



DEF STAN 00-970 NOTICE OF PROPOSED AMENDMENT (Def Stan 00-970-NPA)

CRASH LANDING, DITCHING AND PRECAUTIONARY ALIGHTING ON WATER SEATS AND STRETCHERS (LITTERS). Leaflet 76.

Stage of Amendment: Version 1

Def Stan 00-970 NPA Serial No:	970-2012/08		
Unsatisfactory Report Serial No:	N/A		
MAA Originator:	Grade C1	Name Braunton	Post Cert-ADS1

Affected Part: (including paragraphs)	Pt 1 section 4 Leaflet 76 (to be replaced entirely)
Cross-reference to other relevant amendment proposals or documents:	Pt 1 section 4 leaflet 63
Proposed Issue Date	Issue 10. Jan 2013

Weblink of where this document can be accessed

ADS Point of Contact details	
Rank/Grade and Name:	C1. Nigel Braunton
Telephone Number mil/civ;	9679 35109 / 35366 030 679 35109 / 35366
Civilian Email address:	MAA-Cert-ADS Group@mod.uk

Part 1 (for issue to Regulated Community)

SUMMARY OF PROPOSED AMENDMENT:

Leaflet 76 combines the mass of seat occupants for military aircraft and the additional mass of clothing and equipment that they may realistically be expected to have on their person whilst seated. The leaflet (as seen up to issue 9) is based on out of date data (circa 1971-72 for body mass and 1981-82 for mass of worn clothing and equipment). Adopting the changes will allow seat

<p>designers to account for the increase in mass and therefore the potential increase in forces that may result as a consequence of a heavy or crash landing.</p> <p>Change: As per Annex A. Current leaflet and proposed leaflet.</p>
<p>Impact Assessment: The mass considerations as listed in the current leaflet are not representative of the modern day anthropometric considerations or the equipment in use by today's forces. It is not recommended to retrospectively apply this change.</p>
<p>Risk Assessment: Applying this set of data will allow the extra forces associated with accelerating a higher mass to be taken into account during the design phase.</p>
<p>Courses of Action. 1. Do nothing: Unacceptable due to the increased risk associated with the data in the leaflet.</p> <p>2. Accept (ratify) the changes as presented in part 2 of Annex A</p>
<p>Preferred Course of Action. Option 2</p>
<p>Benefits and Costs: Nil additional costs Nil additional savings. Benefit is an increase in safety within the context of seat design aligning more favourably with the user.</p>
<p>Post Implementation Review: Normal working business for Cert ADS. Comments regarding the content of the standard can be returned via the group user facility and will be actioned accordingly.</p>
<p>Consultation period ends: 28-Oct-12</p> <p>The consultation period for this proposed amendment ends on the stated date. Please send your feedback via email to MAA-Cert-ADS group@mod.uk.</p>

Part 2 (for MAA internal use)

Log of Comments (to be completed once the consultation period has ended).

Comment reference	Date	From (name)	Post	Précis or Topic of Comment	MAA Response

Recap of Proposal: *A short summary of the proposal amendment including what changes were incorporated following the consultation period.*

Recommendation. *This section will be completed once all the comments have been received. The recommendation is for the relevant Head of Division to approve the proposal.*



Approval. *This section will detail exactly what has been approved and by whom, and confirm the date for the amendment to be incorporated as well as the date the NPA should be reviewed to determine what the effects of the amendment were in terms of meeting the objective of the change, if there were any unintended consequences and establishing whether the estimated costs were correct.*

Accepted changes will be authorised at the following levels:

- Changes requiring retrospective mandation: 2 *
- Changes not requiring retrospective mandation but having an engineering impact: 1*
- Changes deemed as administrative only: C1 or Equivalent.

