

CHAPTER 2

MOBILISING INDUSTRY FOR WAR

IT will be recalled that an essential part of the general plan for enabling Australia to arm her own forces was that nucleus government factories should work out the techniques of making munitions and instruct commercial industry in them so that in times of emergency the industrial resources of the country could be fully exploited for defence. In developing this plan it was natural that attention should at first have been focused on the government laboratories and factories. Australian secondary industry in the early twenties was too immature to have profited much from any attempt to develop the second phase of the plan. Though the terms of reference of the Munitions Supply Board contained no clause defining its responsibility for the second phase, it was generally understood by its members that in time of war its function would be to mobilise commercial industry. To do this successfully would entail much preparation beforehand, and it was with this in mind that the board in 1926 arranged for Mr Breen¹ to undertake a Commonwealth-wide survey of the potentialities of commercial industry as a producer of munitions. This was an undertaking of considerable magnitude. To make ammunition for the 18-pounder gun, for example, would require a score of chemical raw materials and more than twice as many chemical intermediates for the various explosives used in it, together with textiles, rubber, paper and half a dozen or more metals and alloys, and machines for fabricating them. The survey was complicated—as all such surveys are—by the continual change in the industrial situation, which made accumulated information soon out of date. Industry, especially that associated with the fabrication of metals, was growing rapidly but lopsidedly, lacked standards, and was not as yet highly organised. Before the survey had been completed, Breen accepted a position as Assistant Secretary of the C.S.I.R. The vacancy thus created in the office of the Munitions Supply Board was not filled immediately, and during the economic depression the appointment was allowed to lapse indefinitely.

Efforts along these lines were not revived until March 1933 when, after some prodding from the British Government and representations from the three Services in Australia, the Council of Defence² decided to carry out a recommendation made at two successive Imperial Conferences (in 1926 and 1930) to set up a Principal Supply Officers' Committee. The Australian Principal Supply Officers' Committee (P.S.O.C.), following the pattern of the corresponding British organisation, consisted of supply

¹ H. P. Breen, CBE. Asst Secretary CSIR 1936-39, Dept of Supply 1940-41, Dept of Munitions 1941-45; Director of Industrial Development 1945-49; Secretary Dept of Supply 1949-51, Dept of Defence Production since 1951. Of Melbourne; b. Richmond, Vic, 30 Apr 1893.

² This was a statutory body created under the *Defence Act* to advise the Federal Cabinet on questions of defence policy. The council, of which the Prime Minister was chairman, consisted of a selected group of Ministers, the three Chiefs of Staff and the Secretary of the Defence Department.

members of the Military, Navy and Air Boards, the Financial Secretary and the Assistant Secretary of the Department of Defence, and the Controller-General of Munitions Supply, who was chairman. The committee's function was to advise the Council of Defence on measures designed to ensure that both government factories and commercial industry would be able to provide munitions on a scale adequate for the country's defence. The magnitude of this scale was, at the direction of the Defence Committee, calculated on the assumption that the armed forces should be prepared to repel "light raids" by an enemy.

For the purpose of carrying out its work the Australian committee, still following the pattern of the British organisation, set up eight Supply Committees, essentially sub-committees, whose activities were coordinated by a Supply Board composed of their respective chairmen. In order to avoid confusion with the Munitions Supply Board, the coordinating body (which became in effect the executive body of the P.S.O.C.) was later renamed the Defence Resources Board; the committees then became known as Resources Committees. Their responsibilities covered: 1. arms and armament; 2. general and marine engineering;³ 4. hardware, general stores and clothing; 5. electrical equipment, scientific and optical instruments; 6. aircraft, aero engines, motor transport; 7. victualling stores; 8. fuel oil and petroleum products generally.⁴

At a meeting on 5th September 1935 the Defence Committee directed that the P.S.O.C. should plan to have its investigations at an advanced stage by the end of 1939, since it was considered highly probable that war would break out in Europe, and possibly in the Far East, about that time.

No one who was familiar with the problem of national defence doubted that in the event of war the larger part of the burden of arming the nation would fall on commercial industry. The question was how and when commercial industry should be mobilised for this purpose. This first became a big issue in 1936. In April of that year Lieut-Colonel Beavis,⁵ Military Liaison Officer on the staff of the High Commissioner in London, was appointed full-time Chairman of the Defence Resources Board. As the Australian representative on the British P.S.O.C., Beavis had had every opportunity to observe the way in which this committee interpreted its responsibilities, and could therefore be expected to give some lead to its Australian counterpart.

Beavis returned to Australia from England with a keen sense of the urgency of the international situation and of the peril Australia would face if war broke out in the Far East. The government munitions factories were,

³ The committees were numbered to correspond with those in Britain; No. 3 committee was never formed here.

⁴ The chairmen of the various committees were: 1. Col G. E. Manchester (Army); 2. Eng Cdr A. C. W. Mears (Navy); 4. Maj E. J. Milford (Army); 5. Sqn Ldr E. C. Wackett (Air Force); 6. Gp Capt E. Harrison (Air Force); 7. Paymaster Cdr H. M. Ramsay (Navy); 8. Cmdr R. J. O. Otway-Ruthven (Navy).

⁵ Maj-Gen L. E. Beavis, CB, CBE, DSO. (1st AIF: comd 53 Bty AFA.) Director of Ordnance Services AIF in Middle East, 1940-42; Master-General of the Ordnance, AMF, 1942-46; Aust High Commissioner in Pakistan 1952-54. Regular soldier; of Bathurst, NSW; b. Bathurst, 25 Jan 1895.

at this time, still struggling from the effects of the economic depression; and commercial industry, because of its general lack of experience in the techniques of mass-production engineering and its inability to undertake the high-precision work needed for making munitions, was unprepared for the demands that war would make on it. The contrast with highly-industrialised Britain offered a challenge which to a man of Beavis's active and enthusiastic temperament could not be denied.

The Defence Resources Board had not long been in existence when it became evident that there was a sharp difference of opinion between Leighton and Beavis about the timing of the effort to organise commercial industry. One theme that constantly recurred in Beavis's reports was: better the thorough organisation of commercial industry before war than improvisation after war breaks out. This was the lesson of the disastrous shortage of munitions in Britain during the 1914-18 war. Beavis wanted to see the work of organising commercial industry begun immediately, and in this he had the strong support of the Services, especially the army and the air force many of whose members felt that the Munitions Supply Board was not doing as much as it should in this direction. However, although the Defence Committee had stated that the country should be ready for war by 1939, the money to carry out the necessary preparations was not forthcoming; the prevailing climate of public and political opinion favoured disarmament rather than preparation for war, and only meagre funds were allotted to defence. The degree of expansion possible was therefore confined within very narrow limits.

In order to extend the field of munitions production to commercial industry it was necessary among other things to place "educational orders". Leighton believed that the best value for the limited funds at his disposal could be obtained by first bringing the government munitions factories up to concert pitch. Consequently he resisted, with all the means in his power, any attempt to divert these funds from the government factories. As Controller-General of Munitions Supply and Chairman of the P.S.O.C. the means at his disposal were considerable. There was no room for two strong opposing policies, and in April 1937 Beavis was recalled to the army.

Other changes followed: in August 1938 the P.S.O.C. was reorganised on a sounder basis with Major Rowe⁶ as its chief executive officer;⁷ the Defence Resources Board and its committees were abolished and replaced by an Executive Panel comprising a number of full-time officers of whom

⁶ Col G. C. Rowe. (1st AIF: 1 Siege Bty.) Munitions representative in London 1919-25; Executive Officer, Defence Supply Planning Cttee, 1939-40; Controller, Gun Ammunition Production, 1940-46. B. Castlemaine, Vic, 31 Jul 1894. Died Jun 1949.

⁷ The new PSOC consisted of: N. K. S. Brodribb, Inspector-General of Works and Supplies, Chairman; Members: Capt G. P. Thomson, for Naval Board; Maj-Gen O. F. Phillips, for Military Board; Air Cmdre W. H. Anderson, for Air Board; A. S. V. Smith, for the Secretariat; J. K. Jensen, for Munitions Supply Board and Contract Board; Major G. C. Rowe, Executive Officer for matters of administration; C. J. W. Gillan, Executive Officer for matters of finance; W. Howie, Secretary.

Commander Herbert⁸ was the leader; sub-committees were created to deal with medical supplies, food, fuel oil and lubricants.⁹

In November 1937 Leighton retired (in accordance with Public Service regulations), and was succeeded as Controller-General of Munitions Supply by Mr Brodribb.¹

The tempo of much of this reorganisation was doubtless hastened by the Imperial Conference of 1937, not so much (as Butlin points out²) by any specific recommendations from the conference itself as from the insight it gave the Australian delegates into the alarming extent to which the European situation had deteriorated. Unequivocal confirmation of these impressions was provided by the Munich Agreement in September 1938—the first of a series of shocks that galvanised the Government into something more than paper planning to mobilise the nation's industrial resources.

The reorganised P.S.O.C., on completing a survey of commercial industry as a source of ammunition components, reported that the "factories of the Munitions Supply Board could be relied upon to supply about 10 per cent of the components under review (that is, the amount of gun ammunition of all natures and sizes estimated as being necessary for the army to repel 'light raids') and that capacity to make the remainder must somehow be created".³ The P.S.O.C.'s preoccupation with ammunition arose from two considerations: manufacture of ammunition constituted a large proportion of any munition program; and owing to its high rate of wastage it was essential to have the manufacture of ammunition well organised before war broke out if critical shortages in the early stages were to be avoided. As a means of creating the necessary facilities the P.S.O.C. recommended that twenty-four special factories, to be known as armament annexes, should be constructed in close association with various State instrumentalities (mainly the railway departments) and prominent industrial organisations, which would operate them on behalf of the Government. The intention of this proposal was to avoid the growth of a large private munitions industry and to avoid building huge factories that would be useless after the war. An annexe, it was suggested, might be built at government expense on land belonging to a company but leased to the Government; or the operating organisation might provide the land and the building, and even, in some cases, the plant and equipment. The more extensively existing facilities could be used the better.

Convinced of the wisdom of cultivating the goodwill and of securing the cooperation of industry, the P.S.O.C. recommended the formation of

⁸ Engr Capt D. P. Herbert, BSc, BE; RAN. (HMAS's *Australia* 1915, *Yarra* 1916.) Naval Engineer Officer, Australia House, London, 1934-38; Senior Technical Investigator, Defence Supply Planning Cttee, 1938-40; Principal Naval Overseer, SA, 1941-45. Of Melbourne; b. Sydney, 11 Nov 1888.

