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Ian Bellany and James L. Richardson

Australian Defence Procurement

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This is the first study ever undertaken of the policies of Australian governments towards the acquisition of weapons for the armed forces. The growth of the Australian defence budget in recent years and the burgeoning cost and complexity of modern armaments have made this subject of considerable interest, not only to those who plan and carry out the policies, but to all concerned as to how a large slice of national income is being spent.

The study covers the period from the early fifties to the present day, but naturally lays emphasis on the much expanded defence purchases of recent years, including the F-111. Future prospects are examined and, in particular, there is a discussion of the chances for success of the new philosophy of greater Australian self-sufficiency in defence *matériel*.

The tables of expenditure collate for the first time figures derived from a variety of published sources, some rather obscure, in an attempt to present a detailed continuous picture of the shape of Australian defence spending.

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CANBERRA PAPERS ON STRATEGY AND DEFENCE

Ian Bellany is the author of *An Australian Nuclear Force* (1969) and James L. Richardson is the author of *Australia and the Non-proliferation Treaty* (1968), Nos. 4 and 3 respectively in this series. James Richardson is also the author of *Germany and the Atlantic Alliance* (Cambridge, Mass., 1966).

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Australian Defence Procurement

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AUSTRALIAN DEFENCE PROCUREMENT*

THE rapid increase in the research and development costs of advanced weapons systems is greatly reducing the ability of European states to develop their own systems, even where the skills and technology are present to a far greater extent than in Australia. The United States, with its much larger orders, can spread the research and development costs more widely. A European government must look to extensive export sales, a precarious basis for sustaining costly defence industries. The trend, then, unless European collaboration becomes far more effective, is towards a decline in the number of states capable of producing advanced weaponry.

In the late 1960s the extent of Australia's overseas defence purchases has come to be the major issue in the procurement debate, inevitably

* The most substantial study to date in this area, *Defence, Technology and the Western Alliance*, undertaken by the Institute for Strategic Studies, is mainly concerned with Western Europe's problems, in particular Europe's chances of remaining a producer of sophisticated weaponry. The study brings out the global context in which Australia's quite different problems arise. It was published by the Institute as six separate studies in 1967. For previous accounts of Australian defence procurement see T. B. Millar, *Australia's Defence* (Melbourne, Melbourne University Press, 1965), chapter 5, and H. G. Gelber, *The Australian-American Alliance* (Harmondsworth, Penguin, 1968), pp. 34-9.

dominated by the lengthening shadow of the F-111. There is little awareness of the experience of weapons procurement in the postwar period as a whole, due to a lack of relevant studies and the considerable secretiveness of Australian governments on defence matters. Consequently, the main features of Australian defence procurement since 1950 (data on costs, in particular) are incomplete and have had to be pieced together from a number of different sources (see Tables 1 and 2).

SOME GENERAL CHARACTERISTICS

DESPITE a few notable achievements in research and development, none of the major items of current Australian defence equipment (warships, tanks, and combat aircraft) is wholly Australian in origin. The extent of the Australian contribution to their design and manufacture ranges from substantial conversions carried out on the U.S. F-86 Sabre aircraft, including a partly redesigned fuselage and the substitution of a British for the original American jet engine, to the 'off-the-shelf' purchases of British tanks (Centurions) and American guided missile-armed destroyers ('Charles F. Adams' class).¹ Between these two extremes, licence-building of British, French, and Italian aircraft with small modifications to the original design, and the construction by Australian shipyards of 'Daring' class destroyers and 'River' class (formerly Type 12) destroyer escorts, with small but significant design and armament departures from the original British 'Daring' and 'Type 12' classes, have since the end of World War II given work to Australian aircraft factories and naval shipyards.

A feature of the aircraft sector is the tendency for equipment to remain in front-line service with Australian forces for longer than in other advanced countries. Australia is one of the few countries that continues (1970) to have Canberra light bombers in its inventory of front-line combat aircraft:² and the subsonic Sabre fighters were removed from front-line service only in 1969. Both of these aircraft first appeared in their original design before the Korean War (the Canberra flew for the first time in 1949, the Sabre in 1948) but the Australian-built versions did not enter service until 1954 and 1956 respectively. The Canberra deliveries were spread over the period 1953-60 and the Sabre from

¹ These have, however, been fitted with an Australian anti-submarine missile (see p. 7).

² A squadron of Canberras is on active service in Vietnam (Commonwealth of Australia, *Defence Report 1969*, p. 38).

TABLE 1* Overseas Spending

	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6	1966-7	1967-8	1968-9
(a) Overseas spending† on defence equipment (\$A millions)	53.2	59.7	66.9	110.0	110.8	130.6	106.7	170.8	n.a.
As a percentage of total procurement spending	47.1	51.6	52.7	59.0	55.4	53.9	44.1	57.4	n.a.
(b) Value of equipment purchased through borrowing from U.S. Credits† (\$A millions)	—	—	—	—	—	—	18.1	32.4	15.7
Navy	—	—	—	—	—	—	14.2	15.6	13.8
Army	—	—	—	—	—	—	53.2	80.9	61.0
Air Force	—	—	—	—	—	—	85.5	128.9	90.5
Total	—	—	—	—	—	—	—	—	—
(c) Actual repayments of borrowings from U.S. Credits (\$A millions)	—	—	—	—	—	—	1.3	20.6	48.2
(d) Value of orders placed with Department of Supply from overseas for defence equipment (\$A millions)	2.8	3.0	1.6	5.7	2.6	3.4	5.1	n.a.	n.a.

* Official defence statistics are strewn with pitfalls for the unwary. In particular care must be exercised here when dealing with R and D spending since 1965, and with spending from the U.S. Credits, which began in 1966-7. R and D totals as they appear in Department of Supply statistics have, since 1965, included the U.K. contribution to Woomera as well as the Australian, and official defence statistics since 1966 (e.g., *C.P.D. (H. of R.)*, 26 November 1968, p. 3285 and 5 November 1968, p. 2463) have, in accordance with normal government practice, usually combined the amounts withdrawn from the U.S. Credits, which are loans, with actual spending, thus causing the defence total, and its fraction spent overseas, to appear larger than the actual expenditures in the year in question. We have followed this practice in Table 2 while identifying the U.S. Credit procurement content in Table 1.

† Does not include spending from U.S. Credits but does include interest and principal repayments on the Credits.

‡ Between 1965 and 1967 the Australian government entered into various agreements with the United States government whereby the Export-Import Bank of Washington agreed to finance payments to the U.S. Department of Defense and other suppliers of defence equipment and services. In 1965 Australia arranged a credit of \$U.S.350 million repayable over seven years at 4½ per cent per annum, in 1966 \$U.S.20 million repayable over 5 years with interest at 5½ per cent and \$U.S.80 million repayable over 5 years at 4 per cent per annum. In 1967 additional credits were obtained: \$U.S.110 million repayable over 7 years at 4¾ per cent, \$U.S.14.7 million repayable over 5 years at 3½ per cent, and \$U.S.35 million repayable over 5 years at 4 per cent. At 30 June 1969 Australia owed \$U.S.294.4 million under the agreements.

Sources: (a) *C.P.D. (H. of R.)*, 26 November 1968, p. 3285. (b) and (c) *Reports of the Auditor-General, 1965-9*, (d) *C.P.D. (H. of R.)*, 14 August 1968, p. 209.

Note: Rows (a) and (d) include as defence equipment items such as clothing, fuel, and medical supplies which are not normally counted as items of military procurement.

TABLE 2 Defence
(All costs, except where stated)

	1950-1	1951-2	1952-3	1953-4	1954-5	1955-6	1956-7
Army							
Weapons, ammunition, communications, transport and engineering, clothing*	10·8	35·8	52·4	30·4	36·8	32·8	28·2
Army procurement <i>excluding</i> clothing, etc.							
Navy							
Aircraft, armament, ships, electronics, electrical stores	10·7	26·8	34·0	34·2	39·6	37·8	22·4
Air Force							
Airframe, engines, armament, aircraft, communications	21·4	40·6	44·6	41·0	41·2	42·8	42·4
Defence R and D (i)†	1·8	2·2	2·4	3·4	3·6	4·4	4·2
Defence R and D (ii) plus Australian spending on Joint Long Range Weapons Project at Woomera	13·6	14·0	15·2	16·8	19·8	23·8	23·4
Total procurement including R and D (i)	44·7	105·4	133·4	109·0	121·2	117·8	97·2
Total defence	207·2	340·2	432·0	357·2§	357·6§	383·2	379·4
R and D (i) as percentage of defence (excludes Woomera)	0·9	0·6	0·6	1·0	1·0	1·1	1·1
Procurement as percentage of defence	21·6	31·0	30·9	30·5	33·9	30·7	25·6
GNP (market prices) \$billion	7·2	7·7	8·4	9·0	9·7	10·6	11·5
Defence as percentage of GNP	2·9	4·4	5·1	4·0	3·7	3·6	3·3

* Clothing and medical supplies are not normally considered procurement items and we have omitted them from the Navy and Air Force figures, but published data are insufficient to allow us to follow the same procedure with respect to the Army over the whole period covered by the table.

1954 to 1961.³ While then the individual aircraft are not exceptionally old, their basic design features, allowing only for subsonic speed and limited pay loads, have classified them apart from most modern military aircraft for virtually a decade. (Later generation aircraft, the F-104 Starfighter and F-4B Phantom, were delivered to the U.S. Air Force in 1958 and 1960 respectively.)

This pattern had already been established by the predecessors of the Canberra and the Sabre. The Lincoln bomber, the basic design of which dated from 1941,⁴ was not entirely displaced by the Canberra until

³ The decision to equip the RAAF with these aircraft had been taken in 1950.

