CASA Child Restraint Research Outcomes - Standards and Guidance Material Changes

7th Triennial International Fire & Cabin Safety Research Conference
Philadelphia, 4th December 2013

Australian Government
Civil Aviation Safety Authority
www.casa.gov.au

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safe skies for all

Overview

- Australian situation
- Research Review
- AS/NZS 1754 & 3629 ‘Child restraint systems for use in motor vehicles’
- CAAP 235-2(2) ‘Carriage and Restraint of small children in aircraft’
- Discussion Paper ‘Review of the carriage of Infants and Children in Aircraft’

Australian CRS use - Road

- Current Australian Road rules require children up to 7 years of age to use CRS.
- First state mandated Child Restraints in cars in 1975 – Victoria. All states follow by late 1970s.
- The first standard for child restraints mandated top tether straps and 5 point webbing based harnesses for FF and RF restraints systems.
- Third generation of Australians starting to use CRS in motor vehicles.

Australian aviation regulations

- All occupants shall be restrained.
- Infants are also allowed to be lap-held or in a CRS.
- Supplemental loop belt the only approved lap-held restraint system.
- Two children can use one seat and seat belt.

- Infants 0<3 years
- Children 3<13 years†

Infant Restraint Options

†

Australian Aviation CRS testing

- 2004 – ATSB B2004/0241 – ATSB/HIE/Britax - Child Restraint in Australian Commercial Aircraft
- 2007 - IN07/1809 – CASA - An Investigation of Automotive Child Restraint Installation Methods in Transport Category Aircraft
- 2009 - ED09/99986 – CASA - An Investigation of Automotive Child Restraint Installation Methods in Transport Category Aircraft - Phase II
- 2011 - CASA/RMIT - A Numerical Investigation into the Crashworthiness of Automotive Child Restraints in Transport Category Aircraft - Phase III

Fabric Style Baby Carriers

- 8-9g peak, ~30ft/s

CASA Infant Restraint Projects

- Focused primarily on automotive CRS compatibility
- Top tether strap performance of Australian Automotive child restraints in an airline seat.
- ISOfix, LATCH and belt restrained CRS in aircraft seats.
- Crash performance affects for adult occupant seated behind a CRS.
- Lap-held infants and their caregiver, and young child in their own seat.

CASA Infant Restraint Project – Results

- Automotive Child Restraints
  - All tested CRS performed adequately without anti-rotation devices*.
  - ISOfix and LATCH reduced CRS excursion.
  - ISOfix reduced head acceleration but increased chest acceleration†.
  - CRS installed by each of the three methods provided an adequate level of protection to the CRS occupant.
  - Child injury levels reduced with rear adult occupant.
  - Adult injury levels slightly increased with CRS installed.
  - For approval of Universal Lower Child Anchor (ULCA), upper tibia bending injury criteria required for aft adult.
  - ULCA load data gathered and available.

CASA Infant Restraint Project – Results

- Non- Automotive Child Restraint Methods
  - 3 year old seated in airline seat - head injury higher than standard adult injury.
  - Practicalities of 3 year old seated position questionable.
  - Measured injury mechanisms for lap held infant high.
  - True injury mechanisms of lap held infant and nursing adults not measurable and subjective.

Conclusions to be drawn

- What came out of all of this research ?
  - Confirmed previous research that children up to ~ four years of age are safer in a Child Restraint.
  - That some Australian Automotive Child Restraints Systems can perform adequately in aircraft without the top tether strap.
  - That an infant lap-held increases adult injury could not be conclusively confirmed.

Research complete

Where to next ?

