Beaufort Matters

1. INTRODUCTION

The story of the manufacture of the Bristol Beaufort aircraft in Australia is one of triumph over the many obstacles that were encountered. It was a magnificent achievement given Australia's low industrial capacity and lack of experience in aircraft construction, the limited pool of technicians and skilled labour that were available, and that there were no facilities for producing machine tools. It involved not only the formation of an organisation capable of mass producing an all-metal, mid-wing monoplane with stressed skin but the establishment and development of a large group of technically complex industries. An indication of the magnitude of the problems faced by the project was expressed by Sir John Storey, Director of the Beaufort Division, Department of Aircraft Production, in 1943 when he stated:

"Looking back from this point, I think I can say that it was fortunate that we had not the slightest appreciation of the difficulties with which we would be confronted. Had we had any conception of those difficulties, I feel that we would have recommended the abandonment of the project'.

This article provides information which hopefully answers a number of questions about the Australian Beaufort program and details some new and surprising facts. Several very good books and articles have dealt with the lead up to, and the manufacture of, the Beaufort and its engines in Australia. Rather than use any of this information, the following notes are sourced only from official records in the National Archives of Australia and a small number from the National Library of Australia and the National Archives of the United Kingdom. The information is fully referenced so that the reader can research the relevant records and files.

Material in this article pre-dates the introduction of metric measurements and decimal currency and the Imperial forms have been retained. Similarly, location names are those used at the relevant time.

2. ORDERS FOR BRISTOL AIRCRAFT

Purchase of the Bristol Blenheim I (Bristol 142M)?

There is no primary evidence to date that the RAAF had ordered the Bristol Blenheim I, no Air Board Agendum nor an Overseas Indent. The Air Ministry file *RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37*, PRO AIR 2/1791 contains no reference either. However, a minute in that file dated 22 April 1936 states that the Australian Liaison Officer in London had been provided with information on the Blenheim and the modified Bristol 142M, by that time known as the Bristol 149, and acknowledged by the RAF to be the type really wanted by Australia.¹ By June, the Air Ministry was referring to the Bristol 149 as the Blenheim (so this may be where some confusion in nomenclature has arisen).²

Other secondary evidence dates from May 1936 and these secondary sources are set out in the end note.³. But perhaps the most interesting indication from this evidence is an Air Board Minute dated 4 February 1938 where Chief of Air Staff (CAS) AVM Richard Williams states:

"You will remember that some time ago we placed an order for 40 'Blenheim' twinengined landplanes and were promised certain deliveries.

"Later Air Ministry advised that there (sic) were improving on the 'Blenheim' which, as you know, was developed as a civil machine in the first place, with the idea of

incorporating more of the requirements of the service and that this new type would be known as the 'Bolingbroke'.

"We thought it would be advisable to take it in preference to the 'Blenheim' especially as the deliveries offered were only a few months later than those of the Blenheim."⁴

However, the Australian Liaison Officer in London was advised in May 1936, that the Air Board had determined two general reconnaissance squadrons were to be re-equipped with the 40 *modified* Blenheims on order, 24 for initial equipment, 12 for reserve and 4 for wastage.⁵ Despite Williams 1938 Minute it would seem that there was no serious attempt for Australia to purchase the Bristol 142M.



Bristol Blenheim I (Bristol 142M) [BAE Systems]

Purchase of the Bristol Bolingbroke (Bristol 149/Blenheim IV)

In August 1936, the Australian Liaison Officer in London advised the Air Board of potential replacement aircraft for the Avro Anson and Hawker Demon and supplied details of the Bristol 149 to replace the Anson; the 149 being described as an interim general reconnaissance aircraft. This same advice also alluded to a potential replacement aircraft for the Bristol 149 already under consideration and combining the general reconnaissance, torpedo bombing and general purpose functions in one aircraft⁶ (this was Specification 10/36 and both the Blackburn Botha (B-26) and the Bristol Beaufort (Bristol 152) were eventually built to this specification).

The RAAF showed an interest in all three Bristol aircraft, the Blenheim I (Bristol 142M), the Bristol 149 (Bolingbroke) and the Bristol 152 (Beaufort), although the aircraft that would become the Beaufort was still only in the early design stage. Based on the above advice, the Air Board decided that the Bristol 149 was more appropriate to, and better suited, Australia's needs than the Blenheim I.⁷ The Australian Liaison Officer in London was instructed in November 1936 to assure the Air Ministry that an order for 40 of the Bristol 149 aircraft was forthcoming, thereby allowing the RAAF's requirements to be fulfilled in the first production run. By now officially referred to as the Bolingbroke in correspondence (retrospectively changed by the Air Ministry to Blenheim Mk IV), these aircraft were destined to equip Nos. 2 and 4 Squadrons in lieu of Avro Ansons.⁸ The Overseas Indent 550 (overseas order) was not placed until February 1937 and provided for these aircraft to have the serial numbers A9-1 to A9-40.⁹ A further order for an

additional 10 Bristol Bolingbroke aircraft to equip half of 6 Squadron was placed in November 1937.¹⁰

In June 1936, the Air Ministry questioned whether the 40 Bristol 149s required for Australia could be spared from RAF requirements as production could not be increased.¹¹ By the following month the delivery of the 40 Bristol 149s to Australia was expected between July and November 1937¹² but a few weeks later this was extended to between October 1937 and March 1938 because of a three month delay in production due to modifications needed to the cowlings to correct engine overheating¹³ (all of these delivery dates proved to be optimistic as the first flight of the Bristol 149/Bolingbroke was not until September 1937).

By the end of August 1936, Viscount Swinton, Secretary of State for Air, became involved in setting aircraft delivery priorities. In addition to RAF and RAAF deliveries, Finland and Turkey were also seeking aircraft from Bristols. Swinton decided not to prejudice the RAF expansion scheme and wanted to help Turkey more than anyone – much more than the Finns and would not attempt to meet Australian requirements until Australia had made a decision on the Empire Air Mail Scheme. This decision had been held up for a year and, as such, he felt very little obligation to Australia.¹⁴

Meanwhile, in May 1937 25 members of the RAAF had been sent to Britain, together with representatives of the other two services, to participate in the Coronation of King George VI as part of the 1937 Australian Coronation Contingent. All musterings were represented and the Air Board took the initiative to attach them for training to RAF units and British aircraft factories at the conclusion of the coronation ceremonies. In anticipation of soon receiving Bolingbrokes, seven members were attached for various periods, lasting up to five months, to either the Bristol Aeroplane Company at Filton or to RAF stations that were equipped with Blenheims (albeit the Blenheim I). At Bristols, they studied the production of spare parts, engine and airframe systems for the Blenheim and worked in the engine assembling and erecting shop.¹⁵



Bristol Bolingbroke – Blenheim IV (Bristol 149) [BAE Systems]

Change to the Bristol Beaufort

Although two orders had been issued for a total of 50 Bristol Bolingbroke aircraft, in early January 1938 the Air Board was already considering replacing the Bolingbroke in these orders with the Beaufort.¹⁶ This was because further advice had been received from the Air Ministry that due to development problems with the Bolingbroke, the RAF had

decided not to proceed with that aircraft but would be placing production orders "off the drawing board" for the Beaufort (Bristols did sort out the problems with the Bolingbroke/ Blenheim IV and a total of 3,307 were eventually manufactured). It was forecast that deliveries of the Beaufort could be expected in early 1939. The Air Board considered the Beaufort to be a further improvement over the Bolingbroke and approval for the orders for 50 Bolingbroke aircraft to be changed to the Beaufort were forwarded to London on 3 March 1938.¹⁷ Just a week later the Air Board advised the Australian Liaison Officer in London that approval was being sought for an additional 83 Beauforts¹⁸, later reduced to about 45¹⁹. During the 12 months until the Beauforts could be delivered, the RAAF would use the Avro Anson and additional Ansons had been contracted to fill the gap.²⁰

In May 1938 the Air Board was informed by the Air Ministry that none of the service equipment ordered for the Bolingbroke could be used in the Beaufort so new equipment was required. This enquiry had resulted from a report by Squadron Leader Leon Lachal RAAF in September 1937, following his attachment to Bristols and on completion of his duties as Commanding Officer of the RAAF Component of the Australian Coronation Contingent.²¹ Some of this service equipment for the Bolingbroke had already been delivered to Australia as the majority of parts had been expected useable in the Beaufort.²²

By 23 August 1938 the Air Board noted that 50 Beaufort aircraft were on order but an additional 87 Beauforts were needed to complete the rearmament program. The Board recommended that an order be placed with Bristols for 40 Beaufort aircraft with Taurus engines, 12 spare engines and spare parts (only 40 aircraft could be ordered at this time due to a lack of funds). This would therefore leave a balance of 47 to complete reserves at a later date when a more definitive cost of the aircraft would be known and additional funds made available. This was approved by the Minister for Air on 31 August 1938.²³

It is interesting to note that these 90 aircraft were to be fitted with the RAF Mk IV autopilot and on 28 November 1938 the Air Board placed an order for the supply of automatic pilot controls and spare parts as these would be the first RAAF aircraft so fitted²⁴ (however, it eventuated that RAAF Beaufort aircraft were not equipped with automatic pilots).



Bristol Beaufort I (Bristol 152) [BAE Systems]

Air Board Foresight

While this series of events to supply Bristol twin-engined aircraft has been well documented previously²⁵, not so well known is the fact that contracts for the Bolingbroke and Beaufort, plus the Avro Anson, included a clause covering, for the Bolingbroke, the manufacture of the airframe only in Australia, for the Beaufort and Anson, the manufacture of both the airframe and engines.²⁶

Some idea of the Air Board's foresight in this matter is a Minute from the Board dated 3 May 1938. The Air Board noted that the Beaufort was still to prove itself a success, particularly with the untried sleeve-valve Taurus engines. It was also concerned that should an emergency arise in Europe, the possibility of the supply of aircraft from the UK to Australia would become extremely uncertain. The Board recommended steps be taken to guard against a breakdown in the supply of the Beaufort by providing for their local manufacture and thereby complement that underway by the Commonwealth Aircraft Corporation (CAC) for single-engined aircraft; an alternative was to review what was available from the United States. Because a British Mission to the United States was evaluating various aircraft in the USA at that time, the Board recommended that any decision should be deferred until after the Mission's findings were known. But the Board did suggest that an approach be made to the Air Ministry for one or two Beauforts to be made available earlier so that service personnel could become acquainted with the aircraft.²⁷

Promise of Early Beaufort Deliveries from the UK

Initial advice from the Air Ministry in August 1937 was that the production of the Beaufort was estimated to commence about June/July 1938 but much depended on prototype trials that September. Production output at that time was not known and the Air Ministry had not yet determined the allocation of deliveries between the RAF and the RAAF.²⁸

As happened for the Bolingbroke, the projected delivery date for the Beaufort was extremely optimistic. Just one month later on 17 March 1938, the Air Ministry advised that no Beauforts could be released for any overseas RAF squadrons or for Australia before May 1940 and then only at a rate that might be in the order of 12 per month.²⁹ CAS Williams was rightly taken aback at this advice and sent a signal back in effect threatening to involve Prime Minister Lyons in the matter or proceed with the alternative of seeking American aircraft.³⁰ The prime ministers of both countries did become involved and as a result, the Air Ministry promised that the second 50 Beauforts manufactured would be allocated to Australia and deliveries could be expected about August to October 1939.³¹

Then in June 1938 the Air Ministry advised that the delivery of the first 50 Beauforts could be expected in July 1939 and two Beauforts would be released about two or three months earlier than that. However, the second order for the additional 40 Beauforts could not be supplied until August or September 1940 following the completion of the RAF's order for $350.^{32}$ The supply of the first 50 Beauforts was confirmed on 14 July 1938 whereby the Air Ministry had allocated Beauforts 28, 29 and 49 to 98 on the production line for Australia.³³ This was later amended, following the increase in the order to 90 Beauforts, to production line Nos. 17 - 26 (10), Nos. 31 - 70 (40) and Nos. 250 - 289 (40) (these last 40 amended later still to Nos. 401 - 440 (40)).³⁴ Shipments were expected as 1 in September, 9 in October, 9 in November, 25 in December in 1939 and 6 in January 1940.³⁵

Although the Air Ministry placed its order for 78 Beauforts on 22 August 1936, the first flight of the aircraft from Bristols at Filton did not occur until 19 October 1938. By early February 1939, Squadron Leader Sims RAAF, who was undertaking a tour of the UK and North America to assess various aircraft of interest to the RAAF, had flown in the

Beaufort and was favourably impressed with its performance. This was followed in March by Group Captain McNamara (RAAF Liaison Officer with the Air Ministry) also flying in the Beaufort³⁶.

Following the British Mission to the United States, by November 1938 the UK Government had taken all of Lockheed's capacity to produce the Hudson General Reconnaissance aircraft and advised the Air Board that it would first equip one RAF squadron with the Beaufort to sort out any problems with introducing it to service and, as stated, would release earlier production line aircraft to the RAAF for delivery between July and October 1939³⁷. In August 1939 the planned re-equipment of squadrons with Beauforts from the UK was determined to be as follows³⁸:

<u>Squadron</u>	Location	<u>No. of</u> <u>Aircraft</u>	Re-equipment Date
No. 2 (General Reconnaissance)	Laverton	12	November 1939
No. 6 (Bomber)	Richmond	12	January 1940
No. 1 (Bomber)	Laverton	12	February 1940
No. 25 (General Purpose)	Pearce	4	March 1940
No. 14 (General Reconnaissance)	Pearce	12	September 1940
No. 21 (General Purpose)	Laverton	4	October 1940

By 30 September 1939 no Beauforts had been shipped to Australia even though the Australian Liaison Officer advised that no decision had been made to alter the allocation of Beauforts. This was because the Air Board had now been advised that no Beauforts were to leave the UK before certain tests of the engines had been completed and this would not likely be until March 1940. In addition, the UK Government now seemed to have put a proviso on whether the Beauforts were to be eventually sent to Australia at all; matters such as what contribution Australia was prepared to make to British fighting forces during war.³⁹ A previous proposal for RAAF personnel to fly UK manufactured Beauforts to Australia was refused by the Air Board, as the personnel necessary to move such a large number of aircraft were not available.⁴⁰

3. AUSTRALIAN BEAUFORT MANUFACTURE

Early Proposals to Manufacture British Aircraft for the RAAF in Australia During the 1920s and into the early 1930s, small numbers of aircraft were manufactured in Australia for the RAAF, such as the Avro 504 and DH60 Moth.⁴¹ Also in the early 1930s the Air Board was developing a policy for the payment of royalties on British designed aircraft, spare parts and equipment manufactured in Australia. This would allow future contracts for purchase of aircraft to include clauses for local manufacturing rights and allow for royalty payments should they be invoked. Royalties had already been determined for the manufacture of the DH60 Moth and it had been hoped that a pre-determined policy would shorten future contract negotiations.⁴²

In January 1937 the Minister for Defence, Archdale Parkhill, delivered a statement on the manufacture of aircraft in Australia and noted that for several years British aviation companies had been open to set up in Australia but no proposal had been forthcoming that in any way offered the advantages comparable with those subsequently offered from CAC.⁴³

During the negotiations with British manufacturers in 1935 for the purchase of the new aircraft, obtaining the rights to locally manufacture these aircraft was discussed and general terms agreed to under which these manufacturers were prepared to grant such rights. The proposed payments for the right to manufacture in Australia were negotiated

with Hawker Aircraft Company for the Demon, Vickers Supermarine Ltd for the Seagull V, Rolls Royce for the Kestrel engine and Bristol Aeroplane Company for the Pegasus engine.⁴⁴ Later in 1935, when ordering the Avro 643 Cadet, agreement was also reached for the possible future manufacture of this aircraft in Australia.⁴⁵

The first indication that the RAAF was taking a serious interest in the manufacture in Australia of a Bristol twin-engined aircraft was in August 1936 during discussions as to whether the Australian Aircraft Syndicate (soon to form CAC) should be approved to manufacture the NA-16/33 as the Wirraway. CAS Williams stated that he considered the Bristol Blenheim would meet the future needs of the RAAF for a twin-engined aircraft but acknowledged that this was a time of rapid technological change. Nevertheless, he sought comment from the Syndicate as to whether the aircraft factories proposed to be built would be capable of switching over, at a later date, to the production of the Bristol Blenheim and the Bristol Aquila engine, both at that time under development in the UK.⁴⁶ The Syndicate replied on 3 September that the Blenheim and Aquila engine could be considered for manufacture once the industry had established and gained experience with building types of simpler construction.⁴⁷ Six months later, Williams was still hoping that CAC would be able to manufacture the Bristol 149 or its development, the Bristol 152).⁴⁸

First Indication of Beaufort Manufacture in Australia

On 5 May 1938 the Air Board gave its first indication that the 45 to 50 Beauforts which were proposed to be ordered and were additional to the first 50 on order may be manufactured in Australia.⁴⁹ The Government was already considering the manufacture of the Beaufort in Australia at this time when it asked the UK Government to ship one or two Beauforts to Australia as early as practicable given possible local production.⁵⁰ The Air Board was further advised in June 1938 that the decision regarding Australian manufacturing rights would be available shortly. By 23 August 1938 the Air Board reported that the local manufacture of the Beaufort was being further considered. However, with no firm commitment for local manufacture, the order for the additional 40 Beaufort aircraft to be manufactured in the UK was therefore placed.⁵¹

Lead Up to United Kingdom Government Air Mission

In November 1938, Australian High Commissioner Bruce sent a long cablegram to Prime Minister Lyons stating that he had given a great deal of thought to the question of aeroplane construction in Australia (presumably based on advancing the proposal conveyed to him in May). He considered that from the point of view of Australian and Empire defence it was imperative to create at the earliest possible moment a potential capacity to construct aeroplanes in Australia in substantial numbers and to ensure the cooperation of the British Government. He had discussed formulating a practical scheme with the Secretary of State for Air and officials of the Air Ministry, who considered such a scheme would probably be possible.

The following broad outline was put forward:

Objective – potential for output of 1,000 planes per annum. The peacetime output necessary to enable war potential to be rapidly realised was 300 planes per annum. The time taken to reach this peacetime figure of 300 was likely to be 3 to 4 years. Method – construction of a large number of a proved and approved type of machine, for example the Beaufort (although ordered by the RAF in August 1936 the Beaufort only flew for the first time one month prior to this cable, so it could hardly be considered "proved").

Method of disposal of production – Australian Government to have priority for the number required for Australian defence; United Kingdom Government to take balance for points between Egypt and the Far East.

Method of organisation for production – sub-contracting with engineering firms and other suitable establishments for production of parts with two assembling points, one of which would be the existing installation in Melbourne and a further one to be created in Sydney. These assembling points would also be in a position to supplement deficiencies caused by failures on the part of sub-contractors.

The method of control – one control for all construction in Australia, presumably by CAC. All information, drawings, etc, to be supplied from the UK and if necessary any jigs and tools required to supplement those produced in Australia.

Designing and experimental work in Australia – as prototype construction in respect of new designs was done by hand, this work could go forward to such an extent as was considered desirable, side by side with the organisation of Australia's production capacity. Any production capacity would be available for other machines.

Bruce went on to state that the governing factor in creating an Australian aeroplane construction potential must be the capacity to dispose of what was produced. The only practical method in framing a scheme whereby such disposal could be assured was in cooperation with the UK Government, although the possibility of enabling a portion of the output to be disposed to other dominion governments or even foreign governments could not be overlooked.

The system of sub-contracting which was contemplated would have the advantage that while affording a stimulus to industry generally it could also reduce should there be a lessening of demand consequent upon an improvement in the international situation. Bruce proposed that if the scheme was approved in broad outline by the UK and Australian Governments, the proposed procedure would be for the United Kingdom to immediately send a representative to Australia to agree to a definite scheme and discuss the method whereby it could be put into operation at the earliest possible date.⁵²

Visit of United Kingdom Government Air Mission and Aftermath

On 9 December 1938 Lyons responded to Bruce agreeing that the best course of action would be for experts to come to Australia to discuss the scheme. Meanwhile, a preliminary survey of the Australian position was prepared for their study in advance. This would cover the supply of skilled labour, industry organisation and the capacity of industries which would be called upon to cooperate. The Government considered that a scheme of this nature was an important gesture at that time, particularly in view of prominence given in the press to the favourable conditions under which similar factories were apparently (at that time) being established in Canada.⁵³

Much has already been written on the visit of the United Kingdom Government Air Mission to Australia which followed on from a similar mission sent to Canada in the middle of 1938. The Air Mission made its report in March 1939 (a copy of the Report of the United Kingdom Air Mission to Australia 1939 can be found in *Aircraft* -*Manufacturing of in Australia Air Mission Papers, NAA: M276, 4*).

The recommendations of that report were as follows: **Matters of Primary Urgency:**

- That immediate orders should be placed in Australia for 180 Beaufort airframes of standard design, with spares, 90 of these airframes to be delivered to the United Kingdom Government and 90 to the Commonwealth Government – the costs of the manufacture of these to be divided in equal proportions.
- 2. That production should be planned to secure the delivery of the first of these machines during 1940 and to attain a delivery rate of 20 airframes per month by the middle of 1941.
- 3. That for this purpose a central organisation be established and a manager with the highest possible qualifications be engaged under the Commonwealth Government to

erect and manage central erection shops at Melbourne and Sydney to supervise and control the main assembly and subcontracting arrangement necessary for carrying out this order.

- 4. That in the execution of this plan regard should be paid to the importance of providing for immediate acceleration and expansion under war time conditions if hostilities should break out.
- 5. That immediate orders for the supply of 250 Taurus engines, to be delivered in Australia in advance of the delivery of the airframes, be placed in England.
- 6. That drawings, jigs and tools now being prepared by the Bristols in anticipation of Australian requirements, together with the materials for the first batch of airframes, and such other requirements as may be necessary to ensure initial progress, be dispatched from England as soon as possible, and that materials, special parts, instruments, etc, be made available from England until such time as local supplies conforming to agreed standard specifications can be produced.

Matters of Less Immediate Urgency:

Consideration should be given to the following matters to further the expeditious execution of the orders proposed above and to foster the long range development of aircraft production in Australia.

- 1. That use should be made of the railway organisations in the States of New South Wales, Victoria, Queensland and South Australia for the purpose of main assembly work and for sub-contracting to the engineering industry to the maximum extent the manufacture of components and subassemblies.
- 2. That the Commonwealth Government should build erection units at the Mascot and Fishermen's Bend aerodromes.
- That a central committee should be established to supervise generally the policy governing the distribution of assembly work, subcontracting and the creation of manufacturing potential.
- 4. That based on the unforeseen aircraft needs of the RAAF, a review should be undertaken of the production at the CAC factory at Melbourne and that endeavour should be made to ensure that these works are kept occupied on a long term program, whether by full scale manufacture of types other than the Beaufort or by the supply of parts of the latter to the central organisation.
- 5. That manufacture at the CAC factory of Gipsy engines for elementary trainers should be considered.
- 6. That careful investigations be made into the possibilities of a progressive changeover at the CAC factory to the Bristol sleeve valve type of engine and that the question of establishing reserves of engines or parts in Australia be coupled with this investigation.
- 7. That every encouragement should be given to technical associations between established British undertakings engaged on the production of materials, instruments, etc, and suitable Australian organisations with a view to production in Australia.

This report received the approval of the Cabinet at the end of the same month⁵⁴ but Australia was not advised until 27 May 1939 that the UK Government had accepted the report subject to the reservation for further consideration on the possibility of using an American engine.⁵⁵

The Beaufort Scheme

The Beaufort scheme was based upon the importance of securing output at the earliest possible date and the desirability of minimising capital expenditure by the utilisation of the existing railway organisations and floor space in the main railway workshops in several states, the erection of two large factories at Melbourne and Sydney for the assembly and fitting out of the aircraft and the setting up of a central organisation to control and manage the undertaking. Within the first 12 months following the approval of

the scheme all local arrangements had been carried out to schedule. A large main store had been built at Spotswood (Vic) and was in operation before the end of 1939. The sections of the railway workshops in New South Wales, Victoria and South Australia allotted to the construction of the airframe components, sub-assemblies and details had been prepared for the installation of jigs and tools. The two main assembly workshops at Fishermen's Bend (Vic) and Mascot (NSW) had been completed ahead of requirements.⁵⁶

Initially Queensland was included in the scheme. At the meeting of railway officers of the several states it was reported that the Queensland Railways could make available 50,000 square feet of space. Queensland later asserted that this space could only be made available if the Commonwealth Government constructed new buildings for that purpose. Following further consideration, it was determined that not more than 30,000 square feet would be necessary at Ipswich. Queensland then advised that only 10,000 square feet would be available and the extra 20,000 square feet could not be provided unless the Commonwealth Government agreed to the cost of constructing new workshops. The Commonwealth then advised that Queensland's contribution would have to be reduced to conform to the available capacity.⁵⁷



Fuel tanks being manufactured at GMH Woodville [State Library SA]

Based on the available engineering technical staff, the actual floor space, suitable labour trades and the suitability of existing technical organisations to take on the additional work with the minimum of additional staff, the proportion of work was allocated staffing requirements of 1,000 in New South Wales, 1,000 in Victoria, 1,800 in South Australia and 500 in Queensland.⁵⁸

A necessary precondition to production was, however, the procurement of thousands of jigs, tools and fixtures, many of an intricate design. The original arrangement provided for all of these jigs, tools and fixtures, totalling some 33,000, to have been supplied from the UK. Bristols, whose responsibility it was to supply these tools, ended up failing in this undertaking. Consequently it was necessary to undertake the manufacture in

Australia of not less than 26,000 of the 33,000 tools required. Furthermore, Bristols was to ship to Australia before 31 December, 1939, 10 sets of fabricated parts and 10 sets of raw materials and the equipment necessary for the construction of the first 20 airframes. These deliveries were seriously delayed and not completed due to the confusion and disorganisation which occurred as a result of the outbreak of war, when thousands of inexperienced workers had to be employed to increase production. Moreover, the data supplied by Bristols contained so many errors and so much misinformation as to necessitate a complete revision of the planning and manufacturing programs and a vast amount of checking and rechecking in Australia.⁵⁹ The central administration was engaged in an examination of all this data and in the detailed planning of the work so as to ensure that production would proceed concurrently in the sub-assembly and main assembly workshops.⁶⁰ In December 1939, the then chief engineer, Fred Shea was sent to England in order to strengthen the liaison with the Air Ministry and Bristols.⁶¹

The initial production timetable for the scheme provided for the following:

- Drawings to arrive in Australia by 30 June, 1939.
- 20 sets of materials to arrive in Australia by 31 August, 1939.
- Two complete aeroplanes to arrive in Australia by 31 October, 1939.
- Jigs and tools to arrive in Australia by 31 December, 1939.⁶²
- 180 airframes manufactured in Australia beginning July 1940 and ending October 1941.⁶³

On 27 March 1939, although it had not been consulted by the United Kingdom Government Air Mission, the Air Board recommended that in accepting its proposals, the Government should approve a policy of aiming to secure complete self-sufficiency in the manufacture of airframes and engines in Australia at the earliest practicable date. The Air Mission's proposal was for 90 Beauforts for the RAAF but the Government had already placed orders for 90 Beauforts with Bristols, deliveries of which, as recorded above) were expected as 50 in July to October 1939 and 40 during 1940. The Board assumed (but did not know) that there was no intention of transferring this order of 90 now placed overseas to local manufacture. The Air Board could in no circumstances recommend this owing to the international situation and also to the uncertainty of deliveries from the local industry. The 90 aircraft proposed to be ordered from local manufacture would therefore have to meet requirements for the years succeeding 1940 to 1941. Requirements after this date were 25 per annum earmarked for two financial years following 1940 to 1941, leaving a surplus of 40 aircraft above immediate requirements. The Board considered that these 40 surplus aircraft would have to be stored as reserves and therefore storage facilities would have to be built to accommodate them.64

Then on 1 May 1939, the Air Board stated that full use should be made of CAC's production facilities even to the extent of bringing it further into the proposed Beaufort scheme than was contemplated and this was discussed with representatives of Bristols on 4 April. Even before the United Kingdom Government Air Mission was conceived, the RAAF had a requirement for an annual supply of twin engined general reconnaissance aircraft and had proposed that CAC manufacture such a suitable aircraft.⁶⁵

Australian Beaufort Manufacture

Following the approval of the Report of the United Kingdom Air Mission, it was necessary for legislation to be enacted setting up the new Department of Supply and Development, of which aircraft construction was constituted a branch. It was not until 1 July, 1939 that the Aircraft Construction Branch began to function.⁶⁶ On 21 March, 1940 the Aircraft Construction Branch was reconstituted as the Aircraft Production Commission (APC), still having direct responsibility to the Minister of Supply and Development. On the

establishment of the Department of Munitions in June 1940, the Commission became a section of that Department. Only 12 months later, the APC became a Commonwealth department known as the Department of Aircraft Production (DAP) responsible to the Minister for Aircraft Production. As of 6 January, 1942 the Commission itself was abolished and enlarged powers given to the Department.



