

SECTION 4

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

TITLE OF PROPOSAL:

Minor Correction to leaflet 63

Stage of Amendment: Draft

Def Stan 00-970

07/12

NPA Serial No:

Unsatisfactory
Report Serial No:

N/A

MAA Originator:

Grade Name Nigel Braunton
C1Post MAA-Cert-
ADS1DS970

Affected Part:

(including paragraphs)

Part 1 section 4 leaflet 63.

Cross-reference to other
relevant amendment
proposals or documents:

JAC Paper 1364

Proposed Issue Date Dec 2012 (Issue 10 submissions)

Weblink of where this document can be
accessed[HERE](#)
ADS Point of Contact details

Rank/Grade and Name:

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)
INTRODUCTION (Not more than 250 words)

This minor change corrects an error in one of the data tables within this leaflet.

The error was noticed within the original data set by those that undertook the study which produced it. An incorrect method for measurement was used for obtaining "Sitting Vertical Functional Reach.

The use of this data from the 2007 Anthropometric Survey of Service men and women was validated and ratified at MASAAG 69 and JAC 173. This error within the wider set was no known at time of ratification. Incorporation of the correct values is not seen as a change which requires external ratification. The paper will be ratified by the 00-970 Lead editor ADS1 and subsequently reported at MASAAG 73 and TAAG 2.

SECTION 4

The new text will be clearly identifiable within Annex A..

SUMMARY OF PROPOSED AMENDMENT

Change: An update to the measurement for "Sitting Functional Reach"
Pg 4 of leaflet 63. From 1165-1400 mm (3rd -99th Percentiles) to 1211-1466 mm

Impact Assessment:

Objective: Intended to remove a minor error in the data used.

Risk Assessment: No associated risks.

Courses of Action. It is recommended to accept this change in data as described above. There are no perceived costs associated with this change. Retrospective Mandation is not required or requested.
00-970 is the UK MoD's baseline in aircraft design, as such it should contain correct information and errors should be corrected once they have been brought to the attention of the MAA.

Preferred Course of Action. The correction should be accepted and the TAAG and MASAAG informed as part of the 00-970 presentation.

Benefits and Costs: Do nothing will result in a known error remaining in the standard. This is not acceptable. No associated costs. Addressing very small errors such as this improves the reputation of the standard and is at the very heart of the sponsor's responsibility to ensure the content remains valid.

Post Implementation Review: Post Meetings: TAAG 2 & MASAAG 73 the change should be recorded within the minutes.

Consultation period ends: 28-Oct-12

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.

SECTION 4

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

Approved by:

Signature	Signed on original
Name	NJ Braunton
Rank/Grade	C1
Post	MAA-Cert-ADS1DS970
Date signed	6/6/2012
Date for amendment to be incorporated	At Issue 9
Date for NPA review to take place	AT MASAAG 73 (18 th Sept 2012)

DEF STAN 00-970 PART 1/5

SECTION 4

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

Document Part:		Sub-Part	
----------------	--	----------	--

Unsatisfactory Report Reference		NPA Reference	
---------------------------------	--	---------------	--

Originator		Date	
------------	--	------	--

Amendment to be Incorporated on	XX/XXX/XX
---------------------------------	-----------

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

SECTION 4

Annex A.Proposed change.

**DRAFT OPTION 2
LEAFLET 63
CREW STATIONS - GENERAL REQUIREMENTS
AIRCREW ANTHROPOMETRY**

1 INTRODUCTION

1.1 This leaflet contains dimensions and weights to be used when designing aeroplanes and cockpit installations.

1.2 Figures 1-4 consist of information taken from Ref 1 which contains a Surrogate Aircrew population of 1,901 men and women extracted as a subset of the 2007 Tri-Service Anthropometric Survey, capturing 117 body measurements, detailed in Ref 2 (see Clause 4.15).

1.3 Figure 5 contains information taken from Ref 3 which contains 2,000 RAF Aircrew that were measured in 1970/71, capturing 88 body measurements.

