

**FINANCIAL AND TECHNOLOGICAL ASPECTS
OF AUSTRALIAN MUNITIONS PRODUCTION
DECISIONS UNTIL 1914 WITHIN THE
CONTEXT OF INTERNATIONAL RELATIONS.**

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Contents

	Page
Abstract	vi
Declaration	xii
Acknowledgement	xiii
Introduction	1
Chapter 1 The Australian Colonial Economy until the 1880's	
Introduction	12
Early settlement – the Crown, owner of land, and the sterling financial structure	16
Colonial Governments – the pastoral economy, urban Development	24
Significance of the colonial railways infrastructure	37
Colonial self-government – The role of service officers within imperial and world politics	43
Chapter 2 The Imperial legal, financial and political structure to 1890	
Introduction	58
Sterling finance, the Gold Standard to 1890 –Barings'	62
Consequences for colonial borrowers of Barings...	71
Schwartz hypothesis	78
Technology enabling development within imperial trade	86
Summing up of the political flux leading into Federation	93
Chapter 3 The demise of <i>Pax Britannica</i>, implications of new technologies	
Introduction	102
Continental Politics and the Demise of Pax Britannica	108
Imperial politics and the colonial political scene	116
British strategic problems, the navy and technology	124
Technological trends – the origins of the mass-production revolution	133

Chapter 1V Australian military involvements and Victorian munitions Production	
Introduction	150
Australian colonial support for governor Grey’s New Zealand operations	154
New South Wales’ response to Gordon’s death	161
Colonial armed forces from 1879 to 1890’s	174
Victorian munitions production decisions	179
Chapter V Strategic realities within the British climacteric 1895-1905	
Introduction	203
Strategic realities within the British Climacteric	207
The South African War 1899-1902	213
Implications for munitions	217
Post South African War	222
The Australian nationalist and industrial response – small arms and ammunition/manufacture	229
Conclusions	237
Bibliography	245

FOREWORD

The industrialisation of Australia is not generally acknowledged to have taken place as early as 1939/40 but it now had enormous implications for the defence of Australia against Japan. The big industrial companies, and the Australian government had always been aware of the importance to defence of industrialisation, although their first priority tended to be national development. This changed with the steady approach of war in the late 1930s. While the government continued to expand the Munitions Supply Board's factories, many private companies made their own defence preparations, culminating in May 1940 in the fusion of all efforts with the creation of the Department of Munitions. This department was run by the big industrialists with the assistance of the Munitions Supply Board's technocrats and it set out to manufacture the necessary armaments to prevent Japan from occupying Australia.

A huge industrial juggernaut was created, and by the time the Japanese were able to begin preparations to invade in early 1942, so much equipment and supplies had been manufactured that an enormous Australian military force was capable of being placed in the field in Australia. This is contrary to all perceptions of Australia's level of preparation at this time. But the Japanese knew. They had been studying

Australia's industrial development from the early 1930s until late 1941. They had deduced the munitions capability of Australian secondary industry and concluded that they could not supply and transport the size of invasion force deemed necessary to give a reasonable assurance of military success. General MacArthur did not save Australia. It was saved by the deliberate development of secondary industry by the captains of industry and Australian governments. They raised the threshold of the necessary Japanese invasion force beyond any possibility the Japanese had of supplying it.

The contribution of Australian secondary industry did not end here. As the Pacific war moved into the jungles of New Guinea and elsewhere, Australian industry completely re-equipped Australian forces for the rigors of jungle warfare. Australian forces were better armed, better fed, better clothed, and given much greater medical support than their Japanese enemies. Australian equipment such as radars, radios, optical devices, and ammunition etc., was far better proofed against jungle organisms. All of this came from the heart of Australian industry. Australia never received large quantities of munitions from overseas.

Calculations of the probable casualties Australian forces would have suffered if they had been equipped like the Japanese indicate that Australia would have lost between

40,000 and 60,000 more killed than her actual casualties from the entire war, which was 27,000 killed over six years.

A T Ross 'Armed and Ready' ppXV-XVI

ABSTRACT

It is the intention of this thesis to present a prequel to *Armed and Ready*.

