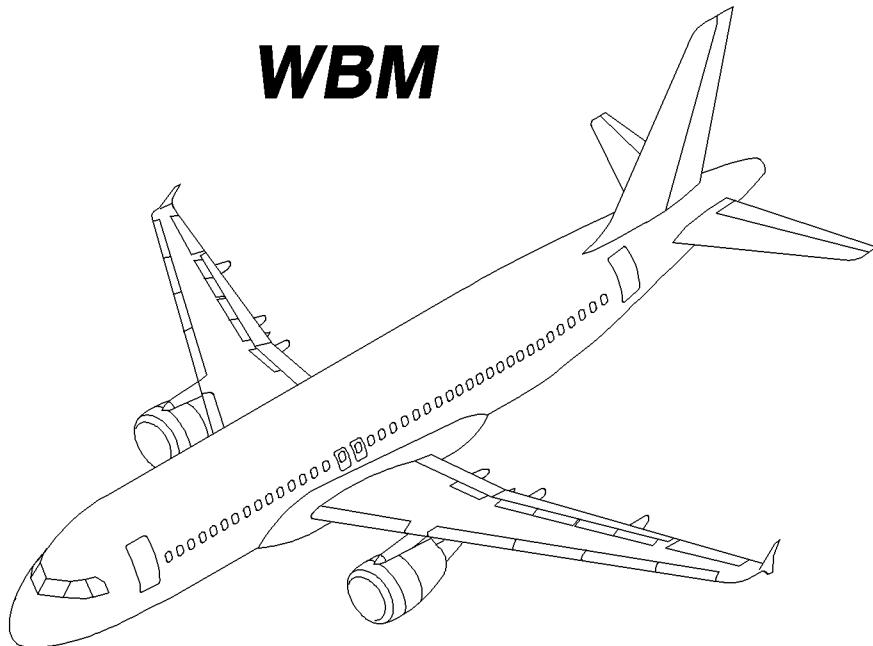




# A320

## WEIGHT AND BALANCE MANUAL

**WBM**



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## WEIGHT AND BALANCE MANUAL

### INTRODUCTION

This manual, specific to the aircraft referenced in chapter 1, section 00 is broken down into two chapters :

Chapter 1 contains, besides the identification of the aircraft concerned and its general data, the weight and balance limitations and detailed information relative to the aircraft loading capabilities.

Chapter 2 contains the aircraft delivery weighing report and the weighing check list.

The information permits the airline to develop their loading instructions as well as the aircraft balance sheet.

The organization of this manual complies with the requirements of the ATA Specification No 100.

The sequence numbers (seq) in the list of effective pages and on corresponding pages in the manual are an AIRBUS S.A.S. internal reference and do not constitute a part of the aircraft designation.

### REVISIONS

They are numbered per manual.

The revision must be recorded on the page "RECORD OF REVISIONS".

A new "LIST OF EFFECTIVES PAGES" mentioning the revision number is dispatched.  
In this list the following identification letters are used :

N (= New) : The page is new (page to be inserted)

R (= Revised) : The page is revised (page to be inserted in place of the previous one)

C (= Cancelled) : The page is cancelled (page to be removed)

V (= Validated) : The page is validated (validity of page is extended to other aircraft)

D (= Devaluated) : The page is devaluated (validity of page is restricted)

A vertical line in the margin of a revised page locates the modified part.

### TEMPORARY REVISIONS

They are printed on yellow paper and concern amendments to be quickly introduced in the weight and balance manual.

They must be recorded on the page "RECORD OF TEMPORARY REVISIONS".

### UP-DATING

Introduce the revision by replacing, adding or cancelling pages.

A temporary revision has to be inserted in front of the modified page of the manual.

### LETTER OF TRANSMITTAL AND HIGHLIGHTS

Includes a list of the pages to be removed and / or inserted with additional information on validity extension or limitation.

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AND CROSS-REFERENCES THE:

- MANUFACTURING SERIAL NUMBER (MSN)
- REGISTRATION NUMBER
- AIRCRAFT MODEL

REV : 003/A

MSN	REGISTRATION	MODEL
7186	PR-YRA	A320-251N
7283	PR-YRB	A320-251N
7291	PR-YRC	A320-251N
7354	PR-YRD	A320-251N
7386	PR-YRE	A320-251N
7409	PR-YRF	A320-251N
7494	PR-YRH	A320-251N
7521	PR-YRI	A320-251N



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N	2.00.00	001	7291	NOV 2016		7291

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### LIST OF EFFECTIVE REVISIONS

WEIGHT AND BALANCE MANUAL	CODE	LATEST EFFECTIVE REVISION	
		No	DATE
BASIC	A 320 – 210	003	NOV 92



## WEIGHT AND BALANCE MANUAL

### RECORD OF REVISIONS

Rev No	Insertion Date	By	Rev No	Insertion Date	By



## WEIGHT AND BALANCE MANUAL

### RECORD OF TEMPORARY REVISIONS

The incorporation and subsequent cancellation of each Temporary Revision must be recorded below.

Temporary Revision		Incorporated		Cancelled		
No	Issue Date	Date	By	Date	Authority (Revision N°)	By



## WEIGHT AND BALANCE MANUAL

### **LIST OF MAIN MODIFICATIONS AFFECTING THIS MANUAL**

REV : 003/A

M	MOD	TITLE	VALIDITY (MSN)
	20000	STRUCTURE- FORWARD FUSELAGE- DEFINE SECTIONS 11,12,13,14 OF THE BASIC AIRCRAFT-	ALL
	20024	FUEL- INSTALL A CENTRE TANK SYSTEM-	ALL
	20029	DOORS- BULK CARGO COMPARTMENT- INSTALL AN ADDITIONAL DOOR AT FR 60/62-	ALL
	20033	EQUIPMENT/FURNISHINGS- INSTALL CARGO COMPARTMENT FURNISHING-	ALL
	20047	EQUIPMENT/FURNISHINGS - FLIGHT COMPARTMENT - INSTALL A 4TH OCCUPANT SEAT	ALL
	20071	FIRE PROTECTION - CARGO COMPARTMENT FIRE EXTINGUISHING - INSTALL A SINGLE SHOT SYSTEM -	ALL
	20109	WATER/WASTE- INSTALL VACUUM TOILET SYSTEM -	ALL
	20268	WINGS-WING TIP FENCES-INTRODUCE WING TIPS INCLUDING FENCES-	ALL
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	21003	WATER/WASTE - RELOCATE POTABLE WATER TANK -	ALL
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	22150	LANDING GEAR - MLG TWIN WHEEL - INTRODUCE A TWO STAGE SHOCK ABSORBER	ALL
	22548	INDICATING/RECORDING SYSTEMS - FWS - INTRODUCE C3 STD	ALL
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	25802	E/F-INSTALL SET 4G FOR CARGO COMPT COMPONENTS IN REAR CARGO HOLD IN BULK VERSION WITH BULK CARGO DOOR	ALL



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### **LIST OF MAIN MODIFICATIONS AFFECTING THIS MANUAL**

REV : 003/A

M	MOD	TITLE	VALIDITY (MSN)
	27276	FLIGHT CONTROLS-ELAC SYSTEM-INTRODUCE ELAC SOFTWARE "L80"	ALL
	27375	E/F-CARGO COMPARTMENTS-INSTALL SET 4.1A IN FWD CARGO COMPARTMENT IN BULK CONFIGURATION (A320)	ALL
	27378	PLACARDS/MARKINGS-FWD/AFT CARGO COMPT-INSTALL REQUIRED PLACARDS	ALL
	28327	EQUIPMENT/FURNISHINGS-CARGO COMPT-INSTL SET 4.1C CARGO COMPONENTS IN AFT CARGO HOLD IN BULK CONFIGURATION FOR A320	ALL
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	37331	WINGS - FIXED PARTITION - INTRODUCE A STANDARD OF BOX WITHOUT DRY BAY	ALL
	158674	EQUIPMENT/FURNISHINGS - PAX COMPARTMENT INSTALL CABIN LAYOUT FOR AZU01 VERSION	ALL
	160001	WINGS-GENERAL-DEFINE AND CERTIFY STRUCTURAL PROVISIONS FOR SHARKLET FOR A320/A319/A318	ALL
	160500	WINGS-GENERAL-CERTIFY SHARKLET INSTALLATION FOR A320/A319/A318	ALL
	161129	FUEL - GENERAL - INTRODUCE MODIFIED FUEL INSTALLATION DESIGN FOR NEO CHANGE	ALL
	161212	ENGINE - GENERAL - DEFINE CFM LEAP-1A ENGINE AND ASSOCIATED SYSTEMS FOR SA NEO BASIC DEFINITION	ALL
	161248	GENERAL - DESIGN WEIGHT - INTRODUCE WVO50 (MTOW 73,5T, MLW 66,3T AND MZFW 62,8T) FOR A320 NEO	ALL
	161384	GENERAL - DESIGN WEIGHT - INTRODUCE WVO53 (MTOW 77T, MLW 67,4T AND MZFW 64,3T) FOR A320 NEO	ALL
	161530	FLIGHT CONTROLS - THS MECHANICAL CONTROL - MODIFY PITCH TRIM WHEEL GREEN BAND ON A320NEO	ALL



## WEIGHT AND BALANCE MANUAL

### 1.00 GENERAL

#### 01. Identification

Manufacturer : AIRBUS S.A.S.  
Airline : AZUL LINHAS AEREAS BRASILEIRAS (AZU)

This manual is applicable to the aircraft listed in the Cross Reference Table (0.00.15) and List of Effective Pages (0.00.20)

## WEIGHT AND BALANCE MANUAL

 02. Units of measurement and conversion factors

 A. Units of measurement

<b>Weight</b>	: in kilograms (kg)
<b>Length</b>	: in meters (m)
<b>Moment</b>	: product of weight and length in kilogram-meters (kgm)
<b>Velocity</b>	: kilometers per hour (km / h)
<b>Capacity and quantity</b>	: in liters (l)
<b>Volume</b>	: cubic meters ( $m^3$ )
<b>Density</b>	: kilograms per liter (kg / l)
<b>Area</b>	: square meters ( $m^2$ )
<b>Pressure</b>	: bars

 B. Conversion factors

	MULTIPLY	BY	TO OBTAIN
<b>WEIGHT</b>	kilograms (kg) pounds (lb)	2.2046 0.4536	pounds (lb) kilograms (kg)
<b>LENGTH</b>	meters (m) millimeters (mm) meters (m) inches (in) inches (in) feet (ft)	39.3701 0.03937 3.2808 0.0254 25.4 0.3048	inches (in) inches (in) feet (ft) meters (m) millimeters (mm) meters (m)
<b>VELOCITY</b>	kilometers per hour (km/h) kilometers per hour (km/h) knots (kt) miles per hour (mph)	0.53996 0.6214 1.852 1.6093	nautical miles (kt) miles per hour (mph) kilometers per hour (km/h) kilometers per hour (km/h)
<b>CAPACITY/ QUANTITY</b>	liters (l) US gallons (US gal)	0.2642 3.785	US gallons (US gal) liters (l)
<b>VOLUME</b>	cubic meters ( $m^3$ ) cubic feet ( $ft^3$ )	35.3147 0.0283	cubic feet ( $ft^3$ ) cubic meters ( $m^3$ )
<b>DENSITY</b>	kilograms per liter (kg / l) pounds per US gallon (lb / US gal)	8.3444 0.1198	pounds per US gallon (lb / US gal) kilograms per liter (kg/l)
<b>AREA</b>	square meters ( $m^2$ ) square meters ( $m^2$ ) square feet ( $ft^2$ ) square inches ( $in^2$ )	10.76 1550.0 0.09294 0.000645	square feet ( $ft^2$ ) square inches ( $in^2$ ) square meters ( $m^2$ ) square meters ( $m^2$ )
<b>PRESSURE</b>	bars pounds per square inch (lb/in <sup>2</sup> )	14.5 0.069	pounds per square inch (lb / in <sup>2</sup> ) bars