⁹ The chairmen of these committees were: Medical, Dental and Veterinary Sub-committee, Maj-Gen R. M. Downes; Oil Fuel Sub-committee, Capt J. A. Collins, RAN; Foodstuffs Sub-committee, C. Massey.

¹ N. K. S. Brodribb, CBE. Manager of various government factories since 1915; Chief Chemical Engineer, Dept of Defence, 1921-37; Controller-General of Munitions Supply 1937-40, 1945-51; Assistant Director-General of Munitions 1940-45. B. Kew, Vic, 27 Dec 1885.

² S. J. Butlin, *War Economy, 1939-42*, in this series.

³ "Interim Report on the Investigation of Industry as a Source of Ammunition Components", 9 Sep 1937.

a panel of leading industrialists to advise the Government. This suggestion was promptly acted upon, and on 10th March 1938 the Prime Minister announced that a body to be known as the Advisory Panel on Industrial Organisation had been created under the chairmanship of Mr Essington Lewis,⁴ Chief General Manager of the Broken Hill Proprietary Company Ltd, to study the measures necessary for mobilising commercial industry. Other members of the panel were Sir Colin Fraser,⁵ Sir Alexander Stewart,⁶ Mr Eady⁷ and Mr Kneeshaw.⁸ Within seven days of its appointment the panel made a report on the problems and proposals that had been submitted to it.

The panel had been informed that the two main objectives of the Munitions Supply Board were to build up in the shortest possible time sufficient stocks to provide six months' reserves of ammunition for the army and the air force, and to create sufficient manufacturing capacity to cope with the great expenditure of ammunition likely to occur in war. As a heavy responsibility for building up stocks clearly fell on the existing government factories, the panel recommended that no time should be lost in forcing these factories up to their full capacity.

With regard to the second objective, the way was not so clear. In the opinion of the panel it was not practicable to undertake the manufacture of shells and bombs in existing commercial engineering shops with any degree of efficiency. It was true, it said, that there existed throughout Australia's engineering shops a large number of general-purpose machine tools which in time of emergency could be commandeered, reassembled and re-erected fairly quickly in annexe factories, but this could not be done without seriously dislocating normal industry. More tools, gauges, jigs, fixtures and machine tools would be essential.

The panel therefore strongly supported the P.S.O.C. in recommending that stocks of machine tools and raw materials should be built up and that the twenty-four annexes to existing industrial organisations should be established forthwith. Management of the annexes on behalf of the Government by the organisations with which they were associated would, the panel believed, enable them to be fully manned and efficiently supervised and controlled. For its part the Government saw in the scheme a means by which it could keep some check on the costs of production and exercise some measure of control over profits. Both these themes, which are outside the scope of the present discussion, are treated at length by Professor

⁴ Essington Lewis, CH. Managing Director, BHP, 1926-38, Chief General Manager 1938-50; Director-General of Munitions 1940-45 and Director-General of Aircraft Production 1942-45. Of Melbourne; b. Burra, SA, 13 Jan 1881.

⁵ Sir Colin Fraser, MSc. Mining geologist and engineer and company director. Director of Materials Supply, Dept of Munitions, 1940-44. Of Melbourne; b. Coromandel, NZ, 14 May 1875. Died 11 Mar 1944.

⁶ Sir Alexander Stewart. Consulting engineer and company director. Chairman, Vic Board of Area Management, Dept of Munitions, 1939-45. Of Melbourne; b. Aberdeen, Scotland, 1877. Died 6 May 1956.

⁷ M. T. W. Eady. President, Vic Chamber of Manufactures 1935-37, Treasurer from 1943. The Representative of Industry on various Manpower Boards and Committees during the war. Company director; of Melbourne; b. Sydney. Died 8 Dec 1947.

⁸ Hon F. P. Kneeshaw, OBE. (Served 1st AIF.) MLC NSW 1933-49; Chairman, Aust Ship-building Board, 1941-43. Company director; of Sydney; b. Canterbury, NZ, 6 Aug 1883. Died 3 Feb 1955.

Butlin. The intention was that each annexe should be a "whole purpose" establishment: one devoted to the manufacture of components for one particular kind of ammunition, such as 18-pounder shell bodies, brass fuses, primers or 3-inch mortar bombs. The panel was greatly concerned to find that in the Commonwealth there was only one explosives and filling factory (that at Maribyrnong) and that all gun ammunition made in decentralised factories had to be transported to this centre. It suggested that serious consideration should immediately be given to the possibility of building another explosives and filling factory outside Victoria.

With the ready cooperation of the industries concerned several annexes were in an advanced state of construction by April 1939. Contracts for twenty-three annexes had been let before war broke out and by June 1940 18 were ready to go into production. While they were being built the Government provided funds for laying in stocks of machine tools and for stockpiling some strategic raw materials, such as nickel and aluminium from Canada, copper from South Africa, sulphur and tool-steel from the United States, and sodium nitrate from Chile. At the same time a survey of manpower was initiated and further efforts were made to explore the country's industrial productive capacity.

These last steps were the outcome of the passing in June 1939 of the *Supply and Development Act*, which dealt with ". . . the Supply of Munitions and the Survey and the Registration of the Resources of Australia", and which led to the setting up of the Department of Supply and Development with Mr Casey⁹ as Minister in Charge.

In addition to taking over the functions of the Munitions Supply Board, the Contracts Board and the P.S.O.C. (which had been renamed the Defence Supply Planning Committee), the Department of Supply and Development assumed responsibility for the assembly and manufacture of aircraft, for which purpose it set up an Aircraft Construction Branch under the managership of Mr Clapp.¹ The new department's responsibilities for the mobilisation of commercial industry were far more explicitly defined than those of the Munitions Supply Board had been. The department was given power to

- (i) make arrangements for the establishment or extension of industries for the purposes of defence;
- (ii) acquire, maintain and dispose of stocks of goods in connection with defence;
- (iii) arrange for the coordination of:
 - (a) surveys of Australian industrial capacity and the preparation of plans to ensure the effective operation of Australian industry in time of war, including plans for the decentralisation of secondary industries and particularly those relating to defence; and

⁹ Rt Hon R. G. Casey, CH, DSO, MC. (Served 1st AIF.) MHR 1931-40 and since 1949; Treasurer 1935-39; Minister for Supply and Development 1939-40, 1949-50, for National Development 1950-51, for Works and Housing 1949-51, for External Affairs since 1951. Aust Minister to USA 1940-42. UK Minister in Middle East 1942-43. Governor of Bengal 1944-46. B. Brisbane 29 Aug 1890.

¹ Sir Harold Clapp, KBE. Chairman, Vic Railway Commissioners, 1920-39; Chairman, Aircraft Production Commission, 1940-42; Director-General Land Transport 1942-44. B. Melbourne, 7 May 1875. Died 21 Oct 1952.

- (b) the investigation and development of Australian sources of supply of goods which are necessary for the economic security of the Commonwealth in time of war, and in particular, the investigation and development of additional oil resources, the production of power alcohol from sugar or other vegetable crops, and the production of oil from coal or shale.
- (iv) ascertain costs and control and limit profits in relation to the production of munitions.

In other words, the Government now had the power to institute control of commodities, build up stocks of materials, rationalise industry, develop alternative local sources of raw materials, and control profits on munitions. When war broke out on 3rd September 1939 there was a well-organised government munitions supply authority with some preliminary provision for enlisting the powerful support of commercial industry in the manufacture of a limited range of armaments, chiefly components for ammunition. Even so the real task of arming the nation had scarcely begun.

The administrative staff of the government munitions organisations then numbered only 18 (it was to rise to more than 6,000 by 1943) and the number of employees was 5,055 (this figure was to rise to more than 54,000). The developmental program launched in 1938, for which the Government had set apart £3,000,000, brought about an increase in the scale and scope of the productive capacity of its munitions factories. By September 1939 another £3,000,000 had been provided. All factories were placed on two long shifts, or three when practicable, though in organising the second and third shifts severe limitations were imposed by the shortage of supervisory staffs and skilled tradesmen. Fortunately it was appreciated in the early days of the war that there would be serious shortages of skilled tradesmen, especially in the metal industries, and steps had been taken to set up a Commonwealth training scheme.

In those days of September 1939 (said Jensen later, in an address to the Institute of Industrial Management) none of us, not even informed people in England, could anticipate what lay ahead, but we of the Munitions Branch, as things appeared to us, could not deny some small feeling of satisfaction with our planning and development of the past years; now we should see whether our work had been worth while. It had been a hard time, that period of retrenchment, disbelief, disarmament and depression, but the support we had received from successive governments, despite adverse finances, had been encouraging, and even in the worst year of all we had actually increased our employment.

One of the first pieces of legislation passed after the declaration of war was the *National Security Act*,² which greatly extended the Government's powers to control the individual and the country's resources. Among other things it provided for taking possession or control on behalf of the Commonwealth of any property or undertaking, or the acquisition on behalf of the Commonwealth of any property other than land; for requiring any person to disclose any information in his possession on any prescribed matter. The Act gave the Government power to issue regulations which would enable it to effect the total mobilisation of the country's resources.

² Passed by the Federal Parliament on 9 Sep 1939.

However the need to exercise these controls fully did not occur for some time.

In the first few months of the war a curious situation arose whereby some government munitions factories, having then been brought up to their full capacity, were faced with the possibility of not having sufficient orders to keep them going. The very efficiency with which they had been brought to full capacity seemed more likely to prove a source of embarrassment than an advantage. Only a week after war broke out intimations from the Services were that when the orders for small arms ammunition then under execution had been completed, nothing further would be required for some time. Had this state of affairs continued, wholesale dismissal of men from the factory would have been inevitable. So acute did this situation become that consideration was given to the question whether it would not be wise to invite the United Kingdom to place orders for munitions (mainly ammunition) in Australia. This step was deferred, however, until the needs of the Services could be more definitely ascertained. The Government temporarily eased the crisis by allotting an additional sum of money to the factories.

For a time the government factories did produce a surplus of some items, principally small arms ammunition and empty shell bodies, and the opportunity was taken of accepting orders from Britain, New Zealand, India and the Netherlands East Indies. Not the least of the gains arising from this policy of export was the confidence it engendered in the quality of the products of the government factories.

Early in 1940 Jensen began to press for more orders from the Services, because he knew that unless there was sufficient notice of requirements it would be impossible promptly to meet demands for new kinds of intricate weapons. In mass production there is an inevitable delay in beginning manufacture, owing to the necessity for "tooling up". For example, it took about six months to prepare for the mass production of a shell, twelve months for a rifle or machine-gun, and for an anti-aircraft gun something like two years. This time lag, inherent in the mass-production technique, was not always fully appreciated by members of the Services other than those responsible for provision of equipment, or by the public. Several years might be needed to bring the whole of the country's industrial resources into war production.