Approved by:

Signature	
Name	
Rank/Grade	
Post	
Date signed	
Date for amendment to be incorporated	
Date for NPA review to take place	



Part 3 - NOTIFICATION OF AUTHORIZED AMENDMENT (Def Stan 00-970 NAA)

Document Part:		Sub-Part	
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Unsatisfactory Report Reference		NPA Reference	
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Originator		Date	
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Amendment to be Incorporated on	XX/XXX/XX
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INTRODUCTION

AUTHORIZED AMENDMENT

FURTHER ACTION

APPROVAL

This Def Stan 00-970 NPA has been approved by the xxxx on behalf of DG MAA

INCORPORATION

The amendment will be incorporated in....

Signed (IAW with part 2).

for DG MAA

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Current Leaflet 76.

CRASH LANDING, DITCHING AND PRECAUTIONARY ALIGHTING ON WATER SEATS AND STRETCHERS (LITTERS)

1 ALL SEATS AND STRETCHERS

1.1 The energy absorption and strength requirements of Clause 4.22 and Section 4 Table 31 are applicable to all seats and stretchers. Section 4 Table 30 gives the maximum accelerations a human body can tolerate and these must not be exceeded.

1.2 Specific static strength requirements are given in Clause 4.22. These are intended as additional arbitrary minima which apply if greater than the accelerations measured in dynamic tests.

1.3 Notwithstanding the minimum requirements for static strength and the maxima allowable in Section 4 Table 30 the designer should aim at limiting the vertical acceleration at the base of the occupant's spine to 15G if possible.

1.4 A further design aim should be to restrain all occupants throughout the crash and provide the maximum support in the most likely direction in the most severe cases allowing for operation of energy absorbers and the buckling of structure.

1.5 All seats and stretchers should be as comfortable as possible but comfort should not compromise safety. Submarining should be impossible.

1.6 Any part of a seat or stretcher which could be bumped or kicked, or used as a step or handhold should be designed accordingly. See Clause 4.22.

1.7 Covers for floor depressions, or wells necessary to provide for seat stroking should be covered with frangible material which will allow the seat to stroke through the cover at a force not exceeding 667 N (150 lbf).

1.8 Design of the attachment of all seats and stretchers should allow for bulging and warping of structure. A movement of any single seat attachment in any direction by 10°, or the relative movement of any pair of attachments by 5° each, in opposite directions, should be possible and the seat should still meet the static strength and energy absorption requirements.

1.9 Seats and stretchers may be attached through their local structure to the ceiling in addition to the floor, to help react crash forces, provided that the ceiling can be shown to be strong enough for this purpose without creating an additional hazard for the occupants. See 4.22.13.

1.10 The Aeroplane Design Authority and the Seat Designer should jointly define the Operating Environment for all seats. See Part 1, Section 7, Leaflet 2.

1.11 The design of seats should be co-ordinated and interfaced with the design of other areas to achieve a completely integrated and efficient crashworthy design.

2 CREW SEATS

2.1 Note on Section 4 Table 32. On crew seats the requirements of Reference 4 of Leaflet 0 Clause 4.22 are framed to provide high static strength with small deflections except in the downward direction where an energy absorber is specifically required to attenuate the peak accelerations, caused by the 42 ft/sec (12.8 m/s) velocity change requirement of Section 4 Table 31, to 25G maximum (15G preferred, see para 1.3 above) within the stroke of the energy absorber, which should be at least 12 ins (30.5 cm).

2.2 The energy absorber should be capable of providing for the range of effective mass of the aircrew (see Leaflet 75 Para. 8 and Tables 1.3 and 4 of this Leaflet) in three increments or by being continuously variable. Its strength must be adequate to resist the forces it generates without premature failure.

2.3 The seat motion should be parallel to the seat back tangent line within $\pm 10^\circ$.

2.4 Unless otherwise stated in the Aeroplane Specification the seat should provide for the 5th to 95th percentile mass including clothing and equipment (see Tables 1,3 and 4) and also for armour if carried. See Clause 9.10.

