

# ROBERT M. HAMILTON

Robert M. Hamilton BA. LLb. MSc.

7 September 2015

Committee Secretary  
Senate Standing Committee on Rural and Regional  
Affairs and Transport  
PO Box 6100  
Parliament House  
CANBERRA ACT 2600  
By email: [rrat.sen@aph.gov.au](mailto:rrat.sen@aph.gov.au)

Dear Committee Secretary

**SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT LEGISLATION  
COMMITTEE INQUIRY INTO THE PERFORMANCE OF AIRSERVICES  
AUSTRALIA**

I refer to my email dated 31 August 2015 and attach my submission to the Senate Rural and Regional Affairs and Transport Legislation Committee Inquiry into the Performance of Airservices Australia.

I am available to provide any additional assistance that the Committee might find appropriate.

Yours sincerely

Robert M. Hamilton

## **SUBMISSION BY ROBERT MAYER HAMILTON TO THE SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT LEGISLATION COMMITTEE INQUIRY INTO THE PERFORMANCE OF AIRSERVICES AUSTRALIA**

### **MY BACKGROUND**

- Former military and civilian fixed wing and helicopter pilot with flying experience in the USA, Vietnam, Australia, New Guinea, Mexico and Antarctica.
- Former Australian air traffic controller with some 16 years control experience at Sydney and Brisbane ATC centers.
- Head Office experience as a Senior Aviation Security Officer and Senior Project Officer Air Traffic Services.
- Bachelor of Arts, Bachelor of Laws and Master of Science in Transport Studies.
- Former Coordinator, Centre for Air Traffic Services University of Tasmania
- Significant experience and published work in the field of air traffic system costing, including costing alternative airspace configurations in the North Atlantic Organised Air Track System and developing a costing model to determine the cost of Australia's entire air traffic services system.
- Particular and historic interest in Australian airspace changes that have occurred since the founding of the Civil Aviation Safety Authority ('CASA') and Airservices Australia ('Airservices').
- Retired barrister and solicitor.

### **MY CONCERNS**

I make this submission because I am concerned:

- That too many recent comments about Airservices, air traffic control and air traffic controllers appear misinformed, uninformed, inappropriate and at times

misleading-I seek to provide history and context to the comments and correct the public record where appropriate and to the extent that I can.

- That Airservices has not accurately provided to the aviation industry and the Australian taxpayer specific details about how ADS-B will be used in Australian airspace, whether it will benefit Australian aviation and what the costs and benefits will be-I seek to ensure, to the extent that I can, that Australia recognises and maximises the benefits obtainable from introducing at significant expense a 4<sup>th</sup> generation air traffic services system.
- About the risk to air safety when history is disregarded in favour of short term narrow objectives-I seek to provide an accurate history of radar in Tasmania and show how public funds were easily spent for no public benefit.
- About Airservices public image problems-I seek to point out the consequences of Airservices' inaccurate public statements and inability to respond to irresponsible and ignorant statements too readily provided by so called 'experts'.

## **SOME HISTORY**

### **Airspace Restructuring creates safety issues**

1. The aviation industry has always been at the forefront of general technological development and Australia, at least until more recent times, has been in the forefront of that industry. The visual/aural range (VAR), distance measuring equipment (DME) and aircraft flight recorders all had their origins in Australia. Commercial exploitation of Australian ideas was left to others, however, and often Australia failed to benefit from its research. Indeed, from the 1960's to about 1980, Australia operated 2 DME systems, Australian DME and international DME. But international DME eventually became the world standard, not the Australian product.
2. Until the arrival of CASA and Airservices, Australian airspace was divided into essentially 3 types: controlled airspace, uncontrolled airspace and military airspace. This configuration was significantly different from that used in other

parts of the developed world, but no one can doubt Australia's safety record when it was in place. It was, however, inhibiting and restraining, and particularly disadvantaged general aviation. Pilot and aircraft standards for flight in controlled airspace were high compared with the rest of the world and too much airspace was controlled.

