officers chosen failed to get the set functioning properly. And the RAAF base commanders at Darwin were apathetic about the 'contraption'."

Nobody thought to send for Piddington and his 'boffins' who, absorbed in further radar work in Sydney, weren't even aware the radar was in Darwin.

Then came the morning of February 19 and Darwin, with a radar the Air Force couldn't work and only a handful of outdated planes to defend it, reeled under the fury of the Japanese attack.

Belatedly, Piddington and Cooper were rushed to Darwin and they got the set going. On March 22 when the Japanese launched their next biggest attack the radar at Darwin proved itself a tremendous weapon.

It's detection of the Japanese planes allowed the squadron of American P40 Kittyhawks, which had arrived at Darwin the week before, to intercept the enemy 20 miles out to sea.

Although the Japanese made many more attacks on Darwin, the radar-directed planes took the sting out of them.

Dr Piddington saw out the rest of the war supervising the installations of radar sets at strategic spots throughout Australia and the Pacific Islands.

## **LESSONS**

No decorations or awards came his way, and he slipped back to his peacetime job of helping advance the secrets of space.

He says: "Perhaps we had to suffer-the indignity of a debacle like Darwin to shake us out of our apathy and learn a few lessons."

Dr. Piddington, has received a gilt-edged invitation card to be in Darwin next Sunday where Air Commodore Pither is to unveil a monument at the site of the radar station.

But for reasons of his own, he won't be there ...

## **Additional Note 2**

**Piddington's report of 22 March 1942-- success at 31RS (Evans, 1970, History of Radiophysics Advisory Board , p.189)**

The following was an extract from a report of a senior officer [likely Piddington] of the Laboratory who was in Darwin assisting in the adjustment of the equipment:

Tests on the AW set were carried out on the 20th and 21st March and in-the early morning of 22nd. Most of these tests were done with small planes (Wirraway, Kitty Hawk and A24). These were followed to and picked up at ranges varying from 37 to 63 miles, which is a reasonable result for this size of plane. In the early morning of 22nd a Hudson, flying below 2,000 feet was picked up at 56 miles and followed in. Five other Hudsons were picked up at ranges between 30 and 34 miles, the limitation in this case being brought about by the fact that the planes were not looked for until they had reached these ranges.

Operation with enemy aircraft: At about 11.30 a.m. on the 23rd March [in fact 22 March 1942, Cooper text, also Simmonds and Smith 1991, *Radar Yarns*] indication was obtained of a plane or group of planes at a distance of 84 miles east of Darwin. This was immediately reported to Fighter Operations Room and subsequently a plot of the course was given. Speed was estimated at about 160 miles per hour and the height at between 12,000 and 14,000 feet. A few minutes later a second indication was obtained at 62 miles from Darwin in the same direction. About twenty minutes after the first warning Fighter Operations said that our planes had engaged the enemy. The planes were at this time about 20 miles from Darwin. The height of the enemy aircraft as subsequently reported by Fighter Operations was between 13,000 and 15,000 feet.