⁴ It was derived from the Lancaster Bomber which was first delivered to the RAF in 1941: the Lincoln went out of service in Australia as a maritime reconnaissance aircraft.

Procurement Spending
otherwise, are in \$A million)

1957-8	1958-9	1959-60	1960-1	1961-2	1962-3	1963-4	1964-5	1965-6	1966-7	1967-8	1968-9
27.8	37.8	31.8	34.7	33.7	34.4	45.4	58.4	63.8	80.2	91.2	86.3
							48.6	47.0	56.9	67.1	63.0
29.6	25.6	27.0	30.6	30.8	34.8	42.0	52.4	73.0	93.4	105.5	95.1
41.0	46.4	49.6	42.2	45.0	48.5	88.6	77.2	94.6	146.9	221.9	196.3
4.4	4.4	4.6	5.4	6.2	9.2	10.4	12.0	10.7	10.9	12.1	12.9
23.8	23.4	23.6	24.4	25.2	24.4	27.2	27.2	25.4	25.6	26.8	21.0
102.8	114.2	113.0	112.9	115.7	126.9	186.4	200.0†	242.1	331.4	430.7	390.6
372.6	380.7	389.6	401.3	409.4	432.3	518.7	598.1	741.9	950.1	1109.5	1164.7
1.2	1.2	1.2	1.3	1.5	2.1	2.0	2.0	1.4	1.1	1.1	1.1
27.6	30.0	29.0	28.1	28.3	29.4	35.9	33.4	32.6	34.8	39.4	33.8
11.6	12.5	13.8	14.6	15.0	16.2	18.0	19.8	20.9	22.8	24.2	27.1
3.2	3.0	2.8	2.7	2.7	2.7	2.9	3.0	3.6	3.7	4.0	4.3

† All defence R. and D. figures in this table are for net expenditure, from the defence vote, for R. and D. projects undertaken within Australia for the Australian government.

‡ Total includes Army spending on clothing etc.

§ Excluding money paid into the Defence Equipment and Supplies Trust Account.

1958, having entered service with the RAAF in 1946. The RAAF retained the Mustang propellor-driven fighter (design dating from 1941) from 1945 until the beginning of the Korean War when it was replaced on active service by Meteor jet-fighters imported from the United Kingdom.

Warships and army ordnance on the other hand have not, since 1950, been subject to the rapid technological changes which have overtaken military aircraft. Great advances in some areas such as nuclear power for ships and anti-tank and anti-aircraft missiles for infantrymen have by no means rendered other forms of marine propulsion obsolete or more traditional defensive artillery useless. Accordingly the Australian Army's Centurions, although bought from the United Kingdom in 1951, can be described as modern tanks; the British have only recently begun to phase

out their own Centurions. Warships of the Australian Navy compare well with ships of a similar class in the navies of the NATO powers. Where Australian naval equipment is deficient is in quantity rather than the quality of individual ships.

The virtual absence of any major weapons of Australian design and the tendency to obsolescence in the case of aircraft until very recently, are interconnected with, and in part derive from, the smallness of the Australian effort on defence research and development (R and D).

If spending on the joint project with the United Kingdom at Woomera is omitted,⁵ the fraction of defence spending devoted to R and D since 1950 has averaged 1 per cent up to 1960 and 1.5 per cent between 1960 and 1968 (see Table 2). This compares with a figure of between 8 and 12 per cent for Sweden, France, and the United Kingdom, 6 per cent for Germany, and 7 per cent for Canada.⁶ In money terms Australian defence R and D has amounted to an average \$3.5 million per annum over the earlier period of our study, from 1950 to 1960, and \$9.3 million between 1960 and 1968. (All figures are in Australian dollars unless otherwise indicated.) The size of the Australian effort can be judged when compared with the likely R and D costs of some advanced defence projects; spread over eight or ten years the production of variable geometry aircraft would require an average annual R and D investment of between \$50 and \$130 million, a ground-to-air missile \$40 to \$50 million, and a battle tank \$4 to \$9 million.⁷

In terms of export performance the Jindivik target drone built by the Government Aircraft Factory has been the most successful product of Australian defence R and D; it has been sold in one or other of its many marks to the United Kingdom, Sweden, and the United States — overseas sales totalling 213 (out of total sales of 395) by the end of 1967 had accounted for \$17 million out of total sales of \$40 million.⁸ Although it is powered by an imported British jet engine (Bristol-Siddeley Viper

⁵ According to a special defence section in the *Commonwealth Year Book 1955*, pp. 985, 1108, 'the long-range weapons project at Woomera is a joint UK-Australia one, the UK being responsible for the development of guided weapons systems and Australia providing the facilities necessary for the testing of such weapons'. Woomera appears to have contributed very little to the Australian services.

⁶ These figures are for the year 1967.

⁷ See C. J. E. Harlow, *The European Armaments Base: A Survey, Part 1* (London, The Institute for Strategic Studies, 1967), p. 22: he gives somewhat higher figures for the variable geometry aircraft.

⁸ T. L. Shelton, 'Further Progress with Jindivik', *Aircraft* (Melbourne), November 1967, pp. 16-18.

Mk 201), its overall design is wholly Australian in conception.

The other two products of Australian defence R and D effort during the period of our study, the Malkara anti-tank missile and the Ikara anti-submarine missile, have also enjoyed some foreign assistance, in the latter case only in the form of financial help. The Malkara,⁹ which has entered service only with the British Army (in 1962), was developed in Australia with some design assistance from the U.K. Fighting Vehicle Research and Development Establishment. The Ikara¹⁰ employs an American acoustic homing torpedo and was developed with financial assistance from the United States under the Mutual Weapons Development Agreement of 1960;¹¹ development of the project began in 1959 and of the \$26 million spent on the project up until 1968, \$4.4 million had been contributed by the Americans.¹² A modified Ikara system for use by the Royal Navy is being developed in Australia. By mid-1968, over \$35 million had been spent on the production and installation of Ikara in Australia's four 'River' class escorts (completed by 1967) and the three 'Charles F. Adams' class destroyers.¹³

From 1953 until 1963, annual procurement spending including R and D expenditure (but excluding Woomera spending) averaged 29 per cent of annual defence spending; from 1963 to mid-1969 annual procurement spending has averaged 35 per cent of annual defence expenditure.¹⁴ This is much lower than Sweden and the United Kingdom, which averaged between 40 and 50 per cent over both periods, but higher than Belgium and Italy, which spent between 10 and 15 per cent up to 1963 and between 15 and 25 per cent afterwards. (Each, however, received substantial U.S. military aid during the 1950s.)¹⁵

Between 1953 and 1963 procurement spending was roughly stationary and was apportioned between the three services, in very round terms, at

⁹ For a full description see S. Pugh, *Fighting Vehicles and Weapons of the Modern British Army* (London, Macdonald, 1962), p. 58.

¹⁰ A description can be found in *Jane's Fighting Ships 1967-68* (London, Sampson Low), p. 506.

¹¹ T. B. Millar, 'Australia's Defence, 1945-1965', in G. Greenwood and N. Harper (eds.), *Australia in World Affairs 1961-1965* (Melbourne, Cheshire, 1968), p. 292.

¹² Commonwealth of Australia, *Report of the Auditor General 1967-68*, p. 307.

¹³ *Ibid.*, p. 279. The Minister for the Navy claimed that \$20 million could be saved by the decision not to install Ikara in the two 'Daring' class destroyers, which would seem an overestimate (*Sydney Morning Herald*, 25 August 1967).

¹⁴ See Table 2.

¹⁵ Harlow, *op. cit.*, *Part 1*, p. 7, and *Part 2*, *passim*: the figures for Britain, Sweden, Italy, and Belgium begin at 1955 so the comparison with Australian figures from 1953 may not be wholly accurate.

\$30 million annually to both the Army and the Navy and \$40 million to the Air Force. Over the same period the defence budget remained remarkably stationary somewhat below (except towards the end, when it was just above) \$400 million. Overseas defence procurement in the 1950s and early 1960s is difficult to estimate: for the period 1950-60 it probably amounted to about 20 per cent of total procurement spending;¹⁶ between 1960 and 1963 it rose to about 50 per cent, and from 1963 to 1968 to about 54 per cent (see Table 1). The United Kingdom and Sweden spend only about 10 per cent of their procurement totals overseas, and the only European country which has spent abroad a sum approaching 50 per cent of its procurement expenditure at any time is West Germany, during the period 1955 to 1964.¹⁷ The value of orders for defence equipment placed in Australia by overseas customers (which would partly offset the foreign exchange cost of Australian procurement) actually decreased from 14 per cent of Australian procurement spending overseas in 1960 to 6 per cent in 1967.¹⁸

NAVY

IN early 1970, the active strength of the Royal Australian Navy (RAN) was 38 vessels, excluding training and support ships.¹⁹ Of these the flagship, the aircraft carrier *Melbourne*, the submarines and the coastal minesweepers were purchased from the United Kingdom, and the three guided-missile destroyers *Perth*, *Hobart*, and *Brisbane* from the United States.

The original cost estimate for the *Melbourne*, and for the *Sydney*, an aircraft carrier of the same Majestic class (but used by the RAN since 1957 as a training ship and troop carrier), was \$8.7 million each, including the cost of initial stores. Both ships were supplied under an apparently generous agreement with the British government which undertook to meet half of the construction cost (originally estimated at \$7.6 million) of both ships. The *Sydney* was accepted for service and arrived in Australia in 1949, her total cost being \$9.8 million, of which Australia paid \$5.1 million. By the time the *Melbourne* arrived in

¹⁶ This figure is no more than an informed guess based upon known total numbers of aircraft, ships, etc. purchased over the period and upon known figures for Australian production of these items.

