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 *Pax Britannica*, 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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I wish to record thanks and appreciation to Dr Wayne Reynolds of Newcastle University who put me on this path, which led via Janet Phillips of the History Department, to Dr Andrew O'Neill, Director of Studies for International Relations. As an amateur dabbler in the field, having an opportunity to explore my historical interests and experiences in a sympathetic academic environment, I found the niche denied me in earlier life, and in later life, within supervised Creative Writing.

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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 Griffths 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

[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

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

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

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.

Chapter 1

The Australian Colonial Economy until the 1880s

Introduction

The first settlement in New South Wales was established in 1788 five years before the French Revolution. Following the Battle of Waterloo in 1815, Britain dominated the counsels of Europe with moral force. In the immediate aftermath of the Napoleonic Wars in concert with the United States declaring the Munroe doctrine, Britain blocked French moves to transport Spanish troops across the Atlantic to retake Spain's colonial empire. An informal British empire was established from Mexico to the Argentine. *Pax Britannica,* liberal ideas, free trade and domination of the seven seas, was to hold sway, undisputed till 1864.

English production of woollen fabrics for export in this post 1815 era, established a voracious demand for wool leading to the parallel development of both Australia and the Argentine. With leather used in the construction of the looms, cattle hides were an important export for the latter. Separate colonies were established around the Australian littoral. With vast areas of pastoral land accessible from the coast, wool

producers dominated the economy and society until the Gold Rushes of the mid 1850's.

Within the formal empire, the Crown owned land. This legal and constitutional structure was common to both Britain and the Colonies. Thus a lender in London enjoyed the same legal rights and obligations in regard to a colonial borrower as he did with borrowers in the British Isles. The importance of the British banking system, the Gold Standard as the Sterling system became known, underpinned world trade till 1914 is stressed. In conjunction with the British Merchant Marine operating within the worldwide projection of the Royal Navy, goods, money and people were able to flow in both directions. The growth of credit in British banking, the use of cheques, and the acceptance of paper for transacting the world's business in London meant the requirement for gold was minimal compared with France and Germany where much of the economy relied upon gold coins.[3] The unspoken reliance of the London banking houses on support and cooperation from Paris during this era is stressed, as a contrast to the perceptions in the antipodes, about war scares with France.

[3] De Cocco, Marcel in *Money and Empire* suggests in the late 1890's £30m as the effective Bank of England gold reserve. British domestic finance revolved around bank credit and paper – cheques. While something like twenty times that amount of gold coins, were in everyday use in both France and Germany.

Following the 1850's Gold Rushes the influx of population, "diggers with political agendas" gave rise to a requirement for close settlement to produce food, the establishment of small firms to manufacture clothing, footwear, and saddlery to provide goods people needed and jobs, changed the political landscape. Recognition in Whitehall, that the American colonies had been lost, because of a failure to grant local self-government, led to colonial self-government for Australian colonies. The idea of universal male franchise and acceptance, there was no question of the Irish being denied the vote,[4] led to a dynamic political structure in contrast with the Argentine where the Italian 'golondrinas' were denied the vote.

Colonial self-government enabled governments to borrow in their own right in London for development. Building railways achieved a number of things. A government bureaucracy was established, with engineering workshops to maintain the imported engines and rolling stock. In Victoria, through railways purchasing policies, local engineering manufacture was nurtured behind tariffs. By radiating in from the littoral new areas of land accessible by bullock wagon journey beyond the railway, expanded pastoral production of wool a commodity for which there

[4] Based on Schwartz *In the Dominions of Debt* the actual quote not identified but – a self-evident remark to Anglo-Australians of an older generation.

remained a firm market. Funding of the operation relied upon the sale of land adjoining the tracks. Political factors led to settlement schemes, which because of the pastoralist domination of Upper House Legislatures achieved few of their intended long-term social benefits. Free-holding of pastoral properties, the valuation set by the benchmark of official sales of land adjoining the railway, enabled pastoralists to borrow mortgage finance. Selectors exploited their legal options typically by choosing a waterhole at the heart of a pastoral property, and by adding claims for hundreds of acres each in the names of their wife and children. To consolidate and develop viable pastoral properties after the eyes had been picked out by selectors, money had to be borrowed to buy them out.

From the 1850's onward, concurrent with self-government there were war scares over Russia during the Crimean War and perceptions, of dangerous incursions by France and Germany into the South Pacific. Fragmented from each other by geography, relying mainly on coastal shipping for interstate transport, sporadic efforts were made for local defence. A significant role of serving army and navy officers, and veterans in the early colonial development was established. The achievements of engineers and surveyors, and perhaps, the cohesion between colonial bureaucracies, separated by long distances, relied upon these large numbers

of serving and former officers. Their influence on topics relating to defence and administration is noted.

EARLY SETTLEMENT – THE CROWN OWNER OF LAND, AND THE STERLING FINANCIAL STRUCTURE

Five years before the French Revolution of 1793, Britain undertook the settlement and colonisation of New South Wales, on the eastern coast of an unexplored continent in the antipodes. The colonial settlement of Australia essentially marked the beginning of Britain's Second Empire. For some decades the financial and maritime resources were found to maintain and nurture this distant colony during the Napoleonic Wars and beyond.

Following the battle of Waterloo in 1815, the Royal Navy and Marines projected the writ of *Pax Britannica* over much of the non-European world. *"Pax Britannica* - the special contributions that Britain made towards setting Europe for a time on a different course – was rather more the influence she exerted on the attitudes of other people, and therefore on the policies of other governments, by her own liberal and

highly rewarding policies."[5] Unlike the Romans, this rarely relied upon direct police powers.

Within the post 1815 world of political and commercial stability, the British woollen industry required expanding volumes of wool. The voracious demand for wool, underwrote pastoral development in both Australia and Argentina. Disparate dependent colonial pastoral economies were established sequentially around the Eastern Australian littoral, and radiated inland. Pastoral development in New South Wales and Victoria proceeded in tandem with the rise of the English woollen industry through the first half of the nineteenth century.

Initially pastoralists simply drove flocks of sheep out into the hinterlands and "squatted." In Australia the Crown owned land. The saga of land tenure is considerable. Leases were granted under an 1847 Order in Council. As these expired, Crown lands were open to free selectors. Land Acts to encourage small-holders were enacted during the nineteenth century. This topic is explored within the later context of Colonial self-government, and the dominant pastoral industry. Herman Schwartz

[5] Imlah, Albert H *Economic Elements in the Pax Britannica* Russell and Russell New York 1969 (Reissued) p2

puts the cogent case[6] that this imperial legal structure in colonial Australia within the context of 1890's Great Depression, ensured far-reaching social, political and economic changes came about following the foreclosures on mortgages secured by pastoral land holdings.

As dependent economies the Australian colonies relied upon Britain for their finance, export marketing, manufactures and predominantly, their immigrant inflow. During this period of early settlement finance from London was directed to pastoral development geared for export of wool to meet the demands of the British woollen industry while simultaneously providing a market for manufactures. The propertied classes, pastoralists producing wool dominated colonial politics. Pastoral development and later, cropping, predominantly of wheat provided the export income to maintain and increase both the private and public borrowings.

The Australian settler economies flourished within the Imperial framework of administration and law under the Crown: with sterling finance, (the later Gold Standard,) underwriting world trade, and migration from the metropole to the

[6] Schwartz, Herman *In the Dominions of Debt: Historical perspectives of Dependent Development* Cornell University Press Ithaca New York 1989

periphery. During the latter half of nineteenth century (British) Imperial expansion, and the development of the sterling system, to a large extent moved in lockstep.

As a result of drought in 1843 New South Wales went through a depression of great severity. In September 1843 an Act of Council was passed permitting banks to lend against liens on live-stock and wool." Despite disallowance from the Colonial Office the Council stood its ground. Banks either lent on these terms or trade stopped. [7] The pastoral industry was able to move on. Inland transport with bush coaches and bullock wagons brought communication to the outlying areas.

It may be helpful to consider the origins of the British financial system within which Australia was established, traded, developed, fought, and remained within for nearly two centuries. In the period in question the joint-stock banks and the finance houses of The City in London dominated much of the world's trade, and public borrowings. It is pertinent to note that the operations of industry, finance, and government were to a large extent, discrete. This reality was clearly demonstrated to Joseph Chamberlain in his efforts to address the industrial challenges associated with the British

[7] Shann Edward *An Economic History of Australia* Georgian House Melbourne, 1963 p107

Climacteric of 1895 to 1905. The problem of the mass-production revolution was brought home with a vengeance in, "The Munitions Crisis of 1915."

"It has long been appreciated that money forms the 'sinews of power'."[8] This is demonstrated by the ability of the British government to finance wars with France for sixty-nine of the one hundred and twenty five years from 1689 to 1815[9]. The Bank of England and its role as a central bank did much to enable the English banking system to weather periodic crises acting as a bankers bank, and lender of last resort.[10] "The government drew freely on a somewhat reluctant Bank of England to finance the Napoleonic wars."[11]

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[8] Schultz, Kenneth A and Barry R Weingast "The Democratic Advantage: Institutional Foundations of Financial Power in International Competition" *International Organization* Volume 57, number1,Winter 2003 p5

[9] Schultz and Weingast ibid p17

[10] Lobell, Steven E "Second Image Reversed Politics: Britain's Choice of Freer trade or imperial Preferences, 1903-1906, 1917-1923, 1930-1932" *International Studies Quaterly* Vol.43 No.4 (Dec. 1999) pp671-693 "The government decision to abandon the Gold standard in 1931 reflected the growing weakness of the financial sector and its acceptance its orbit of leadership was permanently reduced to countries that linked their currencies to the pound, creating a Sterling Area. With abandonment, the government, advised by the Treasury, replaced the Bank of England as the authority over monetary policy…" p 687

[11] Polk, Judd *Sterling: It's Meaning in World Finance* Published for the Council of Foreign Relations Washington 1956 p31

The following is an official Treasury description of how this system evolved, and what it achieved.

> The sterling system originated in the first half of the nineteenth century in the process of bringing some order into the heterogeneous coinage systems and rudimentary banking arrangements which then prevailed in most of the colonies.
>
> First, the local currencies and bank-notes were statutorily regulated as local versions of the pound, printed or stamped with local symbols but all representing the sovereign or legally defined fractions of it, and all backed with some obligatory holding of sovereigns of gold.
>
> Secondly, all looked to London as their metropolitan centre for the employment of surplus funds which could not be invested with the necessary liquidity in the colonial countries themselves.
>
> Thirdly, as trade increased, all looked to sterling as the currency for their external transactions…
>
> Fourthly, all looked to London and the United Kingdom for the raising of new capital, predominantly for private enterprise but largely for governmental, provincial or municipal issues.
>
> It must be noted too that, besides these monetary links with London, London was and has remained the centre for such connected activities as merchanting, insurance, shipping, etc. [12]

The gold standard held sway over what was effectively global commerce. The Bank of England maintained control over sterling in the Australian colonies and The

[12] Conan A R *The Rationale of the Sterling Area* Macmillan and Co Ltd London 1961 p33,34 Principal Memoranda of Evidence Vol 1 H M Treasury to the Radcliffe Committee.

Colonial Office had the authority to override colonial legislation. *London lenders had the same powers in Australian colonies as they enjoyed in the United Kingdom.*

It is pertinent at this stage of the topic to add, from the 1820's onwards the links between The City, the privately owned and managed Bank of England, and the banking establishments in Paris, were very close, as the following example demonstrates.

An early example of Anglo-French financial cooperation in contrast to raising rates on the open market to attract funds, is cited in connection with a 'run" in December 1825. Usury laws placed a ceiling of 5% on rates of interest being offered to the market at large, for banks other than the Bank of England. There had been a run on the banks and a need to attract funds.

> But one expedient, destined to be used again and again reverted to, and ultimately to become classic, was the seeking of assistance to the extent of £2,000,000 from the bank of France.[13]

In 1839 after the stock of bullion in London had declined to £2,522,000 The Bank of England working through Barings as their agent borrowed £2.5m from the Bank of France and £0.9M from Hamburg. "The "deal" was done through Barings, who, in

[13] Powell, Ellis T *The Evolution of the Money Market 1385-1915* Frank Cass & Co Ltd London 1915, 1966 p329

spite of their heavy commitments already mentioned, were apparently quite equal to this gigantic undertaking." [14] Fifteen of the principal banks in Paris agreed to accept

> bills drawn by Baring Brothers, for the account of the Bank of England… The bills were to be discounted by the Bank of France, while the Bank of England was to deposit English securities in the hands of the French institution.[15]

This action averted a financial crisis and marked the beginning of interdependence in financial markets, which became progressively interlocked over the nineteenth century. "There are in Europe," said the duc de Richelieu in 1819, "six great powers - England, France, Russia, Austria, Prussia and Baring Brothers." [16] British finance, foreign policy, and *Pax Britannica* were, therefore acceptable to the majority of foreign powers who engaged in international trade.

History of the money market, essentially that of British finance,[17] suggests from a decade after Waterloo, the interests of French and English banks in maintaining confidence in international finance make a mockery of the Anglo-French war scares fostered in the minds of the public by the press in the metropole and in colonial outposts, periodically after the Crimean War.

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[14] Powell, Ellis T ibid p340

[15] ibid p340

[16] ibid p340

[17] Remarks based on scanning of Powell

COLONIAL GOVERNMENTS – THE PASTORAL ECONOMY – URBAN DEVELOPMENT

The 1850's Gold Rush in Victoria created an immediate increase in population of 'gold-diggers.' Concurrent with the Gold Rushes was intensive agriculture of small farms to feed them. The numbers of former diggers brought an urban population to Victoria. They had to be found housing, jobs and food. The expansion of urban areas, urban development, and the establishment of small manufacturing enterprises to supply goods and provide employment followed. Arising from this, substantial local capital literally dug up within the colony, was used in the financing of pastoral and mining operations.

> Twelve months after its foundation in 1835 Melbourne's population was a miniscule two hundred, growing in the next decade to twelve thousand. Stirrings for the creation of a university began mid-century when the numbers had barely passed twenty thousand, and the movement gained impetus when the separation of Victoria from New South Wales was proclaimed in 1851. Sydney University delivered its first lectures in 1852 and this evidence of rival progress spurred the rumbustious Victorians. Aspirations for a university of their own might have suffered a long delay if there had not been a frenzied era of abundant wealth, consequent on the discovery of the world's richest goldfields not far distant from Melbourne. In the first decade of their exploitation they produced one-third of the global output. In 1851, the year of their discovery, some 700 interstate and overseas ships entered Port Phillip; the following year the surge of gold seekers really commenced and along came 1657 ships, peaking to 2596 in 1854, a tally not to be exceeded until 1888. The population of Victoria responded accordingly, leaping from 86,000 in

> 1851 to 253,000 in 1854, by which time Melbourne itself was nearing the 100,000 mark. … [18]

With the Gold Rushes the sudden influx of settlers and urban expansion, changed the political outlook. Many of the diggers had political agendas. "The immigrant population… had a widespread tradition of political radicalism - for Australia, French socialists, English chartists, German republicans, and Irish rebels…"[19] Over time there was the rise of organized labour.

Given official acceptance in Whitehall that the loss of the American colonies was due to a failure to relinquish administration to local autonomy, self-government for settler colonies was unquestioned within the liberal precepts of *Pax Britannica* in the mid-eighteen-fifties. This cognisance ensured limited self-government was granted to the Australian colonies from the 1850's onward. In contrast with the Italian golondrina's[20] in the Argentine, British subjects who immigrated to Australian colonies enjoyed the franchise. There was no question of denying the vote to the

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[18] Weickhardt, Len *Masson of Melbourne* Royal Australian Chemical Institute Parkeville Vic 19 89 p25/6 Sir David Orme Masson was the professor of Chemistry at Melbourne University, had produced his doctorate on nitro-glycerin and was, (this author asserts,) an important if unsung protagonist in the field of explosives in Victoria till his retirement in 1923.

[19] Moran, Theodore H "The 'Development' of Argentina and Australia" *Comparative Politics* October 1970 p75

[20] "Swallows," the Italians agricultural labourers, mainly from Northern Italy, sailed out for the harvest, and returned in the winter. Their numbers were substantial and consistent. Schwartz

Irish.[21] With self-government in the 1850s formal male suffrage was enacted.[22] Politically, from the time of colonial self-government, the various domestic agendas of the new population had to be heeded. Australian colonial settlement, and the development of self-government within the protection of *Pax Britannica* in the 1850's enabled settler societies to flourish.

With local self-government under the Crown, the legal and constitutional structures remained. Colonial governments were now able to borrow in London against the assured income from export sales of wool, and they assumed responsibility for development and local defence. But defence policy, and foreign policy (as opposed to a colonial outlook, which resented the presence of France and later Germany in

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[21] Schwartz Herman *In the Dominions of Debt: Historical perspectives on dependent Development* Cornell University Press, Ithaca and London 1989 p78 "The Irish-Australians were British subjects - citizens and could not be openly dis-enfranchised like syndicalist Italians in Buenos Aires who lacked Argentine citizenship." This is in the later context of federation but the observation, was always valid. The remark is axiomatic. A further thought. In the late sixties the author was adverse to the vociferous and influential Communist Party of Australia. A former ASIO Section Officer, a lecturer in Commercial Law, provided an insight, appreciated after writing this piece as to why, nothing violent ever happened to Communist Party of Australia members. "Half the membership is Irish. They were brought up as strict Catholics by parents making them attend church every Sunday. Now they are the backbone of the Party…" There is another aspect put forward earlier by Schwartz. Re-emigration from Argentina was an easier proposition than from Australia, which had some considerable bearing on the attitudes of Australian workers to stand and fight.

[22] Shann, Edward O G *An Economic History of Australia* Georgian House Melbourne reprinted 1963 p287

the South Pacific abreast the sea routes thousands of miles away to the east of Australian shores,) remained an imperial prerogative. From earliest times, the activities of the 'state' or government in Australian colonial history assumed a socialist role. The 'state' was the major employer creating a bureaucracy to administer the colony, but also the builder of the railways, and of the associated infrastructure of the economy.

Colonial governments by pushing railways into the interior were able to sell the now valuable land adjoining the tracks, to pastoralists. The two operations fed into each other. While wool prices remained steady, capital continued to flow from London. Similarly the buoyant pastoral economy, railway expansion and employment "[o]f an enlarged middle class based in government bureaucracy (especially the rail), and by the rail systems' local purchases,"[23] flowed back into a speculative urban land and development boom… Underwriting these operations was, "… a strong imperial or central state that could control land ownership and maintain a stable currency."[24] This bottom line ensured continuing access by Australian colonial governments to The City lenders for new funds.

[23] Schwartz, Herman M *In the Dominions of Debt: Historical Perspectives on Dependent Development* Cornell University Press Ithaca 1989 p84
[24] Schwartz ibid p195

After Peel abandoned the Corn Laws in 1846[25] it opened the British market for exports of grain from regions of new settlement. And, for a later Australian generation, exports of refrigerated meat, butter and fruit as well.

> Between 1870 and 1914, British investors in the Australian economy poured about 70 per cent of their capital into colonial governments. This was largely for railway construction to facilitate the transport of food and raw materials to the seaboard and thence to Britain. The railways pushed quickly and recklessly into the newer areas of agricultural land settlement. The remaining investments in the private sector were concentrated at the beginning of this period in the banks and financial, land, and investment companies.[26]

Extending cropping settlement into the north of South Australia, proceeded under the belief, "Rain will follow the plough." Today, north of Port Augusta the deserted and ruined railway sidings, planned towns to which the only remains are names on a billboard with a brief explanation. Crumbling stonewalls beyond testify to the 'recklessly' adjective applied to of areas of settlement.[27]

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[25] Kennedy, Paul *The Rise of the Anglo-German Antagonism 1860-1914* George Allen and Unwin London 1980 p42

[26] Cochrane, Peter *Industrialization and Dependence: Australia's Road to Economic Development, 1870-1939* University of Queensland Press St Lucia 1980 p32 footnote #3 A R Hall, *The London Capital Market and Australia 1870-1914* ANU Canberra 1963 chap 4

[27] Meinig, D W *On the margins of the Good Earth the South Australian Wheat Frontier 1869-1884* John Murray London 1963

Hall notes that Scotland was the major source of funds for the debenture finance upon which the land-mortgage companies relied. The cities of Edinburgh, Glasgow and Aberdeen were the leading centres for establishing such companies, while even English companies had offices there to obtain debenture money "not for use in Australia alone, but for India, Canada, South America…"[28] Besides Australia the companies operated in New Zealand, the United States and Canada.

Pastoral expansion funded by overseas investment, Scottish rentiers, London banks, and mercantile companies based in Melbourne proceeded unchecked for a generation. The requirement to sink dams, fence properties, buy out selectors, and make improvements required a tremendous amount of (mortgage) finance. This had changed since the simple bill financing of 1843.

> Private investment in Australia between 1876 and 1880 amounted to £11,600,000, and of these some eight millions went into the mother colony as deposits, or share capital for banks or land and finance companies. There all financial channels led to stations. With the new money, squatters bought, fenced, watered and improved their runs. Their purchases swelled the government revenues from land.[29]

The pastoral and later small-farming industries were financed in the main by Britain. As both suppliers and customers, flows of money, trade and people went in both

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[28] Hall A R *The London Capital Market and Australia 187-1914* Social science Monograph no.21 Australian National University 1963 p117

[29] Shann *An Economic Hist…* p304

directions. With trade a bourgeoisie established in the ports. Imports of consumer goods, export shipping, local manufacture to supply the pastoral and city markets, all required capital, entrepreneurial and trade skills.

> Agitation by unemployed miners, by gold-created professionals, and by merchants… led in the 1860s to a number of Land Acts in Victoria and New South Wales. The Land Acts opened leased land to outright purchase, in the hope individuals, especially the unemployed, would establish family farms and so relieve urban unemployment and its consequent political tensions.[30]

Political pressure to facilitate closer settlement with agriculture and cropping as had happened in the American West was the hypothesis. Sir John Robertson pushed through both (NSW) Houses his second Act, the Crown Lands Occupation Act.[31] This reduced the term of leases to five years. Under this Act any man with residence and ten pounds was eligible to select land.

The result of this effort to assist honest men to settle had two shortcomings. Much of the interior of New South Wales was unsuited to cropping.

> As the law stood until 1875, anyone adult of infant might select his or her 320 acres. Many a family settler, by clubbing his own and his children's selections, made up a run of perhaps 3,000 acres or more.[32]

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[30] Schwartz Herman F "Foreign Creditors and the Politics of Development in Australia and "Argentina, 1880-1913" *International Studies Quarterly* (1989) 33 281-301 p285

[31] Shann ibid p198

[32] Shann ibid p202

The chicanery arising from this required pastoralists to buy out selectors. There had been no requirement for selectors to fence their holdings. Effectively pastoralists had to pay blackmail, and indulge in all manner of activities to retain their landholdings. During this era, economic conditions favoured squatting, hence the social legislation was a failure, and the bottom line was, pastoralists wanted security of tenure. Large-scale purchases of pastoral properties required a lot of borrowed money.[33] The banks were committed to ensuring the wool industry flourished. Mortgages were substantial. The cost for fencing a large station was in the vicinity of £25,000 to £50,000.

Quantifying some of this background to the voracious capital requirements of the pastoral industry is the following. Referring to the 1870s to 1880's Hall states,

> During that period sheep population increased from 40,000,000 in 1871 to 106,000,000 in 1891, while the output of wool increased at an even faster rate from 208,000,000 lbs. in 1871 to 634,000,000 lbs, in 1891…[34]

While yield per sheep and improvements in flocks was a factor, the requirement to fence runs, establish artificial water supplies, bores, dams, reservoirs, the windmill is part of the lore of the era,

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[33] Hall ibid p131

[34] Hall A R ibid p130

> … these years saw the introduction of the Wolseley shearing-machine which required substantial buildings to house the machines and steam engines to supply them with power.[35]

A further point at this juncture is the control that squatters had of Legislatures' Upper Houses which enabled them to block reform of the Land Acts in favour of smallholders. The use of property and residential qualifications to disenfranchise their migratory labour assisted their activities.[36] This political power exploited the official sales of land adjoining railway lines as freehold as grounds for freehold of their stations and logically access to mortgage finance. It was a demonstration of their ability to preserve their landholdings [37] albeit in thrall to lenders.

South Australian ideas led to mechanical harvesting and mechanized cropping. The jump stump plough, and Ridley's stripper, invented during the gold strikes[38] were the result of scarce and expensive labour. Capital requirements for machinery were significant, but mechanised farming, was established in South Australia. In essence, wages were high for farm labour in Australia and profits arose from replacing men with machines. In the segmented farming of Europe this was not an issue. There is a

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[35] Hall ibid

[36] Schwartz *ISQ*… p 287

[37] Schwartz ibid p285

[38] Shann *An Ecominic Hist…* p219

perception that there was a failure to exploit many ideas and inventions thrown up in the Australian colonies during the nineteenth century.

During the decade to the early eighties the land under crop had increased from 2.14 million acres to 4.6 million acres. The wool price was steady coupled with good seasons, the discovery of silver, lead and zinc at Broken Hill in 1883 plus other mineral discoveries, encouraged further land speculation.[39]

In the 1870s and early 80s the wool price was at a peak. The pastoral lands value reflected their wool cheque. It was from this that repayments were made. Then as now, station prices reflected their value as going concerns. But as British wool consumption slowed, and prices fell in the late 80s pastoralists borrowed to further increase output. The aggregate effect was increased production of wool sold into a shrinking market. By 1894 wool prices were just 63 per cent of 1870 prices.[40]

With the depression of the early nineties the pastoralists were trapped. They were heavily mortgaged. Interest, 20 per cent of the value of wool production in 1881 had risen to 40 per cent in 1887. Profits were squeezed.

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[39] Shann ibid p303

[40] Schwartz *ISQ* p286

> Advances had been made against stock and stations on the basis of values existing prior to 1884, and in 1889 these values had to a great extent disappeared. [41]

The need to meet repayments on finance led to overstocking. The "permanent" destruction of pastures[42] was something not envisaged in that era. Combined with an over-supply of wool and a depression till the mid 1890's pastoralists as a class of capitals had little room for manoeuvre.

The dependence of the Australian colonies on the production and export of wool until the nineties depression, had dominated political and commercial decisions. Public spending on (urban) development had encouraged urban land speculation. Speculative fever undertaken by urban speculators with money obtained from private borrowings in London gripped Australia, in the mid 1880's. Pastoralists had similarly joined in. Funds poured into urban land, shares in, land companies, finance companies speculating in land, and mining companies. Land speculation interacted with the building industry and railways.[43] With the downturn in wool prices, and the reluctance of lenders to continue lending, there were problems...

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[41] Schwartz *ISQ* p286

[42] Florin, Raimundo Carlos *International Borrowing and Financial Crisis in Australia and Argentina in the 1890's* Thesis PhD University of Illinois at Urbana-Champaign 1986 p173

[43] Florin ibid p168 On reviewing this – Hall insisted the building industry was a major economic player, a detail not explored by the later sources. Florin's remark therefore, is very interesting.

Len Weickhardt provides fascinating backdrops of the period in his biography of Sir David Orme Masson, the professor of Chemistry at Melbourne University.

> When the Massons arrived there were a million people in the colony, of whom 40 per cent were in Melbourne, … By 1886 the population growth of the city had exceeded one-third of a million in thirty-five years, posing intolerable strains for housing and civil works. Though gold brought wealth, it caused scarcity of labour which inevitably became expensive, so that provision of roads, drainage and refuse disposal was grossly inadequate. Some fine buildings had been erected, including the immense complex in Carlton gardens for an International Exhibition in 1880, but they served only to heighten the contrast with the squalor and misery of nearby industrial areas.
>
> This ferment of humanity, assembled from many countries, could on the one hand tolerate abominable living and working conditions, and yet from the earliest years be determined to have a university and a public library. The zeal for progress was such that it gladly sought to adopt the most recent advances, so the 1880's saw the introduction of electric lighting, telephones, and an elaborate network of cable-car routes in the city and suburbs – Probably the best transport innovation Melbourne ever achieved.[44]

In 1888 the land boom collapsed. The involvement of politicians in both the financing institutions and land sales ensured the reality of the situation was concealed for three years.

Relying again upon Weickhardt describing a dinner attended by Masson.

[44] Weickhardt, Len ibid p26

An extraordinary picture of the state of Melbourne society at the period emerges from the report of the sixty-ninth dinner held at the Vienna Café, Collins street in 1 October 19892. The Master that evening was Frank Stuart, a member of parliament and a leading merchant of the town. His guest was the former Premier, Duncan Gillies, a long-time parliamentarian who became Premier in 1886 but was swept from office in 1890. His ministry was notable for its incredible extravagance. Free rein had been given to land boomers, railway developers and to many excesses far from prudent banking practice. Alfred Deakin had been his Chief Secretary and, although a brilliant barrister, 'does not seem to have brought his keen intelligence to bear on the State's headlong rush to disaster.' He had been chairman of some of the enterprises which came to grief and this role is supposed to have made him reluctant to prosecute the agents of financial doom with any vigour.[45]

[45] Weickhardt, ibid p37 It may be noted, Deakin is quoted elsewhere by Meaney, *The Search for Security in the Pacific 1910-1914* Sydney University Press Sydney 1976 as suggesting the French should be sorted out…

SIGNIFICANCE OF COLONIAL RAILWAYS INFRASTRUCTURE

The London financial markets recognised Australian colonial governments within the imperial structure, as having the sole authority to tackle the development of infrastructure for their respective settler economies. Arising from this dominant position, government became that of major employer in all colonies.

Railways became the major enterprise of colonial governments across Australia.

> … the rapid construction of railways was begun in the seventies. Once under way, regional parliamentary log-rolling and the undoubted 'beneficial' effects of railway construction on the level of employment and the rate of wages combined to ensure its continuance.[46]

The role of government in building the railways underwrote public employment with an associated bureaucracy and engineering workshops. The commercial and employment implications of branch line construction, also led into the murky realms of political influence. Their legacy was different railway gauges across Australia.

Railways facilitated expansion inland a bullock wagon journey beyond the end of the tracks. By opening up the hinterlands, the Crown was able to sell the land adjoining the tracks for income. The high minimum price set for official land sales raised the

[46] Hall A R ibid p123 footnote 4 see *The Economist*, 1889 pp959-60 and 1468.

value of adjoining lands. Pastoralists obtained greater collateral. Previously the banks lent only against their income from wool.[47]

The importance of coastal shipping till well into the twentieth century makes some observation about the discrete rail networks pertinent. The design specifications for the small runs of locomotives manufactured in the U K for export, were dictated by Engineers on the periphery. [48] That there were later industrial implications for British manufacturing practice in the context of "Individuality" of specifications for colonial locomotive requirements is part of the later analysis. English locomotives were built using the best materials and great skill. An engine was precision engineered with craftsmanship to last a lifetime. The American machine-tool and engineering industries had from their earliest beginnings, embraced a different focus. Steam locomotives made to a common design were produced in quantities, using steel pipes instead of copper for example, and the operating life was consequently much shorter. The designs of American locomotives also reflected different operating conditions, for example the ability to climb hills. The capacity to produce and deliver new and

[47] Schwartz, *ISQ* p286

[48] Saul, S B "The Market and the Development of the Mechanical Engineering Industries in Britain 1860-1914" *The Economic History Review New series* Vol 20 No.1 April 1967 pp111-130

more powerful locomotives in a shorter timeframe, led in later periods, to colonial customers borrowing in London, but buying American engines.[49]

The railways not only had the largest and most advanced engineering workshops, but through their purchasing policies they also underwrote local manufacturing enterprises.

> … the Victorian government ordered state railways to buy local goods. Resulting contracts for locomotives created engineering and metallurgical firms. Despite a later start and a smaller population, manufacturing output in Victoria soon exceeded neighbouring New South Wales.[50]

To an extent, the establishment of railway workshops integral to the respective colonial railways followed British practice. The reality required the colonial railways workshops in the smaller Australian colonies had to be able to repair and manufacture, as in reverse engineer, literally anything connected with the locomotives or rolling stock if the railways were to be kept running. The implications for this were, the broad degrees of skill and initiative inculcated in the engineering

[49] This remark is probably based on Platt, quoting an example from New Zealand over delivery problems from Britain.

[50] Schwartz *In Dom. of Debt* p59

trades in Australia, were probably greater than comparable levels in countries with immediate access to heavy engineering works.

The following illustrates the British railways structure.

> The locomotive industry was considerably more complicated on account of its unusual structure. There were in fact two industries, the railways workshops and the private locomotive builders. The railway companies inevitably required extensive establishments for the repair and maintenance of their engines, carriages and wagons, and this was their prime function. But unlike those in almost every other country, the companies in Britain also manufactured engines for their own use.[51]

It is self-evident that the running of railways on the other side of the world from Britain required adequate workshop and maintenance facilities. The structure and workshop organization of British railway companies was replicated. The importance of the colonial railways workshops as centres of industrial technology cannot be over-emphasised. The role of these establishments in munitions production will be addressed later in the thesis.[52] The reality was, that only governments in the colonies had access to the finance to establish such enterprises. This ensured the technology

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[51] Aldcroft, Derek H *The Development of British Industry and Foreign Competition 1875-1914* Studies in industrial enterprise George Allen and Unwin London 1968 S B Saul, Chapter 7 "The Engineering Industry" by p195

[52] Jensen J K *The Development of Munitions in Australia* address at Assembly Hall Melbourne June 1st 1943 p6 Referring to production of 18 pounder shell in Australia during the Great War, "Incidentally, during the period the Victorian Railways made some experimental 4.5 inch and 6 inch shell, thus being the first to do that in Australia."

was embraced and maintained after the initial importation of locomotives, rolling stock, and rails. The railways were crucial to every aspect of economic and social activity during the nineteenth century. They were the arteries of the separate colonies, radiating inland from the littoral. Notwithstanding their public service structure, they were a significant and prestigious employer. Their trade skills and training were at the cutting edge, while their management of routine finance, and administration similarly reflected current methods.

The expansion of railways brought reliable communications into the interior. Bullock-wagons carting wool, and droving stock to rail-heads gave access to markets on the seaboard. Freight rates charged by the railways commonly failed to incorporate their annual interest payments accruing to London, thereby effectively subsidizing export freight costs.

The substantial outlays for maintaining and running railways were an ongoing commitment. "…[t]he rail deficit was in most years larger than the overall budget deficit-"[53] The question of how much the overheads and investment in the railways should have been incorporated into freight costs for wool railed for export was a debate examined beyond the colonial legislatures. Effectively the rail transport of

[53] Schwartz *In the Dominions 0f Debt…* p 91

wool for export had been subsidised by the railway operating costs. Annual reports of state rail authorities were carefully scrutinised. "But London's discovery that only Victoria's budgetary hand-waving had turned a large deficit into an imaginary surplus in 1889 soured it on Victorian issues. London critics claimed that the "official earnings of the [Victorian] Railways [were] open to grave suspicion," describing Victorian balance sheets as "the annual lie."[54] Governments were compelled to undertake direct taxation on land and income. This, "[p]ut fresh burdens on pastoral production, on devalued urban property, and on the rich."[55]

The railways, as arteries of commerce and interior communication, required public borrowings of such magnitude, that the later prospect of Australian colonial default, called into question the stability of the Bank of England.[56]

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[54] Schwartz *In the Dominions of Debt* p62

[55] " ibid p91

[56] From a reading of Hall A R p171 this later perception of Schwartz' which may not be entirely correct, is attributed to T A Coghlan *Labour and Industry in Australia* pp1646-1647 On the other hand, Schwartz has assiduously consulted the London financial journals of the day.