3. The system was strongly biased toward the airlines and the military, and in the late 1980's the general aviation industry found voice and strongly agitated for airspace change and simplified regulation. Mr Smith was in the forefront in seeking change and it was warranted. He strongly and successfully argued his case and the government of the day set up CASA and Airservices as their instruments of change. They placed Mr Smith in charge.
4. The most immediate, recognisable and significant change introduced by these organisations was major airspace reform. They introduced to Australia a completely new airspace system biased strongly toward international models. This system in the first instance failed for safety reasons well anticipated by industry but ignored at that time by the CASA board.
5. I recall that at the time I opposed the system as unsafe in submission to the CASA board. I recall also that I received a personal telephone call from Mr Smith at which we discussed my concerns. I recall that I thought CASA's proposals unsafe for 3 reasons: the raising of controlled airspace at Launceston from ground level to 10,000 feet was unnecessary and potentially unsafe if air traffic increased in Tasmania; the removal of air traffic control for coastal routes between Newcastle and Port Macquarie would raise significant and dangerous conflict between aircraft climbing and descending on a 2 way route; and removing controlled airspace into Kununurra left another 2 way route without control.
6. Within days of its introduction, CASA's first attempt at airspace reform resulted in extremely serious conflicts on the Newcastle-Port Macquarie route and within a reasonable time thereafter a separation breakdown occurred in the Launceston area. The first airspace system was subsequently withdrawn and reworked and a second version was safely introduced. I neither commented upon nor opposed the introduction of the second airspace reform.

## **Technological advances fail to turn into cost advantages**

7. These major airspace reforms occurred at a time of major advances in aircraft technology, particularly in regard to navigational accuracy and aircraft instrumentation and automation of regular public transport aircraft. The airline industry quickly adapted to the new technology and wanted direct tracks between arrival and departure points, great circle routing over significant distances and reduced lateral, longitudinal and vertical aircraft separation standards. They wanted to maximise the benefits of the new technology but they were constrained in their desire to do so by an air traffic control system that was built around an airspace structure reliant upon ground based navigation aids.
8. The same cost/benefit argument that Mr Smith now raises over the mandatory installation of ADS-B arose then over the costs and benefits associated with mandatory installation of what was then modern equipment (transponders, Mode C transponders that provided an altitude readout capability and greater capacity VHF radios). That argument, I recall, was resolved by inertia and time. Eventually, the equipment became the worldwide industry standard, costs came down and everyone had it. That is what I believe will again occur in Australia in the absence of a mandate for rapid installation of ADS-B.
9. However, what is perhaps not known, or understood or yet to be academically considered is that the constraints of the airspace structure based upon ground based navigation aids and the lengthy period permitted for introduction of the new equipment meant that the Australian aviation industry never enjoyed the full benefits that the new technology brought with it. It still doesn't!

## **A MODERN AIRSPACE SYSTEM: CONCRETE PLAN OR MERE VISION?**

10. Airservices now proposes the introduction of new 4<sup>th</sup> generation technology (ADS-B), says that the new system can provide significant cost savings to industry and wishes to mandate industry compliance over a short time period so that it can maximise industry benefits ('the mandate' or 'mandatory document'. This refers to CASA document NFRM 1105AS). This is an

admirable objective worthy of support. But as the mandatory document points out, there is an industry cost and general aviation is asking about the benefits.

### **A dream or a plan?**

11. It seems to me that this is Mr Smith's question, and it's a fair one. But permit me to widen its scope and ask: What's in it for the entire industry, not just general aviation? Mandating a short period for equipment purchase and installation is a first step toward avoiding the issues of the past but it increases the front end costs to the industry. The danger, though, based on past experience, is that the industry will bear high initial costs for benefits that will arrive only slowly and will never be maximised.
12. The industry's objective now is the same as it was previously: it will have the new equipment and it will want to maximise the benefits that it will bring. And once again, any benefits and the extent of any benefits can only be provided by and known to Airservices, for it is the Australian air traffic system manager and it appears the only organisation that seems to know what the benefits will be for Australian users. But does it?
13. My reading so far suggests that Airservices and CASA demonstrate some knowledge of what ADS-B can do generally, but Airservices has not revealed its capacities or limitations within Australian airspace, how it will be used, what the benefits will be and when any benefits will be realised. Airservices plan, to me, appears more visionary than detailed.
14. Permit me to provide 4 real world examples of my concern. For the last 45 years aircraft departing Sydney for Brisbane have flown a track to West Maitland then Casino then Brisbane, or it seems recently to Casino, then Coolangatta, then Brisbane. Will this new equipment enable pilots to routinely plan and ATC to routinely permit a normal flight track from 5 miles east of Sydney direct to an 8 or 10 mile final approach at Brisbane? If not, then where is the gain to industry?
15. Or, aircraft are landed 3 miles or 2 minutes apart at our major airports. Will this equipment improve on that and the chronic holding delays over

Coolangatta? I doubt it and the result-no cost saving. Or, there used to be a separation standard for properly equipped aircraft of 10 miles either side of planned track. Will the new system permit a lesser standard? If not, then no gain to industry. And another example: basic radar separation is 5 miles plus tolerances, or sometimes 3 miles. Can this be bettered? If not, then no gain to industry.