¹⁷ Harlow, *op. cit.*, Part 1, p. 25.

¹⁸ *Commonwealth Parliamentary Debates, House of Representatives* [subsequently cited as *C.P.D. (H. of R.)*], 14 August 1968, p. 209; and see Table 1.

¹⁹ One carrier, 3 guided-missile destroyers, 3 Daring class destroyers, 4 River class destroyer escorts, 3 coastal minesweepers, 4 submarines, and 20 patrol boats.

Australia in 1956 she had cost the Australian government \$11.6 million in addition to the British contribution of \$4.1 million.²⁰

The increase could be put down in part to the many design changes and the eventual decision to incorporate expensive modifications not carried out on the *Sydney*, such as an angled deck and a steam catapult, which enabled her to carry faster and heavier aircraft; the long period of construction (1949 to 1956) also meant that inflation became significant. One disadvantage of overseas procurement evident in this purchase was the weak control over cost escalation that a small customer could exert. This lesson, however, was obscured by the even more dramatic cost increases over original estimates for the 'Daring' class destroyers and anti-submarine frigates (later called 'River' class destroyer escorts) under construction in Australian shipyards. First ordered in 1946 and 1950 respectively, the estimated unit cost of the destroyers had risen from \$2.8 million in 1945 to \$9.6 million in 1956 and the frigates from \$2.6 million in 1950 to \$7.8 million each in 1956.²¹

The government was moved by these figures to the extent of asking for a complete review of shipbuilding and conversion costs to be made twice a year by the Navy and for 'significant variations' to be reported to Cabinet.²² However, costs continued to rise. By 1959, the final cost of the three 'Daring' class destroyers came to \$42 million and the estimate for the four destroyer escorts was \$48 million.²³ By comparison with this \$14 million average figure, the British 'Daring' class destroyers, very similar in design, were built for a cost of between \$5 and \$7 million.²⁴

²⁰ *Report of the Auditor-General 1949-50*, p. 196 and *1955-56*, pp. 69, 70.

²¹ *Report of the Auditor-General 1955-56*, pp. 69, 70.

²² Another example of weakness in the control and co-ordination of naval procurement was the indecision surrounding the role of the *Hobart*, a cruiser of World War II vintage. In 1950 it was decided to modernise the *Hobart* as a fighting ship until the 'Daring' class destroyers were completed; in 1952 it was decided to rescind this plan and to develop *Hobart* as a training ship. In 1953, it was decided that it would not be needed in this role, as a result of a decision that only one operational carrier, the *Melbourne*, should be kept in service and that the *Sydney* should then become the training ship. Other roles were canvassed for the *Hobart*, but in 1955 it was decided that she should be mothballed. Expenditure had by this time reached \$2.8 million; a further \$2 million would have been needed to complete the modernisation program.

²³ *Report of the Auditor-General 1958-59*, p. 80. The final average cost of the escorts was \$14 million. The destroyers *Voyager* and *Vendetta*, begun in 1949, were completed in 1957 and 1958 respectively; *Vampire*, begun 1952, was completed in 1959.

²⁴ *Jane's Fighting Ships 1968-69* (London, Sampson Low), p. 300.

Although it is true that the British-built ships were completed, on the average, five years before the Australian-built, and cost rises due to inflation must have occurred in the interim, it is surprising that the cost disparity should be as much as 100 per cent. The slight differences in design could make only a minor contribution; armament and displacement are identical,²⁵ and the Australian ships are inferior in propulsion, being a few knots slower in top speed and with 700 miles *less* radius of action for the same amount of fuel carried.²⁶ Britain must have benefited from some economies of scale (eight destroyers to Australia's three), but this was limited in that no two British destroyers were built at the same yard. Perhaps more significant, naval construction was only a small fraction of the work of the British shipyards, whereas it represented a larger part of the work of the Cockatoo Island Dockyard²⁷ in Sydney and the whole of the construction at H.M.A. Naval Dockyard, Williamstown; hence Australia's overhead charges would be much higher. Its per capita labour costs are of course considerably higher.

In recent years two important technological developments have greatly added to the usefulness and cost of destroyers and frigates: anti-aircraft and anti-submarine missile systems. The Australian-built escorts are equipped with the Australian 'Ikara' anti-submarine system and the British 'Seacat' ship-to-air missile system. The 'Charles F. Adams' class destroyers purchased from the United States²⁸ are fitted with the 'Ikara' and the American 'Tartar' anti-aircraft (ship-to-air) missile system. Although the precise cost of the 'Charles F. Adams' destroyers is difficult to ascertain, out of a total cost of about \$40 million per ship, between \$25 and \$30 million is taken up by the cost of the missiles and associated radars.²⁹

The other major naval purchase overseas since 1963 has been the four

²⁵ Except for depth charge mortars: the British use the 'Squid' type, the Australians use the 'Limbo' type.

²⁶ *Jane's Fighting Ships 1968-69*, pp. 14, 300.

²⁷ Cockatoo Docks and Engineering Co. Pty Ltd (sometimes called Vickers (Australia) Pty Ltd), a wholly owned subsidiary of the British company of Vickers, leases this yard from the Australian government.

²⁸ The *Hobart* and the *Perth*, ordered in 1961, were delivered in 1965; the *Brisbane*, ordered 1963, was delivered 1968.

²⁹ The ships themselves were produced for less than the original estimate, but the cost of the shore-based spares increased greatly: 'the actual cost of these ships [*Hobart* and *Perth*] has not finally been determined . . .' (*Report of the Auditor-General 1967-68*, p. 277). The figure of \$40 million does *not* include the cost of installing 'Ikara' which would add perhaps a further \$7 million approximately to the cost of each ship.

'Oberon' class conventional submarines, all of which had been delivered by mid-1970, at a cost of \$10 million each; submarine building has never been attempted by Australian shipyards. However, they have been able to meet some of the Navy's less ambitious requirements; orders for twenty Australian-designed patrol boats at a total cost of \$15 million³⁰ were placed with two commercial shipyards in Queensland and all had been delivered by 1970. The destroyer tender *Stalwart* was designed and built in Australia for \$16 million and delivered in 1968.³¹ The aircraft carrier *Melbourne* underwent an extensive refit in 1968 by H.M.A. Naval Dockyard, Sydney, at an estimated cost of \$7.3 million, mainly to allow her to operate with new carrier aircraft.

The aircraft of the Fleet Air Arm, unlike those of the RAAF, have, with the exception of six Mk 34 Vampires produced in Australia for the RAN by Hawker de Havilland in the late 1950s, always been purchased directly from overseas, but they have suffered from the same tendency to have their lives extended up to the point of operational obsolescence. The first aircraft flying off the *Sydney* were the 'Firefly' and 'Sea Fury', both of U.K. World War II design; they were in service from 1949 to 1956, when they were replaced by 39 Sea Venom (F(AW)Mk 21) and 36 Gannet (AS Mk 4) aircraft bought from the United Kingdom at a total cost of about \$20 million to fly off the *Melbourne* until 1968.³² The Sea Venom ceased front-line operation with the Royal Navy in 1961 and the Gannet was replaced in the Royal Navy by helicopters during the late 1950s.³³

The government's hesitation about the future of the Fleet Air Arm contributed to this obsolescence. Its disbandment was announced in 1959, to take place when the *Melbourne* and her aircraft would need refit and refurbishment (then expected in mid-1963); its partial reprieve was won in 1961 when an anti-submarine helicopter carrying role was suggested,³⁴ and full reprieve came in two stages in 1964 when fourteen anti-submarine 'Trackers' were ordered from the United States, followed in 1965 by eight 'Skyhawk' attack aircraft. These were delivered in 1967

³⁰ Of this cost, \$4.6 million was spent overseas; the engines for example were procured in the United Kingdom. See *C.P.D. (H. of R.)*, 26 November 1968, p. 3285.

³¹ Its original cost estimate, in 1963, was \$10 million (*Report of the Auditor-General 1967-68*, p. 278).

³² *Report of the Auditor-General 1955-56*, p. 70.

³³ But it remained in service with the German Navy (as a land-based aircraft) until the mid-1960s.

³⁴ Twenty-seven Westland Wessex Mk 31A helicopters were ordered for the purpose from the United Kingdom at a total cost of about \$16 million.

at a cost of \$26.5 million and \$17 million respectively.³⁵ There has been no clear trend in Australian naval procurement policy over the period, except perhaps a veering away from Australian shipyards to overseas yards in the placing of orders for the more complex warships. The high excess costs to be borne, as in the case of the 'Daring' class destroyers and anti-submarine frigates, and the slowness of construction,³⁶ together with the increasing sophistication of certain naval weapons systems, have worked against the advantages usually seen in home procurement. The trend towards standardisation with the United States has not extended to submarines and helicopters.

The high costs of Australian shipbuilding, reflected in the level of protection of the commercial industry,³⁷ would seem to place limits upon the ability of Australian shipyards to meet future naval requirements for the RAN, or for export purposes. Perhaps the patrol boats ordered in 1965 by the RAN from two Queensland shipyards are an exception to this melancholy rule; they are as cheap as or cheaper than near-equivalents built overseas and are being constructed at a reasonably rapid rate. Fairly good export opportunities are open for ships of this kind as many countries of small means build their navies around patrol boats.³⁸

A limited naval shipbuilding program of small displacement craft may offer the best course for Australian shipyards; new departures in warship hull design, the first for almost fifty years, the hovercraft and hydrofoil principles, are at present generally speaking suited only for light craft. Concentration on this sector would not cut off Australian yards from these new techniques. Certainly the projected Australian-designed destroyer foreshadowed in the 1969 defence budget (and which we

³⁵ *C.P.D. (H. of R.)*, 26 November 1968, p. 3285.