COLONIAL SELF-GOVERNMENT THE ROLE OF SERVICE OFFICERS WITHIN IMPERIAL AND WORLD-POLITICS

As early as 1853, when France annexed New Caledonia public criticism was expressed by the self-governing colonies. Successive naval, or military threats were perceived initially from Russia at the time of the Crimean War in 1854, and more realistically, from colonial expansion by "the old enemy," France.[57] In common with New Zealand, there were visionaries, and the occasional newspaper opinion in favour of excluding all foreign powers from the region, but, until 1870, there was no political interest in the topic.[58]

Australian settlement had taken place largely within the context of,

> British strategic and military concerns at the end of the eighteenth century and the beginning of the nineteenth century.
>
> As a result of those concerns it followed that a large number of early settlers came from a military background. Much of the early exploration

[57] Having regard to the date of Waterloo, many of the men now being considered had grown up within generations of war with France. The author remembers chatting to an old British soldier, who in the Vietnam era had jobs like Parking Inspectors with the Adelaide City Council, in a uniform wearing hard-earned post-war ribbons… "My mother's family had been soldiers for seven generations…" And, "The Germans will cause trouble again."

[58] Meaney, Neville *The Search for Security in the Pacific, 1901-14* Sydney University Press Sydney 1976 p16

> of the country was performed by military officers, as was the early mapping and surveying. Army engineers contributed to the building of roads and bridges, which in many respects defined the modern transport network in this country.
>
> In politics and administration too, military personnel played an enormous role in the first century of white settlement. Between 1788 and 1888 there were ninety governors, lieutenant-governors or administrators in the six Australian colonies. More than one-third of these people were serving military or naval officers, and half of the remainder had prior military experience before taking up their political office.[59]

(Lieutenant-General Gribeauval, following French army failures in the Seven Years War, established officer training schools with an emphasis on geometrical drawing, and mathematics. It may be observed, during the American Revolutionary War, military links with France demonstrated the achievements of the academic and professional training provided to French Artillery officers. America established the West Point Military Academy to train engineers and administrators, well beyond a narrow focus on military art.

> Referring to the rational manner in which the state of Virginia tackled road-building for transport links, effectively as toll-roads from 1816 onwards, Pursell comments, "The lynchpin of the entire enterprise was the chief engineer. Col. Claudius Crozet, an artillery officer in Napoleon's army, had come to the United States in 1816, after the battle of Waterloo, and taken a teaching position at the American military academy at West Point. It was at the time America's only engineering school and a veritable haven for French engineers who brought with

[59] Horner, David (ed) *Armies and Nation Building Past Experience - Future Prospects* Strategic and Defence Studies Centre Australian National University Canberra 1995, Introduction Lt Gen John Grey p1/2

> them a knowledge of the best and most scientific of European civil, as well as military, engineering practice.[60]

The serving and former officers were a significant element within Australia's colonial administrations. They were well aware of, and had experience of naval and military issues at both an imperial and colonial level. It may be observed, in an era approximating Gribeauval, training for engineer officers was being undertaken at Woolwich. The dichotomy of the roles of British, compared with American "West Point graduates, some detached from military service,"[61] in administering civil engineering, ordnance production and other projects would have to be seen as reflections of their respective social structures.[62] With perceptions of a military and economic threat from the South, Canada with a national self-governing administration from 1867 established a similar military academy to West Point in the late nineteenth century. Australian colonies with discrete administrations, and fragmented interstate railway systems, never comprehended such a priority. The imperial structure, apart from India, seems not to have embraced ideas of grand engineering projects. An example commented upon later in the thesis has to be Cecil

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[60] Pursell, Carroll *The Machine in America A Social History of Technology* The Johns Hopkins University Press, Baltimore and London 1995 p70

[61] ibid p101

[62] Reading the industrial history of Britain, the social emphasis on being a 'consulting' engineer rather than part of the hierarchy of the firm, led to professionals with world class ability, having no connection with the cost realities of operating within competitive engineering businesses.

Rhodes dream of the Cape to Cairo railway, a project with merit, which has never happened.

The earlier role of the British protagonist who arrived on the British colonial scene, meaning something like a quarter of the world's surface by the end of the nineteenth century, and worked within local polities to achieve both personal and official objectives, with limited official resources, was described by Kipling. Also, to an extent by G A Henty and others, probably towards the end of the period in which such initiatives had taken place.

> Of course, some of these pieces were either pure (that is, non-political) adventure stories for a juvenile audience or, like the works of Conrad and in certain respects Kipling, serious and creative efforts to explore external themes by using an imperialist context. But others were blatantly propagandistic.[63]

George MacDonald Fraser's *Flashman…* novels a century later are "allegedly fiction," but document, probably more accurately, the extant political complexities extant, and methods deployed by the protagonists to achieve imperial objectives from about the mid-nineteenth century, attributed in the popular mind of the day, to the exploits of British arms.[64]

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[63] Kennedy , *The Rise…* p376

[64] Hitchens, Christopher "How I fell for a sexist, racist, reactionary cad." *The Weekend Australian* January 19-20, 2008 p16 "But his plots were far more credible than Fleming's, (Ian Fleming of James Bond,) because they were based on the scarcely believable facts about high-Victorian empire, and his characters were much more authentic. … Of Fraser's robust Toryism there can be no doubt. He described

To sum up, naval and army officers serving in colonies exercised a high degree of personal initiative. Before the telegraph in the 1870's, these men took responsibility for making decisions on the spot. They handled situations, and sorted things out. After the telegraph some things did not change, "Nothing was put in writing, unless something went wrong."[65] This explains perhaps, the lack of insight by modern authors without a background of dealing with British officials and individuals overseas where, over generations, a high degree of individual initiative was exercised by men, at humble levels, to a large extent undocumented, in dealing with matters of British interest.[66]

British officers appointed to posts in the Australian colonies had often served on several continents and had wide experience. In contrast with the Australian Army of a century later, these officers were at the top both socially and politically. At the

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the British Empire as "the greatest thing that ever happened to an undeserving world" … It is an illustration of historic irony, and of the bizarre operations of fortune's wheel, that that very tone of voice should now be an indicator of the outlook of the British Right."

[65] Comment by middle aged Brit working in a Riverland garage in the seventies. The remark must be valid for generations of colonial officials.

[66] Griffith, Paddy, *Forward into Battle: Fighting tactics from Waterloo to the Near Future* Presidio Press, Novoto CA 1992 remarks in his bibliography about G M Fraser's works as potential sources… He seems not to have a great awareness of the role of allegedly 'fiction' writers in British history.

pinnacle of the executive of colonial legislatures, i.e. "The Governor in Council…" their opinions were sought, and listened to. The results of this influence, exercised within official deliberations may have been attributed by history, to local political figures.

Britain's Second Empire was administered with enlightened liberal theories, missionaries, and policies of free trade underwritten by sterling and the protection afforded by the worldwide power of the Royal Navy. Notwithstanding, it may be confidently assumed, that there was an official, or inherent appreciation, by English society in general till the late eighteenth century[67], and colonial administrators (with a service background,) until the middle of the twentieth century of other maxims. Where there was either, significant white settlement, or serious economic investment, or both until the 1950's, the maxim attributed by the chattering classes of the 1960's to a discovery by Mao Tse Tung in the following century. "Power comes out of the barrel of a gun,[68]" had long been applied. As a young man earnestly

[67] Barnett, Correlli *The Collapse of British Power* Allan Sutton Gloucester 1984 p20

[68] Ellis: asserts, in the late nineteenth century it was specifically the Maxim gun in Africa. Headrick quotes: Beachey, R W "The Arms Trade in East Africa" ˆ*Journal of African History* 3 No. 3 1962 pp 451-67 Beachey suggests, and documents, the volume of weapons and munitions flogged the length and breadth of Africa over decades was such, that an informed reader can only conclude, it was simply African tribal structures that facilitated imperial annexation. His observation of the role of French weapons supplied to Abyssinia in the defeat of the Italians at the battle of Adowa in 1896 is a case in point. Max Boot in *War Made New* alludes to the

studying the literature on guerrilla warfare in 1964, in the pre-dawn prelude to this country's major involvement, (and the author's unforeseen minor role,) in the Vietnam War, a sentence in an article in the *Military Review* published by the Command and General Staff College at Fort Leavenworth is recalled vividly. It went, "The British Empire… depended for its continuation, upon the hangman's noose."

South Africa is the example in mind, but Malaya, Rhodesia and Kenya, small colonies of economic significance, might be included. Hosbawm remarks that the settlers who went out to farm in the latter two colonies were from the predominantly upper class farming people pushed off the land in the collapse of the English farming sector in the late nineteenth century. Loyalty to the Crown of the two settler communities, were beacons within the African empire. "The Rhodesians were the biggest flag-wavers of the lot, before UDI…"[69]

Cognisant of this background of the executive of colonial administration, the topic of defence, implicit from the foregoing, assumes greater significance than the later

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indifference of the Mahdi in Khartoum to the possibility of advice and collaboration from the Abyssinians in the prelude to the battle of Omdurman. A twentieth century liberal observation… Would Coptic Christians have seen common interest with the Muslims? Not a question explored.

[69] Bruce Mufford, Australian ex-pat, a long time resident of South Africa in the mid-seventies in conversation with the author.

'nationalist historians'[70] descriptions of the surprised discovery of the topic by the population after the advent of the telegraph, and visits from foreign warships.

The early settlement of New Zealand, from the 1840's onward, was accompanied by British troops sent across the Tasman to back up the settlers, and demonstrate, some practical aspects the of *Pax Britannica.*

At the time of the Crimean War in 1854, New South Wales and Victoria raised volunteer rifle and mounted units. Alarm is a word used in connection with Australian perceptions of security at this time and it, led "…to a fitful effort to furnish colonial ports and waters with a minimal defence."[71] Unpaid volunteers served at the expense of their livelihoods, but "…at the end of the Crimean War in 1856, interest in the volunteer forces in Victoria declined… In New South Wales, the volunteer units ceased to exist."[72] A resurgence of interest in military forces took place during a war threat between Britain and France in 1859. [73] But, "Australia in

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[70] Meaney, & Moredike

[71] Meaney, Neville *The Search for Security in the Pacific, 1901-14* Sydney University Press Sydney 1976 p15

[72] Moredike *An Army for a Nation A History of Australian Military Developments 1880-1914* Allen and Unwin in association with The Directorate of Army Studies Department of Defence North Sydney 1992 p1

[73] Kennedy, Paul *Strategy and Diplomacy*... p166 "… the Anglo-French arms-race of 1859-60, begun (in the British view) by France's construction of the armour-clad *La Gloire* and its announcement of a construction programme of sixteen ironclads. This

mid-century felt relatively insulated from the troubles of the world."[74] Little opposition was put forward when the Colonial Secretary in 1863, withdrew the British garrisons from Australia. This "Withdrawal" as Meaney describes it, was the shipping of garrison infantry and artillery units across the Tasman to undertake operations, in effect, to ensure that all of New Zealand was incorporated into the British Empire. Without this timely and decisive deployment, operations in New Zealand almost certainly would have been costly and protracted.

> During the 1860's, each of the six colonies raised units of part-time volunteers, but the problem of maintaining enthusiasm and attracting sufficient enlistments remained.[75] External defence fears were felt throughout the Australasian colonies as a result of the civil war raging in America (1861-65) and Britain's ambiguous attitude to the Confederacy and tensions with the Union, apart from concerns about other events fomenting in Europe and the Pacific.[76]

In these halcyon days, it was envisaged that privateers might conduct a raid on undefended colonial ports. Later, official admiralty papers on colonial defence envisaged, (possibly in connection with grounds for realistic colonial financial

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would give the French a technological (and therefore a *battle*) advantage over the Royal Navy and, taken in association with the evident superiority of steam-driven vessels over sail, seemed to place the island kingdom in great danger. Steam, to use Palmerston's earlier phrase, had at last bridged the Channel."

[74] Meaney *The Search for Security in the Pacific…* p15

[75] Mordike, John ibid p1

[76] Hopkins-Weise, Jeff "Australia's Logistical and Commissariat Support in the New Zealand wars, 1863-66" *Sabretache* Vol XLVII No. 4 December 2006 p7

contributions to the exchequer for a Royal Navy presence based in Australia,) raids conducted by enemy cruisers[77] standing offshore from major ports, (demonstrating their firepower, and demanding a tribute of coal and gold…) There was a corollary, coastal defences were required for the colonial seaport capitals. Designing and constructing fixed defences required engineer officers, while the heavy ordnance required professional skills from permanent gunner officers and N.C.O.s, to both maintain the equipment and stores, and train the gun crews. All these personnel came from the British or Indian Armies. They were not trained within an appropriate equivalent of Woolwich in an Australian colony.

Whitehall realities reflected liberal, Cobdenite views and perceptions, of politics and trade, with *Pax Britannica* civilising world intercourse. The perceptions by settler populations living on a frontier where hard men were practical, and in the main, untrammelled by classical education, but, imbued with the post-Waterloo dominance

[77] Meaney ibid p60 "Colonial Defence Committee's position… 1890, and reaffirmed in federal schemes of 1894 and 1896." Inglis, K S *The Rehearsal* Rigby Adelaide 1985, p122 "During April 1885 the imaginary Russian raiders were perceived more vividly in Australia than ever before. … an advertiser in the *Herald*: "THE RUSSIANS, should they visit us, will take all the money they can lay hands upon. Place yours beyond the reach of invaders by investing the amount profitably in Land AT THE BLACKTOWN RAILWAY STATION only a few miles from the City."

of Britain in the councils of the world, perhaps perceived Britain as the, "Policeman of the world" in a Roman Empire context.[78]

In the 1860's men were required for fighting in New Zealand's Maori wars. "Responding to New Zealand's recruiting campaign, more than 2,000 men were enlisted in Victoria, New South Wales, Tasmania and Queensland." [79] What proportion of these men were; old soldiers finding life difficult in hard economic times, reacting as veterans are wont to do, to the rush of adrenalin, a realistic offer of pay, and generous land grants? What proportion were young men looking for adventure? Is not explored. [80] The author queries the validity of an observation by Mordike,

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[78] Imlah definition of *Pax Britannica* cited in footnote preceding, in context with Kennedy *The Rise…* in which he details colonial figures from West African traders to New Zealand politicians demanding the extension of British hegemony against German expansion, P 177 As a young man working away from home in 1963, a conversation with a school-teacher (of my mother's generation,) in Launceston one evening, her father 'the Colonel,' had been in the Indian Army and was long dead. Her lamenting the failures of American foreign policy in the world… she continued, "The role of Britain is to be the policeman of the world."

[79] Mordike ibid p2

[80] The editor of a defence magazine, *Armed Forces* in Johannesburg, when discussing with the author the operations of Lt Col Mike Hoare in the Congo in the sixties, and contrasting those with his (Hoare's) proposed mercenary operations within the burgeoning Angolan War, referred to the men in Hoare's Congo mercenary units in the following terms, "I was responsible for recruiting them. They were the sweepings of the streets of Johannesburg…" Peter MacIntosh 1975-76. He spoke fluent Portuguese and had extensive reliable, official contacts.

> The participation of Australian colonists in New Zealand, unrelated to any threat to Australian security, exemplified the possibility of using colonists in an expeditionary role to serve imperial ends. [81]

Regular Army officers may focus an overview of some more complex issues in what may be perceived as the elitist Canberra-centric picture. The question of "Why soldiers want to serve?" according to Major Nick Lamprecht of the Rhodesian Army, "Is never answered... The response is often a vague, "My father was in the Army…" If he had either, answers or insights, they were not shared.[82]

Mordike, a regular officer, seems not to have explored, or comprehended this topic. More a concern of the "Other ranks," the question appears to span over a century of campaigns, wars, "police actions," and an "unpopular war…"[83] (The "unpopular war" before last, currently.) In the context of the derision and scorn heaped on the "Other ranks" participants[84] there was an unconnected response of the Regular Army non-commissioned hierarchy in the post-Vietnam era. Whenever an incident of

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[81] Mordike ibid p2/3

[82] Discussion in Officers Mess, King George VI Barracks, Salisbury 1974

[83] The end of the Vietnam War era is the focus of these remarks. It appears history has moved on… reached full circle?

[84] The author found on ANZAC Day 2008, his hand being shaken by younger women veterans, a teenage boy giving him an American salute at the railway station and being told, he was admired.

derision or hostility the former experienced, for much of their remaining adult lives was explored, their throw away line remained the indifferent, “It was only a job…”

The intention of describing these discrete paths emanating from Britain within the *Pax Britannica* is to show; there were hard and experienced officers and men, not altogether prominent within the economic history of finance, trade, railways and pastoral development, but who were in the executive and bureaucracies of colonial self-government. Their influence and role may be discerned in the later realistic grasp of geographical and political realities.

The Second Empire effectively commenced with the settlement of New South Wales in 1788. The thesis explored the sequential settlement around the littoral which established the Australian colonies as exporters of wool for the voracious English mills. The underlying imperial structures which facilitated this colonial expansion within the *Pax Britannica* was command of the seven seas by the Royal Navy and, a merchant marine which spanned the world. Thus British colonies at the ends of the earth, in the antipodes, were able to settle peacefully, farm and trade without let or hindrance.

The financial and legal system within which trading and settlement of the Australian colonies took place was of crucial importance. The legal system under the Crown ensured the Crown owned land. The Crown as the owner of land, in contrast with Argentina, where there were competing claims to title for pastoral land, ensured the constitutional writ of colonial government was valid. Thus, the legal structure meant a lender in London had the same rights against a borrower in New South Wales for example, as he did in the UK itself. The sterling monetary system ensured money in colonies had fiduciary backing.

Following the Gold Rushes and the influx of diggers, of different nationalities, many with radical political agendas, the change in colonial outlook demanded political change. The lesson of the American colonies was recognised by the liberal Cobdenite political leaders in Whitehall. By the mid-1850's most of the colonies had obtained self-government, with responsibility for local defence. Foreign policy, external defence, and currency remained in the hands of the Crown. In effect the British Government. Local self-government meant colonies were able to borrow in their own right. Funds were obtained in London to build railways to develop the hinterlands and expand the pastoral industry to supply more wool. Colonial governments became the major employer with bureaucracies to govern, and administer the railways. Engineering to maintain the railways, reverse engineer parts

where required, and the purchase of locally manufactured metallurgical products did much to establish local manufacture. This underwrote urban expansion. Towards the late 1880's the heavily mortgaged pastoralists found the price of wool was falling. Their industry and the prosperity of the colonies became shaky.

Integral with the administration of all colonies from the earliest times, were the large numbers of serving and former naval and army officers as governors. One assumes veterans were spread through all levels of colonial administration. Their influence on administrative procedures, formulating perceptions of defence threats, and later, working within their respective colonial structures to back military operations in New Zealand at a later time, needs to be recognised.

Chapter 11

The imperial legal structure and the Barings' crisis. The demise of the pastoralists, political and technological changes enabling close settlement.

Introduction

The opening chapter referred to the growth and significance of the sterling system, and the role it played in facilitating worldwide trade and commerce. The pivotal role of The City in financing public borrowings throughout the world was such that during the Crimean War, political scruples to deny Russia the opportunity to raise funds in London were overridden. The Gold Standard effectively enabled countries like the United States, and Germany to finance their industrial growth, purchase raw materials and transact world trade through London. Integrating British formal, and informal empire through commercial transactions with the rest of the world, the era of the late nineteenth century was regarded as "la belle epoch."

Confidence in the British financial system, the Gold Standard and was unquestioned, notwithstanding the periodic crises since 1820 when Paris and Hamburg were routinely called upon to underwrite difficulties. Following the Franco-Prussian War France paid reparations to Prussia. This paper was promptly honoured in London for settlement. The role of Paris as a dynamic financial centre was diminished somewhat. The United States did not have central bank during this era with the Joint-Stock banks in London effectively performing that role till 1913. The implications were that as a major agrarian exporter, seasonal demands for funds from New York to pay farmers in the mid-west with cash translated through the London banks as credit restrictions to industrial and commercial customers of the real British economy. As American farmers spent their harvest proceeds, storekeepers deposited the funds with regional banks, and the money found its way back through the banking system to the New York banks and thus to London.

In 1890 Argentine landowners through their banks, defaulted on loans from Barings Bank. There were no legal remedies. The sums involved were so large the there was a prospect of a major financial crisis in London. Open market operations, raising interest rates to fund a £21M liability was such that international trade would have almost come to a halt. With some adroit footwork the Bank of England pulled almost the entire London banking community into a rescue package to preserve

stability and confidence. The implications for Australian colonial borrowers were not lost to the London financial press.

Colonial self-government in the 1850's led to railways and port building establishing a developed trading infrastructure on the Australian littoral. Pastoral expansion provided increasing volumes of wool, and this proceeded with urban development, with some mining, industrial, and manufacturing growth taking place. Towards the mid-eighteen eighties British woollen cloth exports diminished, translating back to lower prices and reduced demand for raw wool exports from colonial Australia. With pastoralists mortgaged to the hilt, pastures permanently degraded through overstocking, increasing supply into a shrinking market, export prices for wool falling, urban land speculation collapsing, deficits for the railways, colonial governments faced serious problems. The depositors who had lent to speculators in real estate effectively lost their money. The rentiers who had lent mortgage finance through institutions to pastoralists, stepped in to demand foreclosure.

The City institutions had financed colonial governments, and railways, and were concerned at the prospect of the Latin option of default being exercised. Within this scene the unions provoked a showdown with the pastoralists, the banks and, the

shipowners. They were crushed with the full force of ‘the state,’ the militia and Gatling guns.

The nationally organised unions eschewed direct action for the political process, forming the Labor Party and, within a few elections were able, in coalition to change the political direction in New South Wales and Victoria. The pastoralist’s domination of Upper House Legislatures through franchises denying many rural workers a vote, were lost in the maelstrom of political tradeoffs.

Revolutions in ship-building technology using steel, more efficient steam engines, refrigeration of meat and fruit, canneries, irrigation of orchards and pastures for dairies and cross-bred lambs enabled close settlement to proceed. Scots and Victorian rentiers saw an opportunity to revalorise their foreclosed pastoral properties by subdividing them. Labor politicians saw an opportunity, to settle a new class of small farmers, whose produce of frozen cross-bred lambs, butter, and fruit, would supply export markets in the UK. This was the solution to financing public debt interest repayments. Manufacturers saw a local market… All it needed was government backing!

Notwithstanding the jaundiced views of *The Economist*,[85] along lines the whole idea was for public borrowings in London being used to prop up land values through close settlement projects, colonial governments in a time of extreme financial stringency were compelled to proceed. From early settlement where land had been exploited with a minimum of resources, a century later new technology enabled a larger population to produce different more valuable agricultural products. Labor politicians and manufacturers saw the new domestic markets and population as a means to alter the proportion of funds going to the rural sector, society changed to an urban and industrial workforce behind tariffs. Labour political power ensured small farmers had access to official bodies to obtain finance, and sell their produce.

STERLING FINANCE, THE GOLD STANDARD TO 1890 – BARINGS

It is germane, at this juncture, to tie colonial borrowings by Australia into the international framework of the gold standard. The joint-stock banks financed much of world trade directly and indirectly by extending credit to the clients of London

[85] Hall, A R *The London Capital Market*... (& specifically) p182 refers to opinions in *The Economist* and The City of widely held and adverse perceptions of Australian colonial governments over a long period of time, in the days before Keynes, of applying borrowed public expenditure to counter dips in economic activity. [There is direct quote apart from Hall on this topic later in the thesis.]

accepting houses, bill brokers and the stock exchange The international confidence in the British financial structure – for example the Latin American saying "The word of an Englishman"[86] – relied upon the immediate conversion of a sterling bill to gold on demand. If called upon to pay in gold, they did so from their cash reserves. This required them to call in short-term loans and advances, or, borrow from the Bank of England. It should be noted this procedure had immediate financial implications for the real British domestic economy. The essential underpinning of world trade was therefore administered by the privately owned Bank of England in London acting as a lender of last resort to the joint-stock banks.

The gold standard became complex in the light of silver output from the United States and the use of that metal as a currency standard for Asia. Almost at a tangent from "The City" the following is integral to the analysis.

> The Hong Kong and Shanghai Banking Corporation, founded in 1864, in 1880 definitely won for itself ' a commanding position in the China Trade.' Most of the British trading-houses were interested in it. Like all overseas banks, it was accused of manipulating trade in the interests of its nationals, but the main criticism against it was that it had the privilege of holding Customs receipts and sometimes used them for its own purposes; a factor that has created *"the overwhelming financial strength of that institution, which is a strong prop of the Bank of England."* In

[86] George MacDonald Fraser in his last book, *Light's on at Signpost* refers to the termination of this saying, after the British Government overrode diplomatic convention to arrest General Pinochet while travelling on a diplomatic passport.

> our period it was the only Eastern bank making much profit, because it was capitalised locally, in silver; and so was not hurt by the silver fall; whereas the others had to write down their capital, in spite of charging 10 or 12 per cent for their bills. [87]

Open market operations by the Bank (of England), raising the bank rate, and selling securities were the only means by which gold could be attracted to London. As the lender of last resort,

> The Bank held the ultimate reserves for the whole banking system, and the stability of the entire edifice depended on the Bank's being able to meet all its customers' demands for gold in exchange for the notes and bills they presented to it. [88]

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[87] Kiernan, E V G *British Diplomacy in China" 1880 to 1885* Cambridge at the University Press 1939 pp269/270 In sequence # Eitel, "Europe in China" p550, Gowen and Hall, "Outline History of China," Provand, before Gold and Silver Commission of 1887. He was asked: In the Far East "the whole banking system is a speculation in the exchange?" – and agreed. See also evidence of McLean, Manager of the Hong Kong and Shanghai Bank. *Italics the writer's* In the context of the above, the discussion in the biography of Sir Warren Fisher, Secretary of the Treasury and head of the Civil Service during the interwar period a remark not comprehended, becomes clear, "Treasury maintained representatives in (assume New York, Paris,) and Peking." Cannadine, David "Review: The Empire Strikes Back" *Past and Present* No.147 (May, 1995,) pp180-194 "As in the nineteenth century, the interwar empire was still very much dominated by the mother country which continued to hold (and pull) the purse strings. … And in China, despite the revolution of 1911, the City's continued uneasiness, Britain remained the most significant foreign investor, successfully maintaining its influence there until the Sino-Japanese War broke out in 1937." P188 # Cain P J and Hopkins A G *British Imperialism* pp 109-262

[88] de Cocco, Marcel *Money and Empire : The Internationa Gold Standard 1870-1914* Basil Balckwell Oxford 1974 seems to have a different perspective of the realities of the Gold standard, the conflicts and agendas between the key financial players in The City of London in the post-Barings era till 1914.

The size of England's gold reserves was minimal (the average holdings of the Bank of England during this period was something like £30m) in comparison with those of the continental powers. The explanation of this is that gold coinage dominated both French and German economies. By contrast, the widespread use of cheques and credit within the British economy required only minimal amounts of gold coinage.

> The stock exchange and Bill Brokers relied upon the joint-stock banks to finance bills, and short-term loans. The worldwide operations of The City of London depended upon this link. The joint-stock banks effectively financed and underwrote world trade, with liabilities of £170million, secured by cash reserves of about a tenth of that amount.[89]

To explore the Barings crisis it is necessary to reflect on the previous example of 1837. During a banking crisis the interdependence of the Bank of England with Paris, and in this case, of Hamburg was shown with Barings acting as the agent to place bills. In 1890

> The firm Barings' occupied a position almost as commanding as when the duc de Richelieu ranked them among the Great Powers of Europe. When Bagehot invented Treasury Bills, late in the seventies, the finest enconium he could bestow upon them was that they 'would rank before a bill of Barings.'[90]

[89] De Cocco ibid

[90] Powell *The Evolution of the Money Market…* p523

In the seven years preceding the crisis Barings had placed £100,000,000 of securities on the market,

In the summer of 1890 the Argentine paper 'cedula' issued by landowners through banks who on-sold them mainly to Barings, went bad. Barings committed a further £6 Million to halt the slide but their price continued to fall and the extent of the potential losses were beyond them.

> The proximate cause of the crisis was, however, over-sanguine lending to foreign borrowers-mainly South American- not yet fully schooled in the principles of prudence in the region of finance. [91]

In contrast to colonial borrowers, lenders in London were unable to enforce the adherence of either Argentine borrowers or banks, to their financial obligations. On November the 8th the Governor of the Bank of England "became aware Barings' were on the eve of suspending payment, and that liabilities were £21,000,000." [92]

Powell goes to some lengths to elucidate the family and social links the owners of Barings shared with the directors of the Bank of England. Using these links a member of the Bank and another banker were asked to enquire into matters at Barings'. On March 11, 1891 Mr Lidderdale the Governor of the Bank summed up for a meeting the following details. Barings' with liabilities of £21 million was

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[91] Powell ibid p523

[92] Powell ibid p523

beyond the resources of the Bank to assist. The ample reserve for ordinary requirements could not meet the call certain to follow once Barings' difficulties were known.

The liabilities of Barings' were such that almost the entire financial community was to be called upon to form a guarantee fund to enable the Bank of England to maintain international confidence in the London financial market. With problems in several European countries and the United States, attracting gold through open market operations would require interest rates so high normal trading operations, and the activities of industry would be affected, in other words, the real British economy would by strangled for funds.

> It was therefore decided to adopt exceptional measures, even at considerable sacrifice to the Bank. In the course of a couple of days we secured, by the sale of Exchequer bonds to the State Bank of Russia, the sum of £1,500,000 in gold, and obtained from Paris, as a loan, by the prompt and liberal action of the Bank of France, a further sum of £3,000,000, as an addition to other resources. [93]
>
> With adroit manoeuvre and careful management, Mr Lidderdale refused to raise the bank rate above 6% "and insisted the great joint-stock banks should continue discounting as usual.[94]
>
> The suggestion of the Chancellor of the Exchequer of suspending the Bank Act was "declined by the intrepid Governor." [The entire banking

[93] Powell ibid p524/5

[94] ibid p526

> community was dunned, including the Union Bank of Australia which pledged £100, 000 to the guarantee fund which eventually reached £17, 250, 000.] So skilfully was the whole episode handled that, as far as the public was concerned, it was history before it was actuality: - [95]

De Cocco indicates the normal gold reserve during this era was £30 Million.

> The problem of the size of the gold reserves was first brought to the attention of bankers during the Baring crisis of 1890. The crisis had shown that the Bank's (Bank of England) reserves were too small to meet a real emergency, and the Bank had been forced to adopt the expedient of going to the French and Russian central banks for gold.[96]

The history of imperial finance explored by Marcel de Cocco stresses, following the Barings crisis that the Bank of England was to a large extent, sidelined. The joint-stock banks resented competition from the privately owned Bank of England and, in the period from 1890 to 1914, floated the idea of establishing their own gold reserve. The histories of British strategic planning consulted seem not to have grasped the implications of the power of the joint-stock banks and their autonomous operations within a free market structure. Until 1913 they effectively acted as a Central Bank to the United States and, when "The lights were going out all over Europe…" As continental bourses and markets closed, leaving only London and New York

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[95] ibid p527

[96] French, David *British Economic and Strategic Planning 1905-1915* George Allen and Unwin, London 1982, p16 The topic is crucial and the 1915 analysis of Powell, enlightening.

operating. The joint-stock banks closed credit to customers of the Bill Acceptance Houses, and clients of stock-brokers in The City…

de Cocco suggests, the joint-stock banks seized, and "exploited an opportunity" to expand their operations and eliminate what had been competition from other institutions. It was only on the thresh-hold of The Great War, when markets and bourses closed on the Continent in the face of the Serbian Crisis, that it was finally realized in Government, that the Bank of England did not have the power to control the banks. It was merely a player. [97]

(It needs to be added, that until the Federal Reserve was established in 1913, American financial fluctuations, were effectively dominated by the significant agrarian export sector. Payments were made in cash by regional banks drawing down reserves in New York to pay farmers for harvests. This rural demand to work with cash took some time to find its way back via storekeepers into regional banks. Regional banks maintained New York bank deposits to access borrowings and meet statutory requirements. Demands for liquidity in New York essentially to finance seasonal agrarian demands translated into open market fluctuations in London with

[97] The reality was, until 1931 the Bank of England, not the Treasury controlled monetary policy. During the Depression the link between gold and money for British finance was put aside.

associated financial flows and implications for credit in terms of gold. These flowed on through into the real British economy of trade and industry. So the American Treasury was a major buyer and holder of gold, having a significant proportion of the world's gold, but it was hoarded and not used to assist the workings of international trade.[98])

Although the joint-stock banks made efforts to increase their reserves over the coming years there was no real alteration in outlook.

> When from 1906 onwards, the CID began discreetly to inquire what impact upon the British economy a war with Germany could have, it found to its alarm that (i) the gold reserves were minimal, and would probably have to be supplemented by drawing upon the Bank of France, as had happened in the 1857, 1866 and 1890 financial crises as well as in the Boer War – this suggesting in Clarke's words, that 'the entente cordiale is almost a financial necessity'…[99]

[98] This comment based on Marcel de Cocco *Money and Empire*. He expounds, the halcyon days of the Gold standard, were a post Great War fallacy.

[99] Kennedy, Paul *The Rise of the Anglo-German Antagonism 1860-1914* George Allen and Unwin London 1980 p303 #57 PRO Cab. 17/81 (Finance of War), Clarke to Asquith

CONSEQUENCES FOR COLONIAL BORROWERS OF BARINGS…

In London the Baring Bank "suspension of payments" in 1890 led to press scrutiny of the Australian colonies which were at a similar level of development to Argentina, which had "defaulted" on their loans. As a result "Universal distrust [of borrowers] succeeded… almost universal confidence."[100] The appreciation that excessive and unprofitable borrowing by Australian institutions, both private and public, was now coupled with a downturn in the English market caused new lending to become very selective. The balance sheets of colonial railways operations had served as the benchmark of colonial solvency for the purposes of overseas investors. Once the veracity of these balance sheets was called into question, all Australian colonial public borrowing was under scrutiny.

With sovereignty, Argentina was in something like the position of the King of France before the revolution.[101] She had a number of creditors,

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[100] Schwartz *In the Dominions…* p176

[101] Schultz & Weingast P12 "Liberal institutions typically impose additional; constraints on default. As noted above, one way in which reputational mechanisms failed to control sovereigns in medieval and early Europe was that they could pursue 'divide and conquer' strategies, allowing sovereigns to renege successfully on one group while raising money from another. To pursue a divide-and-conquer strategy, the sovereign must be able to discriminate finely among categories of lenders. It is precisely here that the universality of liberal polities – namely institutions requiring that like individuals be treated alike – have an important effect. Debt contracts in

> Despite British pre-eminence, other European nations held at least one fifth of Argentine debt. Unlike the Antipodes, whose London issues were typically monopolized by one banking house, Argentina typically floated its loans through consortia. Argentina could thus play off creditor governments and direct creditors against one another. In negotiations, Argentina dealt with railroad firms individually, rather than through their 'Railway Committee.' Fear of domestic financial collapse pushed British lenders of last resort to support Argentina directly in hopes of supporting Barings indirectly. … Argentine leverage only allowed it to push lenders into various forms of refinance, not into sending new capital.[102]

The scrutiny applied by London financial circles to lending to dependent economies had consequences for Australia. There was a worry, if the Australian colonies also defaulted, that it would be beyond the resources of the Bank of England, as lender of last resort, to organise a rescue of the lenders. These remarks in various works dealing with the Australian debt problems in relation to the risk London was carrying with colonial public debt at this time, may, in the context of the foregoing, be understated.