Rear fuselage manufacture ready for skinning at Newport [National Archives Australia]

Major components were to be manufactured in the following workshops for the Beaufort: Chullora, (NSW): front fuselage, stern frame, undercarriage and engine nacelle. Newport, (Vic): rear fuselage and tail assemblies (tail plane, rudder, fin and elevators). Islington, (SA): centre plane and wings.

Queensland's contribution had now been cancelled.

Training of Workforce

A critical part of the scheme was the need to train staff in the manufacture of this type of aircraft. Specialist tradesmen and foremen needed to be trained at Bristols. Altogether the proposal was for 80 to be trained there, 23 each from Melbourne and Sydney, 25 from Adelaide and 9 from Brisbane. The specialist tradesmen were those working in the Machine Shop, Press Shop, Spars and Rolling Mill, Sheet Metal and Fitting Shop, Tinsmiths and Coppersmiths, Heat Treatment Shop, Planning and Progress, Stores, and Inspection Areas and Sub Assembly and Main Assembly Halls.⁶⁷ It was arranged that four groups of trainees would leave Australia, one each in August, September, October and November 1939 for a period of 3 months.⁶⁸ In fact the first group left Australia at the end of July 1939 and was followed by subsequent groups at intervals of between five and six weeks, and the last of the trainees arrived back in Australia in March 1940.⁶⁹

Trainees for work in aircraft factories were drawn from all walks of life and to give these people the necessary theoretical and practical training in aircraft construction, specialist training schools were established in the various states to supply personnel for the aircraft

servicing contractors. Special schools were also conducted to train personnel for the Beaufort production and assembly workshops. Dedicated classes were established at technical schools in New South Wales, Victoria and South Australia for the training of process workers and aircraft assemblers. Hundreds of personnel received this training and a large number of the foreman and leading hands graduated from classes established at the various scheme's plants.⁷⁰

To assist in the training of workers at Islington (SA) where wings and centre sections were to be manufactured, Bristols dispatched one sample centre section to Australia which arrived in Adelaide on the *SS Corinda* in early December 1939. This was sent for general instruction purposes and the packing case was to be used as a template for when centre sections manufactured at Islington needed to be packed and transported to Melbourne or Sydney.⁷¹ However, the case had been transported incorrectly and both the case and centre section had been damaged requiring a check on the assembly jigs to ensure there had been no major damage.⁷²



Workers Leaving Islington Workshops 15 December 1943 [National Archives Australia]

In addition to the above training requirements, in May 1939 the Air Board realised that the adoption of the scheme would require the establishment of an Aeronautical Inspection Directorate (AID) to inspect the aircraft prior to delivery to both air forces. Based on the scheme as originally proposed, it was estimated that the Directorate would require some 100 inspectors of various grades. It was also therefore necessary for some 12 to 15 inspectors to be sent to England before production began to obtain first-hand experience at Bristols.⁷³

Selected workers at the Mascot Assembly Plant were sent to Fishermen's Bend in May 1941 where four aircraft were in the process of being assembled. The Mascot workers assembled one of these aircraft so as to gain experience in the assembly operations and thereby ensure they would be competent to undertake similar work at Mascot.⁷⁴

Further Assistance from Bristols

To assist with establishing the Australian Beaufort Manufacturing Organisation, arrangements were made in the middle of 1939 for Bristols to send a technical representative to Australia for two years and that a number of suitably qualified technical subordinates be loaned for a period of six months.⁷⁵ In fact, three engineers from Bristols were seconded to Australia to assist – Technical Officer Latham, sub-contract expert Perman and Inspector Croome.⁷⁶

Also at that time, Bristols offered to send one of its fully qualified pilots to Australia to supervise the testing and instruction of pilots on the Beaufort. No RAAF pilots with relevant experience were available nor were there any RAAF pilots in the UK who could be made available to gain the requisite flying experience. It was estimated that a period of two months duration would be adequate for the initial testing and instruction.⁷⁷ It transpired that it would be almost another 2 years before the first flight but the search for a suitable test pilot commenced in April 1940.

The Air Ministry had considered that flight testing of the Beaufort in Australia should be undertaken by a test pilot trained at Bristols and suggested that the Air Board dispatch a pilot to the UK for the necessary instruction.⁷⁸ Bristol's chief test pilot had suggested Flight Lieutenant Paddy Heffernan be sent knowing that he already had considerable experience of flying twins in the UK.⁷⁹ On 23 May 1940 the APC was advised that Heffernan was not available but suggested there be an exchange of one RAF officer to travel to Australia to flight test the Taurus engined Beaufort while one RAAF officer would travel to Bristols to be trained on the Beaufort being modified there to take the Wasp engine. Once trained, the RAAF officer would return in time to test fly the Wasp engined Beaufort.⁸⁰ In June 1940 it had been confirmed that no Taurus engines were now available and all Beauforts were to be Wasp engined and in August the APC noted the exchange was no longer necessary and assumed that the RAAF would provide an officer.⁸¹ This was confirmed that month.⁸²

But by the end of November 1940, the APC wanted to secure a test pilot from the UK who was fully experienced in handling the Beaufort⁸³ and the Air Board soon agreed.⁸⁴ In January 1941 the Commission was seeking a test pilot from the Air Ministry who would reach Australia within eight weeks.⁸⁵ This initial proposal, supported by the Air Ministry, would be for the duration of the war.⁸⁶ The Ministry of Aircraft Production was unable to find an available test pilot but the Air Ministry offered to train and second a RAF officer.⁸⁷ But the Air Ministry was also having difficulty and finally in February chose Flight Lieutenant (later Squadron Leader) Lumsden, who had long experience and who would undertake two weeks special training and then be available to test initial aircraft and train Australian test pilots.⁸⁸ Squadron Leader Lumsden was seconded for a period of only six months from 25 February 1941⁸⁹; he departed the UK by ship on 23 March 1941⁹⁰ and arrived in Melbourne on 19 April having travelled via Canada and the USA.⁹¹

3. WHICH ENGINE?

The story of the supply and manufacture of the Taurus and twin-row Wasp engines, both from overseas and in Australia, is complicated and intertwined. Therefore this section is generally provided in chronological order. In addition, further information on engine production for the Beaufort is provided in *Australian-Built Aircraft and the Industry: Volume 2 – Commonwealth Aircraft Corporation* by Keith Meggs.

1938

In May 1938 CAS Williams was expressing his concern to RAF CAS Air Chief Marshal Sir Cyril Newall that the Taurus engine may not be a success and, if there was an emergency or war, then the Beauforts on order, spares and support may not be available for Australia. As such, Williams considered it essential that Australia had its own aircraft manufacturing capacity.⁹²

1939

At a Cabinet meeting on 27 March 1939 where the Report of the United Kingdom Air Mission to Australia was approved, Cabinet also made additional decisions on the engine to be manufactured. Cabinet recognised that the basis and origin of the Mission's visit was that Australia, in addition to improving her own position in regard to the supply of aircraft, would be a source of supply for British requirements in the East. It was therefore necessary, if Australia was to take advantage of the proposal, for the Commonwealth to produce an engine of the type required by the UK, ie the Taurus. Interestingly Cabinet approved that:

- CAC be authorised to proceed with the development and tooling up for the twin-row Wasp engine as an insurance against the non-supply of Taurus engines from the UK.
- That concurrently CAC be authorised to proceed with the development and tooling up for the Taurus engine.⁹³

The schedule at the end of March 1939 for the engine delivery program for the Bristol Taurus II engine was:

- Supply of 250 engines by Bristols beginning March 1940 and ending April 1941;
- Supply of 110 engines manufactured in Australia beginning September 1940 and ending July 1941.⁹⁴

On 4 April 1939 CAC advised that the dates for tooling up for the Taurus engine would not be completed until December 1940 and production would commence in March 1941. In the nine months from March 1941, 110 engines could be delivered at the rate of the three per week for installation in the final 55 Beaufort airframes. In addition, the Corporation advised that tooling up for the twin-row Wasp engine would not interfere with the tooling up for the Taurus engine and its work on the single row Wasp engine. The Corporation estimated it was approximately 50 percent on the way towards the production of the twin-row Wasp engine.⁹⁵

CAC's estimate was very optimistic while the Air Board was much more pragmatic. On 11 May 1939 the Board was advised that Taurus engine production in Australia would involve the doubling of CAC's engine workshops, machine tools and processing equipment costing some £300,000. Added to this was additional tooling, training of personnel (including at Bristols plant in England and importation of some technical staff from Bristols), licences, raw materials and a testing plant would bring the total to £637,000. Engines could not be expected from the plant for at least $2\frac{1}{2}$ years from the date when the project was authorised. This also assumed that skilled personnel were available.⁹⁶

On 15 May 1939 Cabinet again considered the manufacture of engines and decided that:

- CAC be authorised to proceed immediately with tooling up for the twin-row Wasp engines;
- Arrangements be made through the Air Ministry with Bristols for the redesign of the Beaufort airframe to permit twin-row Wasp engines being used and that on completion of the redesign the aircraft be tested for performance and other characteristics when fitted with these engines;
- A further 110 Taurus engines be ordered by the Air Ministry from Bristols with a break clause providing that if the engines were available from Australian sources, the 110 would not be delivered to Australia but the Air Ministry would arrange for their use elsewhere;

 Action regarding the tooling up for the Taurus engine be deferred until the Air Board's recommendation was received and the matter again examined.⁹⁷

With the Government deciding to proceed in this direction, the UK High Commissioner Sir Geoffrey Whiskard intervened and on 20 May 1939 wrote direct to the Minister for Supply and Development Casey. Whiskard stated bluntly that there was no doubt as to the very strong opinion held by the United Kingdom Government Air Mission and the UK Government of the desirability of an English rather than American engine being manufactured in Australia. Quite apart from the fact that the Beaufort would have to be adapted to take the twin-row Wasp engine, and that this adaption would require a whole series of further trails and tests, the UK Government was anxious to decentralise aircraft manufacture as much as possible and a great deal of the value of that decentralisation would be lost if the type to be manufactured in Australia was dissimilar to the type manufactured in the UK.⁹⁸

While Whiskard was pushing in Australia, the UK Government was pressing High Commissioner Bruce on the same matter over the concern that an American engine might be selected in place of the Taurus engine. Bruce was reminded that any Beauforts made for the RAF in Australia needed to be fitted with the Taurus engine and it would not be economical for Australia to produce such a small number as 180 Beauforts with two different types of engine.⁹⁹ Bruce advised that Australia recognised it was desirable, if possible, to construct an engine which would be acceptable to the UK Government but the Taurus engine was not yet proved and until it was he could not expect Australia to take on the construction of that engine. It was made quite clear that the Air Ministry intent was for Australia to construct these engines so that Bristols did not have to.¹⁰⁰

Following a Cabinet meeting where the manufacture of engines was again considered, Casey wrote a long letter to Harold Darling, Chairman of CAC on 24 May 1939. Casey stated that Cabinet had discussed the merits of CAC manufacturing the twin-row Wasp and/or the Taurus or other Bristol sleeve valve engine and decided to take immediate steps for CAC to manufacture the Bristol sleeve valve engines, not to engage in the manufacture of the twin-row Wasp but, if necessary, import those engines and spares as may be required for Hudson aircraft. In addition, this could also involve the possibility of importing all the Taurus engines necessary for the 180 Beauforts on order if CAC was not in a position to deliver Taurus engines on time. The principal reason for taking this decision was the statement of Government policy in January 1937 that:

"The desirability of standardising equipment with the RAF has not been overlooked, and it is hoped with the experience to be gained over a period of two years in the production of the NA16 type, the local industry will be in a position to undertake the manufacture of what will be the principal type required for Air Force use in Australia, namely the twin engine monoplane, with a crew of three or four. The plant to be installed by the Company for the initial order will be suitable to manufacture the aircraft of this type which is now being developed in England."

The Government considered that the engine, manufactured as early as possible, should conform to British practice. The longer an American aircraft was made the more difficult it would be to translate to a British type. The Government was obliged to follow the principles laid down by the Imperial Conference in 1937:

"That there should be developed in time of peace in different parts of the Empire, resources for the manufacture of munitions, as well as for the supply of raw material, with the following objects in view-

1. A reduction of the existing dependence of all parts of the Commonwealth on the munitions produced in the UK;

- 2. The avoidance as far as possible of over-concentration of resources for manufacture and supply in any area especially liable to attack;
- 3. The possibility of a development and extension of such resources in time of emergency.

That, with regard to manufacturing facilities, subject to any arrangements that may be made between them for combining facilities in peace, Governments should aim in the first instance at becoming self-supporting so far as possible in the matter of armaments and munitions of war."

Casey stated that the adoption of the Report of the United Kingdom Government Air Mission was a major step to give effect to these principles. In this scheme, Australia had the opportunity to become the principal British centre of certain important armaments east of Suez. In order to live up to the opportunities and responsibilities arising from the aircraft scheme, it was incumbent on Australia to be in a position to produce complete aircraft of a type that Britain required for strategic points outside of Australia, thereby securing the advantages of large scale production with lower costs. The UK and Australia would equip their squadrons with the same type. This uniformity in type included the manufacture of the Bristol Taurus engines and possibly later, other and larger types of sleeve valve engines. It would be too much to simultaneously tool up for Taurus and twin-row Wasp engines to fit with the timetable. In view of assurances given by UK Government and Bristols for full and complete cooperation there was no reason to continue with the earlier proposal to tool up for the twin-row Wasp should the Taurus not be forthcoming.¹⁰¹

On 29 May 1939 Darling replied to Casey assuring the Government that CAC would assist in every way in the manufacture of aircraft and engines, which included the manufacture of the sleeve valved engine in Australia. He suggested, though, that since the principle of manufacture of the sleeve valved engine had been accepted then consideration should be given to a higher powered engine, namely the Hercules rather than the Taurus.¹⁰² The change in engine was also under consideration by the Department of Defence¹⁰³, presumably both organisations believing the Beaufort could be powered by the Hercules rather than the Taurus. Undated and unauthored notes at about this time in the file on *Beaufort Early Papers, NAA: MP450/1, 77* provided for the following:

Twin-row Wasp: tool up December 1939 with output by June 1940. Taurus: tool up September 1940 with output by June 1941. Possible manufacture the Hercules engine in lieu of the Taurus¹⁰⁴

Again the Air Board was thinking ahead and also on 24 May 1939 recommended to the Secretary of the Department of Defence that, as CAC was not now tooling up for the twin-row Wasp engine and in order to provide against a war emergency arising within the next two years, half of the 250 engines proposed to be imported for the locally manufactured Beauforts should be brought to Australia early in 1940 and stored. They would then be available as a war reserve if so required, pending the delivery of locally produced Taurus engines.¹⁰⁵

In response to a request for a recommendation, on 14 June 1939 the Air Board advised of its unanimous view that Taurus engines should be manufactured in Australia. The Board considered it essential that the engine to be manufactured should be of a type suitable for installation in the airframe for which it was designed. It acknowledged that should the Hercules be put into production it would be necessary to design or obtain the right to manufacture an aircraft suitable to take it. A changeover to the Hercules or similar type might be necessary some years later but this would be a natural development following Taurus production.¹⁰⁶

Given the decision to only manufacture the Taurus, on 15 June 1939 Cabinet decided to send an officer from CAC to Bristols to make a thorough examination of the costs in connection with tooling up for production and the costs associated with the production of the sleeve valve engine.¹⁰⁷

On 27 June 1939 the Air Board advised the Secretary, Department of Defence that its intention was, beginning with either portion of the second Beaufort order or with normal replacement aircraft in 1941, for CAC to undertake local manufacture of twin engine general reconnaissance aircraft. The Board also considered that should CAC not be in a position to begin with a portion of the second Beaufort order and should the Air Mission scheme go no further than the 180 aircraft on order, then it would be necessary for CAC to be given a contract for some 30 Beauforts complete, in addition to those required by the Air Mission scheme, in order to take up their existing capacity when the Wirraway contract slowed down. This would also lay the foundation for further twin engine general reconnaissance aircraft manufacture.¹⁰⁸

Two days later the Board also advised its annual requirements of the Taurus engine in peace time was 50 and in time of war would be 220 in the first year and 100 in subsequent years. Therefore the manufacturing capacity for Taurus engines should be established on the basis of five per week in time of war but the initial output should be planned on the basis of $2\frac{1}{2}$ engines per week.¹⁰⁹

Even given the above decisions by Cabinet, the Air Ministry was concerned by the beginning of August 1939 of the urgent need to avoid any opening for the Australian Government to sidestep a decision to introduce the Taurus as the engine type to be manufactured in Australia. This was because of the still unresolved problems with the engine.¹¹⁰ Towards the end of that month, the Australian Liaison Officer signalled that the cooling problems with the Taurus engine had now been satisfactory resolved but crankshaft and piston weaknesses would likely delay clearance of the Taurus for overseas service until March 1940.¹¹¹ The Air Board replied immediately as this delay seriously affected the RAAF and was seeking whether the Air Ministry was able to charter or sell any other twin-engined types for immediate delivery or, failing that, any single-engined aircraft suitable for general purpose operations.¹¹² In addition, given the possibility of an outbreak of war, the practicality of proceeding with the Beaufort scheme was reviewed, and advice was sought from the UK Government whether to proceed and, if so, whether under war conditions the necessary supplies and engines could be shipped.¹¹³

By the end of August 1939, the Air Council considered that the best course of action was to continue planning for the production of airframes in Australia and the problems with the Taurus engine would soon be resolved. The Council also stated that, in the event of war, every effort would still be made to carry through arrangements for the supply and shipment of the requisite material to enable the airframe and engine manufacturing program to proceed.¹¹⁴

But the outbreak of war did change the situation and on 13 September 1939 Bristols advised the Under Secretary of State for Air that it was unable to assist in the construction and operation of two proposed engine factories, one proposed to be located in Turkey and the other in Australia, and a decision should be taken immediately as to whether either of these two factories should proceed. It noted that the Australian factory would involve much less work than the Turkish factory and if the Australian factory was to proceed, Bristols would provide the necessary priority for the delivery of machine tools, plant and equipment.¹¹⁵

This issue was considered by the Supply Committee to the Air Council on 18 September 1939 which recommended that, to minimise Bristol resources, new factories in Turkey and Australia for the manufacture of Bristol engines should not proceed. The Committee's proposal was that all Taurus engines should be supplied from the UK for those Beauforts to be produced in Australia.¹¹⁶

However, 10 days later the Air Council decided that the Bristol factory in Turkey must proceed and Australia would no longer manufacture the Taurus but the twin-row Wasp. The Air Council also decided that Bristols would install a twin-row Wasp engine in a Beaufort at the earliest possible opportunity so that the necessary instructions and drawings could be sent to Australia. The Council guaranteed that the UK would supply Taurus engines until twin-row Wasps were available.¹¹⁷ But Bristols were not happy with this decision. On 19 December 1939, despite this decision by the Air Council, Bristols wrote to Under Secretary of State for Air to complain that it was not able to introduce the construction of British aero engines in Australia, which had now been lost to American interests. Bristols further advised it would take at least six months before the installation of the twin-row Wasp installation was likely to be approved for production.¹¹⁸

By the end of September, the Air Ministry advised that it was satisfied Bristols had overcome the troubles with the Taurus engine and 100 would be available in Australia by the time the first 50 airframes were completed but were unable to supply these engines for the balance of the airframes on order. However, now the Air Ministry would be willing to accept twin-row Wasp engines for completion of the RAF Beaufort order.¹¹⁹

This advice led Australia to immediately request Bristols to install twin-row Wasp engines in the Beaufort and forward the details of airframe and any other modifications necessary. In addition, Australia no longer considered it wise to manufacture either the Taurus or twin-row Wasp engines but asked the Air Ministry to commence enquiries in the United States for the supply of the latter engines.¹²⁰ The Air Ministry quickly replied asking the Australian Government to review its decision to not manufacture the twin-row Wasp engines as to proceed with their manufacture would be an invaluable contribution.¹²¹ This was completely opposite to its advice of the previous month!

Yet only a couple of weeks later, on 3 November 1939, the Minister for Supply and Development Casey, who was in the UK, met with senior representatives of the Air Ministry and Bristols to discuss the supply of Taurus engines. From these talks Casey was now able to advise that Taurus engines would be available for all 180 Beauforts to be built in Australia and it seemed that local aircraft engine manufacture was no longer necessary. However, the trial installation of twin-row Wasp engines would continue as an assurance against any successful air attacks on Bristol's engine factory.¹²²

But Cabinet had already acted on the request to proceed with the manufacture the twinrow Wasp engines in Australia and had forwarded a cable to the UK Government confirming the decision to proceed prior to it receiving the above cable from Casey.¹²³ With this decision made, the Government was anxious for Bristols to urgently complete the work necessary to modify the Beaufort to take the American engine. This was still estimated to take six months¹²⁴ and greatly concerned the RAAF. Casey explained that the change of engine introduced extensive modifications to the airframe and the layout of ancillary equipment and instruments. A hand written note on an extract of Casey's cablegram states that Essington Lewis had assured Prime Minister Menzies that CAC could design the necessary modifications if the Air Ministry continued to raise difficulties.¹²⁵

Even by 19 November, Casey was trying to stop engine manufacture in Australia, reiterating Bristol's assurance that they could supply all the Taurus engines required for

the Beaufort program.¹²⁶ But Cabinet's decision stood and on 26 October 1939 the Department of Supply and Development convened a high level meeting to discuss the manufacture of twin-row Wasp engines. The conclusions of the meeting were:

- That the Pratt and Whitney twin-row Wasp engine could be produced in Australia in the requisite quantities within the required time.
- That it was desirable to produce large modern aeroplane engines in Australia.
- That all Beauforts for the RAAF should be equipped with Pratt and Whitney twin-row Wasp engines.¹²⁷

At this meeting, the RAAF now supported the manufacture of the twin-row Wasp engines as 100 Hudsons were on order powered by these engines and local manufacture would assist in the maintenance and repair of the engines on these aircraft. In addition, the installation of twin-row Wasps in the Beaufort would also lead to the standardisation of one type of engine. It was also noted that the Air Board still had 30 Beauforts on order from the UK and these were to be fitted with the Taurus engines. If the manufacture of the twin-row Wasp was to be undertaken in Australia it would be preferable for standardisation if the 30 UK-built Beauforts were to be fitted with Wasp engines in lieu of the Taurus.¹²⁸ In addition, CAC was confident it could manufacture the twin-row Wasp engines but not at Fishermen's Bend, suggesting a purpose built factory in Sydney as the alternative, based on its greater pool of industry and labour. Ordering the twin-row Wasp engines from the USA for the Beaufort program until locally manufactured engines were available was also considered possible.¹²⁹

Based on the advice from this meeting, on 31 October, 1939 Cabinet agreed that:

- The manufacture of the twin-row Wasp engines in Australia be authorised;
- The manufacture of these engines be entrusted to CAC;
- That authority be given for CAC to dispatch at once three officers to the USA, two to examine manufacturing processes and the third to procure necessary machine tools.¹³⁰

The manufacture of the twin-row Wasp engines had been entrusted to CAC because it was engaged in the manufacture of single row Wasp engines and consequently had the technical and manufacturing experience necessary to undertake the production with many parts being similar. CAC accepted the project on 21 November, 1939 and enacted a licence with the United Aircraft Corporation on 29 January, 1940 with the right to manufacture the twin-row Wasp series C engines for a term of five years renewable for a further period not exceeding five years.¹³¹

The type of engine selected for manufacture was the 1830 series S1C3G with the propeller ratio of 3:2 but discussions in the UK disclosed that a 3:2 ratio engine could not be used in the Beaufort airframe due to its lower efficiency and excessive noise and a ratio of 16:9 was required. When the S1C3G engine was selected, the two stage S3C4G engine had not been developed. When the 4G engines became available later, it was neither practical nor desirable to change over production to the higher powered engine having regard to the delay this would entail.¹³²

1940

By January 1940, Bristols were having difficulties in obtaining all the required engine accessories to begin the modifications for the twin-row Wasp and considered the design changes and testing would not be completed until October 1940. The suggestion to source additional Taurus engines instead was not supported.¹³³ Meanwhile arrangements were in hand to order 60 twin-row Wasp engines from the USA.¹³⁴ But it was not until 17 February 1940 that instructions were formally issued to Bristols to modify a Beaufort to take the twin-row Wasp engines.¹³⁵

On 7 March 1940 the APC required that the Air Ministry ship the Taurus engines as set out in the agreed schedule, June 1940 through to May 1941, with half of the engines consigned to Melbourne and half to Sydney.¹³⁶ By July 1940 the Air Board was enquiring whether the Air Ministry intended to fit twin-row Wasp engines to the UK built Beaufort¹³⁷. The August reply to this message stated that the installation of the Wasp engine was expected to be completed shortly and, if satisfactory, would be installed in 50 aircraft¹³⁸.