Approach automotive standards committee

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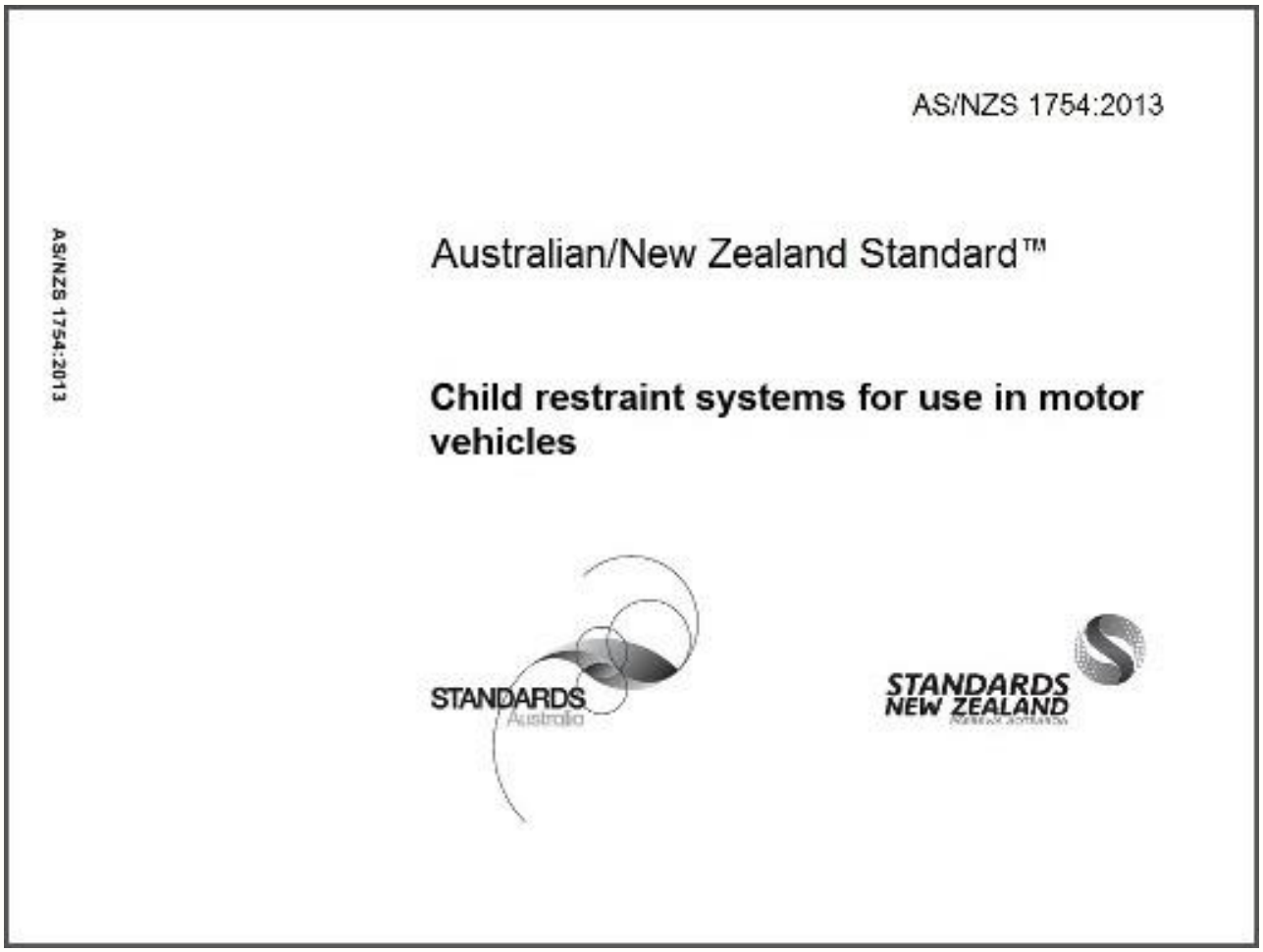
CASA Regulatory Project

AS/NZS 1754 & 3629 ‘Child restraint systems for use in motor vehicles’



AS/NZS 1754 & 3629 ‘Child restraint systems for use in motor vehicles’

- Only Child Restraints made to AS/NZS 1754 may be sold in Australia.
- Only Child Restraints made to AS/NZS 1754 may be used in cars on Australian roads.
- New Zealand additionally allow FMVSS213 and ECE-R44
- AS/NZS 3629 is the test method

AS/NZS 1754 & 3629 ‘Child restraint systems for use in motor vehicles’

- What did CASA ask Standards Australia for ?