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such systems include fine details such as prioritization and cross-default clauses, limiting the ability of the government to discriminate between bondholders." [There is no indication of such sophistication at the time of Baring's difficulties.]

[102] Schwartz *In the Dom…* p220. Powell's 1915 history of the topic is a little more precise. The Bank of England called for the involvement of almost the entire the financial establishment…

Hall writing in the early fifties deals with the machinery by which the Australian colonies sought to float their loans. Initially a tender system was used from 1870 to offer loans for which a de facto underwriting by syndicates occurred.

> On a few occasions before 1890 Australian government loans did fail (e.g. a Victorian issue in 1884) but the market for them was generally buoyant, the credit of the colonies concerned suffered only a temporary setback… In 1891 Australian government loans received their first setback – issues by South Australia, Victoria and Queensland failing badly. Although the sums required by Victoria and Queensland were subsequently raised, … [by lowering the price in the latter case.] These failures were not due to any sudden loss of confidence in Australia but to the breakdown of the marketing mechanism.[103]

Governments were experiencing considerable financial difficulty. The boom in selling crown (pastoral) land had collapsed. Public spending was in straitened circumstances. Questions were being asked about colonial borrowing by lenders in The City.

> … the outstanding feature of 1891 was the rebuff which the London market gave to Australian new issues. Not one of those offered was favourably received. … Though there may well have been some loss of confidence in Australian securities (in the context of Argentina and Barings) this does not appear to have been the reason. What was more important was the breakdown of the marketing mechanism for Australian securities. The period 1888-90 had been one of exceptional activity in the new issue market and the sudden setback by the Baring crisis had left underwriters and marketing syndicates with large batches of unmarketable securities on their hands. When, as a result of this overloading, the syndicates failed to tender for Australian securities there

[103] Hall A R *The London Capital Market and Australia 1870-1914* p101

> was no one to take them up. This failure of the marketing mechanism influenced investors who though that the failure was due to a loss of confidence in them…[104]

With self-governing status, legal and constitutional effect had been given to Westminster traditions, of the familiar legal, administrative and tax structures evolving from 1688. Integral to the Imperial colonial structure, these liberal institutions had become part of ongoing Australian politics. The "Latin option of Default" by the colonial governments, was constrained, by overlapping constitutional, economic and blood ties, to London.

British capital had been unevenly invested in Australia. In The City, investment houses held mainly government debt. This was to have historical consequences for Australia. Holders of public debt were pitted against the insistence of the lenders to private borrowers that their secured debt, not be repudiated. In this situation of capitals in London trying to work out who was going to lose what, organized labour in Australia in May 1890 initiated a showdown with a medium sized sheep station.

The Queensland Shearers Union "forced the owner of Jondaryan … to accept a union contract by getting dockworkers and wool carriers to blacklist his wool." In July the QSU announced it was going to unionise the remaining 20 per cent of stations.

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[104] Hall ibid p171

From 1889 banks had foreclosed on pastoral properties. These were unsaleable. They had no option but to work them as their own properties.

> In 1890 in NSW alone, 1200 stations were foreclosed upon. Where individual owners or small groups of owners retained ownership, banks or financial companies often held legal title to their lease or land as security, effectively turning them into paid managers.[105]

To sum up, the pastoralists were mortgaged to the hilt, and being squeezed by the banks. Their pastures were degraded, and they were selling into an oversupplied and depressed market. They retained control of upper houses of parliament through disenfranchising labour. Neither banks nor pastoralists could afford to give in negotiations with the unions.

A nationwide alliance of pastoralists and shipowners was organized, but the prospect of a dockside-shearer movement was effectively going to hold the pastoral industry to ransom. A Ships' Officers union was negotiating with shipowners and the talks collapsed. The union then affiliated with the Melbourne Trades Hall Council. The shipowners demanded an end to the arrangement and the officers struck, walking out on August 16th. When coalminers, shearers and others walked out in support, it

[105] Schwartz *In the Dominions*... p65, p66 Table 9, A 1889-90 Banks and Corporations held 38.1 % of leases c f 1% in 1866, and 17% in 1879.

became an Australia-wide strike.[106] Unskilled labour, shearers and station hands had organized nationally in 1886.[107]

The underlying concern by employers that the Australian Labour Federation intended to restructure society gave them clarity of focus. If the officers union was onside with ship-owners then ships could sail with non-union labour.

> … [i]f not, ships could not sail, wool did not sell, and the whole rickety financial structure of Australia might collapse. Any officer's union had to be broken immediately. [108]

The interlocking structure of British and colonial society, primarily within clubs, although not documented as it was in India, may be deduced. Schwartz can assert employers groups were backed by the banks, but merely conjectures that, with

> "the British ship-owners federation, set out to destroy the new unions in a pitched battle and succeeded with the help of the colonial states' military and quasi-military forces." [109]The unions were effectively crushed.

A paper on the history of accounting in shipping provides the following insights,

> [g]rowth in British shipping relied extensively on inter-personal and inter-organisational networks to harness information about business opportunities and mobilise the complementary resource sets needed to exploit them. Rather than internalising transactions, British shipowners conducted exchanges through intermediate modes. Thus, British systems reflected the formative influence of a wider contracting culture based on a high degree of trust. Co-operative conduct was learned within the

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[106] Schwartz *In the Dom Of Debt…* p70

[107] Schwartz ibid p68

[108] Schwartz ibid p70-71

[109] Schwartz ibid

> commercial circles of port communities where social and business ties were closely knit, behaviour was highly visible, and gradients of reputation were readily observable. This contracting context deterred opportunism and permitted the wider use of personalised control. [110]

Hence accounting practices in the managerial decision-making of British shipping during the period, corroborates Schwartz' conjecture.

The role of the unions changed. After their crushing defeat in the Queensland Shearers Strike, and the Maritime strike, at the hands of the pastoralists and their export servicing commercial allies, and the "Employers' groups, backed by the banks and some have suggested by the British shipowners' federation," the role of unions changed. Similar defeats were inflicted on other unions and, "The Broken Hill mining companies…" inflicted …" a bloodier, more decisive defeat of the miners in 1892." [111] The unions perceived that by pursuing industrial strength through [Labor Party] political representation in colonial parliaments, their aims and ambitions could be better achieved.

As a result of falling wool prices and the onset of the nineties depression pastoralists as a class were unable to repay their mortgages. In 1893 eight million acres of

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[110] Boyce, Gordon *Accounting for Managerial decision making in British Shipping, 1870-1914-1918* The University of New South Wales, School of Economics, Discussion paper, 94/11 July 1994 P5

[111] Schwartz *In the Dom…* p71

pastoral land was abandoned in N S W. [112]The Scottish-funded financial institutions whose funds had been on lent by London chartered banks foreclosed on the stations, according to sound Calvinist business principles, but were ignored in the maelstrom of who was to be at the top of the list of creditors to be repaid.

> Behind the wave of pastoral foreclosures had come another and greater wave of urban defaults culminating in a general bank failure in 1893.[113] The crash liquidated British stockholders and depositors…. [d]epositors fled, their deposits falling more then seventy five per cent at two representative banks. By 1900 British deposits had largely disappeared from Australia. [114]

SCHWARTZ HYPOTHESIS

The Schwartz hypothesis puts forward the notion because of the imperial legal structure within which the Australian colonies were administered heavily indebted pastoralists were able to be sold up. Resulting from this subdivision of formerly pastoral lands, intensive agriculture providing exports of fat lambs, fruit and dairy products was established with public financial backing. This required manufactures and led to development of industry, and urban development in what had been formerly ports processing exports and imports. These developments in Australian

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[112] Schwartz *In the Dom*… p89
[113] " " p84
[114] Schwartz " p86

colonies Schwartz suggests originated from mortgagors in the metropole who were able to enforce their writ under law, an option not available in Argentina. This on the face of it is a key reason for the dichotomy between the industrial development of the two countries.

For the rentiers in Victoria and Scotland, "…mortgagees of pastoral and urban land made every effort to preserve their own investments at the expense of increased unemployment and insecure public debt." They instructed the lending institutions in the colonies to foreclose - an option not available in Argentina. They embraced a strategy to preserve their investments with an exercise in state-sponsored development. By subdividing and selling the pastoral land suitable for agriculture into small farms, a higher price per acre could be obtained. A technological revolution of refrigeration then enabled meat and dairy produce to be sold to Britain. Refrigeration coupled with the improvements in the efficiency of steam propulsion in ships, was to enable a new rural industry to be established.

Mention is made in the literature that both South Australia and Victoria had a lot of local capital in their pastoral industries. It suggests both classes of capitals reached informal understandings. It may have been relevant that their geographical proximity to both railways, and centres of population facilitated this. Victoria around

Melbourne has probably the richest soil on the continent with reliable rainfall. The majority of pastoralists in arid country were unable to change to meat production or dairy.

State intervention was required.

> As no one could afford to buy land, pastoralists and their bankers proposed official *Credit Foncier* subsidized mortgage schemes, which attempted to loan the unemployed money to buy land. [115]

Effectively the graziers became managers on their own properties acting under instructions from their bank managers.

> The London bankers, however took a dim view of these efforts to revalorise pastoral property, fearing that they would come at the expense of public debt service and that they courted default. The *Economist* said in February 1895: 'All these imitations of the *Credit Foncier* system have at bottom two aims, viz., 1st, the maintenance of the reputed value of land, and 2nd, the introduction of fresh British capital. Australian land is to retain a fictitious value by the help of the British investor. Otherwise, there is no necessity for the intervention of the State in mortgage business. … Loans are no longer regarded only as instruments of 'development' but as necessary to provide employment for workmen, to enable the Government to purchase land at exorbitant prices, and generally 'to keep things going.' It is hard to ignore the fact that restoration of confidence in Australian finance in London is a most pressing need.[116]

The problems of raising money in London following the Barings crisis, and the failure of the marketing mechanism, the requirement to continue public works caused

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[115] Schwartz, Herman M *In the Dominions of Debt* Cornell University Press Ithaca 1989 p89-90 footnote # 113

[116] Schwartz ibid

a change of policy. Following bank failures in Australia and a recovery in 1893, savings were switched from trading banks and, together with new savings placed in savings banks. Governments were able to borrow these funds and thus minimise overseas borrowings. At a somewhat lower level, government expenditure was maintained until 1898.[117]

These events and scenarios are traced within, Schwartz's *In the Dominions of Debt.* But the question of, "Who called the shots from Scotland," is not explored. Hobsbawm in his *Industry and Empire* provides... a fascinating insight about Scottish rentiers. The early nineteenth century Companies Acts enabled the incorporation of firms as a legal entity. The liability of the members was limited to outstanding amounts unpaid on their share-holdings. The shares held were able to be both traded, and bequeathed through estates.

> By 1871 Britain contained 170,000 'persons of rank and property' without visible means of occupation – almost all of them women, or rather 'ladies'; a surprising number of them unmarried ladies. Stocks and shares, including shares in family firms formed into 'private companies' for this purpose, were a convenient way of providing for widows, daughters and other relatives who could not – and no longer needed to be – associated with the management of the enterprise. The footnote: 'Of the shareholders in the Bank of Scotland and the Commercial Bank of

[117] Hall A R *The London Capital Market and Aust…* p136

> Scotland in the 1870's about two fifths were women, and of these in turn almost two thirds were single.' [118]

With the hindsight from what is now over a century, the identification of the Scots rentiers and how they made the decision to "Sell up the pastoralists," is a fascinating topic. "The era of railway, iron and foreign investment provided the economic base for the Victorian spinster and the Victorian aesthete."[119] One pictures, a BBC drama on ABC Television, depicting well-dressed aesthetes wearing three-quarter length tailored coats, sipping afternoon tea, nibbling cucumber sandwiches, in the presence of spinster cousins, and maiden aunts who relied upon the income from investments in pastoral mortgages. And remarking, perhaps, "Bad show the colonial pastoralists… Not meeting their financial obligations…"

The land-mortgage companies who dominated the lending to pastoralist in Australia seem to have been predominantly based in Edinburgh, Glasgow or Aberdeen. Using a structure of shares issued at a low percentage of paid up value, debenture funds were obtained and the yield on the partly paid shares was substantial. The funds available to purchase these debentures was of such magnitude English companies

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[118] Hobsbawm, Eric J *Industry and Empire: an Economic History of Britain Since 1750* The History Book Club, London 1968 p97

[119] Hobsbawm ibid

also borrowed in Scotland, while the lending operations extended beyond Australia to include, India, Canada the United States and New Zealand.[120]

"Foreign" creditors working through the colonial legal system proceeded to remove pastoralists as a class of capitals from the political structure. Hancock makes the point that,

> As a class, graziers were a cohesive and powerful group financially, and politically in the upper houses of colonial legislatures. They did not consider themselves as Australian.[121]

They perceived more in common with their English relatives/class allies than with urban labour and petit bourgeoisie. They were thrown to the wolves.

The opportunity for foreign capitals to make common cause with a class of people with whom they had a long-standing relationship was repudiated. Using the resources of "The State" i.e. the militia backed with Gatling Guns, the pastoralists had crushed the unions in a number of confrontations in the early nineties. The failure of the pastoralists to establish a political alliance with urban political forces for example, the significant manufacturing "interior bourgeoisie" within Victoria ensured their demise. Presumably they became part of the class of paid managers of

[120] Hall ibid p117

[121] Hancock 1964, quoted by Schwartz *ISQ* p287

properties, subjected "to the scrutiny of company pastoral inspectors."[122] At the end of the decade, during the Boer War there was an emphasis on sending 'bushmen's contingents' recruited from the pastoral areas in the main by civilian committees. "Bush workers filled almost all the ranks; pastoralists sons, only some with training, took most officer positions.[123] With foregoing background of the pastoral industry, one could deduce that the loss of an inheritance encouraged many of the young men to enlist.

There is another aspect to this Scottish investment. The Scottish Widows Fund and the Scottish Provident it was estimated in 1889 had invested a million pounds each for each of the preceding three years. Thanks to a canny outlook, they sent their own representatives to Australia to handle the mortgages, lent at 5 to 5 ½ per cent and limited the amounts to two-fifths of one half the value of the free-hold properties. "Thanks to this policy they were able to report in 1894 that they had suffered no losses in Australia."[124]

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[122] Schwartz "Foreign Creditors and the Politics of Development…" *ISQ* p287

[123] Gammage, Bill *The Crucible: the establishment of the ANZAC tradition 1899-1918* in *Australia Two Centuries of War & Peace* Edited by M McKernan and M Browne Australian war Memorial in association with Allen and Unwin Australia 1988, p152

[124] Hall A R *The London Capital Market and Aust…* p119 The author might like to add, many was the time as a young man examining his grandfather's books, a book mark from "The Scottish Widows Fund" was within.

In Australia a power vacuum occurred after the Maritime Strike. Within the colonies there was no domestic class able to guarantee the various loans. The pastoralists were gone. The destruction of this class of "capitals" financially during the nineties depression enabled other, mainly urban oriented, political groups to dominate the emerging federation debates in the context of concerns about immigration, and French and German imperialism in the South Pacific.

In London the holders of private debt split from those holding public debt. Labor's political activities and dealings to enter into coalitions with different political and business groups, enabled them to change the political and economic landscape.

The development of the pastoral industry to provide wool and perhaps hides to Britain was a land-intensive activity,[125] requiring modest labour and capital inputs. Capital flowed from London to ensure wool production was undertaken for their woollen industry. This had been the primary focus of both commerce and government from shortly after the time of earliest settlement.

[125] Habakkuk H J *American and British Technology in the Nineteenth Century: The Search for Labour Saving Inventions* Cambridge at the University Press 1967 ch111,p41

TECHNOLOGY ENABLING DEVELOPMENT WITHIN IMPERIAL TRADE

The establishment and expansion of colonial railways had enabled the interior pastoral lands to be opened in the context of intra-colonial rail links directed to providing transport and links with infrastructure on the littoral. The contrast made by Habakkuk[126] is with the United States where a critical mass of population and industry was in place, and the on-costs of riverine and railway communications provided an additional barrier of protection for nascent industry over and above the tariff. The development of sparsely populated Australia depended on export income from grains and wool, and the exploitation of vast arable and marginal lands. The time taken in shipping to British markets was not a problem. Close settlement could not take place until the revolutions in sea-transport had come into being. In essence, the steam navigation of steel hulled vessels with refrigerated holds able to transport huge volumes of perishable produce around the world to Britain. The use of steel in pipes and boilers of engines enabled higher pressures. The triple expansion steam engine brought a factor of improvement in fuel economy. The input of coal dropped from 2.5 pounds per horsepower hour, later reaching only 1.0 pounds.[127]

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[126] Habakkuk ibid p176-8

[127] Headrick, Daniel R *The Tools of Empire Technology and European Imperialism in the Nineteenth Century* Oxford University Press New York 1981 p166

The railways, which by the 1880's were comprehensive in the south-eastern colonies, were the means by which the output from small-farms producing irrigated fruit, butter and fat lambs could be integrated into world trade. The process of canning meat and fruit should also be added.

Without these converging streams of technological development, what is about to be examined could not have occurred. A related aspect is that

> The growth in the size and number of ships was paralleled by a great expansion in trade. Between 1860 and 1910, Britain's trade… increased with Australia from £17,100,000 to £60,000,000; … during an era of gradually falling prices.[128]

Dairy, fat lamb, and irrigated fruit production were labour and capital intensive in contrast to land-intensive pastoral operations. These industries required capital to establish and are a market for a significant quantity of manufactures. Both required fast and reliable transport with appropriate infrastructure, rail transport to abbatoirs, cold stores, and port facilities to load and ship the production to the open markets in Britain. The technology of canning fruit and meat overlaps to some degree in this narrative. It facilitated fruit and jam exports. Crucially it provided canneries able to

[128] Headrick ibid p 168 footnote 9 Adam W Kircaldy *British Shipping: Its History, Organization and Importance* Kegan, Paul, Trench, Trubner & Co Ltd London and New York E P Dutton & Company 1914 pp 130-37

deliver a product of later strategic importance for Imperial armed forces early in the next century, tinned bully beef.

To place these economic and political developments within Australia, into an imperial framework, a brief insight into the Mercantile Marine is warranted. It tied colonial exports to London, both the free market for agrarian produce and the world's financial centre for commerce and public borrowing.

A brief look at the British shipbuilding industry is pertinent,

> In 1850 only 168,000 net tons out of a total of 3,565,000 were steam driven, and wood was still the material of which most ships were built.[129]

The advantages of cheap timber supplies in the United States enabled them to build ships at the same rate as in Britain. With the repeal of the Navigation Acts in 1849 the whole carrying trade was open by 1854. From the mid-eighteen fifties the metallurgical advance in Britain of iron and steel enabled them to exploit the change in methods of construction. The success of British shipbuilding was a technological revolution facilitated by metallurgy and engineering. The convergence of finance, technical skill, and adventurous management, utilised access to the diversified

[129] Allen G C *British Industries and their Organization* Longmans Green and Co Ltd London 1961 pp146-8

industries of Britain to give a lead in design and technology, dominating world mercantile and naval shipbuilding until 1914.

Following the Civil War, America looked to developing her vast interior, effectively relying upon railways. Britain was left with a clear field. During the period 1850 to 1870, there was a great increase in long distance international trade. The opening of the Suez Canal in 1869 stimulated improvements in steam technology, engine and boiler design incorporating steel enabled higher pressures to be maintained and greater economy.

> In the eighties the triple expansion engine made its appearance, and in the next decade larger and faster steamers with quintuple engines and multiple screws were being built. [130]

With American energies directed to landward expansion after the Civil War, their fleet's share of world tonnage reduced from 19 to 9 per cent during the 1860-70 decade. British technologies of steel and steam enabled them to dominate world shipping with over a third of the world ocean-going tonnage, but more than that proportion of the world steam fleet.

> At the outbreak of war the British mercantile marine was the largest, the most up-to-date and the most efficient of all the fleets in the world. It still accounted for one-third of the world fleet, and nearly one half of the

[130] Allen ibid pp146-8

> world's steam fleet, and it was almost four times as large as its nearest and most powerful rival Germany. The vessels on the UK Register consisted, moreover, of the largest and most efficient types of ships. Britain sold her old models to foreigners and equipped herself with the latest models. Every year around 5½ per cent of the total fleet was disposed of, two-thirds of which were sold to foreign flags. As a result of this policy 85 per cent of the tonnage on the Register in 1914 had been built since 1895 and just over two-thirds since 1900. In terms of world trade carried and ships built, Britain's superiority was equally pronounced. By the early twentieth century British ships were carrying around one half the seaborne trade of the world whilst in the twenty-five years before the war we built two-thirds of the new ships that were launched.[131]

The classical economic factors, of labour, land and capital were, notwithstanding the status of the dependent economy within the imperial structure, able to be integrated. All these factors of 'technology' came about at about the same time, perceived as "A new dawn," by both socialist Labor politicians, as well as local and Scottish rentiers in the depression of the early nineties. The term "Business makes strange bedfellows" applies to the common cause they expounded, with colonial governments compelled politically, to pick up the tab.

The development of these industries, the employment and closer settlement arising from them, provided significant new markets for farm machinery, much of it

[131] Aldcroft, Derek H *The Development of British Industry and Foreign Competition 1875-1914* Studies in Industrial enterprise George Allen and Unwin London 1968 Chapter 11 "The Mercantile Marine" Aldcroft, p326-7

imported from America,[132] plus capital and consumer goods. The opportunity to provide for ongoing immigration to secure the country within this expansion was a consideration. The pastoral industry had been a substantial market for wire, wool presses, galvanised iron and windmills. There also had been a requirement for stationary steam engines after the later Wolseley shearing machines were adopted.[133] What was taking place with close settlement and development, spurred local manufacturing and later, a steel industry exploiting existing coal resources and new iron ore mines.

An indication of the reaction to the slump in wool and the operations to alter output can be seen from an examination of Appendix B, a table of "Overseas-Merchandise exports, 1890 to 1900 in thousands of pounds. (£'000) [134]

	Wool	Meat	Butter
1890	15,965	1,819	71
1891	19,940	2,332	207
1892	19,512	3,186	389
1893	17,176	3,931	668
1894	15,297	4,388	1,050

[132] McLean I W "Anglo-American Engineering Competition, 1870-1914: Some Third Market Evidence" *The Economic History Review* New series, Vol29 No.3 (Aug1976) pp452-464

[133] Detail mentioned by Hall A R

[134] Florin p22 Source E Boehm *Prosperity and Depression in Australia 1887-1897* Oxford: Clarendon Press 1971 p100

The figures suggest that intensive farming was cranked up as a national priority. The Danish cream separator (about 1885)[135] was a major technical step forward. Dairy production requires small farms, irrigated feed, and cows to produce milk. The advent of refrigeration to ship meat and butter happened at much the same time. Pastoralists were able to turn off lambs and ship them to market but they were not of export quality. Finishing off livestock for market is a labour-intensive operation in good country.

> But refrigeration helped the small farmers even more than the pastoralists. Their crossbreds produced better lambs for freezing and their butter became for the first time a profitable export.[136]

> The new economic strength of dairy farming was shown in the voluntary sub-division of pastoral free-holds, which were sold or leased as small farms to dairymen and fruit growers. *These men could now pay for their land at enhanced prices* …their success was conditional on high efficiency and low costs of production. [137]

This tends to support the author's contention that informal agreements were reached between local financiers and pastoralists, not overlooking the upper house legislators.

The development of refrigeration enabled the output from mixed farming, fat lambs, butter and fruit to be exported to the British market. These operations were both

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[135] Shann *An Economic History of Australia* p343

[136] Shann *An Economic History*…. p342

[137] Shann ibid p343 Author's italics

labour intensive and profitable. The resulting repayments for the purchase, by small farmers of their properties using public monies, rescued the substantial Scottish and local private investments in pastoral properties. The new export income, and taxes imposed wherever practicable, secured the interest repayments of the substantial public debt.

SUMMING UP OF THE POLITICAL FLUX LEADING INTO FEDERATION

In New South Wales a parliamentary coalition of the new Labor Party and import merchants enacted taxes on land and income to balance the budget and meet overseas interest commitments. As a minor party able to coalesce within parliament after the destruction of the hitherto politically dominant pastoralists they were, within a few elections, able to exploit their role of providing a balance of power within coalitions. Labor's price was the enfranchising of shearers and station hands, further strengthening their cause. The pastoralists' domination of Upper House colonial legislatures through their power to make property a qualification for a vote for the upper house in rural electorates was similarly lost.

Within a period of years, common interests and shifting coalitions within and among capital groups led to major changes in the political tenor of Australia. Labor ranks embraced groups across the spectrum from station hands, small farmers to industrial unions. Labor was able to integrate both rural and industrial workers, small farmers, and small business into the political process.

Labor sponsored through political pressure political the new small farming sector. They saw to it that the new class of small farmers had access to official sources of finance, for credit-fencier loans to buy their land, and officially structured marketing boards to protect them from "monopolistic shippers, rapacious grain merchants and flint-hearted creditors" [138]. Labor exploited the idea of industry, unions, and business working together behind a protective tariff tying a number of disparate national ideas together. Organised Labor working through the parliamentary system transformed society in Australia much as the pastoralists perceived at the time of the Maritime strike. Labor was a spur to future industrialisation, through public sector spending for both, infrastructure, the railways, and employment. Their ambition and determination to industrialise was broadly a question of how? Their political fortunes flourished.

[138] Shann ibid p227

An insight to the politics of this era is this summing up of Billy Hughes at the 1921 Imperial Conference.

> A working-class Welshman who had emigrated to Australia as a youth, and fought his way to the top of the not over-refined world of Australian politics, Billy Hughes was rather like a pre-evangelical Englishman in his cheerful love of a fight and in his plain and gamey speech.[139]

Victoria passed an income tax but not a land tax. Farming was less dependent on wool. Thanks to the legacy of gold, much pastoral finance was local. The Victorian gold strikes had established a legacy of autonomous financial substance for that colony. From this evolved the major financial, and later industrial heart of what became a "customs union" a federation comprising all the Australian colonies, called the Commonwealth. A coalition emerged willing to confront London lenders but new issues of Victorian debt in London were blocked. Domestic pastoral finance companies (and one deduces Scottish rentiers,) saw increased state aid to family farmers as a means to revalorize pastoral land by subdivision and sale. Credit-foncier schemes enacted by colonial governments supported by Labor were the means by which this was achieved. Tariffs on agricultural products were seen as the means to shift the burden of funding to city consumers.[140] South Australia with much local capital in the pastoral industry followed the same path.

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[139] Barnett, Correlli, *The Collapse of British Power* Allan Sutton Publishing Limited Gloucester 1972 p176

[140] Schwartz *ISQ* p288

The role of public monies in these developments was significant. The political calls for close settlement were hard to resist. This was the path to provide employment for a new class of small farmers, a higher standard of living, significant export earnings from the British market, and a domestic market for manufactures.

Manufacturing industry for both import substitution and the provision of employment had been a reality from the time of the gold rushes. The dominating influence of the Melbourne based manufacturers, an 'interior bourgeoisie," made moves politically to establish a "national manufacturing bourgeoisie" through a customs union behind adequate tariffs. The emerging Labor political machine quickly grasped the implications, "[t]hat the principal effect of the tariff was to raise the real return to both labour and capital at the expense of land."[141] The question of whether tariffs, or free trade should be the means to the industrialisation of Australia was a political question, between Victoria and New South Wales up until federation.

Foreign creditors could not agree on whose loans should be sacrificed. They perceived that federation of the six Australian colonies could establish a

[141] Habakkuk p43 footnote

> …Dominion … able to simultaneously guarantee foreign loans and contain the increasingly powerful socialist Labor parties.[142]

The idea of a single (federal) Australian Commonwealth Government responsible for all public debt was embraced with overwhelming enthusiasm in The City, and reached up into the highest political reaches of Whitehall, where it was welcomed, for reasons of Imperial strategy.

The idea of federation had been tossed around for some years between the colonies, the colonial politicians, and prominent people. There had been a focus on the military problems faced in the South Pacific, of a divided colonial military, particularly after the visit of a British Military mission in 1889[143]. Discussion and agreement on the specifics had yet to be reached. The perceptions of a succession of touring army officers, officially inspecting colonial defence, over a period of some years, of the need for a unified or federal structure for military purposes, never quite gelled in the colonial mindset. Much less the role of a military academy producing technical graduates concerned with ordnance production, engineering (embracing mapping and civil engineering project design/management,) and soldiering. At the time of the showdown with the Queensland Shearers Union the New South Wales

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[142] Schwartz *Foreign Creditors… ISQ* p288

[143] " *In the Dominions of Debt* p73

Government assured their Queensland counterparts, that their laws did not allow their forces to reinforce the proceedings to the north.[144]

Exploring the military history of this period, John Moredike delves into the implications of Major General Sir Edward Hutton and his proposals to raise formations suitable for imperial operations. On 30th August 1893 the commandant of the NSW forces, informed members of the United Service Institution of New South Wales, "… the existing defence legislation of the colony prevented employment of troops beyond the borders."[145]

Australian unity had come to be seen by the colonial politicians as a crucial prerequisite, for presenting their ongoing foreign policy and defence concerns with Whitehall.

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[144] Schwartz *In the Dom of Debt* p 74 footnote 53 … L Crisp, *Australian National Government* (London and Croydon, Victoria: Longmans Green, 1965), p17 "Military fragmentation proved no obstacle to smashing the 1890 strike. But the absence of inter-colonial military cooperation reflected legal difficulties and coincident crises, not an absence of desire. Queensland did request military aid from NSW during the strikes, but Premier Parkes demurred, expressing his lack of authority to do so;"

[145] Moredike, John *An Army for a Nation A history of Australian military developments 1880-1914* Allen and Unwin in association with the Directorate of Army Studies, Department of Defence 1992 p 33

In this chapter the Sterling finance structure was examined from several aspects. The manner in which it was maintained from London and the de facto integration of the British financial system with that of France and, through Barings, close links also to Hamburg, a major continental financial, commercial and industrial centre (in the historical context of musket production at least.)

Perez,[146] starting with the boom in English canal building using funds fleeing from France before their Revolution, charts cycles through two centuries of financial disconnection between production and finance. Towards the end of the 1880's such a process was occurring again with vast sums of money advanced to Argentine and other South American borrowers. Barings with £21million of worthless paper had lent such a vast sum, following the default of Argentina, the world financial structure based in London, looked like coming to a standstill. Without the immediate involvement of the Bank of England to harness the total banking resources of The City, buying gold with treasury notes from Russia and the Bank of France, the real British economy would have been thrown into turmoil.

[146] Perez, Carlota *Technological Revolutions and Financial Capital the Dynamics of Bubbles and Golden Ages* Edward Elgar Cheltenham U K 2003

The London financial press started looking at similar economies to that of Argentina and began to scrutinise the annual reports of colonial railways like that of Victoria. The imperial legal structure giving lenders in the metropole the power to foreclose on mortgagees – pastoralists in Australian colonies – led to three separate financial groups having their own agendas. The depositors in colonial banks who had been heavily involved in the land boom, building and urban development effectively lost their money. The lenders to colonial governments perceived them as borrowing to maintain employment and economic activity, not an officially acceptable thing to do pre-Keynes. The option of Latin of default, caused shudders. The pastoralists, a social and economic group apart, did not see themselves as 'Australian' and failed to forge links with political groups in the cities.

The recent hypothesis of Herman Schwartz suggesting social and economic change came about through the selling up of large areas of pastoral holdings by mortgagors is embraced. The new technologies of shipbuilding with steel, improved steam engines, refrigeration and cold stores enabled close settlement to become an economic proposition. The social and political agenda's of the unions, previously crushed by the state and pastoralists, were pursued through political channels. Colonial governments financed small farmers with *credit foncier* loans, marketing boards, and finance were extended through official institutions to ensure the new

class of small farmers could prosper and export frozen cross-bred lambs, fruit, and butter especially to London markets.

The era of the early to mid eighteen nineties was the beginning of sweeping changes in Asia. Japan had gone to war with China and won in 1894. New more modern naval rivals to the Royal Navy were beginning to flex their might from the South Pacific to Japan. The nationally organised Labor Party working in coalition with existing parties within parliament, removed pastoralist domination of the Upper Houses. The issues leading into federation, were dominated by the essentially urban, labour, and manufacturing political groups. The objective of a customs union, the use of tariffs to maintain employment in manufacturing, changing the proportions of money going to the rural industries was embraced politically.

Chapter 111

The demise of *Pax Britannica* Imperial and colonial Politics within the implications of the new technologies; telegraph, railways, and weapons.

Introduction

Liberal Cobdenite ideas and, on the face of it free trade, across the world had held sway since 1815. British views, of 'being reasonable' had predominated beyond the shores of Europe. But two generations beyond the Napoleonic Wars, times were changing. The telegraph and railways had demonstrated to France in Piedmont and Britain in India, that communication with and movement of troops could overcome essentially local forces. The implications of the American Civil War raging in the early 1860's were not to be widely or carefully evaluated and accepted in Europe until the next century, in the context of the preceding 1914-18 War.

Racial, dynastic and religious links with Germany extended back for centuries; German mercenaries had fought for the Crown in America, and in many of the conflicts against France. The decisive role of the Prussians against Napoleon at

Waterloo in 1815, the commercial links with Hamburg and trade with the German principalities were such that the idea of serious differences with the Prussians took nearly two generations to dawn on a complacent British public.

Bismarck effectively governed Prussia. There was very little in the way of effective checks and balances of his domination of institutions. The crown had applied Von Clausewitz' theories and rotated generations of their young men through the army. A primitive breach-loading rifle the Dreyse Needle-gun had been adopted in 1848. Produced by craft methods it took nearly twenty years to become general issue.

In 1864 Prussia faced off Denmark over Schleswig-Holstein. France was reluctant to commit troops to back Denmark since in Imlah's words, the French army had carried much of the load during the Crimean War - not a clearly stated, or accepted fact to English-speaking peoples a century and a half later. The British Cabinet was divided. The Army had 65,000 men holding down India after the Mutiny. The liberal perception was, "common sense would prevail," and "Britain was not a European power," but as overlord of India, a world maritime and trading power. The maritime power however, was being applied to a moral crusade, to stamp out the slave trade. The links with Hamburg for arms, finance, and trade were intimate and long-standing. The idea? Of the Royal Navy blocking British trade through Hamburg?

Before the advent of European railways, initially financed and built by British firms, much intra-German trade was shipped via North Sea ports around the Mediterranean and up the Danube. The naval option had been valid.

The public was two generations removed from a serious war and, with industry and commerce thriving, failed to grasp that there might be further implications from not blocking Bismarck in Denmark. The Prussians rolled over the Danes; "Blood and iron" prevailed. The dogma attributed to Gladstone by de Cocco - that Government could not incur deficits to achieve long term military and strategic aims,[147] that Britain should gird herself to deal with the next onslaught by Prussia - seems not to have occurred to a divided Cabinet. From this year onwards British Foreign policy became bipolar with Berlin. It was effectively the end of *Pax Britannica*.

Two years later in 1866 Bismarck looked to trounce Austria to establish Prussian domination of the German states. Notwithstanding it was a most serious strategic matter, the British Government again failed to galvanise a diplomatic or military offensive against Prussia.

[147] And, to which dogma Hall attributes the flow of capital to the world from London to develop the raw material supplies required by the industrialising countries….