Britain established her Second Empire after the American War of Independence by colonising a new continent, Australia at the other side of the world. In an era of globalisation, of a prosperous economy underwritten by ore exports, the industrial base established in Australia during the interwar-period 1919 to 1945 examined by Dr Andrew Ross in his seminal book *Armed and Ready* is little understood. To explore the decision to establish small arms ammunition manufacture in Melbourne in the 1880s, and the historical factors during the British climacteric within which the South African War fell, leading to the munitions production decisions at which point Dr Ross commences.

In the period prior to 1904 this country's economic development and engineering capabilities, to a large extent mirrored that of Argentina. Both countries shared intimate trade and financial links with Britain. The subsequent dichotomy of the level of industrial development between the two countries from the 1890's until the 1950's is an interesting question. Political and strategic issues converged from the late 1880's to bring a national political focus to the social issues of racial and

national survival. Australian social structures, the political outlook of discrete colonial governments within changes to engineering and chemical technology accompanying the rise of the competing industrial powers, the United States of America, Japan, and Germany in the Pacific are crucial to understanding the ‘Australian’ response to the imperial decline of Britain in the Climacteric 1895-1905 demonstrated in the South African War. With the Japanese defeat of the Russians on land and sea in 1905 the political decisions were made to produce munitions and naval vessels (in effect industrialise) what had been an agrarian economy at the periphery of empire.

Dependent settler colonies established around the littoral of the Australian continent from first settlement in 1788. The disparate colonial pastoral economies developed a bullock wagon journey in from the littoral. With colonial self-government in the 1850’s following the Gold Rushes, an unquestioned next step to the late 1880’s was borrowing money from The City to establish railways with associated bureaucracies and local industries. Colonial (pastoral) development projected inland along railways originating from seaport capitals. The land adjoining the tracks was sold as freehold to pastoralists to finance development and public spending. The colonial economies flourished on wool exports to England. Pastoralists relied heavily on mortgage finance.

The imperial legal and financial structures within which settlement proceeded, administrative control from London and *Pax Britannica* with its liberal trading policies underwrote flows of money, people, and goods in both directions to the Australian colonies.

Colonial self-government from the 1850's meant the colonies, although divided and rarely of a single mind had a voice. There were early political concerns to self-governing Australian colonies of the role of France in the South Pacific. Concurrent with these political evolutions of the periphery was direct military and logistical support to New Zealand in early settlement, but most significantly to Governor Grey in Wars of the early 1860's. The colonial resources of men and materiel were decisive. The significance of the service officers, both former and serving, as governors and as officials, throughout the colonial bureaucracies is an integral part of the history. Much of this influence is deduced from the experience of a veteran of a later age in the twilight of the influence of World War Two veterans in the Britain, South Africa and this country. Such networks are rarely documented.

Examining the role of Britain in the post-Waterloo era, the Prussians defeating Denmark over Schleswig-Holstein in 1864 marks the effective end of her moral

authority. The resulting bipolar power structure with Prussia, technological changes to weapons design, and Prussian military domination in what became the German Empire, are crucial to an understanding of the later political flux.

Working from the ideas of interchangeable mass-production of musket lock components pioneered in Revolutionary France by Honore Blanc, the Americans had with official backing over forty years for Springfield and Harpers Ferry armouries, by the 1850s established what was later called, 'The American system.' Wide reading into the topic of engineering and manufacture both in Britain and America establishes small arms and ammunition production was the cutting edge of manufacturing technology. The dichotomy between British and American railways industries engineering methods was maintained by engineers on the periphery of empire specifying small numbers and designs of locomotives for which American firms producing runs of a single model simply could not match. British locomotives using the finest materials and workmanship were designed and built to run and run... American locomotives ran at higher pressures and used steel pipes with a lifespan of perhaps only twenty-five years. British naval supremacy based on specialised ship-building and associated ordnance production was challenged by the expansion of newly industrialising powers, Germany, and the United States into the South Pacific.