## WEIGHT AND BALANCE MANUAL

03. List of abbreviations

## A. General

A / C	Aircraft
AD	Aircraft Datum
ALI	Aircraft Loadability Interface
AMC	Aerodynamic Mean Chord
APU	Auxiliary Power Unit
AS	Aerospace Standard
ATA	Air Transport Association of America
AZFW	Actual Zero Fuel Weight
B / C	Business Class
B / F	Brought forward
C / C	Club Class
C / F	Carried forward
CFMI	CFM International
CG	Center of Gravity
C / L	Centerline
COMP	Compartment
Cos	Cosine
CRT	Cross Reference Table
CTR	Center
DOC	Document
EFF	Effective
E.G.	For example
FAR	Federal Aviation Regulations
F / C	First Class
FQI	Fuel Quantity Indicator
FR	Frame
FWD	Forward
GMC	Geometrical Mean Chord
H-ARM	Horizontal arm from station 0 (zero) in length unit
H-ARM FUS. STA.	Horizontal arm fuselage station
IAE	International Aero Engines A G
IATA	International Air Transport Association
IDG	Integrated Drive Generator
ISO	International Organization for Standardization
LE	Leading Edge
LEP	List of effective pages
L / G	Landing Gear
LH	Left Hand
MAX	Maximum
M / C	Main Class
MEW	Manufacturer's Empty Weight
MID	Middle
MIN	Minimum
MISC	Miscellaneous
MLW	Maximum Design Landing Weight
MTOW	Maximum Design Take-Off Weight
MTW	Maximum Design Taxi Weight
MZFW	Maximum Design Zero Fuel Weight
NAS	National Aerospace Standard
No	Number
OEW	Operational Empty Weight
OLW	Operational Landing Weight
OTOW	Operational Take-Off Weight
O <sub>2</sub>	Oxygen
PAX or PASS	Passengers
P / L	Payload



## WEIGHT AND BALANCE MANUAL

POS	Position
RC	Reference Chord
REF	Reference
RESP	Respectively
REV	Revision
RH	Right Hand
Seq	Sequence
Sin	Sine
Tan	Tangent
TC	Type Certificate
TO	Take-Off
TR	Temporary Revision
TSO	Technical Standard Order
ULD	Unit Load Device
US	United States
W	Weight
WBM	Weight and Balance Manual
Y-ARM	Lateral arm from station 0 (zero) in length unit
Y / C	Tourist Class or Economy Class
Z-ARM	Vertical arm from station 0 (zero) in length unit
ZFCG	Zero Fuel Weight Center of Gravity
ZFW	Zero Fuel Weight

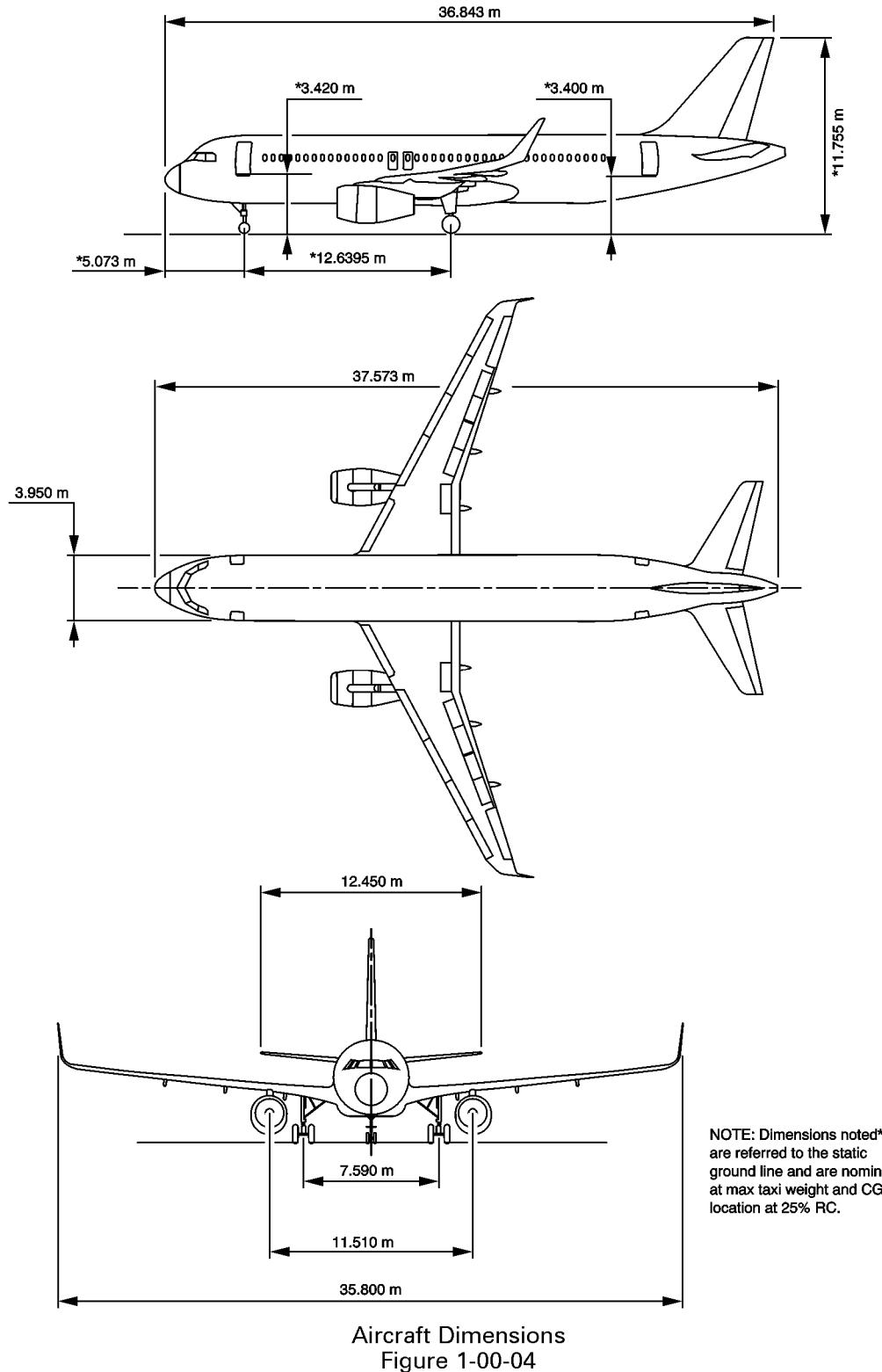
### B. Units

cuft	– cubic feet
cum	– cubic meters
ft	– feet
in	– inches
kg	– kilograms
kg / l	– kilograms per liter
km	– kilometers
km / h	– kilometers per hour
kt	– knots
l	– liters
lb	– pounds
lbin	– pound-inches
lb / sqin	– pounds per square inch
lb / US gal	– pounds per US gallon
m	– meters
kgm	– kilogram-meters
mm	– millimeters
mph	– miles per hour
sqft	– square feet
sqin	– square inches
sqm	– square meters
US gal	– US gallons
%	– percent
°	– degrees
'	– minutes of degree

## WEIGHT AND BALANCE MANUAL

### 04. Aircraft views and main dimensions

The aircraft three views and principal dimensions are shown in figure 1-00-04.



**05. Reference trihedral and balance scale definition****A. Reference trihedral**

A reference trihedral in front of and below the aircraft has been chosen. This trihedral is defined by the following planes.

- (01) Forward plane H-arm 0 (yo<sub>z</sub>) located 2.540 meters forward of aircraft nose section.
- (02) Vertical plane (xo<sub>z</sub>) being the aircraft symmetry plane.
- (03) Horizontal plane (xo<sub>y</sub>) located 7.000 meters below the fuselage datum line.

This definition is illustrated in figure 1-00-05.

**B. Balance scale**

To facilitate CG calculations and representation on the diagrams, the moment is reduced to a more workable magnitude by the following balance scale unit.

$$\text{unit} = \frac{\text{MOMENT (kgm)}}{1\,000 \text{ (kgm)}}$$

NOTE : On balance diagrams the moments are relative to 25 % RC (H-arm = 18.850 m).

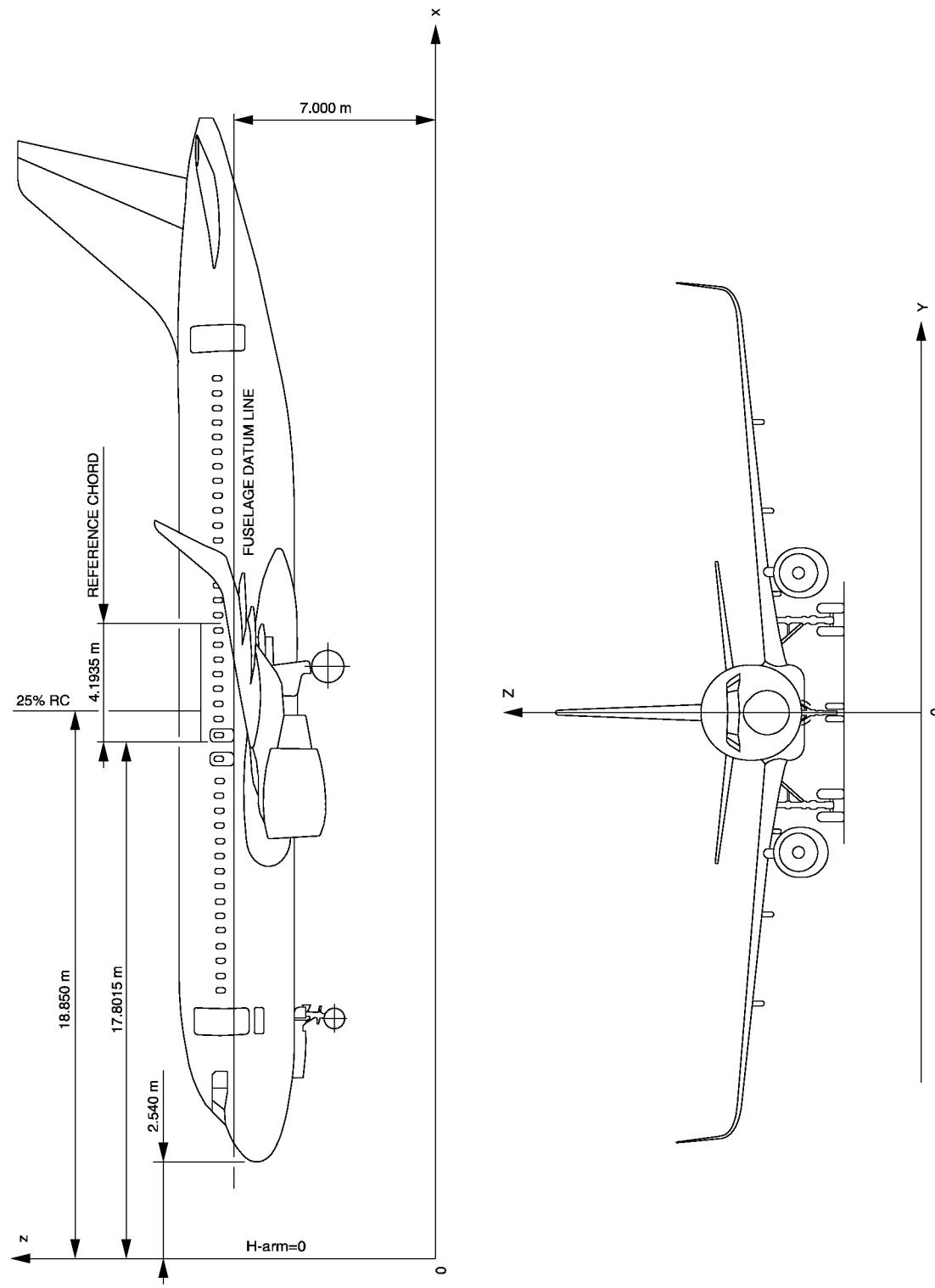
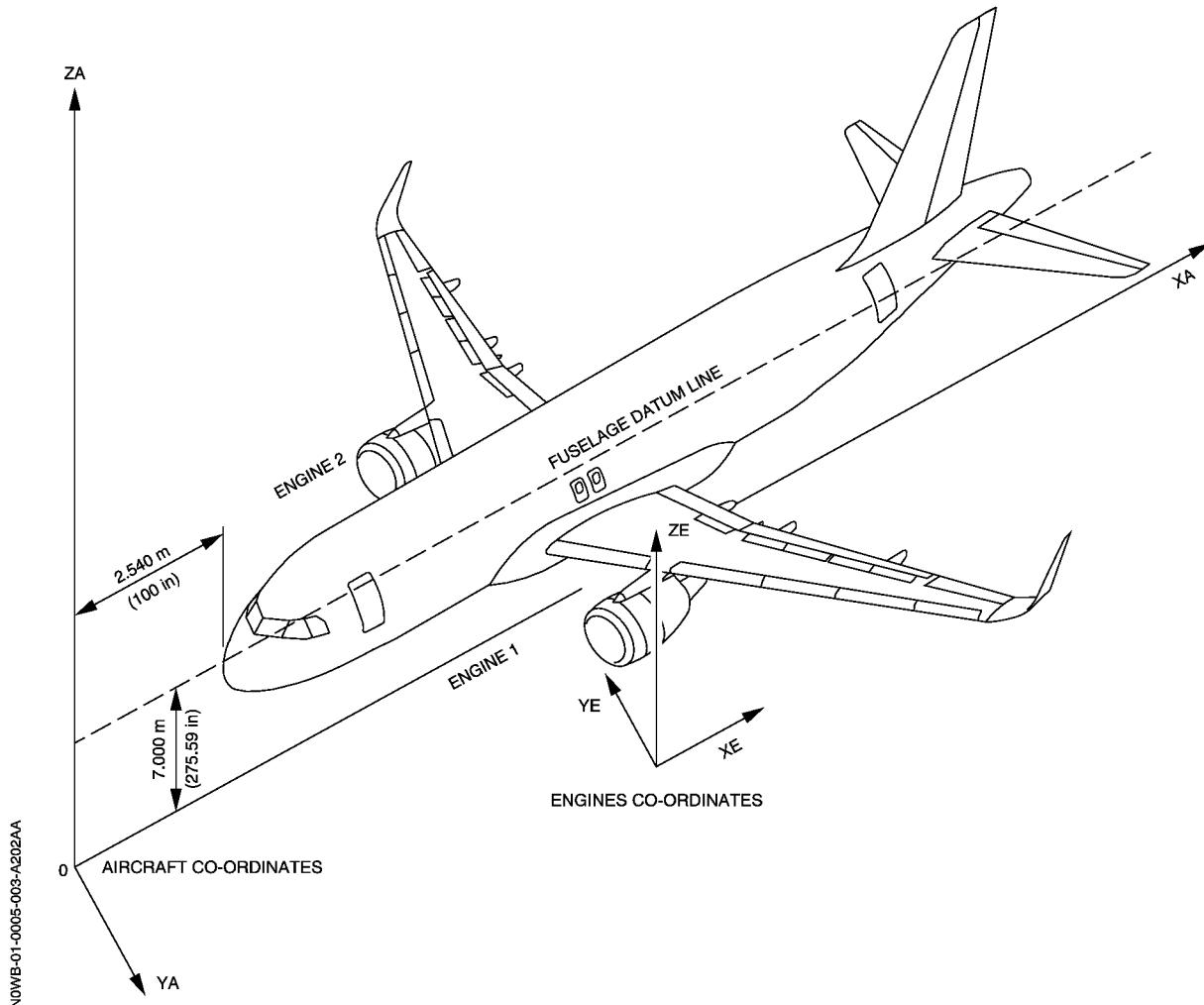