The period of uncertainty and waiting, sometimes referred to as the "phoney war", did not last long. It was merely the lull before the storm. When at last "the slowly gathered, long pent-up fury of the storm broke", as it did in May 1940, developments followed quickly enough. Great losses of equipment were sustained by the British forces during their withdrawal from France. Of the 2,794 guns shipped to France with the British Expeditionary Force only 322 were brought back to England; of 109,000 tons of ammunition only 32,303 tons. A British armoured division and several armoured brigades fought in France, but only 9 cruiser tanks and 13 light tanks returned to England. The desperate position in which Britain found herself after the fall of France has been graphically described

by Mr Churchill: "Our armies at home were known to be almost unarmed except for rifles. There were in fact hardly 500 field guns of any sort and hardly 200 medium or heavy tanks in the whole country. Months must pass before our factories could make good even the munitions lost at Dunkirk."⁴ Australia was thus presented with an entirely new prospect. It was perfectly clear that Britain would need all her energy and resources to replace her losses and to prepare to meet a large-scale air offensive, and perhaps even invasion of her shores. Her needs were so urgent that the Australian Government sent rifles and ammunition from its own reserves, and continued to fulfil orders for other munitions. Late in 1940 Britain received from Australia 30,000 rifles and 6 heavy anti-aircraft guns; 44 guns were later sent to the Middle East. By June 1941 Australia had supplied 100,000,000 rounds of small-arms ammunition, 36,000 filled and 146,000 unfilled mortar bombs. British historians have commented: "The 30,000 Australian rifles take on a new importance when it is recalled that total production in the United Kingdom in 1940 was only 81,000, that the [British] Army was drilling with dummies and that no .303-inch weapons arrived from North America until 1942."⁵

Though Australia could still count on being able to import some of her requirements of raw materials and machine tools from the United States, there was no telling how long she could continue to do so. Clearly an effort on a scale far exceeding that of any previously attempted, or even imagined, was now called for.

The needs of the new situation were forcefully described by the Prime Minister, Mr Menzies:⁵

We must take every power so to order, so to command and direct the factories of Australia, those who operate and those who work in the factories in Australia, that we may in the shortest possible time produce the greatest possible supplies of armaments, ammunition, mechanical transport and all those things which the modern army requires if it is to fight with success.

This declaration heralded the final administrative steps towards mobilising the whole of the country's resources for the production of munitions; munitions would now be produced not only in government factories and in the twenty-five annexes built up to this time, but wherever practicable in commercial industries throughout the length and breadth of the land. It was to be "total war" on the industrial front.

Menzies' first intention had been to appoint a commission of three to direct the new drive for munitions, but he did not adhere to this plan. Instead he called Mr Essington Lewis to Canberra and on 21st May 1940 asked him to accept the office of Director-General of Munitions. The War

⁴ Winston Churchill, *Second World War*, Vol II (1949): *Their Finest Hour*, p. 1.

⁵ H. Duncan Hall and C. C. Wrigley, *Studies of Overseas Supply* (1956) in the War Production Series of the *British History of the Second World War*.

⁶ Rt Hon R. G. Menzies, CH. MHR since 1934; Attorney-General 1935-39; Treasurer 1939-40; Prime Minister and Minister for Defence Coordination 1939-41; Prime Minister since 1949. B. Jeparit, Vic, 20 Dec 1894.

Cabinet immediately approved this move and on 22nd May the Prime Minister publicly announced the new appointment. The entire organisation for producing munitions was to be overhauled, detached in an administrative sense from the Department of Supply and Development, and given the title of Department of Munitions, with responsibility direct to the Prime Minister (who assumed the office of Minister for Munitions). Leaders of industry with experience in the methods of mass production engineering were to be called in to enable the fullest possible use to be made of commercial industry. Over them all was to be placed the Director-General of Munitions entrusted with the widest powers—perhaps the most responsible position of its kind ever allotted to an Australian.

In order to give Mr Essington Lewis the greatest possible degree of authority, subject only to the policy and approval of the War Cabinet and to ministerial direction from myself, there will be established a Department of Munitions, with myself as Minister and Mr Lewis as Director-General. Mr Lewis will have access to the War Cabinet, in the same way as the Chiefs of Staff, on matters which relate to his work.

This new Department of Munitions will deal with all ordnance, small arms, explosives and ammunition, together with such ancillary matters as gas masks, and will have a supervisory jurisdiction over aircraft supply. It will also include related materials.

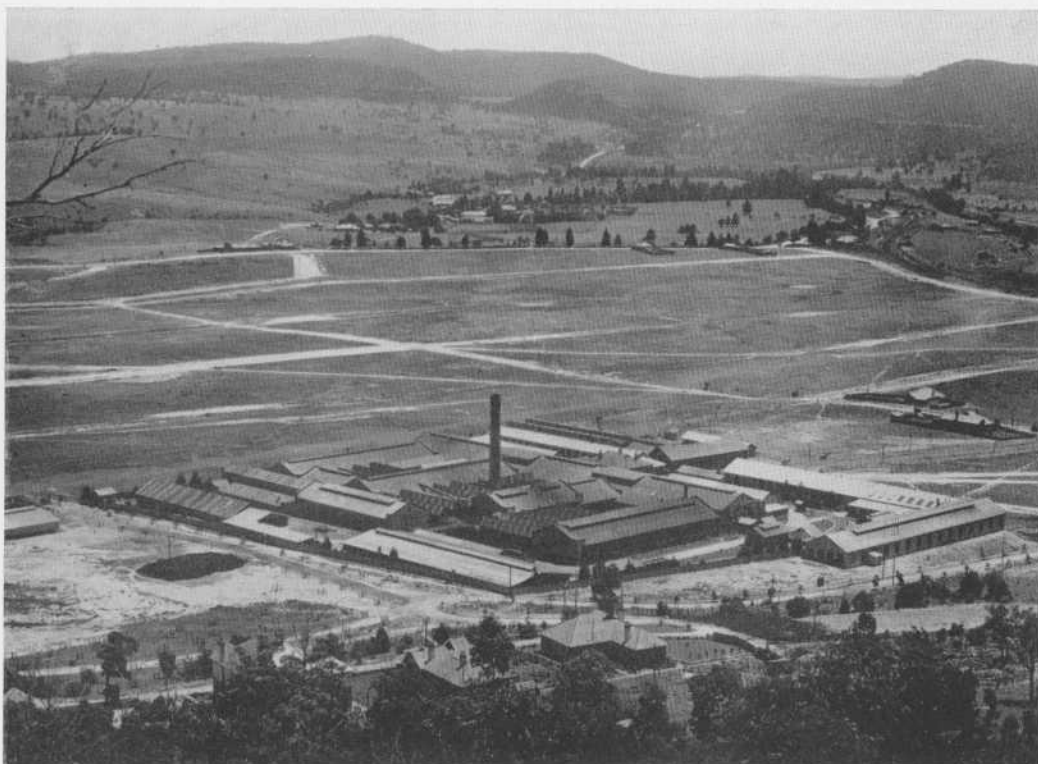
The Director-General will be given a complete power of delegating authority. He will be a member of the Defence Committee. Through his Minister he will have the right of initiating matters for consideration by the War Cabinet. The new department will, as far as possible, use the existing machinery of the Supply Department, including the Contracts Board.

Instead of securing specific approvals from time to time, one of the earliest duties of the new Director-General will be to confer with the other members of the Defence Committee in an endeavour to formulate a series of objectives which it is desirable to achieve during some prescribed period. If these objectives are then approved by the War Cabinet, the mandate to the Director-General will be a perfectly simple one. It will be: Go ahead in your own way and achieve these objectives in the shortest possible time.

We will take power by regulation, to the extent to which it does not already exist, to requisition all private resources of plant and equipment. The Director-General will be authorised to make purchases direct without tenders or circumlocution. A standing order will be issued by the Government that no factory may provide for any new tooling-up without authority. . . . The Director-General will not be limited by Public Service regulations or otherwise in regard to the employment of personnel.⁶

The man chosen for this extraordinary post—virtually an industrial dictator—matched it with equally extraordinary capacities. As Chief General Manager of the Broken Hill Proprietary Company Ltd Lewis had for many years been the guiding force in the development of Australia's vigorous and efficient steel industry, and had come to be accepted as the country's outstanding production engineer and industrial executive. In his capacities of Chairman of the Advisory Panel on Industrial Organisation, and as business consultant to the Department of Defence, he had already advised the Government on the production of munitions. Up till

⁶ From Mr Menzies' broadcast to the nation on 16 Jun 1940.



Lithgow Small Arms Factory—the nursery of mass production in Australia.



A. E. Leighton.



Sir John Jensen.

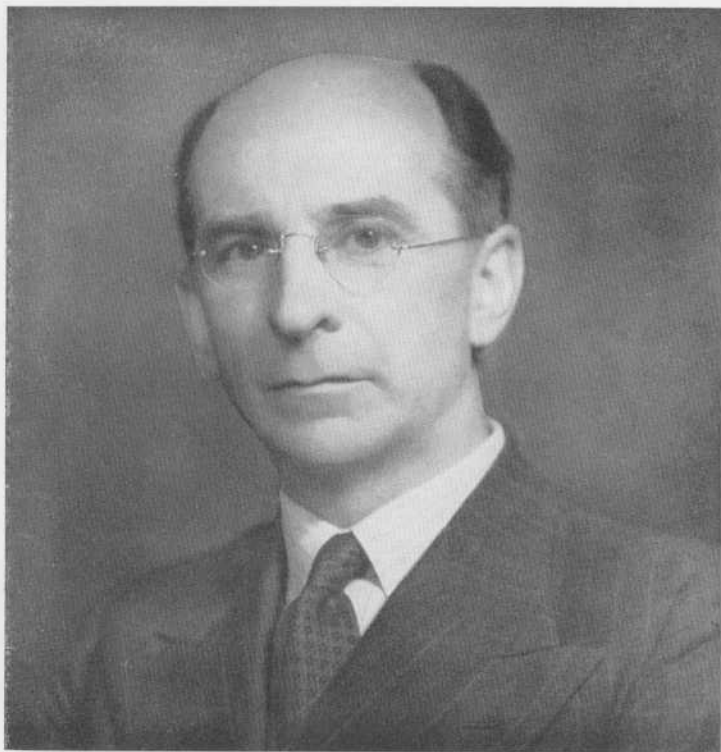


Essington Lewis.