1941 – 42

With 10 Beauforts delivered before the end of 1941, the engine supply position was reviewed on 13 January, 1942. There were 128 S3C4G engines received in Australia and 304 additional engines of this type had been allocated for shipment. In addition there were 65 S3CG engines which had been purchased in USA as an insurance against delay in setting up local production. CAC was first authorised to order materials for 150 engines. Later materials were placed on order for the manufacture of 450 engines and in February 1942 authority was given to order the necessary materials for 420 additional engines making a total of 870 plus spares, the equivalent of 1,000 engines.¹³⁹

With the intended cessation of Wirraway construction, it was proposed that the CAC factory at Fishermen's Bend would manufacture the twin-row Wasp engine and that machine tools be obtained, from overseas and locally, for this expansion so as to allow Lidcombe and Fishermen's Bend to each produce 48 engines per month. On 27 January, 1942 the US Lend Lease Mission to Australia approved the requisition for machine tools required for this expansion to allow production of 96 engines per month.¹⁴⁰

The previously mentioned examination of the engine position in February 1942 expected there to be a shortfall of 805 twin-row Wasp engines as at 31 December, 1943. A major decision therefore needed to be made as to whether it was desirable to continue the production of the Beaufort and the proposed CAC Woomera with the twin-row Wasp engines during the whole of 1943 or whether to obtain from abroad higher powered engines such as the Wright 1,600 horsepower for installation in either the Beaufort or Woomera or both. It was noted that consideration had been given by the UK Government to a Beaufort development aircraft with higher powered engines. On 17 February, 1942, it was decided to request the supply of 400 twin-row Wasp engines to allow for production until 30 June, 1943.¹⁴¹

On 7 July, 1942 the manufacture of the 4G engine was again considered. It was decided that to effect this change was unnecessary as it would involve the manufacture of a large amount of tooling and in any case the necessary tool making capacity was not available. It was conceded that the production of 4G engines could not be achieved until after June 1943.¹⁴² Engine manufacture in Australia was not helped by the fact that in October 1942 there were technical difficulties experienced at the Lidcombe Factory in producing bevel gears and the output of the S1C3G engines had fallen behind schedule and a serious shortage developed. However the USA was able to provide 260 engines and quick shipment was secured.¹⁴³

4. BEAUFORT PRODUCTION ISSUES

Sets of Fabricated and Unfabricated Parts (Raw Materials)

On 20 September 1939 the Department of Supply and Development issued an indent for jigs and tools, materials, sample components, drawings and special equipment for the Beaufort. This order covered arrangements previously made whereby the Air Ministry had issued a contract (Instruction to Proceed) to Bristols on 26 January 1939 for most of these jigs, tools and materials (this being about the time the Air Mission arrived in Australia). This indent required Bristols to ship the bulk of the first five sets of fabricated

parts as soon as practicable after 25 July 1939 (retrospective) and the balance to be ready for shipment by the end of August 1939. The 10 sets of unfabricated materials were to be shipped during the period September to December 1939.¹⁴⁴ By July 1939 Bristols confirmed it would supply the 20 sets of materials as requested¹⁴⁵ and on 25 July the bulk of the first of five sets of fabricated parts were shipped on the *SS Clan McDougall*.¹⁴⁶

By November 1939, Australia was seeking for Bristols to supply 60 additional sets of raw materials¹⁴⁷ but Bristols had previously stated it would prefer not to undertake responsibility for the supply of further requirements and suggested that a government purchasing officer be based under the control of Australia House and/or the Air Ministry.¹⁴⁸ However, the Australian Government considered it was vitally important to maintain close ties with Bristols thereby ensuring the priority of supplies to maintain the program.¹⁴⁹ The order for 60 sets of unfabricated parts was placed in December.¹⁵⁰ However, Bristols did agree to supply 100 sets of fully fabricated engine mounts for the first 50 Taurus engined Beauforts as it would be uneconomical for Australia to manufacture such a small number.¹⁵¹ Bristols also agreed to supply oleo legs to meet the complete program including five spare sets.¹⁵²

By January 1940 both Bristols and the Air Ministry had recommended to have 200 sets of unfabricated parts to cover the 180 aircraft on order so as to allow for wastage, loss, damage and spoilage. High Commissioner Bruce was seeking approval to order a total of 180 additional sets of raw materials.¹⁵³ This was approved on 26 January because the Government considered it desirable to manufacture the forgings, die castings and sand castings in Australia and that raw materials should be supplied instead of the finished parts.¹⁵⁴

By the end of February 1940 the Air Ministry stated that 35% of both fabricated and unfabricated parts necessary for the first 20 Beauforts had already been shipped and that the balance of requirements for the first 20 would be shipped by the end of March.¹⁵⁵ This was far below what had been promised and following a conference on 11 March with Aircraft Production officials in London, Sir Wilfrid Freeman (Air Member for Development and Production) had issued instructions to give Australia's requirements first priority over all Beaufort supplies.¹⁵⁶ At the end of March the Air Council confirmed this and issued instructions to Bristols to give Australian Beaufort requirements priority even to the extent of reducing Bristols output of Beaufort aircraft. Bristols were very unhappy with this instruction as it caused considerable difficulties; a reduction in output would result in a workforce reduction (albeit temporary).¹⁵⁷

It was obvious that Bristols ignored the Air Council instruction. By the middle of May 1940 the Australian Liaison Officer in London reported on his investigation into progress made with shipping the 10 sets of parts. 9,247 items per aircraft were required and 6,128 had been shipped leaving 3,119 outstanding. He reported that the handling of this order by Bristols left much to be desired. Australia's order for 10 sets of parts was simply added to the number of parts required from each department at Bristols and there was never a firm order for 10 sets to be delivered by any specific date. Material was the only drawn when a surplus permitted it.¹⁵⁸

Australia's aircraft production representative in London, Fred Shea, took the matter up with the Air Ministry. The reply that Bristols had done very well in shipping fabricated parts and raw materials to Australia had Shea responding with outspoken criticism of Bristols for their failure to supply what was contracted. The original instructions issued to Bristols by the Air Ministry covering the supply of tools, jigs, and technical data in addition to the fabricated parts and raw materials were dated 26 January 1939 and were revised in July 1939. Bristols were aware of what was required of them for the previous

15 months but shipment did not commence until August 1939 and up until the end of April 1940 only 67% of the fabricated parts had been dispatched. He stated that such a comparatively small order of 10 sets of fabricated parts in a period of nine months could not be regarded as a satisfactory achievement. The position in respect of the 10 sets of raw materials was even worse since only 60% of these had been shipped in nine months.¹⁵⁹ In addition, some of the fabricated parts, when delivered, were rejected because they were either corroded or damaged or rejected on quality grounds.¹⁶⁰

Following the period of embargo of aircraft and equipment, in July 1940 Bristols was able to advise that approval had been received from the Ministry of Aircraft Production to supply all outstanding material to enable the first 20 sets to be completed. However, no material in addition to the 20 sets was to be sanctioned for dispatch to Australia including the remaining 160 sets.¹⁶¹

It was not until November 1940 that Australia's aircraft production representative, now Arthur Hyland, was able to advise that large shipments, almost completing the first 10 sets, were ready with the balance anticipated to leave on 20 November, with the exception of those items affected by the engine installation change. The remainder of the second 10 sets were expected to be complete and ready for shipment by the end of that month. 20 additional tailwheel struts would also be supplied, making 40 with those included in the first 20 sets.¹⁶²

Delivery Schedules

The delivery schedule as initially set out in the Report of the United Kingdom Government Air Mission to Australia 1939 was for the first airframe to be produced in 1940 working up to an output of 20 per month by September 1941 with all 180 completed by March 1942.¹⁶³ By February 1941 it was estimated that the first production aircraft would be completed in June 1941 with 70 by end December 1941 and 180 completed by May 1942.¹⁶⁴

By May 1941 four aircraft were under assembly at Fishermen's Bend and the first 16 aircraft were due for completion by the first week in October.¹⁶⁵ By August it was still considered that 10 aircraft could be delivered by the end of October but after that delivery could not be forecast owing mainly to the supply of raw materials and some equipment being behind schedule. It was estimated that a 3 or 4 month delay would occur after completion of aircraft 10.¹⁶⁶

In the middle of October 1941 the estimate was that by 1 January 1942 11 Beauforts would have been delivered to Singapore and the full 90 not before July 1942. One option proposed to expedite production was to take skilled workers from Wirraway production.¹⁶⁷ By the end of that month this estimate had again changed so that 11 aircraft would be delivered by end of December 1941 and the first 180 by the middle of November 1942. By 8 November 1941 there would be 40 sets of raw materials, standard parts, forgings, castings and service equipment followed by 24 sets per month.¹⁶⁸

With the Japanese attack on 8 December 1941, arrangements were made to possibly forward four additional aircraft to Singapore by 18 December but one aircraft T9548 was at that time undergoing armament trials, which would have to be suspended. No further deliveries could be expected before January 1942.¹⁶⁹ The table below provides the delivery schedules for the manufacture of the Beaufort (excluding L4448) at five different stages pre-production and compares it to the actual for the period ending 31 December 1942.

	13 July	10 Jul	5 Feb	27 Oct	Jan 1942 ¹⁷⁴	Actual ¹⁷⁵
Oct 1940	1959	1340	1341	1341	1342	
Nov 1940	1					
Dec 1940	2					
Jan 1941	4					
Feb 1941	6	1				
Mar 1941	6	4				
Apr 1941	8	5				
May 1941	12	8				
Jun 1941	16	12	1			
Jul 1941	20	16	2			
Aug 1941	20	20	5	1	1	1
Sept 1941	20	24	6	2	2	1
Oct 1941	20	24	12	3	3	3
Nov 1941	20	24	20	4	2	2
Dec 1941	20	24	24	1	3	3
Jan 1942	4	18	24	4	3	4
Feb 1942			24	8	6	6
Mar 1942			24	12	8	8
Apr 1942			24	16	10	12
May 1942			14	20	12	16
Jun 1942				20	14	20
Jul 1942				20	16	13
Aug 1942				20	20	17
Sep 1942				20	20	24
Oct 1942				20	20	29
Nov 1942				20	20	25
Dec 1942				20	20	24
Total	180	180	180	211	180	208

Supply of Parts from UK

As stated, the first consignment of jigs, tools, etc was arranged to leave the UK about 25 July, 1939. But the Australian Government was confident that a portion of the jigs and tools could be made in Australia with an advantage to Australian engineering. AF Bennell of Bristols, who was about to arrive in Australia, would determine what portion of jigs and tools could be made in Australia.¹⁷⁶ This was supported by the UK Government.¹⁷⁷

By December 1939, the Aircraft Production Branch had asked Bristols to defer shipping the second sample airframe pending the final design for cabin heating, anti-icing equipment and latest modifications¹⁷⁸ and by the end of January 1940 High Commissioner Bruce was able to advise that the second sample airframe (airframe 100 on the Bristol production line) was to be shipped by the end of March with a dummy engine and the latest design of cowling.¹⁷⁹ However, the second sample airframe was not completed until the middle of May thereby being caught in the embargo and could not be released¹⁸⁰.

By the beginning of March 1940, the Air Ministry had agreed to supply to the Aircraft Production Branch all of the necessary equipment to outfit the Beauforts being manufactured in Australia for the RAF¹⁸¹. During that month, the Aircraft Production Branch was also seeking Bristols to immediately supply one complete airframe against the RAAF's outstanding order for 14 UK manufactured Beauforts.¹⁸² But in May 1940 the UK Government was obliged to prohibit the export of aircraft materials or equipment of any kind. Within three months of the prohibition having been imposed however it had been relaxed so that Bristols was permitted to complete outstanding requirements for the first 20 Beaufort aircraft sets. Then gun turrets were released, and shortly afterwards undercarriages were made available and by January 1941 agreement was given to supply all outstanding equipment for the 180 aircraft.¹⁸³

In August 1941 RAAF CAS Air Chief Marshal Sir Charles Burnett was seeking agreement from RAF CAS Air Chief Marshal Sir Charles Portal to immediately supply 50 Beaufort airframes to Australia to be modified here to accept twin-row Wasp engines and therefore expedite delivery to Singapore. Engines were available but construction materials were still outstanding and delaying production.¹⁸⁴ Portal responded on 11 September 1941 that the UK was unable to supply the 50 requested airframes owing to limited shipping space and because airframe production was only sufficient to meet UK needs. However, he did agree to try and speed up supplies of outstanding materials from the USA.¹⁸⁵

Effect on Production Due to Delay in Supply of Materials from Overseas On 28 January 1940, the Aircraft Production Branch had notified High Commissioner Bruce that the dispatch of tooling required for the manufacture of Beauforts in Australia was seriously delayed by the Air Ministry requirement for strict AID inspection. This was considered unusual as AID normally only inspected aircraft parts produced from fixtures and the Branch was seeking to have the AID inspection confined to sub-assembly and assembly jigs with tools inspected by the normal tool room inspector.¹⁸⁶ In March 1940, the Aircraft Production Branch was seeking to confirm that assembly and sub-assembly tooling would still be shipped by the end of April and detailed tooling at the end of May, recognising that even this schedule would result in a delay to the program of four months.¹⁸⁷

On 1 August 1940, Prime Minister Menzies issued a press release on progress with the scheme. Menzies stated that Bristols had found it impossible to provide the tooling it undertook to furnish as a result of which Australia had to manufacture 26,000 of the 33,000 jigs and tools necessary for production purposes. The embargo on the shipment of further aircraft materials resulted in the necessity to source raw materials and equipment from the USA and the final success of the scheme was dependent on the arrival of these materials. The adoption of the twin-row Wasp engine in lieu of the Taurus necessitated modifications to the airframe; some drawings had been received but additional work was required in Australia and this was not contemplated in the original scheme.¹⁸⁸

By February 1941, it was obvious that great difficulties were being experienced in obtaining the necessary supplies from both the UK and USA. The initial program was based on raw materials for the entire program being delivered by April 1941 in sets having relation to the number of aircraft to be manufactured. However, shipments had been received in bulk quantities unrelated to units of production, which then had to be sorted. Final delivery was not expected until July 1941. Shipping space had also delayed deliveries and some losses were experienced due to enemy action. Airscrews from the USA delayed the first flight of L4448 and two auxiliary drive shafts required for this aircraft were lost at sea and arrangements had to be made for their replacement by airfreight. Parts outstanding for production aircraft at this time included:

• Lockheed cowlings, gills, etc; one set had been received and a further 63 sets would not be completed until September at which time local manufacture was to be in place. Even so, these needed to be modified at Bristols, the first trial installation being with the 3G engine and further changes were needed for the 4G installation.

- Auxiliary gear boxes from the UK 40 sets were to be supplied from Bristols before local manufacture commenced but this supply was delayed due to the engine change. 10 incomplete sets had been shipped and another 120 were waiting shipment.
- Elevator and rudder spar tubes were to have been shipped from the UK but the embargo stopped this and arrangements were made for these to be supplied from the USA but those received had to be inspected.
- For the service equipment for the first 90 aircraft (those for the RAF) most of that necessary for the first 20 sets had been received but no delivery date had been advised for the remaining 70 sets. The equipment for the remaining 90 RAAF aircraft needed to be sourced partially from overseas but mainly from local manufacture.
- 50 sets of oleo legs and tailwheel struts were being supplied from the UK with 20 sets shipped but only six sets had been received. The remaining 30 sets were expected at the rate of 10 sets per month. An additional 100 sets were on order from the USA and these were expected to be delivered by October 1941. A further 180 sets had to be manufactured locally.
- Engines of the 228 S3C4G engines required for the first of the RAF Beauforts (180 for the 90 aircraft and 48 as spares) only 61 had been received with a further 67 shipped but no date was available for the remaining 100. For the 216 S1C3G engines for the 90 RAAF Beauforts (36 spares), 65 had been received and it was considered that the remaining 151 would be manufactured in Australia.¹⁸⁹



Transporting centre sections and outer wings from Islington to the railway yards [National Archives Australia]

In May 1941 the experimental Beaufort aircraft L4448 had been flight tested and four aircraft were under assembly at Fishermen's Bend. All material requirements were on hand or on route except for the Lockheed engine assemblies. Only one set had been received and that was used on L4448. One set was in transit and 15 others shipped with the remainder to be shipped by the end of that month. The supply of service equipment was uncertain and there continued to be shortages. The Air Ministry was to supply this equipment for all 180 aircraft on order and even though 700 cases had been received, a

number of items were still outstanding. However, it was considered that the first 16 aircraft could be delivered on schedule. Delays in production for aircraft 17 and onwards was forecast due to shortages of some light alloy forging stock, ball bearings, tubing, strip, bar, sheet and extrusion.¹⁹⁰



Loading a completed rear fuselage section into a transport box at Newport [National Archives Australia]

But in July 1941, quantity production of Beauforts was being seriously handicapped by delay in the supply of materials from the USA. CAS Burnett was being urged by the APC to instruct the British Purchasing Commission to give increased priority to the Australian requirements.¹⁹¹

On 6 August 1941, John Storey (soon to be confirmed as Director of the Beaufort Division, Department of Aircraft Production) briefed the Advisory War Council on problems that had resulted in delayed production. The supply of duralumin tubing had been critical. Firstly, the Reynolds Company in the USA failed to supply the quantity ordered. A Canadian company with whom the new order had been placed had had 80% rejections in June 1941. However, delivery was expected by October which would be sufficient for the 180 aircraft. There would be a slight delay in production between the 10th and 11th machine due to waiting for parts. Turrets, guns and oleo legs were being obtained from overseas and arrangements had been made for local gun turret and oleo leg manufacture. The RAF in Singapore were storing some service equipment there. It had taken considerable time to get the necessary equipment and parts from the UK and during the course of delivery there had been many changes in them. Storey was of the opinion that it would have been better to have done without them. Following the embargo by the UK Government in 1940 many parts had to be manufactured in Australia and the task of sorting out the situation was considerable. Later shipment of parts from the UK had improved the position. There was no shortage of engines for the first 90

aircraft. He advised that it took Canada 3 years to manufacture the Blenheim/ Bolingbroke, CAC 2 years and 10 months for the Wirraway and it was about 2 years and 3 months for the Beaufort. It is also interesting to note that at this meeting he advised that discussions were underway with the UK Government to manufacture the Beaufighter in Australia, of which over 70% of parts were interchangeable with the Beaufort.¹⁹²

Based on Storey's briefing, the following day a cable was sent to Prime Minister Churchill stating that the UK Government had failed to supply to date the materials necessary for the production of the first 20 Beauforts which had necessitated seeking supply from the USA. However, there were now sufficient parts in Australia for 10 Beauforts for the RAF. There were not sufficient parts for anything further although a promise had been made from the USA for delivery during the next three months. As such, this would delay Beaufort production until February 1942.¹⁹³



Centre sections from Islington being transported to an Assembly Plant after off-loading from a train [National Archives Australia]

Three days later Prime Minister Menzies personally appealed to both the US and UK Governments to enable the expedition of Beaufort deliveries to Singapore. The production program provided for the delivery of 70 aircraft by the end of December 1941, which was based on material delivery promises which had not been fulfilled. Outstanding materials were urgently required to complete the first 20 aircraft as this would enable one squadron to be sent to Singapore. Failure to deliver would further greatly delay production.¹⁹⁴

By the end of November 1941 the main items still awaited from overseas were:

• Lockheed assemblies: these assemblies constituted the engine cowlings, controllable gills and exhaust systems. 20 complete aircraft sets had been received. Sufficient parts to complete 64 sets were expected to be received by mid-January 1942 and an additional 36 sets by the end of February 1942. However, these 36 sets were to be

diverted from a British shipment and there was no guarantee that these would be complete.

- Electric cables: the items required to complete 90 aircraft would not be received until mid-January 1942 and the remaining 90 by end of February 1942.
- Proprietary items: items such as ball bearings, Duroflex hose, Breeze controls, tachometers, etc were still required for aircraft 20 onwards. Some of these items were to come by airfreight.
- Service equipment: all 90 sets had been received for the RAF Beauforts.¹⁹⁵

Beaufort Turret Manufacture

The 10 sets of fabricated parts and 10 sets of unfabricated materials included the parts necessary for the Beaufort turrets¹⁹⁶ and on 18 December 1939 an order was placed for a further order for 185 gun turrets.¹⁹⁷



Mk VE gun turret on test stand at Fairfield [National Archives Australia]

But by 19 January 1940, Fred Shea, Australian aircraft manufacturing representative in London, advised that only one gas operated Vickers gun with magazine feed was being fitted to Beaufort turrets and a modification for fitting two gas operated guns was under trial. The fitting of Browning guns in Beaufort turrets had not been considered and was not recommended by Bristols as a variation to the feed equipment would cause difficulty. It was suggested that Australia retain the Vickers gas operated gun in turrets as modifications would cause delays and the Air Ministry would probably not agree to any alteration on their aircraft which would involve variation between British and Australian production.¹⁹⁸ But by October Bristols proposed otherwise and would dispatch six single gun Vickers turrets for alteration in Australia to Browning twin guns.¹⁹⁹

When the embargo was placed upon the exportation of aircraft and equipment from the UK in May 1940, Australia was informed that two gun turrets only could be provided. However in August 1940 further advice was received that 20 gun turrets could be made available. This inability to obtain adequate supplies of gun turrets from the UK necessitated arrangements being made for the manufacture of those turrets in Australia.²⁰⁰ In April 1941 Hyland in London reported that the delay in the production of Beaufort gun turrets was in part caused by heavy damage from enemy action to the mill organisation. However, Bristols was working on the adaptation of the Blenheim turret for the Beaufort as there were existing stocks available.²⁰¹

On 3 June 1941 the APC was seeking from the RAAF a Blenheim turret to ascertain whether it could be adapted to the Beaufort without too much difficulty. This was based on APC's understanding that 32 Bristol Blenheim Mark III gun turrets were in RAAF stores²⁰² (these were probably delivered as part of those initial deliveries of parts for the Bolingbroke, retained because at that time the majority of parts were expected to be applicable to the Beaufort).²⁰³

Because turrets were still not available, by August 1941 agreement was reached to manufacture those turrets in Australia. Advice was subsequently received from the UK of a change of policy from the original Beaufort gun turrets to converted Blenheim turrets and clarification was sought from the UK as to whether Australia should also changeover and manufacture the Blenheim type. A cable was received from the UK on 14 August giving formal approval for the fitment of the type B1 Mk V Blenheim gun turret in the Beaufort. To assist, the UK Government shipped a total of 102 turrets, 62 of the Beaufort type and 40 of the Blenheim type, enough to cover the 90 RAF aircraft. The decision as to which type of turret to manufacture in Australia was left to the RAAF. However, tests were being conducted in the UK on a Blenheim type four gun turret and, if these proved satisfactory, the Air Ministry would require this type of turret to be fitted to its aircraft. Due to the urgency though, the APC could not wait and production arrangements had already been put in place for building the Beaufort twin Browning turret²⁰⁴ (later altered to the Blenheim turret after 150 had been manufactured).

Production Delays in 1940

On 13 June 1940 High Commissioner Bruce was advised that the unavoidable delay in the delivery of jigs, tools, raw materials, equipment and the non-supply of engines had rendered it impossible to carry out the scheme for the construction of the 180 Beauforts in the manner originally planned. The Beaufort project had advanced to the stage where every possible expediency had been adopted but the failure of Bristols to deliver to schedule the jigs, tools and fabricated parts and raw materials for the first 20 airframes in accordance with the contract had caused delay in commencing production. Australia now proposed to obtain from the USA raw materials and equipment that was to have been supplied from the UK. Australia would complete modifications to the airframe necessitated by the change in type of engine, this having been commenced by Bristols and would complete the trial installation with sample airframe, engines and propellers recently obtained.²⁰⁵

Hyland in London advised Commissioner Clapp on 17 October 1940 that intensive enemy action in early September had retarded production and further interfered with ship sailings and the accumulation and dispatch of remaining materials for the first 20 sets. Bristols had already started the layout and compilation of drawings for the installation of S3C4G engines in place of S1C3G, the original type allotted for fitment and these drawings would be available in approximately seven weeks time and forwarded as they were prepared. As a result, the following components were considerably affected and required redesign: engine mountings, engine controls, air intake fairings, fuel and oil systems, fire extinguisher system, engine speed indicators, generators, airscrews and de-icing pipe runs. Additional components included the two speed blower control. In addition, Bristols advised that the diameter of the airscrew required was 11ft 6in and provided Curtiss airscrew hubs were interchangeable with Hamilton airscrew hubs, they should be satisfactory.²⁰⁶

Beaufort Production Situation 1941

A report to War Cabinet on progress with aircraft production to the end of July 1941 showed that there were existing orders of 180 Beauforts for the RAF and 90 Beauforts for the RAAF. The first production aircraft was to be completed during the week ending 4 August 1941 with seven aircraft under final assembly at Fishermen's Bend and two at Mascot.²⁰⁷ A further report to War Cabinet for production to the end of December 1941 showed that total deliveries to the end of that month were 10 aircraft.²⁰⁸

Also by the end of December, Prime Minister Curtin stated that every endeavour had to be made to expand aircraft production in Australia to the greatest extent possible. 128 engines were delivered from the USA and a further 100 were promised for delivery in November and December 1941 and January 1942 but these had been withdrawn and further deliveries were uncertain due to diversions to Russian needs. Russian requirements also interfered with shipment of materials from the UK. Owing to the non-delivery of engines from the USA, the changeover to the S1C3G was required at the 51st aircraft rather than the 91st as originally planned. The manufacture of the complete line of instruments had been established, while annexes for airscrew and undercarriages and a drop forge annex was in operation. However, it was noted that an increase in 300lb weight for additional armour would affect the performance of the aircraft.²⁰⁹

Late 1941/Early 1942 Production Delays

On 15 November 1941 Essington Lewis of the APC stated that five Beauforts had been delivered with five more by the end of November but owing to the development of stern frame cracks, as had occurred in the UK, the strengthening modifications necessary would put the delivery of the first 10 back to early December. Two weeks would be necessary to modify the aircraft already produced. This modification had been introduced after aircraft 21 on the production line.²¹⁰



Components ready for assembly, location uncertain but probably Fishermens Bend [National Archives Australia]

With the start of the war against Japan in December 1941, the British Chiefs of Staff Committee were paying renewed interest in Beaufort production for the reinforcement of Singapore and on 2 January 1942 noted that 128 S3C4G engines were now in Australia and negotiations were underway for the remaining 304. All British equipment required for the first 90 RAF aircraft should have now been received in Australia.²¹¹ This was followed by further consideration on 26 January 1942. The Committee noted that production of Beauforts in Australia had been delayed by the shortage of engines, mainly supplied from the USA, and of certain tools and accessories supplied from the UK. As a result, although production began in October, only 10 Beauforts had been produced by 31 December, 1941. It was now estimated that, provided the necessary requirements were met, 270 Beauforts could be produced by the end of 1942. Accordingly, the following action had been taken to ensure that those requirements were met:

- 128 engines were already in Australia and another 94 were due by the end of that month. The UK had obtained a guarantee from the USA for engine deliveries sufficient to meet Australian requirements for at least the whole of 1942.
- The UK had undertaken to supply all materials, fabricated parts, accessories etc. required to complete the 270 Beauforts.
- Action had been taken in the USA to speed up the delivery of certain machine tools to enable Australia to expand Beaufort production.²¹²