Note: Anthropometric data is known to alter. For more information contact DESJSCTLS-HFI-Pol@mod.uk.

2 DIMENSIONS

2.1 A pictorial index of the measurements in Ref 1 is reproduced in Figs. 1 to 4 together with the 3rd and 99th percentile values.

2.2 The measurements are based upon nude body dimensions so allowances must be made for clothing, harness restraint systems and seat geometry.

2.3 The four most critical body dimensions for cockpit workspace govern aircrew selection. These limitations (1982) and their relation to the 3rd and 99th percentile measurements from the Surrogate Aircrew population are:

	Minimum		Maximum	
Sitting Height	864mm (3%ile)	(6 mm >	1010mm (99%ile)	(15 mm >
Buttock-Knee Length	560mm (3%ile)	(1 mm >	660mm (99%ile)	(3 mm <

SECTION 4

Buttock-Heel Length	1000mm (3%ile)	(10 mm >	1200mm (99%ile)	(24 mm >
Functional Reach	740mm (3%ile)	(2 mm <	900mm (99%ile)	(6 mm <

Note: The small differences between the 3rd and 99th percentile and the critical measurements quoted give some flexibility in selection and growth of aircrew after selection.

3 WEIGHTS

3.1 Weights for the 3rd, 50th and 99th percentile range of aircrew are given below:

PERCENTILE VALUES	
%	Kg
3	61.4
50	81.0
99	110.6

3.2 These values are for the nude body, so allowances must be made for clothing and aircrew equipment. Both the minimum and maximum aircrew equipment assembly weights must be considered. Typically these are given by the summer/land clothing assembly and the winter/sea assembly respectively. Specialist advice should be sought in the definition of appropriate clothing assemblies and additional aircrew equipment such as maps, CBRN protection, personal weapons, body armour, survival equipment and Night Vision Goggles (NVGs).

4. EFFECTS OF CLOTHING AND SEAT GEOMETRY ON NUDE DIMENSIONS

4.1 EYE POSITION

4.1.1 The relationship between the seat reference point and the eyeball position of subjects strapped into aeroplane seats is complex. Detailed information has been published (Ref 4).

4.2 SHOULDER BREADTH

4.2.1 The clothing assemblies will add 10-20 mm to the nude Bideloid breadth (min and max respectively).

4.3 BUTTOCK-KNEE LENGTH

4.3.1 The clothing assemblies will add 10-20 mm to the nude Buttock-Knee length (min and max respectively).

SECTION 4

5 POSITION OF CENTRE OF GRAVITY (CG)

5.1 Where, for design purposes, the position of the CG of the complete body is required, it may be assumed to be at Elbow rest height sitting (Fig 1 dimension "N") and 100 mm (small) to 150 mm (large) forward of the buttock/shoulder tangent line.

REFERENCES

<u>No.</u>	<u>Title</u>
1	Outcome of the Tri-Service anthropometric database validation study for aircrew applications, and the adjustment to data values representing the 2007 surrogate aircrew population – Connett CA and Marston P, February 2009
2	Anthropometry Survey of UK Military Personnel 2006-07 – Tyrrell A and Pringle R, QinetiQ/07/01821, June 2007
3	An Anthropometric Survey of 2,000 Royal Air Force Aircrew 1970/71 – RAF/IAM Report 531/PAE Technical Report 73083/FPRC Report 1327/HMSO R&M 3372
4	The Relationship between the Seat Reference Point and the Eyeball Position of Subjects Strapped into Aircraft Type Seats – Beeton DG, September 1975; published as University of London MSc thesis

	PERCENTILE	
	3rd	99th
A Bideloid breadth	457	603
B Biacromial breadth	333	446
C Hip breadth, sitting	338	428
D Stool height	365	471
E Thigh clearance height	118	195
F Acromial height, sitting	524	678