Some of Australia's Munitions Leaders.

(Hanna in Argus, Melbourne)



Sir David Rivett.



Sir Eric Ashby.

(Belfast Telegraph)

this time he was almost unknown to the ordinary citizen. No other Australian was so well fitted for the position, and there was complete agreement in Parliament between Government and Opposition to his appointment.

Lewis had a vast capacity for work. A man of tireless energy and whole-hearted devotion to his job, he was capable of inspiring the loyalty and cooperation of those with whom he worked. In the course of his duties as Director-General of Munitions he would make flying visits (in the Silver City, an aircraft owned jointly by the B.H.P. and Broken Hill silver-lead mining interests) to as many as six engineering and chemical works in one day. That such visits were not mere cursory inspections was borne out by the flood of instructions that would be issued on his return to headquarters. Lewis had a flair for picking the right men as his lieutenants, and having chosen them he gave them his full trust. He expected others to work as hard as, and to be as efficient as, himself. He had a knack of getting things done, whatever the obstacles.

To assist him in his new task Lewis brought a team from the iron and steel organisation who, like Lewis himself, continued throughout the war as salaried officers of B.H.P. or its subsidiaries.⁷ No remuneration was sought from the Commonwealth, the companies concerned regarding this arrangement as part of their contribution to winning the war.⁸

At a historic meeting held on 14th June 1940 a plan was adopted for the new munitions organisation that was to endure practically unaltered until the end of the war. The plan, essentially the one used for the British Ministry of Munitions in the 1914-18 war, adapted to the conditions prevailing in Australia, had been drawn up by Jensen and submitted first to the Department of Defence in March 1939.⁹ The time was then not ripe for it, and it was shelved. No one had a more intimate knowledge of the pre-war government munitions organisation than this administrator, who had been associated with it for the greater part of his working life. Jensen's great abilities had up to this point been to some extent overlooked. At committee meetings he rarely spoke, but when he did so his contribution was always to the point. He preferred to be a power behind the scenes, and in fact became increasingly so as the munitions industry expanded and developed.

This time Jensen's plan was presented neither to the Minister for Defence nor to the War Cabinet, but was adopted by Lewis entirely on his own responsibility. An essential feature of the plan was the setting up of a number of directorates, each of which was placed under a prominent industrialist or administrator. Centralised control was effected through a Board

⁷ The team consisted of: Messrs J. L. Jenkins (personal secretary), J. McShane (technical assistant), and F. T. Merrett (chief engineering assistant).

⁸ Neville Wills, *Iron and Steel in Australia* (1955).

⁹ At that time Jensen was Controller of Munitions Supply, a member of the Munitions Supply Board and Chairman of the Defence Contract Board.

of Directors, which met regularly in Melbourne under the chairmanship of the Director-General. The Board of Directors consisted of:

Assistant Director-General	N. K. S. Brodribb
Aircraft	H. W. Clapp
Ordnance	L. J. Hartnett ¹⁰
Gun Ammunition	W. J. Smith ¹
Machine Tools and Gauges	Col F. G. Thorpe ²
Materials Supply	Sir Colin Fraser
Finance	E. V. Nixon ³
Labour	J. B. Chifley ⁴
Explosives Supply	T. Donaldson ⁵
Secretary, Dept of Munitions	J. B. Brigden ⁶
Assistant Secretary, Dept of Munitions	J. K. Jensen ⁷

Fraser was a leader of the non-ferrous metals industry group; Clapp, Chairman of the Victorian Railway Commissioners; Hartnett, Smith and Donaldson were directors of three of the biggest companies in Australia, concerned respectively with motor cars, glass and chemicals; Thorpe was director of the leading machine-tool company; Nixon was a leading public accountant; and Chifley, who had been a Minister for Defence in the Scullin Government, was now a newspaper proprietor in Bathurst, New South Wales. Directors who were executives of large commercial organisations gave their services to the Department of Munitions in an honorary capacity.

Since it could not be expected that such men, however eminent in their own fields, would be able to walk into the immense department that had just been created and take over the planning of large-scale manufacture of products entirely unfamiliar to them, it was arranged that each should have as second-in-command a controller, who would be a man trained either in the administrative procedure of the government munitions organisation or else have had some experience in the technique of manufacturing

¹⁰ L. J. Hartnett, CBE. (RNAS and RAF 1917-19.) Managing Director, General Motors-Holden's Ltd, 1934-47; Director Ordnance Production, Dept of Munitions, 1940-45. B. Woking, Eng, 26 May 1898.

¹ W. J. Smith, CBE. Managing Director, Aust Consolidated Industries. Director of Gun Ammunition, Dept of Munitions, 1940-42. B. London, 28 May 1882.

² Sir Fred Thorpe, MC, ED. (Served 1st AIF.) Chief Engineer, Southern Cd, 1939-40. Director, McPhersons Ltd and Assoc Machine Tools Aust Pty Ltd, 1939-53. Director Machine Tools and Gauges, Dept of Munitions, 1940-45. B. Macorna, Vic, 25 Dec 1893.

³ Sir Edwin Nixon, CMG. Chartered accountant and company director. Director of Finance, Dept of Munitions, 1940-45. B. Jersey, Channel Is, 31 Mar 1876. Died 19 Aug 1955.

⁴ Rt Hon J. B. Chifley, MHR 1928-31, 1940-51. Minister for Defence 1931; Treasurer 1941-49; Minister for Post-War Reconstruction 1942-45; Prime Minister 1945-49. Director of Labour, Dept of Munitions, 1940. B. Bathurst, NSW, 22 Sep 1885. Died 12 Jun 1951. Chifley, who became seriously ill in Aug 1940, did not resume after his election some months later. He was succeeded by E. J. Kavanagh, a Conciliation Commissioner.

⁵ T. Donaldson. Technical consultant to ICIANZ Ltd and alternate member of the board from 1938; Director of Explosives Supply, Dept of Munitions, 1940-44. B. Stevenston, Scotland, 14 May 1877. Died 24 Jan 1951.

⁶ J. B. Brigden, MA. (Served 1st AIF.) Prof of Economics, Univ of Tasmania, 1924-29; Director, Qld Bureau of Economics, later of Industry and State Statistician, 1930-1938; Sec, Dept of Supply 1939-41 and of Munitions 1940-41; Economic Counsellor to Aust Minister in Washington 1942-47. B. Maldon, Vic, 20 Jul 1887. Died 12 Oct 1950.

⁷ This list of directorates was added to from time to time. They fell into three principal divisions, and as finally organised these were:

Administration: Finance; Labour; Technical Practice; Production Orders and Statistics.

Control and Provision: Material Supply and Machine Tools.

Production: Gun Ammunition; Ordnance; Armoured Fighting Vehicles; Radio and Signal Supplies; Explosives; Locomotives and Rolling Stock; and finally, Small Craft.

appropriate to the particular directorate. The controllers of the directorates set up in June 1940 were as follows:

Ordnance	F. S. Daley ⁸
Gun Ammunition	G. C. Rowe
Machine Tools and Gauges	T. A. Witten ⁹
Materials Supply	H. C. Green ¹
Finance	C. J. W. Gillan ²
Labour	R. J. Murphy ³
Explosives and Filling	A. A. Topp ⁴
Administration	J. K. Jensen

Coordination of the directorates was effected principally through the Controller of Administration but another arrangement contributing largely to this was the monthly meeting presided over by Lewis at which each director read a progress report of the activities under his charge. These conferences were an important feature of Lewis's administrative technique in so far as they kept all directors in touch with policy, served as a method of arriving at important decisions, and kept everyone up to the mark.

After hearing all there was to be said (recalled Jensen) Mr Lewis would sum up and advance his own ideas, after which there was opportunity for further comment, assent or dissent, and then he would announce his decision. His personal secretary, having noted the salient features of the discussion and the decisions, would circulate memoranda of these within a few hours to all the interests concerned, and consequently there was always a full understanding of what was said and decided.

The meetings seem to have left a deep impression on all who attended them. Years afterwards Jensen commented:

To my mind they were, every one of them, unique occasions in many respects. . . . I cannot recollect a case of ill-feeling or ill-will arising, or anything that could not be adjusted after discussion with good will and toleration; there was no quarrelling, no "hanging back in the traces" after an adverse decision—and that is something to say when it is considered that the majority were men of forceful personality accustomed to having their commands received without question.

The next three years were to be no royal progress but a story of almost interminable shortages and difficulties. There were also spectacular successes, and directors' meetings would be enlivened when

lumbering noises would be heard at the door, men would be panting and we would guess that Mr Hartnett had broken another record. With pardonable pride of

⁸ F. S. Daley, BMechE. Assistant Manager, Ordnance Factories, Maribyrnong, to 1931; Staff Engineer, Production Engineer, Technical Adviser to General Motors-Holden's to 1939; Controller, Deputy Director, Director, Ordnance Production; General Technical Manager, Kelvinator Aust Ltd. B. Bendigo, Vic, 1 Nov 1892.

⁹ T. A. Witten. (Served RN, first world war.) Engineer, Thompsons Ltd, to 1939; Controller, then Director, Machine Tools and Gauges, 1940-45. Of Melbourne; b. Barraba, NSW, 31 Jul 1892.

¹ H. C. Green. (Served 1st AIF.) Asst C'wealth Statistician 1937-38; Asst Secretary Dept of Supply 1939; Director and Controller of Materials Supply, Asst Secretary, Dept of Munitions, 1940-45; Director and Gen Manager, Sidney Cooke Ltd, since 1945. Of Melbourne; b. Shepparton, Vic, 2 May 1893.

² C. J. W. Gillan. Accountant, Army HQ, Melb. 1939; Chief Accountant, Dept of Munitions, 1941; Asst Secretary 1941-45; Asst Secretary, Dept of Supply and Development, 1948-49. Of Melbourne; b. Camberwell, Vic, 11 Jan 1887.

³ R. J. Murphy, OBE. (Served 1st AIF.) Former Chief Clerk Defence Dept, Controller Labour, Munitions Dept, Asst Secretary, Dept Labour and National Service; Secretary, Dept of Transport, 1943-48. Industrial relations consultant. Of Melbourne; b. Yengarie, Qld, 16 Dec 1882.