Figure 1-00-05A

Mod : 20268 + 160080 or 20268 + 160500

Seq : 202

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The formulae below transform CFMI ENGINES CO-ORDINATES (XE, YE, ZE) into AIRCRAFT CO-ORDINATES (XA, YA, ZA).

AIRCRAFT CO-ORDINATES	(m)	(in)
XA	$10.774 + 0.999 \text{ } X_E + 0.0384 \text{ } Z_E$	$424.18 + 0.999 \text{ } X_E + 0.0384 \text{ } Z_E$
YA (Engine 1)	$+ 5.641 - 0.0175 \text{ } X_E + Y_E$	$+ 222.09 - 0.0175 \text{ } X_E + Y_E$
YA (Engine 2)	$- 5.641 + 0.0175 \text{ } X_E + Y_E$	$- 222.09 + 0.0175 \text{ } X_E + Y_E$
ZA	$5.033 - 0.0384 \text{ } X_E + 0.999 \text{ } Z_E$	$198.15 - 0.0384 \text{ } X_E + 0.999 \text{ } Z_E$

Engines Reference Trihedral

Figure 1-00-05B

06. Definition of the reference chord and relevant formulae

The length of the reference chord = 4.1935 meters.

H-arm of reference chord leading edge = 17.8015 meters.

Percent reference chord and H-arm conversion :

A. An H-arm can be converted into percentage of the reference chord through :

$$\% \text{ RC} = \frac{\text{H-arm} - 17.8015}{0.041935}$$

B. A percentage of the reference chord can be converted into H-arm through :

$$\text{H-arm} = (\% \text{ RC} \times 0.041935) + 17.8015$$

These conversions can be read on tables in figures 1-00-06A and 1-00-06B.

% RC	.00	.10	.20	.30	.40	.50	.60	.70	.80	.90
0	17.802	17.806	17.810	17.814	17.818	17.822	17.827	17.831	17.835	17.839
1	17.843	17.848	17.852	17.856	17.860	17.864	17.869	17.873	17.877	17.881
2	17.885	17.890	17.894	17.898	17.902	17.906	17.911	17.915	17.919	17.923
3	17.927	17.931	17.936	17.940	17.944	17.948	17.952	17.957	17.961	17.965
4	17.969	17.973	17.978	17.982	17.986	17.990	17.994	17.999	18.003	18.007
5	18.011	18.015	18.020	18.024	18.028	18.032	18.036	18.041	18.045	18.049
6	18.053	18.057	18.061	18.066	18.070	18.074	18.078	18.082	18.087	18.091
7	18.095	18.099	18.103	18.108	18.112	18.116	18.120	18.124	18.129	18.133
8	18.137	18.141	18.145	18.150	18.154	18.158	18.162	18.166	18.171	18.175
9	18.179	18.183	18.187	18.191	18.196	18.200	18.204	18.208	18.212	18.217
10	18.221	18.225	18.229	18.233	18.238	18.242	18.246	18.250	18.254	18.259
11	18.263	18.267	18.271	18.275	18.280	18.284	18.288	18.292	18.296	18.301
12	18.305	18.309	18.313	18.317	18.321	18.326	18.330	18.334	18.338	18.342
13	18.347	18.351	18.355	18.359	18.363	18.368	18.372	18.376	18.380	18.384
14	18.389	18.393	18.397	18.401	18.405	18.410	18.414	18.418	18.422	18.426
15	18.431	18.435	18.439	18.443	18.447	18.451	18.456	18.460	18.464	18.468
16	18.472	18.477	18.481	18.485	18.489	18.493	18.498	18.502	18.506	18.510
17	18.514	18.519	18.523	18.527	18.531	18.535	18.540	18.544	18.548	18.552
18	18.556	18.561	18.565	18.569	18.573	18.577	18.581	18.586	18.590	18.594
19	18.598	18.602	18.607	18.611	18.615	18.619	18.623	18.628	18.632	18.636
20	18.640	18.644	18.649	18.653	18.657	18.661	18.665	18.670	18.674	18.678
21	18.682	18.686	18.691	18.695	18.699	18.703	18.707	18.711	18.716	18.720
22	18.724	18.728	18.732	18.737	18.741	18.745	18.749	18.753	18.758	18.762
23	18.766	18.770	18.774	18.779	18.783	18.787	18.791	18.795	18.800	18.804
24	18.808	18.812	18.816	18.821	18.825	18.829	18.833	18.837	18.841	18.846
25	18.850	18.854	18.858	18.862	18.867	18.871	18.875	18.879	18.883	18.888
26	18.892	18.896	18.900	18.904	18.909	18.913	18.917	18.921	18.925	18.930
27	18.934	18.938	18.942	18.946	18.951	18.955	18.959	18.963	18.967	18.971
28	18.976	18.980	18.984	18.988	18.992	18.997	19.001	19.005	19.009	19.013
29	19.018	19.022	19.026	19.030	19.034	19.039	19.043	19.047	19.051	19.055
30	19.060	19.064	19.068	19.072	19.076	19.081	19.085	19.089	19.093	19.097
31	19.101	19.106	19.110	19.114	19.118	19.122	19.127	19.131	19.135	19.139
32	19.143	19.148	19.152	19.156	19.160	19.164	19.169	19.173	19.177	19.181
33	19.185	19.190	19.194	19.198	19.202	19.206	19.211	19.215	19.219	19.223
34	19.227	19.231	19.236	19.240	19.244	19.248	19.252	19.257	19.261	19.265
35	19.269	19.273	19.278	19.282	19.286	19.290	19.294	19.299	19.303	19.307
36	19.311	19.315	19.320	19.324	19.328	19.332	19.336	19.341	19.345	19.349
37	19.353	19.357	19.361	19.366	19.370	19.374	19.378	19.382	19.387	19.391
38	19.395	19.399	19.403	19.408	19.412	19.416	19.420	19.424	19.429	19.433
39	19.437	19.441	19.445	19.450	19.454	19.458	19.462	19.466	19.471	19.475
40	19.479	19.483	19.487	19.491	19.496	19.500	19.504	19.508	19.512	19.517
41	19.521	19.525	19.529	19.533	19.538	19.542	19.546	19.550	19.554	19.559
42	19.563	19.567	19.571	19.575	19.580	19.584	19.588	19.592	19.596	19.601
43	19.605	19.609	19.613	19.617	19.621	19.626	19.630	19.634	19.638	19.642
44	19.647	19.651	19.655	19.659	19.663	19.668	19.672	19.676	19.680	19.684
45	19.689	19.693	19.697	19.701	19.705	19.710	19.714	19.718	19.722	19.726
46	19.731	19.735	19.739	19.743	19.747	19.751	19.756	19.760	19.764	19.768
47	19.772	19.777	19.781	19.785	19.789	19.793	19.798	19.802	19.806	19.810
48	19.814	19.819	19.823	19.827	19.831	19.835	19.840	19.844	19.848	19.852
49	19.856	19.861	19.865	19.869	19.873	19.877	19.881	19.886	19.890	19.894

Table of Conversion % RC to H-arm

Figure 1-00-06A 1 / 2

% RC	.00	.10	.20	.30	.40	.50	.60	.70	.80	.90
50	19.898	19.902	19.907	19.911	19.915	19.919	19.923	19.928	19.932	19.936
51	19.940	19.944	19.949	19.953	19.957	19.961	19.965	19.970	19.974	19.978
52	19.982	19.986	19.991	19.995	19.999	20.003	20.007	20.011	20.016	20.020
53	20.024	20.028	20.032	20.037	20.041	20.045	20.049	20.053	20.058	20.062
54	20.066	20.070	20.074	20.079	20.083	20.087	20.091	20.095	20.100	20.104
55	20.108	20.112	20.116	20.121	20.125	20.129	20.133	20.137	20.141	20.146
56	20.150	20.154	20.158	20.162	20.167	20.171	20.175	20.179	20.183	20.188
57	20.192	20.196	20.200	20.204	20.209	20.213	20.217	20.221	20.225	20.230
58	20.234	20.238	20.242	20.246	20.251	20.255	20.259	20.263	20.267	20.271
59	20.276	20.280	20.284	20.288	20.292	20.297	20.301	20.305	20.309	20.313
60	20.318	20.322	20.326	20.330	20.334	20.339	20.343	20.347	20.351	20.355
61	20.360	20.364	20.368	20.372	20.376	20.381	20.385	20.389	20.393	20.397
62	20.401	20.406	20.410	20.414	20.418	20.422	20.427	20.431	20.435	20.439
63	20.443	20.448	20.452	20.456	20.460	20.464	20.469	20.473	20.477	20.481
64	20.485	20.490	20.494	20.498	20.502	20.506	20.511	20.515	20.519	20.523
65	20.527	20.531	20.536	20.540	20.544	20.548	20.552	20.557	20.561	20.555
66	20.569	20.573	20.578	20.582	20.586	20.590	20.594	20.599	20.603	20.607
67	20.611	20.615	20.620	20.624	20.628	20.632	20.636	20.640	20.645	20.649
68	20.653	20.657	20.661	20.666	20.670	20.674	20.678	20.682	20.687	20.691
69	20.695	20.699	20.703	20.708	20.712	20.716	20.720	20.724	20.729	20.733
70	20.737	20.741	20.745	20.750	20.754	20.758	20.762	20.766	20.770	20.775
71	20.779	20.783	20.787	20.791	20.796	20.800	20.804	20.808	20.812	20.817
72	20.821	20.825	20.829	20.833	20.838	20.842	20.846	20.850	20.854	20.859
73	20.863	20.867	20.871	20.875	20.880	20.884	20.888	20.892	20.896	20.900
74	20.905	20.909	20.913	20.917	20.921	20.926	20.930	20.934	20.938	20.942
75	20.947	20.951	20.955	20.959	20.963	20.968	20.972	20.976	20.980	20.984
76	20.989	20.993	20.997	21.001	21.005	21.010	21.014	21.018	21.022	21.026
77	21.030	21.035	21.039	21.043	21.047	21.051	21.056	21.060	21.064	21.068
78	21.072	21.077	21.081	21.085	21.089	21.093	21.098	21.102	21.106	21.110
79	21.114	21.119	21.123	21.127	21.131	21.135	21.140	21.144	21.148	21.152
80	21.156	21.160	21.165	21.169	21.173	21.177	21.181	21.186	21.190	21.194
81	21.198	21.202	21.207	21.211	21.215	21.219	21.223	21.228	21.232	21.236
82	21.240	21.244	21.249	21.253	21.257	21.261	21.265	21.270	21.274	21.278
83	21.282	21.286	21.290	21.295	21.299	21.303	21.307	21.311	21.316	21.320
84	21.324	21.328	21.332	21.337	21.341	21.345	21.349	21.353	21.358	21.362
85	21.366	21.370	21.374	21.379	21.383	21.387	21.391	21.395	21.400	21.404
86	21.408	21.412	21.416	21.420	21.425	21.429	21.433	21.437	21.441	21.446
87	21.450	21.454	21.458	21.462	21.467	21.471	21.475	21.479	21.483	21.488
88	21.492	21.496	21.500	21.504	21.509	21.513	21.517	21.521	21.525	21.530
89	21.534	21.538	21.542	21.546	21.550	21.555	21.559	21.563	21.567	21.571
90	21.576	21.580	21.584	21.588	21.592	21.597	21.601	21.605	21.609	21.613
91	21.618	21.622	21.626	21.630	21.634	21.639	21.643	21.647	21.651	21.655
92	21.660	21.664	21.668	21.672	21.676	21.680	21.685	21.689	21.693	21.697
93	21.701	21.706	21.710	21.714	21.718	21.722	21.727	21.731	21.735	21.739
94	21.743	21.748	21.752	21.756	21.760	21.764	21.769	21.773	21.777	21.781
95	21.785	21.790	21.794	21.798	21.802	21.806	21.810	21.815	21.819	21.823
96	21.827	21.831	21.836	21.840	21.844	21.848	21.852	21.857	21.861	21.865
97	21.869	21.873	21.878	21.882	21.886	21.890	21.894	21.899	21.903	21.907
98	21.911	21.915	21.920	21.924	21.928	21.932	21.936	21.940	21.945	21.949
99	21.953	21.957	21.961	21.966	21.970	21.974	21.978	21.982	21.987	21.991