	PERCENTILE	
	3rd	99th
G Shoulder height, sitting	584	712
H Sitting eye height	752	902
I Sitting height	858	995
J Vertical functional reach, sitting	1211	1466
K Knee height, sitting	489	607

	PERCENTILE	
	3rd	99th
L Functional reach	742	906
M Cervicale height, sitting	599	742
N Elbow rest height, sitting	192	329
O Stomach depth	206	342
P Buttock - knee length	559	663
Q Buttock - heel length	990	1176

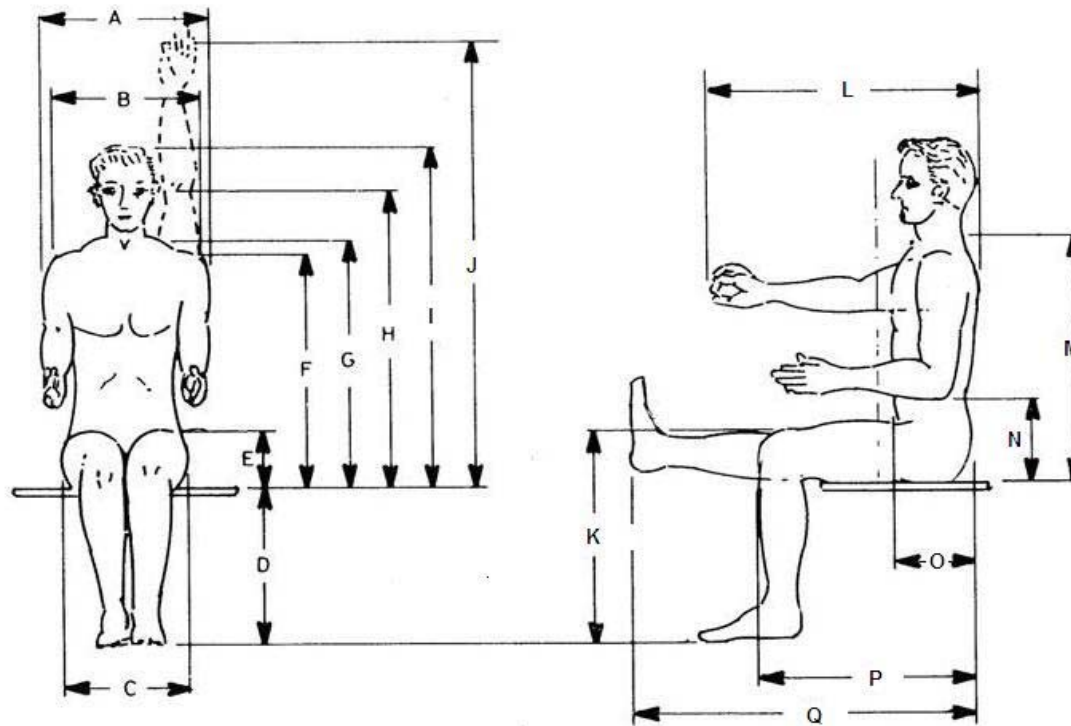


Figure 1: Surrogate Aircrew Population 3rd and 99th percentile values (mm)

PERCENTILE

PERCENTILE

PERCENTILE

	3rd	99th
A Neck circumference	341	439
B Vertical trunk circumference (mean)	1576	1906
C Chest circumference (bust)	845	1186
D Waist circumference (NI)	718	1121
E Buttock circumference	912	1173
F Wrist circumference	151	196
G Thigh circumference	518	718

	3rd	99th
H Calf circumference	344	453
I Ankle circumference	211	276
J Eye height, standing	1559	1811
K Axilla height	1246	1452
L Axilla - wrist length	434	557
M Crotch height	753	942
N Waist to waist over shoulder	700	1040
O Crotch length	719	1069