Beaufort Production to June 1942

On 17 April 1942 High Commissioner Bruce was advised that War Cabinet had approved an aircraft production plan that included increasing the manufacture of Beauforts from 20 per month to 40 per month as soon as practicable and expansion of the twin-row Wasp engine from 40 to 96 engines per month. By then practically all difficulties with the manufacture of the Beaufort in Australia had been overcome. Beaufort production had now been accorded the highest priority. As at 31 March 1942, 28 Beauforts had been delivered with scheduled production for April at 10; planned production of 20 per month to be achieved by August with 40 per month by January 1943. However, no total quantity had been stipulated beyond the 270 previously approved.²¹³

The manufacturing position at 30 June 1942 was:

- 76 Beauforts delivered.
- Major components produced for 124 aircraft.
- Pressed parts and sub-assemblies produced for 230 aircraft.
- Raw materials issued from store to produce the equivalent of 290 sets.²¹⁴

5. RAF ORDERED BEAUFORTS

Orders for RAF Beauforts

The Report of UK Government Air Mission to Australia 1939 provided for Australia to order 180 Beauforts, the first 90 for the RAF and second 90 for the RAAF.²¹⁵

On 25 January 1941 Air Chief Marshal Brooke-Popham, C-in-C Far East, in cabling the Air Ministry stated that, following discussions with CAS Burnett, he had agreed to make the fullest use of aircraft manufactured in Australia. The only aircraft required was the Beaufort. Advantages of utilising aircraft manufactured in Australia were that the aircraft could fly to Malaya thereby saving shipping space and avoid losses from possible sinkings. It was also easier to supply urgent spares and allowed for interchangeability with Australian squadrons. He hoped that by the end of 1941 there would be six Beaufort squadrons in Malaya and two more in 1942 with Far East requirements including reserves of 216 aircraft. He also considered that the Beaufort was suitable to the end of 1942 but it was desirable to then changeover to a more advanced type which, from production point of view, should be a Beaufort development with upgraded engines

and not a new aircraft. Brooke-Popham recommended that an additional 126 Australianmanufactured Beauforts be ordered.²¹⁶

Notice of this intent was conveyed to the APC and the Minister for Munitions was advised on 13 February 1941 that the UK Government desired to obtain Beaufort aircraft additional to the 90 already ordered. The first 180 aircraft were due to be delivered by May 1942 and with an additional 90 aircraft be manufactured for the RAAF, which could be completed by September 1942; any additional Beauforts for the RAF could be commenced in October 1942.²¹⁷ The UK Government authorised the manufacture of 90 additional aircraft for the RAF in April 1941.²¹⁸



T9541 at Fishermens Bend about late in 1941 [National Archives Australia]

Fitment of Service Equipment to RAF Beauforts

By the end of April 1941, the Ministry of Aircraft Production required all service equipment to be installed in RAF Beauforts before delivery²¹⁹ and that all 90 RAF Beauforts plus spares were to be consigned to RAF Seletar, Singapore.²²⁰ Then in June the Department of Air advised the APC that all service equipment should be fitted before aircraft were dispatched to the RAF but it was the responsibility of the RAF to make this equipment available.²²¹

In June 1941 CAS Burnett wrote to Air HQ Far East recommending that an officer with the necessary qualifications be sent to Fishermen's Bend to advise on the fitment of the necessary service equipment.²²² Further, the Air Board queried from Air HQ Far East whether aircraft should be fully equipped with service equipment in Australia as there were a great number of items not yet received from the UK, or would this be done in Singapore. This included guns, bomb sights, rangefinders, sextants, dinghies and various instruments.²²³ There was some confusion between London and Melbourne as Air HQ Far East replied, on advice from the Air Ministry, that all service equipment specified for Beauforts had been supplied with the exception of turrets and guns.²²⁴

This was followed at the end of July by a meeting between officers from Air HQ Far East, the RAAF and APC where details of the supply of the Beauforts to Singapore was

finalised. Spare parts for twin-row Wasp engines and airscrews were to be forwarded direct to RAF Seletar from the USA. Aircraft were to be fitted with blind flying equipment which was being dispatched from the UK, however it was noted that aircraft deliveries were not to be held up because the equipment had not been received. Four out of the 90 aircraft, and preferably the first four, were to be fitted with dual controls. It was also unclear what camouflage colour was to be painted on the underservices, aluminium, sky blue or light green and the decision was made to paint sky blue. The first 20 aircraft would be delivered without the rearward-facing under defence gun but the mountings would be fitted retrospectively in Seletar after these were flown there when available. No drawings had been received from Bristols for the front traversing gun and when received, would be incorporated as soon as possible.

It was agreed that some of the first aircraft would be delivered minus certain pieces of service equipment which had still not been received. There was to be no hold up of delivery of aircraft, fitting of this equipment to be done at Seletar from stocks available there but the short fitted items would be dispatched when they arrived, as Seletar only had maintenance stocks. Torpedo sights had not been received and the Air Ministry would be asked to send these direct to Seletar, otherwise the APC would forward them on.²²⁵

By 4 August 1941 the Air Ministry recognised that there <u>was</u> a shortfall of service equipment for the Beauforts and although 95% had been dispatched the remainder would be sent as soon as could be arranged.²²⁶ However, in Australia, RAF and RAAF officers noted that if not received the aircraft would not be able to function on arrival in Singapore. The minimum requirement considered necessary in regard to fitment of service equipment was to allow for the aircraft to drop torpedoes and have minimum defensive armament.²²⁷

Given all of the above, on 8 September 1941, the Air Ministry authorised Beauforts to be delivered to Singapore without some service equipment, namely cabin heating, torpedo sights, gyro angling, blind approach and airscrew de-icing. However, fixed fittings for approved modifications were to be incorporated unless this would delay deliveries.²²⁸ In addition, the Air Officer Commanding (AOC) Far East was also given authority for the deletion of equipment not required for operations in that Command.²²⁹ A week later the Air Ministry also advised that the Mark IV auto controls would not be available for Australian-built Beauforts. The Air Ministry suggested that the Sperry auto-pilot would be suitable but only after drastic modifications to the instrument panel and flying control systems but Bristols could not design and flight test a trial installation in under six months.²³⁰

By 8 December 1941 the AOC Far East complained to the Air Ministry (with a copy to the APC) that no provision had been made by Australia for spares for the RAF Beauforts in Singapore. The AOC asked for spares to be sent from the UK and the Air Ministry urgently sought what provisions had been made for spares and asking what type and quantity was required from the UK.²³¹ A response was forwarded to the Air Ministry on 31 December 1941 refuting the statement that the APC had made no provision for spares. In fact spares manufacture was in hand with items and quantities in accordance with the spares assessment agreed in September that year. Production of airframe spares was already in production. Spares requirements were planned to be forwarded to Singapore with every 20 aircraft but some items would be difficult to supply, except at the expense of new aircraft production. A complete survey of the spares position was being made and this was to be supplied to the Air Ministry, including any spares that should be supplied from the UK. Complete engines and propellers for spares were being sent direct from Australia.²³²

<u>Detailed Beaufort Production Information - August 1940 to December 1941</u> The information below is that applicable to the end of each month mentioned.

August 1940

Salvage work had commenced on the fabricated parts and raw materials received from the UK which had been damaged in transit and this continued until at least the end of the month. Beaufort L4448 was being assembled and preliminary work had commenced on the installation of the twin-row Wasp engines although only some drawings had been received from Bristols for this. One front fuselage jig had been damaged in transit and required repair work, 10 front fuselage assembly jigs were assembled although only two were ready and four stern frame jigs were ready for production.

The lack of drawings from Bristols had delayed the production of many detailed parts and sub-assemblies. Other delays included fins and rudders awaiting modification drawings, a shortage of spar tubes for elevators, no interchangeability gauges for the tailplanes, a lack of the specialised nuts and bolts for the assembly of nose sections and a large salt bath for the heat treatment of small parts had not been completed. However, 10 completed ailerons and five elevators were ready for covering, four tailplanes had been completed but were still waiting the interchangeability gauges; skinning had commenced on four rear fuselages and 13 airscrews had been completed.²³³

September 1940

The damaged front fuselage assembly jig had been repaired and reconstructed with one front fuselage in its assembly jig. However, work was delayed due to a lack of sub-assemblies. Further delays in production still resulted from a lack of complete sets of drawings which had been promised by not delivered.²³⁴

October 1940

Various jigs had been inspected and passed for centre sections and wings and eight rear fuselage jigs were now in place. Fin and rudder jigs were still being modified and the large salt bath for the heat treatment of small parts was now in operation. Delays in production were caused by the slow delivery of materials, tooling jigs, etc and due to the training required of personnel for quantity production. For a period, production was suspended due to the poor quality of local duralumin.

Aileron and elevator production was proceeding satisfactorily with 14 ailerons and four elevators sent to Victorian and Interstate Airways for covering with fabric, however nine tailplanes were still waiting the interchangeability gauges. 23 airscrews had been delivered by early October; seven stern frames had been completed or in production; one front fuselage had been completed and a further eight were in various stages of assembly; 11 rear fuselages were in various stages of production and one sample fin was still being modified.²³⁵

November 1940

A further 12 jigs for centre sections and wings were now ready for production including the final wing assembly jigs. There were delays in the production of some subassemblies. Wing ribs and flaps were now being produced. Detailed parts were arriving in reasonable quantities and interchangeability gauges had been received with work proceeding on 11 tailplanes. Production of front and rear fuselages and ailerons and elevators was increasing and fin and rudder production had recommenced following the receipt of the sample assembly.²³⁶

December 1940

An interchangeability gauge for the centre section and port wing was passed and the centre section main assembly jig was ready for production. The first sets of ailerons and elevators plus two tailplanes, two fins and one rear fuselage were completed and sent to the Main Assembly Workshop at Fishermen's Bend on 2 December.²³⁷

January 1941

Four further jigs were passed ready for production. Production was delayed due to the non-availability of certain detail parts. Approximately 10% of all finished detail parts were being rejected. 11 front fuselages were in the course of production or final fitting out. Additional ailerons, elevators, tailplanes, fins, rear fuselages and the first rudders were delivered to the Main Assembly Workshop at Fishermen's Bend. The first spars for mainplanes and centre sections were produced. Several thousand parts and sub-assemblies were forwarded from GMH Woodville to the APC store at Spotswood.²³⁸

February 1941

Shortages of rudders and tail wheel assemblies and some detail parts were still delaying production.

L4448 – assembly was making steady progress but engine mounts and some parts had still not been delivered.

Main Assembly Workshop – Fishermen's Bend

Aircraft No. 1 (T9540) – in its assembly jig having the tail unit and rear fuselage connected to the centre section.

Aircraft No. 2 (T9541) – assembly commenced.

Aircraft No. 3 (T9542) – assembly commenced.

Aircraft No. 4 (T9543) – assembly commenced.²³⁹

March 1941

There were major shortages of centre sections, front fuselages, wings and undercarriages. There were now 70 Pratt and Whitney S3C4G twin-row Wasp engines, two stern frames, four rear fuselages and six tailplanes in store in addition to those major components required for the four aircraft being assembled. Two Wasp engines had been sent to Ford Company at Geelong for fitting of cowlings. Six gun turrets were being treated to rectify corrosion after being immersed in seawater and the two unaffected turrets were to be modified. Arrangements had been made for the loan of the Royal Aircraft Establishment Mk IV auto pilot from the Vickers Wellesley aircraft (presumably L2639) as a sample for trial installation.

L4448 – awaiting the supply of engine mounts.

Main Assembly Workshop – Fishermen's Bend

Aircraft No. 1 (T9540) – fuselage and centre section assembly completed, undercarriage assemblies were being fitted and wings had now arrived.

Aircraft No. 2 (T9541) – mounted in the assembly jig for the connection of the fuselage and centre section but no wings were available.

Aircraft No. 3 (T9542) – no centre section yet available.

Aircraft No. 4 (T9543) - no centre section yet available. 240

April 1941

Centre sections, front fuselages, wings and undercarriages were still in short supply but a total of 78 Pratt and Whitney S3C4G twin-row Wasp engines had been received. L4448 – engines fitted and ground run tested.

Main Assembly Workshop – Fishermen's Bend

Aircraft No. 1 (T9540) – being fitted out internally but undercarriage and wings still not fitted.

Aircraft No. 2 (T9541) – fuselage and centre section assembly completed, being fitted out internally and wings arrived but not fitted.

Aircraft No. 3 (T9542) – rear fuselage and centre section assembly completed, front fuselage and stern frame in the process of being fitted and wings now arrived.

Aircraft No. 4 (T9543) – centre section mounted in the assembly jig with rear fuselage being fitted and front fuselage ready.

Aircraft No. 5 (T9544) – awaiting a centre section.²⁴¹
May 1941

Lack of engine mounts delayed the entire production and the unavailability of further centre sections was delaying the assembly of additional aircraft.

L4448 – first flight on 5 May with aircraft then based at Laverton for service trails. Engine nacelle doors required modification prior to further flights.

Main Assembly Workshop – Fishermen's Bend

T9540 (aircraft now referred to by their serial numbers) – continuing to be fitted out internally but engines not fitted due to lack of engine mounts.

T9541 – continuing to be fitted out internally but no engine mounts.

T9542 – removed from assembly jig, wings attached, undercarriage in process of being fitted and internal fitting out commenced.

T9543 – fuselage and centre section assembly completed, being fitted out internally, undercarriage in process of being fitted but no wings to fit.

T9544 – fuselage and centre section assembly completed and port undercarriage attached.²⁴²

June 1941

Lack of centre sections was continuing to delay the assembly of further aircraft. L4448 – new engines installed at Laverton and test flown with these on 12 June. The aircraft commenced altitude tests.

Main Assembly Workshop - Fishermen's Bend

T9540 – fitted with engines and expected to be completed shortly.

T9541 – wings fitted and in process of being fitted with engine mounts and adaptors.

T9542 – wings fitted and in process of being fitted with engine mounts and adaptors.

T9543 – undercarriage fitted but no wings to fit.

T9544 – undercarriage fitted but no wings to fit.

T9546 – in the assembly jig with rear fuselage fitted to centre section and front fuselage ready for attachment.

Main Assembly Workshop – Mascot

T9545 – assembly commenced.²⁴³

July 1941

L4448 – completed test flights to Sydney and Adelaide and now being prepared for installation of Lockheed engine mounts.

Main Assembly Workshop – Fishermen's Bend

T9540 – all components assembled and engines installed.

T9541 – all major components assembled, fittings and accessories being attached but engine mounts not fitted.

T9542 – engine mounts, bulkheads and engines fitted and all other major components assembled with fitting out proceeding.

T9543 – engines and wings to be fitted.

T9544 – fuselage and undercarriage assembled with preliminary fitting out proceeding.

T9546 – fuselage assembled and undercarriage attached.

T9548 – in the assembly jig with front and rear fuselages and undercarriage in process of being fitted.

Main Assembly Workshop – Mascot

T9545 – no change.

T9547 – being prepared for assembly.

T9549 – being prepared for assembly.²⁴⁴

August 1941

L4448 – Lockheed engine mounts installed together with locally made adaptor structures, completed test flight to Queensland, auxiliary fuel tank installed and speed trials being carried out.

Main Assembly Workshop – Fishermen's Bend

T9540 – first flight conducted on 22 August.

T9541 – all major components assembled, fittings and accessories being attached and Lockheed engine mounts being fitted.

T9542 – engine mounts replaced with mounts manufactured from T45 tubing and fitting out proceeding.

T9543 – all major components assembled but engine mounts still not installed.

- T9544 fuselage and undercarriage assembled with fitting out proceeding.
- T9546 fuselage assembled and undercarriage attached.
- T9548 fuselage assembled and undercarriage attached.

Main Assembly Workshop – Mascot

T9545 – no change.

T9547 – being prepared for assembly.

T9549 – being prepared for assembly.²⁴⁵



T9540 at Fishermens Bend 1941 [National Archives Australia]

September 1941

Investigations commenced for the possible fitment of Sperry auto pilots in both RAF and RAAF Beauforts. Preliminary design work had been initiated on the installation of the Sperry auto pilot control unit in the pilot's cockpit and the servo unit in the fuselage. It was considered unlikely that an experimental installation could be made available for air testing in under six months. Following a mock-up of the full W/T equipment, it was realised that the full installation restricted space in the fuselage and an alternative position for the oxygen bottle storage was being considered.

L4448 – engine mounts changed to T45 tubing and fin area increased. Mainplane stabilisers removed to ascertain effect of increased fin area. Aircraft flown to Camden on 12 September and Tasmania on 15 September.

Main Assembly Workshop – Fishermen's Bend

T9540 – DTD347 engine mounts and adaptors removed and T45 mounts installed, dual controls fitted and released to RAAF for type trials and RAF pilot conversion training at Laverton. At completion of these flights, aircraft to be returned to Fishermen's Bend for redesign of auxiliary gear box generator drive, final adjustments of hydraulic turret, undercarriage doors, wireless gear and inspection for final acceptance.

T9541 – all major components assembled, engines installed and in final fitting out stage. T9542 – in final fitting out stage although starboard generator drive required redesigning. T9543 – all major components assembled, engine mounts fitted and fitting out proceeding.

. T9544 – all major components assembled and preliminary fitting out proceeding.

T9546 – fuselage assembled and undercarriage attached but still in assembly jig.

T9548 – fuselage assembled and undercarriage attached but still in assembly jig. Main Assembly Workshop – Mascot

T9545 – all major components assembled and fitting out proceeding.

T9547 – fuselage and undercarriage assembled, engine mounts and turret received but not yet installed.

T9549 – fuselage and undercarriage assembled.²⁴⁶



Loading outer wings into transport boxes for transport at Islington [National Achieves Australia]

October 1941

Due to the lower revolutions of the twin-row Wasp engines as compared with the Taurus engines for which the generators were originally designed, it was proposed to modify the auxiliary gear box drive in the starboard engine to increase the generator revolutions. L4448 – flown to Sydney and further trials carried out.

Main Assembly Workshop – Fishermen's Bend

T9540 – continuing type trials at Laverton.

T9541 – completed and first flown on 11 October and aircraft later delivered to Bankstown.

T9542 – completed and first flown on 26 September but aircraft delivered later to Bankstown. Starboard wing assembly damaged in accident at Bankstown while being used for RAF pilot conversion training. Replacement wing used from T9549 and replacement engine from T9547.

T9543 – completed and first flown on 26 October.

T9544 – continuing with fitting out.

T9546 – all major components assembled, including engines, and fitting out continuing. T9548 – all major components assembled, including bulkheads, and fitting out continuing.

Main Assembly Workshop – Mascot

T9545 – completed and undergoing contractor's tests. Aircraft first flew on 22 October and flown by ACM Brooke-Popham, who was in Sydney.

T9547 – major components assembled except airscrews and fitting out proceeding.

T9549 – airframe assembled except for engine mounts and wings.²⁴⁷

November 1941

The three Beauforts at Bankstown were being returned to Fishermen's Bend for the final fitment of equipment prior to delivery to Singapore. Work on the experimental installation of the Sperry auto pilot was temporarily delayed pending receipt of information to clarify the supply position of the various types of auto pilots available.

L4448 – fitted with torpedo gear and further trials carried out.

Main Assembly Workshop – Fishermen's Bend

T9540 – completed.

T9541 – completed.

T9542 – completed. Modifications carried out to cam in tail wheel, strengthening of stern frame, auxiliary fuel tank and starboard wing gun installed.

T9543 – completed. Flight test being carried out as aircraft flies port wing down and problems with aileron.

T9544 – modifications completed to cam in tail wheel and strengthening of stern frame, auxiliary fuel tank installed and further test flight carried out on 20 November (first flight about 12 November).

T9546 – fitting out proceeding.

T9548 – fitting out proceeding.

T9550 – front and rear fuselage attached and fitting out proceeding.

T9552 – front and rear fuselage being prepared for attachment.

Main Assembly Workshop – Mascot

T9545 – completed. Auxiliary fuel tank being fitted and further modifications carried out at Fishermen's Bend.

T9547 – modifications being made to strengthen stern frame (first flight about 25 November).

T9549 – airframe assembled except for airscrews but modifications being made to strengthen stern frame.

T9551 – rear fuselage being assembled to centre section but no wings, rudder and elevators available.

T9553 – assembly not yet commenced but rear fuselage, stern frame, tailplane and engines received.²⁴⁸

December 1941

Shortages of wings, engine mounts, elevators, rudders and gun turrets causing delays together with requirement to strengthen stern frames.

Main Assembly Workshop - Fishermen's Bend

T9540 – completed. New wing being fitted for gun modification, new engines to be installed, beam guns being fitting but no under-defence guns available.

T9541 – completed.

T9542 – completed.

T9543 – completed.

T9544 – completed.

T9546 – completed and first flight on 10 December. Dual controls fitted, flight test carried out and ready for delivery.

T9548 – delivered to service 17 December (first flight about 13 December).

T9550 – fitting out proceeding.

T9552 – fitting out proceeding.

T9554 – fuselage completed and fitting out proceeding.

T9556 – front and rear fuselages attached and fitting out proceeding.

T9558 – assembly not yet commenced.

Main Assembly Workshop – Mascot

T9545 – completed.

T9547 – completed.

T9549 – delivered to service 17 December (first flight about 15 December).

T9551 – fuselage assembled, wings and beam guns being fitted.

T9553 – fuselage assembled, engine mounting adaptors and bulkheads fitted. Engines assembled to mountings and nearly ready for installation. Undercarriage fitted and turret installed. Fitting out proceeding.

T9555 – fuselage assembled, undercarriage being fitted and stern frame being modified. T9557 – centre section in assembly jig, rear fuselage being attached, front fuselage

ready for fitment and stern frame being modified.

T9559 – assembly not yet commenced.²⁴⁹

Acceptance of Aircraft by RAF

The following five aircraft were officially accepted by the RAF on the dates shown (other aircraft acceptance dates unknown):

T9542 accepted on 1 December 1941

T9543 accepted on 1 December 1941

T9544 accepted on 1 December 1941

T9547 accepted on 26 November 1941

T9548 accepted on 15 December 1941²⁵⁰

Beaufort Flight to Singapore

The RAF in Singapore had been waiting some time for the delivery of the Australianmade Beauforts. This necessitated flying over the Netherlands East Indies with one refuelling stop required. On 1 October 1941 the British Consul-General in Batavia was requested to seek permission for three Beauforts to fly through the Netherlands East Indies, landing at Sourabaya about 13 October.²⁵¹ However, on 10 October 1941 this movement was deferred to about the first week in November due to a mishap (presumably the accident to T9542 at Bankstown).²⁵²

The British Consul-General in Batavia was then requested on 8 November 1941 to seek permission for six Beauforts to fly through and land at Sourabaya about 24 November²⁵³ and approval was given on 15 November 1941.²⁵⁴ Then on 24 November 1941 the British Consul-General was advised that the departure had been delayed a further few days but all aircraft would proceed Darwin – Sourabaya – Singapore in one day. Transit visas were also required for 24 members of the RAF, RAAF and APC leaving Melbourne about 1 December.²⁵⁵ The aircraft and crews were:

T9541, call sign VNZRM2, pilot Wing Commander McKern with Flying Officer Hughes, Flight Sergeant Whitley and Flight Sergeant Taylor;

T9542, call sign VNZRM4, pilot Squadron Leader Rowland(s) with Flight Sergeant Bonas, Sergeant Gibson and Sergeant Kinksman;

T9543, call sign VNZRM8, pilot Squadron Leader (Flight Lieutenant) Mitchell with Sergeant Morgan, Sergeant Brooker and Corporal Britton;

T9544, call sign VNZRM3, pilot Squadron Leader (Flight Lieutenant) Tillott with Pilot Officer Hood, Sergeant Neighbour and Mr Milnes;

T9545, call sign VNZRM5, pilot Squadron Leader (Flight Lieutenant) Burton with Pilot Officer Lee, Sergeant Chalmbers and Corporal Seaton; and

T9547, call sign VNZRM6, pilot Captain Young with Flying Officer Gibbs, Sergeant Drying and Corporal Bondfield.²⁵⁶

The British Consul-General was then asked on 15 December 1941 to seek permission for two additional Beauforts to fly to Singapore transiting through the Netherlands East Indies on 17 December. These were

T9546, call sign VNZRM3, pilot Squadron Leader Ingledew with Flying Officer Blanchard, Sergeant Terry and Sergeant Cross; and

T9549, call sign VNZRM6, pilot Flight Lieutenant Purvis, Flight Lieutenant Hampshire, Sergeant McMillan and Sergeant Hart.²⁵⁷

However, both these aircraft were to be held at Darwin on 17 December for return to Melbourne²⁵⁸ (in fact T9549 fouled a drain and crashed on landing at Batchelor²⁵⁹ on its way to Darwin). Four Beauforts from Singapore (T9543 had been destroyed at Kota Bharu on 8 December and T9544 was damaged and returned to Australia on 22 December) were ordered to return to Melbourne but T9541 was badly damaged at Sourabaya.²⁶⁰



T9547 after a landing accident at Tenant Creek on return from Singapore in which it swung off the dirt runway and its port undercarriage collapsed, 21 December 1941 [Kevin Gogler Collection via Bob Wiseman]

Issues with First Beauforts

As a result of the first combat action with the Beaufort (T9543 at Kota Bharu), on 12 December 1941, Air HQ Far East requested urgent modifications to the Beaufort including doubling the thickness of the armour plate and incorporating a bullet-proof windscreen for the pilot. Modification sets were to be dispatched urgently for the five surviving Beauforts in Singapore plus any Beauforts already en-route.²⁶¹ This was followed two days later by Milnes, the APC representative in Singapore, providing further details. He requested that all armour plate as fitted should be increased in thickness from 4mm to 9mm gauge and supplies for the under defence gun be dispatched urgently. He also advised that Perspex panels were blowing out and all retaining strips needed to be widened by 50% and the Perspex to be bolted in place.²⁶² Also requested to be dispatched to Singapore were all moulded panels for the front fuselage and turret together with tail wheel struts due to failures.²⁶³ The APC immediately took action to improve the panel framing as suggested.²⁶⁴

Meanwhile, Captain Tom Young, the APC's Chief Test Pilot at Fishermen's Bend, who had flown Beaufort T9547 to Singapore, had returned and provided a report on the 15 December 1941. The Air Ministry contract required Australia to provide all airframe spares for the complete Depot Holding for two squadrons and 17 spare engines while the USA was to supply one complete Wasp tool kit and the UK to provide the necessary detailed squadron tool kits. While in Seletar, Young had determined that all the necessary torpedo carrying gear had arrived in Singapore, four sets of dual controls had arrived from the UK as well as two sets from Australia. Considerable spares had already arrived from the UK including main wheels, tyres and tubes, axles, brake gear, tail wheel forks and a number of smaller items. A considerable tonnage of cases of spares had also recently arrived from the UK but had not yet been checked.²⁶⁵

By the 22 December 1941 RAAF Headquarters became involved and reminded the APC that no modifications to the armaments or armour of Beauforts could be incorporated unless those modifications had been duly authorised by the Air Ministry. The instructions received from Singapore had given ground for rumours relating to the perceived non effectiveness of the Beaufort.²⁶⁶ It would seem that the APC agreed with the latter statement as a week later it appealed to CAS Burnett that there were RAF and RAAF pilots complaining of defects in Beauforts. Many complaints seemed to be caused by the improper handling of the aircraft and Burnett was asked to ensure that the RAF and RAAF pilots were properly trained and all defect reports were sent through the proper channels.²⁶⁷