³⁶ However, it is hard to be sure in some instances whether construction is slow or has been slowed to fit in with limits placed on defence expenditure; the construction of the 'Daring' class destroyers, for example, was carried out in the years of the \$400 million defence budget 'ceiling'.

³⁷ The industry is subsidised by the government at a rate of up to one-third construction cost on all vessels intended for use in Australia of 200 tons or more; vessels of smaller displacement are protected by tariff. In 1966-7 naval shipbuilding accounted for roughly 15 per cent by value of the total output of Australian yards.

³⁸ *Jane's Fighting Ships 1968-69, passim*. The eventual cost of the Australian-built patrol boats is expected to be approximately \$750,000 each (*Report of the Auditor-General 1966-67*, p. 214), although there are some indications that this figure may be somewhat low. The patrol boats sold by the British to Singapore in 1968, which although somewhat faster than the Australian boats have similar dimensions and displacement, cost \$1.5 million each (*The Military Balance 1968-69*, London, Institute for Strategic Studies, 1968, p. 59).

discuss further below) will severely test Australia's capacity to construct major warships at tolerable cost.

THE ARMY

IN terms of expenditure on large and glamorous items of defence equipment the army anywhere is the Cinderella of the services; the Australian Army is no exception. The pace of technological change on the battlefield (except of course in communications) has been far slower than the changes in the air and even at sea: a modern tank, for example, is not so very different from a World War II tank either in appearance or cost. This slowness of technological change has had two effects on the pattern of Army procurement. Equipment has become obsolescent only very slowly and replacement therefore has been infrequent; and much of the Army's needs are capable of being met from national resources.³⁹

The consequences of this have been that from 1958 to 1963 no item of major equipment was procured for the Army from overseas sources and between 1963 and 1968 the total value of the five most costly overseas orders for the Army (about \$30 million) was less than the cost of one 'Charles F. Adams' destroyer.⁴⁰ Accordingly in recent years the Army has drawn less from the U.S. Credits than either of the other two services (see Table 1). Outside of procurement spending its foreign exchange requirements are of course large; keeping Australian army units in Vietnam, Malaysia, and Singapore accounted for \$34 million in 1967-8,⁴¹ a good proportion of which must have been in foreign currency.

The principal armour of the Australian Army consists of some 120 British Centurion tanks purchased between 1950 and 1959 at an average cost of about \$100,000 each, and the American armoured tracked troop carrier (M113A1), orders for several hundred of which have been placed since 1964 at a cost of about \$30,000 each;⁴² up to 1968 \$8.9 million had been spent. Where international comparisons can be made the Australian Army does not seem particularly deficient in quantity of armour. The Canadian Army, with a manpower level of 41,500 men,

³⁹ According to *Defence Report 1967* (p. 31) 80 per cent of the Army's needs are being met by Australian production.

⁴⁰ *C.P.D. (H. of R.)*, 26 November 1968, p. 3286. The orders were for: armoured personnel carriers (M113A1), Bell helicopters, amphibious vehicles (Larc 5), Pilatus Porter aircraft, and 105 mm 'pack' howitzers.

⁴¹ *Report of the Auditor-General 1967-68*, p. 281.

⁴² Harlow, *op. cit. Part 2*, p. 11; the British equivalent, the FV432 Trojan, costs twice as much.

which is close to the Australian Army of 45,400 men, has a similar inventory of armour.⁴³

Australian artillery and guided missile strength include the air-transportable 'pack' 105 mm howitzer, designed in Italy and adopted by several NATO countries, including the United Kingdom; it was issued to the Army beginning in 1962, two years after it entered service with the British Army. Total spending on the 'pack' howitzer has been between \$1 and \$2 million. The lack of heavier artillery is a longstanding Army grievance, which could be a serious constraint in any situation where the Army could not, as it can in Vietnam, call on allied artillery support.

The Army possesses no offensive missiles, that is missiles which could participate in an artillery barrage. It possesses, however, an anti-tank missile, the French Entac, and has on order an anti-aircraft missile, the American Redeye, both of which are lightweight weapons and launchable by infantry. The Australian-developed anti-tank missile, the Malkara, was designed specifically for the British Army. It is a good deal heavier than the Entac and requires a one-ton truck for transport and launching. It entered service with the British Army in 1962 and began to be replaced by the British-developed Swingfire in 1967. The cost of the Malkara to the British appears to have been quite low, comparing favourably with the much lighter but equally effective Vigilant missile which entered service with the British in 1963 at a cost of \$1,200 per missile.⁴⁴

The Entac, which is similar to the Vigilant and was developed about the same time, supplements the Army's 84 mm Carl Gustav anti-tank gun which is of Swedish origin. Both were procured during the period 1963-8 at a total cost of over \$0.5 million for each order.⁴⁵

One advantage of the Entac over the Vigilant to Australia is that it is also in service with the American Army; the Vigilant has been sold outside the United Kingdom only to Finland.

The Redeye was ordered from the United States over the same period

⁴³ *The Military Balance 1968-69*, p. 21.

⁴⁴ Neville Brown, *Arms Without Empire* (Harmondsworth, Penguin, 1967), p. 107. It should, however, be borne in mind that the Vigilant needs no support vehicle, while the Malkara is useless without the fairly large support truck which would probably cost an additional several thousand dollars.

⁴⁵ *C.P.D. (H. of R.)*, 16 October 1968, p. 2048. The cost is likely to have been below \$1 million; items procured or ordered abroad of a total cost in excess of \$1 million are listed in a later Hansard (26 November 1968, p. 3285). Neither Entac nor Redeye is on this list.

at a cost of more than \$0.5 million.⁴⁶ Australia and Switzerland seem to be the only countries to possess this missile outside of the United States where it first entered service in 1966-7.

The Australian Army has the NATO standard rifle, the Belgian FN 7.62 mm (called L1A1 in Australia), which was manufactured in Australia to U.K. design drawings by the government-owned Small Arms Factory at Lithgow, New South Wales, beginning in 1958.⁴⁷ Its ammunition is made at the government-owned Footscray (Victoria) Ammunition Factory. Australia manufactures a variety of other small arms and ammunition.

The electronics requirements of the Army are relatively modest and are limited to radio equipment and tactical radar equipment which in recent years have tended to be procured overseas,⁴⁸ although more recently successful attempts have been made by the Department of Supply to encourage local production of a wide range of components,⁴⁹ and items such as the PRC-F1 portable two-way communications set.

Next to the M113A1 armoured troop carriers the biggest overseas Army procurement orders since 1958 have been placed for Bell helicopters (types 47G381 and 47G2) from the United States and Pilatus Porter light aircraft from Switzerland at a total expected cost of \$6.2 million and \$3.7 million respectively.⁵⁰ The total number of these light helicopters so far in service with the Army is about fifty and the first four Pilatus light aircraft entered service in 1967-8.⁵¹

Looked at in the round the pattern of procurement for the Australian Army is notable for three things: the small amount of money spent overseas compared to the other services, the low level of participation by

⁴⁶ *C.P.D. (H. of R.)*, 26 November 1968, p. 3285. Again the cost is likely to have been below \$1 million. The Swiss paid \$8 million for more than 1,000 Redeye missiles due to enter service in 1969 (*Military Balance 1968-69*, p. 58).

⁴⁷ British production began in 1957 and ceased in 1959; Australian production is only now winding down.

⁴⁸ *C.P.D. (H. of R.)*, 16 October 1968, p. 2048.

⁴⁹ *Defence Reports 1965-68*. Some preliminary electronics work has also taken place in Australia for Project Mallard. This is the code name for an international military satellite communication system involving Britain, Canada, and the United States as well as Australia, due to enter operation by 1975. Private industry and government laboratories within Australia up to 1969 had completed contracts worth about \$500,000 and between 1969 and 1971 are expected to share a further \$1 million worth of development work. The total development cost of the project is about \$113 million and will be mainly borne by the United States and Britain.

⁵⁰ *C.P.D. (H. of R.)*, 26 November 1968, p. 3286.

⁵¹ *The Military Balance 1968-69*, p. 34 and *Defence Report 1968*, p. 30.

Australian private industry in meeting army requirements, and the trend towards standardisation of equipment with that of the armies of at least some allied countries.

The first of these is not peculiar to Australia. Industrial countries everywhere tend to manufacture their own light and medium arms and as much as possible of their ammunition requirements, the total value of which usually forms a large part of army procurement budgets.

In view of the size of the Australian motor vehicle industry (340,000 vehicles, excluding trucks, produced in 1966-7) it is at first sight surprising that it participates so little in supplying equipment to the armed forces, and to the Army in particular. The private industry in Italy, for example, builds tanks and M113 armoured personnel carriers for the Italian army and the Dutch vehicle industry has designed and built personnel carriers for the Dutch army.⁵² Part of the reason may lie in the relative smallness of potential Army orders, but this has not deterred the International Harvester Company from supplying a range of trucks to Army specification.⁵³ The foreign ownership of the entire Australian vehicle industry may be another influential factor.

According to the 1965 *Defence Report* a major requirement of Army equipment is that it should be standardised or at least compatible with that of Australia's allies. Australia had entered into a 'Basic Standardisation Agreement' with the United Kingdom, the United States and Canada, which New Zealand entered in 1963;⁵⁴ seldom since then has Australia ordered Army equipment which is not also in service with either or both the British and Americans. While this is partly a natural consequence of the Australian tendency to order from British or American suppliers and the tendency of NATO members in recent years towards standardisation in small arms and artillery amongst themselves, the production of the Australian-designed 9 mm sub-machine gun was held up (somewhat belatedly) for design changes to meet standardisation needs.⁵⁵

⁵² Harlow, op. cit., *Part 2*, pp. 64, 54. India, too, builds tanks (British) under licence.