⁴ A. A. Topp, OBE. Works Manager, Explosives Factory, 1926, Manager 1928; Controller, Explosives Supplies, 1940-44, Director 1944-48; General Manager, Explosives Factory, Melbourne, 1948-52. Of Melbourne; b. South Yarra, Vic, 2 Jan 1886. Died 29 May 1952.

achievement something never before made in the country would be carried in; the table would be creaking under, say, a 3-inch trench mortar as Hartnett expounded the merits of a set-up for mass production and the quality of the product. Particularly and justifiably was he proud of the work done by his Optical Munitions Panel.

It was recognised from the outset that while the general planning and coordination of the munitions program could be efficiently carried out at Melbourne headquarters, the functions of management throughout Australia could not be directed from one point. Accordingly Boards of Area Management,⁵ charged with the direction of the manufacture of munitions by commercial industry, were set up in the capital cities of each State. Boards consisting of prominent industrialists and representatives of organised labour were assisted by area controllers, who were responsible for providing technical assistance to manufacturers, as well as for arranging for the supply of materials, machine tools and gauges, and skilled labour. The secretary of each Board of Area Management was a regular public servant responsible for administration and the keeping of accounts, thus leaving members of the board free to direct technical and business operations. The intention was that the secretary, who was nominated by the Public Service Board, should keep the industrialists on the narrow path of public service procedure. The original chairmen and secretaries of the boards were:

NSW	Sir Philip Goldfinch ⁶	J. W. J. Byrne ⁷
Vic	Sir Alexander Stewart	A. A. Tregear ⁸
Qld	Col D. E. Evans ⁹	D. Sutherland ¹
SA	Hon F. T. Perry, MLC ²	S. Lillywhite ³
WA	R. O. Law ⁴	A. A. C. Ramm ⁵
Tas	H. B. Bennett ^{6, 7}	J. O. Robson ⁸

⁵ The term "area" was adopted rather than the more obvious "State", to prevent possible confusion in the public mind as to whether the boards were State or Commonwealth agencies.

⁶ Sir Philip Goldfinch, KBE. General Manager, Colonial Sugar Refining Co, 1928-43; Chairman NSW Board of Area Management 1940-43. B. Gosport, Hampshire, Eng, 13 Apr 1884. Died 7 Apr 1943.

⁷ J. W. J. Byrne, MBE. Senior Investigation Officer, Taxation Dept, to 1940; Secretary and Accountant, NSW Board of Area Management, 1940-43, Chief Executive Officer 1943-45. B. Forbes, NSW, 18 Feb 1899.

⁸ A. A. Tregear, BCom. Clerk Assistant, House of Representatives, Canberra, to 1940; Secretary, Vic Board of Area Management, 1940-41; Clerk of House since 1955. B. Port Melbourne, Vic, 15 May 1896.

⁹ Col D. E. Evans, DSO, VD. (Served 1st AIF.) Chairman, Director, Evans Deakin and Co Ltd; Chairman, Qld Board of Area Management, 1940-41. B. Geelong, Vic, 8 May 1885. Died 1 Dec 1951.

¹ D. Sutherland. Former Deputy Commissioner for National Insurance, Qld, and Senior Inspector Auditor-General's staff; Secretary, Qld Board of Area Management, 1940-44. Of Brisbane; b. Edinburgh, Scotland, 14 Aug 1882.

² Hon Sir Frank Perry, MBE. Chairman and President Metal Industries Association of SA 1940-48; Chairman SA Board of Area Management 1940-45. B. Gawler, SA, 4 Feb 1887.

³ S. Lillywhite, MBE. Accountant, PMG's Dept, SA, 1931-40; Secretary, SA Board of Area Management, 1940-45; State Controller, Dept of Munitions, 1945-48. Of Adelaide; b. Magill, SA, 1 Nov 1882.

⁴ R. O. Law. Chairman WA Board of Area Management 1940-45; General Manager Metropolitan Brick Co Ltd, Perth, 1940-47. B. Ballarat, Vic, 20 Sep 1867. Died 22 Sep 1947.

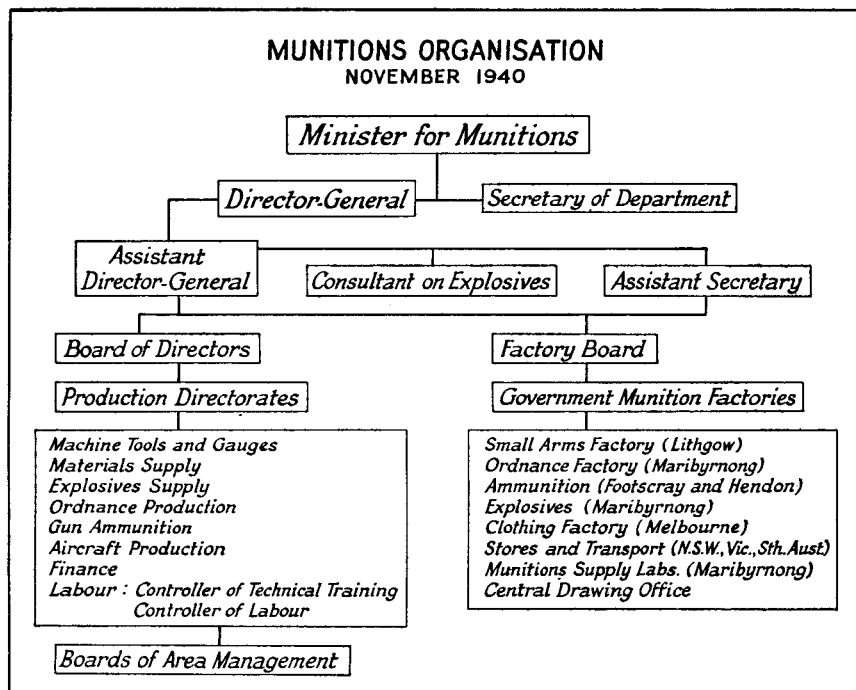
⁵ A. A. C. Ramm, MBE. Sub-accountant, PMG's Dept, Perth, to 1940; Secretary, WA Board of Area Management, 1940-45. B. Toowoomba, Qld, 23 Mar 1894.

⁶ Col H. B. Bennett, ISO, MBE, ED. (Served 1st AIF.) General Manager, Tasmanian Govt Railways, 1939-44; Director of Industrial Develop, Tas, 1944-53; Chairman, Tas Board of Area Management, 1940-45. B. Mt Egerton, Vic, 24 May 1889.

⁷ Mr David Meredith, Manager of the Electrolytic Zinc Co of Aust Ltd, was appointed chairman at the outset but he retired after a month or so in favour of Col Bennett.

⁸ J. O. Robson. Federal Dep Commissioner of Taxation, Tas, 1938-48. B. Collingwood, Vic, 15 Jan 1883.

It was not easy to define where the functions of the directorates ended and those of the boards began. Put briefly, the directorates were responsible for planning and production and the boards for managing the projects within their respective areas. This left the directors free to turn their attention to the new developments that constantly presented themselves. It also left them free to coordinate the management functions of the Boards of Area Management when a particular project was the concern of more than one State. For example, the Director of Ordnance Production had to see that 25-pounder components made in South Australia reached the assembly line in Victoria at the appropriate time; the Director of Machine Tools had to see that machine tools made in Victoria were delivered to New South Wales or wherever they were wanted. Likewise, it was a directorate's function to pool information and to see that new techniques developed in one State were quickly transmitted to the other States. By the nature of things Boards of Area Management looked at matters from the State point of view, whereas the directors were obliged to take the national viewpoint. It was the business of the boards to see that every possible productive agency in their respective States was being used and effectively coordinated with others to fulfil the program of munitions production allotted to them. The boards administered armament



annexes. They used large industrial organisations not only as manufacturers but also as centres for farming out components to small-scale manufacturers—that is, as coordinating contractors. The over-all planning

was done by the central body working directly under Lewis so that the interests of the country as a whole could be approached dispassionately and with regard to a full and effective coordination of all available resources.

In administering the government factories Lewis was assisted by the Factory Board. He was completely satisfied with the organisation which existed to run these factories and saw no reason for placing any of them under the administration of the directorates. The dual nature of the Department of Munitions may be seen from the accompanying chart; it has been simplified by omitting some of the purely administrative details.

This, then, was the structure of the largest manufacturing and producing organisation ever established in Australia, which together with the appointment for its direction and control of a group of outstanding industrialists and public servants, was completed well within six days.

At the inaugural meeting of the Department of Munitions held on 25th June 1940, Lewis said that according to preliminary advices of Service requirements the probable demands would be:⁹

252	anti-aircraft guns
840	field guns
722	anti-tank guns
121	light anti-aircraft guns
1,746	trench mortars
6,410	Bren guns
2,034	Vickers guns
50,000	rifles
6,000,000	rounds gun ammunition
1,500,000	mortar bombs
1,000,000	grenades
575,000,000	rounds of small-arms ammunition
47,000	aircraft bombs.

For their manufacture the principal materials needed would be:

10,000	tons cordite
9,000	tons TNT
585	tons carbamite
12,500	tons nitrate of soda
15,000	tons commercial and alloy steels
168,000	tons shell steel
37,000	tons copper
600	tons nickel
12,000	tons zinc.

This first order, composed almost entirely of munitions for the army and handed to Mr Lewis by the Chief of the General Staff, Sir Brudenell White,¹⁰ on 12th June 1940, was estimated to require the construction of

⁹ The principal items of munitions to be manufactured were grouped thus: 8 types of guns and mortars; 4 types of rifles and machine-guns; 8 types of cartridge cases; 11 types of fuses, gages and primers; 8 types of shells; 2 types of shell forging; 3 types of bombs and grenades; 4 types of small arms ammunition; the varieties of explosive needed for the foregoing; factories for filling the explosives and assembling the ammunition; and machine tools needed for making additional machine tools, and the tools and gauges.

¹⁰ Gen Sir Brudenell White, KCB, KCMG, KVO, DSO. BGS Aust Corps 1915-18; CGS AMF 1920-23, 1940; Chairman, C'wealth Public Service Board, 1923-28. Of Melbourne; b. St Arnaud, Vic, 23 Sep 1876. Killed in aircraft accident 13 Aug 1940.

factories that would cost approximately £14,000,000. Within little more than a month (on 15th July) the War Cabinet had approved of

Army requirements amounting to	£94,343,000
Air Force requirements (excluding aircraft) amounting to	3,750,000
Navy requirements amounting to	289,000

The smallness of the navy order was due to the fact that the navy, being ready for war at all times, did not, like the other two Services, have to start almost from zero. It always insisted on having in store its full complement of munitions, a situation which the army viewed with some envy. Much larger sums were spent on naval requirements later on. The above orders, it should be noted, were only the first of the demands made upon the Department of Munitions; they were followed by many more from all three Services, especially during the next twelve months, but it was a substantial first instalment, running as it did into nearly £100,000,000. The program to be covered by this expenditure was wide enough in scope to provide a sound foundation for the manufacturing capacity from which all later demands could be developed. The Chief of the General Staff had stated that the war was expected to last for a long time, and in view of this every effort was made to see that the rapid expansion then taking place would be adequate to cater for the ultimate requirements of the war. In a speech at a press lunch on 2nd July Lewis said:

The foundations of munitions production in Australia were well laid—for the needs of the time. Today the needs are infinitely greater. We require a vastly expanded system. In comparison with what was done in other Dominions, our pre-war system was good. We need not deceive ourselves that in past years a majority of the public would have appreciated a very heavy expenditure on munitions.