16. Airservices needs to show what changes it intends, not what changes it believes are possible. And then it needs to accurately, reliably and in greater detail cost and report to industry and government on the savings that it intends to deliver and on what time period it intends these savings will occur.

### **Costings fail the accuracy test**

17. Airservices costings, at least as stated in CASA's ADS-B mandate, appear more a back of the envelope wish list than any accurate and supportable cost/benefit analysis. Until Airservices knows what specific changes it intends to make to the airspace system that it controls, then it cannot know and supportably state the savings that it intends to deliver.
18. An important point favouring the ADS-B mandate's rigid and short implementation timetable is that it avoids a lengthy and piecemeal industry compliance period. The result is an opportunity for industry to maximise benefits from the first day the new system is implemented. This was a major issue when implementing the technological changes I discussed earlier: a lengthy and piecemeal approach to airspace implementation meant industry costs were incurred early and benefits were gained only slowly over a lengthy time period.
19. With strong and detailed strategic and operational planning on the part of Airservices, rigid attention to detail and carefully calculated implementation milestones, for the first time in the history of Australian operational aviation, Airservices and the industry have an opportunity to implement a new air traffic system and airspace management system for Australia on a single date where both parties have the equipment, knowledge and ability to immediately maximise the benefits to all.

20. The industry is getting itself ready; the question is whether Airservices is. And that is of concern because Airservices in my view is yet to accurately and supportably quantify the benefits it intends, much less provide details of how it intends to deliver them.

### **Airservices has a public information issue**

21. Airservices has a significant public information issue. 2 examples of this: In an article in the Australian dated 6 July 2015, correspondent Ean Higgins stated: 'Asked the separation standard in Tasmania below 7,000 feet, an Airservices spokesman said 'in most cases, 20 nautical miles'.' Assuming that the quote is correct, then the answer is not. The correct reply is that no aircraft is separated in Tasmania between 1,500 feet and 8,500 feet because that airspace is uncontrolled and positive separation is not provided. And 20 miles, well that's primarily an enroute separation standard, what happened to the use of procedural arrival separation standards that allow lesser separation? In other words, Airservices public statement in this instance, is incorrect and incomplete.
22. And another example of misleading public information from Airservices, this time from page 7 of CASA's mandatory document itself (I assume that CASA drafted the document on the basis of information provided by Airservices): 'For the large areas outside radar coverage procedural air traffic control applies with a 50 nautical mile procedural separation standard.' The standard referred to is a lateral separation standard relevant to aircraft equipped to use only the existing ground based route structure. But the aircraft using the airspace to which this standard might apply will in at least 99% of instances have modern navigation equipment that permits the use of more efficient standards. Whatever happened to vertical or longitudinal separation standards or lateral separation 10 miles either side of track? The comment, as written, is incomplete and misleading.
23. If Airservices cannot accurately and simply explain an air traffic control issue to the Australian public then it can hardly be expected to wisely reply to nonsensical, irresponsible and ignorant statements, like this quote from Mr



Smith, reported in *The Australian* dated 4 September 2015: 'To ever think that procedural separation-developed in the 1930s was invented-could be as safe or as efficient as separation using radar, as we do in every other capital city in Australia is simply ridiculous.'

24. To think that anyone who knows anything about air traffic control would make such a statement is even more ridiculous. What is worrying, though, is that Airservices has difficulty countering statements like this. It seems too often unable to get its facts right. The result is that its organisational image suffers and it loses confidence with the Australian public, within the aviation industry and among its own staff.

## **RADAR IN TASMANIA-A CASE STUDY OF HOW TO WASTE TAXPAYERS MONEY**

### **History**

25. There was never an issue concerning radar in Tasmania until after CASA and Airservices came into existence. For at least 20 years before that time, aircraft flying into and out of Launceston and Hobart were provided a positive air traffic control service from the time they taxied at either airport until they left controlled airspace. This included positive control from ground level to 10,000 feet.