⁵³ However, the engine and chassis differences between an army truck and a civilian truck may not be as great as those between a private car and a 'jeep' or Land Rover-type vehicle.

⁵⁴ Canada is not formally allied to Australia. The agreement is a statement of willingness to co-operate on new military developments and techniques with an eye to increasing standardisation. See *The Times*, 20 February 1963.

⁵⁵ *Supply '66: Activities and Developments* (Commonwealth of Australia, Department of Supply, September 1966), p. 31.

It is possible that the Army may in future obtain an even larger fraction of its procurement needs inside Australia. On the whole, however, it seems reasonable to assume that any government effort to increase home procurement is likely to be directed more towards the other two services which are far greater consumers of foreign exchange and which, in recent years, have been buying 50 per cent or more of their equipment overseas.

AIR FORCE

THE combat aircraft of the Australian air force (RAAF) included (in early 1970) 40 Canberra BMk20 light jet bombers, 100 Mirage III-0 jet fighters, and 60 Sabre (Commonwealth) jet fighters together with 10 P-3B Orion anti-submarine 'search and strike' aircraft and 12 P-2H Neptune anti-submarine and anti-shipping patrol bombers. Only one squadron of Canberras remained in the front line force and the Sabres had been replaced as front-line aircraft by Mirages. In addition it possesses 51 Macchi Mb326 jet trainers, 49 transport aircraft, C-130 Hercules and CV-2B Caribou, and 2 UY-1B Iroquois helicopter squadrons.⁵⁶

The Canberra, Sabre, Mirage, and Macchi were built in Australia under licence from their original manufacturers, with different degrees of design modification and with different proportions of locally manufactured to imported components.

Two aircraft factories, the government owned Government Aircraft Factory (G.A.F.) and the privately owned Commonwealth Aircraft Corporation (C.A.C.),⁵⁷ have been responsible for all four production programs. The Hawker de Havilland Company, a wholly owned Australian subsidiary of the British Hawker Siddeley Group, is a major subcontractor for the production of the Macchi trainer. Earlier, Hawker de Havilland built the Vampire jet: 80 fighters were built between 1948 and 1953, and 109 trainers by the time production ceased in 1961.⁵⁸

Since 1950 new orders placed inside Australia for military aircraft have been apportioned almost equally between the G.A.F. and the C.A.C., both of which companies are dependent upon government contracts, with as much regard for the preservation in being of each

⁵⁶ *The Military Balance 1968-69*, p. 34, and *Defence Report 1969*, pp. 38 and 39.

⁵⁷ Prominent shareholders are Broken Hill Proprietary Limited and the Electrolytic Zinc Co. together with several Australian subsidiaries of overseas firms—Rolls-Royce, I.C.I., and the P.&O. Company.

⁵⁸ *Jane's All the World's Aircraft 1966-67* (London, Sampson Low), p. 8.

company as for its suitability as a contractor: the G.A.F. has tended to specialise in airframe construction and testing, the C.A.C. in engine production.

The Canberra bomber was built by the G.A.F. over the period 1950 to 1958 under licence from the original manufacturers, the English Electric Company; in all forty-eight were built,⁵⁹ with little departure from the original English design, except for changes to the cockpit interior.⁶⁰ Tools and jigs were produced substantially in Australia, and body and wing components were manufactured locally. The Chrysler motor works of Adelaide made sheet metal pressed parts and the workshops of both South Australian and N.S.W. government railways also rendered assistance.⁶¹

The engines (Rolls-Royce Avon 111), and those of the Sabre which are closely similar but not identical (Avon 20s and later Avon 26s), were built by the C.A.C., with some parts imported, but at a cost well in excess of that of importing complete engines from the United Kingdom.⁶²

The building rate was slow: the last aircraft was completed only three years before the British removed the Canberra from the RAF Bomber Command; and the cost of the aircraft was rather high in spite of the low production rate.⁶³ The most precise official estimate put the average cost per aircraft at \$950,000.⁶⁴ The British sold six of a later version of the Canberra, the B(1)12, to Peru in 1968 for \$U.S.4.8 million⁶⁵ or \$720,000 per aircraft; the cost of a British-produced Canberra in 1953 was variously reported to be \$400,000 and \$500,000.⁶⁶

Orders for the Sabre were placed with the C.A.C. in 1951. The Australian-built Sabre was substantially different in design from the original North American aircraft in that a Rolls-Royce Avon engine was

⁵⁹ J. W. R. Taylor, *Warplanes of the World* (London, Ian Allan, 1966), p. 44: the first Australian-built Canberra flew in 1953.

⁶⁰ Out of a total of 19,300 basic design drawings 17,000 were of overseas origin (*Aircraft*, July 1953, p. 24).

⁶¹ *Ibid.*, p. 26.

⁶² The Australian engines cost at least 43 per cent more (*ibid.*, December 1956, p. 58).

⁶³ Which for a small total production target favours low costs. See S. G. Sturmev, 'Cost Curves in Aircraft Production', *Economic Journal*, Vol. LXXIV, No. 296, December 1964, pp. 954, 982.

⁶⁴ Statement by Defence Minister, *C.P.D. (H. of R.)*, 11 September 1956, p. 368; a later but vaguer estimate gave 'in the vicinity of \$800,000' as the price, *C.P.D. (Senate)*, 8 May 1957, pp. 605, 606. It is unclear whether these estimates include any allowance for spare parts.

⁶⁵ *The Military Balance 1968-69*, p. 59.

⁶⁶ *Sydney Morning Herald*, 26 July and 12 August 1953.

substituted for the General Electric (J47-G6-27), and more powerful armament was installed.⁶⁷ However, tools and jigs and large quantities of airframe components were purchased directly from the American manufacturers.

A total of 112 Sabres were built in Australia in three batches, each batch with slightly different design details initially but later all aircraft were standardised to the final mark, Mk 32. Uncertainty and hesitation over the choice of an aircraft to succeed the Sabre, which was not resolved until 1960, were largely responsible for the spinning out of the Sabre production until 1961.

The Sabre represents the peak of participation by Australian industry in the design of a military aircraft since the end of World War II. The design modifications met their limited objectives, and the C.A.C. Sabre is faster, but still subsonic, and more heavily armed than the American original. But in return for these gains, sacrifices were made both in cost and in speed of entering service. An official estimate of cost made in 1956 (when about 60 Sabres had been produced) was \$510,000 each,⁶⁸ which according to an Opposition spokesman was \$160,000 more than the cost of buying the admittedly inferior standard Sabre abroad.

When the C.A.C. Sabre entered service with the RAAF in 1956, the supersonic version, the Supersabre, had already been in service with the USAF for three years. This slowness of Australian aircraft production was particularly disadvantageous in the circumstances of the 1950s: military aircraft were evolving very rapidly, supersonic aircraft, particularly fighters, rendered subsonic types such as the Sabre obsolete in some respects almost overnight; the introduction of supersonic interceptor aircraft and surface-to-air missiles (SAMs) over the same period much reduced the efficacy of subsonic medium bombers such as the Canberra.⁶⁹ It is arguable that in the light of the defence commitments of the RAAF this obsolescence could be tolerated: the British, alongside whom the RAAF operated in Malaysia and Singapore, retained their subsonic fighters, Gloster Javelins, in Malaysia until 1966. But this meant that the RAAF's role would be severely limited in any war where the opponent was supplied with supersonic aircraft.

As Sabre production was wound down in 1961, preparations began for production under licence of the French Dassault Mirage III-0 super-

⁶⁷ Only 40 per cent of the original fuselage structure was retained (*Aircraft*, July 1953, p. 29).

⁶⁸ Defence Minister, *C.P.D. (H. of R.)*, 11 September 1956, p. 368.

⁶⁹ Heavy bombers could be equipped with 'stand-off' missiles which permitted the discharge of bombs outside the range of SAMs.

sonic fighter aircraft for which the G.A.F. was appointed the prime contractor and overseeing body, with the C.A.C. a major sub-contractor. It is difficult to establish how much of the Mirage engine and body components are actually made, as against merely assembled, in Australia. The C.A.C. 'produces' the engine, wings, fins and tail assembly and the G.A.F. 'produces' the fuselage, but the foreign exchange cost of the 100 Mirages is officially estimated as \$193.7 million,⁷⁰ which probably includes the cost of the Matra R530 air-to-air missile, some \$20 million.⁷¹ The total cost of the project, excluding the missile, is estimated at \$246 million, and expenditure by the Department of Supply within Australia was \$74.6 million up to June 1968.⁷² It is claimed that 90 per cent of the Mirage engine, by value, is locally manufactured, which rather suggests that most of the rest of the aircraft must be merely assembled. The extent of Australia's dependence on French suppliers has been little recognised.

The Macchi trainers, however, which are simpler aircraft than the Mirages, appear to have a higher Australian-produced content; out of a total estimated cost of \$64.7 million for 107 aircraft, only \$21.6 million worth of components and completed aircraft were imported from the Italian mother factory.⁷³ Orders were placed with the C.A.C. in 1965 for a total of 97 Macchi to be completed in three batches, one of 75, the others of 12 and 10 in the period 1965-71, these last ten for the RAN (the first 12 were wholly imported from Italy).⁷⁴

The only aircraft to be built by Australian industry entirely to Australian specifications since World War II were the Winjeel trainer and the Jindivik target drone; the Winjeel was built by the C.A.C. from 1955 to 1958. The Jindivik, built by the G.A.F., was designed in 1948,

⁷⁰ *C.P.D. (H. of R.)*, 26 November 1968, p. 3286.