	3rd	99th
P Axilla - cervicale length	154	222
Q Cervicale - crotch length	613	765
R Shoulder height, standing	1352	1574
S Cervicale - vertex length	231	287
T Cervicale - waist length	333	474
U Waist height	1026	1240
V Cervicale height	1418	1641
W Stature	1665	1908

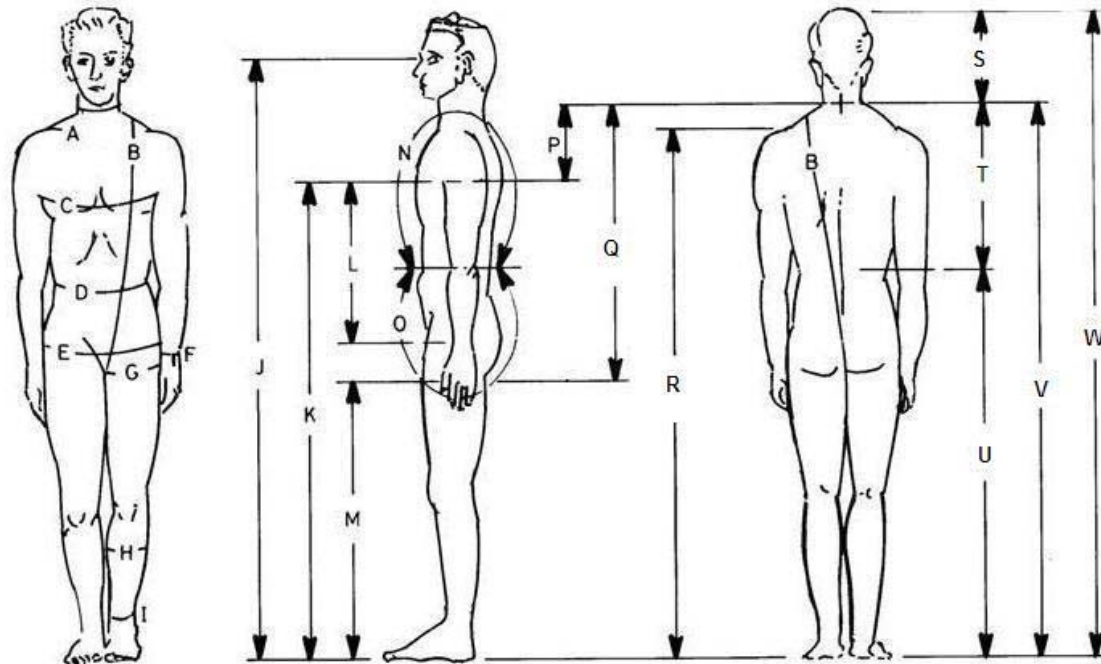


Figure 2: Surrogate Aircrew Population 3rd and 99th percentile values (mm)

	PERCENTILE	
	3rd	99th
A Inter - elbow span	883	1078

B	Hand length	178	228
C	Elbow functional reach	368	460
D	Elbow, fully bent circumference	309	418
E	Knee, fully bent circumference	390	510
F	Heel - instep circumference	316	389