Table of Conversion % RC to H-arm

Figure 1-00-06A 2 / 2

H-arm (m)	.000	.010	.020	.030	.040	.050	.060	.070	.080	.090
17.800	- .04	.20	.44	.68	.92	1.16	1.40	1.63	1.87	2.11
17.900	2.35	2.59	2.83	3.06	3.30	3.54	3.78	4.02	4.26	4.50
18.000	4.73	4.97	5.21	5.45	5.69	5.93	6.16	6.40	6.64	6.88
18.100	7.12	7.36	7.60	7.83	8.07	8.31	8.55	8.79	9.03	9.26
18.200	9.50	9.74	9.98	10.22	10.46	10.70	10.93	11.17	11.41	11.65
18.300	11.89	12.13	12.36	12.60	12.84	13.08	13.32	13.56	13.80	14.03
18.400	14.27	14.51	14.75	14.99	15.23	15.46	15.70	15.94	16.18	16.42
18.500	16.66	16.90	17.13	17.37	17.61	17.85	18.09	18.33	18.56	18.80
18.600	19.04	19.28	19.52	19.76	20.00	20.23	20.47	20.71	20.95	21.19
18.700	21.43	21.66	21.90	22.14	22.38	22.62	22.86	23.10	23.33	23.57
18.800	23.81	24.05	24.29	24.53	24.76	25.00	25.24	25.48	25.72	25.96
18.900	26.20	26.43	26.67	26.91	27.15	27.39	27.63	27.86	28.10	28.34
19.000	28.58	28.82	29.06	29.30	29.53	29.77	30.01	30.25	30.49	30.73
19.100	30.96	31.20	31.44	31.68	31.92	32.16	32.40	32.63	32.87	33.11
19.200	33.35	33.59	33.83	34.06	34.30	34.54	34.78	35.02	35.26	35.50
19.300	35.73	35.97	36.21	36.45	36.69	36.93	37.16	37.40	37.64	37.88
19.400	38.12	38.36	38.60	38.83	39.07	39.31	39.55	39.79	40.03	40.26
19.500	40.50	40.74	40.98	41.22	41.46	41.70	41.93	42.17	42.41	42.65
19.600	42.89	43.13	43.36	43.60	43.84	44.08	44.32	44.56	44.80	45.03
19.700	45.27	45.51	45.75	45.99	46.23	46.46	46.70	46.94	47.18	47.42
19.800	47.66	47.90	48.13	48.37	48.61	48.85	49.09	49.33	49.56	49.80
19.900	50.04	50.28	50.52	50.76	51.00	51.23	51.47	51.71	51.95	52.19
20.000	52.43	52.66	52.90	53.14	53.38	53.62	53.86	54.10	54.33	54.57
20.100	54.81	55.05	55.29	55.53	55.76	56.00	56.24	56.48	56.72	56.96
20.200	57.20	57.43	57.67	57.91	58.15	58.39	58.63	58.86	59.10	59.34
20.300	59.58	59.82	60.06	60.30	60.53	60.77	61.01	61.25	61.49	61.73
20.400	61.96	62.20	62.44	62.68	62.92	63.16	63.40	63.63	63.87	64.11
20.500	64.35	64.59	64.83	65.06	65.30	65.54	65.78	66.02	66.26	66.50
20.600	66.73	66.97	67.21	67.45	67.69	67.93	68.17	68.40	68.64	68.88
20.700	69.12	69.36	69.60	69.83	70.07	70.31	70.55	70.79	71.03	71.27
20.800	71.50	71.74	71.98	72.22	72.46	72.70	72.93	73.17	73.41	73.65
20.900	73.89	74.13	74.37	74.60	74.84	75.08	75.32	75.56	75.80	76.03
21.000	76.27	76.51	76.75	76.99	77.23	77.47	77.70	77.94	78.18	78.42
21.100	78.66	78.90	79.13	79.37	79.61	79.85	80.09	80.33	80.57	80.80
21.200	81.04	81.28	81.52	81.76	82.00	82.23	82.47	82.71	82.95	83.19
21.300	83.43	83.67	83.90	84.14	84.38	84.62	84.86	85.10	85.33	85.57
21.400	85.81	86.05	86.29	86.53	86.77	87.00	87.24	87.48	87.72	87.96
21.500	88.20	88.43	88.67	88.91	89.15	89.39	89.63	89.87	90.10	90.34
21.600	90.58	90.82	91.06	91.30	91.53	91.77	92.01	92.25	92.49	92.73
21.700	92.97	93.20	93.44	93.68	93.92	94.16	94.40	94.63	94.87	95.11
21.800	95.35	95.59	95.83	96.07	96.30	96.54	96.78	97.02	97.26	97.50
21.900	97.73	97.97	98.21	98.45	98.69	98.93	99.17	99.40	99.64	99.88
22.000	100.12	100.36	100.60	100.83	101.07	101.31	101.55	101.79	102.03	102.27
% RC										

WN 1.00.06 004 AB 001

Table of Conversion H-arm to % RC

Figure 1-00-06B

## WEIGHT AND BALANCE MANUAL

07. Weight definitions

The weight terms used throughout this manual are given below together with their respective definitions.

A. Manufacturer's Empty Weight (MEW)

The weight of structure, power plant, systems, furnishings and other items of equipment that are an integral part of a particular aircraft configuration, including the fluids contained in closed systems.

The weights of all operator's items are excluded.

B. Operator's Items

These items include the following :

- (01) Unusable fuel
- (02) Oil for engines, IDG and APU
- (03) Water for galleys and toilets
- (04) Chemical fluid for toilets
- (05) Aircraft documents and tool kits
- (06) Passenger seats and passenger life jackets
- (07) Tables and baby bassinets
- (08) Galley structure and fixed equipment
- (09) Catering
- (10) Pallets and baggage containers
- (11) Emergency equipment including :

Evacuation aids, portable O<sub>2</sub> bottles and boxes, extinguishers, megaphones, flash lights, axes, first aid kits, emergency radio beacons, asbestos gloves and smoke goggles, demonstration kits, life jackets for crew and children.

- (12) Crew and their baggage

C. Operational Empty Weight (OEW)

Sum of manufacturer's empty weight and operator's items weight.

D. Payload (P/L)

Sum of passengers, cargo and baggage.

E. Actual Zero Fuel Weight (AZFW)

Sum of operational empty weight and payload. The AZFW must never exceed the maximum design zero fuel weight (MZFW).

## WEIGHT AND BALANCE MANUAL

**F. Operational Take-Off Weight (OTOW)**

Maximum weight permitted at brake release for a given flight operation.  
This is a function of airport and operational restrictions.  
The OTOW must never exceed the maximum design take-off weight (MTOW).

**G. Operational Landing Weight (OLW)**

Maximum weight permitted at touchdown for a given flight operation.  
This is a function of airport and operational restrictions.  
The OLW must never exceed the maximum design landing weight (MLW).

**H. Maximum Payload**

The difference between the maximum design zero fuel weight (MZFW) and operational empty weight (OEW).

**I. Maximum Useful Load**

The difference between the maximum design take-off weight (MTOW) and operational empty weight (OEW). Useful load is the sum of payload and usable fuel.

**J. Maximum Design Taxi Weight (MTW)**

The maximum weight for ground manoeuvre (including the weight of run-up and taxi fuel).

**K. Maximum Design Take-Off Weight (MTOW)**

The maximum weight at the start of take-off run.

**L. Maximum Design Landing Weight (MLW)**

The maximum weight at which the aircraft may land.

**M. Maximum Design Zero Fuel Weight (MZFW)**

The total maximum of operational empty weight (OEW) and payload.  
It is also the maximum operational weight without usable fuel.

**N. Minimum Weight**

The minimum weight at which the aircraft may be operated.

## WEIGHT AND BALANCE MANUAL

**08. Location of aircraft main components**

The relative positions of the various aircraft components (wing, fuselage, etc...) are defined on drawing : AI 004-00.5030.

Dimensions of these components are defined on the following drawings :

Wing : BAe D 57S.55156

| Nose landing gear : Messier-Hispano PR60984 EQ3

| Main landing gear : Dowty Rotol 200001249

Engine pylon : AS / A320.30.54.501

Vertical tailplane : 31-D550-70000

Horizontal tailplane : CASA 3511 D - 5518L001

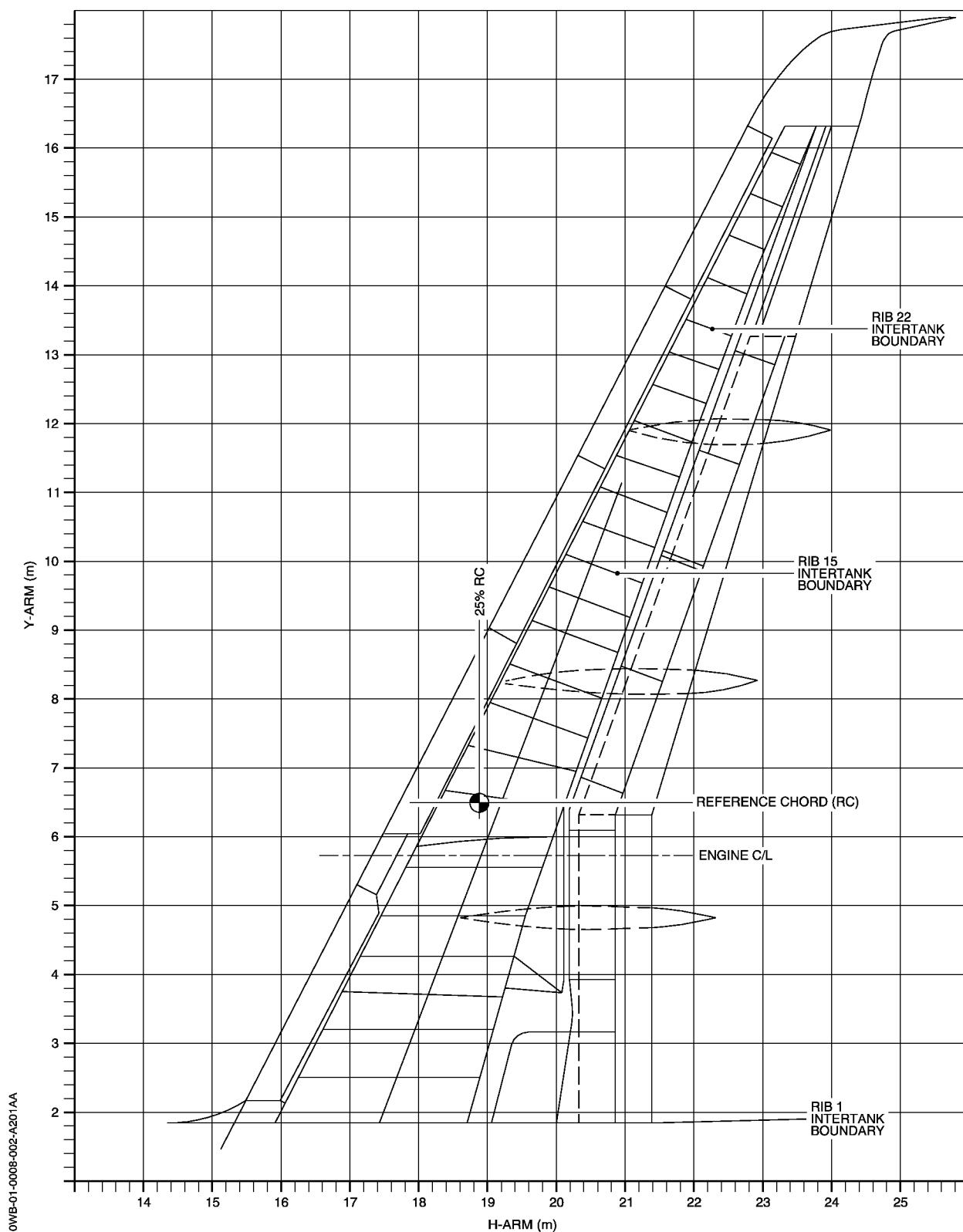
Fuselage : AI 004 - 00.5031

Station diagrams for the wing, horizontal tail and vertical tail are shown in figures 1-00-08A, 1-00-08B and 1-00-08C.

| For fuselage frame numbers refer to figure 1-00-08D,

| For fuselage frame H-arms refer to figure 1-00-08E.