⁷¹ *Air Force Magazine*, January 1965, p. 46.

⁷² *Report of the Auditor-General 1967-68*, pp. 285, 308. This total foreign exchange cost must include payment for a large quantity of spare parts. The cost of a Mirage III-C (similar to the III-O) bought directly from the French is given by one source as less than \$900,000 (R. Miller and D. Sawers, *The Technical Development of Modern Aviation* (London, Routledge and Kegan Paul, 1968, p. 273). This is close to the estimate of \$1 million given by the Australian Minister for Air in 1960 for the 'flyaway' cost of the aircraft, which he contrasted with \$2.2 million for its 'program cost' (including spares, spare engines, ground handling equipment, and technical information) (*Aircraft*, January 1961, p. 46). The rather similar Mirage 5 has recently been sold by France at approximately \$U.S.2 million (*The Military Balance 1968-69*, pp. 58-9). Australia has bought ten Mirage trainers from France at \$2.4 million each.

⁷³ *C.P.D. (H. of R.)*, 26 November 1968, p. 3286 and *Report of the Auditor-General 1967-68*, p. 289.

⁷⁴ *Aircraft*, October 1967, p. 24.

first flew in 1952, and has been in continuous production since then. It is the sole export of the Australian aircraft industry since its founding in 1936.⁷⁵

With the order of the F-111C (October 1963), Australia for the first time committed itself to purchase an aircraft in the forefront of advanced technology: there could be no danger of early obsolescence, but Australia has had the misfortune to be initiated into the world of escalating R and D costs at a time when further advances in aircraft have become more difficult and uncertain, as well as more costly than ever before. This is not the place to argue whether the government's bold risk—far bolder than it realised—had any justification, though much of the subsequent difficulty was due to the haste with which the government entered into the contract. But several aspects of the decision are relevant to this study.

The government had been under heavy criticism for its failure to replace the Canberras, especially after Indonesia had received Badger medium bombers from the Soviet Union in 1961. The announcement of the F-111 order and the American offer (not taken up) to supply B-47s as an interim measure, turned a potential electoral liability into an asset, especially when the government announced the 'bargain' price of \$112 million for 24 aircraft after a price of \$200 million had been widely rumoured. There was a striking absence of public discussion of the implications of rising costs and technological complexity, or of Australia's need for this rather limited form of 'deterrent'.

The lack of informed public debate saved the government's cost claims from any searching scrutiny. A year before the F-111 order, the journal *Aircraft* had estimated that a new bomber would cost at least \$5 million, and that two squadrons of the A3J Vigilante, the strike aircraft most widely mentioned, would cost \$220 million, an estimate of the 'program cost' of the aircraft, including a full stock of spares.⁷⁶ The \$112 million for the two squadrons of F-111, it was revealed much later, included only one year's spares.⁷⁷ \$112 million was not unreasonable in relation to the American estimates at that time (\$U.S.4.6 million per aircraft, a little less

⁷⁵ See the discussion of research and development above.

⁷⁶ 'Aeronews Roundup', *Aircraft*, September 1962, pp. 42, 43. For a comprehensive discussion of the Australian government's decision, see Hanno Weisbrod, 'Australia's Decision to buy the F-111', *Australian Quarterly*, Vol. 41, No. 2, June 1969.

⁷⁷ *C.P.D. (H. of R.)*, 2 May 1968, p. 1080.

than the \$U.S.5.2 million for the Australian aircraft).⁷⁸ Since a large part of the subsequent cost 'escalation' represents the cost of a long-term inventory of spares, the basic aircraft cost having increased by about one-third, a realistic estimate of the 'program cost' in 1963 would have led to a figure much closer to the \$220 million suggested in *Aircraft* in 1962, and might well have provoked discussion of the merits of purchasing a Canberra replacement at such a cost. The 1968 cost estimate of \$267 million (\$U.S.300 million) was made up as follows: aircraft, \$U.S.143 million; changes ordered by the RAAF, \$U.S.3 million; supporting equipment and spares, \$U.S.120 million; conversion of 6 aircraft for reconnaissance, \$U.S.34 million.⁷⁹

The 1969 cost estimate of \$299 million, announced in Parliament on 23 September, when Australia reaffirmed its intention to purchase the aircraft after a period of uncertainty, included a further \$32 million, essentially a rise in the basic aircraft price, attributed to rises in the cost of materials and labour and modifications accepted by Australia, or especially required for the Australian version.

In addition to the F-111, small numbers of specialised aircraft and missiles have been purchased overseas; the maritime aircraft Orion and Neptune have been bought from the United States at a total estimated cost of \$59.3 million and \$20.5 million respectively; transport aircraft and helicopters have been bought from the United States and Canada for a total cost of around \$100 million between 1958 and 1968.⁸⁰

In addition, one squadron of Bloodhound Mk 1 surface-to-air missiles was purchased from the United Kingdom between 1959 and 1962 at a cost of \$5.2 million, and Sidewinder air-to-air missiles were procured from the United States, beginning in 1959, to arm the C.A.C. Sabre, at a cost probably not much in excess of \$1 million.

There are several noteworthy characteristics of aircraft procurement policies over the period. First is the continuing lack of standardisation, even after a major policy statement of April 1957 calling for standardisation as far as possible with the United States.⁸¹ Second, except where very small numbers are involved, combat aircraft have been built in Australia under licence in preference to purchase overseas. However, the

⁷⁸ Certain charges, e.g. for ground handling equipment, would be a higher proportion of aircraft costs in the case of a small order such as the Australian. T. Alexander, 'McNamara's Expensive Economy Plane', *Fortune*, June 1967, p. 186, gives data for the original American estimate.

⁷⁹ *Report of the Auditor-General 1967-68*, p. 289.

⁸⁰ *C.P.D. (H. of R.)*, 26 November 1968, p. 3286.

⁸¹ Speech by Mr R. G. Menzies, *C.P.D. (H. of R.)*, 4 April 1957, pp. 571-9.

trend since World War II, culminating in the Mirage, has been towards increasing overseas supplies of key components, as aircraft become more complex and the importance of electronic systems, for example, increases. This trend clearly goes a long way towards undermining one of the traditional arguments for local defence industries, namely, that they can meet future requirements for spare parts, which would be especially important if the supplier withdrew the item from service while Australia wished to maintain it.⁸²

It is clear that the manufacture or even the assembly of aircraft in Australia carries penalties of cost and delays in production. The available data do not permit a reliable estimate of the cost penalty, partly because of incompleteness but mainly because it is seldom made clear, in Australian or overseas data, how much of any given figure refers to spares and related items over and above the basic cost of the aircraft. However, there are several reasons why Australian costs might be expected to be relatively high. These include the high cost of locally produced materials and components, high wages (relative to the United Kingdom, but not to the United States), high overhead costs on plant designed to enable the rate of production to be expanded in an emergency, the smallness of the companies and their shelter from competition. Experience suggests that unit costs in Australia in the case of a production run of 200 would be about 60 per cent of those in a production run of 50.⁸³

Despite a number of parliamentary denials of delays in the production of the Canberra and Sabre, Prime Minister Menzies remarked in 1955 that 'on the production rate and cost of producing planes in Australia we would all be getting pretty elderly by the time we got a first-class Air Force'.⁸⁴ A clearer picture emerged from the evidence of Sir Frederick Shedden, Secretary of the Department of Defence, to the Public Accounts Committee in 1956:⁸⁵ one of the locally produced aircraft initially fell considerably behind schedule, but eventually the planned rate of production was nearly achieved, a pattern which was

⁸² In practice it is difficult to find instances of this; it is interesting that an item for the purchase of spare parts for the Sabre from an American supplier appeared in the 1966-7 defence estimates (*Report of the Auditor-General 1966-67*, p. 232).

⁸³ For a scholarly inquiry into the general problem of aircraft production costs see Sturmev op. cit.

⁸⁴ *Sydney Morning Herald*, 13 January 1955, p. 5.

⁸⁵ Australian Parliament: Joint Committee of Public Accounts, *29th Report*, 1956, Minutes of Evidence, p. 46.

to be reproduced in the case of the Mirage.⁸⁶

What scope might the future offer for a small-scale military aircraft industry like the Australian? A merger of aircraft companies may improve the efficiency of licence-built production in the future,⁸⁷ perhaps to the extent of making exports possible. Australian-designed projects would still have to be on a small scale to match the small Australian R and D capacity. A development of the Jindivik drone to provide a cruise missile is one possibility; a similar conversion has been done by the French who have modified the Nord CT20 target drone to become a surface-to-sea and sea-to-sea missile. The possibility of co-operative projects with allied or friendly countries, with the benefits of shared R and D costs, and larger markets, could also be explored.

DISCONTINUITIES

Two principal criticisms have been levelled at Australia's procurement policies. Firstly, they are criticised for their haphazardness, their apparent stop-gap character, their neglect of long-term planning, manifested in delays in reaching and implementing decisions, in sudden reversals of policy, and failure to achieve stated policy goals. These deficiencies are frequently attributed to faulty organisation: an old-fashioned defence structure which magnified inter-service rivalries while subjecting the services to arbitrary financial controls—arbitrary in the sense that they were not related to the consideration of strategic options, and thus prevented the effective co-ordination of defence policy.⁸⁸ Secondly, throughout the period of Liberal rule, but more especially in the defence build-up of the 1960s, Labor spokesmen in particular have criticised the extent of overseas procurement.

