Chapter 4

Going up

4.1 As noted in the introduction, Australia was an early leader in rocketry. At its peak, Woomera in South Australia was the world's second most heavily used launch site, after Cape Canaveral and launched Australian, European and American rockets.[1]

Should Australia be a launch site?

"Set the controls for the heart of the sun,
The heart of the sun"
Pink Floyd, *Set the Controls for the Heart of the Sun*, (Lyrics: R. Waters)

"For here am I sitting in a tin can
Far above the world
Planet earth is blue
And there's nothing I can do"
David Bowie, *Space Oddity*, (Lyrics: D. Bowie)

4.2 The committee has heard conflicting views about the current state of the Woomera rocket range. One view is that the Woomera facilities are now far from world-class for rocket launching:

> …there would be considerable investment required to resurrect any role that it might aspire to...[2]
>
> As far as using space is concerned, it would require some significant investment in infrastructure to bring it back to the sorts of things [rocket launches] that it was doing in the fifties.[3]
>
> a fair bit of investment is needed to bring some of the communications and telemetry and some aspects of the launching facilities into the modern era.[4]

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1 Senate Standing Committee on Transport, *Communications and Infrastructure, Developing Satellite Launching Facilities in Australia and the Role of Government*, April 1992, pp 1 and 6.

2 Dr Michael Green, DIISR, *Committee Hansard*, 16 May 2008, p. 3. An even more sceptical view was expressed by Hendrik Gout, 'Lost in Space – the Woomera rocket fizzer', *Independent Weekly*, 13 January 2007.

3 Air Vice Marshal Geoffrey Brown, Department of Defence, *Proof Committee Hansard*, 29 July 2008, p. 14.

4 Professor Boyce, Australian Hypersonics Network, *Proof Committee Hansard*, 29 July 2008, p. 21.

> I think things like launch capability are now closed off to us; it is just too competitive for us to compete.[5]
>
> Do I see Woomera as a potential space launch site in the future? The answer is: it could be, but I do not believe that is where Australia should be investing its money…[6]

4.3 On the other hand, the South Australian government describe Woomera as 'an active space launch site'.[7] Others also praised it:

> The Woomera test range is a facility that is unique in the world. It is unfortunately literally gathering dust, but it is a test range that many countries would love to have. It is a capability that Australia can really build on uniquely to its own interests.[8]
>
> …they, fortunately, kept Woomera going, we still have that facility and the DSTO have facilitated us flying scramjets…the great space centre at Woomera…[9]
>
> …for the purpose of testing systems and testing re-entry capabilities Woomera is fantastic. The fact that it is a land range means the rest of the world look at it in envy and they would like to come for many flight experiments… one of the big advantages is that you can recover the bits of an experiment after the experiment has happened and from the damaged bits you can work out what happened.[10]
>
> Woomera is perhaps one of Australia's most important strategic military and security assets because it is the world's largest land based test range.[11]

4.4 A possible reconciliation of these views is that Woomera is currently not suitable for large scale launching of orbital payloads (for which launch sites closer to the equator are desirable) but suitable for smaller suborbital launches and testing. The Australian Space Research Institute has been a regular user of the Woomera rocket range since 1993 giving students the opportunity for involvement in over 100 small-scale launches using 'sounding rockets'.[12]

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5 Mr Matt Miller, SMS, *Committee Hansard*, 23 May 2008, p. 28.

6 Mr Brett Biddington, *Proof Committee Hansard*, 29 July 2008, p. 52.

7 South Australian Government, *Submission 79*, p. 3.

8 Dr Andy Thomas, *Committee Hansard*, 23 May 2008, p. 21.

9 Professor Richard Morgan, Centre for Hypersonics, *Proof Committee Hansard*, 29 July 2008, pp 16-8.

10 Professors Russell Boyce and Raymond Stalker, *Proof Committee Hansard*, 29 July 2008, p. 22.

11 Mr Brett Biddington, *Proof Committee Hansard*, 29 July 2008, p. 52.

12 Mr Gary Luckman, *Proof Committee Hansard*, 16 May 2008, pp 33–4. The rockets were donated to the Institute by the Australian Government on the condition that ASRI use them to promote space science and engineering. The rockets were military rockets that had ended their useful life, and were modified to launch payloads.

4.5 At various times, Darwin, Christmas Island and Cape York have been suggested as possible Australian launch sites, as all are closer to the equator, but nothing eventuated.[13]

Space elevator

4.6 The Indian Ocean off Western Australia has been identified as an ideal location for a 'space elevator'; a thin carbon nanotube connecting a barge to a space station, along which supplies could be carried up. Construction could draw on the WA oil industry's expertise in constructing offshore platforms, as well as its material resources. NASA is currently investigating the feasibility of the project. [14]

Should Australia be researching/designing propulsion systems?