Now at last money was available to do all that was needed. At one of his meetings with the directors Lewis remarked: "In the past we have had almost unlimited time but little money; now we have almost unlimited money but little time." All that was now needed was the will of the community to produce its utmost effort: manufacturers with their organisations and machinery, employees with their skill and enthusiasm.

The Director-General was also furnished by the Defence Committee, acting upon the advice of the three Chiefs of Staff, with a list comprising aircraft, merchant vessels, and railway rolling stock in which the order of urgency of supply was indicated. The question of priorities was always a complicated one. The Department of Munitions had no responsibility for deciding the order in which different items were to be made; that was a matter for the three Services to decide among themselves on the basis of strategic considerations. Each Service set out the items it wanted in order of priority. These lists were submitted to the Defence Committee. The Chiefs of Staff, after some argument, would accept or modify each other's claims, assign a priority rating to each item, and combine them into one list.

Once the Chiefs of Staff had thus set out their requirements, the Department of Munitions had then to decide upon priorities of manpower, materials and equipment among the different manufacturers. Though the complexity of the munitions program made it particularly difficult to allot

priorities for materials, this was generally achieved without detriment to the progress of manufacturing. When conflict arose in respect of priorities between the Services or other government departments, the matter was referred to the War Cabinet.

After the Department of Munitions had been split off from the Department of Supply and Development,¹ the latter was left with the responsibility for supply, "other than munitions, e.g. clothing and other personal equipment for the services, foodstuffs and stores of all kinds". While carrying on its earlier function of surveying Australian industrial capacity and essential supplies necessary for the security of the Commonwealth, the department undertook to control the production of minerals and metals other than those needed for munitions, and to promote the manufacture of indigenous liquid fuels (including shale oil, power alcohol and benzol), and the use of other substitutes for imported liquid fuels (particularly producer gas).²

No great extension of manufacture of munitions such as that undertaken in June 1940 was possible until commercial industry had been properly instructed on the technical requirements of manufacturing equipment for the Services, especially the need to conform strictly with drawings and specifications, often to very fine tolerances.

The only organisations with the technical staffs capable of explaining these requirements to the manufacturers were the government munitions factories, which under Leighton's scheme had been planned partly as technical schools for just this purpose, and the Inspection Branches of the Services. As was to be expected, the Munitions Supply Laboratories and the government factories advised commercial industry in such matters as methods of manufacture, provision of tools and gauges, and the testing of raw materials. In the early stages of the war especially, the Inspection Branch of the Army³ under Colonel Gipps and the smaller Naval Ordnance Inspection Service under Commander Nurse⁵ also gave much help.

Although industry was acquainted with the principles of mass production and some branches had had experience in the manufacture of components to precise measurements, most of them had to learn that the tolerances and tests necessary for war materials were much more exacting than they had been accustomed to. It fell to the inspection services to teach industry something of the standards required.⁶ This they did with

¹ When in Oct 1942 this department was assigned the responsibility for shipping, its name was changed to Dept of Supply and Shipping.

² It also assumed other functions, but these are not relevant to the main theme of this volume.

³ Army Inspection also acted for the air force in many matters. The Directorate of Aircraft Production maintained a separate Inspection Branch specifically for aircraft manufacture.

⁵ Engr Capt E. S. Nurse, RAN. (HMS *Glorious* 1917-18.) Chief Inspector of Naval Ordnance; Chief Naval Representative, Dept of Supply, since 1955. Of Toorak, Vic; b. 22 Nov 1899.

⁶ Brig J. K. Coffey recalled the story of a carpenter and a fitter who were talking one day in a large private factory. The carpenter was complaining that these Army Inspection people were most unreasonable: they were expecting him to work to 1/16 inch. The fitter replied, "Oh, you're lucky—they want me to work to thous." "What's a thou?" asked the carpenter, "how many of them to an inch?" "Oh, I don't know—millions of the bastards I expect." The plain fact was, said Coffey, that very few factory engineers and tradesmen could read a properly toleranced drawing, and they had to be taught to do so before production could begin.

remarkable efficiency when it is considered that they were compelled to dilute their own small staffs with untrained men and train them and many small factory staffs at the same time. Not until well into 1941 was the bulk of this work taken over by the production directorates.

Instruction, however, was a minor role of the inspection services; their primary function was to guarantee the high quality and performance of munitions. Though they came under fire at times for being too critical and exacting, no one intimate with the details of wartime production would deny that they did an excellent job. In an official tribute paid to Gipps towards the end of the war it was said that in no instance did his organisation fail to meet every need, despite the immense quantities of munitions handled, many of new types and designs and manufactured by new techniques.⁷ Hundreds of millions of pounds' worth of equipment passed through his hands; his certificate of quality was accepted not only by the Australian Services but by those of the other Allied countries as well. It was with good reason the United States Army, on arrival in Australia, asked that Gipps should be made responsible for acceptance tests for munitions made locally to their order.

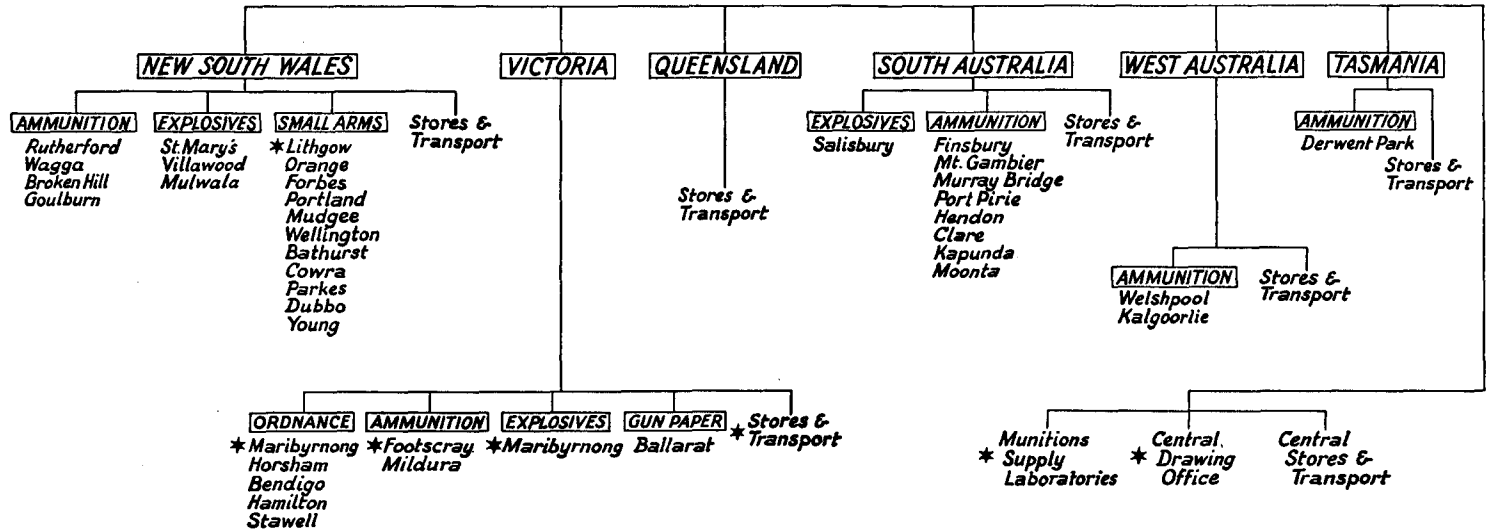
The Department of Munitions could not always proceed directly to the manufacture of all the vast quantities of munitions that had been ordered. Often it had first to build factories to manufacture the materials and machines that would be required, and then the factories where the actual munitions were to be made. Lewis attacked the problem of expanding munitions production by concentrating on two main fronts: firstly by the construction of additional government factories, and secondly by increasing the number of annexes. By the middle of 1943, at the floodtide of the munitions drive, the number of government factories had risen from 4 (early in 1940) to 39, of which 17 were devoted to making ammunition, 6 to explosives and filling, 5 to ordnance and shell, 11 to small arms and machine guns. In the same period the number of annexes was increased from the original 24 to 213.

The ruthless appropriation of materials and labour involved in all this new construction and direct war production threatened the stability of the "non-military sector" of the country's economy, and with it the "home front". Some industries, especially those concerned with the supply of such raw materials as steel, expanded under the stimulus of war; some—the primary industries, for example—suffered heavy losses of manpower; while others again—unessential or luxury industries—found they had no place in total war. In order to lessen the impact of this disruption of industry on the community the Menzies Government set up a Department of War Organisation of Industry in June 1941, but owing to the instability of the political situation which marked the "distant war" period

⁷ Munitions Dept Newsletter of 25 May 1945.

MUNITIONS ESTABLISHMENTS

DECEMBER 1943



* Factories operating before 1939

it was not fully drafted until some months later when a Labour Government under Mr Curtin⁸ had taken office.⁹

The entry of Japan into the war did much to hasten "a systematic attempt to reorganise the non-military sector of the community". A few days after this event, spontaneous offers of help came from the Associated Chambers of Manufactures, the Associated Chambers of Commerce, the Central Council of Employers, and the Council of Fire and Accident Underwriters. In a joint letter to the Prime Minister on 18th December they said: "It is fully recognised that the whole future of Australia is at stake and that industry and commerce, in common with all other interests, must be subordinated to the imperative necessity of national defence."

Through the new Department for War Organisation of Industry the Government set out to achieve, *inter alia*, the following objectives:

1. To devote an increased proportion of labour and plant to war production in all industries which could contribute to the war program.
2. To release labour, materials and equipment from non-essential production by:
 - (a) reducing the production of non-essential services and commodities;
 - (b) eliminating unnecessary varieties and packaging wherever these retained labour and materials that could be used for war purposes;
 - (c) rationalising distribution wherever this promised economy in manpower and other resources.