In February 1942, Beaufort T9558 was attached to 7 Squadron RAAF at Laverton so that CO Wing Commander Sam Balmer could report on the flying abilities of pilots from No 100 Squadron RAF (one of the existing Far East-based RAF squadrons that was poised to be the beneficiary of the RAF's Australian Beaufort order). Balmer provided the following notes on the operation of T9558, which was with the Squadron for a period of three weeks. During this period it was flown for 12 hours only, as the remainder of the time it was unserviceable. Although the aircraft had come directly from the APC as a new aircraft, there were a number of defects, namely:

- Badly fitting windows in the cockpit rendered conversation impossible;
- Badly fitting cowl gills that did not close evenly and when open more than 10 degrees produced severe buffeting.
- Unequal adjustment of engine controls which had to be set ½in apart to give equal RPM;
- Incorrect adjustment of oil cooler gills;

• Failure of oil pressure gauge, oil temperature gauge and airscrew control meter. But Balmer did consider that generally the Beaufort appeared much easier to fly than the Hudson; any qualified Hudson pilot could fly the Beaufort safely without further dual but Beaufort pilots who flew the Hudson experienced some difficulty.²⁶⁸

Training of RAF Pilots in Australia

On 27 May 1941 the APC was asked to supply the Air Board with a forecast of RAF Beaufort deliveries so that arrangements could be made with the Air Ministry to train aircraft crews in the flying and operation of the Beaufort. It was acknowledged that considerable training and instruction of the crews would be necessary before the aircraft could be delivered.²⁶⁹ This was followed shortly after, seeking clarification on the actual delivery destination of the aircraft, the method of delivery – by ship or flying – and, if by flying, the urgent need to commence training of pilots and crews. Three options were being considered – RAF, RAAF or civil pilots.²⁷⁰ Accordingly by 1 July 1941 the Air

Board was seeking confirmation from Air HQ Far East on whether the Beauforts were to be flown to Singapore and, if so, arrangements should be made for RAF pilots to be sent to Australia for a short conversion course.²⁷¹ To assist with these RAF Beauforts, Squadron Leader Miller RAF, who had operational experience on Beauforts in the UK, would be sent from Singapore to give advice on defects with the UK aircraft and would make suggestions on operational requirements.²⁷²

Then on 10 August 1941 Air HQ Far East advised that the following provisional arrangements be agreed to for the collection of the Beauforts; three crews, consisting of pilot, navigator, wireless operator and Fitter E, plus one spare pilot, would leave Singapore about 18 August via KNILM and QANTAS. The pilots would have some Blenheim experience before departure and it was suggested that 10 hours solo in Australia would be sufficient for those pilots. Further batches of aircraft could be collected under similar arrangements.²⁷³

Following the Japanese attack, Air HQ Far East requested that those pilots flying the Beauforts up to Singapore be kept and used for operations because of the difficulties of training pilots in Singapore under the conditions then existing.²⁷⁴ Air HQ Far East then realised the impracticality of this and advised the Air Board that the RAF was unable to train crews in Singapore and it was therefore no point sending Beauforts if they could not be used. The RAAF was asked to train pilots and crews in Australia²⁷⁵ and agreed this could be arranged at Laverton and suggested that crews for conversion or further training be sent.²⁷⁶ The two pilots with Beauforts enroute (at this time – 17 December – advice had not yet been received that T9549 had crashed at Batchelor) were being returned (as stated above) to assist with the conversion course. Two further Beauforts were due to be received from the factory on 22 December and these would also be retained for the conversion course. If RAF pilots were not available then RAAF trainees could convert but these would not be trained in general reconnaissance work.²⁷⁷

Following the return of the Beauforts to Australia from Singapore, the Air Board was advised by Air HQ Far East that personnel sufficient to make up nine complete crews plus maintenance personnel for one Flight would be dispatched at the first opportunity. When this Flight was operationally trained it would return to Singapore.²⁷⁸

Following complaints of defects in Beauforts in December 1941 (as mentioned above) and then again in March 1942, the Minister was advised that the Beauforts returning from Singapore were doing so in order that crews could be trained at airfields in Australia as no airfields were available there due to enemy action and all training would now to be carried out in Australia. This was to dismiss any apprehension that the aircraft were not up to standard nor were there mechanical issues.²⁷⁹

These complaints resulted in Captain Young, to report on 25 December 1941, that both RAF and RAAF pilots were not operating the Beaufort in accordance with the Pilots Operating Notes, particularly in relation to using the carburettor and propeller feathering, taxying procedure, braking, engine ground running, fuel and oil systems, hydraulic systems and aircraft handling. He considered the Air Board needed to revise its system of training if pilots were to handle the Beaufort correctly.²⁸⁰ Young also gave examples of where problems with the Beaufort had been caused by poor maintenance.²⁸¹

On 18 February, as stated above, Wing Commander Sam Balmer of 7 Squadron received instructions from Southern Area to report on the flying abilities of pilots from No 100 Squadron RAF. Wing Commander AW Miller RAF, Flight Lieutenant FD Mitchell RAF and Pilot Officer FA Hendry RNZAF were attached to 7 Squadron for this purpose as was Beaufort T9558. Balmer reported on these three officers but considered the latter two had insufficient experience in the handling of Wasp engines.²⁸²

By 21 February 1942, the Beaufort flight ex Singapore, now known as 100 Squadron RAF, had 15 Beauforts with a further two by the end of February and one more in early March, by which time it would be at full strength. However, the Squadron had only nine RAF crews plus Wing Commander Miller as CO. RAF ground crew were being supplemented with RAAF crews and equipment and the American-British-Dutch-Australian (ABDA) Command was requested to send a further nine crews so the Squadron could deploy at the end of March.²⁸³ But five days later, ABDA Command advised that in view of the change in situation, (and still only at Flight strength) it was not now required to move to the ABDA area. The Air Board confirmed it was building the Flight up to Squadron strength with RAAF personnel and it was proposed to retain it in Australia for operational duties pending Air Ministry direction.²⁸⁴ Subsequently, a RAAF order dated 28 February 1942 provided for 100 Squadron RAF to become 100 Squadron RAAF stationed at RAAF Richmond.

RAF Beauforts Retained by RAAF

On 20 February 1942 first advice was received, through the Department of the Treasury, that the UK Government would hand over the first 90 Beauforts manufactured in Australia for the RAF to the RAAF.²⁸⁵ With no confirmation, on 26 March 1942, the Minister for Air requested that Prime Minister Curtin write to the UK Government requesting that these first 90 Beauforts be retained by Australia due to the present Japanese menace, a serious shortage of modern aircraft types, the rapidly increasing requirement for Beauforts be retained for local defence needs. Australia's requirement for the Beaufort now stood at 224.²⁸⁶



T9545 at Richmond in 1942 [Kevin Gogler Collection]

The request was sent and the UK Government replied on 20 April 1942 that in view of inter-allied arrangements for pooling resources and distributing them to meet strategic needs, the UK Government no longer regarded as binding the arrangement to allocate to them 90 of the first 180 Beauforts manufactured in Australia. The Air Assignments Sub-committee had allocated 100% of Australian-manufactured Beauforts to Australia. However, the UK Government did not officially endorse any proposal which amounted to withdrawing Australian Beauforts permanently from the general pool. Short of a considerable change to the strategic situation, practical considerations made it most unlikely that the UK Government would wish to bid for a share of this Australian production.²⁸⁷

Reconciling for RAF Aircraft

On 12 December 1945 the Department of the Treasury was seeking to reconcile outstanding costs for the Beaufort project following a request from UK Government so as to finalise their interests. The documents note that six aircraft were delivered to RAF in Malaya, and quoted T9542 to T9547 inclusive (as already stated, this was incorrect – T9541 flew to Singapore and T9546 did not). In addition, T9550 crashed at Richmond whilst under command of 100 Squadron RAF. Subsequently, T9542, 44, 45 and 46 were returned to the RAAF. Treasury proposed that the UK Government should be charged to settle on the basis of seven Beauforts and spares at £47,000 each, less an appropriate allowance for the four aircraft returned. Treasury sought the views of the Department of Air as to the appropriate allowance.²⁸⁸ An undated reply was forwarded stating that the four aircraft returned had only been retained by the RAF for an average period of 16 days and that a reasonable charge for the use of these aircraft would be £1,500 each. Therefore the total claim against the UK Government would be three aircraft at £47,000 each and four aircraft at £1,500 each making a total of £147,000.²⁸⁹

6. RAAF ORDERED BEAUFORTS

Early RAAF Beaufort Requirements

On 23 February 1939 the Department of Defence asked the Air Board to provide information of the prospective requirements for the RAAF over the five years from 1938/39 to 1942/43 for twin-engined general reconnaissance aircraft of the type proposed to be manufactured in Australia. The minute shows handwritten notations in answer to the questions asked:²⁹⁰

Number of aircraft required for initial equipment of squadron's at present	120
formed or contemplated	
Number of aircraft required for reserves	60
Number of the aircraft required for replacement through losses	54
Number of the aircraft required for additional squadrons of the RAAF using	36
this type of machine which might possibly be formed after exploration of	
present program and which would be required in 1941/42 and 1942/43	
Total	270
Less number on order or to be ordered from overseas	184
Total probable requirements to be manufactured in Australia	86

When Beaufort production commenced, the Air Board started to review the requirements for the Beauforts being manufactured and decided on 5 September 1941 that four general reconnaissance squadrons were to be formed from the first 90 Beauforts delivered to the RAAF. One Beaufort general reconnaissance squadron was to be based at each of the following RAAF stations, Darwin, Richmond, Laverton and Pearce. Facilities for the operation and maintenance of torpedoes was to be provided at each RAAF station at which a Beaufort general reconnaissance squadron was located. War reserves of torpedoes were to be held at each Beaufort general reconnaissance station. A supply of 360 torpedoes with warheads was being sought from the UK.²⁹¹

Initial RAAF Beaufort Orders Followed by Reductions

As stated, the Report of UK Government Air Mission to Australia 1939 provided for Australia to order 180 Beauforts, the first 90 for the RAF and second 90 for the RAAF.²⁹² However, it was not until 13 July 1940 that the contract was placed with the APC for the supply of these aircraft, fitted with two twin-row Wasp engines and completely equipped with all fitment items.²⁹³

However, by August 1939, the Air Board must have been in a quandary as for over 12 months it still had 80 Beauforts on order from the UK fitted with Taurus engines and now the Government was committing the RAAF to a further 90 Beauforts but fitted with the twin-row Wasp engines. There were plenty of aircraft on order but few had materialised to equip the necessary squadrons. By the end of August, Cabinet was advised that owing to technical faults arising in the Taurus engine, further considerable delay in the delivery of Beauforts from the UK would occur with deliveries now unlikely before March, 1940. The Air Board had contacted the Air Ministry to ascertain the possibility of the immediate delivery of alternative aircraft and also contacted the Lockheed Aircraft Company to enquire whether additional Hudsons could be purchased; 30 additional Hudsons would be available for delivery between November and January 1940 but only if these were ordered immediately.

The Air Board had intended to await the reply from the Air Ministry but considered that a decision should be made immediately on the offer of these Hudsons. The original number of Beauforts on order from the UK had totalled 90, the first order of 50 and the second order of 40 but 10 of the latter were deleted (date unknown) and 10 Beaufighters substituted (18 Beaufighters were ordered on Indent 712 in June 1939). The first order of 50 was due for delivery in Australia between October 1939 and February 1940, whilst the remaining 30 were to come forward between March and June 1940, however now both much delayed. Further, the Air Board considered the non-delivery of these Beauforts had not only a serious retarding effect on the development of the RAAF but would be particularly unfortunate from an operational aspect if war should come (as it did just a few days later). This resulted in a number of operational units continuing to be armed with Ansons which, although useful as a stopgap short reconnaissance aircraft and for training, had a limited value in long-range reconnaissance work and as a bomber. However, the Lockheed Hudson, of which 50 were at that time on order, with deliveries expected between September 1939 and January 1940, was also in service with the RAF.

The Air Board considered that 30 additional Hudsons should be ordered with an option over a further 20. To provide the necessary funds for the purchase of the 30 additional Hudsons, it was proposed that these could be substituted for the second order of 30 Beauforts. Should the Government approve the option for an additional 20 Hudsons, these could be substituted for 20 of the original 50 Beauforts. It was realised though that any substitution would be subject to the concurrence of the Air Ministry. It was also recognised that if war was declared it would be extremely doubtful whether the RAAF would obtain deliveries of any Beauforts at all.²⁹⁴

The Air Board further considered that if this substitution was agreed to, the Beaufort order should not be cancelled until such time as the Government was reasonably sure that the Hudsons would be delivered. Cabinet approved this arrangement and 50 Hudsons were ordered and 50 Beauforts were to be cancelled from the UK deliveries.²⁹⁵ The Australian Liaison Officer in London was advised of this on 5 January 1940 and was also informed that an additional 16 Beauforts of the second order were cancelled in order to release funds for the increased costs of the 50 Hudsons ordered. Further, the 14 Beauforts remaining on order were now to be delivered less engines but with modifications to take the twin-row Wasp engines.²⁹⁶.

By the end of January 1940 the Air Ministry had cancelled Australia's order for the Beauforts with Taurus engines but advised that the date of delivery of the 14 remaining Beauforts would depend on the time taken to finalise the Wasp engine installation.²⁹⁷ But this was not the end of the matter as on 20 March 1940 the Air Board was considering ordering 26 additional Beaufort airframes for fitting with Wasp engines with that fitting to be carried out in Australia.²⁹⁸

On 7 April 1940 the Air Board was advised that the 14 Beaufort airframes on order and to be modified to take the twin-row Wasp engines could not be delivered before early 1941. The Australian Liaison Officer in London was concerned that this date may not be realistic given the long series on unfulfilled promises over the previous two years and in particular the delay by the Air Ministry to push through the modifications required to fit the Wasp engine to the Beaufort.²⁹⁹ Based on these concerns and with Air Board advice, two weeks later Cabinet decided to cancel these 14 Beauforts and order an equivalent number of Hudsons.³⁰⁰ At the end of April 1940, following a query from the Australian Liaison Officer, the Air Board advised not to pursue the 26 additional Beaufort airframes proposed the previous month.³⁰¹

On 5 October 1940 the APC sought confirmation of further orders for Beauforts in addition to the 180 already on order.³⁰² By February 1941, War Cabinet noted that the manufacture of the Beaufort in Australia was proceeding and the second batch of 90 aircraft, those for the RAAF, were to be delivered by March 1942 but these 90 aircraft would only be sufficient to equip nine of the 14 general reconnaissance squadrons required under the approved 32 squadron plan. Due to the delay in receiving any suitable general reconnaissance type aircraft from overseas, War Cabinet approved the order of a further 90 Beauforts from the APC, making a total of 270, to commence immediately following the order for the RAAF's first 90 aircraft.³⁰³ The 90 RAAF Beauforts were required for general reconnaissance duties to supplement the 96 Hudsons which were available for the seven squadrons engaged in general reconnaissance duties. In addition, the aircraft were to establish two additional squadrons and to provide a wastage reserves of 26 aircraft.³⁰⁴

Soon after this decision was made it was ascertained that 52 Hudsons could be obtained from USA earlier than the locally manufactured Beauforts. Under those circumstances, War Cabinet decided to order the Hudsons and reduce the number of Beauforts to 38.³⁰⁵. This was because the cost of the 52 Hudsons was £420,000 cheaper than the equivalent number of Beauforts manufactured in Australia.³⁰⁶ Then in April 1941, Prime Minister Menzies received advice that all 146 general reconnaissance aircraft required could be of the Hudson type and would be received before the remaining 38 Beauforts on order. Therefore, orders already in place for these 38 Beauforts were also cancelled.³⁰⁷ The reduction in Australian requirements for the locally manufactured Beaufort were to be offset by an increase in the number required by the RAF³⁰⁸, this being authorised by the UK Government in April 1941 so that the Beaufort order was restored to a total of 270 aircraft.³⁰⁹

Additional Orders for RAAF Beauforts

Of were 270 aircraft authorised for production at the beginning of 1942, 180 were marked for delivery to the British authorities whereas the rapid advance of the Japanese made it obvious that Australia required for her own protection the maximum number of aircraft which Australia factories could produce.³¹⁰ By 4 July 1942 Cabinet agreed to order 450 Beauforts plus spares equivalent to an additional 100 aircraft thus increasing the programme from 270 to 450 aircraft.³¹¹ It was estimated that this would take production up until July 1943. War Cabinet required that the UK Government was to be fully informed of the increase in Beaufort requirements for the RAAF so that it could take over any Beauforts produced in excess of Australia's actual requirements, should those requirements fall below 450 aircraft.³¹² Then on 30 January, 1943 War Cabinet approved a further extension of the Beaufort program to a total of 700 aircraft plus spares.³¹³

The Australian Beaufort

Major Australian modifications to the Beaufort were:

Engines: – substitution of Pratt and Whitney twin-row Wasp engines in place of Bristol Taurus engines necessitating redesigning of engine nacelle, cowl and cowling panels, engine controls, propeller controls, cowl gill controls, engine bulkhead and the repositioning of the major accessories and fittings.

Propeller: – from Hamilton to Curtiss electric and later to Hamilton full feathering. Gun turret: – substitution with Australian designed and manufactured gun turret, giving increased rotation from 180° to 240°.

Armament: – designed installation of 0.5 inch wing guns in place of the former 0.303 inch guns and rear, nose and upward firing guns.

Armour plate: – installation of armour plate to protect the pilot from rearward and frontal attacks.

Tail wheel: – a special shimmy damping arrangement, designed in Australia, entirely eliminated tail wheel shimmy.

Fin: - redesigned fin area increased by approximately 15% to correct yaw.³¹⁴

Assembly plant at Fishermens Bend in early 1943 [National Archives Australia]

Beaufort Renaming

On 2 August 1941, the APC considered it essential that the Australian-built Beaufort should be differentiated from Beauforts manufactured in the UK. This was because there were numerous changes in the Australian Beaufort and for spare parts practicality, as there was the potential for confusion unless a definite distinction was made between the two aircraft. It was suggested to either allot the name Australian Beaufort or rename the aircraft altogether.³¹⁵ The Air Board noted 10 days later that a parts list would be raised for the locally built Beauforts and it was not likely that airframe spares would be needed to be ordered from overseas. There could be confusion in RAF units operating Beauforts but the method of distinguishing between UK built aircraft and those built in Australia was a matter for the Air Ministry. It was decided that the easiest way would be to allot separate Mark numbers to the Australian-built Beaufort or include an 'A' after the relevant Mark number and there was no justification for coming up with a new name.³¹⁶

Beaufort Mark Numbers

In response to a request for clarification from the Air Ministry, advice was received on 4 June 1940 that the following Mark numbers had been allotted to Beaufort aircraft: Airframes fitted with the Taurus II engine would be named the Beaufort Mk. I. Airframes fitted with the Taurus III engine would be named the Beaufort Mk. II. Airframes fitted with the Twin-row Wasp engine will be named the Beaufort Mk. III. As such, all 180 Beauforts on order at that time were to be the Mk. IIIs.³¹⁷

As stated, the Air Board acknowledged that Beauforts produced in Australia would differ in certain details from those made in UK and considered it desirable to assign a Mark number to the Australian-built Beaufort. The Board sought further advice from the Air Ministry, especially as the Beaufort built for the RAF would have the Wasp S3C4G engines and for the RAAF the S1C3G engines. It was suggested this difference could justify different Mark numbers. .³¹⁸

The Air Ministry responded in November 1941 that there was not enough difference between Australian and British built Beauforts with S3C4G engines to warrant separate Mark numbers and accordingly both would now be changed to Mark II. However, Beauforts built in Australia and for RAAF with S1C3G engines should be given a separate Mark number and Mark V was allocated.³¹⁹ The following month both the Department of Air and the APC were to correct the Air Ministry and advise that the RAAF would be using the same engines for their Beauforts, ie S3C4G, plus the S1C3G.³²⁰

A9-231 ex 8 Squadron being converted to MkIX A9-727 in 1945 [National Archives Australia]

The final Marks settled on in 1942 were:³²¹

Mk V	A9-1 to A9-50	Standard Australian Beaufort Airframe, S3C4-G engines with Curtiss Electric Airscrews and Mk IE turret
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Mk. VA	A9-151 to A9-180	Standard Australian Beaufort Airframe, S3C4-G engines with Hamilton constant Speed or DH3E50 Airscrews and Mk IE turret
Mk. VI	A9-51 to A9-90	Standard Australian Beaufort Airframe, S1C3-G engines with Curtiss Electric Airscrews and Mk IE turret
Mk. VII	A9-91 to A9-150	Standard Australian Beaufort Airframe modified to suit RAAF requirements, S1C3-G engines with DH3E50 Airscrews and Mk IE turret
Mk. VIII	A9-180 onwards (to A9-700)	Standard Australian Beaufort Airframe modified to suit RAAF requirements, S3C4-G engines with Curtiss Electric Airscrews and Blenheim Mk V turret (later replaced with the DAP turret)

The Beaufort Mk IX or Beaufreighter, a transport version, was developed in 1943 and 43 existing airframes were converted during 1944 and 1945.

Beaufort Serial Numbers for Australian-Built Aircraft

It has already been stated that the first 40 Bristol Bolingbroke aircraft ordered in February 1937 provided for these aircraft to have the serial numbers A9-1 to A9-40 and the further 10 ordered in November 1937 would presumably be A9-41 to A9-50. Once these orders were changed to the Beaufort, and an additional 40 aircraft were ordered. the serial number sequence would continue to A9-90. By April 1940, with assembly of the Beaufort imminent, the Aircraft Production Branch was seeking advice as to the serial numbers and other designations to be allotted to the aircraft supplied to the RAAF.³²² Within two weeks, the Department of Air responded to confirm that the serial numbers for the Australian Beaufort Aircraft on order from the United Kingdom were A9-1 to A9-90; however, all but 14 of these had by that time been cancelled and it was likely that these too would also be cancelled. Should this occur, then the Australian-built Beauforts for the RAAF would be serialled with these numbers. It was expected that a decision would be made the following week.³²³ But again this timeframe was optimistic. In fact, the APC (now DAP) was not formally advised of the decision to cancel the remaining 14 Beauforts from the United Kingdom, and to allot the serial numbers A9-1 to A9-90, until two years later, on 29 April 1942³²⁴ even though these 14 were formally cancelled at the end of April 1940, as stated above.

However, there was to be a further change. In June 1942, the DAP was advised that those Beauforts previously numbered with RAF serials were to be renumbered as RAAF aircraft and the serials A9-1 to A9-90 had been allotted to those aircraft. As such those T-prefixed aircraft already in RAAF service would be renumbered by the units in which those aircraft were serving; those aircraft still in production would need to be renumbered on the production line. The second 90 aircraft to be manufactured would now have the serials A9-91 onwards.³²⁵ By this time about 65 aircraft had been delivered but it should be noted that the Beaufort aircraft status cards did not include RAF serial numbers after T9625 (A9-58).

For the RAF Beauforts, a similar request for the serial numbers to apply to those aircraft was forwarded at the end of April 1940.³²⁶ A reply was quickly received advising that the serial numbers for the 90 RAF Beauforts were to be T9540 to T9569, T9583 to T9608 and T9624 to T9657.³²⁷

Once production commenced and assembly began at Fishermen's Bend and Mascot, the need to allocate blocks of serial numbers to each site was finalised. Fishermen's Bend commenced assembly before Mascot and three aircraft (T9540, T9541 and T9542)

were flown at Fishermen's Bend before the first Mascot aircraft (T9545) flew on 22 October 1941. Two other aircraft were already well advanced on the production line at Fishermen's Bend and had serial numbers applied (T9543 and T9544). From this time, an odds and evens numbering system was introduced for the RAF T numbers with aircraft from Fishermen's Bend being even numbers (T9544, T9546, T9548 etc) and odd numbers from Mascot (T9545, T9547, T9549, etc).³²⁸ When the direction was received to change to the RAAF A9 serials and because the conversion resulted in a T even number becoming an A9 odd number (ie T9540 to A9-1), numbering on the assembly line changed so that aircraft from Fishermen's Bend were serialled with A9 odd numbers and those from Mascot with even numbers.

Training of RAAF Personnel

To assist with the introduction of the Beaufort into RAAF service, four experienced airframe and engine fitters sailed from Melbourne to England on 6 May 1939 on *SS Esperance* to receive instruction in the construction, operation and maintenance of these aircraft. It was anticipated that they would remain in England for a few months.³²⁹

On 28 January 1942 the Department of Air requested the DAP to provide maintenance and scheduled servicing for RAF Beauforts T9542 and T9545 recently returned from Malaya.³³⁰ The DAP replied that these two aircraft would be overhauled but that the RAAF, even though the aircraft were RAF, needed to make arrangements for this servicing by its own personnel as there was no longer space nor personnel to undertake this work at either Fishermen's Bend or Mascot. However, the DAP did make the offer for RAAF personnel to receive intensive training at both assembly workshops.³³¹

7. OTHER PROPOSED CUSTOMERS FOR AUSTRALIAN BEAUFORTS

Australian-Built Beauforts for Other Forces

The first known indication that Australian-built Beauforts were being considered for other users was a Minute dated 25 January 1939. The Air Ministry was enquiring whether the Royal New Zealand Air Force (RNZAF) could be equipped with Beauforts instead of the Vickers Wellingtons previously ordered. This was based on the intention to manufacture Beauforts in Australia (even though this was before UK Air Mission to Australia).³³² It was Air Ministry policy that all general reconnaissance and torpedo bomber squadrons in Far East should only be equipped with Beauforts. In addition, the Air Ministry considered that squadrons in Malta, Aden and Basrah, as well as the Far East, could later be replaced with Beauforts manufactured in Australia.³³³

In March 1939, Group Captain Ralph Cochrane, who was acting as CAS RNZAF, had recommended Wellingtons because of their long range striking capacity and reaffirmed that this decision should stand so the proposal was dropped.³³⁴ However, it was resurrected three years later following a request for additional aircraft from the New Zealand Government. The Air Ministry hoped that it may later be possible for New Zealand to have a share of Australian-manufactured Beauforts (but this provided unnecessary when aircraft were made available from the USA).³³⁵

In August 1941, Brooke-Popham advised that the Admiral of the Netherland East Indies Naval Forces, Lieutenant Admiral Conrad Helfrich, had requested Brooke-Popham use his influence to secure Australian-made Beauforts for the Dutch forces. Brooke-Popham made it clear that the Beauforts were earmarked for the RAF in Malaya first, then RAAF squadrons and because of delays in production it was unlikely any aircraft would be available for the Dutch forces before the end of 1942.³³⁶

Enquiries were also received in 1941 from the Government of India seeking Beauforts with twin-row Wasp engines.³³⁷

8. IMPROVING THE AUSTRALIAN BEAUFORT

Beaufort Progressive Improvements

War Cabinet was first advised of moves to improve the Beaufort when agreeing to order 450 Beauforts on 4 July 1942. These improvements were to be introduced progressively both in the aircraft's operational performance and the production line.³³⁸ Some improvements had already been incorporated and the following schedule was attached for the information of War Cabinet (a number of which did not eventuate or were delayed):

Incorporated Subsequent to Aircraft 1

Increase in armament from total of 2 to 7 guns. Modification of fin to overcome longitudinal instability. Replacement of general purpose wireless with Australia equipment. Installation of IFF (Identification Friend or Foe). Modification to enable all-up-weight to be increased to 21,000lbs. Provision for electrically heated boots and gloves. Introduction of flexible pipe line between engine and bulkhead.