With the Depression of the 1890's, collapse of the wool price, the Baring's Bank crisis and a changing world, colonial polities underwent convulsions as lenders in the metropole foreclosed on pastoralist mortgagees. The Schwartz hypothesis suggests the imperial legal structure enabling lenders to have recourse to defaulting mortgagees in Australia in contrast to Argentina, compelled the economic re-ordering of the colonies. The nationally organised unions having eschewed industrial action for the political process, made common cause with urban manufacturers and pursued their objectives of employment and development through industrialisation and official schemes to subdivide pastoral properties to establish fat-lamb, fruit growing, and dairy farming. Within a few elections, the Labor Party became a force changing political directions, ideas, and society.

With colonial support for Britain over the South African War, the challenges to the Royal Navy from emerging industrial powers, the disparate Australian colonies after a decade of political discord and wrangling, initiated political change among themselves federating in 1901.

From 1901 to 1914 in the context of a narrow focus on national and racial survival, the perceived threat from Japan following their decisive defeat of Russia on both land and sea and their post-war objective to raise and train a million man army, the

Commonwealth Government working from a financial, industrial, and scientific base in Victoria, established arsenals and factories to provide autonomous sources of weapons and munitions for Australian forces.

CANDIDATE'S DECLARATION

'I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree of diploma in any university, and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is given in the text.'

Gordon Duncan
8th September 2008

SUPERVISOR'S DECLARATION

I believe that this thesis is properly presented, conforms to the specifications for the thesis and is of sufficient standards to be, *prima facie*, worthy of examination.

Richard Leaver
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“Weapons are the Fulcrum of Peace.”

Financial and Technological Aspects of Australian Munitions Production Decisions until 1914, within the Context of International Relations

Introduction

The motto of the ‘Honourable Artillery Company’ of London, founded in the seventeenth century provides the title for this study of the economic and political origins of Australia’s early munitions production.

To produce a prequel to Dr Andrew Ross’ *Armed and Ready*, it is necessary to explore engineering technology, finance, and political will to pull them together for munitions production. Many of the factors which influenced the decision to establish munitions factories in Victoria in the late 1880’s and NSW in the lead up to the Great War were what may be described as the tides of history in Europe and Asia rolling over the *Pax Britannica* which relied upon moral force. The imperial structure and changing political tides in Europe are explored concluding with the British Climacteric at the turn of the twentieth century.

Sources of historical data were not plentiful. A speech given by Sir John Jensen as he later became, in Melbourne in 1943 was invaluable. After completion of this thesis it was accidentally discovered there are two copies of the manuscript Sir John wrote covering munitions production in Australia. His family has one, the other is held within the DSTO library system and thus academic researchers are unaware of its existence. Retrieving one chapter from archives was costly and ended up delivering large quantities of paper, consider two reams, relating to factory drawings... not germane to academic endeavour.

Exploring engineering technology, and it needs to be spelled out. Production of small arms and ammunition established mass-production techniques with interchangeable parts.

Although of French origin the Americans persevered with it at Springfield and Harpers Ferry armouries achieving success in the 1850's. Two academic theses, by Duff, and Fries gave incredible insight into the small arms production of the UK. Exploring histories of machine tools and weapons manufacture in the UK in the late nineteenth century is in the author's opinion directly related to understanding the industrial decisions made later in this country. A small booklet published since this thesis was written *The Enfield Inch & The Lithgow* .303 by Tony Griffiths B.Sc.(Tech) is a synopsis of how the British engineering industry worked prior to 1915. The Royal Small Arms Factory relied upon gauges to produce interchangeable parts. The drawings used in the factory used two different measures. Most measuring verniers were imported from the USA prior to 1918 anyway. With cheap skilled labour British industry had rejected Whitworth's ideas of standardised threads. In the First War when fuzes were unable to be threaded into shells in battle, metrology became a national focus. The sources consulted were many and varied and considerable sifting was required. Apart from Jensen's speech there was no similar work relating to the origins of munitions production in this country in the period prior to Dr Ross' work.