The implications of Prussian domination of central Europe rose to a crescendo after the Franco-Prussian war of 1870-71 but were, to a large extent, lost to colonial politicians, traders, and probably the India Office during this period until 1890. Whitehall was urged for strategic and probably missionary motives: to lock up vast tracts of West Africa; to establish protectorates to cordon in the Boer Republics away from a common border with any European power; to take almost the entire coast of East Africa[148] and; various island groups in the South West Pacific to deny them to Germany. Economically they were irrelevant. But as symbols to Germany who saw in colonies an acknowledgement of great power status, this incomprehension around the periphery, but perceived by Bismarck as orchestrated from London, lit a fuse.

Notwithstanding common liberal ideas of France and Britain, and their interlocked financial structures, the naval threat to Britain was normally couched in terms of French naval innovations. Leaks to the Pall Mall Gazette in the late 1880's led to increases in naval shipbuilding, with a halt around 1887 when it is suggested by this author; the stated reason, the requirement to design new weapons to deal with torpedo boats, ignores the data presented in the reprint of the Nordenfedt Catalogue of 1884. The machine gun, and quick-firing mechanisms for ordnance were in

[148] "The French and Portuguese fornicated their way across Africa!" The remark of an Anglo-South African to the author in 1975, given the influential role of the missionaries in the political perceptions concerning Africa, was this a factor?

production. The limitations of such weapons; were the chemical characteristics of Gun-powder, a lot of residue within the mechanism, the burning characteristics – maximum pressure at ignition, dominating design, and vast clouds of smoke after discharge. These technical considerations are put forward as the strategic requirement for the British Government to bypass the Nobel patents on smokeless powder propellants for naval anti-torpedo boat guns, not to overlook new small arms. This scientific endeavour was successfully completed within a few years.

The structure of the British engineering industry is examined, the propensity to manufacture small runs of specialised steam engines built to last a generation and their export to the formal and informal empire. The predominantly Scots, engineers bought British, notwithstanding liberal ideas of price competition, and free trade from other suppliers. In contrast the Americans manufactured runs of a single standardised model of engine, not built to last as long, out of cheaper materials, but designed for climbing hills. The question of the implications for the engineering industries in Britain, are raised.

Following the battle of Sadowa in 1866 the Prussian Army was established by military organization (the Great General Staff,) and technology as ‘the army’ on the continent. The topic of technology, of design and mass-production of infantry

weapons and munitions became an international scramble. Britain in 1851 had had so many problems from an intractable and colluding gun trade in obtaining Minie muzzle-loading rifles in volume, that a Parliamentary Commission was sent to America to investigate the ideas for manufacturing weapons with interchangeable parts. This novelty had been demonstrated by Colonel Colt's revolvers made in London, and exhibitors of rifles at the Great Exhibition.

The problems with craft production in garrets and cellars of components for rifles requiring accurate and interchangeable parts were such War Office requirements demanded the Royal Small Arms Factory should be equipped with the latest machine-tools and methods and expanded to become the leading factory of its type in Britain. A report at this time contained the words, "The American system of manufactures," and so it became.

The French origins and the later importance of interchangeable mass-produced parts are as pertinent to the questions of technology, as early settlement of Australia is to the economic and political structures which later evolved. If Trebilcock makes the point, the ability of Watt to bore accurate cylinders for steam engines relied upon the machinery for boring ordnance, the requirement for vast numbers of rifles capable of

firing many cartridges made for them in different factories changed society. This history is explored.

CONTINENTAL POLITICS – THE DEMISE OF PAX BRITANNICA

Across the Channel from the seat of Empire, the use of telegraph and rail transport as demonstrated by France in 1859 against Austria in Piedmont revived a trend of European militarism through huge conscript armies clothed and equipped by industry.[149] All three of these factors embracing technological and social change were epitomised by Prussia.

The role of the telegraph during the Indian Mutiny is described in the following, "At the time of the Indian Revolt of 1857, the 4,500 miles of land lines in India helped the British move troops quickly and crush the uprising in a few months."[150]

> The strategic value of railroads is a familiar topic in the history of Germany … it was a powerful motive in India as well. Lord Dalhousie, a governor-general of India, wrote in a "Minute to the Court of Directors" in 1853 that railroads would provide 'full intelligence of any event to be transmitted to government at five times the speed now possible; as well as the concentration of its military strength on every given point, in as many days as it would now require months to effect.'

[149] Imlah ibid p17-18

[150] Headrick ibid p158

> Dalhousie's prediction came true in the Indian Revolt of 1857, which led to a rash of railroad building in 1858 and 1859.[151]

The above quotes suggest, the use of telegraph and railways was both recognised, and exploited by Britain in India, and France in Piedmont, some years before the American Civil War 1861-65. But, It is mainly that war, to which profound, but imperfectly understood lessons pertaining to new criteria of total war, were later hailed, notably by Jean Bloch. [152]

Following the doctrines of von Clausewitz in the post 1815 era, vast numbers of trained and disciplined troops were rotated through the Prussian army ranks. Equipped with breech-loading rifles adopted in 1848 when the muzzle-loading Minie cap-lock rifle was a novelty, secure internal lines of communication with the telegraph and railways meant Prussia's army was poised to dominate Europe.

In London in 1863 at the zenith of *Pax Britannica*, the Schleswig-Holstein question, and support for Denmark against Prussia was being evaluated in the context of, the Royal Navy showing the flag in the tropics and suppressing the slave trade. "In the

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[151] Headrick ibid p182/3 footnote 6 refers.

[152] Clarke I F *Voices Prophesying War, 1763-1984* Panther Books, London p134 (Quoted by Ellis chapter III) The serious researcher may consult; Bloch, I S *The Future of War in its Technical, Economic, and Political Relations, abridged*" Boston 1902. (Robert O'Connell in *Of Arms and Men* Oxford University Press New York 1989 quotes both the above sources in his footnotes for chapter 13.)

years following the French naval 'scare' of 1859, the mid-Victorians had relapsed into their usual state of complacency about the navy…. there was little to spare for operations in European waters." [153]

It was a British political obsession,

> …that low public spending would permit continued growth and ever-increasing prosperity. This faith was reflected in the budget figures for the fifty years from 1820 to 1870, which increased only slowly while national income soared. [154]

The obsession that government could only incur short-term deficits was integral to this budgetary management.

> Ideally, even the costs of war should have been defrayed by increasing taxation rather than loans. During the struggle against Napoleon this had proved impossible, and successive governments spent the rest of the nineteenth century scrupulously paying off the burden of debt that had resulted. … Meeting past responsibilities and avoiding unnecessary peace-time borrowing were the two principal means of ensuring the nation's credit.[155]

Friedberg traces the financial road to the descent of the British Climacteric and coincidentally, provides the details to corroborate de Cocco's insight cited above. In

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[153] Kennedy *The Rise* … p16

[154] Friedberg, Aaron L *The Weary Titan Britain and the Experience of Relative Decline 1895-1905* Princeton University Press New Jersey 1988 p94 . Hall A R suggests minimal public spending underwrote worldwide capital investment to develop the empire, formal and informal.

[155] Friedberg, Aaron L ibid p94

1852 Gladstone became Chancellor of the Exchequer, serving in that role twice and became more influential from then on as Prime Minister alternating with Disraeli… It would appear, the origins of the dogma, were lost to political debate. De Cooco asserts it originated from Gladstone refusing to become hostage to the Bank of England over fiscal policy …[156]

In this Danish situation of 1864 where Bismarck's juggernaut of "blood and iron" was beginning to roll, Britain faced a number of other issues, which dictated her decisions. The British Army had 65,000 men holding down India after the Mutiny, New Zealand had a war with natives, and there were other threats and commitments. In the perceptions of the (British) public "There was … a kind of optimistic belief that sound sense, however unaided would triumph in the end."[157] The result of which, saw diplomatic activity wielded effectively since 1815, (in essence, it had been moral authority,) defied successfully by Bismarck, removed from a centre of gravity in London.

With regard to the British Army being on the other side of the world, the question of a continental ally was summed up in,

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[156] de Cocco, Marcel *Money and Empire* observations based on his remarks
[157] Imlah ibid p17-18

> The French also were undecided and hesitant and felt that the brunt of war would fall on their army as it had in the Crimea if they joined with Britain for a firm stand against Prussia." The (British) Cabinet was divided, "…And with a public grown complacent in the satisfactions of material success, they stopped short of effective diplomacy; they failed to organize a concert of powers capable of qualifying," Bismarck's success. Britain, "… failed to rally other powers into a common front against violent change.[158]

Drawing on a number of sources, the key issues of British foreign policy for this period were as follows. During the early-1860s when the Schleswig-Holstein question arose between Prussia and Denmark, Bismarck effectively called Britain's bluff. "By the end of 1863 the Anglo-French *entente* which had existed since the Crimean War was in ruins,"[159]

What Kennedy emphasises, Britain with racial, dynastic and religious ties to Prussia, could not perceive a military solution was required, or inevitable. The implication is, at that time, it was recognised in Whitehall at that time, was that operations against Prussia required both a huge army and serious political will - neither of which existed in the British Isles. The realisation the Royal Navy was not a strategic option for threatening Prussia, was seen with greater clarity than it was to be fifty years later

[158] Imlah ibid p18

[159] Kennedy, Paul *The Rise of the Anglo-German Antagonism, 1860-1914* George Allen and Unwin London 1980 p10

in the era of Fisher from the nineties to the early 1900's.[160] The interlinked perceptions were; Britain was not a European power; that it had no requirement for a large standing army; and that it could stand aside from power struggles on the Continent, relying upon "a balance of power between the major powers" (as in, no majority of them agreed to put their heads together and combine against Britain,)[161] to preserve peace and prosperity. This was not easily disabused, with the task ultimately taking fifty years. Even then, the idea Britain was not a European power was both propounded, and revisited disastrously, in the inter-war period of 1919-1938.

Citing Kennedy's detailed dispositions of imperial commitments,[162] it may be suggested, with some degree of authority that had the regular army combatant units, specialist officers, veterans, recruits, munitions, and commissariat stores (including foodstuffs) sent from Australia not been forthcoming, then the War waged to secure New Zealand within the Empire would have bogged down into, at best, a drawn out stalemate.

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[160] Sumida, Jon "British Naval Administration in the Age of Fisher" *The Journal of Military History* Vol 54 no 1 Jan 1990 pp1-26

[161] Kennedy in his writing uses this reality as the key reason for the long-term survival of the British Empire.

[162] Kennedy *The Rise*... p16

Thus, from 1864 onwards, the dominance Britain won at Waterloo in 1815 dropped back to a bipolar power relationship with Prussia. [163] By 1866 faced with an Austro-Prussian War with serious strategic implications, Britain's military weakness was unchanged. There was a realisation domestic political realities within Britain, precluded a military intervention on the continent, unless there was public support. With racial, religious, and dynastic ties to Prussia, there was no reason to anticipate serious long-term problems.

Military realities of a protracted conflict with the Prussian Army may have become apparent after the Danish army was trounced over Schleswig-Holstein. Although the breech-loading (Dreyse) Needle-guns were produced using craft methods, remorseless output over twenty years enabled it to become general issue.[164] In 1866 two years after Schleswig-Holstein, the Needle-guns were decisive in the later Austro-Prussian War of 1866. (Their efficacy in the 1870-71 Franco-Prussian War has been questioned, but despite a superior rifle the Chassepot and the mitrailleuse[165] (a 30 barrelled volley fire gun,) the French army leadership was unable to rise to the

[163] Imlah, ibid p17-19

[164] Exports of American machine-tools to set up Prussian arsenals were significant later, Durfee writing in *The American Machinist*1893

[165] With the exception of one battle the French deployed the weapons as artillery pieces integral with their field guns instead of siting them forward with the infantry.

challenge of the resulting changes in tactics required by the ability to deliver overwhelming small arms fire at close range.)

The following elaborates:

> The Dreyse's forte was its loading speed. During the war of 1866 between Prussia and Austria over the mastery of the German states, Prussian soldiers, kneeling or lying down, could fire their Dreyse's seven times in the span it took the Austrians to load and fire once standing up. The war, which was brief, culminated in a Prussian victory at Sadowa. This battle not only assured Prussia's supremacy in Germany but revolutionized the art of warfare. Before that battle, armies saw no need to uniformly adopt new equipment; instead they gradually acquired new weapons as their old ones wore out. After Sadowa, however, all the great powers of Europe scrambled to switch to breech-loaders. An arms race had begun, renewed every few years by the now rapidly evolving technology of gun design. [166]

Looking at the question of production technology Headrick has not addressed the Anglo-American production aspects of this topic.[167] His observation of the Prussian

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[166] Headrick, Daniel R *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* Oxford University Press New York 1981 p97 Rather a sweeping statement. In 1851 Britain at least, realised American machine tools and manufacturing methods were crucial when setting up production for the Minie rifle in the early fifties. A parliamentary commission was sent to America to tackle the project… The question is not mentioned anywhere in the literature. But, the implication has to be the Prussians never operating far from home, in contrast to the global operations of the British Army, ignored the topic of refitting huge numbers of damaged or broken rifles at any distance from a major arsenal. Needle-Guns with parts manufactured by craft methods were never used in operations lasting long enough for the senior officers to realise there might be a problem.

[167] The paragraph relies upon; McNeill, *The Pursuit of Power,* & Ken Alder, *Engineering the Revolution*

grasp of weapons and munitions technology is however, unquestioned. This is in effect, the beginning of the narrative about the nature of the later Victorian and Australian munitions production decisions.

Two streams of perception dominated political decisions till the South African War at the end of the nineteenth century: That of a public no longer accepting the traditional "Call to the Colours" and, the dogma of the "Balanced budget," which insisted the materiel resources to undertake a military role on the Continent simply could not be found. Many little wars fought by Britain in the Far East and around the Indian Ocean littoral were conducted by the Indian Army at the expense of the Indian taxpayer. Because of this, "The outstanding feature of British foreign policy after 1870 was that it was perpetually on the defensive."[168]

IMPERIAL POLITICS & COLONIAL POLITICAL SCENE

The Australian colonies had perceived concerns in the South Pacific as early as 1853. After 1870, as clouds gathered on the Pacific horizon, colonial political leaders in inter-colonial conferences formally adopted, "as a settled object of policy," British

[168] Platt, D C M *Finance Trade and Politics in British Foreign Policy 1815-1914"* Clarendon Press 1968 p*357*

annexation and financial responsibility for the administration of, the Pacific Islands. The reality of colonial parsimony had considerable influence on the reluctance of Whitehall to engage with the problem at a time when there was little international focus or interest in the region. British control, "From New Guinea in the north through the Solomons to the New Hebrides and, more distantly, Fiji and Samoa in the east" was seen as erecting for Australia "a 'rampart,' as Hughes was later to call it, against potential enemies." [169]

From the apogee of British power in the mid-1860s, industrialisation of the continental powers proceeded, facilitated in Germany, by imports of raw materials financed and insured by London and shipped by the British mercantile Marine via London or Hamburg to the purchasing firms,[170] Germany and the United States of America also became competitors of the Royal Navy in the Pacific. Rivalry and acrimony between the former two navies established itself in Samoa and continued progressively for decades.[171]

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[169] Meaney *The Search for Security in the Pacific 1910-1914* Sydney University Press Sydney 1976 p16

[170] Kennedy *The Rise…* p48

[171] Vagts, Alfred "Hopes and Fears of an American-German War 1870-1915" *Political Science Quarterly* Vol 54 No 4 December 1939 pp 515-535. What is not specifically spelled out in this piece is that America and Germany were also competing head on in world markets for modern industrial products. To a large extent, British industry, divorced from The City financiers, was unable to rise to this challenge. Joseph Chamberlain and his ideas of an Imperial zollverein, and the

Colonial fears of the imperial ambitions of both France and Germany in the arc from New Guinea to Fiji, and Samoa to the east, led to ongoing, and strident political debate with London. Australian political thinkers saw a specific strategic problem, with a solution, lying in a "Munroe doctrine for the South Pacific."[172] Authorities in Whitehall, while recognising the analogy, could not see any connection with isolated island groups thousands of miles to the east of Australia, with a security threat.

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modernising of British industry never got off the ground. Industry was financed in the main by the provinces, Perez refers "to the banks trading their shares.' To Treasury, the dogma of 'free trade' was sacrosanct. It would appear, because the trade surplus of Australia and India, added with the profits from invisibles from The City, shipping, insurance, merchanting, covered the deficits, the declining export market share, and corresponding increased imports of industrial manufactures, there was no challenge comprehended by the financial and political elite. (Based on Friedberg) Kennedy, *The Rise*… p295 "Perhaps nothing illustrates the multilateral trading relationship better than the fact that in 1913 Germany had a *visible* trade surplus with Britain of around £20million, whereas Britain had a surplus of £30 million with India and Australia, and those two had a surplus of slightly over £20 million with Germany!"

[172] Kircaldy Adam W *British Shipping Its History, Organisation and Importance* Kegan Paul Trench Trubner & Co. Ltd. London 1914 Referring to the Spanish colonies in South America who had declared themselves independent. In context, the French navy was about to transport Spanish troops across the Atlantic to retake them. (Britain threatened to interdict the troopships.) "The newly established Republics across the Atlantic were menaced with many dangers, and looked naturally to the saviour of European liberties, nor did they look in vain. Canning resisted the blandishments of the Holy Alliance, and, going a step further, suggested to the United States the policy which has developed into the *Munroe Doctrine,"* p440

The reality of British interests and policies, in the context of European politics and imperial strategy, were of more immediate importance to Whitehall than the fragmented and parsimonious Australian colonial proposals and their importuning for annexing new colonies. Australian ideas were for a "Munroe doctrine" for the entire South Pacific controlled by Britain, and it was in Australia's interest to prevent other nations - France, especially, but also Germany and America - from intruding and straddling the crucial sea-lanes across the Pacific.

"Australians, like other British peoples, had since the 1870's come to see Americans as Anglo-Saxon race cousins and the United States as a friendly power."[173] The other Anglo-Saxon settler colonies - the later dominions of Canada, and New Zealand - were regarded as relatives. From the middle of the nineteenth century onward, war, with the United States, was generally regarded as unthinkable in Whitehall. In all disputes, whether on behalf of Canada, the isthmian (Panama) Canal, or Venezuela (when Britain was about to act in concert with Germany,) appeasement in the interests of the Americans, was energetically pursued. Long-term diplomatic achievements arose from this policy and are outlined by Bradford Perkins in the *Great Rapprochement*.[174]

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[173] Meaney ibid p22

[174] Perkins, Bradford *The Great Rapprochement: England and the United States 1895-1914* Victor Gollancz Ltd London 1969

With industrialisation in Germany, Japan and the United States of America in the latter part of the nineteenth century, the formerly quiescent diplomatic certainties in the Pacific that existed for some time after the colonies were granted self-government were no longer known quantities. Nor were the imperial policies centred on Whitehall, as political, commercial, and military relationships between the new industrial powers began to swirl and flow. The strategic reach of these new powers was translated in terms of their navies, within certain constraints. The British Empire for instance controlled all cable communications by Germany with the outside world by virtue of their routing through England.[175]

Following discoveries and development of coal supplies from Natal through to Borneo, Whitehall, effectively was able to dictate to which European navies coal supplies around the globe and to the Far East were accessible. Examples in a much later period were provided by Spain in the Spanish-American War in 1898. A Spanish squadron of equal size to the US Navy in the Far East[176] was denied access

[175] Headrick ibid p164

[176] In a later context of Sims, the effects of USN bombardment of Spanish fleet in Manila Harbour…. Significance of this item, would more targets have improved the 2% hit ratio of 5,000 odd shells?

to coaling before entering the Suez Canal and was forced to return to Spain.[177] With Britain as an ally of Japan in the Russo-Jap War of 1905 the Russian fleet was compelled to engage German colliers to sail with them, around the Cape.

Germany theoretically had access to (British) colonial markets through the free trade policy within the *Pax Britannica*.[178] Notwithstanding the existing flows of money and trade through London and Hamburg carried in British vessels, an outgrowth of German industrial and commercial expansion was the belief colonies were essential for commercial and national prestige.

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[177] Perkins, Bradford *The Great Rapprochement: England and the United States 1895-1914* Victor Gollancz London 1969 p44-5 "Late in June a Spanish squadron under Admiral Camara, as strong or stronger than the American forces in the far east, weighed anchor for the Philippines by way of Suez. In Egypt, Camara sought permission to coal, and since Egypt was still technically a Turkish possession and the Porte had not issued a proclamation of neutrality, there seemed a good reason to permit Camara to do so. However, after consulting London, Lord Cromer, the British voice at Cairo, induced Egyptian authorities to prevent coaling, even if carried on from lighters beyond the three-mile limit, and to order the Spanish ships to leave. They returned to Spain." Footnote 231 on the, Sims and Gunnery in USN see text above. 5,859 shells fired, 2.42 % were hits. If there had been a factor times the number of Spanish ships, what might that percentage have been?

[178] de Cocco Marcello, *Money and Empire* Basil Blackwell Oxford 1974 Makes the point, the British managers and engineers on the periphery bought British. Price was not a consideration, especially for India. The remarks above by Aldcroft in relation to engineers on the periphery specifying quantities and design parameters which could only be supplied by the specialised English locomotive manufacturers, ensured standardised mass-produced engines from America were unacceptable. An example of "English liberalism?"

The older continental powers, France, Russia and Austria-Hungary always had maritime strength. It is to the two former powers we will digress.

Within the evolving outlook of the colonial polities, political, military, and industrial decisions were taken, as a result of challenges to British power in the Pacific.

> In constitutional theory and form, (the colonies were,) dependencies and the control over the most vital external functions of government, over defence policy in its widest sense and over foreign policy remained in the hands of the imperial power.[179]

The idea of a federation, a Commonwealth, arose for a number of reasons, not least of which was the pursuit of national self-interest, and, perceptions of long-term national and racial survival. A predilection with immigration at variance with the ideas of aristocratic, classically educated, liberal imperial politicians and officials was one of the more eloquently expressed, topics.[180]

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[179] Meaney *The Search for Security in the Pacific…* p8

[180] Gladys Gordon, my grandmother had travelled to England in 1916 "To go nursing…"On arrival my grandfather who had gone over ahead of her to join up in 1916 married her. She mentioned a number of times, while watching the Victory Parade in London from a cab, she saw a woman holding a baby, and invited her to join her. "The Australians marched past and the woman said, 'But they're white!' I said, 'I am Australian,' and the woman almost dropped the baby! She almost dropped the baby."
A contrasting insight with the class making political decisions, it was summed up as follows: " … that long era in which Britain's policies were decided by a select group of aristocrats, country squires and men of commerce, who argued without much concern for the views of the masses about the 'national interest' and who usually displayed a wish to preserve that interest energetically, if need be by armed force;" Kennedy, Paul *Strategy and Diplomacy 1870-1945* George Allen and Unwin,

The German and American naval rivalry and acrimony which began off Samoa in the early 1870's, washed west over colonial politicians. Although the Australian colonies were in orbit around London, accurate and timely observations of the changes were being perceived. Unlike the traditional enemies of armies who remained, the admirals of the new navies perceived different enemies within the strategies and concepts of sea power developed by Mahan. [181]

Kennedy makes it abundantly clear the three key protagonists in control of the post-Bismarck German empire had separate and self-seeking agendas. Kaiser Wilhelm 11, his Chancellor Bulow, and Admiral Tirpitz had no comprehensive or ongoing picture of what they were each, separately undermining, and achieving. The discrete political factions within their empire, domestic economic agrarian, industrial, and jingo factions were selectively manipulated, and reacted to. There was no over-riding

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Fontana Paperbacks, Great Britain 1984 p29 He describes the passing of this era in about 1920.

[181] Vagts Alfred "Hopes and Fears of an American-German War, 1870-1915" I, *Political Science Quarterly*, Vol.54, No.4 Dec. 1939 pp 514-535: p514

parliamentary authority to enquire, check, question taxation, or expose: spending, and political policies.[182]

From this period until the Treaty of Washington after the First World War, Australian political thinkers were acutely attuned to potential threats to Australian sea-lanes through the South Western Pacific.

BRITISH STRATEGIC PROBLEMS, THE NAVY - AND TECHNOLOGY

From the 1880's the changes to technology for ordnance had gone far beyond W G Armstrong's reading of newspaper reports from the Crimea, and in horrified reaction, immediately designing new field guns. Naval ordnance, engines, ship design and characteristics established what is, still today, an intimate relationship between serving officers (naval in this historic example,) and the stimulation of invention by private individuals and firms.

> Armstrong, Dreyse, Krupp, and their like – were able to revolutionise armaments simply by bringing military technology to the level of civil engineering. But this mid-nineteenth century style of private invention

[182] Stevenson, William *A Man Called Intrepid The Secret War 1939-1945* Sphere Books, London 1976 p 484 "The first line of the free world's defence was the free flow of information. Where this flow was impeded by censorship and controls imposed within a totalitarian society, it became necessary to secure the information through secret intelligence and disseminate it as widely as possible. A world war had been started because of miscalculations based on lack of information on both sides."

> was quite incapable of carrying naval engineering to the heights actually attained between 1884 and 1914. [183]

These intimate links are described by McNeill as "Command technology." The end-user, in this example the Royal Navy, officially stimulated deliberate invention, "… tactical and strategic planning began to shape warships…" [184]

Following disagreements with the French in 1884 "The English turned to inspect their first line of defence, and were shocked to find it inadequate for possible contingencies." Leaks from within the government to the Pall Mall Gazette dramatised the naval threat and called for increased spending.

> After two years of higher budgets, allocations for warship construction were cut sharply in 1887 and 1888. … it was apparently also a result of a realization by navy planners that their expensive new battleships might be vulnerable to undersea torpedoes launched from cheap, fast-moving torpedo boats. [185]

This, it is suggested, was the underlying reason why, "… that British ship designers had to wait until the invention of the quick-firing gun (1889) which provided them with a weapon with which to keep torpedo boats out of range of their battleships."[186]

There was a related perception of French naval thinking;

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[183] McNeill, William H *The Pursuit of Power, Technology, Armed Force, and Society since AD 1000* The University of Chicago Press Chicago 1982 p278

[184] ibid

[185] Friedberg, ibid p146/7 Footnote 44 Sumida, *Financial Limitation, Technological Innovation and British naval Policy, 1904-1910* p7 Phd Diss. University of Chicago 1982

[186] ibid

> … it certainly seemed by the mid-1880s that Britain's traditional rival had pinned its faith on a radically new weapons system for close-in operations, while falling back on the age-old strategy of commerce-trading for action at longer distances.[187]

But this above passage from Kennedy simply does not add up. Nordenfedt, Gardner, and Hotchkiss had produced anti-torpedo boat "machine guns" in the early 1880's.[188] These weapons are described and evaluated in the reprinted Nordenfeldt Catalogue of 1884 identified in the footnote. Extensive coverage is devoted to the one inch Nordenfeldt in comparison with the 37mm Hotchkiss, along with technical appraisals of the effects of the shells fired within various scenarios against armour plate. While gunpowder remained the only propellant, the explosive guncotton for use in shells had been established for decades.

> In 1881, when the torpedo-boat threat was new, the Admiralty defined the characteristics of a quick-firing gun needed to combat the danger. What the Admiralty wanted was a gun capable of firing at least twelve times a minute and powerful enough to blow an approaching torpedo boat out of the water long before it got within the 600 yards which the represented the effective range of self-propelled torpedoes.
>
> By 1886, when Admiral Fisher was at last authorized to turn to private firms for weapons… two different designs already existed which met the admiralty's 1881 specification. The one actually chosen was the work of

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[187] McNeill ibid p264

[188] *The Nordenfeldt Machine Guns Described in Detail and Compared with Other Systems also Their Employment for Naval and Military Purposes* The Naval and Military Press Ltd January 1884 published in Association with the Royal Armouries Uckfield East Sussex current printing no date printed. Downloaded from www.naval-military-press.com 2007

> a Swedish engineer named Nordenfeldt. … Armstrong simultaneously developed a large-caliber quick-firing gun whose power much exceeded the specification of 1881. The largest of these used hydraulic recoil cylinders to return the gun automatically to firing position after each discharge.[189]

Exploring the rest of McNeill's discourse of innovations for breech-sealing (not really an issue with quick-firing guns using a fixed drawn brass cartridge with a case which obdurates on firing,) and of the recoil system invented by the Frenchman Joseph Vavasseur there appear to have been three separate paths of invention and innovation which needed integration to solve the threat from torpedo-boats.

From the time of the mid-1880's torpedo boats were designed which contained their coal bunkers in compartments between the hull and the engine room, thus adding a belt of coal to the armour of the vessel. To penetrate the hulls of these more heavily armoured, high speed vessels required a much heavier shell than the mere one inch (or 25mm,) and 37mm (equates to the old two pounder in the World War Two era, the calibre is still around.) The technical problem was not that of gun technology; the 'machine gun mechanism' albeit hand-operated was well and truly accepted (within the Royal Navy). The problem was aiming and firing continuously at a high-speed target able to launch a lethal torpedo which could sink the heaviest ship at six hundred yards. Improvements were on the way to double the torpedo range. The

[189] McNeill ibid p279

problem was similar to the requirements of direct fire weapons (machine cannons) that faced later generations, both from Motor Torpedo Boats, torpedo aircraft, the Kamikaze's and, much later, from missiles.

There was no question in the minds of naval gunnery officers a suitable quick-firing gun was required. It had to use fixed ammunition, a brass case with the shell crimped into it, easily and quickly handled by gunners and loaders within a drill. The handicap facing the Royal Navy in the period in question, post-1886 was that of propellants. In the era of gunpowder, firing at a rapidly moving target, closing on a major vessel and capable of sinking it, the gunners were immersed in smoke once a shot was fired. Building new ships was a liability until this problem was addressed. The French scientist Paul Vielle had in 1886 developed smokeless propellants for small arms.[190]

The following elaborates:

> One of the difficulties with using gunpowder as a gun propellant was its irregularity of burning when compared with cordite. As a result it would produce abnormally high pressures in the gun barrel which is why at the breech end, they were made so thick.[191] (Experiments by Robbins in

[190] Huon, Jean *Military Rifle and Machine Gun Cartridges* Ironside International Publishers, Inc Alexandria VA 1988 p132

[191] Rosenberg, Nathan *The American System of Manufactures* Edinburgh University Press Edinburgh 1969 p37 Exploring the topic of production in government establishments of products of strategic importance. "This was particularly the case where there were special problems of quality control, and where the competitive process involved a serious danger of quality deterioration. For example, gun-powder

> India in the eighteenth century established irregularity of burning powder. Prior to this the bursting of guns was attributed to faults with the casting.[192]) Cordite can be controlled and therefore produces uniform pressures and more consistent ballistics. The other problem with gunpowder was the vast amount of smoke produced on ignition which rapidly obscured a fast moving enemy torpedo boat coming towards a battleship. The other reason why it was unsatisfactory was its fouling effect and the bore of a gun rapidly became encrusted with the detritus remaining from the burning. This of course was no good in machine guns with their very fine tolerances. Cordite burns slowly and on this account the initial pressures within the gun are comparatively low and the pressure on the base of the projectile in the bore is well sustained. This is clearly demonstrated in comparing the graphs of pressure against shot travel.[193]

The book *Naval Gunnery* by Captain H Garbett published in 1897 referred to by the source above, is fascinating for it's propounding, not only of the details of ballistics

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was produced at a government establishment at Waltham abbey as early as 1790… Were the past history of powder contracts, previous to the existence of a Government manufactory, to be fully investigated, many unjust attempts to defraud the Government, not only as regards the quality but also the price of the powder, would be found to have been made. It was the extent to which these attempts were carried which determined the Government, about the year 1790, to have an establishment of their own, and after a few years so much was the quality of the manufactured article improved the charge of a cannon was reduced from one half of the weight of the shot to one third." John Anderson "General statement of the Past and Present Condition of the Several Manufacturing branches of the War department (London HMSO 1857) p31-2

[192] Remark based on Krier, Herman and Summerfield, Martin *Interior Ballistics of Guns* Volume 66 Progress in Astronautics and Aeronautics New York University N Y page with date not to hand. An historical note relating to this topic appears within the abstract introducing a chapter not copied for this project.

[193] Lt Col, Royal Australian Artillery, former Commander of Proof and Experimental Range, Port Wakefield. Email passed to author by Professor Emeritus Scott Henderson Uni of Adelaide.

but, the photographs; of a gunner in whites laying a 6 pounder[194] Hotchkiss anti-torpedo boat gun. It was a reasonably heavy, long barrelled (perhaps eight feet overall in proportion to the gunner crouched behind it,) single-shot piece of ordnance, on a pedestal mount. It could be easily manipulated to anticipate a moving target at point blank range. Of a naval infantry unit, it was formed in a square with Magazine Lee-Enfields, with fixed bayonets. This was the year before the battle of Omdurman.

The descriptions of muzzle-loading 12inch naval guns, charge bags of corned gunpowder weighing 110 pounds… During a bombardment of Japan years before, one of the breechloaders had exploded. A piece of the breech mechanism had not been cranked home before it was fired. The response was not, "improve the mechanism!" But, "Revert to muzzle-loading guns." Decades later a double-gun, something like 8inchers in a forward barbette, blew up killing eight gunners and two officers. It was established at the resulting court of enquiry, that one gun had fired, and that the crew had not noticed the other had not. Both were reloaded. With the next salvo, the original charge went off with the second, destroying the guns and killing the crew. The reality of breech-loading ordnance in the other navies of the

[194] The British 6 pounder anti-tank gun used for the first time at El Alamein suggests the profile and mass of the solid shell was optimum for an anti-armour role.

world, advances in metallurgy and science, finally did see the muzzle-loading naval gun off. During the British Climacteric effectively from 1895, the withdrawal and decommissioning of these vessels stationed around the world was seen as evidence of a new broom sweeping the Royal Navy under Fisher. The earlier question, "of failure to keep abreast with technology[195]," relegated to tomes on naval gunnery.[196]

Drawing again on the erudite William H McNeill,

> "Torpedoes, lethal to armoured ships at ranges of 500 to 600 yards, were bad enough, but the embarrassments of the Royal Navy were rendered even more acute by a simultaneous revolution in gunnery which made muzzle-loading hopelessly inefficient. The most important change was in the propellant. By shaping grains of powder with hollows so each grain could burn simultaneously from inside as well as from outside in, it proved possible to equalize the chemical change that occurred within a gun barrel from first ignition to the end of the burn." [197]

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[195] Author's observation

[196] Garbett is the source for the incident described - Friedberg ibid p137 "In the face of all this the British navy was distributed on the basis of principles that dated 'from a period when the electric telegraph did not exist and when wind was the motive power." Its squadrons were scattered at stations at the four corners of the earth, and many of them included slow, poorly armed, aged vessels that, in the event of war, could 'neither fight nor run away.' The time had come to eliminate these useless ships…" Quoting PRO Cab 37/73/159, "Distribution of the fleet," Selbourne, 12/6/04 p1

[197] An interesting observation might be added, reading Krier and Sumerfield it is apparent the use of black gunpowder in an extended container forward of the cap and within the main charge in the shells of big guns to ignite modern propellants remained common a generation ago.

Thomas J Rodman an American army officer (d 1871) established this innovation which became integral later with the new smokeless propellants.[198] Simply using the grained black powder

> "The sustained push that a well-regulated explosion could communicate to a projectile increased muzzle velocities greatly. It also made longer barrels necessary since the expanding gases of the regulated explosion could continue to accelerate the projectile for a longer time than had been possible when a sharp initial impetus petered out…. (see quote above) Longer barrels, in turn made muzzle-loading impossible…."[199]

In the context of Clive Trebilcock's piece on the Cordite Ring, and the methods by which, using official procedures, the Nobel patents for smokeless powder, were bypassed by Professor Dewar… presents an explanation at variance to Kennedy's observations.[200] From an examination of all the patents, the committee produced Cordite with one molecule of difference to that of Nobel's. The inventors had proprietary right to the patents for sales outside the Empire. Until the British Government had the proprietary right to use a smokeless propellant, Nathan Rosenberg spells out the underlying rationale, of why, in spite of a public commitment to the reliance on private manufacturing, Government control of manufacturing of ships, or products of strategic importance was not questioned,

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[198] McNeill ibid p 265

[199] McNeill ibid p265

[200] Trebilcock, Clive "A Special Relationship: government, rearmament and the cordite firms" *Economic History Review* 2nd ser. Vol 19 (1966) pp254-72

many projects from new small arms ammunition to building battleships, were put on hold.