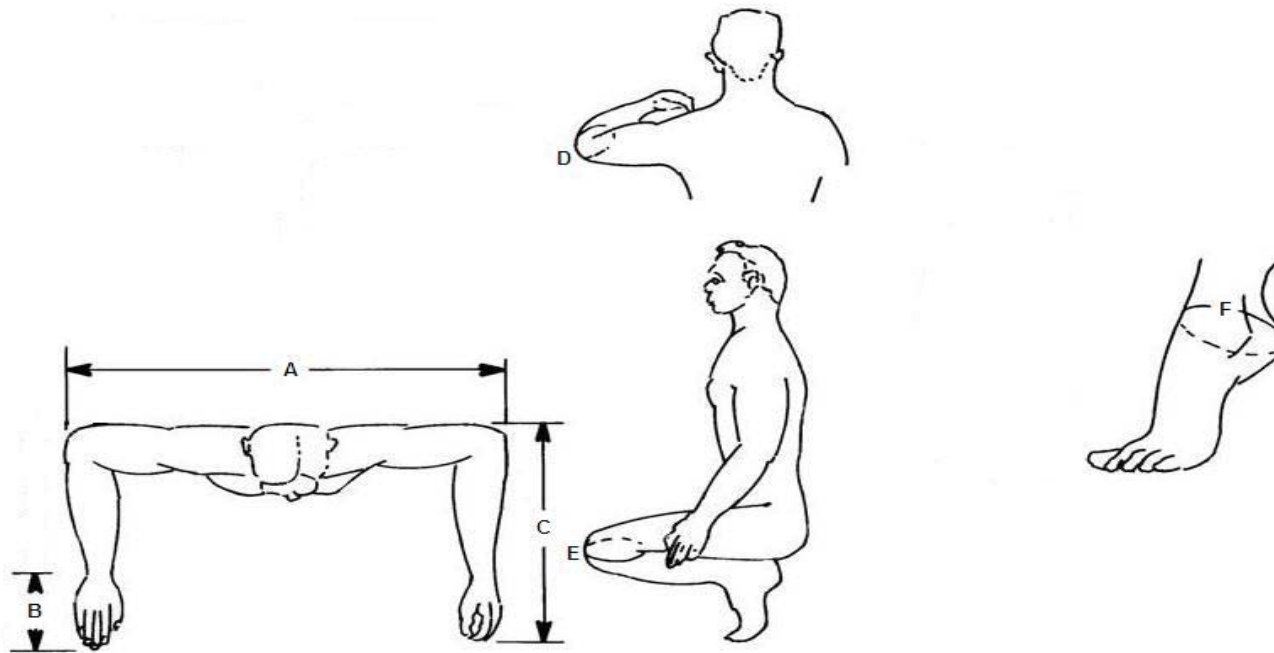


Figure 3: Surrogate Aircrew Population 3rd and 99th percentile values (mm)

		PERCENTILE	
		3rd	99th
A	Head breadth	146	171

B	Head circumference	539	614
C	Head length	185	218

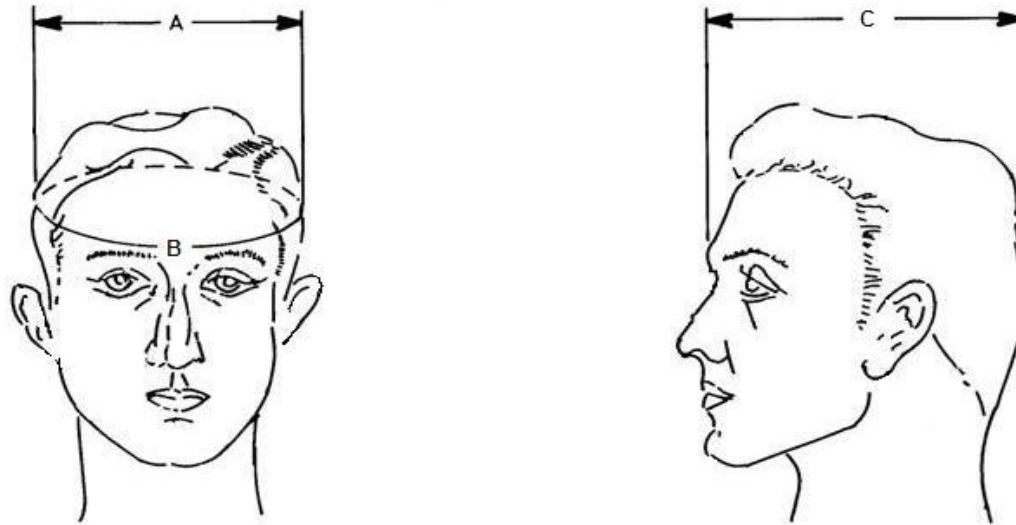


Figure 4: Surrogate Aircrew Population 3rd and 99th percentile values (mm)