While all the settler colonies accepted responsibility for local defence, Victoria with the critical mass of finance, population and industry established during the Gold Rushes, was the only colony with a defence ministry.¹ This dissertation is essentially an analysis of the how this political decision, interacted with early purchasing decisions of the railways to buy locally made metallurgical products, which given the colony's strong bias towards the training of chemists for industry, flowed through into later munitions production. Carroll Pursell comments "... World War 1 was sometimes called the chemist's war...."² It was the University of Melbourne, and the other institutions training chemists, for the industrial and mining industries who employed them, that underpinned the imperial war effort and facilitated the later industrialisation of Australia explored by Dr Andrew Ross in *Armed and Ready*.

The history of British settlement in the antipodes, that established disparate dependent pastoral based economies around the Australian littoral, introduces the thesis. Developing within the imperial legal, financial and constitutional structures, clear objectives about racial and national survival were pursued by colonial polities in the post *Pax Britannica* era. Australian Colonial support for the Empire in the South African War during the British Climacteric of 1895-1905 entrenched within the colonial psyche of the day the priorities of a unified political structure, a federation able to achieve industrialisation, and undertake military operations. Logistics problems in that War, were a preview of the later "Munitions Crisis of 1915" and again demonstrated to colonial decision-makers, that autonomous

¹ Coulthard-Clark, C D *Formation of the Australian Armed Forces 1901-14* P123 in McKernan M & Browne M *Australia Two Centuries of War & Peace* Australian War Memorial in association with Allen & Unwin Australia 1988

² Pursell, Carroll *The Machine in America A Social History of Technology* Johns Hopkins University Press, Baltimore and London 1995, p225

munitions production and, naval shipbuilding in an uncertain world, were a prerequisite for national survival.

Chapter one introduces the early colonial settlement with settlers pushing inland with flocks of sheep to supply wool for the voracious English textile industry. The structure of imperial finance within which this took place is analysed. The legal structure of the Crown owning land, with pastoral borrowers in the colonies being subject to legal obligations identical to those in the United Kingdom, defined the dichotomy between formal, and informal empire. The Gold Rushes brought an influx of diggers, many with political agendas. Colonial self-government granted in the mid-eighteen fifties reflected this changed social composition and the knowledge that the denial of such autonomy, had led to the loss of the American colonies. With the authority to borrow in The City, colonial government decisions on development led to them establishing railways with an associated bureaucracy and engineering capability. With a steady demand and price for wool, pastoral development was pushed inland along the rail arteries. Land adjoining the tracks was declared Free-hold and sold by governments for income. The pastoralists' domination of Upper House Legislatures enabled them to obtain similar title, providing security of tenure. The role of service officers within this colonial administration is also explored.

Chapter two traces the first generation of economic and political development following colonial self-government. In the context of various settlement schemes that reflected different social objectives but not economic realities, vast sums were borrowed by pastoralists against the security of their lands and the income arising from the wool clips to secure and develop properties, effectively to "buy out" selectors. By the late 1880's falling wool prices, degradation of pastures from overstocking, urban development and land speculation

converged with the default by Argentine borrowers, at a similar stage of economic development, upon Barings Bank in London. The structure of the Gold Standard and the significance of Barings' problems are explored, and the hypothesis of Herman Schwartz relating to the demise of the pastoralists is accepted. Following the Barings crisis Colonial borrowings in London were subject to considerable scrutiny, - as much for what were deemed in the days before Keynes - as the socialist spending policies of public spending being undertaken as counter-cyclical economic policy. The earlier observations of Hall that it was the machinery for presenting colonial loans to the London market which failed at that time, rather than the credibility of the colonial borrowers, are noted.

The action of rentiers in Scotland and Victoria to foreclose, and then subdivide suitable pastoral properties and, in alliance with the forces of nationally organised labour (the Labor Party) compelled Colonial Governments to become underwriters of new intensive agricultural industries. There was no option of default for colonial pastoralists, who failed to engage urban political allies on the issue. The revolution in technology of fast efficient steam ships with refrigerated holds enabled perishable produce to be delivered to European markets. Close-settlement to produce irrigated fruit, dairy, and cross-bred fat lambs provided produce for which there was an export market in the UK, and an enlarged market for local manufactures. The export income generated from the new production enabled interest and debt repayments for existing borrowings to be maintained. In the context of the British Climacteric, (the erosion of British industrial and military power from 1895,) the Sino-Japanese War of 1894, naval competition with the Royal Navy in the Pacific, major questions of immigration from Asia, defence and foreign policy, required a coordinated political reaction from the colonies.