There is no lack of examples of delays and reversals of policy, but whether these are correctly attributed to faulty organisation is more debatable. A few examples may bring out the diversity of problems associated with the policy discontinuities referred to above: delays in aircraft production have already been referred to, and seem to reflect

⁸⁶ *Aircraft*, Vol. 45, No. 6, March 1966, p. 24.

⁸⁷ Such a merger would probably be feasible only between C.A.C. and G.A.F., see *Australian Financial Review*, 14 November 1968, for a discussion of a possible merger.

⁸⁸ For a forceful critique along these lines, see B. D. Beddie, 'Some Internal Political Problems', in John Wilkes (ed.), *Australia's Defence and Foreign Policy* (Sydney, Angus and Robertson for Australian Institute of Political Science, 1964).

mainly the inevitable difficulties of a small industry in meeting technological advance, and the deliberate stretching out of production in order to keep the industry alive.

Delays in decision-making, notably on replacements for the Sabre and Canberra, are of greater interest. Official references to the replacements began as early as 1954, and the first of four missions to evaluate new aircraft visited the United States and the United Kingdom the following year. By 1957 the government had given many indications that it would acquire the Starfighter, F-104, as a successor to the Sabre.⁸⁹ There were reported disagreements between the RAAF and the aircraft industry on whether the F-104, like the Sabre, should be modified to be fitted with a Rolls-Royce engine.⁹⁰ In his defence statement of 4 April 1957, Prime Minister Menzies said:

Our present planning and preparations are proceeding on the basis of an operational contribution to allied strategy of highly trained men armed with the most modern conventional weapons and equipment. The Air Force was to be equipped with 'an aircraft equivalent in performance to that of the Lockheed F-104'.⁹¹

The decision, announced in September 1957, not to acquire the F-104, was justified mainly on the ground that it was too specialised for the RAAF (a rather unconvincing argument in view of the diversity of roles it has been assigned in Europe, and one which surely applied equally to the Mirage, let alone the F-111). But irrespective of the merits of the decision, it reversed the stated policy of equipping the Australian forces with the most modern weapons.

The F-104 decision was the most remarkable instance of changes in apparent governmental intentions and discontinuity between the stated aim of defence policy and the weapons actually provided.⁹² Resounding declarations of strategic purpose counted for little against the cost, which must have involved the breaching of the \$400 million ceiling on the defence budget. It is difficult to avoid the conclusion that this was the decisive consideration.

⁸⁹ This was claimed, for example, by H. Weisbrod, 'Australia's Defence Structure Reorganisation, 1957-58', Australian National University Department of International Relations, Work-in-Progress Seminar, 1965, p. 2.

⁹⁰ *Aircraft*, July 1956, p. 4.

⁹¹ *C.P.D. (H. of R.)*, 4 April 1957, pp. 575, 576.

⁹² The changes of mind over the Fleet Air Arm, referred to earlier, represent a more straightforward case of the revision of policy in the light of a loosening up of budgetary restrictions, reassessment of life of existing aircraft, and reassessment of the practicability of flying the next generation of aircraft (Tracker and Skyhawk) from the carrier *Melbourne*.

Furthermore, the government failed to fulfil even a modest version of its declared program (establishing a professional force capable of rapid deployment overseas, even if lacking the more advanced air support), as the need to introduce conscription to meet the Malaysian and Vietnam emergencies was to demonstrate. The weaknesses of the procurement policies of the later 1950s were not *sui generis*, but part of the wider failure to think through to a consistent conception of the functions of the Australian forces, and to act on such a conception. Questions of organisation were secondary. There is no reason, for example, to attribute changes of mind over the F-104 to organisational weaknesses, and, more generally, there is no reason to suppose that the government was unaware of the deficiencies which kept the forces below strength and operational readiness, or of service proposals to remedy the latter.⁹³ Rather it was prepared to tolerate deficiencies of a kind which had been normal in peacetime in the past, but were no longer normal elsewhere with the heavy defence spending of the present.

AUSTRALIAN VERSUS OVERSEAS PROCUREMENT

THE domestic defence industry was vital to Australia in World War II, as not even the United States was in a position to give a high priority to supplying Australia. It was the policy of the postwar Labor government, followed by the Liberal governments, to maintain the nucleus of a naval ship-building and military aircraft industry which could be expanded in an emergency. To an increasing extent, however, the more sophisticated items have been purchased overseas. In the five years 1962-3 to 1966-7, orders placed overseas amounted to \$1,040 million, nearly 50 per cent more than orders placed in Australia (\$713 million).⁹⁴

The Labor Party has traditionally been critical of overseas defence procurement and has called for support for the local defence industries, increasingly so with the recent high import levels. In reply, the government argued that many weapons either could not be produced in

⁹³ Sir Frederick Shedden (Secretary of the Defence Department), who caused a sensation by stating before the Public Accounts Committee in 1956 that the forces were not ready for mobilisation either in 1953 or 1956, went on to say that the government 'is aware and has long been aware of what are the deficiencies of the Services', but had not been willing to meet the cost. Australian Parliament, Joint Committee on Public Accounts, *29th Report*, 1956, Minutes of Evidence, pp. 43-4.

⁹⁴ *C.P.D. (H. of R.)*, 16 October 1968, pp. 2048-9. The figures are for orders placed, not actual expenditure, which would lag behind the orders, but in fact average 53 per cent of total procurement for this period (see Table 1).

Australia, or could be produced only with too great a delay or at undue cost, for example when only small numbers of an item are required. However, there has recently been a tendency for the positions of Government and Opposition spokesmen to converge. The Deputy Leader of the Parliamentary Labor Party, Mr Lance Barnard, has formulated a more closely reasoned version of the traditional Labor position, and the Minister for Defence, Mr Allen Fairhall, in many speeches in 1968-9 spelled out a new approach aimed at encouraging greater local procurement and Australian participation through subcontracting in overseas weapons projects.

Mr Barnard argues for a policy of stimulating Australian defence industry through an upgrading of defence R and D, which was relatively high under the five year plan of the post-war Labor government (13.5 per cent of the defence budget, admittedly mostly for Woomera). Such a policy should not be over-ambitious but rather 'a modest programme limited essentially to Australian tactical requirements'.⁹⁵ Even though Australia could not hope to produce the most complex weapons systems, it should make sub-systems wherever possible, and should insist on offset arrangements in other cases.

The new approach formulated by Mr Fairhall, similar in outline, was more fully developed, especially with regard to the use of defence contracts as an incentive to raise the technological and managerial level of Australian industry.⁹⁶ The new approach has four aspects. First, local procurement is to be encouraged directly by greater liaison with industry in the formulation of equipment plans. One of the tasks of the new Defence Science organisation in the Defence Department is to work with the Department of Supply and the services to this end.⁹⁷ A \$600,000

⁹⁵ L. H. Barnard, 'Increasing Stresses and Strains in Defence Policy', *Australian Financial Review*, Annual Defence Survey, 2 December 1968, p. 17; *Australian Defence—Policy and Programmes*, Victorian Fabian Society Pamphlet 18, January 1969.

⁹⁶ See reports in *Australian Financial Review*, 17 October and 7 November 1968, 2 April, 13 May, 8 July, and 26 August 1969; *Canberra Times*, 1 February 1969. Also *Defence Report 1969*, p. 11.

⁹⁷ *Defence Report 1968*, pp. 8-9. Defence Minister Fairhall has elsewhere admitted that there was some force in one of the frequent criticisms of procurement policy: 'in the past insufficient notice has sometimes been given for industry to develop the necessary special skills in a satisfactory time scale . . . I have instituted new procedures whereby appropriate Services requirements are made available to industry advisory committees as soon as they are finalised within the Service concerned' (*Australian Financial Review*, Annual Defence Survey, 2 December 1968, p. 14).

contract with Amalgamated Wireless (Australasia) Ltd for the development of micro-electronic technology, in May 1968, pointed to a new willingness—on however limited a scale—to support industrial research relevant to defence. In March 1969 a Defence Industrial Committee, with senior business and official membership, was established with wide terms of reference, including the power to recommend industrial participation in research, development, and production for overseas as well as Australian defence needs and to advise on all aspects of Australian as against overseas procurement.⁹⁸

Second, Australia will seek offset arrangements as part of any future major overseas procurement purchases. On one occasion this was formulated in terms of local projects equal to the foreign exchange costs of the overseas purchase, but typically, and more realistically, the amount of the offset has been left unspecified. This general policy brings Australia in line with most major arms purchasers.

Third, offset is envisaged largely in terms of subcontracting either within the project ordered by Australia or any other defence project in which Australian industry can supply relevant items. This broadening of the field of possible offset projects has the effect of establishing defence subcontracting as an area of industrial opportunity in its own right, especially in view of the widely reported attitude of American firms—a willingness to take advantage of comparative cost advantages wherever they find them, but reluctance to make any special provision for any particular overseas suppliers.⁹⁹

Fourth, the strands of the 'Fairhall doctrine' are drawn together in the suggestion that governmental stimulus (e.g. through research and development projects), competition for subcontracts in the very demanding American environment, and the incentive of wider home and export markets may induce Australian firms to advance more rapidly, technologically and managerially. The indications are that Mr Fairhall's successor, Mr Malcolm Fraser, will seek to maintain the same general policy towards procurement.

By far the largest program announced or more accurately foreshadowed under the new procurement philosophy is the project for an Australian designed and built light destroyer. Tenders for a preliminary design study were called in 1969 and in July 1970 the \$860,000 contract was awarded to Y-ARD (Australia) Pty Ltd, a subsidiary of Yarrow-

⁹⁸ *Australian and Australian Financial Review*, 10 March 1969.