## WEIGHT AND BALANCE MANUAL



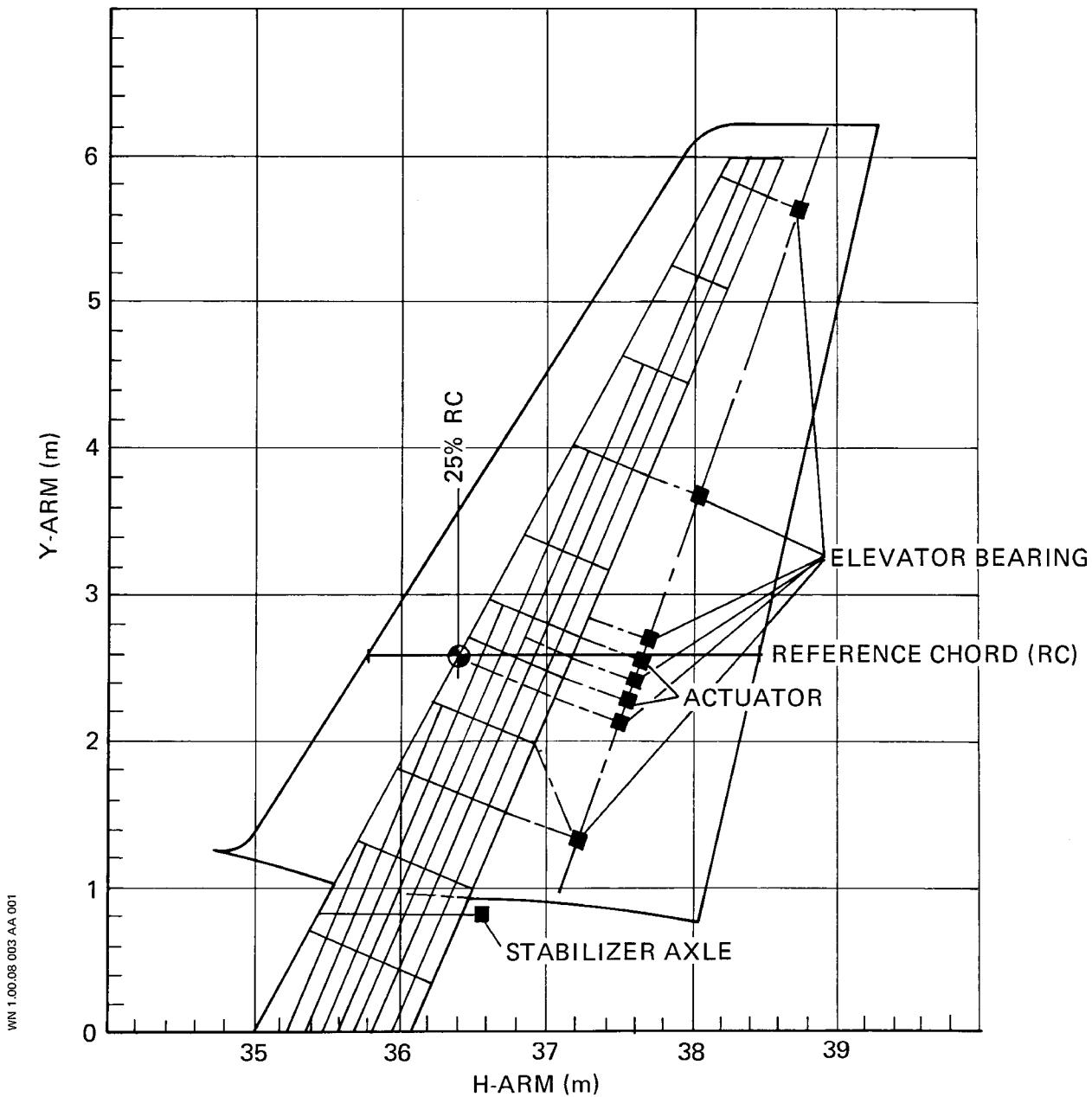
Station Diagram for the Wing

Figure 1-00-08A

Mod : 20268 + 160080 or 20268 + 160500

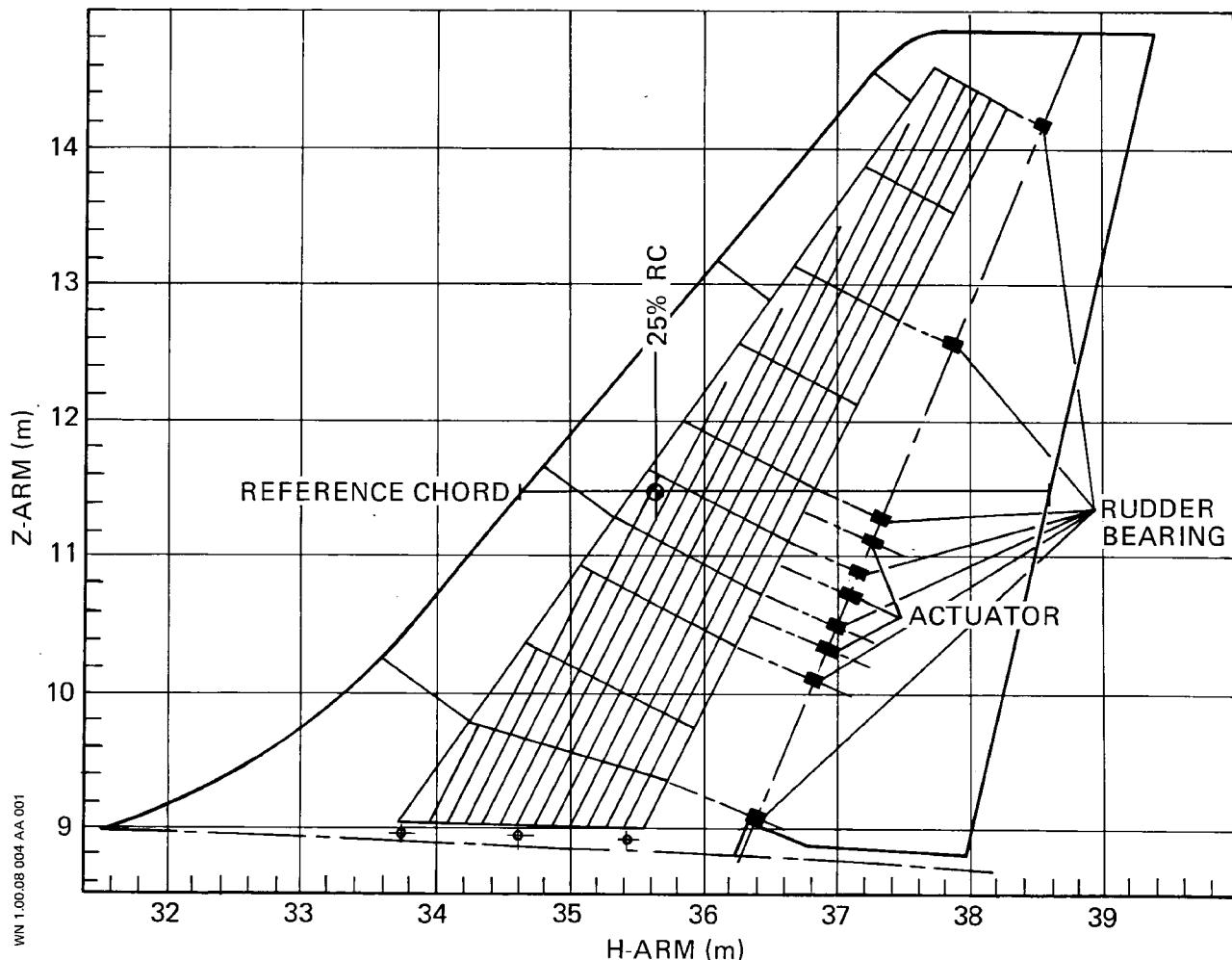
Seq : 201

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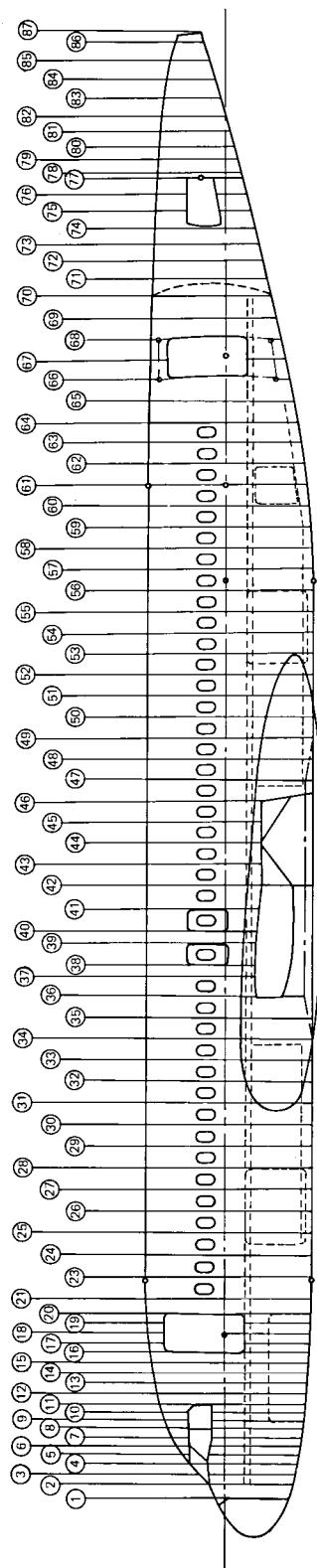
Station Diagram for Horizontal Tail

Figure 1-00-08B



Station Diagram for Vertical Tail

Figure 1-00-08C



Fuselage Frame Numbering

Figure 1-00-08D

Mod : 20029 or 20449

Seq : 110

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## WEIGHT AND BALANCE MANUAL

FRAME NUMBER	H-ARM (m)						
NOSE	2.540	23	8.966	45	20.295	67	32.074
1	3.500	24	9.500	46	20.828	68	32.571
2	3.850	25	10.033	47	21.361	69	33.096
3	4.090	26	10.566	48	21.895	70	33.655
4	4.330	27	11.100	49	22.428	71	34.055
5	4.546	28	11.633	50	22.962	72	34.506
6	4.762	29	12.167	51	23.495	73	34.906
7	4.967	30	12.700	52	24.028	74	35.306
8	5.194	31	13.233	53	24.562	75	35.719
9	5.394	32	13.767	54	25.095	76	36.132
10	5.594	33	14.300	55	25.629	77	36.545
11	5.794	34	14.834	56	26.162	78	36.657
12	6.052	35	15.367	57	26.695	79	36.976
13	6.311	36	15.900	58	27.229	80	37.295
14	6.570	37	16.408	59	27.762	81	37.665
15	6.828	38	16.688	60	28.296	82	38.035
16	7.087	39	17.255	61	28.829	83	38.490
17	7.318	40	17.534	62	29.362	84	38.945
18	7.599	41	18.101	63	29.896	85	39.400
19	7.830	42	18.694	64	30.429	86	39.855
20	8.077	43	19.228	65	31.013	87	40.113
21	8.433	44	19.761	66	31.577		

H-arm Table of Fuselage Frames

Figure 1-00-08E

### 09. Stabilizer trim wheel setting

The green scale on trim wheel gives the trim setting for all weights and all configurations, as a function of the aircraft center of gravity (% RC) as shown on the diagram below.


NWNB-01-0009-001-A303AA

Take-Off Horizontal Stabilizer Trim Wheel Setting

Figure 1-00-09

## WEIGHT AND BALANCE MANUAL

10. Effect of moving components on the aircraft CG

Balance effects caused by operation of slats, flaps, thrust reverser and landing gear are given below.

A. Slats and flaps extension

The table below gives the moments due to slats and flaps extension.