TECHNOLOGICAL TRENDS – THE ORIGINS OF THE MASS-PRODUCTION REVOLUTION

Following the French defeat in the Seven Years War[201] General Gribeauval had established formal and professional training for artillery officers. The focus was on geometry and mathematics. Three-dimensional drawings with accurate views and measurements enabled common parts (for ordnance) to be made in any of the arsenals across France. The finished parts conforming to standard measurements would fit all guns and gun carriages made in France. Further scientific analysis of ordnance, led to the conclusion longer barrels with smaller bores, and a closer fit of projectile to bore gave better ballistic performance. This was applied to both ordnance and muskets.

Owing to conflicting ideas within this period, there was competition and striving between factions within the Army which rose and fell with the changes of War Minister. Under such conditions there was rapid progress of both technology and

[201] McNeill, William H *The Pursuit of Power Technology, Armed Force, and Society* University of Chicago Press Chicago 1982 Paperback Edition 1984 Chapter 5

technique within military art. Toward the end of the pre-Revolutionary period, Honore Blanc an officer from a humble artisan family evolved his idea of interchangeable musket lock parts made with machine tools designed for the purpose.

> Somebody – I wish I could remember who it was – once said that if Napoleon Bonaparte had only put up a reward of a million francs for the invention of a weapon superior to the flint-lock musket he would have become master of the world. In this there is much truth, but only because Napoleon controlled his War Office. It would have been technically possible to have put a percussion rifle, breech-loading like the Ferguson, into the hands of French soldiers in the early 1800's with incalculable results.[202]

Napoleon, relying on a critic of Gribeauval, had previously dismissed the Revolutionary industrial idea demonstrated in Paris of large national arsenals employing machine tools, and specialised engineering operations could, even with craft skills, by changing the 'social structure' produce large numbers of weapons efficiently. At the later Paris exhibition of 1806 fifty musket locks with interchangeable parts were on display, as was a cap-lock made with stamped copper parts.

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[202] Smithers A J *A New Excalibur The Development of the Tank 1909-1939* Grafton Books A division of the Collins Publishing Group London 1988 p11

Much of the information which demonstrates, it was a question of French technique - of both methods and decisions of how arms production was undertaken - rather than technology seems not to have been comprehensively presented to the English reader until Alder's recent work.[203] A paper in the *Gun Digest* of 1959 describes the Ferguson rifle[204], as a flintlock breech-loader with a threaded plug through the breech, the diameter of the bore. It was withdrawn downwardly by rotating an extension of the trigger guard attached to the bottom of the plug. The hole revealed in the top enabled an appropriate sized ball to be dropped against the lands of the rifling sealing the bore the loose charge of powder poured in behind, the plug then being returned to position by rotating the trigger-guard lever back to the original position. The flint-lock was primed in the normal manner. Muzzle-loading rifles of the day required either, a smaller ball within a patch pushed down the bore, or a mallet applied to the ramrod to get a tight lead ball down the lands. J F C Fuller in his work *British Light Infantry of the Eighteenth Century*[205] describes Hessian mercenaries, bayoneting American colonists while they were hammering… Colonel Patrick Ferguson, the inventor, was killed at the battle of King's Mountain. The summing up of Jac Weller, in 1959 was, that the production in quantity of the rifle at

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[203] Alder, Ken *Engineering the Revolution: Arms and Elightenment…* Princeton University Press

[204] Weller, Jac "Breech-loaders in the revolution" *Gun Digest* The Gun Digest Company, Chicago 6 Thirteenth edition 1959 pp53-58

[205] This passage read as a schoolboy, remains in vivid memory.

the time of the American Revolutionary War exceeded the engineering capabilities of England.

> These famous weapons were praised by all who saw them. Too far ahead of their time, perhaps, both in design and mechanical details of construction, the Ferguson rifle probably wasn't practical mechanically when invented, or for years later. Even in Britain, which the led the world in gunmaking skill, there wasn't enough capacity to turn out the multi-pitch threads required in the breech mechanism with sufficient nicety for sealing off the powder gases. At least 100,000 weapons would have been required to arm the British forces.[206] The entire capacity of the gunmakers in England to produce these intricate threads was probably less then one per cent of this. … Ferguson's rifle could deliver at least three shots for every shot fired by any other rifle; …[207]

Smithers quoted above, speculates on the changes which would have been wrought in warfare on the field with infantry able to produce aimed rifle-fire from other than a standing position. The Dreyse needle gun of 1848 used against the Austrians in 1866 using Minie (muzzle-loading) rifle was an inefficient breech-loader, but was nonetheless revolutionary. Breech-loading enabled the weapon to be reloaded in

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[206] PRO BT 382 / 1921 *LESSONS LEARNT FROM BRITISH WAR PRODUCTION EXPERIENCE 1914 -1939* footnote page 1: the 300,000 British troops at Waterloo had with them only 100 pieces of artillery. C321429 For the importance of small arms and the British preference for infantry manoeuvre, see *Forward into Battle* Paddy Griffith. There is a quote in one of the tracts on weapons production obtained from National Archives, of a soldier on the eve of Waterloo saying to Wellington, "Let's give 'em Brummagen…" (Birmingham where the bayonets were made.)

[207] Weller, Jac "Breech-loaders in the Revolution" *Gun Digest*, The Gun digest Company, Chicago, 1959 pp 58

other than the standing position. (The strong possibility of soldiers being blinded from gas blowback, made them reluctant to maintain their aim, many therefore fired from the hip.) Britain had embraced American machine-tools and methods to produce the Minie Rifle in the early 1850's in a Royal arsenal. With the Needle-gun produced by traditional craft methods and an annual output of 20,000, it took almost two decades for the rifle to become general issue within the Prussian Army.

Napoleon relied upon advisors, adverse to General Gribeauval and his ideas. The reactionary Emperor, relied on political support from the artisans and entrepreneurs who produced arms by traditional craft methods, both in France and in the adjoining territories he annexed. His was a focus on artillery tactics with no comprehension of the opportunity to exploit a revolution in the technology of infantry weapons. It is suggested by Alder that, analogous with Japan at one stage banning all knowledge of guns for one hundred and fifty years, a similar process ensued in France in relation to mass-production with interchangeable parts. It was not until 1886 when the Lebel rifle was developed, temporarily in advance of all others by virtue of its smokeless ammunition, that mass-production machine-tools purchased from America, were brought into official French arms production.[208] As with Britain in the 1850's, France

[208] Alder, Ken *Engineering the Revolution; arms and enlightenment in France 1763-1815* Princeton University Press, Princeton N J 1997

in the aftermath of the Franco-Prussian War, having hastily cobbled together a design to utilise their new smokeless powder for propellants, accepted traditional methods of manufacturing small arms were unable to re-equip a huge army at a time of ongoing anxiety.

Benjamin Franklin had looked at the work of Honore Blanc with his musket locks of interchangeable parts and sent samples and details back to America in about 1785. In 1800, a French tract on interchangeable parts manufacture was translated at West Point and printed. Current scholarship attributes the origins of the "American System" to this work but the prominence of Eli Whitney in the literature on the topic has not been merited.[209]There is no question that he had access to the prior Blanc technology.

The establishment by the Americans of the West Point Military Academy was in the French mould of training army engineers and artillery people along scientific lines as established by Lt Gen Gribeauval, following the defeat of France in the Seven Years War.[210] Pioneering America relied heavily upon West Point graduates to undertake exploration and mapping, project management and design of major civil engineering

[209] Woodbury, Robert "The Legend of Eli Whitney" *Technology and Culture*
[210] Comment based on William H McNeill

works, while numbers were also prominent in administration during the early days of railway expansion. The role of officers within the Army Ordnance Bureau in incrementally establishing mass-production of muskets with interchangeable parts, at Springfield Armoury and Harpers Ferry, was also clear. Both arsenals were important to the development of machine tools and manufacturing processes. The task having regard for the democratic process, and the proclivities of the workforce, required over forty years of support from Government for the social changes to mesh with the technological. This led to a revolution in technology in another lifetime. It had been the acceptance of the American Army and Treasury of extra cost for the benefit of having interchangeable weapons parts in their far-flung garrisons which saw the idea nurtured and prodded on over a fifty-year period.

Historically, the influence of the requirements of armies for small arms, on technology and industry has been, to some extent, arcane.

> In Europe military requirements, especially for guns, had always been met by the combined efforts of numerous small gunsmiths. Because of the static nature of military technology throughout the sixteenth, seventeenth and eighteenth centuries any army could safely rely upon slowly stockpiling the necessary guns rather than putting in large orders. In America however… 'most of the muskets which the Americans had won their Revolution fifteen years before had been made in France or elsewhere in Europe… Since military firearms had not been manufactured in quantity in America… the country was, in effect,

> unarmed.' The only solution was to turn the problem over to the new engineers. [211]

In 1798 Whitney, although unable to deliver the ten thousand muskets within the time frame contracted for, established the idea of mass-production of interchangeable parts.[212] …in the United States, the links between armaments manufacture and machine tooling had already been established."[213]

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[211]Nathan Rosenberg in "Technological Change in the Machine Tool Industry 1840-1910" *Journal of Economic History* Vol.23 No.4 Dec 1963 pp414-43 footnote 7 p417 quotes:
Woodbury, Robert S "The Legend of Eli Whitney and Interchangeable Parts" *Technology and Culture* 11 No.2 Summer 1960 pp235-53 for a skeptical in depth evaluation of Whitney. There is further data of people and firms other than Whitney who brought about this engineering process. Footnote 15 elaborates that H Blanc, an Ordnance Officer in Revolutionary France undertook great efforts to bring about interchangeable parts in arsenals of the day. At least fifteen years prior to Whitney. This is described by
Durfee, W J "The First Systematic Attempt at Interchangeability in Firearms" *Cassiers Magazine* V Nov. 1893-April 1894 pp469-77. Other references are in French, while the library at West Point has material on the topic. In 1959 a Professor John E Sawyer had completed a manuscript about Blanc… Professor Merritt Roe Smith of MIT has read the manuscript presented to him by Mrs Sawyer. He understood it is now being held within a collection sent to the Huntington Library in California – protracted, but fruitless enquiries by the author have been tabled to Professor Smith 6th February 2008. The whereabouts of the manuscript are now unknown.

[212] According to Woodbury, p1251 J H Hall at Harpers Ferry Arsenal developed "Drop forging. This art is believed to be of American origin and was first used at Harpers Ferry, Md in the year 1827 is the work of J H Hall." There were others, both official at Springfield Armoury, and some commercial firms, in contrast to Whitney.

[213] Ellis, John *The Social History of the Machine Gun* Pimlico an imprint of Random House, London 1976 p22/23 footnote 13 quoting Lt Col G S Hutchison DSO MC *Machine Guns: their History and tactical Employment* Macmillan, London 1938 pp48/9

The Minie rifle of the 1850's was effectively, a revolution. The reliability of the cap ignition (of the charge,) the ability for it to be used in the rain was of profound military significance. With an effective range of one thousand yards, marksmanship became legendary with examples of aimed shots at ranges not exceeded for a generation. With the adoption of the Minie muzzle-loading cap-lock rifle there was an "operational requirement" for a large number of rifles, more than could be quickly produced by handcraft methods. The decision was made for the Royal Small Arms Factory at Enfield to change over to American machine tools in the early 1850's.[214]

> "The English military, in 1811, had been left with 200,000 unusable muskets, [215]because they did not have a system of interchangeable parts." "Even in England where skilled workmen were most available, there were not enough armourers to meet the demand, and in 1811 the government had on hand 200,000 musket barrels which were useless for want of men to make or repair the locks." [216]

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[214] Ames, Edward; Rosenberg, Nathan "The Enfield Arsenal in Theory and History" *The Economic Journal*, Vol 78 No.312 Dec. 1968 pp827-842

[215] Parkes, Henry Bamford *A History of Mexico* Eyre and Spottiswoode London 1962 P163 "Two loans, each of more than three million pounds, were floated on the London stock exchange, but the discount demanded… was so heavy that not much more than half the money ever reached the Mexican government. … The Mexican ambassador was allowed to use the proceeds of the first loan in buying second-hand war material, much of which had been used at Waterloo, and no account of his spendings was ever required." Parkes makes further mention elsewhere, that much of this equipment, muskets were unserviceable…

[216] Rosenberg, Nathan *The American System*... ibid footnote 1 page 47 Joseph W Roe 'Interchangeable manufacture' Transactions of the Newcomen Society XVII 165

The requirement to manufacture a nipple[217] with a thread, able to screw into a holder attached to the side of the breech, required a standard thread and considerable accuracy, in both the fitting and the nipple onto which the cap containing the priming compound was firmly seated. The cap, was a tapered miniature "top hat" of copper sheet with mercury fulminate within the top, able to be waterproofed with shellac, which slid over a hollow nipple, referred to as a 'cone' in the engineering literature. This was a precision lathe-turned component which had to thread into a block on the side of the barrel where there was situated, a hole to enable the spark to enter the main charge in the chamber. This had been integral to gun technology of small arms from the earliest beginnings. The nipples had to be interchangeable since dry firing a number of times tended to burr them out of shape. The cap had to slide on and remain in place securely with the rifle at half-cock while being carried in the field. For such an item to be standard, it required both accurate measurement and manufacture on machine tools such that a damaged nipple might be replaced anywhere British troops were deployed. The question of the repair of locks made change imperative.

[217] Also referred to as a 'cone' in some of the literature. The author recalls as a teenager the middle-aged Dennis Ekins in the historic "W E Ekins Gunsmith" in Currie Street, coming to the door before opening, examining the 1853 model Enfield Rifle, looking up and exclaiming, "It needs a new nipple able to take shotgun caps. It is a 16 Whitworth thread and will have to be turned up…" Long after the holiday opportunity to fire the rifle had passed.

Machine tools and accurate measurement to enable the interchangeability of this item in the field, on another continent were a prerequisite. These items cannot be produced by hand methods and fitted by an armourer working with a file at a vyce[218] on the back of a cart in the field. A lathe and accurate measurement is required.

Britain accepted the cap-lock muzzle-loading rifle developed by the French Captain Minie in the 1853 Model Enfield Rifle. They were required in such quantities and with such uniform precision, the traditional artisan and contractor methods of production were quite unable to meet the task. Craft methods relied upon entrepreneurs sub-contracting the manufacturing of components by artisans working in garrets and cellars. As has been suggested, precision of production, accurate and consistent measurement were not integral to the proceedings…

> Between 1853 and 1860 Enfield changed from a small establishment with a very limited production and repair capacity to the largest firearms manufacturing plant in England using American machine techniques. This change stemmed directly from problems of supply with the adoption of the new model rifle-muskets of 1851 and 1853. In both cases the Birmingham contractors delivered late and charged high prices which the War Department attributed to collusion. Since the government found the

[218] The author's woodwork Master insisted, the current word 'vice' did not in his opinion, reflect the honourable English origins of the word vyce when describing this item in our workshop at St Peter's College. Circa 1958?

> Birmingham contractors intractable, it turned to the possibility of making arms in its own Enfield Arsenal on a greatly increased scale.[219]

As a result of Colonel Colt demonstrating his revolvers with interchangeable parts at the London Exhibition in 1851 a Parliamentary Commission travelled to America to gather evidence, and organise the procurement of both, machine tools and the adoption manufacturing methods.

> By the time the Small Arms Committee met in 1854, even the most obtuse military mind (Lord Raglan as Master-general, was the person charged with the responsibility for the supply of small arms) was convinced that rifles with interchangeable parts would enormously simplify the logistic problems of an army in the field. [220]

The term "The American System" a phrase buried in a subsequent report - provided the title to a technological revolution. The War Office requirements were of such importance, mass-production technology for producing small arms in a Royal Arsenal became official policy. The requirement for Minie rifles was so great for the Crimean War an order for 25,000 rifles was placed in America.[221] American

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[219] Fries, Russell Insell *A Comparative Study of the British and American Arms Industries, 1790-1890* The Johns Hopkins University, Ph.D., 1972 History modern Xerox University Microfilm, Ann Arbor, Michigan p308/9

[220] Ames, Edward & Rosenberg, Nathan ibid p835 #3 Joseph W Roe "Interchangeable Manufacture" *Transactions of the Newcomen Society,* Vol XVII p165

[221] Hubbard, Guy "Development of Machine Tools in New England" *American Machinist* Jan 31 1924 – doc delivery docket did not cite the pages. The firm of Robbins and Lawrence had production problems due to drought not powering water wheels. They delivered only half the contract and were, subject to the terms of their contract with the firm representing the War Office, taken over… and sold up. An

'mechanics' as machinists were termed in those days, were given positions in the Royal Small Arms Factory to oversee the set-up of the machinery and establish production. [222]

John Anderson was a staff member within ordnance manufacturing, he was a member of the commission sent to America, and remained in the senior position, later being knighted, within official British weapons manufacturing till he retired.

> One of the most novel contrivances with which Anderson was associated was the so-called Floating Factory which it was determined to send to the Crimea in 1855 in order to assist the military forces with all sorts of engineering and carpentry work…
> A steam vessel of 600 tons having been procured, a plan was drawn out for converting her into an engineer's workshop, fitted with 4 forges and 28 heavy machines, consisting of different sized lathes, planing, slotting, drilling, screwing and other tools, which were placed on a floor in the hold, and worked with overhead shafting, while galleries ran along the sides of the vessel; containing a number of vice benches; a complete saw mill with three benches was placed on the deck, which also carried a cupola, with fan, portable steam engine, and all the requisite plant of a

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early case of an innovative engineering firm going to the wall through circumstances not entirely of their own making. (Woodbury article the original source?)

[222] Bowbelski, Margaret E "*The Royal Small Arms Factory*" Occasional Paper (New Series) No. 35 ISBN 0 902922 30 0 At page 5 She states, "In 1851 Robbins and Lawrence of America sent six interchangeable rifle to England to be exhibited at the Great Exhibition. These rifles excited great interest in military and government circles and in 1853 Joseph Whitworth was appointed a member of the Royal Commission to the New York Industrial Exhibition." Page 6 "An American, Mr. Burton, who was Master Armourer of Harper's ferry, U.S.A. was engaged to come to Enfield where he was responsible for the design of many of the new tools and the installation of the new machinery."

> brass and iron foundry, either to be used in the vessel or on shore, as might be found most convenient according to the situation of the army. The power to work the machinery was obtained either from the 70 horsepower engine of the ship or from the portable engine, the gearing of the vessel being arranged either to work the screw or to give motion to the machinery.
> The factory contained 24 chests of tools of different trades, and also the tools of the brick-maker and well-sinker; it was provided with store of wood, copper, tin, steel and iron, sand, fire bricks, fire clay, crucibles, and a general assortment of small stores used in the various branches of handicraft… [223]

(It has been speculated by later historians exploring the origins of armoured vehicles, if the Crimean War had continued, the prospect of steam-powered cross-country vehicles might have been addressed for military purposes sixty years earlier than the Great War.[224])

In Britain the established Royal Small Arms Factory was equipped with American machine-tools and tradesmen to get mass-production under way.[225] This led to a technological ripple through industry. British machine tool manufacturers copied and designed new machines. But there was a dichotomy, with cheap and plentiful skilled

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[223] Rosenberg *American system*… ibid p85 footnote 2 "Satement of Services 38. See also 'On the application of machinery in the war department' 158-9; General Statement 16-17

[224] Smithers ibid p19

[225] Duff, Colin Matthew, "*British Armoury Practice Technical Change and Small Arms Manufacture, 1850-1939*" unpublished Master of Science thesis, University of Manchester 1990

labour, British machine tools were designed to last a long time;[226] presumably they were constructed from sturdy castings of adequate strength which gave great mass. They were not designed to change functions quickly, and were more specialised machine-tools compared to their American counterparts.

The importance of the Minie Rifle was immediate in the Crimea where, with a range of 1,000 yards British and French troops were able to engage the Russians who, with smooth bore muskets and a maximum effective range of 200 yards were outgunned. A similar advantage accrued to British units in the later Indian Mutiny. (Anecdotes recorded in papers dealing with the Campaign in the Crimea cite kills at eight hundred yards with the .577 Enfield Rifle.)

Effectively the rising domination of Central Europe by Prussia was firstly brought about by social organization, (the Army,) political will, and the technology of weapons and railroads, the latter predominantly financed and built by Britain. A R Hall[227] in his thesis suggests much of the finance with which Britain developed areas

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[226] Floud, Roderick *The British Machine Tool Industry 1850-1914* Cambridge University Press, Cambridge, 1976 Describes the general orientation of predominantly, Greenwood and Batley because theirs were the main records he relied upon to research the topic.

[227] Hall A R *The London Capital Market and Australia 1870-1914* Social Science Monograph no.21 The Australian National University Canberra 1963

of the world from which raw materials were sourced for the industrialisation of Europe was available because of low government expenditure. Conforming to liberal Cobdenite theories, and Gladstone's dogma of balancing the budget and repaying the national debt from the Napoleonic Wars, British military resources were incapable of meeting a continental European adversary on land. This reality, the demise of the *Pax Britannica,* was lost to the hard men who lived within the empire outside the United Kingdom.

Before the railways had been established within Europe much trade within central Europe was shipped from North Sea ports, especially Hamburg sailed round through the Mediterranean to the Black Sea and brought up the Danube. British sea power and blockade was an effective option. The technology of steam and shipbuilding from steel had been effectively embraced by Britain but changes to technology, driven in some cases by France caused pauses in naval shipbuilding while scientific resources were applied to what became 'Command design' of propellants, and later ordnance and other systems for ships. While Britain had embraced the latest American technology for manufacturing small arms after the Great Exhibition, it had been Prussia who in 1848, using craft methods, produced the Needle-gun, a breech-loading rifle with revolutionary military implications.

The thesis proceeds to examine the involvement of the Australian colonies in imperial military operations. The importance of logistical support for the Imperial operations across the Tasman, and the political step of supporting the Empire in the Sudan marked the beginning of a policy, which remains. The limits to the munitions production capabilities of Britain in the context with the war scare with Russia in 1885 was accepted in Victoria specifically, and steps were taken to establish autonomous small arms ammunition production. The more ambitious ideas of an ordnance arsenal, shelved. The shortcomings of British weapons production, the small arms industry and the lack of priority for deliveries to distant colonial customers has to have been appreciated at this time, in the context of later political, military, and industrial decisions within the timeframe of this study. Much attention is devoted within the thesis to the topic of engineering. But this was an age where the major source of scientific endeavour relied upon chemists. The most important human resource Victoria produced in the generation prior to The Great War was the large number of chemists trained at the University of Melbourne and in associated institutions.

Chapter IV

Australian Colonial direct involvement in the Wars in New Zealand, the Sudan, their armed forces, and nascent Victorian munitions production.

Introduction

In the opening chapter some discussion of the significant numbers of serving, and former army and navy officers who were governors and administrators within the colonial bureaucracies was undertaken. In the 1860's the problems with restless natives in New Zealand assumed the scale of war. The immediate and unquestioned response by colonial administrations - the ransacking of war stocks, releasing Imperial units and specialist officers immediately to assist Governor Grey - had a decisive effect on operations in the North Island. As was explored in the context of the Schleswig-Holstein question, the British army was effectively tied down in India. There were threats and campaigns in other theatres and, had it not been for the immediate cooperation from Australian colonies, the time factor of transport and the costs of campaigning with logistics sourced from India or the Cape (or in the case of

steam river-boats, from England itself,) would have drawn out operations, probably inconclusively, for a period of years.

The colonial response of volunteers, many of whom were veterans of other wars around the empire, plus the enthusiasm of the young men of the day, was decisive. The ability of the local firms to provide food, fodder, horses, livestock clothing, tents, accoutrements hinged upon a detail – namely, an appropriate credit being granted in London to the New Zealand authorities. The Victorian Government parted with their entire battery of Armstrong guns and ammunition once the price was agreed, in order to back the operations, thereby denuding the colony of every gun they possessed.

In 1885 within the framework of rising colonial political flux on the topic of French activities sending troops and convicts to their possessions in the South Pacific, the intrusion of the Germans into New Guinea and the nearby islands, inflamed political opinions on the periphery of empire. The possibility of an American style rejection of the bonds of empire was beginning to be taken very seriously in London. The offer from New South Wales of a battalion of infantry with guns to serve with the British army at Suakin in the Sudan was accepted, regardless of the fact few of the soldiers had prior training. The gesture was welcomed as a show of imperial

solidarity. Evidence that British operations were defensive in relation to the Mahdi's forces are considered in the light of technical data relating to the ammunition being used in the Martin-Henry rifles not being suitable for campaigning in very hot climates where units under attack from overwhelming force needed, reliable firepower.

The topic of colonial military forces in the era of the late nineteenth century is covered briefly in this chapter, including the purchase of Colonial Ships, especially the "Protector" by South Australia. The skipper, Captain Cresswell was later instrumental in establishing the Royal Australian Navy in the early 1900's. His Engineer-Lieutenant William Clarkson was to later distinguish himself by ensuring the engines of the "Protector" worked faultlessly on the trip from Queensland to Hong Kong to serve in the Boxer Rebellion. The repairs and refits required on arrival anything up to ten days were not required. His engineering skills and knowledge were such he was later selected by the Minister Defence, with the concurrence of the Secretary of the Department, to advise him the topic of manufacture of a service rifle in Australia. In the context of Japanese military and naval capabilities following the Russo-Jap War this topic was of national importance. This was in addition to his duties of selecting designs for the new vessels to be both purchased by the Commonwealth in England, and those to be built in Australia, for the establishment

of the Royal Australian Navy. On the basis of his advice, the Minister framed his decisions and telegraphed instructions back to Clarkson to purchase a complete arsenal from Pratt and Whitney in America.

The early history of munitions production in Australia revolves essentially around Victoria. The only colony to have a Defence Ministry the industrial base was stimulated politically by Railways purchasing policies, and by tariffs. Following the Gold Rushes the University of Melbourne and technical colleges in Ballarat and Bendigo all taught chemistry. Along with mining and industry, chemical engineering was the crucial prerequisite for producing the explosives for later munitions production. Local production of explosives was already in process.

A policy of paying realistic salaries to attract the best brains to come to Melbourne and take a chair at the university, specifically in chemistry, offers an (un-stated) explanation of the capability of the later Commonwealth Government to establish an explosives factory in Maribyrnong. This chapter describes the technological and political background upon which the later munitions production was established.

AUSTRALIAN COLONIAL SUPPORT FOR GOVERNOR GREY'S NZ OPERATIONS

In the New Zealand Wars of 1863-66, public sentiment in Australia, along with the colonial and imperial authorities supported the settlers. "The co-operation New Zealand received from Australia's imperial military, and civil representatives of the now self-governing colonies, enabled the scale and success of the campaigns that took place in 1863-64." There had been previous, if grudging support in the Taranaki War of 1860-61.

Foregoing remarks about the service affiliations of many senior officials in colonial Australia now fall into context. It was in this situation that Governor Grey in New Zealand looked across the Tasman with complete confidence to old comrades, sharing and concurring with his outlook both within the colonial bureaucracies, and the respective legislatures.

The New Zealand 'operational requirements' of Governor Grey were immediately met from Colonial war stocks, and orders were placed within colonial industrial, manufacturing, and food production firms. Personnel, materiel, small arms, ammunition, field guns and related logistical support enabled Governor Grey to

amass an "Enormous imperial and colonial war machine… to attempt to conquer the North Island regions of the Waikato and Taranaki." [228]

Significant engineering firms in Sydney complemented the railways. Pertinent to the specific context of the Australian colonial support for the imperial and local operations in the New Zealand Wars in 1863-66 is the following. There was an operational requirement for iron river gunboats (stern-wheel paddle-steamers) to provide both fire, and logistical support for operations conducted inland where rivers were the main artery of transport and communications. Shallow draught highly manoeuvrable boats were designed and built. The vessels were steamed across the Tasman with local crews. Later, prefabricated vessels were shipped across. To obtain such vessels from England would have required eighteen months. River vessels built in South Australia for the Murray trade were also purchased and steamed across the Tasman.

> The P N Russell Engineering and Foundry Works in Sydney manufactured the pre-fabricated sections of these two gunboats during late 1863 and early 1864. Peter Nicol Russell established this firm in Sydney in 1842, which by the 1860's had developed into a major engineering and foundry business. It possessed various branch works and wharves, manufacturing goods from dredges to railway rolling stock. Earlier in 1842 the firm had been of assistance to the imperial forces

[228] Hopkins-Weise, Jeff "Australia's Logistical and Commissariat Support in the New Zealand Wars, 1863-66" *Sabretache Vol XLVII* No.4 December 2006 p 5

> being amassed for service in the Bay of Islands by manufacturing a small batch of Coehorn mortars.[229]

This suggests that the industrial infrastructure for limited ordnance production was in place, if not undertaken, in New South Wales. (Till the end of the era of smoothbore muzzle-loading field-guns within which the Crimean War initially fell. Rifling of muzzle-loading guns was undertaken as that war progressed.[230])

The publicly owned railways of the colonies were a crucial underpinning of both a government bureaucracy and industrial technology in their dependent economies.

> Like the Romans, the British had always laid tremendous stress on communications; and perhaps the genius of British colonial method lay as much in engineering skill as in administration.[231]

Logistical help provided in response to Governor Grey's appeals are recorded within separate colonial records. The Tasmanian Colonial Secretary, after the despatch of 100 tons of commissariat stores in June undertook in July to provide 500 Enfield rifles and accoutrements, no revolvers were available, but smoothbore pistols were included. In 1864 tenders for transport to Onehunga of… flour, oats, bran, and two tons of biscuits… other stores were, 180 tons of munitions to Auckland to ensure the

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[229] Hopkins-Weise ibid p12

[230] Floud ibid p160

[231] Headrick ibid p129

local forces were able to withstand an attack. Garrison troops and specialist officers had been immediately sent. Effectively the British garrison units were released.

New South Wales had sent half their infantry and half their artillery, and in August 1863 after the arrival of the Hon. Mr. Dillon Bell the Native Minister, the governor of NSW Sir John Young wrote to Grey advising him;

> I have the honour to inform you in answer to you communications that I have in accordance with your request given Mr Dillon Bell all the aid and countenance in my power.
> 2. The Ministers have liberally afforded him arms and ammunition from the Colonial Magazines and accorded him every facility for recruiting.
> 3. A further detachment from Her Majesty's 12th regiment embarks for New Zealand this day…[232]

The *Claud Hamilton* conveyed 1,000 rifles and 200 breech-loading carbines, along with 150 barrels of cartridge powder from the magazine at Goat Island. Sir John also saw to it that two Armstrong guns and ammunition were added to the contributions.

The role of the Sydney engineering firms building iron riverboats, the A.S.N. Company, and P.N, Russell and Co has been previously addressed.

Negotiations by Colonel G D Pitt and the New Zealand government party with the Victorian government led to the proposal by Ministers that, '[t]he whole of the

[232] Hopkins-Weise ibid p8

imperial garrison should be sent, and that the whole battery of six (Armstrong guns) should be loaned to new Zealand if requested.'

> To order guns from England would involve a long and protracted sea journey; to request guns from Victoria was obvious… 'If these guns went to New Zealand,' argued the Assembly, 'there was virtually no coastal defence in Victoria…' After much debate the Assembly decided half a battery was neither use nor ornament, and by the same token about as useful as throwing stones to the New Zealand Government. In their argument the Victorians made a virtue of the pressing New Zealand necessity. [233]

Some months later a price was agreed, the guns were shipped with ammunition and stores in November. New Zealand's Crown Agent in London paid the Government of Victoria the following year.

South Australia sent "525 Rifled Muskets, Enfield Pattern 1853 and one rifled carbine… Captain Francis Cadell who had pioneered the navigation and transport along the Murray River was one of the many veterans from various wars invited to assist the New Zealand effort.[234]

The more mundane, but crucial and substantial supplies of coal, flour, fodder, meat, horses, clothing, accoutrements, and equipment like tents, were all sourced from

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[233] Hopkins-Weise p13 [NB the foregoing "there was virtually no …" is as per the quote.]

[234] Hopkins-Weise ibid p14

Australian suppliers and shipped to New Zealand. With most of their settlers in the various armed units, food production simply could not be undertaken. The bottom line of this was, sterling funds were advanced in London to the New Zealand authorities to underwrite these transactions.[235] This is the first significant example of the importance of Australia providing logistical resources, weapons, munitions, and personnel, without which Governor Grey's operations could not have been undertaken. Within the respective colonial military establishments, informal knowledge of these activities may have had a significant later influence on that class of, "men of substance," who comprised both the officer cadre of the volunteer forces, and members of parliament, one of whom was Frederick Sargood of Melbourne.

It may be surmised, New Zealand with a temperate climate, land suitable for settlement by Britons, able to develop and export wool and other primary produce, was self-evidently able to negotiate and obtain loans in London. In the context of the above arguments, the trans-Tasman collaboration between colonial administrations handled the war as a matter of course. Squeamish (Australian) manpower and public opinion was not a constraint. There was therefore, no requirement – military, financial, or political - for the Raj to become involved.

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[235] Hopkins-Weise ibid p14 footnote 55, *B-No2 a: Papers respecting The One Million Loan*, Journals of the House of Representatives of New Zealand: 1864 (Auckland).

Citing Kennedy in the context of Britain supplying arms to both sides in the later Franco-Prussian War in 1870-1 that small arms, ordnance and munitions could be found and shipped to New Zealand. "In the limited colonial wars of the nineteenth century the services had only to go to the large number of black powder firms to satisfy any extra demand for explosives."[236] But, the matter of how quickly infantry, artillery and support units could be made available, in the context of existing deployments and in the face of threats which may have required deployments to closer theatres, is another question altogether.

Whether Sepoy battalions could have been sent from India, at a time when the loyalty of the Indian army was being secured with 65,000 British troops, is a question that can only be speculated upon.

> The British Indian Army … was financed out of local tax revenues, but it was put to use repeatedly for imperial purposes beyond India's borders. Indian troops were employed in the Crimea (1854-1857), in China (1859), Abyssinia (1867), (Malta 1878) … [237]

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[236] Trebilcock, C A "Special Relationship"- Government, Rearmament and the Cordite Firms *The Economic History Review* Vol 19 No.2 1966 Page 372

[237] Friedberg, Aaron L *The Weary Titan* p219 Kennedy in *Strategy and Diplomacy*… p204, stresses, one of the features of moderate British defence spending during this era was in no small part due to the Indian Army. " … most of the smaller 'gentleman's wars' (as Bismarck dismissively termed them) were relatively cheap - and often financed by the Indian rather than the British taxpayer."

Having regard to the sailing times from New Zealand to Britain and back to New Zealand, something like nine months would elapse simply to allow for ships to sail back with a despatch, and, a similar period for an immediate return before military operations of any consequence could be mounted. Speaking from the experience of the author travelling by troopship for a mere ten days a century later, one might speculate troops who have sailed for nine plus months from Britain to New Zealand, might require a month or so of vigorous training at the end of their voyage before being in a fit condition to undertake operations.