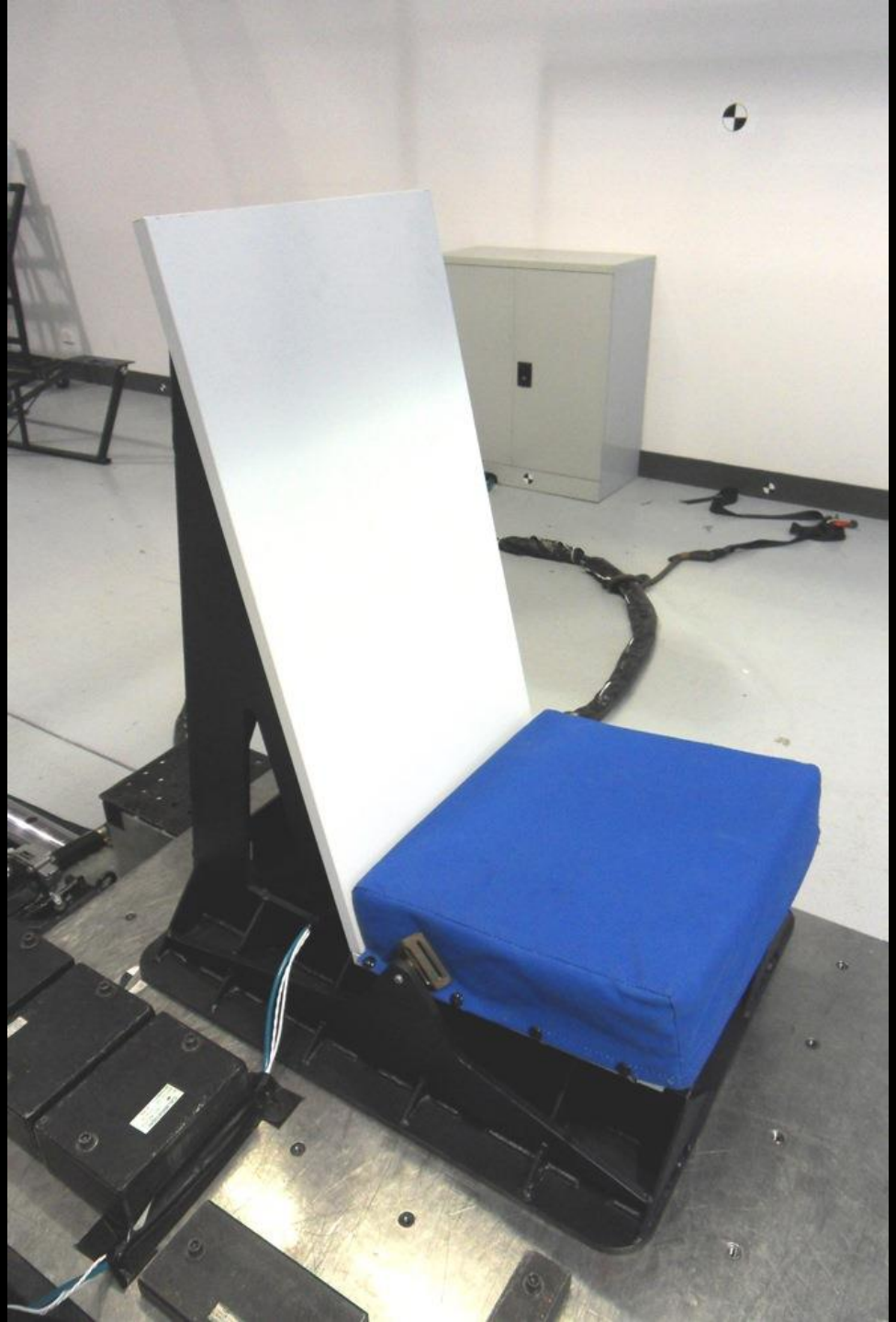
1. That AS/NZS 1754 consider fitment in aircraft as well as in motor vehicles.
2. Fit to aircraft without use of top tether.