Much of this rationalisation of industry represented a pushing to the limit of the principles advocated by the Standards Association of Australia. Thus in the elimination of unnecessary diversification of types of manufacture the major tobacco companies reduced the number of packs of tobacco and cigarettes from 763 before the war to 17 by 1943. The number of varieties of domestic glassware was reduced from 800 to 85; dry batteries from 478 to 71, and gardening tools from 215 to 55. Economies were effected by simplifying the design of clothing.¹⁰ The cuffless trousers and buttonless sleeves of the "Victory suit", the tail-less shirt and the unlined hats with their unwelted brims may not have been great sartorial successes but they were at least symbols of rationalisation. The zoning of deliveries and services, reduction of transport of unessential goods, control of building, advertising and unessential industries, as well as the control of new industries, were all manifestations of the rationalisation of industry. For a full assessment of their influence on war production, Professor Butlin's volume in this series may be consulted.

While the basic plan for the utilisation of commercial industry remained unchanged throughout the war, there were considerable changes in the Department of Munitions itself, including an expansion in the number of directorates. When the Cabinet was reorganised in June 1941, a portfolio was created for Aircraft Production and the Aircraft Directorate was

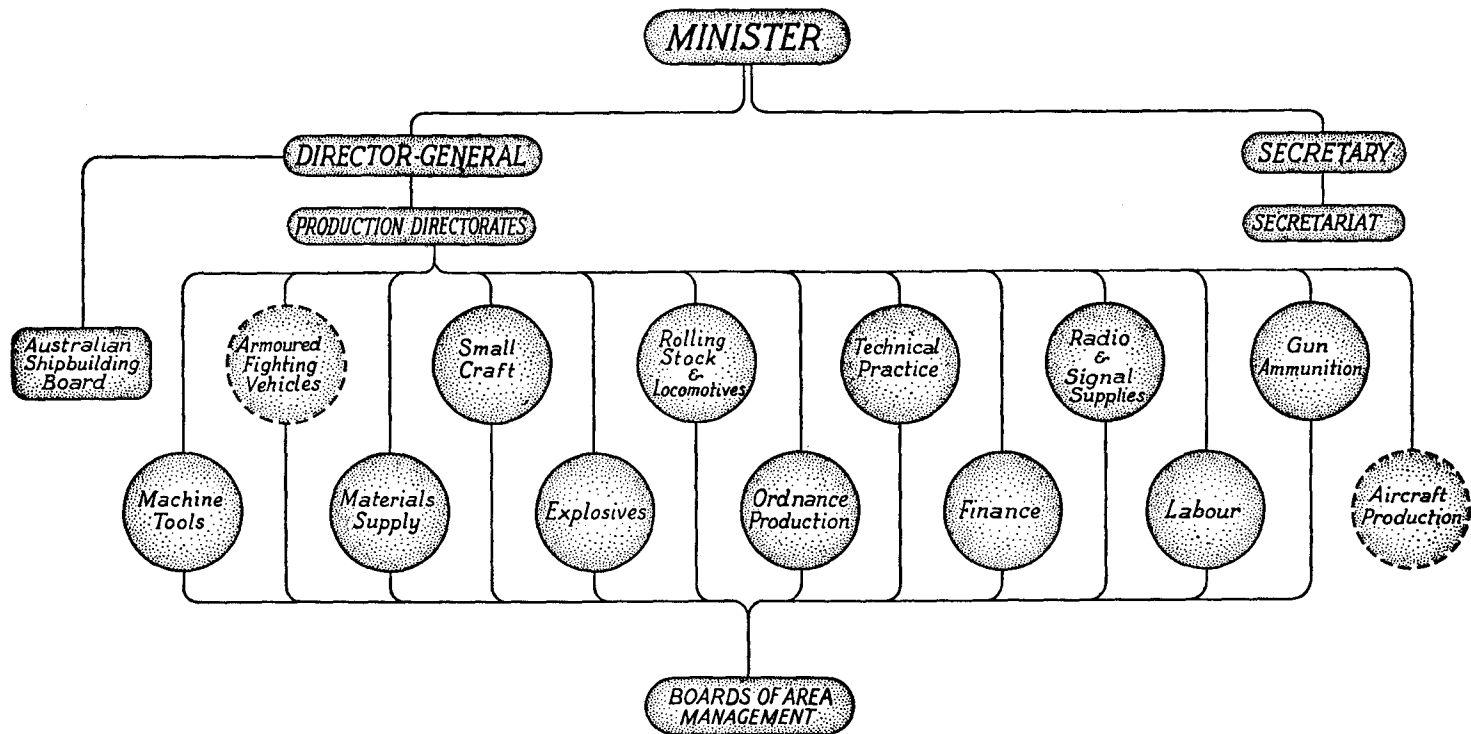
⁸ Rt Hon J. Curtin, MHR 1928-31, 1934-45; Prime Minister and Minister for Defence 1941-45. Of Cottesloe, WA; b. Creswick, Vic, 8 Jan 1885. Died 5 Jul 1945.

⁹ Hon E. S. Spooner, first Minister for War Organisation of Industry, was succeeded in Oct 1941 by Hon J. J. Dedman.

¹⁰ E. R. Walker, *The Australian Economy in War and Reconstruction* (1947).

MUNITIONS ORGANISATION

DECEMBER 1943



 Discontinued by 1943

detached from Munitions to become a separate department. It was a remarkable tribute to Lewis that the Labour Government which took office soon after the establishment of the Department of Aircraft Production promptly appointed him Director-General of Aircraft Production in addition to his existing appointment as Director-General of Munitions.

As the war progressed the scope of the Department of Munitions was increased in some directions and decreased in others. Difficulties in the early attempts to make tanks brought into existence a separate Directorate of Armoured Fighting Vehicles. Similarly the unprecedented demand for radar and telecommunication equipment prompted the formation of a Directorate of Radio and Signal Supplies. The activities of several sections of the department became so extensive and complex that it was occasionally forced to consider questions outside its province. Lewis was averse to the Munitions Department's dealing with matters beyond its charter. He did, however, consider that labour supply, welfare and technical training came within its ambit and it therefore came as a surprise to him when, in October 1940, these activities were made the subject of a special ministry, the Department of Labour and National Service, which was placed under Mr Holt,¹ previously Assistant Minister for Munitions. Later, when the Commonwealth Departments of Transport and Health were formed, the corresponding activities of the Department of Munitions were transferred to the new departments. However Lewis, with the help of Jensen (who was now Secretary of the Department of Munitions) managed to evolve satisfactory working arrangements with these new departments.

The entry of Japan into the war and the threat of invasion which hung over Australia in the months that followed, gave the greatest stimulus of all to the production of munitions. Much anxiety was felt lest Australia be cut off altogether from oversea supplies of any kind. Government factories, especially those for making explosives and ammunition, began to arise wherever there were sources of labour: in the suburbs of the great cities and in the quiet countryside. Establishments in the rural areas became especially numerous, many of them representing a second line of defence in the event of the big cities being bombed out. The trend which had been developing during 1941 for export of munitions abroad, particularly to India, the United Kingdom and the Netherlands East Indies, practically disappeared; but with the arrival of American forces many new supply problems were created. In 1942 the great industrial effort underlying the munitions program was moving towards its climax. The whole of commercial industry, except that needed to provide the minimum of civilian needs, was pressed into service. The munitions undertaking became so complex that to give a chronological account would make it almost impossible to follow the development of any particular project. From now on, therefore, the major projects will be followed separately. Even so it will not be possible to do more than touch on a few of the more important achievements.

¹ Rt Hon H. E. Holt. MHR since 1935; Minister for Labour and National Service 1940-41 and since 1949; Minister for Immigration 1949-56. B. Sydney, 5 Aug 1908.

APPENDIX

List of Establishments housing Government Annexes

NEW SOUTH WALES

<i>Establishment</i>	<i>Project</i>
Stewarts and Lloyds (Aust) Pty Ltd Newcastle	25-pdr shell forgings 5.5-in shell machining
NSW Railway Workshops, Eveleigh	Shell
NSW Railways, Chullora	Originally tank assembly, later auxiliary marine craft
NSW Govt Railway Workshops, Eveleigh	Radar equipment
Colonial Sugar Refining Co, Pyrmont	Activated carbon Shell Glycerine
R. B. Davies Pty Ltd, Marrickville	Grenades 36 Grenades 68
Duly and Hansford Pty Ltd, Marrickville	Fuses, Gains
Electricity Meter Manufacturing Co Pty Ltd, Waterloo	Fuses 20-mm Oerlikon shell
Electricity Meter Manufacturing Co Pty Ltd (Westinghouse Rosebery Works), Waterloo	Primers
Amalgamated Wireless (A/sia) Ltd, Ashfield	Fuses 20-mm Oerlikon shell
Commonwealth Steel Co Ltd, Waratah	Shell and 4.2-in mortar bombs Gun forgings
Gilbert and Barker Pty Ltd, Alexandria	Fuse, contact mine, A.T. Fuse 231
E.R.L. Products Pty Ltd, Glebe	Aircraft bomb pistols Primers
Plumbs (Aust) Pty Ltd, Alexandria	Shell
Westinghouse Brake (Aust) Pty Ltd, Concord	Depth charge pistols and primers
Broken Hill Pty Company Ltd, Newcastle	Shot Shell Magnesium powder 80-ft Steel lighters
Timbrol Ltd, Rhodes	Aniline, Monoethylaniline, Diethylaniline, etc.
General Motors-Holden's Ltd, Pagewood	25-pdr Gun howitzers
Bradford Kendall Ltd, Alexandria	Aircraft bombs assembly Tank castings; general engineering Heat Treatment capacity