NEW SOUTH WALES' RESPONSE TO GORDON'S DEATH

> On 5 February, the fall of Khartoum and the death of Gordon was made known; … Yet there was worse to come. On 21 February, Russian troops established themselves at the head of the Zufilcar Pass, threatening not only Afghanistan but also the security of India.[238] The Anglo-Russian war, Which Europe had expected for over two decades, was in sight and it appeared to be a virtual certainty when London

[238] Friedberg, Aaron L *The Weary Titan* "The problem of defending India was not one that emerged new and freshly formed after the turn of the century. In fact, to a considerable degree, the terms in which the whole question was discussed after 1900 were set some fifteen years before, following the Russian occupation of the city of Merv. The assumptions formulated in the wake of that traumatic event continued to shape official thinking for at least the next two decades." P 224 (It is the author's understanding Merv was the railhead for the jump off to Penjdeh.)

> received news on 8 April of an Afghan defeat by the Russians at Penjdeh.[239]

"It was on 9 February that new of the death of Gordon reached London, and the Government all but fell.'"[240] The reaction to the death of Gordon in Sydney was immediate.

> The Acting Premier of New South Wales, William Bede Dalley, cabled Britain with an offer to send 'two batteries of our Permanent Field Artillery, with ten sixteen-pound guns, properly horsed; also an effective and disciplined battalion of infantry, five hundred strong'. This force, Dalley informed the British government, could arrive in Sudan thirty days after embarkation. The conception and execution of this offer depended entirely on the recent advances in communication and transportation.[241]

A fortnight later the hastily recruited force of 770 men with 218 horses embarked on the 3rd of March. The precedent for raising and despatching untrained troops, in contrast to maintaining an "expeditionary force" of regulars, was herewith established.

An interesting insight into this colonial military operation, and the independent ideas of either W. D. C. Williams the Regimental Medical Officer for the unit, (he later became a full colonel,) or of the staff people in the headquarters in Sydney, was made in the later South African War,

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[239] Kennedy, Paul *The Rise of the Anglo-German Antagonism 1860-1914* George Allen and Unwin 1980 p181, #56

[240] Kiernan E V G ibid p188

[241] Moredike, ibid p5

> On 4 April (1900) the Commander-in-Chief made an official visit to the New South Wales Hospital at the Artillery Barracks. He gave high praise to the New South Wales Ambulance wagons saying that he intended to recommend them as a pattern for the imperial Army. In 1885 Lord Wolseley, the British Commander-in-Chief in Egypt, had paid a similar compliment in praising the pattern of the five wagons that arrived in the Sudan with the Ambulance Corp sent from New South Wales. The ambulance wagons had been fully fitted up in Sydney.[242]

In the author's youth, books concerning the later successful Sudan Campaign conducted by The Sirdar, Horatio Kitchener in 1898 remained on family and school library bookshelves. Published in the early twentieth century the topic had received a lot of attention from G W Steevens and others. An explanation of the reticence of the British army to come to grips with retaking the Sudan during this period in 1885, a question implied in *The Rehearsal*[243] may include the following.

> Cycle manufacture remained ancillary, however, to small arms production and the company (BSA) played a large part in re-equipping the British army when, in 1888, the War Office decided to adopt the Lee-Metford as its new weapon. *This rifle replaced the Martini-Henry, in which the Egyptian campaign of 1884-5 had revealed serious defects.*[244]

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[242] Wallace, R L *The Australian at the Boer War* The Australian War Memorial and the Australian government Publishing Service Canberra, 1976 p 182

[243] Inglis K S *The Rehearsal: Australians at war in the Sudan, 1885* Rigby Adelaide 1985

[244] Ward, Donovan M *The Other Battle: Being a History of the Birmingham Small arms Co. Ltd.,...* (published by the company presumably) July 1946 p20 Emphasis of this author.

It is the author's contention, the primitive technology of the rolled brass cases of the ammunition was the explanation. Elaboration of this topic is as follows.

> In the very hot weather of South Africa in the earlier Zulu Wars the problem had arisen. The perception of Lord Chelmsford's incompetence at the hands of the Zulus however, sidelined his valid criticisms of the cartridges. Some years later in Egypt, and the Sudan, in very hot weather the Martini-Henry's were again fired rapidly. The rolled brass cases "welded into the chamber…[245]

This was in addition to the routine matter of the iron flange being ripped off the rolled brass body when the rivet failed. There were thus two design failings of the case. This topic is explored below in relation to the Victorian Government's venture into small arms ammunition manufacturing in 1889.

The observation might be added. Did this shortcoming of munitions technology, dictate the resulting military caution in relation to operations against the Mahdi. He had previously cleaned up Hicks Pasha (Colonel Hicks) and an Egyptian army of ten thousand. The literature of the era refers to all these rifles, "falling into the hands of the Mahdi." The Remington Rolling-Block rifles[246] using drawn brass cases must, by

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[245] Higham, Malcolm Ian letter 18th February, following query after his piece published in "The Australian Shooter." From enquiries of Graham Tweeddale, Sergeant Armourer Army Reserve, he concurs. The barrels would need to be removed from the rifles and the chamber reamed out with an appropriate tool. Not a quick or routine process in a field workshop pushed out into the desert or veldt during that era.

[246] Research whether Egypt set up an ammunition arsenal to produce the ammunition, more advanced than that Victoria established over a decade later has been beyond the author. A history of Remington cited by Professor Merritt Roe

definition have been superior to the Martini-Henry firing rolled brass cases. Ten thousand in the hands of an enemy, even allowing for their predilection of firing with the sights fully up[247] at close range "to give the cartridge more power," made them a formidable enemy.

It is suggested the New South Wales force was immediately accepted as a gesture to confirm colonial loyalty. Kennedy in his works on Samoa, indicates Whitehall was treating the Australasian colonial outlook of, focus on the South Pacific, as a matter of grave importance. The bonds of empire and race might, with injudicious handling, be smote asunder. There was conjecture within the NSW force, and discussion, of a possible role in being deployed to fight the Russians on the North West Frontier.

At the time there was colonial chagrin over the British decision to recognise German annexation of New Guinea and, a feeling that federation was crucial to obtaining a hearing in Whitehall over ongoing Pacific issues. The Australian colonies perceived, that to make any impression on Whitehall, their policies needed to be co-ordinated

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Smith is not held in the Australian library system… While the Tenth Census of the United States which deals with machine tools exports, is not held in South Australia and, because of it's age is not lent…

[247] G A Henty books read as a boy, in which the protagonist describes the casualties inflicted on non-combatants behind the British lines… The trajectory of the slow moving lead projectiles easily cleared standing troops at moderate ranges.

and their concerns about the Pacific pursued. Their first step was the establishment of a permanent inter-colonial conference, "… a Federal Council of Australasia … authorized to act with respect to 'the relations of Australasia with the islands of the Pacific'."[248]

> In 1885 the British parliament at the instigation of the colonies had passed the Federal Council of Australasia Act setting up the Council and clothing it with appropriate powers. … It lacked executive and revenue powers, and became caught up in a complex web of inter-colonial jealousies and internal colonial politics. … the Federal Council came to be seen not as a symbol of unity, but a source of colonial antagonisms.[249]

The implications of the threatened war with Russia, for the Australian colonies were, weapons and munitions could not be procured from England at a time of acute military anxiety. This anxiety was to become ingrained in what became the national psyche.

The war scare in Australia[250] was considered very real. What was not grasped in either the colonies, Army officers at large, in New Delhi, or perhaps in London itself,

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[248] Meaney ibid p19

[249] Meaney ibid p30

[250] Robina Gordon, my great-grandmother told my father as a boy, during this period she lived with the family on Park Terrace at Parkside on what is now Greenhill Road, some houses west of the Glen Osmond Road intersection. The arrangement in those days, last thing at night before turning in, one assumes great-grandfather went

was the decisive re-actions of the Royal Navy and British diplomats in China. At the time the Chinese had raised levies to fight the French in Tongking.

> It must be borne in mind that China was at war with France, and threatened with war with Japan. Of these two the former and perhaps the latter, was a friend of Russia; therefore an explosion between Russia and England might well put them against England, making England automatically China's ally.[251]

By the middle of March Vice-Admiral Dowell had collected his ships from the Ports, the German and American Ministers had been engaged to protect British interests, the navy was about to act. China had land forces but looked to England to take her side at sea. It is observed, these happenings were as important as those at Herat in Afghanistan.

With decisive manoeuvre Parkes sent a ship to Port Hamilton (Komundo today,) to observe. "Early in April the British Government made up its mind to occupy Port Hamilton as a naval base for the approaching war."[252] With a coaling station on Port Hamilton the Royal Navy had a base from which to attack Russians at Vladivostok. From this point onwards, the diplomatic machinations among and between the Chinese - who had suzerainty over Corea - the Coreans, the Japanese, and the

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outside and looked towards the Town Hall. "If a red lantern was hanging from the Town Hall balcony, the Russians had landed!"

[251] Kiernan ibid p189

[252] Kiernan ibid p190

Russians continued. As the war with the French over Tongking petered out, efforts were made to encourage the Chinese to move their army into Kashgar in Central Asia where a Russian backed rebellion had previously broken out, to threaten the Russians.

> England was in a position not altogether dignified for a nation of moralists. Her *coup* had been Copenhagen over again; in a wicked world, England has not infrequently had to do such things. We seized Macau in the Napoleonic wars – in case France should seize it. But England was so accustomed to feeling herself incapable of the duplicity of less enlightened races, that when she committed a robbery she was pained to find that some onlookers could find no better name for it than – robbery. England is always above her own suspicion: unluckily, not always above that of others.[253]

But, in the context of the shifting sands of what was happening between France, and Russia with Bismarck exacerbating, selectively, relations between the major powers, on questions of colonial expansion in Africa and the Far East, the critical importance of Egypt as the link to India via the Suez Canal meant that limited German aspirations had to be accommodated. (The South West Pacific aspirations were a topic of particular interest to colonial politicians.) The question of Russia and the stability of Turkey was another matter… During the Franco-Prussian War Britain had displayed, in Bismarck's words in orders to the press, "Fraudulent neutrality" by

[253] Kiernan ibid p198

supplying arms, (one deduces Armstrong rifled field guns,) to both sides.[254] Fifteen years on, there was no formal alliance between Britain and any continental power.

The forgoing assumes somewhat greater clarity with this historical background of the preceding year. The loss of the American colonies might easily be repeated if colonial self-governing autonomy were challenged. In the context of German ambitions to annex territories in West Africa, South West, and East Africa there was an outcry by traders in those regions, while Anglo politicians in the Cape, and Natal, simply did not want any (European) neighbours. There was a strategic aim to ensure the Boer Republics did not obtain a land border with the colony of a European power – specifically Germany. The role of the lone protagonist working within local polities of the empire referred to above begins to fit into context here. Cecil Rhodes[255] and the Cape to Cairo railway, still mentioned in 1970's South Africa, for example, was beginning his career. Ironically, it was another later lone protagonist Dr Leander Starr Jameson, who ended Rhodes' career by invading the Transvaal.[256]

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[254] Kennedy *The Rise*… p23 Statistical sources of trade data for Britain in the nineteenth century do not appear to list exports of engineering products. Friedberg more or less corroborates this in the discussion of Chamberlain and the Imperial Federation ideas…

[255] Lt Col O'Connor of the Accredited Rhodesian Diplomatic Mission in Pretoria had a photograph on the wall behind his desk. In reply to the query of the author, "That is Cecil Rhodes. We need men like him today…" 1975

[256] Ellis, John *The Social History of the Machine Gun* Pimilico, Random House London 1976 Referring to the large number of Maxim guns upon which success

France immediately imposed fifty per cent tariffs in her annexations locking British trade out. The Germans also embraced free trade in their colonies and so, from a formal examination from a purely trading perspective, the German colonial ambitions could have been more generously accommodated within the liberal, "Cobdenite agenda." [257]

The India Office felt nobody should be permitted to establish colonies on the east coast of Africa…

> Finally in the Pacific the self-governing colonies of Australia and New Zealand were enraged at the incursion of a German as well as a French 'threat', and prepared to take counter-measures themselves if the London government would not. At first this stance had been ridiculed by the lethargic Derby as a "Munroe Doctrine" for the Pacific, but by the summer of 1884 even he had been forced to alter his purely negative stance - and his officials were nervously writing 'that the idea of allowing any of these islands to fall into the hands of European powers… might almost drive the Australasian colonies into revolt. [258]

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depended… "Unfortunately he neglected to take along adequate supplies of water, with which to cool the guns, and when they were brought into action they jammed almost immediately. …Jameson was forced to surrender. Here one sees a rare example of an *over-estimation* of the machine gun's capabilities. And a fatal over-estimation it was too. Not only did it doom the raid to failure, but it also wrecked the political career of Jameson's friend, Rhodes, and brought a little closer the prospect of war between the Boers and the English." p90

[257] de Cocco it should be stressed, maintains this was fiction. ("English liberalism" was a term used by Afrikaans intellectuals in the seventies which seems apt…) Scots (predominantly) engineers simply refused to buy from other than Britain. In India, price was not considered.

[258] Kennedy, *The Rise*... p179

The self-governing colonies, Bismarck believed, were subservient to London. Taken in context with British Customs activities over trademarks, problems with officials and traders in the colonies, he saw "deliberate obstructionism."[259] Blocking Bismarck's ambition was the beginning of a long-term, serious and ongoing problem, for Britain with the German Empire.

Whether in relation to territorial annexation policies, migration policies, or financial contributions to the Exchequer for sharing in the security of sea-lanes underwritten by the Royal Navy, the noble policy "Of appeasement, and, of being reasonable," held sway.[260] In London there was always a realistic appreciation that British settlers must be dealt with as de facto sovereign partners, if they were not to be driven to follow the American example. What was not appreciated at this time within either, the metropole or the periphery was the importance to Germany of acquiring an empire. British naval mastery enabled the locking up of tracts of Africa[261] and the Pacific of no great economic importance[262], denying them to Germany, which at that

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[259] Kennedy ibid p179

[260] Kennedy, Paul *Strategy and Diplomacy 1870-1945* George Allen and Unwin London 1983 comment based on this work

[261] Platt, D C M *Finance, Trade and Politics in British Foreign Policy 1815-1914* Clarendon Press, Oxford 1968 "British officials moved into Africa - Robinson and Gallagher have pointed out - 'not to build a new African empire, but to protect the old empire in India.' " p 358

[262] Barnett, Correlli, *The Collapse of British Power* suggests that until 1945 when Britain felt obliged to honour her vast war debts to Egypt, Iraq and India, Colonial

time was not a hungry power like France or Russia may, perceived with hindsight, have been an error.[263]

French activities in the New Hebrides had been a source of complaints by the agents-general of the colonies from 1884 onward. The questions of French annexation, of sending recidivists there, met with a hostile reception from all Australian colonies. It was felt that if Britain had annexed all the island chain from New Guinea to Samoa, the colonies would be secure…

> After the French landed troops on the islands in July, Australia's attitude hardened… In Victoria some political leaders were threatening to take matters into their own hands and oust the French by their own efforts.[264]

> In the total spectrum of British world policy, neither the Pacific, the New Hebrides nor Australia were that important. In the winter of 1886-7 British diplomacy was given over to the Bulgarian crisis, to keeping Russia out of the Mediterranean and the Near East.[265]

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officials in Africa refused to sanction the necessary changes to African land tenure and society necessary to produce exports for world markets… These changes, once implemented led to the break-up of the empire in short order. From before the end of the War, Australia became a creditor of Britain. Kosmas Tsokhas *Dedominionisation…*

[263] Kennedy, *The Rise*…author's understanding. The most bitter irony of all has to be the repeated comments in the South African English speaking press in 1974-6. Every time a reporter investigating opinion in Rhodesia about the current sell-out, the invariable comment was, "We fought on the wrong side in the last War…"

[264] Meaney *The Search for Security in the Pacific…* p20

[265] ibid

The perceptions of the strategic importance of the Pacific in Whitehall from 1865 to 1875 were the area was of little importance beyond the ruminations of colonial politicians that Britain should establish control over the islands. In 1880 this remained the case. "The Old Foreign Office," as Zara Steiner describes it,[266] tended to be dominated from the top and was pragmatic in its dealings with Germany, notwithstanding the irritation and unpleasantness emanating from their Foreign Office and the later Kaiser. Problems on the frontier (specifically the Pacific) had by the late 1880's escalated beyond matters "solvable at the periphery… and solvable within the local situation and local demands."[267] In the context of Australian colonial political aspirations and the need to balance Anglo-German relations what had formerly been peripheral matters had become by 1886-87 elevated to the attention and priorities of British statesmen at the highest level, in the context of the diplomatic power game.

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[266] Steiner, Zara "The Last Years of the Old Foreign Office 1898-1905" *The Historical Journal* VI, I 1963 pp 59-90 Printed in Great Britain – She stresses after 1905 Eyre Crowe established a hardline anti-German foreign policy line within the Foreign Office in contrast with the earlier flexibility.

[267] Moses, John A and Kennedy, Paul editors *Germany in the Pacific and Far East, 1870-1914* University of Queensland Press St Lucia 1977: Martin P Knight "Britain Germany and the Pacific, 1880-87" p61

COLONIAL ARMED FORCES – 1879 TO 1890'S

The topic of colonial military and naval forces from the late nineteenth century, to federation in 1901 follows a number of discrete paths. There had been an inspection concerning defence of the Australian Colonies in 1879. Following a request from the governments of New South Wales, Victoria, Queensland and South Australia,

> Colonel Sir William Jervois and Lt Col Peter Scratchley, inspected and advised on colonial defence in 1877 and 1878. Their recommendations were based on the principle that the colonies should rely, for their first line of defence, on armed vessels at sea. The immediate protection of major ports and cities would then be provided by powerful forts operating in conjunction with mobile forces consisting of paid part-time soldiers, and a small number of colonial regulars.[268]

In 1878 another war scare from the Russians got fortifications built and armaments procured. The colonial railways, fortifications and armaments shared one thing in common. They were specific to their colony. The question of rail standardisation was a problem embraced towards the end of the next century.

It was some years later that colonial parliaments accepted there might be a problem. The South Australia government and its now governor, Lt-Gen Jervois (who had carried out the original inspection,) found common cause on the topic of defence.

[268] Moredike ibid p3

> During early 1882 the colony had received a disconcerting series of visits by foreign warships, beginning in February with the German corvette *Carola* and, later that month, three ships of the Russian Pacific Ocean Squadron[269], followed by another German ship, the *Habicht,* in March. None of these visits was malevolent in intent or hostile in tone, yet to anxious colonial minds they represented a disturbing pattern. Both German ships appeared entirely without warning, and although the Russian ships had been expected (having previously called at Sydney, Hobart and Melbourne) their passage up Gulf St Vincent to the capital, Adelaide, had also gone undetected. One newspaper commented that the last arrival furnished 'abundant proof of how easily the place might be surprised by an enemy's navy.' [270]

The Government of South Australia "was jolted out of its inertia…" The presence of Lt Gen Jervois at the deliberations of "The Governor in Council…" may be tangible evidence of the influence of service officers put forward above. The purchase of a cruiser was authorised and funds found.

> South Australia in 1884, under the influence of Jervois, who had become governor of the colony, acquired the *Protector*, a small but heavily armoured cruiser of 960 tons designed to watch over the coastal trade.[271]

An important protagonist enters with this purchase. The Engineer officer for the *HMCS Protector* engaged to sail the Colonial Ship from the shipyard in England to Adelaide, remained in the Colonial Naval Force till federation. He displayed great

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[269] Meaney *The Search for Security…* p24 "The colonies, especially fearful of raids by a new class of Russian ships-of-war, the *Rurik*, adopted most of the Jervois-Scratchley recommendations."

[270] Coulthard-Clark Chris *Without Peer Sir William Clarkson KBE CMG (1859-1934) Engineer Vice-Admiral Royal Australian Navy* The Warren centre for Advanced Engineering Sydney 2002 p3-4

[271] Meaney ibid p24

competence and skill in running the engines on the voyage from Queensland to Hong Kong to serve in the Boxer Rebellion. At the end of that voyage, to the amazement of the Port Authorities, the customary days required, not to overlook expense, to refit the engines, were not required. After federation Engineer-Commander William Clarkson was selected by the Defence Minister, with the acquiescence, and agreement of the Secretary of the Department to undertake detailed enquiries into specifications for the purchase of ships for the new Royal Australian Navy, and crucially, into the methods and plant required to mass-produce quickly, substantial numbers of current pattern rifles to equip a modern Australian army during a period of considerable anxiety about Japanese naval and military threats.[272]

At the 1887 Colonial Conference agreement had been reached on the Admiralty providing an auxiliary squadron to the Australian station. In return for financial commitments from the colonies

> … the Admiralty recognized the special function of these auxiliary ships in defending the Pacific colonies' trade and territory. They were not to be moved out of the limits of the Australian station without the permission of the colonial government.[273]

[272] Coulthard-Clark, Chris *Without Peer*... author's overview based on the book.
[273] Meaney *The Search for Security*... p26/7

Landward defences were another matter. With a naval agreement achieved a number of leaders "expressed a desire for closer co-operation in improving their land defences." Duncan Gillies the Victorian premier, pushed for an imperial officer to make an inspection. Consequently, "Major-General J Bevan Edwards visited the colonies in 1889 and produced a comprehensive report on the military needs of both the individual colonies and Australia as a whole."[274]

Major-General Edward Hutton was appointed to his command as GOC in New South Wales as the nineties depression was beginning to wreak havoc on the dependent economies. Banks were failing over the slump in land, and as discussed, there was considerable hardship for the established pastoralists. To a great extent oblivious of social and economic issues, Major General Hutton, an English army officer with an English outlook, as opposed to Scots, notwithstanding his flawed comprehension of changing strategic and colonial political realities, undertook a strategic planning role, beyond the responsibilities of his command. His major achievement, precisely documented but perhaps not comprehended by Moredike[275] may have been, his activities clearly indicated, to 'the establishment' outside the War Office, that future imperial aims involving Anglo-Saxon settler populations and their resources,

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[274] Meaney ibid p27/8

[275] Moredike, John *An Army for a Nation A History of Australian military Developments 1880-1914* Allen and Unwin North Sydney 1992

required diplomacy, every bit as subtle as that deployed elsewhere in regard to British interests. The intimate ties of language, blood, and the crown, facilitated formal and informal discussions and the propounding of political issues. Colonial Conferences and, in the day-to-day official, commercial, and financial exchanges between London and the colonies were the means by which common interests might be identified, and achieved.

Hutton sought to unify the various colonies' armed forces, to enable them to mount an expeditionary force. He envisaged their operations fighting Russia for the Empire, beyond the borders of India, and colonial insurgencies as required. In these halcyon days before the establishment of the Committee of Imperial Defence there was no formal official integration of the disparate military and strategic realities confronting the Empire.

Appreciating, after a generation the urgent requirement for a united voice when talking to Whitehall about concerns in the Pacific, colonial politicians became focussed on federating. The ability of Japan to conduct a war against China in 1894, with prescience, was recognised by the GOC of NSW Forces as a potential threat.

Economic matters, immigration, and political voice at the heart of empire dominated federation debates till the South African War. The colonies separately raised and committed units to that War, where rather than being integrated as "Australian" units the contingents were attached to British regiments. Many of the topics raised by Hutton provoked post-federation legislative responses, in relation to the Defence Act after federation, which, it could be observed, were not redressed until the prelude to conscription for the Vietnam War in 1964.

VICTORIAN MUNITIONS PRODUCTION INITIATED

Two ideas crucial to the following have their origins from the earliest settlement of Victoria. During the gold rushes a university was established in Melbourne and schools of mines at Bendigo and Ballarat, all having a role in training chemists for the mining industry. Engineering was established by the policies of the State Railways buying local products. With these intellectual and industrial resources, it was possible in the late nineteenth century for the Victorian defence establishment to establish a nascent munitions industry.

Jensen suggests January 17, 1882 is the earliest record of an Australian interest in munitions production. Major Frederick Sargood, a director of Sargood Gardner, a

large and well-established softgoods firm in Melbourne[276], made an enquiry in England about plant and materials for making small arms ammunition. His careful enquiry into the possibility of making munitions in Victoria had arisen as a result of his role as the Victorian special delegate, to the 1882 Imperial Commission concerned with protecting British possessions abroad. His enquiries into the manufacture of rifle cartridges and later, ordnance are regarded as the beginning of Australian munitions production.[277] One can confidently assume the previous gesture of denuding Victoria of regular troops and the colony's only guns to assist New Zealand was a topic continuing to be tossed around clubs and messes where Sargood mixed with his peers.

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[276] This man of substance was a driving force in government for what were in effect "National Factories" to produce munitions. What is curious in retrospect, is the absence of a similar drive from among that class of men who were involved in the Victorian engineering industry. Perhaps it emphasises the primitive, fragmented, and small size of manufacturing firms, (Cochrane's words.) The free trade dogma, for over a century was government enterprises, for example the Railways Workshops, should not compete on commercial markets… to make a profit!

[277] Jensen *The Development of Munitions Production in Australia* Address delivered to memberds of the Institute of Industrial Management, the assembly Hall. Melbourne June 1st 1943 and from

Cain *Arming the Nation" A History of Defence Science and Technology in Australia,* Australian Defence Studies Centre University College ADFA Canberra 1999

As an officer of the Volunteers, he went on to become Minister of Defence for Victoria, and was knighted.[278] He was the driving force behind Victoria's primacy in defence industry for the whole of Australia. [279] "… Victoria became the most advanced colony in respect of Defence matters, and responsible for the origin of an Australian navy and of Munitions Production."[280] He was working within the evolving financial, industrial and technical resources of what became the dominant industrial state. Later munitions production required the founding of modern industries, producing chemicals, shipbuilding, and subsequently, ordnance.

Major Sargood's enquiries in relation to the proposed plant and materials to produce the .45inch Martini-Henry ammunition in Victoria, initiated exchanges with other colonial governments, in Australia, New Zealand, Fiji and Canada. Quotations

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[278] The important point of this appointment, Victoria was the only colony with a Defence Ministry! Biographical information of Sargood in this context, beyond the gardens of his mansion Ripon-Lea in Melbourne, has not been identified by the author's enquiries.

[279] McKernan, M & Browne, M *Australia Two Centuries of War and Peace* Australian War Memorial in association with Allen and Unwin Australia 1988, "Formation of the Australian Armed Forces 1901-14" C D Couthard-Clark p123 "Before federation only one state, Victoria, had created a separate department, under a minister of state responsible for defence affairs. Although the choice of Melbourne as the temporary federal capital made it possible to simply take over this existing organization, formal transfer of the Victorian department's staff did not come about until 1 July 1901 and involved a total of only twelve people." #10 Australian Commonwealth Gazette 1901 Mordike ibid, cites the war stocks of rifle ammunition for Victoria at federation as being, 17 rounds per rifle…

[280] Jensen, Sir J K speech p1

received included one of July 6 1886, from Greenwood and Batley Ltd of Leeds offering machinery to produce a six-inch fortress gun.[281]

> The private small-arms and ordnance industries, and the Enfield and other government factories, were rescued from stagnation during the next decade from 1884 onwards, by the coincidence of two types of stimulus to demand for arms, a war scare and the decision by the War Office to change the pattern of arms. As Allen puts it during 1884:
> 'Prospects began to improve owing to the proposed adoption by the War Office of the magazine rifle; and then, in 1885, both the Enfield and the private factories were roused to a sudden activity by the danger of a rupture between Russia and England.'[282]

In the context of what was happening in ordnance circles, Sargood can be seen to be dealing with the largest English machine tool manufacturer supplying the major ordnance and munitions factories.[283] Things were happening in engineering and ordnance manufacturing circles, and the foregoing gives an indication of the issues Captain John Whitney was exploring in his travels. The breech-loading magazine rifle, the dominant weapon of land warfare in the nineteenth century, the weapon

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[281] Jensen speech p1

[282] Floud, Roderick *The British Machine Tool Industry, 1850-1914* Cambridge University Press Cambridge 1976 p164 [Allen G C 'The Industrial Development of Birmingham and the Black Country, 2nd edition, London 1966]

[283] Floud, Roderick *The British Machine Tool industry 1850-1914* , The book relied heavily upon the surviving records of Greenwood and Batley.

upon which German infantry tactics revolved in their 1914 onslaught to the west, heralded far-reaching changes to warfare on land.[284]

In 1866 all the standardised Enfield Minie rifles were converted to the (stop-gap) Snider breech-loading system. The associated rolled brass cartridge case, a simple straight walled design, was later used for the basis for the next generation cartridge, a .577 necked to .450 and termed the .577/.450 Martini-Henry. In contrast with the French Chassepot of the same era which relied upon a paper cartridge, Colonel Boxer's design of the case and cap which bears his name was more advanced.[285] In 1871 the Martini-Henry was adopted, followed in 1888 by the Lee-Metford

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[284] Fuller J F C *Armament and History* Eyre and Spottiswoode London 1946 p120, …destruction of cavalry, as a shock arm in Franco-Prussian War, p136 tactical organisation of German army in 1914 around rifle, instead of the machine gun and artillery.

[285] Huon, Jean *Military Rifle and Machine Gun Cartridges* p343 "In … the British Army converted its old cap-firing muzzle loaders to breech loading. The cartridge was designed by Colonel Boxer, who brazenly copied the ideas of his compatriot George Daw, who had bought and improved upon the French Pottet and Schneider patents for his design. Despite proof of his claims, Daw's complaints were dismissed."

Pridham, Major C H B *Superiority of Fire A Short History of Rifles and Machine Guns* Hutchinson's Scientific and Technical Publications Melbourne 1945 P14 "N. B. – The Boxer cartridge was crudely made, as the brass case was built up by rolling a thin brass plate around a mandril with the join running along the length of the case. Expansion did not take place evenly owing to the lengthwise join, causing hard extraction both with rifles and machine-guns, as the extractor was liable to tear off the iron base leaving the chamber blocked up with the brass part of the cartridge."

magazine rifle using (smokeless)[286] powder in a .303inch, drawn brass cartridge case. With the dominance of the battlefield from the mid 1850's by rifles and breech-loading rifled field guns, the brief lifespan of the weapons, munitions, and the plant within the arsenals producing them, required almost ongoing decisions about capital investment, procurement of machine tools and management of the production.[287]

During the period of the late 1880's the implications of free trade and the perception munitions should not be produced only in the Royal Arsenals led to a number of decisions. An absolute lack of comprehension in War Office and political, not to overlook financial circles, about the realities of engineering production generally,

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[286] Huon, Jean *Military Rifle and Machine Gun Cartridges* Jean Huon/Ironside International Inc. Alexandria, Vir 1988 p299 The initial ammunition, which went through two Marks I, and II used a charge of pressed black powder. Trebilcock "A Special Relationship: …" may unwittingly, by tracing the method by which Cordite was developed in the two years after the adoption of the .303inch cartridge, have elucidated the reasons for black powder being used. The War Office established a committee to develop and establish a proprietary right by the Crown for Cordite, instead of buying a not quite identical propellant from Nobels. Allegations of patent infringement… and suggestions of sharp dealing by government are part of this story.

[287] Floud, ibid, Summing up in his final chapter quotes various military historians. He had considerable difficulty establishing exactly what the mechanical differences were between any given machines, possibly purchased decades apart, but with an identical description. There is no question, ongoing design changes to the machine tools evolved from the input and observations of the official users, and from new foreign machines.

ensured the later debacle of munitions supply in the Boer War for imperial, and colonial forces.

The origins of Australian munitions production decisions immediately after federation are an outgrowth of these, and previous experiences. There was a parallel and independent exercise in Canada, with the Ross straight pull rifle. Russell Fries suggests in his thesis[288] the reliance of the Birmingham Small Arms and London Small Arms firms on periodic and unreliable War Office contracts during the era of the late nineteenth century, in contrast to looking at new patents and serious production for the civilian export markets as was the case by American small arms producers, was the managerial shortcoming of those firms. He quotes figures for about the 1890's, 6% of the annual sporting gun output in the United States was sold to Canada and Australia. (In the context of enquiries put to Canada in relation to Australian produced ammunition, this is an interesting historical insight into the drive of the men on the ground.)

In 1885, following the Russian war scare over Afghanistan, exports of ammunition from Britain to the Empire were suspended. In New Zealand a former army officer,

[288] Fries, Russell Inslee *A Comparative Study of the British and American Arms industries, 1790-1890* The Johns Hopkins University, Ph. D. 1972

Captain Whitney set up a small company in Auckland, Messrs Whitney and Sons making cartridges. In 1887 the success of this undertaking encouraged Captain Whitney to look at expansion.

In London to purchase new plant, he wrote to the Victorian Defence Minister also in London to attend the 1887 Colonial Conference. He proposed to build a new factory in Victoria if a subsidy of £5,000, a land grant, concessions for the importing of plant, and a ten year contract for the output were all forthcoming.[289]

The firm of Greenwood and Batley Ltd were at the time leading producers of machine tools for armaments. Cognate with the above quote of July 1886 for ordnance was an offer made the same month in relation to the Small Arms Ammunition factory. The supplier offering the munitions plant, expressed adverse opinions reflecting the economic dogma of the day in relation to munitions production by small distant users. In essence, the Defence Minister of Victoria made an autonomous and independent decision. “Following upon Greenwood and Batley’s offer, correspondence ensued with the various Colonies as to participation, all the firms approached having represented that Victorian requirements alone would

[289] Cain, and Jensen ibid based on their very brief historical treatment of this early period.

scarcely warrant a factory, but the response was lukewarm, notwithstanding the so-called "Russian scare" of the time-"[290] Indifferent, within Pax Britannica the other Australian colonies prevaricated about their requirements.

The newly appointed Secretary of the Victorian Defence Department, a Major-General had however, reviewed the project in 1886, and rejected the idea of publicly funded arsenals producing both ammunition and ordnance. He suggested that a private enterprise ammunition factory would be a more economic exercise.[291] This period coincided with the rethink in the War Office in relation to a departure from the traditional policy of the Royal Ordnance Factories producing all army requirements.[292] In the later context of federation, the newly fledged Commonwealth forces were bequeathed for national coastal defence, a motley collection of ordnance and associated munitions spread across the continent.

John Whitney in a letter of 21st July 1887 to Sir James Lorrimer the Victorian Defence Minister visiting London, stated in relation to his proposal,

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[290] Jensen speech p2

[291] Cain ibid

[292] Various sources in ordnance suggest the investment to upgrade the Royal Ordnance Factories's and organise steel production was eschewed. Conversely the question of propellants and explosives ensured ongoing and close involvement by both War Office and The Admiralty.

> As stated to you at our last meeting, I have been for some time engaged upon the manufacture of cartridges in Auckland for the New Zealand Government, and came to England a short time since to purchase additional machinery, to increase production and prepare for the probable change in small arms.[293] And whilst here have made arrangements with Messrs. Greenwood and Batley, "who make all the Woolwich Cartridge Machinery," and some one or two other gentlemen who have joined me in forming a small private Company for the production of small arms ammunition and possibly, later on, of war stores generally.[294]

Woolwich undertook both the design work for ordnance, and was the major arsenal for the War Office. It was the home of the Royal Artillery, and the Military Academy where officers were trained.