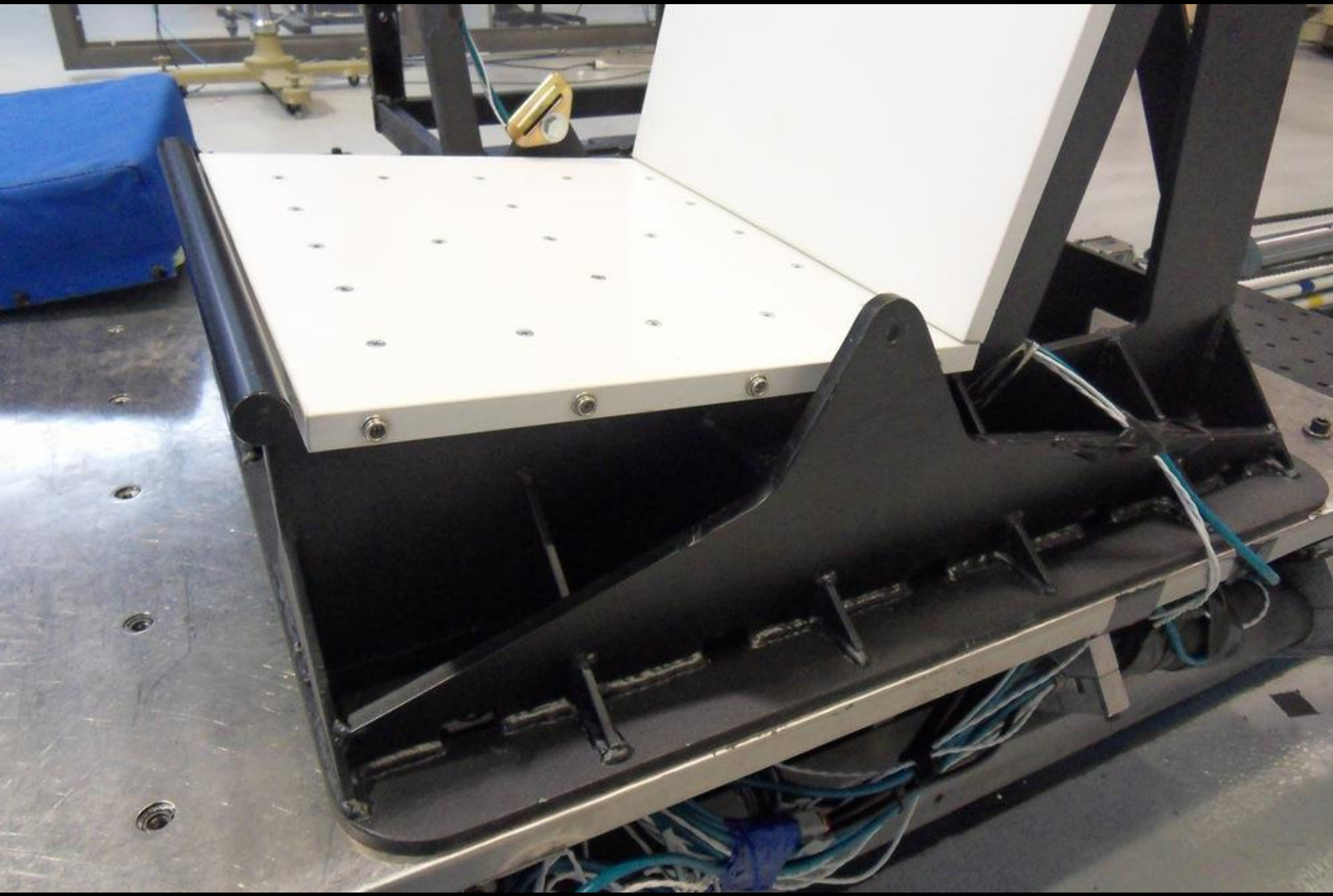
Changes to AS/NZS 1754:2010

- Introduction of ISOfix and LATCH (to be termed rigid and flexible lower attachment connectors)
- Introduction of Type G restraints (forward facing restraint with in-built harness for children 8 to 10 years)
- Introduction of optional low birth weight category for Type A CRS
- Introduction of optional ‘Aircraft Use Criteria’

AS/NZS 1754 ‘Aircraft use criteria’

- Specific frontal dynamic test required in an ‘aircraft test fixture’ to unique a crash pulse
- Dimensional restrictions
- Stipulates contents and markings for:
  - The instruction booklet†
  - The packaging
  - The child restraint*
- Limited to Type A1, A2, A4 and B restraints
- CRS meeting criteria are allowed unique branding





AS/NZS 1754 ‘Aircraft use criteria’ Child Restraint and packaging marking

This Child Restraint System meets the standards for use in aircraft as recommended by the Civil Aviation Safety Authority of Australia and the Civil Aviation Authority of New Zealand.

Only to be used on aircraft with the permission of the aircraft operator, pilot and crew.

SUITABLE FOR FORWARD OR REAR FACING USE*

The top tether strap is not required to be used onboard aircraft and should be stowed securely.

AS/NZS 1754 ‘Aircraft use criteria’ Current Status

- AS/NZS 1754:2013 was published 7 June 2013.
- AS/NZS 3629:2013, 8005:2013, 4370:2013 are also published.
- CRS for sale in Q1 2014.