2.5 The seat should provide for the 5th to 95th percentile dimensions including clothing and equipment. See Leaflet 63.

3 PASSENGER, TROOP AND PARATROOP SEATS

3.1 Note on Section 4 Table 33. On seats for passengers, troops and paratroops static strength is specified in Reference 5 of Leaflet 0 Clause 4.22, to meet the requirements of Section 4 Table 31, in only two directions. In the other three directions energy absorbers are specifically required to attenuate the peak accelerations to “bottomed” value given, within the stroke of the energy absorber. The strength of the energy absorber must be adequate to resist the forces it generates without premature failure.

3.2 The seats should provide for the 5th to 95th percentile mass and dimensions of fully clothed and equipped troops. See Table 2.

3.3 The preferred alignment of the seats (forward, aft, lateral) is to as stated in Part 5. (Not yet published advice is to be sought from the Project Team Leader).

3.4 Individual (single) seats are preferred to units of 2 or more for ease of application of energy absorbers particularly of a multi-seat unit being occupied by only one person.

3.5 Provision should be made against whiplash effects of the head.

3.6 The energy absorber should include a snubber against rebound and some indication of energy absorber stroking, even partial, so that maintenance crew checking the effects of a heavy landing would notice.

4 STRETCHERS (LITTERS)

4.1 Stretchers should be aligned laterally if possible. If not then special attention should be given to the design of the harness.

4.2 A structural pan should be provided if conventional (low strength) stretchers are to be used.

4.3 There should be adequate clearance beneath the lowest stretcher in a stack and the floor below it to allow for deflection in the 25G vertical case. The minimum should be 20 cm (8 in).

4.4 Attachments of stretchers to the airframe should be designed so that it is easy to see if they are properly locked.

4.5 Two straps should be provided with each stretcher each capable of taking 8900 N (2000 lbf) in pure tension. At this load elongation should be not more than 10 cm (4 in) in 122 cm (48 in). Straps should be automatically self-adjusting for length and fitted with quick-disconnects.

TABLE 1

MASS OF AIRCREW (kg)

(Source DEF STAN 00-970 Vol 1 Leaflet 105/3)

Item	3 rd percentile	5 th percentile	50 th percentile	95 th percentile	99 th percentile
Body	59.46	61.33	74.46	90.02	96.50
Clothing) Boots)	14.00	14.00	14.00	14.00	14.00
Equipment	10.00	10.00	10.00	10.00	10.00
Total Mass	83.46	85.33	98.46	114.02	120.50
Effective Vertical Mass	67.77	71.26	81.77	94.22	99.40

TABLE 2

MASS OF TROOP or PARATROOP SOLDIER (kg)

(Source MIL-S-85510 (AS))(Inactive)

Item	3 rd percentile	5 th percentile	50 th percentile	95 th percentile	99 th percentile
Body	55.34	57.3	71.0	91.6	100.17
Clothing	1.4	1.4	1.4	1.4	1.4
Boots	1.8	1.8	1.8	1.8	1.8
Equipment	15.5	15.5	15.5	15.5	15.5
Total Mass	74.04	76.0	89.7	110.3	118.87
Effective Vertical Mass	60.89	62.46	73.42	89.9	96.76

TABLE 3

MASS OF AIRCREW (kg)

(Source STANAG 3950 AI)

Item	3 rd percentile	5 th percentile	50 th percentile	95 th percentile	99 th percentile
Body	59.5	61.4	74.5	90.0	96.5
Clothing) Boots)	15.5	15.5	15.5	15.5	15.5
Equipment	10.0	10.0	10.0	10.0	10.0
Total Mass	85.0	86.9	100.0	115.5	122.0
Effective Vertical Mass	68.6	70.1	80.6	93.0	98.2

TABLE 4

MASS OF AIRCREW (kg) USAF

(Source STANAG 3950 AI)