COCKPIT INDICATION SLATS / FLAPS	MOMENTS (kgm)		
	SLATS	FLAPS	TOTAL
0	0	0	0
Automatic	- 96.5	0	- 96.5
1	- 96.5	220.0	123.5
2	- 96.5	275.5	179.0
3	- 96.5	330.5	234.0
Full	- 118.1	358.1	240.0

B. Thrust reverser extension

Thrust reverser = negligible

C. Landing gear retraction

Nose landing gear = - 202 kgm

Main landing gear = - 738 kgm

NOTE : The aircraft is weighed with slats, flaps and thrust reverser retracted.



## WEIGHT AND BALANCE MANUAL

### LIMITATIONS

The aircraft must be operated within the limitations set out in this section of the manual. The information given is incorporated in the aircraft Flight Manual by reference.

#### 01. Design weights

The design weights of the aircraft are as follows.

A. Maximum Design Taxi Weight (MTW) 77 400 kg

B. Maximum Design Take-Off Weight (MTOW) 77 000 kg

C. Maximum Design Landing Weight (MLW) 67 400 kg

D. Maximum Design Zero Fuel Weight (MZFW) 64 300 kg

E. Minimum Weight 40 600 kg

## WEIGHT AND BALANCE MANUAL

### 02. Design center of gravity limits

The design center of gravity for BASIC and ALTERNATE CG limits are defined in the following tables, and diagrammatically in figure 1-10-02.

The aircraft center of gravity must always be within these limits regardless of fuel load.

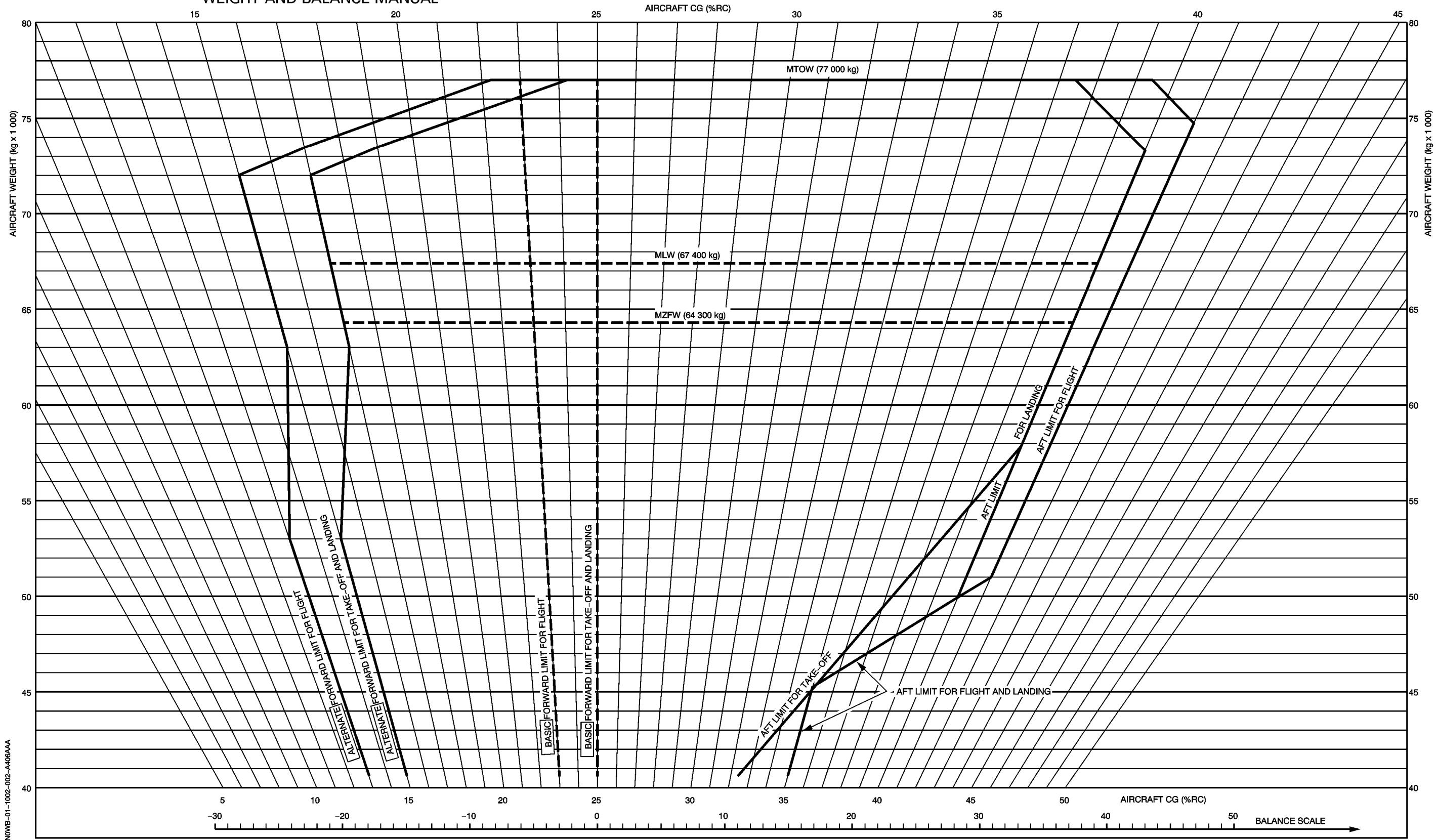
#### A. Forward CG limits

A / C Weight (kg)	For take-off in % RC (landing gear, slats and flaps down)		For flight in % RC (landing gear, slats and flaps up)		For landing in % RC (landing gear, slats and flaps down)	
	BASIC	ALTERNATE	BASIC	ALTERNATE	BASIC	ALTERNATE
40 600	25.00	15.00	23.00	13.00	25.00	15.00
to		constant		constant		constant
53 000		15.00		13.00		15.00
to		linear variation		linear variation		linear variation
63 000		17.00		15.00		17.00
to		constant		constant		constant
67 400		constant		constant		17.00
to						
72 000		17.00		15.00		
to		linear variation		linear variation		
73 500		19.00		17.00		
to		linear variation		linear variation		
77 000	25.00	24.20	23.00	22.20		

#### B. Aft CG limits

A / C Weight (kg)	For take-off in % RC (landing gear, slats and flaps down)	For flight in % RC (landing gear, slats and flaps up)	For landing in % RC (landing gear, slats and flaps down)
40 600	32.38	35.00	35.00
to		constant	constant
45 249		35.00	35.00
to		linear variation	linear variation
49 942	linear variation	linear variation	40.00
to			
51 000		41.00	40.00
to			constant
57 900	40.00		
to			
67 400	constant	constant	40.00
to			
73 326	40.00		
to			
74 708	linear variation	41.00	
to		linear variation	
77 000	37.41	39.41	

## WEIGHT AND BALANCE MANUAL



Certified CG Limits

Figure 1-10-02

Mod : 20802 + 161212 + 161248 + 161384

Seq : 406A

**03. Fuselage shear loads and bending moments due to payload**

The plots shown in figure 1-10-03 give the permissible limits for shear loads and bending moments resulting from the payload and dependent on the zero fuel weight center of gravity, at

- | – frame 36 (H-arm = 15.900 m or 625.98 in) for the forward cantilever section,
- | – frame 42 (H-arm = 18.694 m or 735.98 in) for the aft cantilever section.

These limits are compatible with :

- the operational empty weight of the aircraft in the defined delivery configuration ;
- the zero fuel weight and balance limits given in paragraphs 1.10.01 and 1.10.02 respectively.

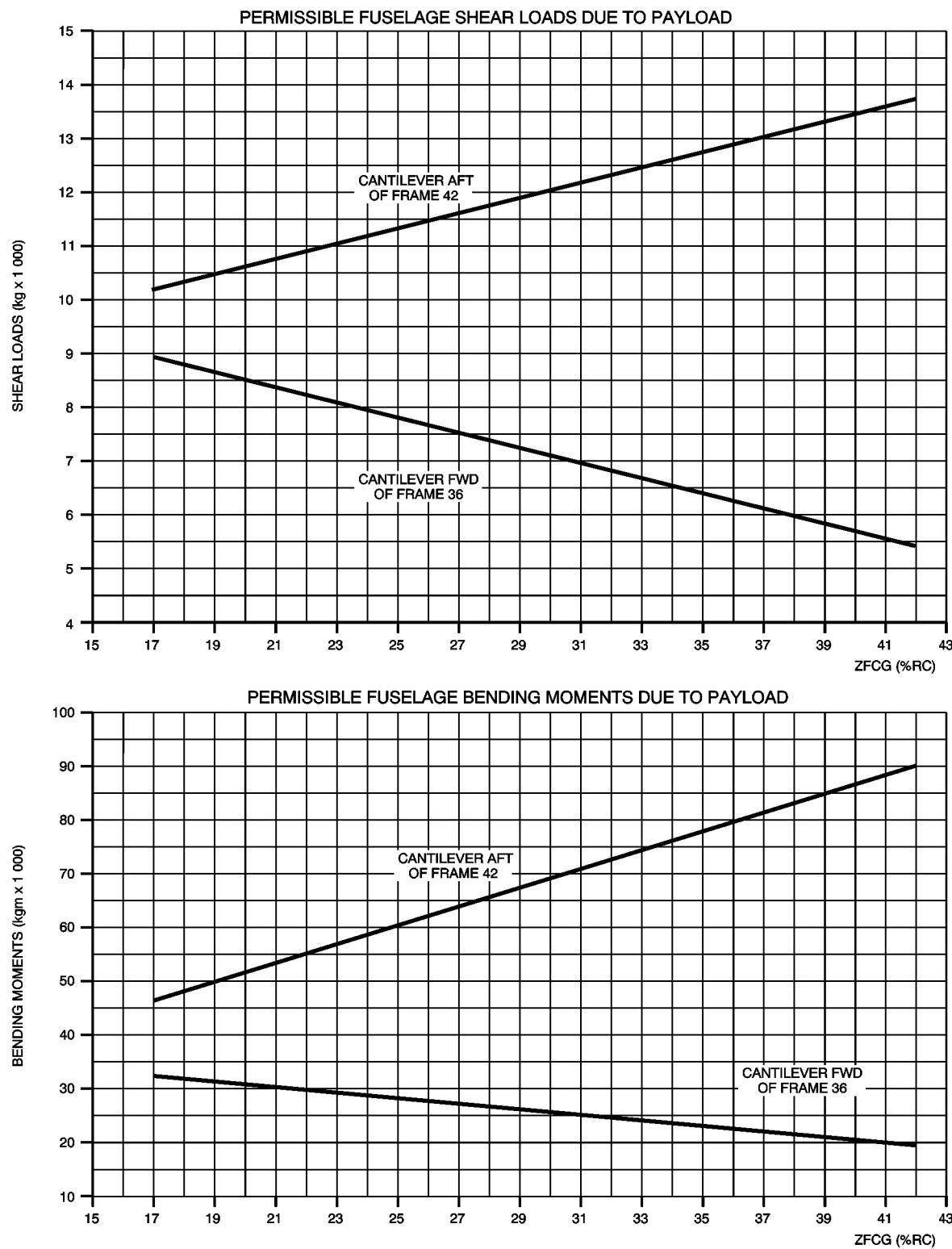
In these conditions, it has been shown that for any case of loading complying with :

- the cargo hold limitations given in paragraphs 1.10.05 , 1.10.06 and 1.10.07,
- the passenger compartment arrangement described in sections 1.40 and 1.50,

there are no limitations due to shear loads and bending moments.

- | Therefore, the shear loads and bending moments given in figure 1-10-03 need to be checked only in case of unusual loadings.

## WEIGHT AND BALANCE MANUAL



Permissible Fuselage Shear Loads and Bending Moments due to Payload

Figure 1-10-03

04. Floor loading limitsA. Cabin floor

**CAUTION : IT IS PROHIBITED TO CARRY LOOSE BULK FREIGHT IN THE PASSENGER CABIN.**

(01) Structure

The floor structure is capable of supporting seats, loaded with 91 kg (200 lb), equivalent to the seat and passenger weight, fitted six per row at a minimum pitch of 0.711 m (28 inches) between rows.

(02) Panels

Each floor panel is capable of carrying a local load of 339 kg (750 lb) on any 0.093 m<sup>2</sup> (1 ft<sup>2</sup>) without permanent deformation and 91 kg (200 lb) walking load on any 645 mm<sup>2</sup> (1 in<sup>2</sup>) without appreciable deformation.

Floor panels in service and aisle areas are of adequate robustness to withstand the maximum expected rolling loads from service carts up to 100 kg (220 lb) gross weight.

B. Forward cargo hold (compartment 1 and 2) floor(01) Structure

The floor structure is capable of supporting via the floor panels in the flat and sloping floor areas a maximum distributed load of 732 kg/m<sup>2</sup> (150 lb/ft<sup>2</sup>), provided the requirements of paragraphs 1.10.05 and 1.60.03 are met.