	PERCENTILE			PERCENTILE			PERCENTILE				
	3rd	99th		3rd	99th		3rd	99th			
A	Bitragion - coronal arc	330	385	I	Tragion to pupil, vertical	3	36	P	Foot breadth	87	106
B	Bitragion diameter	129	152	J	Nasion to menton, vertical	110	140	Q	Ball of foot circumference	228	278
C	Menton to vertex	210	252	K	Tragion to brow ridge, horizontal	85	112	R	Instep-sole circumference	228	273

D	Tragion to vertex	118	145	L	Tragion to back of head	88	118	S	Foot length	244	297
E	Tragion to menton, vertical	81	120	M	Tragion to menton, horizontal	81	117				
F	Nasion to vertex	88	128	N	Menton to back of head	179	224				
G	Tragion to nasion, vertical	6	45	O	Maximum head diagonal from menton	247	280				
H	Pupil to vertex	97	130								

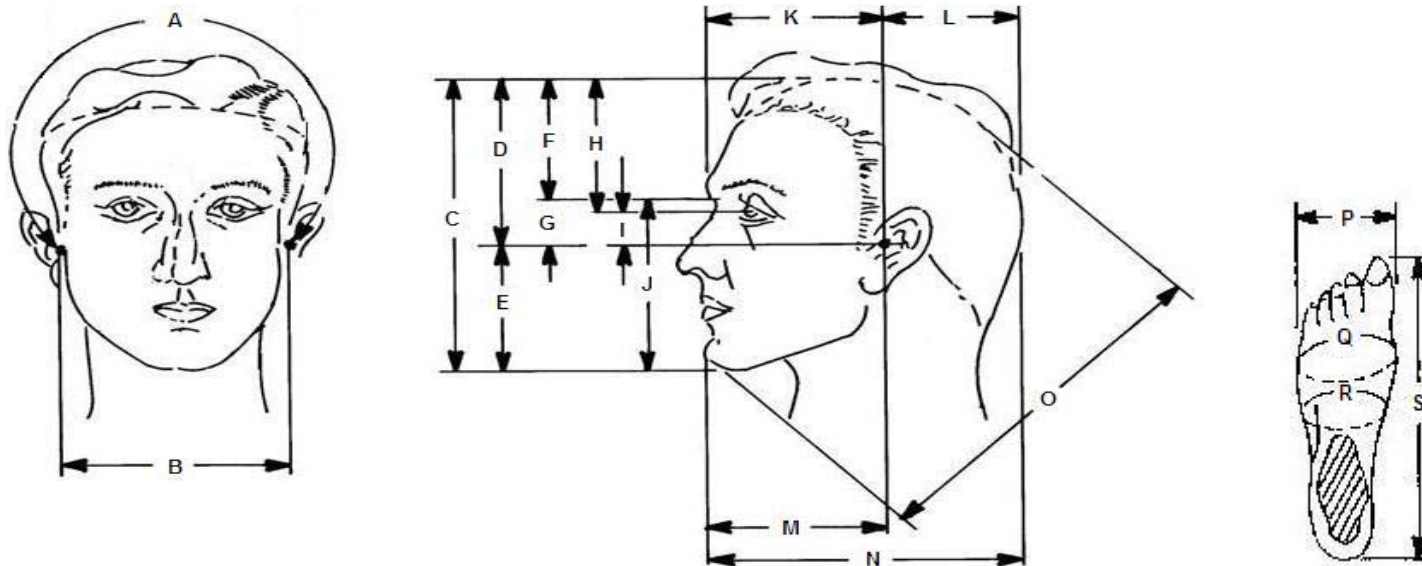


Figure 5: 1970/71 Anthropometric Survey of 2,000 Royal Air Force Aircrew 3rd and 99th percentile values (mm)



The proposed new entry. This should include the entire change and where applicable should be followed by a copy of the existing text to allow a comparison to be made.