Item	3 rd percentile	5 th percentile	50 th percentile	95 th percentile	99 th percentile
Body	61.6	63.6	78.2	95.6	103.3
Clothing) Boots)	15.5	15.5	15.5	15.5	15.5
Equipment	10.0	10.0	10.0	10.0	10.0
Total Mass	87.1	89.1	103.7	121.1	128.8
Effective Vertical Mass	70.2	71.8	83.5	97.4	103.6

Proposed updated leaflet:

**LEAFLET 76
CRASH LANDING, DITCHING AND PRECAUTIONARY ALIGHTING ON WATER,
SEATS AND STRETCHERS (LITTERS)**

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1.9 Seats and stretchers may be attached through their local structure to the ceiling in addition to the floor, to help react crash forces, provided that the ceiling can be shown to be strong enough for this purpose without creating an additional hazard for the occupants. See 4.22.13.

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2.3 The seat motion should be parallel to the seat back tangent line within $\pm 10^\circ$.

2.4 Unless otherwise stated in the Aeroplane Specification the seat should provide for the 5th female (minimum) to 95th male (maximum) percentile mass and dimensions of fully clothed and equipped aircrew. See Tables 1 and 2.

3 PASSENGER, INFANTRY AND AIRBORNE INFANTRY SEATS

3.1 Note on Section 4 Table 33. On seats for passengers, infantry and airborne infantry static, strength is specified in Reference 5 of Leaflet 0 Clause 4.22, to meet the requirements of Section 4 Table 31, in only two directions. In the other three directions energy absorbers are specifically required to attenuate the peak accelerations to “bottomed” value given, within the stroke of the energy absorber. The strength of the energy absorber must be adequate to resist the forces it generates without premature failure.

3.2 Unless otherwise stated in the Aeroplane Specification the seats should provide for the 5th female (minimum) to 95th male (maximum) percentile mass and dimensions of fully clothed and equipped infantrymen. See Table 3.

3.3 The preferred alignment of the seats (forward, aft, lateral) is to as stated in Part 5. (Not yet published advice is to be sought from the Project Team Leader).

3.4 Individual (single) seats are preferred to units of 2 or more for ease of application of energy absorbers particularly of a multi-seat unit being occupied by only one person.

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**TABLE 1
MASS OF ROTARY WING AIRCREW**

(Source; 2007 MILITARY SURROGATE AIRCREW)

Item	Pilot		Rear Crew	
	Minimum (kg)	Maximum (kg)	Minimum (kg)	Maximum (kg)
Nude Body	57.6	103.4	57.6	103.4
Clothing & Equipment	4.8	31.3	3.0	33.2
Total Mass	62.4	134.7	60.6	136.6
Effective Vertical Mass*	49.4	109.9	47.5	111.7

**TABLE 2
MASS OF FIXED WING AIRCREW**

(Source; 2007 MILITARY SURROGATE AIRCREW)

Item	Pilot		Rear Crew	
	Minimum (kg)	Maximum (kg)	Minimum (kg)	Maximum (kg)
Nude Body	57.6	103.4	57.6	103.4
Clothing & Equipment	3.7	31.0	3.7	33.2
Total Mass	61.3	134.4	61.3	136.6
Effective Vertical Mass*	48.3	109.6	48.3	111.7

**TABLE 3
MASS OF INFANTRY OR AIRBORNE INFANTRY PASSENGER**

**(Source; ANTHROPOMETRY SURVEY OF UK MILITARY PERSONNEL 2006–7;
ARMY AND ROYAL MARINE POPULATION
(ISSUE 3))**

Item	Minimum (kg)	Maximum (kg)
Nude Body	54.6	103.3
Clothing & Equipment	2.8	69.8
Total Mass	57.4	173.1
Effective Vertical Mass*	44.5	150.1



*Effective Vertical Mass (predicted force acting on the seat) calculated as follows:

Total combined body, clothing & equipment mass excluding an allowance for lower leg components resting on the floor