Incorporated Subsequent to Aircraft 50

Change to Australian S1C3G engines. Change to Australian cowling and gills. Modification of torpedo gear to use American torpedoes. Installation of armour plating for dashboard, pilot and wireless operator. Installation of radio direction finding equipment (radar).

To be Incorporated Subsequent to Aircraft 90

Change to Australian Mk1E gun turret. Incorporation of twin nose guns increasing guns to 9. Installation of cabin and suit heating. Change to low pressure oxygen system. Rearrangement of electrical system to meet RAAF requirements. Introduction of shock-proof mounted instrument panel and rearrangement of instruments. Installation of Vokes Carburettor air cleaner. Special sound absorption. Improved draught exclusion. Introduction of more efficient braking. Change from Curtiss Electric to Australian-made constant speed airscrews.

To be Incorporated Subsequent to Aircraft 180

Sperry auto pilot.

Introduction of Blenheim type gun turret.

Replacement of .303in wing guns with .5in guns.

Redesigned electrical system introducing "Common Negative" return and incorporation of plug system on interconnecting components.

Incorporation of dive flaps.

Installation of radio compass.

Replacement of existing direction finding loop with Australian circular type. Installation of additional hydraulic pump to supplement hydraulic system.

To be Incorporated Subsequent to Aircraft 450

Replacement of Blenheim type turret with Australian-made .5in twin gun turret. Change to Wright 1700hp engines for increased performance.³³⁹

Modifications and Improvements to Beaufort Armament Nose Armament

Following the first actions against the Japanese, the Air Board requested on 19 December 1941 that action be taken to investigate the following forwarded firing guns and installations on Beaufort Aircraft:

- 1. Four Browning Mark II guns in each of port and starboard wing.
- 2. Two front traversing guns in the nose.
- 3. Four fixed guns firing forward under the nose.
- 1 and 3 were later restricted to preliminary investigation only.340

The front traversing twin Vickers GO gun mounting was already under development but not yet introduced when on 10 February 1942 the Air Staff also asked that an investigation be made urgently to ascertain whether a 20 millimetre aircraft cannon could be fitted to the nose gun position of Beauforts as alternative armament.³⁴¹ Just under a month later a Hispano 20mm cannon had been delivered to the flight shed at Fishermen's Bend for a trial installation.³⁴² But this installation was deferred owing to pressure of more urgent developmental work.³⁴³

By 19 March 1942 a mock-up of a front traversing gun mounting in the nose had been completed. It had been decided to adopt the Air Ministry mounting for the sake of interchangeability and ease of incorporation.³⁴⁴ A further priority was to modify the mounting to give an increased area of fire.³⁴⁵ By the end of August 1942, the twin nose gun installation had been incorporated into eight aircraft and the mock-up of the installation to give an increased area of a fire was almost ready.³⁴⁶

At this time there was a proposal to install a 0.5in flexible gun in the nose even though this would result in a considerable weight increase on an already overloaded aircraft. Weight reduction could only be achieved by more closely defining the operational roles of the aircraft and only providing such equipment as was necessary for it to successfully fill one specific role.³⁴⁷ By December 1942 the DAP indicated that the installation of the 0.5in nose gun would not permit the placement of the under defence gun due to space requirements. However, the Beaufort Division advised there should be no reduction in the space or forward view as the 0.5in gun was to be mounted underneath the navigator's table³⁴⁸ and the Division would be in a position to commence production early in May 1943.³⁴⁹ The mock-up of the nose 0.5in gun installation was not ready for inspection until 9 June 1943³⁵⁰ but the following month RAAF Command advised that this installation was no longer required.³⁵¹

Wing Armament

About the same time as consideration was being given to a 0.5in gun in the nose, a proposal to incorporate a 0.5in gun in each wing, in lieu of existing Browning .303in gun, was progressed so that drawings and a mock-up had been prepared by the Department of Civil Aviation.³⁵² By September 1942 the Beaufort Division advised that it would not take any action to incorporate the 0.5in wing guns in production until aircraft number 451 (by this date approximately 210 sets of wings had been completed).³⁵³

By 26 October 1942 the Beaufort Division revised its assessment and considered it was possible to incorporate the 0.5in gun wing installation in Beaufort number 351 but not to make this installation retrospective. At that time there were sufficient 0.5in Browning guns for wing installation for only 100 Beauforts.³⁵⁴ However, it was not until July 1943 that firing trials for the 0.5 wing guns had been carried out on a prototype. Each week's delay in the approval to proceed with this modification involved the manufacture of seven aircraft and a further revised assessment was that 0.5 wing guns could not be fitted to production aircraft until aircraft number 500.³⁵⁵

Torpedo Armament

By 19 March 1942 investigations were underway to determine the modifications necessary for the Beaufort to use the US Mark XIII torpedo.³⁵⁶ This continued into April with further investigation required to obtain the desired clearance on the tail unit³⁵⁷ but was then delayed pending receipt of further information from the USA.³⁵⁸ By the end of April 1942 advice had been received that an experimental Canadian Beaufort, investigating this installation, had crashed and the necessary technical data in regard to the torpedo tail modification and installation was further delayed.³⁵⁹ However the necessary design work was completed by the middle of June and ready for manufacture.³⁶⁰

Turret Armament

Bristol Mark I turrets were fitted to aircraft A9-1 to A9-20 and were later modified to Mark IE. Mark IE turrets were being fitted to all production aircraft up to A9-180. Subsequent aircraft were to be fitted with Blenheim Mark V turrets. Flight tests were carried out to determine the aerodynamic qualities of a Blenheim turret elevated an additional 8 inches. This provided a greatly increase the field of fire.³⁶¹ In November 1942 the Department of Air asked the Beaufort Division to investigate installing a four gun turret in the Beaufort with information available from the UK where this had already been explored. However, the Division again expressed concern at the weight increase this would impose on an aircraft already operating at its all up weight.³⁶²

Installation of Mk VE turret in A9-533 in late 1943 showing the increased traverse of the DAP turret. Note the guide on the starboard beam gun hatch to protect the wing from 'friendly fire'. [National Archives Australia]

Beam, Vertical and Under Defence Armament

A note in the file on 29 August 1942 confirmed that all Beauforts were fitted with under defence and beam guns.³⁶³ In addition, an experimental installation had been carried out on a Beaufort at Laverton. Firing trials had been completed but the Beaufort Division

determined that this installation was not structurally satisfactory and a suitable installation was designed. ³⁶⁴

By the end of April 1943 there was a proposal to substitute 0.303in Browning guns in the beam positions in the Beaufort as a substitute for Vickers GO guns, which were in short supply at bombing and gunnery schools. The proposal was not pursued as this would increase the all-up-weight by 30 to 40 pounds and would likely only release 200 Vickers GO guns.³⁶⁵ A further decision was made on 8 July 1943 that Beauforts from number 351 onwards would not be fitted with an under defence gun, mounting and cupola, however all aircraft would still be capable of having such a gun fitted if required.³⁶⁶

General

From February 1942 Beauforts T9542 and T9545 were being used for a trial installation of bullet proof glass³⁶⁷ and a couple of months later T9589 was being prepared for armament trials.³⁶⁸

On 12 July 1943 RAAF Northern Command finalised its armament requirements for the Beaufort based on operational experience and decided, based on weight factors, the effort involved in the modifications under discussion and the roles of squadrons equipped with these aircraft, that the installation of 0.5in guns in the wings to replace the existing 0.303 guns was desirable and that this modification should continue but 0.5in guns were not required in the nose of Beauforts.³⁶⁹

A9-700, the final Beaufort, off Sydney showing to good effect the underwing Yagi radar aerials and field of fire from the MKVE turret – August 1944 [National Archives Australia]

Beaufort Floatplane

On 22 August 1942 the DAP sought advice on the possibility of fitting floats to Beauforts in place of landing wheels. In particular the Department was seeking any designs already available or designs used for the Blenheim.³⁷⁰ By the end of September 1942 Bristols seemed doubtful that this was a viable proposition owing to the length of time necessary to get this heavy aircraft up on the step and unstuck with its existing power. Further information was obtained from the Ministry of Aircraft Production stating that it

may be a practical proposition. However, this would likely result in the loss of 20 miles per hour speed and 250 miles range and would also require some weight reduction or possibly a four-bladed propeller.³⁷¹

Hyland in London reported on 5 October 1942 that he had spent a day at Shorts, Rochester. In 1940 Shorts had investigated fitting Taurus engined Beauforts with floats and produced designs which were considered satisfactory with 18,750 pounds all-upweight. Shorts believed it was possible to put Australian Beauforts on floats and Hyland asked for all necessary drawings and data so these could be forwarded. Shorts was confident that the proposal could proceed with an all up weight of 23,000 pounds, which included a full fuel load. However Shorts had asked for the operational requirements that would be undertaken by a Beaufort on floats.³⁷²

Then in November 1942 the Ministry of Aircraft Production advised that a detailed investigation had shown the proposed Beaufort float conversion was practicable on both structural and aerodynamic grounds. The main changes involved the fitting of the floats and general airframe strengthening, a larger fin would be required to maintain directional stability and a decrease in dihedral on the outer wings may be necessary. Extra weight would be about 1,500 pounds with a drag increase of about 30%. This would reduce range by about 15 per cent and the deterioration of single engine flying characteristics would necessitate fully feathering propellers. The Ministry would not undertake detailed design work of the conversion unless there was strong support based on operational requirements and support from the Australian Government.³⁷³ No further action seemed to have been taken.

Continued Beaufort Production or Changeover to Different Aircraft

By September 1941 the Australian Government was considering the future of aircraft construction and what types could be manufactured after the Wirraway and Beaufort. The UK Government proposed that Australia just concentrate on the present type of aircraft produced, both airframes and engines, and abandon the idea of producing an aircraft of a new type. This was because:

- The recent excellent performance by the Beaufort in operations had resulted in the conviction that there was nothing in sight to replace the Beaufort in its class and that its production was desirable until the end of 1943 if not longer;
- Experience had shown that the Beaufighter was approaching obsolescence and its place would probably be taken by the Mosquito of which prototype tests (presumably the fighter variant) had recently been satisfactorily completed;
- It was highly important to avoid interference in production which would result if Australia was now to plan and tool up for a new type of aircraft.³⁷⁴

It is hard to see that this advice from the UK was made in good faith. This was because less than nine months later, in June 1942, RAAF Overseas Headquarters had been discussing the replacement of the Beaufort with the Air Ministry and the Ministry of Aircraft Production, both of which now recommended Australia consider manufacturing the Beaufighter Mk VI.³⁷⁵ Robert Lawson, Director General of Production and Supply at the Air Board, expressed that it was rather remarkable to now recommend the Beaufighter for production when Australia had so recently being deterred from such a course and had been offered the Mosquito instead.³⁷⁶

Redesign and Improvement to Australian-Manufactured Beaufort

Regardless of the UK Government's advice, by March 1942 the DAP was examining a possible replacement aircraft to build in Australia following on from the Beaufort and sought details on the Bristol Buckingham, currently being developed in the UK. This aircraft was designed on the same principles as the Beaufort but was much larger. It

was expected that this aircraft would fly about August 1942.³⁷⁷ By July 1942, CAS Jones had already taken action to obtain the views of the Air Ministry on a suitable type of aircraft to replace the Beaufort. The RAAF deliberated on this advice including that from its own officers and considered the following options:

Bristol Beaufighter Mk VI – questioned whether the Beaufighter was really a type wanted by the RAAF to be manufactured in Australia because of its operational limitations.

Bristol Buckingham – this used the Bristol Centaurus engine and would mean that Australia would depended entirely on the importation of these engines from the UK. It was noted that the aircraft to be manufactured should be within Australia's engine production capacity and that spare parts would be readily available.

North American B-25 Mitchell or Martin B-26 Marauder – these were the only current American aircraft capable of being both a general reconnaissance and torpedo bomber type but the Lockheed Ventura could also be considered.

Vultee Vengeance – would take 12 months to get the Vengeance into production. CA-11 (Woomera) – could be used as a dive bomber.

The DAP considered that a Beaufort improvement would be to install Wright 1,700hp engines and to be more heavily armed. This would be the most logical development and should be explored further from an engineering point of view. It was expected that a larger wing would be required.³⁷⁸ The Department undertook additional work that month and provided further details on a proposed Beaufort replacement. The proposal was a development of the Beaufort, designed to perform the same functions but at a considerably greater speed and with powerful defensive armament more in line with modern requirements. Being a modified version of a type already in production, it could be produced much more easily than any other type. The preliminary specifications were based on the following:

Armament:

Defensive armament consisting of 0.5in calibre machine guns arranged as follows -One free gun in the nose, with 400 rounds of ammunition;

Two fixed guns in the wings with 235 rounds each;

Two guns in the rear turret with 400 rounds each;

One rear tunnel gun with 400 rounds.

The turret was designed to cover 360° in azimuth, with a maximum of the 85° elevation. It thus covered practically the whole of the upper hemisphere and was an enormous improvement on the present Beaufort turret. The ability of this turret to fire forwards, in conjunction with the free nose gun, was considered to provide adequate defence against present Japanese methods of attack.

Bomb or Torpedo Load:

This was the same as for the Beaufort. In the bomb well could be carried -

1 x 21 inch torpedo; or

4 x 250 pound bombs; or

2 x 500 pound bombs; or

1 x 2000 pound bomb.

Under each wing could be carried 1 x 250 pound bomb.

Powerplant:

2 x Wright GR2600 B engines of 1,700 HP each;

2 x 3 bladed 12 foot diameter de Havilland hydromatic propellers of Australian manufacture.

Performance:

Maximum speed 315 mph.

Range 1,100 miles at 240 mph with a full military load.

Manoeuvrability:

The fitment of dive breaks would greatly enhance the operational utility as compared with the Beaufort.

Crew Comfort:

Modifications to increase the comfort of the crew and lessen fatigue included – Elimination of draughts;

Addition of heating and ventilating systems;

Provision of soundproofing;

Provision of Sperry auto pilot.

Miscellaneous Improvements:

Many improvements and refinements on existing Beaufort practice were to be incorporated on the replacement machine. Amongst these were –

Flush riveting and general aerodynamic cleaning up to improve performance; Incorporation of single wire electrical system, permitting the use of the same generators, etc, as were used on American types; Much greater breaking capacity on main landing wheels; Redesigned tail wheel installation, retractable with closing doors; Better arrangement of the cockpit controls and instruments; Improved radio DF loop.³⁷⁹

Higher Powered Engines

On 31 October, 1940 Cabinet gave approval in principle for CAC to immediately negotiate and start tooling for a 1,500 to 2,000 horsepower engine. Following advice with UK authorities and the Air Board, it was agreed that the Wright R2600 1,600 horsepower engine appeared to be the most suitable type. Approval was later granted to negotiate a licence agreement.³⁸⁰ However by February 1941, the US Government indicated that it was averse to Australia swapping from the Pratt and Whitney series to Curtiss Wright as it would involve extra demands on US productive capacity, such as machine tools, skilled labour and tool facilities. The UK Trade Minister believed there was a better chance for Australia to secure a more powerful Pratt and Whitney engine.³⁸¹

On 17 February, 1942, it was decided to request the supply of 400 twin-row Wasp engines to allow for production until 30 June, 1943 and, in addition, to order 600 1,600 horsepower Wright engines to meet the prospective requirements in 1943 for an aircraft of improved performance. On 4 July, 1942 Cabinet was advised of the proposal to change over from the twin-row Wasp engine to the Wright R2600 engine at Beaufort aircraft number 451. It was proposed that the Wright engines would be manufactured at Fishermen's Bend but it was soon realised that by the time a factory was tooled up to produce this engine it would be superseded by a higher powered engine, perhaps at 2,000 horsepower, and it would be preferable to plan for the production of such an engine which might be achieved in January 1944.³⁸²

But the whole plan to re-engine the Beaufort or replace it with a revised airframe was quashed by the end of August 1942. In response to a request made on 5 June, 1942 the Air Ministry had investigated improving the existing Beaufort by the installation of Wright R2600 model engines in lieu of the Pratt and Whitney 1830 engines. Preliminary investigations by the Air Ministry concluded the following:

24,000 pounds
24,500 feet
288 mph at 5,000 feet
300 mph at 15,000 feet

Maximum cruise	208 mph at 5,000 feet
Economical cruise	165 mph
Range	1,240 miles
Endurance	7.5 hours
Take off	800 yards over 50ft screen

The Air Ministry also concluded that a complete redesign of the undercarriage and a general strengthening of the aircraft would be required. It was estimated that unacceptable instability would be induced if the weight of the aircraft increased to 24,000 pounds. Trials were about to commence in the UK at 22,500 pounds and stability at this weight was not expected to be satisfactory. Because of the decrease in range and endurance, increased take off run and probable instability, the Air Ministry believed that re-engining with the Wright Cyclone was not a viable option and there was considerable risk of this installation proving unsatisfactory.³⁸³

Therefore in September 1942 options were examined for the production of more powerful aircraft engines in Australia and these included a turbo super charger for the 1,200hp twin-row Wasp engine. However, the prospects of manufacturing super chargers in Australia was not considered practical. Investigations were underway at Lidcombe to increase the horsepower of the twin-row Wasp engine to 1,350hp (from R1830 to R2000) by incorporating new pistons and cylinder assemblies and several were built.³⁸⁴

On 27 October 1942 CAC recommended that it should commence to tool up for the R2800 Pratt and Whitney engine developing 1,850hp. However this proposal did not proceed at that time as it was rightly decided that a type of engine to be constructed must relate to the type of aircraft to be built.³⁸⁵ Similarly, it was also finally acknowledged that the time taken to change manufacturing over from the 1,200hp twin-row Wasp engine to the 1,700 Wright engine would be two years and in view of this and no final decision as to which type of aircraft would replace the Beaufort on the production line, the project was suspended. At this time, of an order for 130 of the improved 1,700 Wright engines, 10 had been received from USA, a further 10 had been shipped and 75 were expected to be delivered in January 1943.³⁸⁶

If manufacturing the radial type engine in Australia had continued beyond the R1830 twin-row Wasp engine to either the R2800 double row Wasp or 1,700 horsepower Wright engine, as was contemplated, such production in the light of subsequent developments would have been useless or would have seriously limited to the types of aircraft that could have been built in Australia.³⁸⁷

9. BEAUFORT MANUFACTURING SUMMARY

Beaufort Program Statistics

The Beaufort Division of the DAP managed the following major facilities, contractors and personnel:

Assembly Plants – Fishermens Bend (Vic) and Mascot (NSW): 700 aircraft assembled between 1941 and 1944.

Area Workshops – at State Government Railway Workshops at Newport (Vic), Chullora (NSW) and Islington (SA); to manufacture and assemble certain complete components. **Engine factory** – Lidcombe (NSW): this factory was erected by CAC on behalf of the Government for manufacturing S1C3G type Pratt and Whitney 1,200 horsepower twinrow Wasp engines for installation in the Beaufort. The Lidcombe factory was designed for the production of 40 engines per month and the first engine was completed in October 1941. A total of 870 complete engines and the equivalent of 130 additional

engines in unassembled parts were manufactured. The remaining engines and parts were imported from the USA.

Aircraft Repair and Assembly Centre – Essendon (Vic): established for the re-building of badly damaged but repairable aircraft, for the introduction of modifications after delivery to the RAAF and for the salvage of components too badly damaged to be re-built.

Beaufort spares at the Repair and Assembly Centre – Essendon [National Archives Australia]

Hydraulic Landing Gear Annex, National Motor Springs – Alexandria (NSW): 763 tail wheel struts, 657 sets of oleo frames and 770 retracting gear sets.

Aero-electrics Annex, ETC Industries (renamed Tecnico Ltd in December 1942) – Marrickville (NSW): for the manufacture of electric starters and generators, magnetos and electrical systems.

Heavy Forge Annex, Australian Aluminium Co – Granville (NSW): for aluminium sheet, strip and extrusions with the necessary rolling mills and extrusion press imported from the USA.

Gun Turret and Armament Annex – Fairfield (Vic): Conversion of 90 imported Mark 1 Bristol type single gun turrets into Mark 1E twin gun turrets to increase firepower, complete manufacture of 150 Mark 1E Bristol type twin gun turrets, dismantling and reassembling 294 imported Bristol type gun turrets of different Mark numbers to standard Mark V design, increased the capacity of Mark V and VE/3 turrets from 900 rounds to 3000 rounds, development and manufacture of the 210 Mark VE/3 Australian type gun turrets with a primary rotation of the 245° as compared to the 120° rotation on the imported Mark V turret and fitted with an electrical interruption device to protect wing, tail plane and rudder surfaces, development and manufacture of 521 sets of twin Vickers nose gun installations and a prototype hydraulically operated 0.5in Browning nose gun. **Airscrew Annex** – Granville (NSW): engine crankcases and blade and hub forgings for complete propellers including 45 Beaufort type for Taurus engines.

Instrument Maintenance Annex – Australian National Airways, Essendon (Vic).

General Motors Holden – Woodville (SA) produced the 13,600 pressed metal detail parts, 2,800 sub-assemblies and 40 component assemblies for each Beaufort aircraft. Approximately 9,590,000 parts were manufactured at Woodville and 910 sets of fuel tanks were manufactured.

Richards Industries – Mile End (SA) manufactured 2,500 oil tanks and 168 auxiliary fuel tanks for Beauforts.³⁸⁸

Beaufort Training Schools – Sydney (NSW) and Melbourne (Vic): for the training of process workers, aircraft assemblers, foreman and leading hands.

Storehouses – 28 (Vic), 4 (NSW) and 1 (SA).

Other Contractors - 200 (Vic), 200 (NSW) and 10 (SA).389

Personnel – on 15 February 1943, the number of personnel, excluding those employed by the contractors, managed by the Beaufort Division was³⁹⁰:

	Male	Female	Total
Administrative	692	681	1,373
Assembly Plant – Fishermens Bend	1,273	135	1,408
Assembly Plant – Mascot	1,015	268	1,283
Area Workshop – Chullora	1,578	562	2,140
Area Workshop – Islington	1,041	398	1,439
Area Workshop – Newport	702	473	1,175
Storehouses	434	227	661
Gun Turret Plant	499	202	701
Training Schools	21	92	113
Hydraulic Landing Gear Annex	277	92	369
Airscrew Annex	840	299	1,139
Heavy Forge Annex	99	-	99
Aero-electrics Annex	67	24	91
Engine Factory	2,334	310	2,644
	10,872	3,763	14,635

Acknowledgement: My thanks to David Vincent for his assistance with this paper.

¹ Minute to DDOR from Personal Secretary to Air Member for Supply and Organisation dated 1 May 1936 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

² Minute 7 dated 4 June 1936 on Minute Sheet in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>
³ In the Minute "New Bristol Types" dated 28 August 1936 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213 a hand written note, in response to the proposed ordering of the Bristol 149 states that "…it is hardly worthwhile proceeding with details of the Blenheim order…"; in the Cypher Message to Australian Liaison Officer London from Air Board dated 17 March 1938, Ibid, Williams refers to "…the forty aircraft ordered May 1936 subsequently increased to fifty…"; both the Melbourne Herald and the Newcastle Sun papers contain an article dated Wednesday 4 November 1936 stating that Bristol Blenheims had been ordered, the Herald expecting them to be delivered before Christmas and the Sun that they were ordered some six months previous, at the same time as the Avro Anson. While not necessarily disputing these claims, why was a new Overseas Indent (No. 550) issued and not the order for the Blenheim Is just altered to the Bristol 149 Bolingbroke as was the case when the Beaufort replaced the Bolingbroke?

⁴ Minute to Air Board Members from Chief of Air Staff Williams dated 4 February 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

⁵ Copy of Wireless Message to Austair from Air Board dated 12 May 1936 in Co-ordination of Orders placed in UK, NAA: A1196, 1/501/24

⁶ Minute to Secretary Department of Defence (For Air Board) from Australian Liaison Officer London dated 25 May 1936 plus attachment in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

⁷ Minute "New Bristol Types" dated 28 August 1936 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/21. This Minute was written to clarify which type was now being ordered. See also Air Board Minute dated 4 February 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/21. This latter Minute also provides the history summarised above for the purchase of the Blenheim I, then Bolingbroke, then Beaufort but dates are lacking.

 ⁸ Air Board Agenda 1997 (RAAF) - Supply of Bristol type 149 General Reconnaissance aircraft with Mercury engines - Air Board Order No. 550 dated 12 February 1937, NAA: A14487, 11/AB/1997.
 ⁹ Overseas Indent No 550 dated 12 February 1937 in Overseas Indents 550 and 591 Bristol Beaufort Aircraft and Taurus Engines, NAA: A705, 9/18/15.

¹⁰ Air Board Agenda 2128 (RAAF) - Supply of Bolingbroke aircraft with Mercury VIII engines – Overseas Indent No. 591, NAA: A14487, 11/AB/2128.

¹¹ Minute 7 dated 4 June 1936 on Minute Sheet in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

¹² Minute 13 dated 2 July 1936 on Minute sheet in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

¹³ Copy of Minutes from File No. S.36970 dated 21 August 1936 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

¹⁴ Copy of Minute to CAS and AMSO from Viscount Swinton Secretary of State for Air dated 28 August 1936 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

¹⁵ Kevin Gogler, *The RAAF in the Australian Coronation Contingents of 1937 and 1953*, self-published, 2018, p28.

¹⁶ Minute from Air Board to Australian Liaison Officer London dated 7 January 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

¹⁷ Air Board Minute dated 4 February 1938 and Cypher Message to Australian Liaison Officer London from Air Board on 3 March 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

¹⁸ Cable to the Australian Liaison Officer in London from the Air Board dated 10 March 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

¹⁹ Minute to Secretary Department of Defence from Air Board dated 3 May 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

²⁰ Minute to Secretary Department of Defence from Air Board dated 3 May 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

²¹ Letter to Secretary Dept of Defence from Australian Liaison Officer London dated 25 May 1938 in Overseas indents 55-1 & 65-8 - Maintenance spare parts, materials & overhaul equipment etc. for

Beaufort aircraft - Taurus engines called for an overseas indents 550, 591 & 657, NAA: A705, 9/18/1. ²² Minute *RAAF Indent 550 for 40 Beauforts* to Deputy Director Equipment (A) from Australian Liaison Officer dated 27 April 1938 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA https://nla.gov.au/nla.obj-727838660.

²³ Air Board Agenda 2284 (RAAF) - Supply of forty (40) Bristol Beaufort aircraft - Overseas Indent No. 657, NAA: A14487, 12/AB/2284.

²⁴ Air Board Agenda 2348 (RAAF) - Supply of automatic pilot controls and spare parts - Overseas Indent No. 681 dated 28 November 1938 in NAA: A14487, 12/AB/2348.