CASA Regulatory Project CS12/23

Revised Guidance Material
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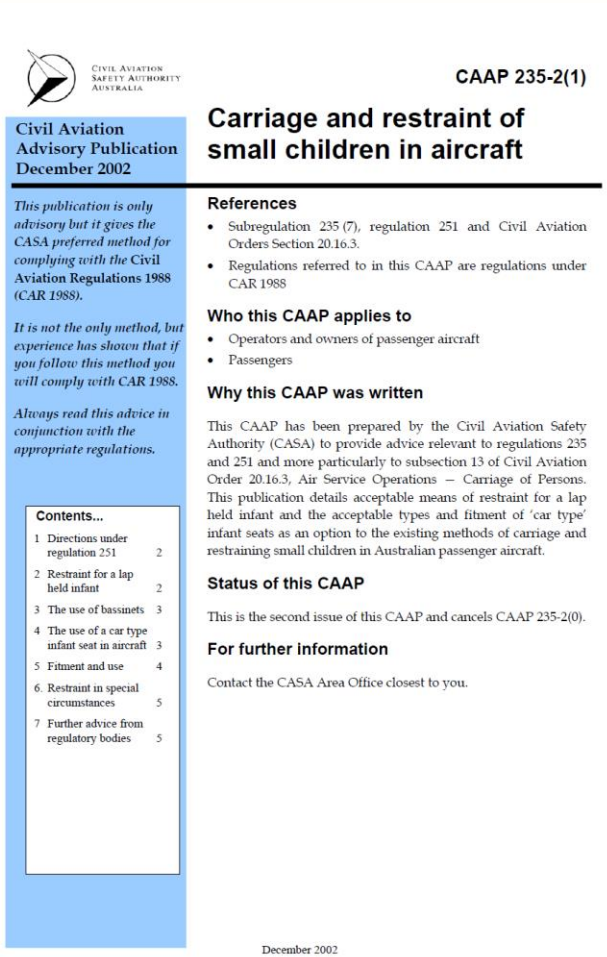
Discussion Paper

CAAP 235-2(2) ‘Carriage and restraint of small children in aircraft’



CIVIL AVIATION SAFETY AUTHORITY AUSTRALIA

CAAP 235-2(1)

Civil Aviation Advisory Publication December 2002

This publication is only advisory but it gives the CASA preferred method for complying with the **Civil Aviation Regulations 1988** *(CAR 1988).*

It is not the only method, but experience has shown that if you follow this method you will comply with CAR 1988.

Always read this advice in conjunction with the appropriate regulations.

Contents...

Carriage and restraint of small children in aircraft

References

- Subregulation 235 (7), regulation 251 and Civil Aviation Orders Section 20.16.3.
- Regulations referred to in this CAAP are regulations under CAR 1988

Who this CAAP applies to

- Operators and owners of passenger aircraft
- Passengers

Why this CAAP was written

This CAAP has been prepared by the Civil Aviation Safety Authority (CASA) to provide advice relevant to regulations 235 and 251 and more particularly to subsection 13 of Civil Aviation Order 20.16.3, Air Service Operations – Carriage of Persons. This publication details acceptable means of restraint for a lap held infant and the acceptable types and fitment of ‘car type’ infant seats as an option to the existing methods of carriage and restraining small children in Australian passenger aircraft.

Status of this CAAP

This is the second issue of this CAAP and cancels CAAP 235-2(0).

For further information

Contact the CASA Area Office closest to you.

December 2002

CAAP 235-2(2) ‘Carriage and restraint of small children in aircraft’

- Operational guidance material
- Part of CASA Regulatory Project CS 12/23
- Applicable to all aircraft operators – General Aviation, Air Transport, and Rotorcraft
- Advice for operators, aircraft owners and passengers
- 11 years since last revision

CAAP 235-2(2) ‘Carriage and restraint of small children in aircraft’

- New guidance to include:
  - Expanded guidance on lap held infants including the unsuitability of fabric style infant carriers.
  - Use of child restraint systems (general), use of aviation specific child restraints, and use of car type child restraints.
  - The list of acceptable aviation and car standards and products has be updated.
  - Information on AS/NZS 1754 “CRS for Aircraft use”.
  - Expanded guidance on the fitment and use of CRS, including the use of an extension belt.
  - A new section of kids and airbags.