"And I think it's gonna be a long long time
Till touch down brings me round again to find
I'm not the man they think I am at home
Oh no no no I'm a rocket man
Rocket man, burning up his fuse up here alone"
Elton John, *Rocket Man* (Lyrics: B. Taupin)

"Hey, wish that was me up there--
It's the biggest rocket I could find,
And it's holding the night in its arms"
Kate Bush, *Rocket's Tail* (Lyrics: K. Bush)

4.7 Australian engineers have had some success in this area. The DIISR commented:

> Professor Allan Paul, with his hypersonic scramjet research, has been successful in winning quite a large contract from the Americans to further develop that work...[15]

4.8 Scramjets are supersonic combustion engines with potential aerospace applications. They do not have to carry most of their propellent as they can draw oxygen from the atmosphere. Australian research is being conducted under the Australian Hypersonics Initiative, bringing together the University of Queensland, ANU, Australian Defence Forces Academy, the Defence Science and Technology

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13 Senate Standing Committee on Transport, *Communications and Infrastructure, Developing Satellite Launching Facilities in Australia and the Role of Government*, April 1992, especially Chapter 4; Dr Michael Green, DIISR, *Committee Hansard*, 16 May 2008, p. 4; J. Laing, 'Go for launch!', *Australasian Science*, March 2002; M. Dapin, 'Fantasy Island', *The Age*, 9 August 2008.

14 Western Australian Department of Industry and Resources, *Submission 85*, pp 17-8.

15 Dr Michael Green, DIISR, *Committee Hansard*, 16 May 2008, p. 2.

Organisation and the state governments of Queensland and South Australia. Hypersonics refers to speeds about five times the speed of sound (ie mach 5).[16]

4.9 An ANU team has recently developed two revolutionary designs for rocket engines; an ion engine and a plasma engine.[17] The work has attracted interest from the European Space Agency.

4.10 The committee heard of their potential:

> Scramjets are the potential means of reducing this cost. DSTO are pioneering the way in flight testing them. The first application will be like unmanned missiles and, if that is successful, we can look at a high-speed cruise around the world. You could maybe have an hour's transit time between continents. You could have return trips between continents that revolutionise the way we do business. Following on from that, maybe 20 years down the track, we could look at developing scramjets that could give you partial access to space—reusable vehicles with much lower running costs.[18]

4.11 Asked about the timetable for different types of scramjets, the scientists replied:

> There is the unmanned mach 7 one. Maybe we could do that in about five years. If you then look at making it as a transport for intercontinental travel it would be maybe another five to 10 years after that. If you are actually looking at part of a boost system to orbit—it all depends on the funding of course—it would be in the 10- to 20-year time frame…[19]

Australia as a base for space tourism

"Fly me to the moon, let me sing among those stars
Let me see what spring is like, on Jupiter and Mars"
Frank Sinatra, *Fly Me to the Moon,* (Lyrics: B. Howard)

"But somewhere in a private place
She packs her bags for outer space…
I would fly to the moon and back if you'll be,
If you'll be my baby
Got a ticket for a world where we belong"
Savage Garden, *To the Moon and Back*, (Lyrics: D. Hayes, D. Jones)

4.12 There has been increasing discussion about the prospects for space tourism. Some market research suggests space tourism revenues could be around $700 million

16 *Submissions 36, 39 and 49* give more detail.

17 ANU, *Submission 13*, p. 3.

18 Professor Richard Morgan, Centre for Hypersonics, *Proof Committee Hansard*, 29 July 2008, p. 18.

19 Professor Richard Morgan, Centre for Hypersonics, *Proof Committee Hansard*, 29 July 2008, p. 21.

in 2020.[20] The Australian company, Grollo Aerospace, has expressed an interest in offering space tourism experiences.[21]

4.13 The scramjet technology potentially could be employed for tourism. The South Australian Government suggested 'the Woomera site remains a favourite location for…the establishment of a space base for space tourism.'[22]

4.14 Dr Andy Thomas thought Australia was well-placed, but it would not happen soon:

> …Australia provides an ideal forum for many of these high altitude parabolic flights, which is what most of them are... However, the market is still small, so I think it will be quite some time before it would be buoyant enough to have operations in Australia as well as the other planned operations, for example, that in New Mexico that Richard Branson is supporting, and so on. But, ultimately, that could happen.[23]

4.15 The potential for space tourism may be limited by the danger it currently involves:

> Between about 50 and 100 space launches end in disaster—they do not get there or they do not come back. If you are talking about manned space flight, that means we really have to look at the lunatic fringe if we want to get people to fly in space. Those sorts of risks are equivalent to the risks that extreme sportsmen take. Normal people do not do it…The market will not develop until it costs in the order of a few thousand dollars to get into space and you know you are going to come back alive…[24]

Conclusion

4.16 While not opposed in principle to Australia regaining its role as a launch site if a commercial venture wishes to do so (whether for satellites or tourists), the committee does not see this as likely, nor as something the government should be supporting with taxpayers' money.

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20 Cited by Australian Hypersonics Network, *Submission 36*.

21 Grollo Aerospace, *Submission 54*, p. 1.

22 South Australian Government, *Submission 79*, p. 9. Woomera was also supported as a potential space tourism site by Dr Andy Thomas, *Committee Hansard*, 23 May 2008, p. 21.

23 Dr Andy Thomas, *Committee Hansard*, 23 May 2008, p. 21.

24 Professor Richard Morgan, Centre for Hypersonics, *Proof Committee Hansard*, 29 July 2008, pp 16-8.