(02) Panels

Each floor panel is capable of carrying a local load of 906 kg (2000 lb) on 0.093 m<sup>2</sup> (1 ft<sup>2</sup>) and a point load of 6.6 kg/cm<sup>2</sup> (94 lb/in<sup>2</sup>) without permanent deformation.

The local loads must be separated from each other in such a way that the floor structure load limitations as stated above are not exceeded, as well as relevant maximum compartment loads, refer to paragraph 1.10.05.



## WEIGHT AND BALANCE MANUAL

### C. Aft cargo hold (compartment 3 and 4) floor

#### (01) Structure

The floor structure is capable of supporting via the floor panels in the flat and sloping floor areas a maximum distributed load of 732 kg/m<sup>2</sup> (150 lb/ft<sup>2</sup>), provided the requirements of paragraphs 1.10.06 and 1.60.04 are met.

#### (02) Panels

Each floor panel is capable of carrying a local load of 906 kg (2000 lb) on 0.093 m<sup>2</sup> (1 ft<sup>2</sup>) and a point load of 6.6 kg/cm<sup>2</sup> (94 lb/in<sup>2</sup>) without permanent deformation.

The local loads must be separated from each other in such a way that the floor structure load limitations as stated above are not exceeded, as well as relevant maximum compartment loads, refer to paragraph 1.10.06.

### D. Rear (bulk) cargo hold (compartment 5) floor

#### (01) Structure

The floor structure is capable of supporting, via the floor panels in the flat and sloping floor areas a maximum distributed load of 732 kg/m<sup>2</sup> (150 lb/ft<sup>2</sup>), provided the requirements of paragraphs 1.10.07 and 1.60.05 are met.

#### (02) Panels

Each floor panel is capable of carrying a local load of 906 kg (2000 lb) on 0.093 m<sup>2</sup> (1 ft<sup>2</sup>) and a point load of 6.6 kg/cm<sup>2</sup> (94 lb/in<sup>2</sup>) without permanent deformation.

The local loads must be separated from each other in such a way that the floor structure load limitations as stated above are not exceeded, as well as relevant maximum compartment loads, refer to paragraph 1.10.07.

## 05. Loading of forward cargo hold (compartment 1)

**CAUTION :** THE MAXIMUM LOAD ON THE FLOOR MUST NOT EXCEED THE VALUES SPECIFIED IN PARAGRAPH 1.10.04.B.

The forward cargo hold (compartment 1) is designed for the carriage of bulk loads with a maximum load density of 240 kg/m<sup>3</sup> (15 lb/ft<sup>3</sup>).

Bulk loads are defined as loose loads, baggage or freight which can be loaded within a net section.

### A. Cargo hold (compartment 1) capacity

The cargo hold has a maximum load capacity of 3 402 kg (7 500 lb).

For loading control purposes the cargo hold is divided into individual sections as given in the table below.

SECTION DESIGNATION	EXTENSION FRAME STATION		MAXIMUM LOAD CAPACITY	
	From	To	(kg)	(lb)
11	24A	28	1 045	2 303
12	28	31	1 225	2 702
Sub-Total Net Section 11 and 12	24A	31	2 270	5 005
13	31	34	1 132	2 495
Total	24A	34	3 402	7 500

The cargo hold is subdivided by a removable lateral net at frame station 31 into two net sections.

The arrangement of the cargo hold, cargo hold volumes and average H-arms are given in paragraph 1.60.03.

### B. Restraint conditions

When the certified net restraint system is used, additional tie down is normally not required except as shown in the following.

All individual items of load which by their nature, shape or density may constitute a hazard shall be restrained. Restraint can be achieved by filling the cargo hold or net section volumetrically, or by tie down.

Compartments or net sections which are 80 % volumetrically filled are considered to be volumetrically full.

Packages weighing more than 150 kg (330 lb) shall be restrained or individually tied down. Single packages should be tied down.

A minimum clearance of 51 mm (2 in) to the cargo compartment ceiling has to be respected.

All single items exceeding the size of a net section are considered as non unitized load.

In case of non unitized load the divider net at frame station 31 can be removed if :

- all items in net sections forward and behind a removed divider net are individually restrained, refer to paragraph 1.60.06,
- no loose cargo left in net sections forward and behind a removed divider net.

### C. Tie down requirements

Tie down of loads to aircraft structure is achieved via tie down straps and nets connected to the tie down points located on the cargo hold floor.

Each tie down point is designed to an ultimate load of 906 kg (2 000 lb), in any direction.

Location of tie down points is given in paragraph 1.60.03.

Tie down arrangement via tie down straps and nets or equivalent restraint hardware shall provide evenly distributed loads to the cargo hold floor.

### D. Tie down methods

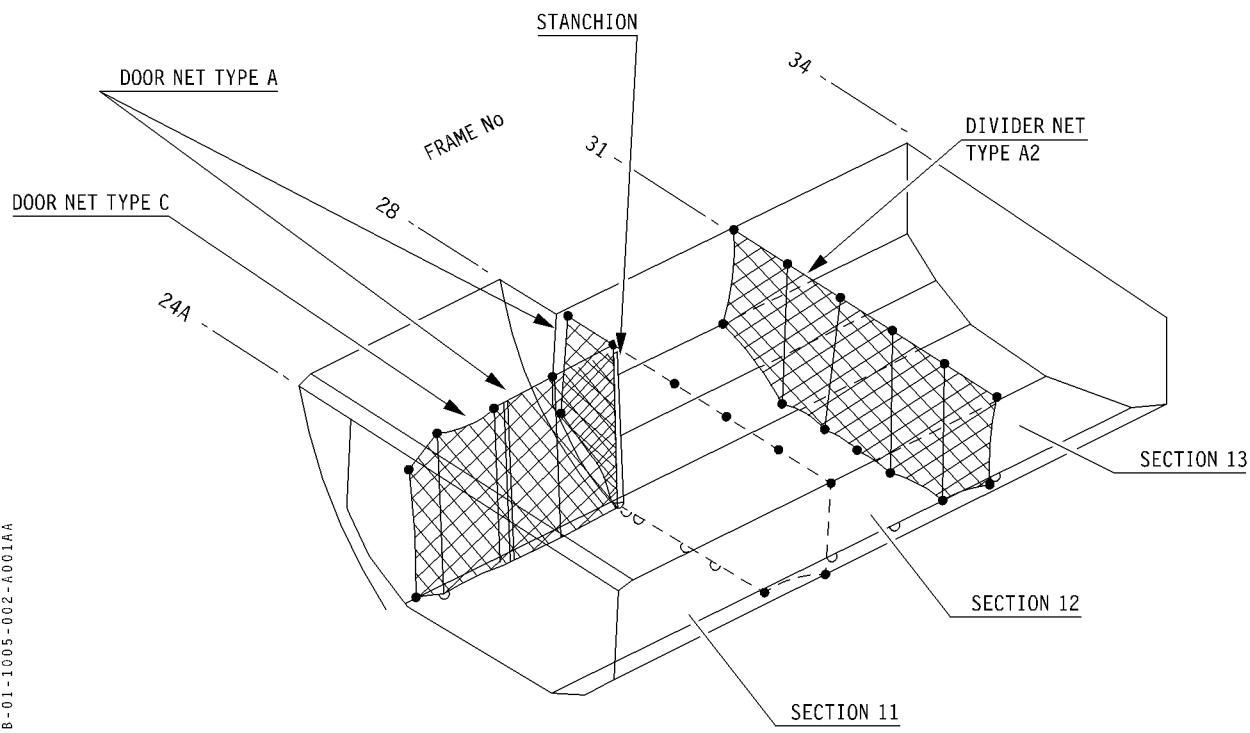
Methods of tie down are given in paragraph 1.60.06.

The load factors below must be used when establishing the ultimate load.

COMPARTMENT NUMBER	LOAD FACTOR			
	FWD	AFT	SIDE	UP
1 (Forward)	1.69	1.12	0.88	2.57

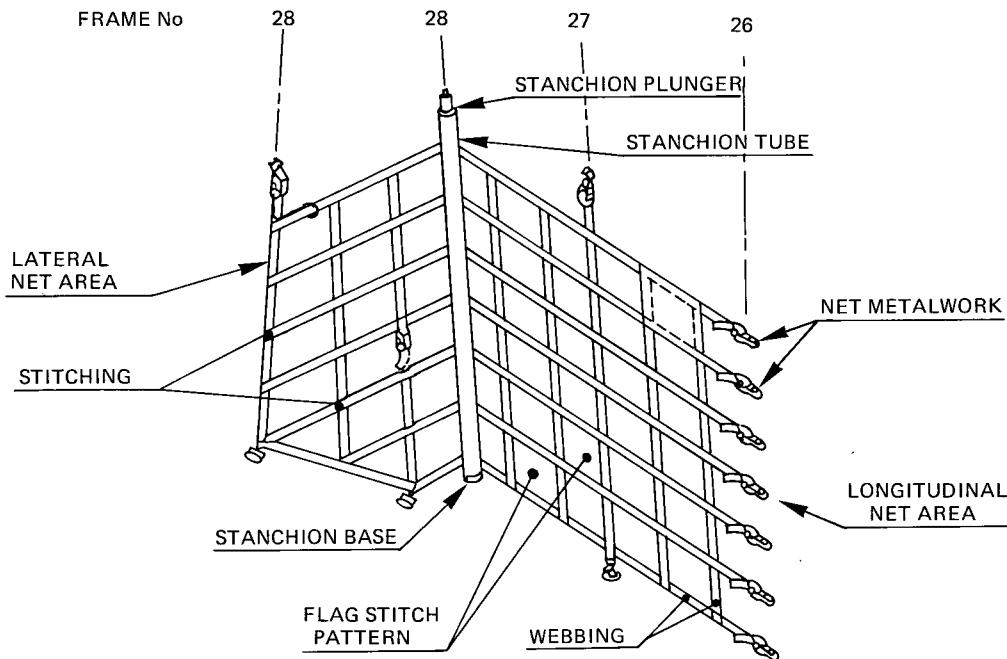
### E. Cargo hold nets malfunction limitations

For layout of the net installation in the forward cargo hold (compartment 1) see the illustration below.



## WEIGHT AND BALANCE MANUAL

The following tables give the load restrictions to be applied when nets are damaged or missing.

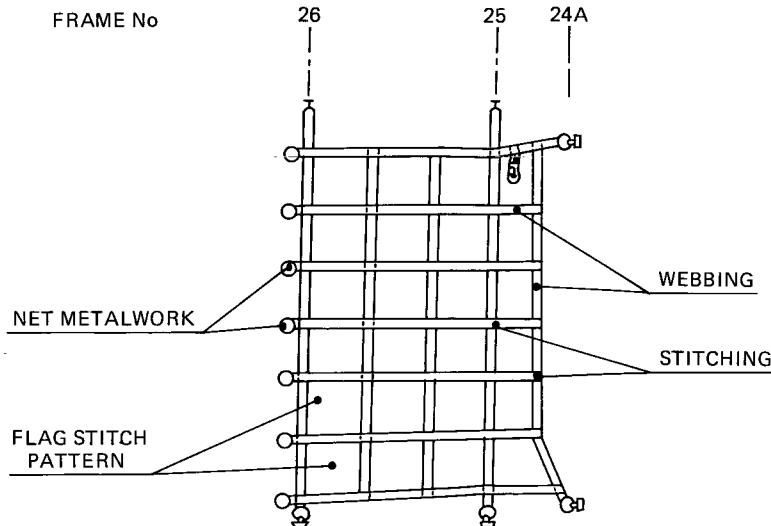
(01) Door net type A

WIN 1.10.05 003 AA 001

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch patterns affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch patterns affected	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually.
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually.
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	More than one loop detached or missing	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually

(02) Door net type C


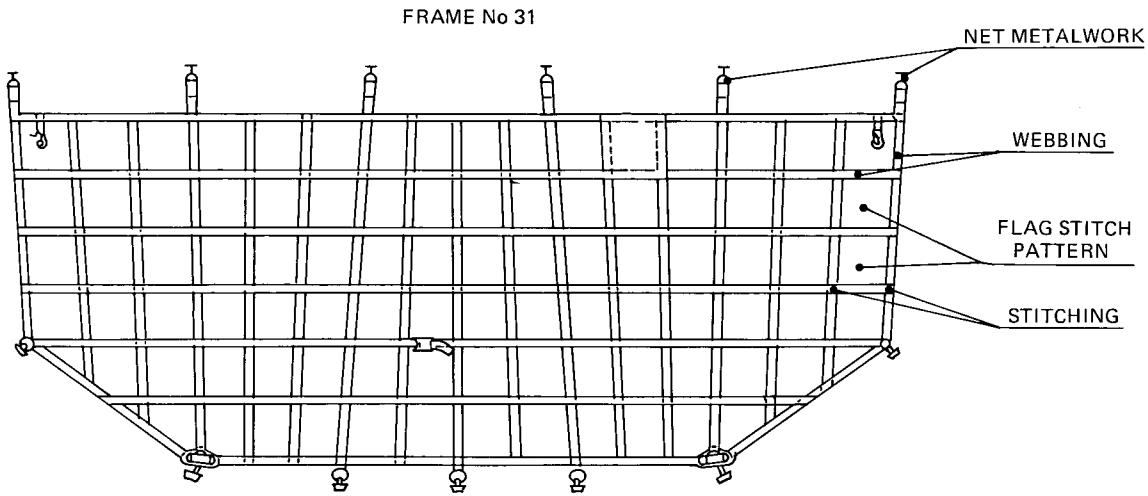
WN 1.10.05 006 AA 001

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb), or bulk load is restrained individually.
	All damage exceeding the failures defined above	Net section 11 and 12 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

(03) Divider net type A2

WIN 1.10.05 006 AA 001



ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb) and gross weight of net section 13 must be reduced to 849 kg (1 871 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb) and gross weight of net section 13 must be reduced to 849 kg (1 871 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 and net section 13 remain unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 11 and 12 must be reduced to 1 702 kg (3 752 lb) and gross weight of net section 13 must be reduced to 849 kg (1 871 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 11 and 12 and net section 13 remain unoccupied, or bulk load is restrained individually

## 06. Loading of aft cargo hold (compartment 3 and 4)

**CAUTION :** THE MAXIMUM LOAD ON THE FLOOR MUST NOT EXCEED THE VALUES SPECIFIED IN PARAGRAPH 1.10.04.C.

The aft cargo hold (compartment 3 and 4) is designed for the carriage of bulk loads with a maximum load density of 240 kg/m<sup>3</sup> (15 lb/ft<sup>3</sup>).