²⁵ For example, see David Vincent, Quest for a Bomber: the RAAF's supply problems, 1934-41, Article in the Journal of the Australian War Memorial: 1986,9, David Vincent, The RAAF Hudson Story Book 1, self published 1999, Chapter 1 – Policy and Procurement and John McCarthy, Australia and Imperial Defence 1918 – 1939: A Study in Air and Sea Power, University of Queensland Press, St Lucia, 1976, Chapter 5 – The United Kingdom and the Formation of the Australia Aircraft Industry 1918-1939.

²⁶ Copy of Wireless Message to Australian Liaison Officer London from Air Board dated 4 March 1937 in Overseas Indents 550 and 591 Bristol Beaufort Aircraft & Taurus Engines, NAA: A705, 9/18/15, and See and Cypher Message to Air Board from Australian Liaison Officer London dated 10 July 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File NAA: A1196, 1/501/213. For rights to the local manufacture of Avro Anson airframes and Cheetah engines see Air Board Agenda 1819/1938 New Aircraft Type – Avro Anson in NAA: A14487, 10/AB/1819.

²⁷ Minute to the Secretary of the Department of Defence from the Air Board dated 3 May 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213 and Cablegram to High Commissioner Bruce from Prime Minister Lyons dated 11 May 1938 in [Personal Papers of Prime Minister Bruce], NAA: AA1970/559, 35.

²⁸ Copy of Wireless Message to Air Board from RAAF Officer London dated 12 August 1937 in Overseas Indents 550 & 591 - Bristol Beaufort aircraft & Taurus engines, NAA: A705, 9/18/15.
 ²⁹ Cypher Message to Air Board from Australian Liaison Officer London dated 17 March 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

³⁰ Cypher Message to Australian Liaison Officer London from Air Board dated 17 March 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

³¹ Cable to Air Board from Australian Liaison Officer London dated 23 April 1938. in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

³² Cypher Message to Air Board from Australian Liaison Officer London dated 13 June 1938.
 Overseas Indents 550 & 591 - Bristol Beaufort aircraft & Taurus engines, NAA: A705, 9/18/15.
 ³³ Cypher Message to Air Board from Australian Liaison Officer London dated 14 July 1938.
 Overseas Indents 550 & 591 - Bristol Beaufort aircraft & Taurus engines, NAA: A705, 9/18/15.

³⁴ Minute 115 dated 12 January 1939 on Minute Sheet and Minute to Air Member for Supply and Organisation from Australian Liaison Officer dated 28 September 1939, both in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA https://nla.gov.au/nla.obj-727838660.

³⁵ Minute titled New Type Aircraft – Erection and Servicing dated 14 July 1939 in Orders for New Equipment Bristol 149 and Hudson, NAA: A705 208/7/649.

³⁶ Cypher Messages to Air Board from Australian Liaison Officer London dated 7 February 1939 and 27 March 1939. in Orders for New Equipment Bristol 149 and Hudson, NAA: A705 208/7/649.

³⁷ Extracts from Signals form Liaison Officer (extract from signal 1 November 1938). in Orders for New Equipment Bristol 149 and Hudson, NAA: A705 208/7/649. The RAF's "generosity" could well have been in response to the news that the RAAF was proceeding with an order for 50 Lockheed Hudson general reconnaissance aircraft.

³⁸ Minute *Rearming Policy* (Table A) to CAS from ACAS dated 8 August 1939 in Re-arming Policy - Operational Units, NAA: A1196, 1/501/308

³⁹ Minute 118 dated 30 September 1939 on Minute sheet Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

⁴⁰ Minute *Supply of 40 Beauforts* to Air Member for Supply and Organisation from Australian Liaison Officer dated 6 March 1939 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

⁴¹ See Milestones – Important Dates in the Development of Australia's Aircraft Industry in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4 and a detailed history of aircraft manufacture for the RAAF is contained in Chapter 9 Local Development and Production in C.D. Coulthard-Clark, *The Third Brother, The Royal Australian Air Force 1921-39*, Allen & Unwin, Sydney, 1991.

⁴² Air Board Agenda 1571 (RAAF) - Future policy in regard to the payment of royalties on aircraft and spare parts and equipment built in Australia in NAA: A14487, 9/AB/1571.

⁴³ Ministerial Statement on the Manufacture of Aircraft in Australia by the Minister of Defence dated 23 January 1937 in Australian Aircraft Factory: type of service aircraft to be manufactured 1936-39, PRO AIR 2/1893 in Trove NLA <u>https://nla.gov.au:443/tarkine/nla.obj-727838708.</u>

⁴⁴ Air Board Agenda 1778 (RAAF) - Rights for local manufacture of aircraft - draft agreement in NAA: A14487, 10/AB/1778.

⁴⁵ Air Board Agenda 1830 (RAAF) - Agreement for rights of local manufacture - Avro Cadet trainer in NAA: A14487, 10/AB/1830.

⁴⁶ Minute from Williams and Recommendation (d) of Air Board Minute to Minister of meeting dated 21 August 1936 in Air Board Agenda 1931 (RAAF) - Aircraft manufacture in Australia, NAA: A14487, 11/AB/1931.

⁴⁷ Attachment to letter from Syndicate dated 3 September 1936 in Manufacture of Aircraft in Australia, NAA: A705, 16/1/1.

 ⁴⁸ Letter to Chief of Air Staff Newell from CAS Williams dated 4 March 1937 in Copy of Air Liaison Letters from Australia Part 1, PRO AIR 23/1608 in Trove NLA <u>https://nla.gov.au/nla.obj-727838563</u>
 ⁴⁹ Cypher Message to Australian Liaison Officer London from Air Board dated 5 May 1938 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213. ⁵⁰ Cablegram to High Commissioner Bruce from Prime Minister Lyons dated 11 May 1938 in [Personal Papers of Prime Minister Bruce], NAA: AA1970/559, 35.

⁵¹ Air Board Agenda 2284 (RAAF) - Supply of forty (40) Bristol Beaufort aircraft - Overseas Indent No. 657, NAA: A14487, 12/AB/2284.

⁵² Cablegram to Prime Minister Lyons from High Commissioner Bruce dated 20 November 1938 in [Personal Papers of Prime Minister Bruce] Aircraft Manufacture in Australia, NAA: M104, 6/3.

⁵³ Cablegram to High Commissioner Bruce from Prime Minister Lyons dated 9 December 1938 in [Personal Papers of Prime Minister Bruce] Aircraft Manufacture in Australia, NAA: M104, 6/3.

⁵⁴ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁵⁵ Copy of Cablegram to Prime Minister from Secretary of State for Dominion Affairs dated 27 May 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

⁵⁶ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁵⁷ Copy of Letter to Premier of Queensland from the Department of Supply and Development? dated 14 July 1939 in Beaufort early papers, NAA: MP450/1, 77.

⁵⁸ Copy of Report on Meeting of Chief Mechanical Engineers of the State Railways and Mr Ord of United Kingdom Government Air Mission in Sydney from 20 to 23 March 1939 to Secretary Dept of Defence dated 23 March 1939 in Beaufort early papers, NAA: MP450/1, 77.

⁵⁹ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁶⁰ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁶¹ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁶² Production timetable for Beaufort Airframes undated in Beaufort early papers, NAA: MP450/1, 77
 ⁶³ Beaufort Aircraft - Engine Delivery Program for Bristol Taurus II dated 28 March 1939 in Beaufort early papers, NAA: MP450/1, 77.

⁶⁴ Minute on Manufacture of Aircraft in Australia to Secretary Dept of Defence from Secretary Air Board dated 27 March 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

⁶⁵ Minute on Manufacture of Aircraft in Australia to Secretary Dept of Defence from Secretary Air Board dated 1 May 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

⁶⁶ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁶⁷ Minute of preliminary Allocation of 80 Men Agreed upon to Send to the Bristol Aeroplane Co Ltd for Training in Aircraft - Dispatch of Trainees to England, NAA: D1743 1939/1.

⁶⁸ Letter to Acting Chief Mechanical Engineer, (SA) Railways from General Manager, Aircraft Construction Branch dated 31 July 1939 in Aircraft - Dispatch of Trainees to England, NAA: D1743 1939/1.

⁶⁹ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

⁷⁰ Aircraft Production in Australia by Dept of Aircraft Production dated 31 August 1945 in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

⁷¹ Letter to Acting Chief Mechanical Engineer (SA) Railways from General Manager, Aircraft Production Branch dated 6 December 1939 in Aircraft - One (1) Beaufort Centre Plane Complete Forwarded to Islington [by ship case approx 24 ft by 12 ft by 4 inches], NAA: D1743 1939/71.

⁷² Copy of letter to General Manager, Aircraft Production Branch from Acting Chief Mechanical Engineer (SA) Railways dated 16 December 1939 in Aircraft - One (1) Beaufort Centre Plane Complete Forwarded to Islington [by ship case approx 24 ft by 12 ft by 4 inches], NAA: D1743 1939/71.

⁷³ Air Board Agenda 2462 (RAAF) - Manufacture of aircraft in Australia – Inspection, NAA: A14487, 13/AB/2462.

⁷⁴ Progress Report of the Beaufort Scheme dated 1 May 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

⁷⁵ Copy of Report on Meeting of Chief Mechanical Engineers of the State Railways and Mr Ord of United Kingdom Government Air Mission in Sydney from 20 to 23 March 1939 to Secretary Dept of Defence dated 23 March 1939 in Beaufort early papers, NAA: MP450/1, 77.

⁷⁶ Report titled Aircraft Construction Organisation under Staff Seconded to Australia dated June 1939 in Aircraft – Organisation, NAA: D1743 1939/2.

⁷⁷ Air Board Agenda No. 2481/1939 – Visit to Australia of a Pilot of the Bristol Aeroplane Company dated 23 May 1939 in Air Board Agenda 2481 (RAAF) - Visit to Australia of a pilot of the Bristol Aeroplane Company NAA: A14487, 13/AB/2481.

⁷⁸ Cablegram from Shea in London dated 30 March 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁷⁹ Cablegram to Clapp from Shea in London dated 6 April 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁰ Letter to Chairman Aircraft Production Commission from Secretary Dept of Air dated 23 May 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸¹ Letter to Secretary Dept of Air from Chairman Aircraft Production Commission dated 12 August 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸² Letter to Chairman Aircraft Production Commission from Secretary Dept of Air dated 24 August 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸³ Memorandum to Secretary Dept of Air from Chairman Aircraft Production Commission dated 27 November 1940 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁴ Letter to Chairman Aircraft Production Commission from Secretary Dept of Air dated 11 December 1940 in Flight Testing of Beaufort Aircraft, NAA: in MP287/1 117.

⁸⁵ Cablegram to Hyland in London from Chairman Aircraft Production Commission dated 2 January 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁶ Cablegram from Hyland in London dated 8 January 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁷ Cablegram from Hyland in London dated 16 January 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁸ Cablegram from Hyland in London dated 27 February 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁸⁹ Cablegram from Hyland in London dated 9 April 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁹⁰ Cablegram from Hyland in London dated 7 May 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁹¹ Notes Concerning Appointment of S/L Lumsden dated 24 June 1941 in Flight Testing of Beaufort Aircraft, NAA: MP287/1 117.

⁹² Letter to Chief of Air Staff Newell from CAS Williams dated 25 May 1938 in Copy of Air Liaison
 Letters from Australia Part 1, PRO AIR 23/1608 in Trove NLA https://nla.gov.au/nla.obj-727838563.
 ⁹³ Cabinet Agendum on Manufacture of Aircraft in Australia – Report by the United Kingdom

Government Air Mission dated 27 March 1939 in Aircraft Manufacture in Australia, A816, 6/301/530. ⁹⁴ Beaufort Aircraft - Engine Delivery Program for Bristol Taurus II dated 28 March 1939 in Beaufort early papers, NAA: MP450/1, 77.

⁹⁵ Notes on Conference on 4 April 1939 regarding the manufacture of aircraft and engines as recommended by the United Kingdom Government Air Mission in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

⁹⁶ Copy of Memorandum to Air Board unauthored dated 11 May 1939 in Production of a/c [aircraft] during war, NAA: A705, 9/30/8.

⁹⁷ Copy of Cabinet Agendum on Manufacture of Aircraft and Aero Engines in Australia to dated 15 May 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

⁹⁸ Copy of letter to Minister for Supply and Development Casey from UK High Commissioner Whiskard dated 20 May 1939 in Manufacture of Aircraft in Australia. Correspondence between Minister of Supply and CAC and Robert Bryce and Co, NAA: A5954, 873/6.

⁹⁹ Letter to High Commissioner Bruce from Secretary of State for Air Kingsley-Wood dated 9 December 1939 in [Personal Papers of Prime Minister Bruce] Aircraft Manufacture in Australia, NAA: M104, 6/3.

¹⁰⁰ Notes of a Conversation with Secretary of State for Air Kingsley-Wood and High Commissioner Bruce dated 8 June 1939 in [Personal Papers of Prime Minister Bruce] Aircraft Manufacture in Australia, NAA: M104, 6/3.

¹⁰¹ Copy of letter to Chairman Commonwealth Aircraft Corporation Darling from Minister for Supply and Development Casey dated 24 May 1939 in Manufacture of Aircraft in Australia. Correspondence between Minister of Supply and CAC and Robert Bryce and Co, NAA: A5954, 873/6. ¹⁰² Copy of letter to Minister for Supply and Development Casey from Chairman Commonwealth Aircraft Corporation Darling dated 29 May 1939 in Manufacture of Aircraft in Australia,

Correspondence between Minister of Supply and CAC and Robert Bryce and Co, NAA: A5954, 873/6. ¹⁰³ Minute on Manufacture of Taurus Engines in Australia to Secretary Dept of Defence from Assistant Secretary dated 6 June 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

¹⁰⁴ Three pages of handwritten notes undated in Beaufort early papers, NAA: MP450/1, 77

¹⁰⁵ Copy of Minute to Secretary Dept of Defence from Secretary Air Board dated 24 May 1939 in Manufacture of Aircraft and Engines in Australia, NAA: A1196, 1/502/5.

¹⁰⁶ Minute on Local Manufacture of Aero Engines to Secretary Dept of Defence from Secretary Air Board dated 14 June 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

¹⁰⁷ Memo of Cabinet Discussion on 15 June 1939 on Manufacture of Beaufort Engines by CAC dated 15 June 1939 in [Personal Papers of Prime Minister Holt] Aircraft Manufacture, NAA: B3229, 2.

¹⁰⁸ Minute on Programme of Work –CAC to Secretary Dept of Defence from Secretary Air Board dated 27 June 1939 in Aircraft Manufacture in Australia, NAA: A816, 6/301/530.

¹⁰⁹ Minute to Secretary Dept of Defence from Secretary Air Board dated 29 June 1939 in Manufacture of Aircraft and Engines in Australia, NAA: A1196, 1/502/5.

¹¹⁰ Minute 14 dated 2 August 1939 on Minute Sheet in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045.</u>

¹¹¹ Cypher Message to Air Board from Australian Liaison Officer London dated 25 August 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹¹² Cypher Message to Australian Liaison Officer London from Air Board dated 26 August 1939. in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹¹³ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin-row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹¹⁴ Telegram from High Commissioner London to Prime Minister dated 31 August 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹¹⁵ Letter to Under Secretary of State for Air from Bristol Aeroplane Company dated 13 September 1939 in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045</u>.

¹¹⁶ Minute 24 dated 18 September 1939 on Minute Sheet in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045.</u>

¹¹⁷ Minute 28 dated 28 September 1939 on Minute Sheet in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045.</u>

¹¹⁸ Letter to Under Secretary of State for Air from Bristol Aeroplane Company dated 19 December 1939 in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045.</u>

¹¹⁹ Cablegram to Prime Minister from High Commissioner London dated 29 September 1939. in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹²⁰ Copy of Cablegram dispatched to High Commissioner – 2nd October 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.
 ¹²¹ Cablegram to Prime Minister from High Commissioner London dated 23 October 1939 in

Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

 ¹²² Cablegram to Prime Minister from Richard Casey dated 3 November 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme NAA: A705 69/19/22.
 ¹²³ Cablegram to High Commissioner London from Prime Minister dated 3 November 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme NAA: A705 69/19/22.

¹²⁴ Cablegram to High Commissioner London from Prime Minister dated 3 November 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme NAA: A705 69/19/22.

¹²⁵ Extract from Cablegram to Prime Minister from Richard Casey dated 5 November 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme NAA: A705 69/19/22.

¹²⁶ Cablegram to Prime Minister from Richard Casey dated 19 November 1939 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.
 ¹²⁷ Notes of Meeting Held at Supply Department on 26 October 1939 Regarding the Manufacture of

Twin Row Wasp Engines in Notes on Beaufort Production 1939 - manufacture of twin row wasp engines for Beaufort aircraft, NAA: MP450/1, 126A.

¹²⁸ Extract of Notes of Meeting Held on 26 October 1939 in Notes on Beaufort Production 1939 - manufacture of twin row wasp engines for Beaufort aircraft, NAA: MP450/1, 126A.

¹²⁹ Notes of Meeting Held at Supply Department on 26 October 1939 Regarding the Manufacture of Twin Row Wasp Engines in Manufacture of Beaufort Aircraft Taurus engines in Australia, NAA: MP450/1, 52.

¹³⁰ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹³¹ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹³² Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹³³ Cablegram from High Commissioner London to Prime Minister dated 31 January 1940 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹³⁴ Cablegrams to Trade Commissioner New York and High Commissioner London from Prime Minister's Department dated 27 January 1940 and to High Commissioner London from Prime Minister's Department dated 16 February 1940 in Manufacture in Australia of Beaufort and Taurus engines - whether to proceed with scheme, NAA: A705 69/19/22.

¹³⁵ Letter to Bristol Aeroplane Company from Director of Contracts dated 17 February 1940 in Production of Taurus engines in Australia PRO AIR 2/3652 in Trove NLA <u>https://nla.gov.au/nla.obj-727839045.</u>

¹³⁶ Cablegram to Shea at High Commissioner's Office London from Clapp, Chairman Aircraft
 Production Commission dated 7 March 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.
 ¹³⁷ Cypher Message to RAAF Air Liaison Officer London from Air Board dated 29 July 1940 in
 Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

¹³⁸ Cypher Message to Air Board from RAAF Air Liaison Officer London dated 8 August 1940 in Purchase of Beaufort Aircraft for RAAF – Policy File, NAA: A1196, 1/501/213.

¹³⁹ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹⁴⁰ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹⁴¹ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹⁴² Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹⁴³ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

¹⁴⁴ Copy of Order for Jigs, Tools and Materials for the Beaufort Aeroplane, dated 20 September 1939 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁴⁵ Cablegram to Prime Minister Menzies from High Commissioner Bruce dated 8 July 1939 in Beaufort early papers, NAA: MP450/1, 77.

¹⁴⁶ Hand written note undated in Notes on Beaufort Production 1939 - manufacture of twin row wasp engines for Beaufort aircraft, NAA: MP450/1, 126A.

¹⁴⁷ Cablegram to Minister of Supply Casey from Prime Minister Menzies dated 30 November 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁴⁸ Cablegram to Prime Minister Menzies from High Commissioner Bruce dated 8 July 1939 in Beaufort early papers, NAA: MP450/1, 77.

¹⁴⁹ Cablegram to Minister of Supply Casey from Prime Minister Menzies dated 30 November 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵⁰ Cablegram to High Commissioner London from Chairman Aircraft Production Commission dated 18 December 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵¹ Cablegram to High Commissioner London from Chairman Aircraft Production Commission dated 20 December 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵² Cablegram to Clapp, Chairman Aircraft Production Commission from Shea at High

Commissioner's Office London dated 22 February 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵³ Cablegram to Prime Minister's Dept from High Commissioner London dated 17 January 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵⁴ Cablegram to High Commissioner London from Clapp, Chairman Aircraft Production Commission? dated 26 January 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵⁵ Extract from Cable to Prime Minister Menzies from High Commissioner Bruce dated 29 February 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁵⁶ Cablegram to Clapp, Chairman Aircraft Production Commission from Shea at High Commissioner's Office London dated 15 March 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵⁷ Cablegram to Clapp, Chairman Aircraft Production Commission from Shea at High Commissioner's Office London dated 30 March 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁵⁸ Extract from Report of Australian Liaison Office, Beaufort Scheme dated 16 May 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁵⁹ Copy of Letter to Deputy Director-General of Production, Air Ministry from Shea in London dated 14 May 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁶⁰ Various Minutes in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁶¹ Extract from letter to Chairman of Aircraft Production Commission Clapp from Hyland in London dated 24 July 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁶² Extract from Cablegram to Chairman of Aircraft Production Commission Clapp from Hyland in London dated 14 November 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁶³ Report of UK Government Air Mission to Australia 1939 dated 18 March 1939 in Aircraft -Manufacturing of in Australia Air Mission Papers, NAA: M276 4.

¹⁶⁴ Revised Production Schedule, February 1941 undated in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁶⁵ Progress Report of the Beaufort Scheme dated 1 May 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁶⁶ Letter to Director of Production from Resident Technical Officer dated 5 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁶⁷ Copy of Cable to Air Ministry and C-in-C Far East dated 17 October 1941 in Beaufort Aircraft -Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁶⁸ Master Schedule for Aircraft Production by Aircraft Production Commission dated 27 October 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁶⁹ Copy of Cable to Far East from Air Board dated 8 December 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁷⁰ War Cabinet Minute No 1503 - Aircraft Construction in Australia in NAA: A2676, 1503.

¹⁷¹ Progress report on the Beaufort Scheme in NAA: A2680, 12/1941.

¹⁷² Progress report on the Beaufort Scheme in NAA: A2680, 12/1941.

¹⁷³ War Cabinet Minute No 1503 - Aircraft Construction in Australia in NAA: A2676, 1503

¹⁷⁴ Beaufort Aircraft – Revised Schedule for February 1942 in Department of Aircraft Production progress reports, NAA: MP450/1, 182.

¹⁷⁵ Aircraft Production in Australia by Dept of Aircraft Production dated 31 August 1945 in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

¹⁷⁶ Copy of Cablegram to High Commissioner Bruce from Prime Minister Menzies dated 22 July 1939 in Beaufort early papers, NAA: MP450/1, 77.

¹⁷⁷ Copy of Cablegram to Prime Minister Menzies from High Commissioner Bruce dated 26 July 1939 in Beaufort early papers, NAA: MP450/1, 77.

¹⁷⁸ Cablegram to High Commissioner London from Chairman Aircraft Production Commission dated 23 December 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁷⁹ Cablegram to Clapp, Chairman Aircraft Production Commission from High Commissioner London dated 31 January 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁸⁰ Cables dated 13 and 25 May 1940 in Beaufort Sample Aircraft – Assembly as Experimental Aircraft, NAA: MP287/1 228.

¹⁸¹ Air Board Agenda 2738 (RAAF) - Equipment for fitment to Beaufort aircraft - Overseas Indent No. 754 dated 29 February 1940 in NAA: A14487, 14/AB/2738.

¹⁸² Cablegram to Shea at High Commissioner's Office London from Clapp, Chairman Aircraft Production Commission dated 21 March 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁸³ Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

¹⁸⁴ Wireless Message to CAS Portal from CAS Burnett dated 20 August 1941 in Beaufort Aircraft – Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁸⁵ Cypher Message to Air Board from Air Ministry dated 11 September 1941 in Beaufort Aircraft – Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁸⁶ Cablegram to High Commissioner London from Clapp, Chairman Aircraft Production Commission? dated 28 January 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁸⁷ Cablegram to Shea at High Commissioner's Office London from Clapp, Chairman Aircraft
 Production Commission dated 21 March 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49
 ¹⁸⁸ Press release by the Prime Minister dated 1 August 1940 in Purchase of (Beaufort) Aircraft for
 RAAF - Policy file, NAA: A1196 1/501/213.

¹⁸⁹ Progress report on the Beaufort Scheme dated 5 February 1941 in NAA: A2680, 12/1941.
 ¹⁹⁰ Progress Report of the Beaufort Scheme dated 1 May 1941 in Beaufort Aircraft - Supply to United Kingdom. NAA: A705, 9/18/93.

¹⁹¹ Memorandum to CAS Burnett from Chairman Aircraft Production Commission dated 9 July 1941 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

¹⁹² Advisory War Council Minute dated 6 August 1941 in Meeting with Mr Storey, Aircraft Production Commission. Production of Beaufort aircraft in Australia, NAA: A2684 947.

¹⁹³ Notes of Meeting between Chief of Air Staff, Director-General of Supply and Production, Deputy Chief of Air Staff and Group Captain Walker RAF dated 7 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁹⁴ Cablegram to High Commissioner London and Australian Minister Washington from Prime Minister dated 10 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

¹⁹⁵ Memorandum to Minister from Chairman, Aircraft Production Commission dated 28 November 1941 in War Cabinet Minute No 1503 - Aircraft Construction in Australia, NAA: A2676 1503.

¹⁹⁶ Copy of Order for Jigs, Tools and Materials for the Beaufort Aeroplane, dated 20 September 1939 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

¹⁹⁷ Cablegram to High Commissioner London from Chairman Aircraft Production Commission dated 18 December 1939 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁹⁸ Cablegram to Clapp, Chairman Aircraft Production Commission from Shea in High Commissioner's Office London dated 19 January 1940 in Beaufort - Local manufacture, NAA: A705, 9/18/49.

¹⁹⁹ Cablegram to Chairman of Aircraft Production Commission Clapp from Hyland in London dated 17 October 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

²⁰⁰ Memorandum on Local Manufacture of Gun Turrets to Minister for Aircraft Production from Chairman Aircraft Production Commission dated 11 July 1941 in Gun Turrets for Beaufort Aircraft – Manufacture in Australia, NAA: MP287/1 924.

²⁰¹ Cablegram to Chairman Aircraft Production Commission from Hyland in London dated 25 April 1941 in Gun turrets for Beaufort Aircraft – Manufacture in Australia, NAA: MP287/1 924.

²⁰² Memorandum to Secretary Dept of Air from Commissioner Shea Aircraft Production Commission dated 3 June 1941 in Gun Turrets for Blenheim Aircraft - Consideration of Adaption for Beaufort Requirements, NAA: MP287/1 965.

²⁰³ Minute *RAAF Indent 550 for 40 Beauforts* to Deputy Director Equipment (A) from Australian Liaison Officer dated 27 April 1938 in Copy of RAAF Estimated Aircraft Requirements from UK 1-7-36 to 30-6-37, PRO AIR 2/1791 in Trove NLA <u>https://nla.gov.au/nla.obj-727838660.</u>

²⁰⁴ Minute Local Manufacture of Gun Turrets to FJ Shea from John Storey dated 18 August 1941 in Gun Turrets for Beaufort Aircraft – Manufacture in Australia, NAA: MP287/1 924.

²⁰⁵ Extract from Cablegram to High Commissioner Bruce from Prime Minister? dated 13 June 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

²⁰⁶ Cablegram to Chairman of Aircraft Production Commission Clapp from Hyland in London dated 17 October 1940 in First 20 sets materials [for Beaufort Aeroplane]: 10 sets fabricated, 10 sets unfabricated, indent SD.8 (AC.6), NAA: MP287/2, B1264.

²⁰⁷ War Cabinet Agendum - No 278/1941 - Report by the Minister for Aircraft Production - July 1941 in NAA: A2671, 278/1941.