26. The control provided was procedural and the airspace from ground level to 10,000 feet was controlled from Launceston and Hobart towers. Each tower provided both an approach/departure service and a tower control service. Given the level of traffic at that time, both services were provided by a single controller.

27. An initial objective of the first major airspace changes undertaken by Airservices (the unsafe changes) was to reduce the amount of controlled airspace in Australia to the greatest extent possible. For Tasmania, that meant raising the base of controlled airspace to 10,000 feet and eliminating the approach/departure control service previously provided at both Launceston and Hobart airports.

28. This had 3 effects, of which 2 were significant. First, the pilots of all aircraft between 10,000 feet and the top of the airport control zones needed to provide their own separation. Second, for Launceston at least, it meant that any aircraft completing an instrument approach commenced that approach in uncontrolled airspace and then eventually flew into controlled airspace at low altitude when it entered the control zone. Third, it reduced controller workload at Launceston to separating aircraft in the control zone only.
29. I opposed this change as a safety issue in my submission to the CASA board. I pointed out that positive aircraft separation was simple, logical, minimised pilot communication workload and provided the protection of controlled airspace to aircraft in the critical climb and descent phases of flight. I argued that retention of the existing controlled airspace structure allowed pilots to more readily and safely fly their aircraft without having to worry about who else was sharing their airspace.
30. I lost the argument. I believe that I did because the CASA board held a strong view that the new airspace structure needed to be one where a single size fit all. It was a dangerous view and the board over the following weeks received a strong lesson in the meaning of aviation safety. Nevertheless, the board's second revised and workable airspace system did not change the Tasmanian airspace configuration.
31. I cannot recall when the issue of radar for Tasmania was first raised, but I believe that it was shortly after I left the industry. That would have been shortly after the second airspace structure came into effect. I cannot recall how the issue arose, or why, but I am certain that it did not arise in the context of any particular airspace incident. I can, however, recall how silly I thought it was at the time and how such a waste of taxpayer's money it would be. I have it in mind that the initial costing was said to be something in the order of \$40M.
32. I understand that a radar head was eventually installed on a hill near Launceston, but I do not know the final cost. If my understanding is correct, then it must be that the recently installed radar was a replacement that was

advertised as better than the one it replaced and has created disappointment that the advertised performance has not been achieved.

33. I am not aware when the lower level of controlled airspace in Tasmania was lowered to 8,500 feet, but I note that this level is important because it is a strong indicator that the Tasmanian radar can be shown to provide not only a radar separation service to that level but also a radar surveillance and alerting service. If so, then it has no economic utility and no safety function between 8,500 feet altitude and 1,500 feet.

### **Radar in Tasmania is neither needed nor a cost effective traffic separation tool**

34. Radar in Tasmania is neither needed nor a cost effective traffic separation or surveillance tool because:

- It is not, and cannot, be made fit for purpose.
- The number of affected aircraft movements does not warrant it.
- Its contribution to aircraft safety is minimal and to industry saving is nil.
- For minimal restart cost (probably > \$150,000) procedural control can be reinstated and effectively used to resolve potential conflicts in the Launceston and Hobart areas.

35. There is one caveat to these assertions. A flight school at Hobart Airport might generate enough local movements to raise control difficulties integrating arriving aircraft and there may be both a safety and efficiency case for the installation of terminal radar at Hobart Airport for surveillance purposes, even with terrain limitations.

### **Radar in Tasmania is not and cannot be made fit for Purpose**

36. If, as stated in various news articles, the lower limit for radar control in Tasmania is 8,500 feet, then it can be fairly asserted that any radar will not be fit for purpose in those parts of Tasmanian airspace where it is most needed; that is, from ground level to 8,500 feet. Particularly in the Launceston area

most, if not all, aircraft conflict will occur within this altitude band. This band is also where workload is highest in an aircraft cockpit for departing and, particularly, arriving aircraft.

37. Yet within this altitude band Airservices requires that pilots learn of conflicting aircraft, locate them and resolve their own conflicts while dealing with a fast but decelerating large aircraft flying into a valley surrounded by high terrain often leading to an approach that requires significant low altitude maneuvering within a confined space. Radar cannot be used for monitoring because it is terrain limited and cannot see aircraft, so a warning service cannot be provided. And, given that any climb or descent is within uncontrolled airspace, an air traffic control service is not permitted.
38. Radar will not resolve this dilemma because it cannot see descending aircraft below 8,500 because of terrain limitations, or as recently reported, it just doesn't work. Radar can see only as far as the next hill and significant hills surround the Tamar Valley into which an arriving aircraft is descending. The radar is also on a hill, so it cannot see or monitor aircraft that are flying below the radar head.
39. The outcome is that radar cannot be used to monitor and warn pilots of other aircraft and cannot be used to separate aircraft. If radar cannot be used to separate aircraft and cannot be used to provide an advisory service, then what use is it below 8,500 feet? And if it suffers from significant operational failure then it has no use in any event. Clearly, if this is the case, then the radar is not fit for purpose.