⁹⁹ See, e.g., *Australian Financial Review*, 24 November 1969 (special Defence Survey) and 11 December 1969.

Admiralty Research Department, against competition coming especially from Litton Industries. This suggests that the ships of the RAN will remain, if not British-designed, then at least under British design influence. Although a desire to improve Australia's capacity for ship designing was a factor in the decision, what was probably decisive was that neither present British nor American designs are suited to Australian conditions, the former being governed by NATO requirements (e.g. relatively short range), the latter being larger than is deemed necessary.¹ It is intended that the new destroyers will eventually replace the Daring and River class vessels; there could also be an export potential for a multi-purpose long-range light destroyer unless costs are too high.

The problems for the new policy are not far to seek. The most basic issue is whether Australian industry has sufficient resources or sophistication to play the role assigned to it, except on a very modest scale. If Western Europe is preoccupied with the 'technology gap', what prospect has Australia of bridging it? Some indication of Australia's position with respect to advanced technology is given by comparative data for research and development carried out by business enterprises (as distinct from defence R and D discussed earlier). For Australia, this has recently been estimated as \$35 million per annum, or 0.15 per cent of the GNP.² For certain OECD members closest to Australia in GNP, industrial R and D for 1963 was as follows (in \$U.S.):³

Belgium	\$95 million	(0.68% GNP)
Canada	\$212 million	(0.53% GNP)
Netherlands	\$195 million	(1.34% GNP)
Sweden	\$175 million	(1.09% GNP)

Data for the electronics industry, the key industry for advanced weapons systems, are not available, but some impression of Australia's position may be gained by comparing Australia's estimated \$5.6 million R and D expenditure in the electronic and light electrical field in 1967 with Belgium's \$14.4 million and Sweden's \$38.2 million expenditure on R and D in the electrical machinery and apparatus field in 1963.⁴

Such data serve to suggest how far Australian industry falls short of the capacity to develop advanced weapons systems, and throw some

¹ Naval press briefing, reported in *Australian Financial Review*, 15 October 1969.

² 'Australia lags behind world in industrial R and D', *Australian Financial Review*, 16 August 1968.

³ *A Study of Resources devoted to R and D in OECD Member Countries in 1963/64* (in series International Statistical Year for Research and Development, OECD, Paris, 1968), pp. 156-7.

⁴ *Ibid.*, pp. 156, 157.

light on the trend, observed above, towards an increased import content in Australian-produced items such as aircraft. They suggest probable limits to the scope for subcontracting in major projects. However, it seems likely that Australia could produce a wider range of systems, or at least subsystems, under licence, even in the electronic field. Several of the smaller European countries took part in the production under licence of Hawk, Sidewinder, and Bullpup missiles, some with a smaller industrial base than Australia.⁵

Industrial spokesmen at times make large claims on behalf of Australian industry. For example, a spokesman for an electronics firm stated in 1965 that local industry could supply 75 per cent of Australia's needs in this field.⁶ This is unlikely, bearing in mind the heavy cost of electronics in the most expensive recent purchases—the Mirage, the F-111, and the Charles F. Adams destroyers, all close to the frontier of development in avionics, control and guidance systems. A more plausible view is that of Alex Hunter:

One is forced to conclude that the further Australian defence moves into electronically sophisticated weaponry, radar detection and communications, the less the contribution the local industry can make to these important, but expensive, innovations.⁷

While this suggests major limits to Australia's defence potential, it does not rule out the possibility of offset arrangements of a more modest kind, or indeed the gradual diversification of Australian defence industry within these limits. Labour costs are in Australia's favour, in relation to the United States, in the construction of aircraft components. Given all the other variables likely to enter into the decisions of an American firm, these are not often likely to be decisive except where there is the added incentive of a major sale.

Australia's chances of obtaining offset or licence arrangements, on the other hand, will be related to the extent of competition to supply the

⁵ Under the NATO *Hawk* program, France, Germany, Italy, the Netherlands, and Belgium built 4,000 missiles at a cost of \$U.S.667 million, estimated to be 20 per cent higher than the cost of American construction. Belgium, Denmark, Germany, Greece, the Netherlands, Norway, Portugal, and Turkey took part in the much smaller *Sidewinder* program (5,000 missiles, cost \$25 million)—Robert Rhodes James, *Standardisation and Common Production of Weapons in NATO, Part III of Defence, Technology and the Western Alliance* (London, Institute for Strategic Studies, 1967).

⁶ *Aircraft*, January 1966, p. 13.

⁷ Alex Hunter, 'Industry and Defence in Australia', in T. B. Millar (ed.), *Australian-New Zealand Defence Co-operation* (Canberra, Australian National University Press, 1968), pp. 54-5.

item in question, as may be illustrated from the new procurement decisions announced in March 1970. The \$23 million order for a light helicopter would depend, it was stated, on the prospects for local manufacture and commercial sales: either of two types (the Bell OH 58A or the Westland-Sud SA 341) was technically satisfactory.⁸ On the other hand, the order for two additional submarines (\$37 million) could scarcely have been other than for the existing type, the U.K. Oberon class which cannot be constructed in Australia, giving little leverage for offset negotiations.

It is too early to measure the new policy against the yardstick of actual experience. There has been a hiatus in major defence orders for several years, a consequence of the earlier heavy purchasing and, possibly, delays imposed by the new organisation and planning procedures. Precedents have been made in subcontracting, so far on a very small scale.⁹ Two Australia-based firms, Philips Industries and Hawker de Havilland, have entered into arrangements with the government of Singapore, the former to manage a new electronics company, the latter to undertake the maintenance of Singapore's military aircraft, thus pointing to a new means by which the defence industries may contribute to the balance of payments.¹⁰

In the period since World War II the *rationale* for Australian defence industry has changed fundamentally, and now calls for rethinking. Technological change has ruled out the degree of self-sufficiency that was possible, and necessary, in World War II, and a protracted non-nuclear war of that nature now seems a remote contingency. However, a danger which has become evident in the 1960s is that foreign arms suppliers may exploit a purchaser's need for spare parts, ammunition, or specialised maintenance equipment, to control the defence or foreign policy of the purchasing countries—a danger that has been dramatised by the India-Pakistan war of 1965 and by Franco-Israeli relations. Australia has been conscious of this danger in the case of the Mirage, and has even met with attempts by Switzerland to restrict the use of the Pilatus Porter light aircraft in Vietnam and by Sweden to prevent use of Carl Gustav anti-tank weapons. This danger can be reduced, but never

⁸ *Australian Financial Review*, 11 March 1970.

⁹ In February 1969 Australia signed a contract to build wings for the General Aircraft Corporation's GAC-100, at the Government Aircraft Factory. In May 1969 Hawker de Havilland won a contract for the manufacture of helicopter tail rotor hub assemblies, and later in the year Litton Industries called for subcontracting bids in Australia for work on a radar defence system.

¹⁰ *Australian Financial Review*, 24 February and 3 June 1969.

wholly eliminated, by acquiring large stocks of spares and maintenance and repair facilities: combat use of aircraft, for example, will use up spares more rapidly than peacetime use. Australia tends for logistic reasons to hold unusually large stocks of spares. But the cost of wartime stocks (which could be only imperfectly estimated) would place too heavy a burden on defence budgets. In practice, these considerations may lead Australia to rely more heavily on the United States for advanced weapons, and certainly to avoid such unpredictable suppliers as France. It is difficult to imagine Australia's becoming involved in any war unless it has the general support of the United States. Logistic dependence is secondary to broader strategic dependence.

If self-sufficiency is an unrealistic objective, what are the advantages of Australian defence production? The most obvious objective is to reduce the balance of payments cost of defence procurement. This has to be formulated with some care, since there is a good *prima facie* case for extensive defence imports. Advanced equipment, requiring heavy R and D investment and technologies scarcely present in Australia, is a field in which comparative costs strongly favour overseas suppliers, as some of the earlier examples indicate. There is little to be said for paying very high costs to produce part of an advanced weapons system, if vital components must still come from overseas. However, it is sound on broad strategic grounds to incur some extra costs for local production (at least up to the level of protection of comparable civilian industry). The trade balance will not always be favourable, and defence purchases, being one of the imports directly in the hands of the government, are likely to suffer in times of balance of payments difficulties, especially if they constitute a very large item. Present policies, provided they are implemented effectively, are well directed towards the general aim of maximising local production within the scope of Australia's present industrial technology.

The second advantage of local defence production would be its influence as a stimulus to Australian industry. Provided the aspirations here remain realistic, there is everything to be said for a policy which presses industry to become more competitive instead of having recourse to tariff protection. Perhaps the main question to be raised in this context is whether the government should not be envisaging rather more direct intervention to upgrade industry's potential to compete more effectively for subcontracts and exports. The \$600,000 contract for microelectronics stands alone as an example of what might be involved.

The period studied here falls naturally into three phases. In the first,

up till the early 1960s, defence procurement was constrained by the \$400 million budget ceiling, which in the early 1950s appeared sufficient for modest peacetime and small-war forces but by the early 1960s fell far short of this. In the heightened tension of the mid-1960s the government responded to the new technological environment by large-scale, hasty and at times ill-judged overseas purchases or orders. In the breathing-space at the end of the decade, no longer constrained by an unchanging budget ceiling or pressure for an immediate buildup, it has formulated a general policy and reorganised the procurement process with a view to achieving more integrated weapons choices and a much greater Australian content. The new policies appear to be soundly conceived but geography and technology render Australia's procurement choices more difficult than those, for example, of a small European state. Whether Australia rises to the challenge or succumbs to the difficulties will depend in a large measure on the skill of its political leaders, but certainly it will not be assisted by turning a blind eye on the difficulties.

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