Chapter three traces the apogee of *Pax Britannica* reached at the time of the 1864 Schleswig-Holstein crisis. With the moral priority of suppressing the slave trade and, the financial dogma of “the balanced budget” Gladstone justified for keeping the Bank of England out of fiscal policy, Britain was therefore unable, either alone or in concert with other powers, to prevent the Prussians achieving their aims with “Blood and iron.” In this period of two decades from 1864 to the late 1880’s colonial politicians in Australasia, and The Cape, traders in West Africa, in concert with the India Office, were oblivious to the new bipolar structure of European power, but were able to lock up vast tracts of Africa for what were perceived as “strategic reasons.” Denying Germany colonies of no economic value to Britain was to have long term, and dire consequences. The changes to military and naval technology in this period up until 1890, was marked by the mass-production of new infantry weapons and explosives. Naval shipbuilding and armament also underwent change.

The role of railroads and telegraph within continental powers like the United States and Prussia had been grasped by France in Piedmont and Britain in India, although the strategic implications were not understood by Royal Naval planners. The French origins and the further development of mass-production by the Americans are traced. The acceptance and adoption by the British Government of the technology known as “The American System” following the Great Exhibition of 1851, is effectively the beginning of the narrative of technology.

The early but crucial strategic role that Australian colonies played in the New Zealand wars of the 1860’s is explored within Chapter four. Two earlier discussions, of the role of service officers within colonial administrations, and that of manufacturing, weave through this military operation at the furthest extent of the empire. The importance of this timely role

given imperial commitments elsewhere in the empire is detailed. Following the death of “Chinese” Gordon at the hands of the Mahdi’s troops at Khartoum in 1885, New South Wales offered a battalion of infantry to support British operations at Suakin. The significance of this gesture within imperial decision-making is noted. A brief examination of colonial armed forces introduces a rather more detailed look at munitions production decisions taken in Victoria, the only colony with a Defence Ministry. The disparate strands of finance from the Gold Rushes and the origins of industrial infrastructure and manufacturing within railways purchasing policies are considered. The details of emerging weapons technology, and the structure of the British weapons and munitions industry in context with the decisions made in Melbourne, bring the topics of economics, finance, technology and colonial political perceptions, up to the threshold of federation, the South African War, and the changed strategic balance in the Far East within the British Climacteric from 1895 to 1905.

Essentially the Climacteric was the shift in British standing in relation to international power. The new industrial powers of the United States, Germany and Japan with their modern and expanding navies marked the end of Royal Navy domination of the seven seas. There was an erosion of British financial, industrial, naval and military power, which at the time of the South African War saw Britain and her empire, alone and friendless in the world. Early in the twentieth century a naval treaty was reached with Japan allowing the Royal Navy to concentrate in the North Sea, an entente was formally established with France, while ongoing appeasement of the United States in all disputes, allowed a close relationship to evolve. Joseph Chamberlain’s idea of tackling the obsolescence of British industry was categorically rejected by both government and The City financial interests. The joint-stock banks financed British Empire trade, which supplied raw materials to the world’s industrial countries in British ships, British industry it should be noted, was not financed by The City.

Notwithstanding British enthusiasm for military, financial, and industrial involvement with Japan, Chapter five explores the antipodean dominion's perceptions and reactions to the stark terms of the new military and political situation in the Pacific. Japan had fielded an army as large as that of the British Army in South Africa, and, defeated a well-equipped European army, and navy in the Russo-Japanese War. Her later capability to mobilise and transport a million trained men... alarming! Autonomous munitions production from local materials, and a national navy were perceived by both sides of Australian politics as prerequisites to national and racial survival in a hostile world. These political and industrial decisions are examined within the imperial context.

It is suggested that; a century beyond this narrative questions about the reliance on exports of ores and minerals, and the failure to train adequate numbers of engineers, chemists, scientists, and a wide range of technicians, plus a focus on service industries, continues to generate dependency on imports of manufactures that may be analogous with the era of this study.