²⁰⁸ War Cabinet Agendum - No 8/1942 - Aircraft production - Progress report for December 1941 in NAA: A2671, 8/1942.

²⁰⁹ War Cabinet Minute No 1584 - Aircraft production policy and administrative machinery for the direction of the aircraft industry in NAA: A2676, 1584.

²¹⁰ Notes for CAS on Delivery of Aircraft Requirements dated 15 November 1941 in unknown NAA file.

²¹¹ Chiefs of Staff Committee Memoranda, Provision of Beauforts for Malaya from Australia – Copy of letter from Ministry of Aircraft Production dated 6 January 1942 in The National Archives of the UK, CAB/80/33.

 ²¹² Chiefs of Staff Committee Memoranda, Production of Beauforts in Australia – Note by the Vice Chief of the Air Staff Freeman dated 26 January 1942 in The National Archives of the UK, CAB/80/33.
 ²¹³ Cablegram to High Commissioner Bruce from Hyland Dept of Aircraft Production dated 17 April 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²¹⁴ War Cabinet Agendum 257/1942 dated 4 July 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²¹⁵ Report of UK Government Air Mission to Australia 1939 dated 18 March 1939 in Aircraft -Manufacturing of in Australia Air Mission Papers, NAA: M276 4.

²¹⁶ Cypher Cable to Air Ministry from CinC Far East dated 25 January 1941 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

²¹⁷ Memorandum to Minister for Munitions from Chairman Aircraft Production Commission dated 13 February 1941 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

²¹⁸ Historical Notes in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

²¹⁹ Memorandum on Beaufort Aircraft – 90 for RAF to Secretary Dept of Air from Chairman Aircraft Production Commission dated 28 April 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁰ Copy of Cablegram to Secretary Dept of Air from High Commissioner's Office London dated 30 April 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²¹ Copy of letter Beaufort Aircraft for RAF to Chairman Aircraft Production Commission from Secretary Dept of Air dated 5 June 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²² Copy of letter to Chairman Aircraft Production Commission from Chief of Air Staff dated 23 June 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²³ Copy of Wireless Message dated 1 July 1941 to Headquarters RAF, Far East from Air Board in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁴ Cypher Message to Air Board from Air HQ Far East dated 15 July 1941 in Beaufort Aircraft -Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁵ Minutes of Meeting between RAF Personnel from Far Eastern Command Seletar and Aircraft Production Commission and RAAF at Fisherman's Bend on 31 July and 1 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁶ Copy of Wireless Message to Air HQ Far East from Air Board dated 4 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁷ Notes of Meeting between Chief of Air Staff, Director-General of Supply and Production, Deputy Chief of Air Staff and Group Captain Walker RAF dated 7 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁸ Copy of Cypher Message to Air HQ Far East and Air Board Melbourne from Air Ministry dated 8 September 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²²⁹ Minute to Secretary Aircraft Production Commission from Secretary Dept of Air dated 13 September 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²³⁰ Cable to S/L Miller RAF from Air HQ Far East dated 17 September 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²³¹ Cablegram to Aircraft Production Commission from Australian High Commissioner dated 8 December 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²³² Cablegram to Air Ministry through Australian High Commissioner from Aircraft Production Commission dated 31 December 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²³³ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 30 to 33 for the month of August 1940 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5.

²³⁴ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 34 to 37 for the month of September 1940 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5.

²³⁵ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 38 to 42 for the month of October 1940 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5.

²³⁶ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 43 to 46 for the month of November 1940 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5.

²³⁷ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 47 to 49 for the month of December 1940 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5.

²³⁸ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 50 and 51 for 2 and 9 January 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) January 1940 - January 1941, NAA: A11252, 5 and Serial Nos. 52 to 54 for 16, 23 and 30 January 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²³⁹ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 55 to 58 for the month of February 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁰ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 59 to 62 for the month of March 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴¹ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 63 to 66 for the month of April 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴² Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 67 to 70 for the month of May 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴³ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 71 to 74 for the month of June 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁴ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 75 to 79 for the month of July 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁵ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 80 to 83 for the month of August 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁶ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 84 to 87 for the month of September 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁷ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 88 to 92 for the month of October 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.
²⁴⁸ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 93 to 96 for the month of November 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁴⁹ Review of Weekly Progress Report – Supply and Production Branch, Serial Nos. 97 to 101 for the month of December 1941 in Report by Chief of the Air Staff on Activities of the Air Force (Weekly) May 1942 (sic) - December 1941, NAA: A11252, 1.

²⁵⁰ Signed acceptance forms in Beaufort aircraft for RAF - Receipt forms for, NAA: MP287/1, 1252.
²⁵¹ Cablegram to British Consul General in Batavia from Dept of External Affairs dated 1 October 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵² Cablegram to British Consul General in Batavia from Dept of External Affairs dated 10 October 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵³ Cablegram to British Consul General Batavia from Dept of External Affairs dated 8 November 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵⁴ Cablegram to Dept of External Affairs from British Consul General in Batavia dated 15 November 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵⁵ Teleprinter Message to Secretary, Dept of External Affairs from Secretary, Dept of Air dated 28
November 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI
[Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.
²⁵⁶ Cablegram to British Consul General Batavia from Dept of External Affairs dated 24 November

²⁵⁶ Cablegram to British Consul General Batavia from Dept of External Affairs dated 24 November 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵⁷ Cablegram to British Consul General Batavia from Dept of External Affairs dated 15 December 1941 in War Records - Defence - Singapore: Passages of Service Aircraft through NEI [Netherlands East Indies] - Individual Cases, NAA: A981, DEF 125.

²⁵⁸ Paraphrase of signal to Air Board from Air Headquarters Far East dated 17 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁵⁹ Minute to Harold Clapp from J Johnstone dated 18 December 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶⁰ Cypher message to Aircraft Production Commission from Acting Consul Sourabaya dated 23 December 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶¹ Cypher Message to Air Board from Air HQ Far East dated 12 December 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁶² Cypher Message to Clapp Chairman APC from Australian APC Representative in Singapore dated 14 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁶³ Cable to Chairman Aircraft Production Commission from Australian Representative Singapore dated 17 December 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶⁴ Cable to Australian Representative Singapore from Chairman Aircraft Production Commission dated 16 December 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶⁵ Minute to Commissioner Shea from Captain TR Young dated 15 December 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶⁶ Letter to Chairman Aircraft Production Commission from Deputy Chief of the Air Staff undated in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁶⁷ Copy of letter to CAS Burnett from Clapp Chairman APC dated 29 December 1942 (this is should obviously be 1941) in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.
²⁶⁸ Minute on Report of Pilots of 100 Squadron dated 10 March 1942 in [No 7 Squadron] - Training of Pilots, NAA: A11281, 8/1/4/AIR.

²⁶⁹ Minute to Secretary Aircraft Production Commission from Resident Technical Officer dated 27 May 1941 in Beaufort Aircraft: delivery of 90 for RAF, NAA: MP287/1, 996.

²⁷⁰ Letter on Delivery of Beaufort Aircraft to RAF to Director of Production from Residential Technical Officer dated 7 June 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.
²⁷¹ Copy of Wireless Message dated 1 July 1941 to Headquarters RAF, Far East from Air Board in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁷² Copy of letter to Secretary of Aircraft Production Commission from Director General, Supply and Production dated 12 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁷³ Copy of Cypher Message to Air Board from Air HQ Far East dated 10 August 1941 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁷⁴ Paraphrase of signal to Air Board from Air Headquarters Far East dated 16 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁷⁵ Paraphrase of signal to Air Board from Air Headquarters Far East dated 17 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁷⁶ Paraphrase of signal to Air Headquarters Far East from Air Board dated 17 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁷⁷ Paraphrase of signal to Air Headquarters Far East from Air Board dated 17 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁷⁸ Paraphrase of signal to Air Board from Air Headquarters Far East dated 18 December 1941 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁷⁹ Memorandum to Minister for Air from Clapp Chairman APC dated 23 December 1941 and Copy of Memorandum to Minister for Air from Bladin, Acting Chief of Air Staff dated 8 March 1942 in Training of RAAF Personnel for Beaufort Operation, NAA: A5954, 228/20.

²⁸⁰ Copy of Minute to Mr Fred Shea from Captain TR Young on Handling Qualities of the Beaufort dated 25 December 1941 in Training of RAAF personnel for Beaufort Operation, NAA: A5954, 228/20. ²⁸¹ Copy of Minute to Mr Fred Shea from Captain TR Young on Beaufort Return from Seletar dated 25 December 1941 in Training of RAAF personnel for Beaufort Operation, NAA: A5954, 228/20. ²⁸² Minute on Report of Pilots of 100 Squadron dated 10 March 1942 in [No 7 Squadron] - Training of

Pilots, NAA: A11281, 8/1/4/AIR.

²⁸³ Message to ABDA Area from Air Board dated 21 February 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²⁸⁴ Message to RAAF Liaison Officer London from Air Board dated 26 February 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²⁸⁵ Memorandum titled Beaufort Production dated 20 February 1942 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁸⁶ Letter to Prime Minister from Minister for Air dated 26 March 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²⁸⁷ Cablegram to Prime Minister from High Commissioner London dated 20 April 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

²⁸⁸ Memorandum to Secretary, Dept of Air from First Assistant Secretary, Dept of the Treasury dated 12 December 1945 in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁸⁹ Copy of Memorandum to First Assistant Secretary, Dept of the Treasury from Secretary, Dept of Air undated in Beaufort Aircraft - Supply to United Kingdom, NAA: A705, 9/18/93.

²⁹⁰ Minute RAAF Requirements for Australian manufacture of Twin Engined General Reconnaissance Aircraft to Secretary Air Board from Secretary Dept of Defence dated 23 February 1939 in Manufacture of Aircraft and Engines in Australia, NAA: A1196, 1/502/5.

²⁹¹ NAA: A14487, 19/AB/3425 Air Board Agenda 3425 (RAAF) - Supply of torpedoes for Beaufort aircraft - Overseas Indent No. 949.

²⁹² Report of UK Government Air Mission to Australia 1939 dated 18 March 1939 in Aircraft -Manufacturing of in Australia Air Mission Papers, NAA: M276 4.

²⁹³ Air Board Agenda 2928 (RAAF) - Supply of Beaufort aircraft - Demand Aircraft Production Commission No. 55, NAA: A14487, 15/AB/2928.

²⁹⁴ War Cabinet Agendum - No 3/1939 - Supply of aircraft dated 29 August 1939 in NAA: A2671, 3/1939.

²⁹⁵ Minute to Secretary Dept of Defence from Secretary Air Board dated 29 August 1939 in War Cabinet Agendum - No 3/1939 - Supply of aircraft, NAA: A2671, 3/1939.

²⁹⁶ Copy of wireless message to Austair from Air Board dated 5 January 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File, NAA: A705, 9/19/177.

²⁹⁷ Copy of secret cypher message to Air Board from Australian Liaison Officer dated 31 January 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File. NAA: A705. 9/19/177.

²⁹⁸ Copy of wireless message to Australian Liaison Officer from Air Board dated 20 March 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File, NAA: A705, 9/19/177. ²⁹⁹ Copy of cypher to Air Board from Australian Liaison Officer dated 7 April 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File, NAA: A705, 9/19/177.

³⁰⁰ Copy of cypher to Australian Liaison Officer from Air Board dated 18 April 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File, NAA: A705, 9/19/177.

³⁰¹ Copy of cypher to Australian Liaison Officer from Air Board dated 27 April 1940 in Order for 49 Hudson Aircraft etc - (Overseas indent 790-1-2) Policy File, NAA: A705, 9/19/177.

³⁰² Letter to CAS Burnett from Chairman Aircraft Production Commission dated 5 October 1940 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

³⁰³ Supplement No. 4 to War Cabinet Agendum - No 151/1940 dated 3 February 1941 in War Cabinet Agendum - No 151/1940 and supplements 1-7 - Expansion of home defence air forces, NAA: A2671 151/1940.

³⁰⁴ Historical Notes in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

³⁰⁵ Supplement No. 5 to War Cabinet Agendum No. 151/1940 dated 16 May 1941 and War Cabinet Minute dated 20 May 1941 in War Cabinet Agendum - No 151/1940 and supplements 1-7 - Expansion of Home Defence Air Forces, NAA: A2671, 151/1940.

³⁰⁶ War Cabinet Minute dated 14 February 1941 in War Cabinet Agendum - No 151/1940 and supplements 1-7 - Expansion of Home Defence Air Forces, NAA: A2671, 151/1940.

³⁰⁷ Supplement No. 5 to War Cabinet Agendum No. 151/1940 dated 16 May 1941 and War Cabinet Minute dated 20 May 1941 in War Cabinet Agendum - No 151/1940 and supplements 1-7 - Expansion of Home Defence Air Forces, NAA: A2671, 151/1940.

³⁰⁸ War Cabinet Minute dated 14 February 1941 in War Cabinet Agendum - No 151/1940 and supplements 1-7 - Expansion of Home Defence Air Forces, NAA: A2671, 151/1940.

³⁰⁹ Historical Notes in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

³¹⁰ Historical Notes in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

³¹¹ War Cabinet Agendum 257/1942 dated 4 July 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

³¹² Supplement No. 1 to Air Board Agenda 3954 (RAAF) - Supply of additional 127 Beaufort aircraft dated 22 September 1942, NAA: A14487, 23/AB/3954.

³¹³ Development of the manufacture of aircraft engines in Australia and matters associated therewith -[Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

³¹⁴ Historical Notes in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4.

³¹⁵ Minute dated 2 August 1941 to Director of Production from Resident Technical Officer in Australian-made Beaufort – Proposed Renaming, NAA: A705, 9/18/108.

³¹⁶ Minute 2 dated 12 August 1941 on Minute Sheet in Australian-made Beaufort – Proposed Renaming, NAA: A705, 9/18/108.

³¹⁷ Letter dated 4 June 1940 to Aircraft Production Commission, Dept of Supply and Development from Dept of Air in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.

³¹⁸ Wireless Message dated 14 August 1941? to Air Liaison Officer London from Air Board in Australian-made Beaufort – Proposed Renaming, NAA: A705, 9/18/108.

³¹⁹ Copy of Secret Cypher Signal dated 22 November 1941 to Air Board from Air Liaison Officer London in Beaufort Aircraft - Allocation of Mark Numbers, NAA: MP287/1, 1262.

³²⁰ Memoranda dated 19 and 22 December 1941 between Dept of Air and Aircraft Production Commission in Australian-made Beaufort – Proposed Renaming, NAA: A705, 9/18/108.

³²¹ Beaufort Instruction No. 2 Issue 3 undated in Australian-made Beaufort – Proposed Renaming, NAA: A705, 9/18/108 and taken from Minutes of Beaufort Local Modifications Committee Meetings No. 11 of 10 June 1942 and No. 17 of 2 September 1942.

³²² Copy of letter dated 3 April 1940 from Aircraft Production Branch, Dept of Supply and
Development to Dept of Air in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.
³²³ Letter dated 18 April 1940 from Dept of Air to Aircraft Production Branch, Dept of Supply and

Development in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.

³²⁴ Letter dated 29 April 1942 from Dept of Air to Aircraft Production Commission, Dept of Supply and Development in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.

³²⁵ Letter dated 12 June 1942 from Dept of Air to Dept of Aircraft Production in Beaufort Aircraft - Allocation of Mark Numbers, NAA: MP287/1, 1262.

³²⁶ Extract of cablegram dated 23 April 1940 from Aircraft Production Branch, Dept of Supply and Development of Air to Shea in London in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.

³²⁷ Extract from Cablegram dated 1 May 1940 from Shea in London to Aircraft Production Branch, Dept of Supply and Development in Beaufort serial numbers (RAAF) and RAF, NAA: MP287/2, B1507.

³²⁸ See information on Beaufort aircraft in the various Review of Weekly Progress Reports, Supply and Production Branch to Secretary Dept of Air from Director- General, Supply and Production Branch in Report by Chief of the Air staff on activities of the Air Force (Weekly) May 1942 - December 1941, NAA: A11252, 1.

³²⁹ Memorandum to Official Secretary, London from Secretary, Dept of Defence dated 31 May 1939 in Orders for New Equipment Bristol 149 and Hudson, NAA: A705 208/7/649.

³³⁰ Letter to Secretary Aircraft Production Commission from Secretary Dept of Air dated 21 January 1942 in Sir Geoffrey Whiskard, High Commissioner for the British Government - Supply of Information Concerning Materials for the Production of Beaufort Aircraft, NAA: MP287/2, B599.

³³¹ Letter to Secretary Dept of Air from Secretary Dept of Aircraft Production dated 28 January 1942 in Sir Geoffrey Whiskard, High Commissioner for the British Government - Supply of Information Concerning Materials for the Production of Beaufort Aircraft, NAA: MP287/2, B599.

³³² Minute to numerous recipients from Personal Secretary to Chief of Air Staff dated 25 January 1939 in Substitution of Beauforts for present order of Wellingtons for New Zealand, PRO AIR 2/3019 in Trove NLA <u>https://nla.gov.au/nla.obj-727838781.</u>

³³³ Minute to Deputy Chief of Air Staff from Deputy Director Operations (O) dated 26 January 1939 in Substitution of Beauforts for present order of Wellingtons for New Zealand, PRO AIR 2/3019 in Trove NLA <u>https://nla.gov.au/nla.obj-727838781</u>.

³³⁴ Minute 15 dated 14 March 1939 on Minute Sheet in Substitution of Beauforts for present order of Wellingtons for New Zealand, PRO AIR 2/3019 in Trove NLA <u>https://nla.gov.au/nla.obj-727838781.</u>

³³⁵ Telegram to New Zealand Govt from Dominions Office dated 31 March 1942 in Supply of aircraft to New Zealand in PRO AIR 8/675 in Trove NLA <u>https://nla.gov.au/nla.obj-727841209.</u>

³³⁶ Letter to Air Chief Marshal Burnett from Air Chief Marshal Brooke-Popham dated 15 August 1945 in Beaufort Aircraft - supply to United Kingdom, NAA: A705, 9/18/93.

³³⁷ See details in Government of India - enquiry for Beaufort Aircraft and Twin Row Wasp Engines, NAA: MP287/1, 780.

³³⁸ War Cabinet Agendum 257/1942 dated 4 July 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

³³⁹ Appendix B to War Cabinet Agendum 257/1942 dated 4 July 1942 in War Cabinet Agendum - No 257/1942 - Beaufort production, NAA: A2671 257/1942.

³⁴⁰ Enclosure No. 9A Minute on Beaufort Forward Armament to Chief Engineer from Resident Technical Officer DAP dated 19 December 1941 in Directorate of Armament - Beaufort aircraft gunnery equipment, NAA: A705, 9/18/114.

³⁴¹ Enclosure No. 28A Minute on Beaufort Aircraft – Armament Equipment – Fitment of 20mm Cannon to Resident Technical Officer DAP from Director of Armament dated 10 February 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴² Enclosure No. 35A Minute on Beaufort Armament – Provision of 20mm Cannon to Chief Engineer from Resident Technical Officer DAP dated 7 March 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴³ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 112 for the week ending 19 March 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁴⁴ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 112 for the week ending 19 March 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁴⁵ Item No. 87 dated 26 October 1942 from Group Captain (DTS) on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴⁶ Enclosure No. 69A Minute on Beaufort Armament to Director of Armament from Resident Technical Officer DAP dated 29 August 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴⁷ Item No. 87 dated 26 October 1942 from Group Captain (DTS) on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴⁸ Item No. 108 dated 10 December 1942 from Wing Commander (D.Arm) on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁴⁹ Enclosure No. 96A Copy of Minute on Beaufort Armament - .5 Nose Guns to Director of Technical Services T.S.7 from Resident Technical Officer dated 4 December 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵⁰ Minutes of Local Modifications Committee Meeting No. 31 dated 9 June 1943 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵¹ Enclosure No. 148 Letter on .5 Gun Installation in Hudson and Beaufort Aircraft to RAAF Headquarters (Forward Echelon) from Air Officer Commanding RAAF Command dated 12 July 1943 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵² Enclosure No. 69A Minute on Beaufort Armament to Director of Armament from Resident Technical Officer DAP dated 29 August 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵³ Enclosure No. 74A Copy of Minute on Beaufort .5 Wing Gun Installation to Deputy Director of Armaments from Squadron Leader T.S.7 dated 10 September 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵⁴ Item No. 87 dated 26 October 1942 from Group Captain (DTS) on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵⁵ tem No. 142 dated 12 July 1943 from Wing Commander T.S.7 on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁵⁶ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 112 for the week ending 19 March 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁵⁷ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 115 for the week ending 9 April 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁵⁸ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 116 for the week ending 16 April 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁵⁹ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 117 for the week ending 23 April 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁶⁰ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 125 for the week ending 18 June 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁶¹ Enclosure No. 69A Minute on Beaufort Armament to Director of Armament from Resident Technical Officer DAP dated 29 August 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁶² Minutes on Beaufort Rearward Defensive Armament to Secretary Dept of Aircraft Production from Secretary Dept of Air dated 23 November 1942 in Beaufort Aircraft - 1600 H.P. Engines Production bo B.D. 43A Aircraft, NAA: MP287/1 1417.

³⁶³ Enclosure No. 69A Minute on Beaufort Armament to Director of Armament from Resident Technical Officer DAP dated 29 August 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁶⁴ Enclosure No. 69A Minute on Beaufort Armament to Director of Armament from Resident Technical Officer DAP dated 29 August 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁶⁵ Item No. 130 dated 28 April 1943 from Squadron Leader (T.S. 1/c) on Minute Sheet in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

 ³⁶⁶ Enclosure No. 156A Minute of Under Defence Gun on Beaufort Aircraft to RAAF Headquarters Units from RAAF Headquarters dated 8 July 1943 in Directorate of Armament - Beaufort aircraft gunnery equipment, NAA: A705, 9/18/114.
³⁶⁷ Minute *Beaufort – Bullet Proof Glass* to Commissioner Storey from Resident Technical Officer

³⁶⁷ Minute *Beaufort – Bullet Proof Glass* to Commissioner Storey from Resident Technical Officer dated 15 January 1942 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114.

³⁶⁸ Review of Weekly Progress Report – Supply and Production Branch, Serial No. 118 for the week ending 30 April 1942 in Report by Chief of the Air Staff on activities of the Air Force (Weekly) March 1942 (sic) - June 1942, NAA: A11252, 12.

³⁶⁹ Enclosure No. 148 Letter on .5 Gun Installation in Hudson and Beaufort Aircraft to RAAF Headquarters (Forward Echelon) from Air Officer Commanding RAAF Command dated 12 July 1943 in Directorate of Armament - Beaufort aircraft - gunnery equipment, NAA: A705, 9/18/114. ³⁷⁰ Cablegram to Fernie at Bristol Aeroplane Company from Latham Dept of Aircraft Production dated 22 August 1942 in Beaufort Aircraft: Proposed fitment of floats to, NAA: MP287/1 2252.

³⁷¹ Cablegram to Dept of Aircraft Production (?) from Hyland in London dated 29 September 1942 in Beaufort Aircraft: Proposed fitment of floats to, NAA: MP287/1 2252.

³⁷² Cablegram to Dept of Aircraft Production (?) from Hyland in London dated 6 October 1942 in Beaufort Aircraft: Proposed fitment of floats to, NAA: MP287/1 2252.

³⁷³ Cablegram to Dept of Aircraft Production (?) from Hyland in London dated 9 November 1942 in Beaufort Aircraft: Proposed fitment of floats to, NAA: MP287/1 2252.

³⁷⁴ Cablegram from High Commissioner Bruce to Acting Prime Minister Fadden dated 16 September 1941 in Prime Minister's Visit Abroad 1941. Australian Aircraft Production Policy. Ministry of Aircraft Production. 25/1/41 - 3/10/41, NAA: A5954, 617/3.

³⁷⁵ Cypher Message to Air Force Melbourne from Overseas Headquarters dated 20 June 1942 in NAA: Torpedo Reconnaissance Aircraft (Beaufighter Attack Aircraft), NAA: A1196 1/502/24.
³⁷⁶ Minutes (Enclosure 22A) to Air Member for Supply and Equipment from Lawson dated 24 June

1942 in NAA: Torpedo Reconnaissance Aircraft (Beaufighter Attack Aircraft), NAA: A1196 1/502/24. ³⁷⁷ Cablegram to Dept of Aircraft Production from Hyland in London dated 25 March 1942 in Beaufort

Aircraft - 1600 H.P. Engines Production bo B.D. 43Å Air-craft, NAA: MP287/1, 1417. ³⁷⁸ Notes of Conference held with Chief of Air Staff on Beaufort Replacement held on 11 July 1942 in Beaufort Aircraft - 1600 H.P. Engines Production bo B.D. 43A Air-craft, NAA: MP287/1, 1417.

³⁷⁹ Notes on Proposed Beaufort Replacement undated (but Minute Sheet Encl 34A indicates 24 July 1942) in Torpedo Reconnaissance Aircraft (Beaufighter Attack Aircraft), NAA: A1196, 1/502/24.
³⁸⁰ War Cabinet Agendum 295/1941 Manufacture in Australia of Wright Cyclone R.2600 1600hp aircraft engine dated 30 August 1941 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

³⁸¹ Cable to Prime Minister's Dept from FB Clapp Australian Govt Trade Commissioner New York dated 27 February 1941 in Production of Aircraft in Australia, NAA: A1196, 1/501/364.

³⁸² Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

³⁸³ Letter titled Beaufort Replacement to Secretary Dept of Aircraft Production from Secretary Dept of Air dated 26 August 1942 in Beaufort Aircraft - 1600 H.P. Engines Production bo B.D. 43A Air-craft, NAA: MP287/1, 1417.

³⁸⁴ Memorandum to Shedden Secretary Dept of Defence from Minister for Air dated 10 September 1942 in Production of aircraft engines (refers to Advisory War Council Minute Nos 1000, 1012 and 1078), NAA: A2680, 44/1942.

³⁸⁵ Report dated 16 August 1943 in Development of the manufacture of aircraft engines in Australia and matters associated therewith - [Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

³⁸⁶ Memorandum to Shedden Secretary Dept of Defence from Minister for Air dated 10 September 1942 in Production of aircraft engines (refers to Advisory War Council Minute Nos 1000, 1012 and 1078), NAA: A2680, 44/1942.

 ³⁸⁷ Development of the manufacture of aircraft engines in Australia and matters associated therewith -[Notation by DAP, 16 August 1943, on twin row Wasp engine production, Lidcombe], NAA: MP450/1, 30.

³⁸⁸ Aircraft Production in Australia by Dept of Aircraft Production dated 31 August 1945 in Miscellaneous reports, minutes of meetings, historical notes dealing with aircraft production [reports: aircraft production in Australia and aircraft industry history 'plane building' 1939-45], NAA: MP1472/1, 15 PART 4 and Survey of Aircraft Production in Australia including Appendix 1 dated 7 February 1942 in Aircraft Production in Australia, NAA: MP450/1, 4.

³⁸⁹ Beaufort and Beaufighter: Production in Australia: by Beaufort Division, Department of Aircraft Production, NAA: M3908, 2.

³⁹⁰ War Cabinet Agendum - No 111/1943 - Department of Aircraft Production - Progress report for February, 1943, in NAA: A2671, 111/1943