CAAP 235-2(2)
Current Status

- Public consultation ended (November 2013)
- CASA website ‘Traveling with children’ will also be updated

Discussion Paper
‘Restraint of Children in aircraft’

- A Discussion Paper (DP) seeking industry and public comment on the merits and current relevance of:
  - CAO 20.16.3 Paragraph 13.1 - that allows two children to sit in one seat, and
  - CAO 20.16.3 Paragraph 13.2(1) - with respect to lap-held children.
- A public review on contentious child restraint methods in aircraft and new technology availability has been recommended

Discussion Paper aspects - ‘Two kids in one seat’

- **CAO 20.16.3**
- **13 Carriage of infants and children**
- 13.1 Where their combined weight does not exceed 77 kg, 2 children may occupy 1 seat if:
  - (a) seated side by side; and
  - (b) restrained by a lapstrap only; and
  - (c) the seat-belt is adjusted to secure both children at all times when a seat belt is required to be worn.

Discussion Paper aspects - ‘Two kids in one seat’

- Research shows this seating configuration to be dangerous.
- Principally affects General Aviation, outback and sightseeing operations.
- DP development included finding out if any other NAA allow this.

Discussion Paper aspects - ‘Lap Held Infants’

- CASA and others have repeatedly shown lap held infants (restrained or unrestrained) are not provided the same level of protection as a seated-alone adult.
- There is subjective evidence (research and accident history) to suggest the adult holding the child has a reduced tolerance to impact.

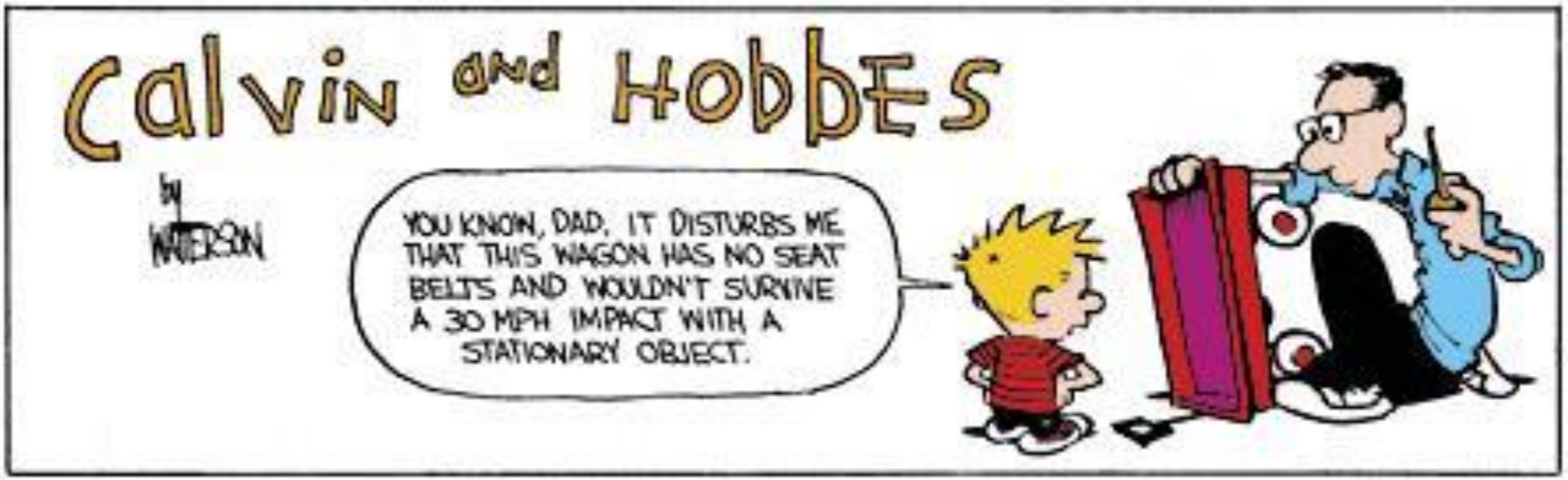
Discussion Paper
‘Restraint of Children in aircraft’

- A dedicated and complete consultation will provide definition on these two issues.
- As a result of this consultation, a proposal as to whether to revise regulations can be considered.
- ICAO working paper A38-WP/99 initiated by USA and supported by Australia.

Discussion Paper
Current Status

- For public consultation shortly.
- Available at CASA ‘Documents for comment’ webpage.

Questions ?


Calvin and Hobbes
by
WATTERSON
YOU KNOW, DAD, IT DISTURBS ME THAT THIS WAGON HAS NO SEAT BELTS AND WOULDN'T SURVIVE A 30 MPH IMPACT WITH A STATIONARY OBJECT.