NEW SOUTH WALES—*continued*

<i>Establishment</i>	<i>Project</i>
S. T. Leigh Pty Ltd, Kensington	Fuses
Slazengers Pty Ltd, Alexandria	Rifle and Bren-gun components and boxes Filter pads for anti-gas respirators
Slazengers Pty Ltd, Putney	Auxiliary marine craft Timber creosoting
Slazengers Construction Co Pty Ltd, Newcastle	Auxiliary marine craft
Rylands Bros (Aust) Pty Ltd, Newcastle	2-pdr links and Bren-gun magazines
Lever Bros Pty Ltd, Balmain	Glycerine
Industrial Steels Ltd, Lidcombe	Tank castings and track links Bomb castings, machining and assembly
Hadfields Steelworks Ltd, Alexandria	Tank and carrier castings; general engineering
Quality Castings Pty Ltd, Waterloo	Silicon iron castings
Coote and Jorgensen Ltd, Alexandria	Tank gears and parts; components for marine craft
Sonnerdale Pty Ltd, Petersham	Gear boxes for tanks; marine engine gear boxes General capacity for production of gears
Acetone Pty Ltd, Lane Cove	Acetone
Australian Window Glass Pty Ltd, Alexandria	Optical glass
Howard Auto Cultivators, Northmead	Owen gun parts Pistols
Airzone (1931) Ltd, Camperdown	Grenades assembly
Australian Consolidated Industries Ltd, Waterloo	Mortar bomb castings
Commercial Steels and Forge Co (Aust) Pty Ltd, Lidcombe	Stores accommodation
Cooper Engineering Co Pty Ltd, Mascot	Tracer and Igniter No. 12, fuses Jigs, tools and gauges
Automatic Totalisators Ltd, Sydney	Jigs, tools and gauges
Goulburn Gas and Coke Co Ltd	Contribution towards gas mains
Sulphide Corporation Ltd, Newcastle	Nickel matte roasting
Australian Aluminium Co Pty Ltd, Granville	Aluminium scrap remelting
Davies Shephard (Sydney) Pty Ltd, Mascot	Torpedo components

NEW SOUTH WALES—*continued*

<i>Establishment</i>	<i>Project</i>
Sydney Williams and Co Pty Ltd, Dulwich Hill	Tools and gauges
Fletcher Springs Pty Ltd, Redfern	Small wire springs
G. E. Crane and Sons Pty Ltd, Sydney	Duralumin, alclad and aluminium sheet
Australian General Electric Ltd, Auburn	5-KVA alternators
A. W. Fairfax Pty Ltd, Fivedock	Mortar bombs, machining
Wunderlich Ltd, Rosehill	Mortar bombs, machining
Westinghouse Rosebery Pty Ltd, Waterloo	5-KVA generating sets
Imperial Chemical Industries of Aust and NZ Ltd, Botany	Chlorine, perchlorethylene, hexachlorethane
Australian Gaslight Co, Mortlake	Plant for disposal of fatty acids from Lever Bros' glycerine plant Toluol from coal gas
Silovac Electrical Products Pty Ltd, Camperdown	Tools and gauges
Clyde Engineering Co Ltd, Granville	Buildings and equipment
Ferrier and Dickinson Ltd, Marrickville	Auxiliary marine craft outfitting depot
Hastings Deering Service Ltd, Sydney	.38 pistols
Chubb's Australian Co Ltd, Sydney	Recuperator blocks
A. Goninan & Co Ltd, Newcastle	Refrigeration barges
Tulloch's Pty Ltd, Rhodes	Auxiliary marine craft
British Optical Co Pty Ltd, Darlinghurst	Optical munitions
NSW Railways, Cardiff	Tools, jigs and gauges
VICTORIA	
Chas Ruwolt Pty Ltd, Richmond	Mortar bombs Gun production, etc A.P. Shot Mortar bombs and A.P. Shot Steel barges
Chas Ruwolt Pty Ltd, Holmesglen	Armour plate castings
Victorian Railways, Newport	Shell
Victorian Railways, Melbourne	Electrical instruments
Australian Glass Manufacturers Co Pty Ltd, Spotswood	Shell machining 3.7-in Shell machining 4.5-in smoke Shell forging Fuses Diecasting Toolsetters' training school

VICTORIA—*continued*

<i>Establishment</i>	<i>Project</i>
H. V. McKay, Massey Harris Pty Ltd, Sunshine	Shell A.P. shot
McKenzie and Holland Pty Ltd, Newport	Fuses Aircraft practice bombs
Johns and Waygood Ltd, South Melbourne	Mortar bombs
Ford Manufacturing Co of Aust Pty Ltd, Geelong	Mines Auxiliary marine craft, with facilities for assembling and launching
No. 5 Explosives Factory, Albion (under management of ICIANZ)	TNT, Cordite 1, Carbamite, Ballistite, etc. Charcoal and Gunpowder Experimental Station.
Imperial Chemical Industries of Aust and N.Z. Ltd, Deer Park	Gunpowder Signal cartridges, Tracer shot cartridges Percussion Caps Methanol Primer caps for grenades Trench mortar cartridges A.S. Chlorosene Chlorosene packing unit Solid sodium chlorate Pure potassium and barium chlorates Sodium perchlorate
H. E. Brehaut Pty Ltd, Mont Albert	Tail units for aircraft bombs, mortar bombs
Thompsons Engineering and Pipe Co Ltd, Castlemaine	Forging, machining and testing for guns, etc. Non-ferrous forgings
John McIlwraith and Co Pty Ltd, Richmond	Fuses tracer and igniter No. 12
Sutton Tool and Gauge Manufacturing Co Pty Ltd, Northcote	Tools and gauges
Purvis Glover Engineering Pty Ltd, Footscray	Fuses Primers
W. G. Goetz and Sons Ltd, Spotswood	Fuses
J. W. Handley Pty Ltd, Abbotsford and Brunswick	Optical munitions
Dominion Can Co Pty Ltd, Melbourne	Fuses
Melbourne Iron and Steel Pty Ltd, Brooklyn	Casting of bomb ingots for Ordnance Factory Preparation and rolling of steel for A.P. shot
Australian Paper Manufacturers Ltd, Maryvale Maryvale and Melbourne	Paper wood cellulose Alpha cellulose board

VICTORIA—*continued*

<i>Establishment</i>	<i>Project</i>
British United Shoe Machinery Co of Aust Pty Ltd, Fitzroy	Heat treatment, anti-tank gun components Recuperators for anti-tank guns
Metropolitan Gas Co, Fitzroy	Machine-gun carriers
Ruskin Motor Bodies Ltd, West Melbourne	Assembly of aircraft bombs
Marfleet and Weight Pty Ltd, Abbotsford	Heavy machine tools
Albright and Wilson (Aust) Pty Ltd, Yarraville	Phosphorus grenades Amorphous phosphorus Calcium phosphide
Olympic Tyre and Rubber Co. Ltd, Footscray	Field telephone cable
F. L. Cook and Williams Pty Ltd, Abbotsford	Grenades
Jeffree Bros, Bendigo	Aluminium powder—flake and blown
Stanger and Co Pty Ltd, West Preston	Tools and gauges
Commonwealth Fertilisers and Chemicals Ltd, Yarraville	Pyrites roasting plant in connection with production of sulphuric acid and oleum
H. A. Chivers, Melbourne	Torpedo components
Myttons Ltd, South Melbourne	Primers
Metropolitan Gas Co, West Melbourne	Ammonia liquor
Ammonia Co of Aust Ltd, Spotswood	Ammonia liquor
Aluminium Fabrication Factory, Wangaratta (under management of Aust Aluminium Co Pty Ltd)	Aluminium fabrication
Waldown Pty Ltd, Collingwood	Electric drills and grinders
W. Watson and Sons Ltd, Tunstall	Pyrometers
Steel Co of Aust Pty Ltd, Coburg	Tank-track links
University of Melbourne	Valve manufacture investigation
Specialised Engineering Products Co, East Brighton	Torpedo components
Crusader Plate Co Pty Ltd, Abbotsford	Mortar bombs, smoke
J. Botterill and Fraser, South Melbourne	Auxiliary marine craft
QUEENSLAND	
Toowoomba Foundry Pty Ltd, Toowoomba	Primers
Metal Products Pty Ltd, Albion	Shell igniters, gaines
Ford Motor Co of Aust Pty Ltd, Eagle Farm	Water transport barges
Queensland Railways, Ipswich	Tools, jigs and gauges

SOUTH AUSTRALIA

<i>Establishment</i>	<i>Project</i>
South Australian Railways, Islington	Shell machining Shell forging
Pope Products Ltd, Beverley	Gaines, Aircraft practice bombs
General Motors-Holden's Ltd, Woodville	Aircraft bombs
Woodville and Beverley	Gun production Polsten gun
Woodville and Birkenhead	Torpedo components
Woodville	Ammunition boxes 40-mm shell
Broken Hill Pty Co Ltd, Whyalla	Shell Forgings
Kelvinator (Aust) Pty Ltd, Keswick	Primers
Perry Engineering Co, Mile End	Shell forgings and machining Forgings
Richards Industries Ltd, Keswick	Cartridge containers, etc
B. S. Williams, trading as Wheatley and Williams, Bowden	Non-ferrous castings
David Shearer Ltd, Mannum	Track links for machine-gun carriers
Southcott Ltd, Adelaide	Heat treatment of tools and gauges
Horwood Bagshaw Ltd, Mile End	Anti-tank guns
Wiles Chromium and Electroplating Co Ltd, Mile End	Wiles mobile cookers
British Tube Mills (Aust) Pty Ltd, Kilburn	Oil and fuel bottles for torpedoes Cold-drawn steel tubes
Stewarts and Lloyds (S.A.) Pty Ltd, Kilburn	Hot-rolled tubes for hollows
I.C.I.A.N.Z. Ltd, Osborne	Calcium chloride
S. Aust. Railways, Islington	Tools, jigs and gauges
WESTERN AUSTRALIA	
W.A. Railways, Midland Junction	Shell forging and machining
Geo Hill and Co, Perth	Primers
Boltons Ltd, Perth	Mortar bombs, machining
Hadfields (W.A.) Ltd, Perth	Mortar bombs, castings
F. Tough, Perth	Optical munitions
West Australian Government: Midland Junction Railway Workshops and State Engineering Works, North Fre- mantle	Development of steel casting capacity
W.A. Railways, Midland Junction	Tools, jigs and gauges

TASMANIA

<i>Establishment</i>	<i>Project</i>
Tasmanian Railways, Launceston	Shell, Mortar bombs
Henry Jones and Co Pty Ltd, Hobart	Primers
Associated Pulp and Paper Mills Ltd, Burnie	Chlorine
E. N. Waterworth Annexe, University Grounds, Hobart	Prisms and optical munitions
Electrolytic Zinc of Aust Ltd, Risdon	Zinc alloy
Tasmanian Railways, Launceston	Tools, jigs and gauges

OPTICAL MUNITIONS

The Optical Munitions Project was distributed among the following organisations, in order of importance:

- University of Melbourne
- Commonwealth Solar Observatory
- E. N. Waterworth Annexe, Hobart
- University of Sydney
- Australian Optical Co Ltd, Sydney and Melbourne
- National Standards Laboratory
- University of Western Australia
- University of Adelaide
- Council for Scientific and Industrial Research
- Sydney Technical College
- Melbourne Technical College
- British Optical Co Pty Ltd, Sydney