### **The Number of affected Movements in Tasmania does not Warrant Radar**

40. *The Australian* quotes an Airservices statement that 70,000 gross aircraft movements occur per year in Tasmanian airspace. A movement, as I understand it, is a landing, takeoff or transit. So to what does the figure relate? Perhaps it may be that 50,000 of the 70,000 of the movements relate to the flight school conducting training operations at Hobart or that a further large percentage occurs outside the area covered by the radar service, whatever

that may be. What is not known are the movement figures that relate to the service that Airservices is trying to provide.

41. What is needed are the arrivals, departures and transiting numbers for that part of the Launceston airspace that laterally encloses arriving and departing regular public transport aircraft between 8,500 and 1,500 feet. These figures will permit a reasonably accurate calculation of the numbers of potential conflicts that occur in that airspace and which might benefit from a radar service.
42. Given that Airservices has not provided those figures, I should like to suggest that the number of potential conflicts are less than 10 per day. The gross figures do not tell the story, but the question is, should the aviation industry bear the capital and recurring cost of a radar that provides a service to so few aircraft? And can it be that the industry should bear that cost when there is so readily a safer and more cost effective alternative?

### **Radar's contribution to Aircraft Safety in Tasmania is Minimal and Industry Saving is Nil**

43. There appears a misinformed view in the pilot community that radar is the ultimate technology for air traffic control and that radar control is needed if minimal safe separation is to occur between aircraft. Pilots also see radar as a tool that permits greater operational efficiency leading to reduced operating costs. The latter point is valid at most locations in Australia where a radar service is available, but neither point has merit insofar as flights into and out of Launceston or Hobart Airports is concerned.
44. The art of air traffic control is to use the safest and most efficient separation standard to fit a particular control circumstance. It may sometimes be radar separation but often it is not, and radar should not be considered a game changer when it comes to separation safety or operational efficiency. Like any aircraft separation tool, radar has its advantages and its limitations and traps, and given its capital and recurring cost, a financial case needs to be made before installation. And if other equally efficient separation means are available at less cost, then the financial case fails.

45. The issue at both Launceston and Hobart is an inability to provide a radar separation and control service below 8,500 feet. The effect at Launceston is that arriving aircraft are delayed in bad weather. This is not because of lack of radar, but because the instrument approach into Launceston requires low level maneuvering to a position to intercept the final approach path and only one aircraft can safely execute an instrument approach at one time.
46. On the other hand, were there a radar control service to ground level at Launceston, then aircraft could be radar vectored to directly intercept the final approach path and, if there was more than one arriving aircraft, they could be positioned one directly behind the other to maximise runway usage. There would be significant safety and efficiency gains that would make the case for a radar installation in this case. But absent a radar control service to ground level, it is impossible to see operational benefits.
47. Hobart is different: its instrument approach is straight in off the arrival track and no maneuvering is required. In other words, Hobart's airspace is already efficient. This being so, absent the earlier caveat about Hobart's flight school, Hobart accrues no benefit from radar even were a radar control service available.

### **There is a simple and cost effective answer to the Radar Issue**

48. There was never a case for a radar installation in Tasmania and there is yet to be one. Radar was not installed at Launceston out of necessity, but because of ideological rigidity. It is submitted that its use in the Tasmanian context has only become an issue because enough years have passed since installation for Airservices to consider that they are merely replacing a radar that has been there forever and for which a need must have been demonstrated sometime in the past.
49. For at least 20 years before CASA and Airservices were brought into existence, there was a positive air traffic control service from ground level to at least 10,000 feet provided by both Launceston and Hobart towers. It was procedural control and safe control provided by a single tower controller at

each airport. But a continuation of that service ran counter to the one size fits all ideology that CASA had when it restructured Australian airspace.