Imperial political realities imposed on the colonial politicians, in the context of the industrial and engineering processes involved in sourcing munitions, must have

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[293] The purpose of this footnote is to elucidate on "the probable change…" Not the quote. Barnes, Frank C Edited by Amber, John T *Cartridges of the World* Follett Publishing Company Chicago 3rd edition 1972 p192 "The 8mm Lebel was the first small bore smokeless powder military rifle cartridge developed by any world power.[France] The cartridge and the Lebel bolt action rifle were both adopted in 1886."
Huon, ibid p132-135."French research on small calibre weapons and the advent of smokeless powder (invented by Paul Vielle in 1886) resulted in a new magazine repeating rifle shooting an 8mm cartridge designed by Captain Desaleaux and Colonel Gras. The original bottlenecked case is made of brass and has a rounded head. This was required by the large diameter of of the 11mm Gras case from which the Lebel was derived, resulting in a sharply tapered cartridge, when necked down to 8mm. This later proved a hindrance for use" in automatic weapon magazines."

[294] Jensen speech p2 Whitney to Lorrimer 21st July 1887

provided numbers of the colonial delegates with an enlightened outlook. Lord Salisbury went along to the Imperial Conference "With a firm resolve to put the colonists in their place."[295] The history of diplomacy has gaps for the two days of talks in question. We can suggest however, that given problems with supply of munitions from Britain in the recent past, men of substance, like Sargood must have been arguing very strongly that, if, "Money is the sinew of power," not having an independent and plentiful supply of basic small arms ammunition in Australia when considering the questions of the evolving situation in the South Pacific, made any deliberations about action quite meaningless.

The Victorian Government requested further information and Whitney's detailed proposals in February 1888, were formally accepted three weeks later. The factory was set up at a site on the Maribyrnong River at Footscray. "Production commenced the following year and the first deliveries of ammunition were made to the Victorian Militia in July 1890."[296]

There are two separate strands of history converging around the decision to manufacture small arms ammunition, and not manufacture ordnance. As discussed

[295] Meaney *The Search for Security*…. p21
[296] Cain, Frank ibid p125

above, the topic of the annual balance sheets of the Victorian Railways and their annual deficit was assuming importance in The City. Was the Government simply unable to finance an ordnance plant? The land boom was collapsing in 1888, but the involvement of politicians in the speculation managed to conceal the unpleasantness for some three years. The decision to manufacture small arms ammunition was urgent. The background being in the context, supplies were not forthcoming,[297] and,

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[297] During this time frame production, and export of small arms and ammunition from the United States was extensive. The literature refers to the Remington Rolling block rifles, sold to Denmark, who also took a licence for manufacture, Deliveries to Spain, and licence manufacture undertaken in Sweden, who probably supplied Norway. Between 1870-76 Egypt ordered 60,000 rifles. Egypt, defaulted on a contract, so the rifles could be supplied to France during the Franco- Prussian War. National customers were supplied with rifles chambered for a cartridge unique to, and named after them. Barnes, *Cartridges of the World* Ibid, p198, 200, 202,203

Substantial American exports of weapons and ammunition were made to Russia. Smith and Wesson Revolvers, Berdan rifles, 2 models… Berdan, an American army officer is credited with the development of the drawn brass cartridge case and the cap which retains his name. Barnes is the source for much of this.

Durfee, ibid p1249 Refers to cartridge making machinery (for drawn cases) being supplied to all the above mentioned licencees, Russia, Sweden, Spain, Denmark, Egypt. Also to Prussia and England… Logically, the machine tools for the arsenals producing the rifles under licence were similarly supplied.

Ellis, ibid p66
Gatling guns were purchased in large numbers (by Russia,) and a licence for manufacture was granted.

Rosenberg, Nathan "Technological Change in the Machine Tool Industry, 1840-1910" *Journal of Economic History* Vol.23 No.4 (Dec. 1963) pp414-443 p442
"…technological convergence, experience in the production of firearms made it a

with French expansion in the Pacific, "Deakin claimed that in 1888-9 the Victorian government was prepared to use its own naval force to prevent further French military intervention in the islands."[298]

The details Jensen outlines of production, initially of .45-inch Martini-Henry Ball Ammunition using solid drawn brass cases… The solid drawn brass case was replaced by production of the rolled case. The author's understanding is the Gatling Guns[299] jammed using rolled cases.

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relatively simple matter to produce sewing machines. #65 Just as it simplified, for example, the development of the typewriter, whose
problems remained unsolved until it was placed in the hands of the skilled machinists and technical experts of E Remington and Sons, gun manufacturers at Ilion, New York. *Twelfth Census* (1900), "Manufactures" p442
Contrast these activities with tardy British exports. (In relation to small arms and ammunition.) At this stage, there was already a marked contrast between the two countries' manufacturing technologies. American industry relied heavily on machine tools to perform specific tasks. Mass-production by well-paid semi-skilled labour was the objective. British industry used heavier machine tools capable of accurate work but their emphasis was on quality rather than quantity. One of the studies in Aldcroft mentions a locomotive made in England using the best materials and would last fifty years. Contrasted with the cheaper American product with a much shorter working life.

[298] Meaney ibid footnote 23, p21 Deakin, *The Federal Story* pp22-3

[299] Pridham ibid P 27 "The Gatling Gun. The first really practicable machine-gun… consisted of a group of rifle-barrels mounted-not side-by-side… but fixed at equal distances round a central axis, and mounted on a carriage like that of an artillery field gun. The reloading mechanism was placed behind the six barrels. This worked by a crank-handle at the side; the cartridges fed in from a gravity drum at fixed at the top of the gun, the rounds falling by their weight- one by one – as each shot fired.
As the crank handle was turned, the drum and barrels all revolved around the central exis. Each round dropping into the gun was pushed forward into the uppermost

"The sand of the desert is sodden red,--
Red with the wreck of a square that broke;--
The Gatling's jammed and the Colonel dead,
And the regiment blind with dust and smoke.
The river of death has brimmed his banks,
And England's far, and Honour a name,
But the voice of a schoolboy rallies the ranks:
'Play up! Play up! And play the game!"[300]

To put the Colonial Ammunition Company and its production into an imperial perspective, in 1889 a complex series of ongoing negotiations between Salisbury and Bismarck evolved, with a view to restraining the French.

> If Britain did agree to a public alliance with France for a fixed term of years, it would almost certainly deter even Boulanger from any rash action - which was particularly important at a time when both Germany's small-arms and Britain's battleships were thought to be obsolescent.[301]

As mentioned, the French development of smokeless powder and the 8mm magazine Lebel rifle in 1886 was a quantum leap forward. Looking at other designs of rifles and ammunition, the French technical lead lasted probably, until 1895. Within this timeframe, Kennedy mentions the Russians placed an order for rifles from France.[302]

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barrel. As the barrel passed to the lowest position it was fired. As the barrel passed up on the left side the empty case was extracted, and when it again reached the top position it was ready to receive another live round."

[300] Vitai Lampada *They Pass On The Torch of Life* Sir Henry Newbolt (1862-1938) http://hbllmedia2.lib.byu.edu/~english/WWI/influences/vitai.html

[301] Kennedy, Paul *The Rise of the Anglo-German Antagonism 1860-1914* George Allen and Unwin London 1980 p196. [Footnote#179 above elaborates]

[302] Kennedy, *The Rise*... He actually omits to specify the model of rifle… It was the Russian designed Moisin-Nagant.

From a technical overview, the step by the designers of simply necking down the obsolete 11mm Gras cartridge produced a workable, if short-term solution. The shape of the case arrived at was unsuitable for the later requirements of more modern weapons. The one advantage was, when a heavier bullet firing tracer and incendiary for shooting at aircraft, specifically balloons was urgently required after 1914, Hotchkiss machine guns chambered for the 8mm Lebel required only a different calibre barrel to change up to a modern version of the 11mm Gras cartridge.[303] As a result of the urgency with which the weapons requirements of the mid-eighties were tackled, the French Army, unable to re-equip with a more suitable cartridge and weapon prior to 1914, was handicapped in relation to basic infantry weapons throughout the First World War. The design of the Hotchkiss strip for feeding the gun made the shape of the cartridge to a large extent irrelevant. The Maxim/Vickers machine guns where the cartridge was removed rearwardly from the belt, aligned with the chamber, fired, removed and ejected, functioned with any design of

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Smith W H B and Smith, Joseph E *The Book of Rifles* Castle Books, New York Fourth Edition 1972 P421 "The Model 1891 was first made at Chatellerault in France; it has also been made by SIG in Switzerland and Steyr in Austria." One deduces the very heavy financial involvement of French investors in Russian bonds in this period facilitated the transactions.

[303] Huon *Military Rifle and Machine Gun…* p132 8x50R Lebel and p189 "During World War 1, the 11mm Gras case was standardised by the Allies to provide a large calibre cartridge for the Vickers aircraft machine gun. "

cartridge. In contrast the British .303inch cartridge was able to function in later modern light machine guns designed to use radial and later, box magazines.

An ammunition company had been established in Victoria. Some degree of independence from imported munitions was immediately established, effectively, for all the "Australasian"[304] colonies. It was producing the earliest pattern of cartridge case, based on the simplest most primitive cartridge adopted in 1866 to convert the Enfield Minie muzzle-loading rifles to the Snider breech-loader. The context was the Prussians with their needle-guns sweeping the fields of opposing infantry in the Austro-Prussian War of that year. The obsolete rolled brass Martin-Henry .577/.450 cartridge was set up for manufacture in Melbourne at the same time Britain was developing the Magazine Lee Metford rifle and drawn brass cartridge. Both incidentally were imported. James Paris Lee was an ex-pat Scot in Canada, who had established his design in America. The .303inch cartridge was essentially a Swiss round developed by Colonel Rubin.[305] The design of the rimmed case, while not

[304] A term widely used, the author remembers small handbooks of his grandfather with maps, shipping routes and the term Australasia sprinkled within.

[305] Huon, Jean *Military Rifle and Machine Gun Cartridges* English Edition Ironside International Publishers, Inc Alexandria Virginia 1988 "The British Army was interested in small calibre rifles and ammunition as early as 1883. Results of research led to the adoption of the Lee Metford rifle in December 1888, with the cartridge being officially put into service on February 20, 1889. This cartridge was derived from the 7.5mm Swiss Rubin (rimmed) and was the forerunner of a large series with many variations." P299

ideal for automatic weapons with magazines, remained in service with the British Army till the mid-1950's. Had tooling suitable for stamping drawn brass cartridge cases been purchased initially, producing the new .303 inch cartridge with the later high pressure smokeless powder, would have been a simple procedure of; changing the dies, incorporating jacketed projectile manufacture into the system so that production could continue. Comprehending the technology of manufacturing rifle ammunition from a tour of the Footscray Factory in the early sixties, the appropriate presses for drawing the cases would all have to have been purchased from scratch. With regard to the machine tools purchased in 1889? Perhaps if there had been an energetic entrepreneurial management they might have been able to be used for making paper shotgun cartridges…

Large numbers of the Martini-Henry rifles were rebarrelled to .303 in England, called Martini-Metfords, and later Marks, the Martini-Henry-Enfield and issued to contingents going to the Boer War. From an historical perspective, new plant and machinery was purchased to produce the obsolete design of a cartridge at the same time as a new generation of infantry rifle and ammunition, which was to dominate warfare till the early years of the 1914-18 War, was being adopted by the War Office. The laconic explanations of Durfee writing in 1893, of exports of cartridge making machinery for drawn brass cases to be used in the Remington Rifles in what

was then, the recent past, cannot help but emphasise the dichotomy between American and British technology and production methods. Early members of the Colonial Ammunition Company executive included, Sidney Batley the secretary, and Arthur Greenwood[306]. The Greenwood Batley company with it's ties to the ordnance and arms factories, and involvement with CAC would have been well able to advise their Victoria customer of anticipated trends for which they were designing the machine tools at the time of the discussions.

This decision not to have an arsenal producing ordnance may be a striking example of a decision attributed by history to a seconded army officer in relation to munitions. An ordnance plant would have been a tangible investment and provided industrial "spin-off" to local manufacturing. The shemozzle of a motley collection of guns, munitions, and associated equipment deployed for coastal defence acquired on the formation of the Commonwealth, was exceeded in variety, only by the rail network. A lot of British money invested indirectly in suburban real estate at that time, and on deposit in banks investing in urban land development was about to, vanish. As conjectured, the problem may have been, new finance.

[306] Graham Tweeddale, email 13/1/07

From enquiries made of an Army Reserve Armourer[307] who has consulted diverse historical sources, the following is relevant. The drawn cases for the .45 Martini-Henry were imported, loaded at CAC and supplied to New South Wales. Greenwood and Batley suppliers of machine tools to English munitions firms of the day obtained the cases from Eley Brothers and supplied them to C. A. C.

> The simple rolled brass sheet cases were cheap to produce.[308] The plant required was less complex than the presses needed to draw a cartridge case successively from a stamped disc of brass, to a finished necked case. The brass sheet, (picture a material like heavy Alfoil but of brass .005 inch thick,) iron for the rims, and caps were initially imported. There is a query about the origin of the lead and the paper for the patches as to whether they were produced locally.[309]

Gunpowder was crucial to all mining, quarrying and shooting. It can be confidently asserted that, with the minimal capital outlay and rudimentary technology involved in setting up a powder mill, it was made in Australia from the early nineteenth century. The Broken Hill mines were producing silver, lead and zinc at this time. German money and involvement was tackling the smelting and export marketing.

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[307] ibid Graham Tweeddale

[308] Pridham ibid, also Tweeddale, and self-evident from a technological observation.

[309] Discussion with Graham Tweeddale January 11 2007. Historical research into CAC is being undertaken and may become available.

An insight, which further supports the view, munitions production in Australia has its origins and obtained its momentum in Victoria, is the following quote, "Another firm with which the Victorian Government was in communication at that time is now known as Imperial Chemical Industries Limited."[310]At the time Jensen is referring to "The cordite industry itself was composed of an inner ring of seven firms dominated by three giants, Kynoch Ltd., National Explosives, and Nobel Explosives Ltd. and, later, an outer ring of twenty or so non-contracting firms, sporting explosives and ammunition manufacturers, was added. Practically all of these were absorbed in the great explosives merger of 1918… which in 1926 was… merged into I.C.I."[311]

Exploring the history of *The Chemistry Department of the University of Melbourne* the above remark quoted from Jensen nearly two generations after it was made, sounds like another historical detail.

> The Schools of Mines at Ballarat and Sandhurst (Bendigo) were always jealous of the University's higher status in teaching. … Both colleges, however, responded to the call of Major W. C. Smith, the Minister for Education and for Mines, and Member for Ballarat West, in 1879 to popularise the study of science in schools, and introduced evening courses in chemistry for local teachers. Though short-lived, the courses gave several teachers an opportunity to learn more about science – and incidentally, to give them certificates valuable for promotion. [312]

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[310] Jensen speech ibid p2

[311] Trebilcock "A Special Relationship…." p365/6

[312] Radford Joan, *The Chemistry Department of the University of Melbourne* The Hawthorn Press Melbourne 1978 p22

This quote perhaps emphasises the technological and scientific intellectual infrastructure existing in Victoria in context with the dominant pastoral and gold mining operations of the era.

> Referring again to Orme Masson of the University of Melbourne, "On 23 March 1887 Orme delivered his inaugural address to an enthusiastic audience in Wilson Hall. … He spoke of the rise of science based industries, notably dyestuffs won from coal-tar derivatives, and went on to indicate that intense involvement with his forthcoming lecture programmes had not withheld him from a journey over the hot dry plains west of Melbourne to visit a dynamite factory at Deer Park. Its presence reflected the great demand by the mining and civil engineering industries for the powerful explosives devised by Nobel; and its installation only a few years after the first of its kind to be built in Scotland afforded Orme a good example of an industry which required expert chemical control and direction. He dwelt in particular upon the key compound nitroglycerine which had figured so emphatically in his doctoral thesis."[313]

Capital from gold in Victoria had been the exception to the focus on wool. The establishment in Melbourne of the Broken Hill mining companies in the late eighties, Described as "Anglo-Australian" companies "In which British Capital predominated," [314] BHP and the Collins House group shares were presumably also listed in London as well as Melbourne. The complementary role of these Melbourne based Anglo-Australian public companies, (floated originally in the late 1880's,

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[313] Weickhardt ibid p32

[314] Cochrane, Peter *Industrialization and Dependence: Australia's Road to Economic Development, 1870-1939* University of Queensland Press 1980 p76 Chapters 5 and 6

moving on to mining coal, refining ores, and producing lead, zinc and steel, without which munitions are back in the stone age.) in achieving both vertical integration within their companies, and, of national industrial objectives was significant.

At the time Britain was entering her Climacteric in 1895, the pastoralists who had dominated political and economic outlook since early settlement had been effectively removed from political power. Urban groups concerned with manufacturing coalesced with the Labor politicians organised on a national basis. Both saw close settlement through public policy as achieving social and commercial objectives. Early political efforts to stimulate metallurgical skills through Victorian Railways purchasing policies, the tariff policies propounded by David Syme, the science studies offered by the University of Melbourne, and Schools of Mines in Ballarat and Bendigo, the wealth obtained from gold-mining and the use of that wealth to establish the Broken Hill companies[315] mining silver, lead, and zinc placed the Victorian economy, notwithstanding cash-flow problems, on the thresh-hold of the Imperial stage. It will be recalled above Australian (the Broken Hill mines the output processing of which, was German owned until 1915,) and Indian, trade surpluses

[315] Hall AR ibid insists British investors, although interested and prepared to invest in Australian mines, had great difficulty in bypassing the informed domination of local investors in the most successful Australian mining ventures floated during the period 1870-1914.

with Germany underwrote a faltering British industrial structure. An ongoing deficit from the purchase of German manufactures, dyes and chemicals. Correlli Barnett makes the point in *The Collapse of British Power*[316] it was not until a year into the Great War, that aspirin stopped being imported to Britain from Germany through neutral countries to Britain.

Early into the period of colonial self-government direct military and logistical support from the colonies was drawn upon by Governor Grey in New Zealand to prosecute a war with the natives. The relinquishing of British army garrison units, the ransacking of war stores for weapons and munitions were unquestioned in support of what, everybody accepted had to be undertaken. The industrial capabilities of producing steam riverboats, the light industries producing saddlery

[316]The author's perception is Barnett spent 'a long time' carefully reading the twelve volumes of *The History of the Ministry of Munitions*. Since this reference is important a number of things should be added. A set each of the histories were sent to each public library in the UK, and one set each to the dominions. Susan Blood in a email from the ARL Library within the DSTO confirms this history is not within the library system of this country. She is outside it. Something like 300 sets were printed. 150 were held in storage but burned during *the blitz*. There are strong grounds for suggesting, that if this information was not accessible in Australia in the post Great War era, the bulk of the decisions and drive with which A E Leighton and his colleagues drove Australian industrialisation, was based on personal experience and knowledge acquired from within The Ministry of Munitions! Jensen's manuscript is held at the ARL Library. The other holding is within archives and the family have also have a copy which has been made available to Tony Griffiths whom Thales Group have backed in writing about the Small Arms Factory Lithgow.

and accoutrements, tents, everything from fodder to coal were delivered from the eastern Australian colonies to New Zealand. The finance from London to Governor Grey was a key underwriting of the activity. The presence of large numbers of veterans within the colonial bureaucracies is a self-evident explanation of the immediate responses, both for materiel and volunteers.

While there was colonial unease over German and French expansion into the South Pacific, in Britain war with the Americans was unthinkable, by the mid-eighteen eighties, these topics were addressed by the Prime Minister himself, at Colonial Conferences. Following the popular uproar over the killing of Chinese Gordon at Khartoum in 1885, New South Wales reacted with the offer of a battalion of troops with guns to support the British Army in Suakin. In the imperial interest the offer was accepted. Retrospective observations about the technology of the weapons of the day are made.

The structure and capabilities of the colonial armed forces are briefly considered for the period in question. The emphasis was on protection of seaports with fixed defences and some naval vessels for coastal defence.

The industrial policies of Victoria, the only colony with a defence ministry, the capital from gold, and especially the university training of chemists, and production of explosives, are the turning point upon which the thesis hinges. From these political and industrial policies, the reality of being at the ends of the earth, and the end of the line of priorities, when weapons and munitions were required from British industry, was acted upon. Key personalities, both service and political gave, during this period, focus to popular unease over the South Pacific, and during the nineties, interpretation of the British Climacteric in terms of strategic realities within the context of "The Yellow Peril."

Chapter V

Strategic realities within the British climacteric 1895-1905

Introduction

The British Climacteric identified as commencing in 1895, was the backdrop to colonial unease over their maintenance of restrictive immigration policies and the naval capabilities of China, and Japan demonstrated during the 1894 Sino-Japanese War. Naval competition from Russia and expansion by Germany, France, and America in the South Pacific had been a topic of political focus, albeit sporadically, for a long time. The appreciation of the limitations of British naval and military capabilities was brought home with the South African War.

The colonial military response to the South African War was immediate and significant. The service experiences of their contingents, both directly, and through large numbers of Australian volunteers who had been in the Transvaal before the War and of others who paid their way over to Durban and Cape Town to join up within the Imperial forces, had a considerable influence. Lord Roberts provides an

insight into the importance of Australian troops. Histories observe many of the imperial mounted units raised in South Africa were Australian in all but name.

The lack of comprehension of the British Government about the realities of an engineering industry requiring time and organization to produce small arms, munitions and ordnance was unquestionably demonstrated, to all these colonial participants in the War. But the lesson was none too clear to the political class and their financiers in The City who had even less comprehension of the strategic implications. The incompetence of Army logistics within South Africa had much to do with the soaring national debt following the War. Badsey makes the point several times,[317] that when decisive action by cavalry could have finished the War years earlier, orders were not clearly conveyed and, because adequate fodder was rarely provided, the horses simply could not physically cover the distances in the time required. Horse carcasses across the veldt were a feature of British Army operations.

The federation of the Australian colonies took place during the South African War, with the armed forces of the colonies being subsumed within the Commonwealth Forces. Following the War, Imperial Conferences took place in London about every

[317] Badsey, Stephen David *Fire and the Sword, the British Army and the Arme Blanche Controversey 1871-1921* Dissertation for the Doctor of Philosophy, Faculty of History, University of Cambridge 1981

two years. The Anglo-Japanese Naval Treaty of 1902, and withdrawal of the Royal Navy from the Far East and the North American Station assumed significance in Australia in the context of Kaiser Wilhelm 11's apt description of, "The Yellow Peril."

Following the defeat of Russia by Japan and the Battle of Tsushima in 1905, Meaney observes that national survival and questions of defence capabilities were tackled in a pragmatic and determined manner by the political leadership of both parties.[318] Despite awareness in the colonial psyche, munitions deliveries from Britain simply did not happen when there was an international crisis, working from the financial, industrial and scientific base in Victoria the new Commonwealth Government tackled the topics of establishing a navy, naval shipbuilding, and serious production of small arms and ammunition. Associated factories to produce woollen fabrics, uniforms, harness and saddlery, boots and accoutrements were also established.

Drawing on the following analysis the conclusion sums up the role of Sir Frederick Sargood attributed by Sir John Jensen in 1943, and the not so prominent role, of Sir Orme Masson of the University of Melbourne Chemistry faculty. The appointment of Cecil Neville Hake the Chief Inspector of Explosives for Victoria as the first

[318] Meaney *The Search for Security in the Pacific 1910-1914* p1/2 pp 13/14

Defence Scientist in 1907, and his decision to appoint A E Leighton to manage cordite manufacture in Australia was of historical importance.[319] Reflecting in a few sentences on what has been outlined, of the political tides, financial and commercial changes over a century, and the revolutions of technology which intersected with Australian political decision-making is an observation, not entirely original, that Frank Cain made it to the author in February 2005, "This country is almost at the same stage it was in with regard to military industry as it was a century ago."

STRATEGIC REALITIES – THE BRITISH CLIMACTERIC

During much of the nineteenth century history of Australian settlement,

> Britain's foreign policy had revolved around three facts. It was an island off the coast of Europe; it possessed a vast colonial empire; and the security of both Britain and its empire rested on its possession of a preponderant navy. Perceiving that a large standing army was unacceptable politically, and, to avoid hostility from a combination of

[319] Andrew Ross, and Frank Cain in their writing amply praise A E Leighton. The significance of the prior administrative decisions to put the right people like C N Hake in the right position at the right time, the author is trying to illustrate. The insight into the absence of a knighthood for Leighton, in Ross' PhD, the author found 'fascinating.'A history of *A Century of Defence Science* is ready for printing, awaiting the authority of the Minister to proceed. (Email from Jimmy Hafesjee mid 2008.)

> hostile maritime powers, British policy harmonised with that of a majority of other powers. [320]

Britain was committed to preserving the independence of states, especially those threatened by their neighbours. "But second only to national independence was 'free intercourse of trade in the world's markets.' So free trade was a strategic necessity to Britain."[321] The dogma to disdain mercantilism was; a tariff barrier around the empire might eventually provoke a hostile coalition against it. The gold standard and the City of London's role in financing and facilitating free trade throughout the world, underwritten by the Bank of England, was seen as indispensable to world commerce interacting in an enlightened liberal era.

There is a further strand to this analysis quoted by French from Sir Eyre Crowe's memorandum of 1 January 1907[322]. "Regarded as the 'evil spirit' of the Foreign Office Germanophobes,"[323] he is quoted in retrospect, in the literature on the topic of the fading of la belle epoch, as a dominating clear thinker. Zara Steiner charts the ascent of Eyre Crowe and the direction in which he drove foreign policy. Rejected for service in the Boer War he threw his energies into reforming the Foreign Office administration. Earlier Foreign secretaries had tolerated the outbursts of the Kaiser,

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[320] French, David *British Economic and Strategic Planning 1905-1915* George Allen and Unwin, London 1982 p15

[321] ibid p16

[322] Gooch G P and H Temperley eds *British Documents on the Origins of the war, 1898-1914* London 1926-38 Vol 3 p 402 sourced by French p15

[323] Kennedy, ibid *The Rise*…" p254

the objectionable activities of their German counterparts, and sought to keep some flexibility in British dealings with Germany.

> … on 29 December 1905 a memorandum explaining the new system was sent to all heads of departments. The anti-German faction was in power and the reformers had won. The appointment of Hardinge and the selection of Eyre Crowe as temporary head of the Central Registry assured the success of the new programme.[324]

The focus of Germanophobia by the Foreign Office and Admiralty at the beginning of the Great War could be considered in extremely adverse terms from more genteel vantage points than those of Berlin. With Don Dignan for example, questioning the implications for Australia of immediately involving Japan in the War against Germany. Australian ships with troops on board planned to seize the strategic German islands in the northern Pacific, thanks to Churchill and Sir Eyre Crowe's cabal, Japan seized them before they could sail. The implications for interwar strategy were set in stone. The role of Japan in backing Indian revolutionaries - Britain was a Moslem power - The implications of Churchill provoking war with Turkey, and if lost, signalling the end of the Raj.[325]

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[324] Steiner, Zara "The Last Years of the Old Foreign office, 1898-1905" *The Historical Journal* VI (1963) pp59-90 Printed in Great Britain p87

[325] Dignan, Don *The Indian Revolutionary Problem in British Diplomacy 1914-1919* Allied Publishers Private Limited, Bombay, 1983

British foreign policy from 1865, to the period ending in Munich in 1938, energetically pursued a positive policy of appeasement. Paul Kennedy summarises the underlying motives in a paragraph,

> [t]here were always… motives – moral, economic, strategical, and domestic – operating in the public consciousness and prompting British governments from the mid-nineteenth century onwards to favour a foreign policy which was , with rare exceptions… pragmatic, conciliatory and reasonable. It was a policy predicated on the assumption that, provided national interests were not too deleteriously affected, the peaceful settlement of disputes was much more to Britain's advantage than recourse to war." … 'Peace as a National Interest' is a valid description of Britain's overall strategy.[326]

But 1895 should have been seen as the beginning a new era in world politics. In Whitehall the realities of limits to finance, industrial power, and military manpower on a continental scale, left reliance on the Royal Navy as the main defence of the United Kingdom as a European power. There was a realisation that the Royal Navy was being both numerically and technologically challenged by new industrial powers and changed strategic realities. The views propounded in the early 1900's by MacKinder of railways within continental powers like Germany, and the United States, sidelining Mahan's theories about naval power were ignored. Large numbers of vessels deployed carrying muzzle-loading ordnance were withdrawn from service predominantly in the Far East during the British Climacteric. The existence of these

[326] Kennedy, Paul *Strategy and Diplomacy 1870-1945* Fontana Paperbacks Aylesbury Bucks 1984 p 19

ships in service may be an overlooked indictment of an earlier lack of grasp of technology, referred to above in observations on Captain H Garbett RN's 1897 tome *Naval Gunnery*. Various works in business schools[327] for example, comment on the squadrons the Royal Navy maintained in all sorts of out of the way places which were recalled in this period as Fisher imposed his measures of efficiency, the vessels being obsolete, and the role performed, theoretically covered by more modern vessels extending their reach.

The Australian colonial rejection of Japanese migration, and the later realities, of both Chinese and Japanese naval capabilities caused some political anxiety. Japan had overcome China in the Sino-Japanese war in 1894 and, with naval shipbuilding established by British firms in Japanese yards, the question of a realistic Royal Navy presence in Australasian waters was no longer an arcane topic. Within the context of a diminishing Royal Navy preponderance in the Pacific by the mid-nineties, a high degree of focus and clarity was assumed in political debate. It is apposite to consider what these changes led to in the context of the South Pacific.

[327] The author undertook a B. Bus. Marketing at the SAIT 1977-79 – one of the texts had a paragraph on the above topic while another referred to the British Empire being 'administered with probity…' The topic was the reforming zeal and efficiency of Fisher as he rationalised the Royal Navy. Bit of a problem to identify texts, predominantly American, after thirty years.

The Australian Colonies were dependent economies in the late eighteen nineties. There was a dire problem servicing external public debt, in an era experiencing depression, in a changing world of hostile navies, whom, if they combined, would be capable of striking out into the British Empire as far away as the South Pacific. The colonies had to make some hard decisions. "Federation paved a political road out of the overlapping debt crises of the 1890's. But while it made renewed expansion possible, it did not specify for whom." [328] The un-stated reality, the British trade deficit with Germany specifically, was covered by export surpluses from Australia and India. The commercial bonds were more than intimate.

Opinion in The City looked to federation of the Australian colonies in as a means of ensuring that a single national government would have control of borrowing, and responsibility for undertaking the debt repayments of the previously disparate colonial borrowers. The political conferences and negotiations extended for a decade. But with; official enthusiasm from Whitehall, a financial umbilical cord extending from The City of London, and shared common perceptions of future military threats from naval rivals, federation took place in 1901.

[328] Schwartz *In Dominions*... p105

It is intended to demonstrate the existence of a high degree of realistic, and independent political and military thinking by the political leadership of the late nineteenth century Australian colonial parliaments. The perhaps intuitive feel for *realpolitik*, by "unsophisticated" politicians, in the early Commonwealth era, both Anglo-Saxons and Celts, has been vindicated by historians writing two generations later with the benefit of access to classified British Cabinet documents. [329] In retrospect, the pragmatic decisions these men made in relation to national aspirations, at variance with imperial policies, without formal access to the cabinet and military deliberations in London, must be seen as, remarkable.

THE SOUTH AFRICAN WAR 1899-1902

As in most historical turning points, the unease within the colonial polities, the questions of finance and development in an uncertain world, the topics of Asian immigration, the commercial and industrial competition from Germany and America in Empire markets, converged with perceived military threats from potentially a combination of two or more of the naval powers other than America in the Pacific.

[329] Friedbeg, Aaron L *The Weary Titan: Britain and the Experience of Relative decline 1895-1905* Princeton University Press New Jersey 1988

In the mid-nineteenth century "Australians," in the proud martial traditions of the Scots and Irish joined battle in the New Zealand Wars. After war broke out in South Africa in 1899,

> The idea seemed to be that the contingents were to prove to the world that the Colonies were willing to follow the flag, rather than have any direct military effect. … In every Colony troops marched through the streets of the cities to the ships, amid scenes of the greatest patriotic fervour.[330]

Large numbers of men had gone to the Transvaal during the depression of the nineties to work on the gold mines on the Rand. Fleeing to the coast as war loomed, they comprised a significant proportion of the effective Imperial mounted units raised in Natal and The Cape Colony.

During the War many colonial volunteers unable to enlist in Australia, paid their way over as private individuals to join Imperial units. The impression is gained the mounted units officered by British regulars were Australian, in all but name.

The Boer War marked the first military commitment by the colonies acting in concert to send contingents.

> At the end of April (1900) two members of the New South Wales Parliament, Mr R. Sleath and Mr. B. B. O'Connor, arrived in

[330] Wallace R L *The Australians at the Boer War* The Australian War Memorial and the Australian Government Publishing Service Canberra 1976 p34

> Bloemfontein and were given an interview by Lord Roberts. Roberts told them that the high opinion held for the Australians was shown by the forward and responsible positions they held in the campaign. 'The best proof of what I think of them is the position I have assigned to them. At first the men were only tried out of compliment to the colonies, but now we can't do without them,' Lord Roberts said.[331]

Colonial unit loyalties were not easily put aside to form integrated "Australian" units, the perception of the smaller contingents was they preferred to be attached to British units.[332] Following Federation in 1901, the Commonwealth committed to the war, raised and sent national units to continue operations, until the Treaty of Vereeniging in 1902.

The climacteric of British power in this period is the backdrop. The abysmal performance of the British Army during the Boer War and the importance of the role of colonial forces changed a lot of official views.

The incompetence of Kitchener in relation to logistics during the South African War is illuminated in relation to specifically, the wastage of horses. Half a million were shipped in to South Africa, 66 per cent of which died. The complete disregard for the financial costs, Wallace quotes a soldier saying 'a horse was worth £40/-/-,' a

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[331] Wallace ibid p182

[332] Gammage, Bill *The crucible: the establishment of the ANZAC tradition, 1899-1918* in McKernan, M and Browne M *Australia: Two Centuries of War and Peace* the Australian war Memorial in association with Allen and Unwin Australia 1988

substantial sum on the face of it, a notional £13.2Million on the national debt at the end of the War. (The difference in debt incurred by Britain for the South African War and that of Japan for the Russo-Jap war was something like ten per cent.) The Dissertation by Stephen David Badsey, *Fire and the Sword…*[333] dealing specifically with the cavalry operations, the official incomprehension, fodder had to be shipped in, and supply maintained in the field. Horses from Argentina and Australia were unable to live off the spiky Veldt grasses. 'Dead horses scattered across the Veldt' became, a signature of the British Army operations. (Lloyd George in his memoirs after the Great War is quoted as saying "Kitchener could not even grasp the arithmetic required to estimate forward numbers of rifles required."[334]) It could be reliably deduced, observations by officers and men from colonial contingents spread throughout the Imperial forces were listened to on their return in relation to the measures that needed to be addressed in Australian defence.

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[333] Badsey, Stephen David *Fire and the Sword The British Army and the Arme Blanche Controversy 1871-1921* Dissertation for D Phil Faculty of History University of Cambridge Sidney Sussex College Sept 1981

[334] Cited in Ellis, John *The Social History of the Machine Gun* Rondom House, Pimlico London 1976

IMPLICATIONS FOR MUNITIONS

The inability of British industry to supply weapons and munitions to colonial military forces at the time of the Russian War Scare of 1885 had been recognised in the colonies. In the aftermath of that war scare, and with French and German expansion into the South Pacific we have seen how the Victorian Government; undertook production of small arms ammunition. The scientific and industrial infrastructure within which the latest explosives from Nobel's were being produced west of Melbourne for the mining industry was similarly considered.