50. The effect was that CASA removed positive control from the upper level of the Launceston and Hobart control zones to the lower level of upper airspace and left pilots to separate themselves. There was protest at the time from both pilots and controllers but CASA's ideological rigidity prevailed, money was easy to come by and radar, a hard line to public opposition and controller redundancy eventually quietened the opposition.

51. There is no reason why the procedural positive control service cannot be reintroduced if a case were made for it. The equipment is already in place-a single coordination button to Melbourne ATC. All that's needed is for someone to consider its costs and benefits.

52. Would the reintroduction of a procedural control service create delays? Possibly, but only minimally more than the delays inherent in the present system. In any event, the cost of minor delay would be less than the safety benefit provided by controlled airspace. It would certainly be less than launching regular public transport aircraft into uncontrolled airspace, having the industry pay for an unreliable and insignificant radar system and leaving pilots to look out for themselves and their passengers. Radar in Tasmania was always nonsensical, no case was ever made for it and no case can now be made for it given the ready availability of a no cost and safe alternative.

### **Opportunity Cost**

53. Another absent consideration with respect to the Launceston radar is opportunity cost. This raises the question whether the cost of the Launceston radar might be better absorbed in another project, or whether the radar might provide more utility to the industry in some other location. After all, if the radar is of no use in Launceston, then the question should be asked whether it can be used somewhere else.

54. It is interesting that Mr Smith, in his submission, raises issues concerning the Ballina area. I am not able to find aircraft movement details for that airport, or Gladstone Airport, both of which, I suggest, should interest Airservices. But I

note that Ballina appears to have almost doubled its passenger movements in the last 4 years. This being so, then the question arises whether it is close to meriting the installation of a tower, or whether it might benefit from the installation of the Launceston radar there.

55. Other questions also arise when published aircraft movement figures are considered, such as why Rockhampton with 16,856 movements for the first 6 months of this year does not need a radar but Launceston, with 12,146 movements, needs a radar that is not fit for purpose. Might it be that movement of the Launceston radar to some other location and the reintroduction of a positive aircraft separation service in Launceston can be more cost effective, provide more safety benefits and a greater gain to industry than leaving the radar in Launceston? It seems to me that Airservices should at least be considering this contingency, and it should be doing so on a regular basis.

#### **FINAL COMMENT-SUBMISSION BY MR SCOTT BENNETT**

56. Mr Bennett's submission is concerned with an apparent decision by Airservices to transfer the present Adelaide Terminal Control Unit to the Melbourne Air Traffic Services Centre.
57. Airservices has already demonstrated the technical feasibility of so doing and there is no safety case favouring transfer or otherwise, so the issue appears a matter of cost/benefit analysis. That analysis would be close, I suggest, and the outcome would depend upon the analytical categories considered. An example that could sway costs is as simple and political as this: all other factors being equal, is it important that jobs remain in Adelaide? If so, then why move the unit?
58. Mr Bennett's expressed local concerns raise a more serious issue, however, and that is the national need for physical security of Airservices sites, high levels of communication system security, operational redundancy and failover.
59. Australia's air traffic service is of national importance. It not only services air traffic from halfway across the Indian Ocean to halfway to Hawaii and halfway



to New Zealand, but it also provides a highly adaptable nationwide surveillance and communications system of military standard operated by highly disciplined and operationally flexible personnel able to rapidly respond to serious and sometimes unusual national crises and local emergencies.

60. Airservices provides a vital national service to Australia that far exceeds ordinary air traffic control, and decisions relating to consolidation of units, protection of facilities, redundancy of service and the need for rapid failover involve issues of national security as well as system security. The extent of proposed consolidation suggests an increasing need for Airservices to particularly emphasise physical security at its Melbourne and Brisbane centres. Brisbane centre is of immediate concern as it seems vulnerable to any determined physical threat.

## REFERENCES

Ean Higgins, 'Tasmanian pilots told to switch off \$6m radar system', *The Australian*, 6 July 2015.

Matthew Denholm, 'Air body 'lying' over isle radar use', *The Australian*, Date not known.

Matthew Denholm, 'Chiefs assure air safe', *The Australian*, 4 September 2015.

Nick Clark, 'Dick Smith says radar systems at Hobart and Launceston airports a safety risk', *The Mercury*, 9 July 2015.

———, 'Airservices Australia fails to follow own safety plan', *The Australian*, 14 July 2015.

Submission by Mr Dick Smith dated 14 August 2015 with Attachments.

Submission by Mr Scott Bennett, undated.