An aside to weapons in the Boer War has to be consideration of Colonel W. D. C. Williams who commanded the New South Wales Army Medical Corp. He became the principal MO for the Australian and New Zealand forces and his deputy Major Fiaschi, was awarded the Distinguished Service Order. The unit left Sydney in 1899

> with six wagons and complete field equipment, including their own horses." [It will be recalled he was the R M O of the NSW force sent to Suakin in 1885 where as previously noted, the wagons he took were superior to those of the imperial forces.] On his return to Sydney from South Africa… he said, "Whatever virtue is claimed for our Corp is due to the Wagon Service." Emphasising that the unit followed Imperial Army methods and organization… "Our wagons are much higher [standard] than those of the Imperial Corps, and they are consequently far more mobile. The country we went through is as rough as you could find.

> … Another is that instead of depending on the Army Service Corps for drivers and horses, we provide our own. This relieves us of depending on other people; … I first noticed the drawbacks of the Imperial system when I went to the Sudan in 1885. I saw that the wagons were too heavy, and that difficulties were encountered when depending on the Army Service Corps; so when the NSW Corps was formed later on, I introduced what I considered to be improvements. The wagons were constructed of light tough wood, and steel from my own design, and if they will stand being galloped over South Africa, they will stand anything."[335] Colonel Williams had been praised for his outstanding competence as a Medical Officer, by a London war correspondent.[336]

An insight to the Commonwealth Government's early decision to manufacture woollen textiles, uniforms, and boots, harness and saddlery in Government factories are mentioned, but not explored by Ross, and Cain. After Christmas Day 1899,

> At Cape Town the equipment and uniforms of the contingents underwent a fair amount of change. Officers' swords were sent to store and the officers were issued with a rifle in the same way as every trooper.[337] Everything bright was removed or replaced with leather or dull khaki. The men were issued with Lee Metford magazine rifles. W. J. Lambie wrote: 'Our men are taking to the new magazine rifles like a new toy.' *They had also to overcome the problem of trying to squeeze into jackets that did not fit. At this time two-thirds of the colonial troops did not fit easily into the standard British jacket.*[338]

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[335] Wallace ibid p181/2

[336] Wallace p181 Footnote Julian Ralph, of the "Daily Mail" in his book *Towards Pretoria* published 1900

[337] John Gordon, a Company Commander in the 2/43rd Infantry Battalion AIF often mentioned to the author as a boy, 'Officers always carried rifles in New Guinea so the Japs would not identify them as different from soldiers…"

[338] Wallace, ibid p79 The implication has to be the soldiers had arrived either with no rifles, or had been issued with single shot .303inch Martini-Henry-Enfields in Australia. The later mention by Cain of the insistence of Australian soldiers on uniforms and boots being sourced from Australian during the Great War fits into context.

Discussing the fighting around Ladysmith R L Wallace illuminates the implications of design failings of British field guns.

> In an effort to overcome the long-range artillery superiority held by the enemy, White telegraphed for naval guns. These were two 15-pounder and two 4.7-inch guns hastily set up on improvised wooden carriages at the naval workshops at Simonstown. They arrived on 30 October by one of the last trains from the south. Although so few they were the only guns capable of reaching the enemy positions, thus giving the defence some parity with the Creusots. The use of these guns remained restricted because of the limited supply of shells and the field artillery was more or less powerless to reply to the Boers. [339]

Naval guns with their crews were to figure prominently in the artillery role during the War.

> The British field artillery, in Roberts's opinion, was inferior to the European in range and rapidity of fire. There were muddles over small arms and ammunition. Sixty million rounds manufactured at Dum Dum in India had to be withdrawn because they stripped in the rifle barrel.[340]

Over 200,000 Lee-Enfield rifles were found to have faulty sighting, firing eighteen inches to the right at 500 yards.[341] Field guns were purchased from Krupp for the

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[339] Wallace ibid p50 A number of references through the book in relation to their role and of naval officers who distinguished themselves.

[340] In the days of the infancy of machine guns, the tactics were established in the Russo-Japanese War of 1905, the enormous quantity of 60 million rounds of defective rifle ammunition makes the writer ponder, whether some of the Boer victories were analogous to the battles of the Indian Mutiny when the Brits were using Minie rifles and the Indians Brown Bess muskets…

[341] Barnett, Correlli *Britain and Her Army 1509-1970* Allen Lane The Penguin Press 1970 p342 Donovan M Ward *The Other Battle* 1946 a history of BSA makes remarks about "A problem pointed out to the War Office… Even Bisley Shots were

South African War… [342] By implication the appropriate shells would have had to be sourced from Germany – shades of the Franco-Prussian War!

Trebilcock[343] referring to the Boer War, remarks, that armaments firms working on export orders rejected urgent War Office munitions orders. The priority of export trade was more important! There is a single sentence in the *History of Ministry of Munitions* which refers to the, "Production of fuses had been a matter of special difficulty during the South African War, when supply from the trade had failed almost entirely.[344]" The British private arms industry, (in a preview of 1915,) displayed it's inability to manufacture and deliver munitions to maintain an enormous army in South Africa fighting hard Calvinist settlers armed with the best armaments Germany and France could supply.

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unable to hit the target…" Seems curious reading in 2008, a generation later Ward was unable to spell out the details.

[342] Many of the details relating to matters such as these are single sentences in major works. If there is, to quote David Edgerton, "A non-academic who has written an anti-history of army munitions…" this author has, despite extensive enquiries, been unable to identify either a work on the topic, or an academic interested in it.

[343] Trebilcock quotes a reference at the PRO which is so vast as to not be accessible without hiring professional archivists.

[344] *History of the Ministry of Munitions* Microform Harvester Press 1976 Volume I Ch V Components and Materials p49 Hist Rec/R/1122.11/19

A recent Land Warfare publication cites following federation, fifty-four (American) Colt Machine Guns on wheeled mounts being the 'total number of machine guns in the country.'[345] Wallace cites a Colt on a heavy wheeled mounting being used in conjunction with Maxims.[346]It is understood the South Australian contingent took a Colt with them… The guns obviously had been sourced from America, illustrating Australian resolve.

In Melbourne on the other hand, at the University, reverting again to Joan Radford,

> Naval, marine and military science were all discussed as university courses in 1906 and 1907. Military science had been in the air since September 1902, when Henry Edward Armstrong, at the Presidential Address to the BAAS, had awakened British scientists to the need for much better military education of its army officers. Their shortcomings had been revealed to the nation during the Boer War. The Science faculty rejected the move to add these studies to their already overloaded educational plate. It was to be almost seventy years before marine science was added to its courses.[347]

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[345] Stockings, Craig A J *The Making and Breaking of the Post-Federation Australian army, 1901-09* Land warfare studies Centre Canberra July 2007 P100 "In 1909 the Army also possessed ten 'Pom-Pom' guns and fifty-four Colt machineguns for the Light horse and Infantry battalions. Both however, required replacement as prohibitive costs forbade the maintenance of equipment no longer used by Great Britain.""

[346] Researching for another project the biography of a left-wing British officer Tom Wintringham *English Captain* London 1939 describing his activities in the Spanish Civil War there were some pages devoted to the Colt Machine Guns. Their complexity and their tendency to bend rounds such that they would not feed… Whether using the lower powered .303inch Marks of the early 1900's the guns were less susceptible to stoppages, is another question. The guns he was using were for the high-powered American .300 round.

[347] Radford, Joan ibid p80

POST SOUTH AFRICAN WAR

After federation in 1901, the Commonwealth government was accorded responsibility for defence from London. By agreement between the colonies to become federated states, the ramifications of outstanding state's debts became a matter involving the Commonwealth. Ensuring commerce, trade, and immigration flowed smoothly to the benefit of the whole country… The manufacturers' objective of a customs union had been achieved. A single national government could now enact tariff protection. The ideas of the German economist List, embraced by America and Germany, at variance with English liberal economic theories, advocated protection to enable new industries to be established. The political structure and economic policies were a prerequisite for the establishment of both national factories – arsenals – and the major steel and chemical industries upon which industrialisation depended.

The Australian public having rejected immigration from China, Japan and India observed the 1902 Anglo- Japanese alliance had secured British interests in Asia. Britain had been friendless in a hostile world at the time of the South African War three years earlier. The settler colonies had rallied to the Crown. Hard and self-

reliant men from what became the Dominions provided the British forces with troops the equal of the Boers in the field. The perception of being part of an empire potentially able react to aggression at the periphery with naval and expeditionary forces from the hub of empire at some future time, had considerable influence on Australasian colonial and Canadian attitudes and actions to support the empire.

The perceptions that Australian "national" interests able for the first time to be voiced by a unified, but unarmed government was an uneasy one.[348] Despite the two-power parity maintained by the Royal Navy with (nominally) France and Russia, it had effectively withdrawn both from the Far East and the Western Hemisphere.

In the context of imperial strategy, Canadian military preparations likely to antagonise the Americans were discouraged. Appeasement of the United States, by both Britain and Canada was seen as the most realistic and appropriate defence policy. Anglo-American links were demonstrated by Britain blocking the Spanish squadron (of equal size to the U S Navy fleet in the Pacific,) en route to the

[348] Stockings ibid p100 "Only a few magazine Lee-Enfield rifles were available in Australia at Federation. Although this number grew to around 48,000 by 1909, the total was still well below the number required and 28,000 of the new weapons did not have bayonets. As far as ammunition for the rifles was concerned, in 1901 there existed only 9million rounds across the country, about two fifths of the number there should have been. Despite this shortage, by 1909 neither the small arms factory at Lithgow nor the cordite factory at Maribyrnong was in operation."

Philippines at the Suez Canal. During this period before 1914 English writers, and political thinkers moved to establish common ground at all levels with the Anglo-Saxon power across the Atlantic. A digression follows which weaves together informal British methods, and the shortcomings of technology for the growing might of the American Navy – not immediately apparent in the tables of the later Janes' books on the navies of the world – and as The Great War was to demonstrate, the balance sheets of tonnages and armaments of navies did not necessarily translate into a decision.

Percy Scott had been a serving RN officer who left to join Armstrong's to pursue his inventions, he was later brought back into the Royal Navy, and as follows, shared technical information for no direct personal benefit.[349] It was Scott who took a young Lieutenant Sims USN in hand in Hong Kong and shared all his knowledge of gun-laying at sea. Prior to that discussion, despite the huge ranges of naval ordnance the rolling motion of ships meant their effective range was point blank, a few thousand yards.[350]

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[349] McNeill refers to Scott being adamant about his royalty payments from the Admiralty. This sharing of his knowledge, there seemed to be a drill the gunner raised or lowered the gun in context with the pitch of the ship …

[350] Smith, Professor Merritt Roe *Military Enterprise and Technological Change* MIT Cambridge MA 1985 Chapter by Susan Douglas on Radio and the USN, makes mention of Sims efforts from Hong Kong to change the Bureau thinking with the Naval hierarchy. Interesting in that William H McNeill refers to Admiral Scott

> Sims first came to the attention of the nation as a persuasive advocate of improved gunnery in the fleet. During the War with Spain, despite the success of Admiral Dewey at Manila Bay and Admiral William T. Sampson at Santiaga de Cuba, the shooting of the navy had proved woefully deficient. For example, Dewey's ship fired 5,859 shells but made only 142 hits, as success rate of only 2.42 percent. While serving in the Pacific after the war, Sims became acquainted with the gunnery reforms that Sir Percy Scott had initiated in the Royal Navy. Forceful, even overbearing in manner, Sims fought effectively for the adoption of Scott's methods in the U.S. Navy as inspector of target practice from 1902 to 1909. More an advocate than a creative intellect, Sims did not add much to Scott's techniques; his energies went toward breaking resistance to changes in the fleet.[351]

As a nation, Britain benefited from Scott's gestures, years later. Sims headed the U S

Navy Mission in London during The Great War unsuccessfully advocating an

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demanding the royalties on his inventions used by the British Government. The ideas and technical thinking he shared with the younger American officer are an example of "practical" British diplomacy. A century later there is a formal structure, the ABCA Pact…

[351] Bradford, James C *Admirals of the New Steel Navy: Makers of the American Naval Tradition 1880-1930* Naval Institute Press Annapolis Maryland 1990 page 285 An interesting observation. The biographical study written by an American author clearly highlights the "dogma of the battleship" over-riding Sims and the realities of naval anti-submarine vessels urgently required to maintain allied merchant shipping convoys in the darkest days of the War. The "dogma of strategic bombing" in the next War it required American presidential authority to over-ride Bomber Command, and divert bombers to anti-submarine operations. (Paper by Blackett.) The losses of materiel due to submarines sinking merchantships was vastly more costly to the war effort in both wars than the indifferent early achievements of battleships and of the later aerial bombing. In the context of modern alliances the history of competent officers on the spot being ignored by the higher reaches of command in Washington in previous wars must be an encouragement to younger generations of allied General Staffs.

emphasis on anti-submarine operations to protect convoys supplying the allies, and thus becoming identified as Anglophile. He was at variance with the high level perceptions in Washington, that more battleships were needed in case the Allies lost and the German navy sailed west...

Within this timeframe, returning to Australia as the Commander of the newly constituted Commonwealth Military Forces General Hutton had again become prominent. His obsession with seeing Australia in the terms of an autocratic Indian principality - technically independent, but responding to 'guidance' from a political officer from the Raj - failed to mesh with reality. One of his ideas for an early expedition for Australian forces was, that of sending mounted infantry[352] to assist the Japs in the Russo-Jap War… There is mention in the literature of large numbers of Boer War veterans offering to no avail, their services as volunteers to the Japanese Consulate in Melbourne. Had the formerly dominant political and economic class of pastoralists still been a force after federation, the proposals of General Hutton might have been quite acceptable. As "a class" they looked to common interests with the establishment "At home," ahead of coastal urban populations carried by their export earnings from "The sheep's back…"

[352] Mention is made by Moredike of mounted infantry veterans from the Boer War offering their services to the Japanese Consulate in Melbourne.

The defeat of the Russian fleet at Tsushima in 1905 at the hands of the Japanese was a portent. Although recognised by the Kaiser as, "The Yellow Peril,"[353]he ignored the foreign policy opportunities for exploiting it. And, in a July 1907 interview, "He characterised England as a traitor to the white race for allying with Japan…"[354]

Ties of blood, religion and money were manifested in loyalty to the crown. Australian Prime Ministers travelled to London for Imperial Conferences at two-year intervals. With ties to the crown, and an alliance with Britain notwithstanding, pragmatic and decisive Australian Commonwealth governments in the context of threats from maritime powers, and access to money in The City, established a national navy.[355] This was in contrast to an equivocal Canada.

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[353] Offer, Avner *The First World War: An Agrarian Interpretation* Clarendon Press Oxford 1989 p212

[354] Esthus, Raymond A *Theodore Roosevelt and Japan* University of Washington Press Seattle and London 1966 P258

[355] In *The Collapse of British Power* Correlli Barnett suggests that Billy Hughes followed the lines of thinking of the eighteenth century Englishmen who founded the empire… Unlike those educated in "Good schools" during the nineteenth century. The contrast between the Labor politicians and the others may not be simply in terms of "nationalist" as Mordike suggests, but more fundamental, with realistic ideas which had not been expunged by "evangelical" school masters obsessed with a "classical education."

Australia recognised, and shared common strategic realities about Japan, with Canada, and the U S A. 'National responses' predicated the first independent foreign and defence policy decisions of the two dominions. The Prime Minister of the newly federated Commonwealth invited the "Great White Fleet" of the United States Navy to visit Australia. This 'national' political response was in the context of a tangible threat of war between the United States and Japan in the Pacific. (The Anglo-Japanese naval treaties expressly stated that Britain could not become involved in the event of Japanese hostilities with the Americans.) Essentially the threat arose from anti-Japanese riots in San Francisco. The "jingoe" newspapers in both countries began a war scare. While maintaining close diplomatic links and friendly official ties with Tokyo, Roosevelt saw an opportunity to secure his naval shipbuilding programme with Congress. Sending the battleship fleet to the Pacific was a gesture. The Pacific was not to become a Japanese lake… Underwritten by Japanese entente naval treaties with all maritime powers except Germany and the United States.[356] The Royal Navy had withdrawn from the Western Hemisphere, redeployed to the North Sea, but America was now asserting her naval power in the Pacific.

[356] Esthus *Theodore Roosevelt… ibid*

There had also been anti-Asian riots in Vancouver, where, unlike California, the Japs and Sikhs had given the rioters a rough handling. A civil servant, William Lyon MacKenzie King was sent to Vancouver to conduct an official enquiry into the riots. His subsequent dealings with President 'Teddy' Roosevelt, was the commencement of the dominant political role he was to assume later in Canada as Prime Minister. His immediate elevation to official travels to London, (where he was accused of being, "…another ambassador for America,") and immediately afterwards to Asia, may have had greater historical importance than a visit by the United States Navy to Vancouver. Canada declined to invite the American battleship fleet to visit.[357]

THE AUSTRALIAN NATIONALIST INDUSTRIAL RESPONSE - SMALL ARMS AND AMMUNITION MANUFACTURE

Colonial forces had been sent to the Boer War with the Commonwealth taking over responsibility for the units after federation. As had happened in the 1885 crisis, the supply of munitions from Britain to Australia was similarly restricted. The implications of what is described as the "First Munitions Crisis" at the time of the South African War, during the British Climacteric of the late 1890's led to a hard-headed and pragmatic Australian analysis of political, military and industrial options. Australian officials and politicians comprehended, that reliable domestic sources of

[357] Esthus *Theodore Roosevelt… ibid*

munitions production had to be established, for reasons of autonomy, finance, control of quality, and output.

Nationalist, but intuitive decisions reached by Australian colonial political leaders displayed a high degree of accurate insight[358] in their perceptions (which they shared in common with the West Coast populations of California and British Columbia,) that a new "Island Empire" was rising in the northern Pacific. The debacle of both the British Army and munitions industry in the Boer War and financial implications arising was followed by the ascendance of Japan in North Asia. The alliance with Japan in 1902 enabled that country to go to war with Russia in 1904. Japan defeated a European power on the Eurasian landmass deploying an army that was as large as that which Britain and the white empire committed to the South African War. It had an expanding navy and, within years of the battle of Tsushima, a million trained men able to be mobilised. The Australian links with the Crown and Britain, in the context of the threat from Germany enunciated at Imperial Conferences some years after the Boer War, converged with "The Yellow Peril" to become the stimulus for Australia to establish autonomous munitions production, and naval shipbuilding.

[358] Comparing the histories written in the author's generation with access to Cabinet documents of the day, reviewing the insight of colonial politicians you could observe, in the context of national survival they were using second sight.

Dependent financially and commercially on the metropole, during the period 1905 to 1911 key national strategic objectives of autonomous production of armaments and shipbuilding drove industrialisation of the self-governing dominion within the framework of what was for the Commonwealth of Australia, an imperial alliance.[359]

It has been previously noted the Victorian Government underwrote the establishment of a private firm to produce small arms ammunition working through a contract structure, and this continued under the Commonwealth until after the Great War. But as part of the military concerns of the day, a Defence Scientist was appointed in 1907,[360] Cecil Neville Hake formerly the Chief Inspector of Explosives for Victoria. It was accepted that since cordite required as a propellant for all munitions could not be stored for long periods with safety, it was imperative to undertake manufacture in Australia. While the proximity to plentiful supplies of water is mentioned, the tangible realities were, the ammunition factory was in Victoria, as was the industrial infrastructure. The University of Melbourne Chemistry faculty and the Schools of Mines at Ballarat and Bendigo underwrote the abilities of a scientifically articulate workforce to run such an operation.

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[359] The title of Holland's book, *Britain and the Commonwealth Alliance*… describing the later interwar period is the basis of this remark.

[360] Forthcoming history of *A Century of Defence Science in Australia,* Peter Dougherty.

The decision was made to establish a cordite factory at Maribyrnong. Hake on a visit to England interviewed A E Leighton on leave from India for the position of manager of the new arsenal, and appointed him in 1909.[361] Leighton was able to successfully establish cordite manufacture in Australia, before returning to England during the War. After the War, he became the father of Australian industrialisation by drawing on the resources of over 100 chemists who volunteered to travel to Britain to work on explosives in the Ministry of Munitions during hostilities.[362]

Immediate and substantial numbers of modern rifles were required in a situation of large numbers of soldiers were to be raised.[363] The shortcomings of British industry

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[361] Proceedings of the Royal Australian Chemical Institute Kelvin Hall 55 Collins Place Melbourne Volume 21 1954 p2

[362] A E Leighton in directed his chemists to collect any technical data about whatever industrial process they were in the proximity of, and send it to an Australian office in the Strand where it was collated and forwarded to Australia. The context is Argentina after 1945, owing to political differences with the Americans during and after the 1939-45 War industrialisation required refugees with the knowledge to be integrated into enterprises to tackle the topic. The imperial alliance bypassed such possible difficulties for Australia.

[363] Moredike ibid p187 Describes Deakin proposing a training scheme… to raise an army of 200,000 men. "Each infantryman – about three quarters of the total force – would be equipped with a rifle, a bayonet and scabbard. 'We have satisfied ourselves, after careful enquiry,' Deakin continued, 'that they can be made here cheaper than they can be purchased abroad.' It was planned to commence manufacture at the rate of 20,000 rifles each year. Infantrymen would also be equipped with a sling, a water bottle, a great coat, a blanket, a waterproof sheet, mess tins and a haversack. 'All these will be made locally,' Deakin announced. … There

in small arms production methods and machine tools was identified by Engineer-Commander Clarkson whom the Minister for Defence and the Secretary of the Department engaged to look into the topic. As a result, the government decision was made to buy American machine tools to establish the Lithgow Small Arms Factory from the leading American machine-tool firm, messrs Pratt and Whitney.[364]

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would be an ammunition factory, a cordite factory and possibly a rolling-mill to manufacture cartridge cases. A general staff would also be established…"

[364] Jensen, J K *Defence Production in Australia – 1908 -1914 Chapter 2 Establishment of Munitions Factories (Continued) The Small Arms Factory, Lithgow, New South Wales* – [Nota Bene – the ARL Iibrary within the DSTO holds a loose leaf copy of the complete manuscript.] A careful reading of the archival material by Jensen raises some appalling implications. Pratt and Whitney having produced the tooling undertook a sample run of rifles to demonstrate this turnkey factory could produce the rifles as per the contract. The sample rifles could not fit together owing to a unique measurement used for the drawings. "The Enfield inch!" A C Wright the engineer-in-charge was a second-generation tradesman who had done his apprenticeship at the Royal Small Arms Factory, before emigrating. That he successfully reverse-engineered the appropriate number of rifles from the six sealed pattern rifles sent with the drawings is known. Within five years the War Office was; buying rifles from Japan, and required to redesign the P13 .276 rifle which was tested unsuccessfully as a replacement for the SMLE. [This lack of success was indicated by rifles blowing up during rapid fire.] The source for this is *History of the Small Arms School Corp 1972* by Major Frederick Myatt MC held in ADFA Library. Vast quantities of .303 ammunition sourced from Japan had their characteristic hard brass which had been responsible for the extractors of their Hotchkiss machine guns in the Russo-Jap War being ripped off. [Pridham complains about this Jap ammunition continuing to be used in the post-War British Army.] Despite the .303 P14's shortcomings, its manufacture in the USA was undertaken. Remington Arms were handed to job to convert the P13 to .303, and undertake its manufacture. It is quite clear from *The History of the Ministry of Munitions,* the reality the Lee Enfield

From the 1911 Imperial Conference onwards, planning in earnest was undertaken in the Dominions in the belief a major continental war was looming. Imperial conferences exploited fears of Japan and the decision to establish the Small Arms Factory to manufacture rifles in Australia fitted in with War Planning in London. But the purchase of advanced mass-production factory plant from America instead of specialised tooling from obsolescent British industry may be described as radical. This decision in 1909 to undertake production of the Short Magazine Lee Enfield is interesting in that it seems to have been undertaken and implemented without procrastination, literally two or three years before the War Office made their decision to place the same rifle into production.

The shortcomings of the Magazine Lee Enfield experienced during the Boer War had been addressed with no effort or expense spared, in the following years. The Australian authorities made the decision to adopt and produce the resulting Short, Magazine Lee Enfield Rifle. The SMLE was in operational use in the Australian forces until, effectively, the late 1950's.

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as evolved, could not be manufactured in America is clear evidence, there was no institutional comprehension of the Australian experience.

The War Office had not made a formal decision to go ahead with the Short Magazine Lee Enfield with the new Mk VII ammunition until the Morocco crisis of late 1911. The testing of the .276 rifle was still in progress and the decision to purchase the new Vickers guns instead of buying a few of the old Maxim guns a year was held over on the grounds, the army did not know what calibre they were to be required in.[365]

After the W O decision was made to place the S M L E into production, overtime was not authorised. It was intended, full issues of rifles would be effected throughout the Army by 1915…

> Britain was so short of military rifles in the early months of the war… And 20 years of German trade warfare had reduced this country's armaments industry to a skeleton:[366] Was the statement of an anonymous author of the BSA Centenary issue of their in-house newsletter in 1961. …in the early months of the war… recruits drilled with wooden dummies.[367] The overwhelming disaster of the [British] Munitions Crisis in 1915 had implications for Australia. It is indicated in a number of sources that guns in France were only permitted four rounds each per day…[368] Shells exploded in the barrels.[369]

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[365] Bidwell, Shelford & Graham, Dominic *Fire-Power The British Army Weapons & Theories of War 1904-1945* Pen and Sword Military Classics First Published by Allen and Unwin 1982 p54 It is effectively from these two writers the story come together, details of the P13 .276 rifle blowing up during rapid fire seems only to be documented in *A History of the Small Arms School* upon which these authors relied.

[366] BSA Group News, No.17 June, 1961 Published by the Birmingham Small Arms Company,… Birmingham p17

[367] ibid

[368] Peden G C *British Rearmament and the Treasury: 1932-1939* Scottish Academic Press Edinburgh 1979 p 25

This collection of quotes is a postscript to the success of the joint-stock banks effectively over Joseph Chamberlain and the political indifference to the British engineering industry in Whitehall, compared with Melbourne.

Evolving an industrial base to undertake munitions production and shipbuilding relied on ongoing trade and financial ties with Britain. National development, and autonomous armaments decisions proceeded within the "Imperial alliance." The previously quoted remarks of Meaney in relation to Australia's political leadership of the day are in the foregoing context, 'modest.'

[369] Barnett, Correlli *Britain's Army* – these observations are not prominently spelled out within the literature. The case in point – what student of technology would consult Peden to specifically find details specified above. For example, 'a sentence' in another work refers to, one of the six? 8 inch guns was destroyed when a shell exploded in the barrel…

CONCLUSIONS

In a speech delivered in Melbourne in 1943, Sir John Jensen attributes to Sir Frederick Sargood the propounding of the ideas and drive which established a foundation for munitions production in the next century, within the frameworks of the Victorian bureaucracy, industrial, scientific, and financial circles, He was influential in pushing for an Australian navy.

> "The Commonwealth assumed responsibility for defence from 1901 but it was not until 1910 that the government found itself with increased revenue – resulting from the termination of the Braddon clause – to embark on heavy defence expenditure…"[370] [Frank Cain makes the point,] "On federating there was an agreement. The states were to be given a substantial and dominant share of tax revenue for a number of years. The balance accrued to the Commonwealth. At the expiry of that agreement, the Commonwealth reversed this proportion and retained that money to finance defence expenditure. The states were powerless."

The nationalist and may it be suggested, socialist ideas of publicly owned factories were unquestioned politically as the Commonwealth established national shipyards and munitions factories to make the young nation self-reliant, able to equip armed

[370] Cain Frank *Arming the Nation" A History of Defence Science and Technology in Australia,* Australian Defence Studies Centre, University College ADFA Canbera 1999 p1 And conversation with author February 2005

forces with basic infantry weapons[371], ammunition, and associated stores largely from local resources. There was public acceptance of public expenditure to counter the business cycle at least a generation before Keynes, gave Australian governments a socialist tinge in London financial circles.

> " Elements other than socialism also brought discredit abroad to the Australian governments. One of these was the nationalism of the early years of the Commonwealth. In 1902 "The Economist" considered that as a result of is 'intemperate references to France' with regard to the New Hebrides, the outrageous attempts to tax ships' stores, the offence to Japan given by the Immigration Act, and the abuse to Britain for its 'reluctance to unquestionably champion Australian so called rights and aspirations', it would be a long time before the bad impression created by the first twelve months legislation of the Commonwealth would be effaced."[372]

Correlli Barnett's observation of Billie Hughes with the outlook of an eighteenth century Englishman before such ideas were educated out of the more dynamic members of that community during the next century, tends to suggest, he was characteristic of the national outlook in the new Dominion, which we may observe, did not last a generation beyond him.

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[371] J K Jensen appointed at that time to be the accountant for the Small Arms Factory, Lithgow and sent to America for training, remarks in a speech delivered in 1943, the Defence Minister had urged him to read, *The Valor of Ignorance* by Homer Lea. Given the book predicts the scenario of invasion and conquest carried out by Japan in the late thirties, Australian politicians were prescient. Roosevelt was at this time, accepting the Philippines could not be defended against Japan…

[372] Hall A R *The London Capital Market…* p182 footnote 95 *The Economist* 1902 p162

Following the Imperial Conferences before the Great War, decisions were made by the Commonwealth of Australia to establish a navy. The production of steel and munitions was to be undertaken in Australia. The acquisition of a national fleet both purchased and, with the establishment of local shipbuilding, was a testament to political determination, plus the long-standing Australian public financial probity within London capital markets. "Australian governments, without distinction of party or person, were aware of their peculiar geo-political circumstances and within the formal framework of the British Empire they evolved consistent, cohesive and comprehensive defence and external policies to provide for the security of their own country."[373]

Following what might look to be parallel strands of history, the access to money in itself does not enable a dependent nation to industrialize. Gold in Victoria was perhaps the first and most important windfall to fast-track urbanisation and the growth of light industry. From this, the finance was available to float the Broken Hill and other mining companies in the late 1880's.[374] Discoveries of coal, iron and other

[373] Meaney ibid p1/2

[374] Hall A R *The London Capital Market and Australia…* p113/4 referring to shares in mines "…it was most unusual for the best Australian mines to be offered in London. Most of the leading Australian mines could only be bought in the first instance by purchases on the Australian Stock Exchanges – a process which was

minerals ensured that only management and determination were needed to establish industry. Australia was, with clear and explicit objectives, able, by military and industrial ties with the United Kingdom, to gain access to the latest industrial research and technology.

> The contrast between British and German industry was the reliance upon universities.
> "There was no compelling reason why Britain in 1913 had only nine thousand university students compared to almost sixty thousand in Germany… why Germany produced three thousand graduate engineers per years while in England and Wales only 350 graduated in all branches of science, technology and mathematics with first- and second-class honours, and few of these were qualified for research."[375]

An insight to scientific opinion attributed by Joan Radford to Orme Masson (Professor of Chemistry at Melbourne University) in this period is useful.

> ""Masson announced the declaration of war with Germany at a chemistry lecture. … Yet to Masson, more than to most Australians, the

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facilitated in the early nineties by the movement to London of a small group of Australian brokers. Only a well-informed mining speculator would have been able to carry out these operations successfully. Apart from these purchases the shares of the best mines remained in Australia. In each Australian colony there was a large group of local investors interested in mining companies who were much better able to judge the bona fides and value of Australian mines than were British investors. It was only on rare occasions they allowed a sound investment to slip through their fingers and reach London. That this was so is not surprising when we remember that the best provincial companies in Britain were rarely offered in the first instance in London even at the end of our period." [1914] The last sentence underwrites the explanation of why Joseph Chamberlain failed to obtain support from the financiers in London over his proposals.

[375] Hobsbawn *Industry and Empire…* p153

> implications of the war in terms of death and destruction must have been very clear. He was among those British scientists who for years had been urging, persuading and berating industrialists and government to use modern scientific methods to improve the output and efficiency of all industry, primary and secondary, and close the gap between achievement in Germany and *At Home.* He knew the advantage better manufacturing industry had conferred upon the Germans in the production of all weaponry, high explosive and metallurgical, and could foresee the carnage ahead."[376]

In 1914 Australians accepted that if Britain was at war, so were we. The extant Commonwealth munitions factories met significant military requirements during the War. Manufacturing for import substitution was not simply an opportunity. Given the problems of supply and shipping from overseas suppliers - predominantly Japan[377] which dominated both price and availability - it was a national imperative. In 1915 all German investments, in lead and zinc were eliminated to the benefit of the Australian companies who took over the investments and operations. Britain was thus able to secure a substantial proportion of her requirements and, obtained a bargaining counter against other suppliers on the world market.[378]

BHP expanded to concentrate on a vertical integration of the production of; coal, iron ore, and steel production to supply much of the steel requirements of Australia.

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[376] Radford, Joan ibid p 102-3

[377] See Sissons, Donald Carlisle Stanley *Attitudes to Japan and Defence 1890-1923* thesis 1956 http://eprints.unimelb.edu.au/online/00000295/

[378] *History of the Ministry of Munitions* Harvester Press Microform 1976, chapter dealing with Australia

Owing to excellent quality and prices, the firm was able to export steels for munitions to Britain and significant quantities of rails to South Africa and France.

During the War, the takeover of German interests in lead and zinc production resulted in the dominant position of the Collins House Group. Presumably these metals were a significant proportion of the export surplus from Australia, which in concert with similar exports of raw materials from India had for many years underwritten the chronic British trade deficits for manufactures and chemicals from Germany.

Referring to the commercial history of the Melbourne based mining group which took over lead and zinc production on a world scale, Cochrane tells us, "Collins House was compelled into a strategy for the centralization of its capital and the consolidation of markets abroad to beat off competitors."[379]Size and financial power enabled these companies' to exploit the flux of wartime, their own government's requirements, and the demise of the German quasi monopoly for smelting lead. The three firms comprising the Collins House Group, North Broken Hill, Broken Hill South, and Zinc Corporation bought into smelters at Port Pirie, "… and then poured

[379] Cochrane, Peter *Industrialization and Dependence Australia's Road to Economic Development…* UQP 1980 Ch 5 the Collins House Empire

money and skill into their development."[380] One assumes the University of Melbourne chemistry graduates dominated this process.

> It was, however, the political leaders alone who were responsible for the shape and character of Australia's first defence and foreign policy. In their attitudes to international affairs the Australian statesmen were narrowly self-interested and generally indifferent to the wider issues of peace and war, and their analysis of international relations, though for the time in fundamentals of 'fair and reasonable', was often expressed crudely and couched in the language of racial intolerance. Yet in the carrying out of the first function of a nation's external policy, namely the safeguarding of its citizens and territory, the Australian achievement will stand comparison with many other countries which had all the advantages of a full and independent international status.[381]

Writing a century beyond what is described above, the parallels appear quite obvious. A new age of liberal dogma, of globalisation, free trade, economic rationalism, have on the face of it, brought Australia full circle to where it was a century ago. Whether there is a current direct external military threat to the country is unclear. What is clear, the manufacturing and industrial base, much less the political and social will to enable the nation to substitute many imported items with local production, whether for defence requirements or for normal goods is no more. The ideas of 'economic nationalism' and going it alone with strategic industries seem

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[380] Cochrane ibid p77

[381] Meaney, Neville *The Search for Security in the Pacific, 1901-14* Sydney University Press, Sydney 1976 P13/14

(with the exception of shipbuilding) obscured by what may be an artificially buoyant currency, for which accurate knowledge of exactly why it is at such a level is not apparent.[382] New technologies and new challenges have overtaken the country. But in contrast with a century ago, there does not appear to be a common outlook or acceptance that serious issues of technology and national interest, as opposed to 'politically correct populist issues,' need to be planned for.

[382] Conversations with Associate Professor Richard Leaver early 2008

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