Bulk loads are defined as loose loads, baggage or freight which can be loaded within a net section.

### A. Cargo hold (compartment 3 and 4) capacity

The cargo hold has a maximum load capacity of 4 536 kg (10 000 lb).

For loading control purposes the cargo hold is divided into individual sections as given in the table below.

SECTION DESIGNATION	EXTENSION FRAME STATION		MAXIMUM LOAD CAPACITY	
	From	To	(kg)	(lb)
31	47	50	1 301	2 868
32	50	52A/53	1 125	2 481
Sub-Total Compartment 3	47	52A/53	2 426	5 349
41	53	56	928	2 046
42	56	59	1 182	2 605
Sub-Total Compartment 4	53	59	2 110	4 651
Sub-Total Net Section 32, 41 and 42	50	59	3 235	7 132
Total Compartment 3 and 4	47	59	4 536	10 000

The cargo hold is subdivided by a removable lateral net at frame station 50 into two net sections, and is separated from the rear (bulk) cargo hold (compartment 5) by a removable lateral net at frame station 59.

After installation of a removable lateral net at frame station 52A/53 the cargo hold is divided into compartments 3 and 4 for reduction of operational margins.

The arrangement of the cargo hold, cargo hold volumes and average H-arms are given in paragraph 1.60.04.

### B. Restraint conditions

When the certified net restraint system is used, additional tie down is normally not required except as shown in the following.

All individual items of load which by their nature, shape or density may constitute a hazard shall be restrained. Restraint can be achieved by filling the cargo hold or net section volumetrically, or by tie down.

Compartments or net sections which are 80 % volumetrically filled are considered to be volumetrically full.

Packages weighing more than 150 kg (330 lb) shall be restrained or individually tied down. Single packages should be tied down.

A minimum clearance of 51 mm (2 in) to the cargo compartment ceiling has to be respected.

## WEIGHT AND BALANCE MANUAL

All single items exceeding the size of a net section are considered as non unitized load.  
In case of non unitized load the divider net at frame station 50, 52A/53 and/or 59 can be removed if :

- all items in net sections forward and behind a removed divider net are individually restrained, refer to paragraph 1.60.06,
- no loose cargo left in net sections forward and behind a removed divider net.

**C. Tie down requirements**

Tie down of loads to aircraft structure is achieved via tie down straps and nets connected to the tie down points located on the cargo hold floor.

Each tie down point is designed to an ultimate load of 906 kg (2 000 lb), in any direction.

Location of tie down points is given in paragraph 1.60.04.

Tie down arrangement via tie down straps and nets or equivalent restraint hardware shall provide evenly distributed loads to the cargo hold floor.

**D. Tie down methods**

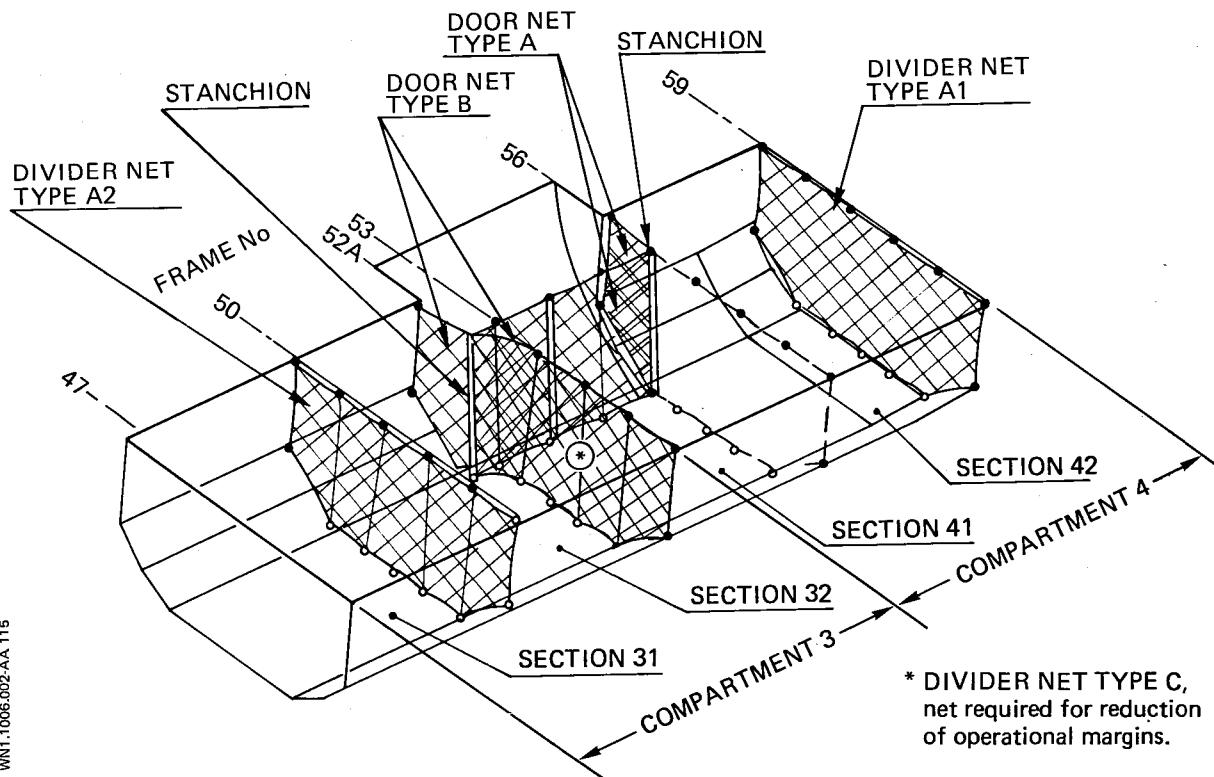
Methods of tie down are given in paragraph 1.60.06.

The load factors below must be used when establishing the ultimate load.

COMPARTMENT NUMBER	LOAD FACTOR			
	FWD	AFT	SIDE	UP
3 (Aft)	1.69	1.12	1.46	3.01
4 (Aft)	1.69	1.12	1.72	3.53

**E. Cargo hold nets malfunction limitations**

For layout of the net installation in the aft cargo hold (compartment 3 and 4) see the illustration below.



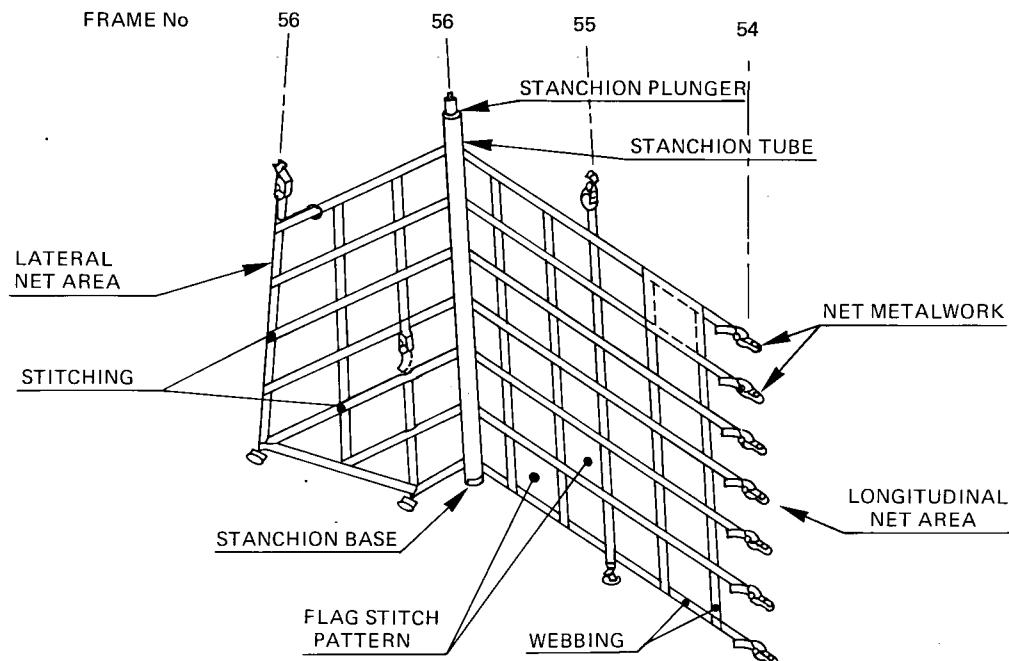
## WEIGHT AND BALANCE MANUAL

## (01) Net at frame 52A/53 for reduction of operational margins not installed

The following tables give the load restrictions to be applied when nets are damaged or missing.

## (a) Door net type A

WN1.1006.003-AA 115

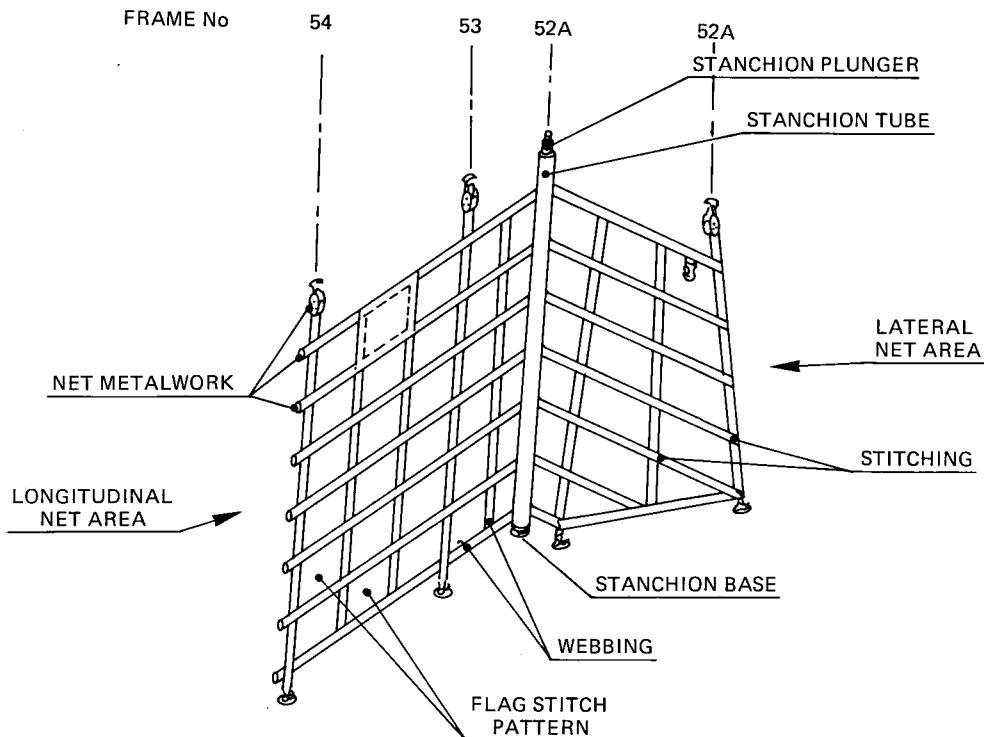


ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch patterns affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch patterns affected	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	More than one loop detached or missing	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

 (b) Door net type B


WNI.1006.005-AA 115

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch patterns affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch patterns affected	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

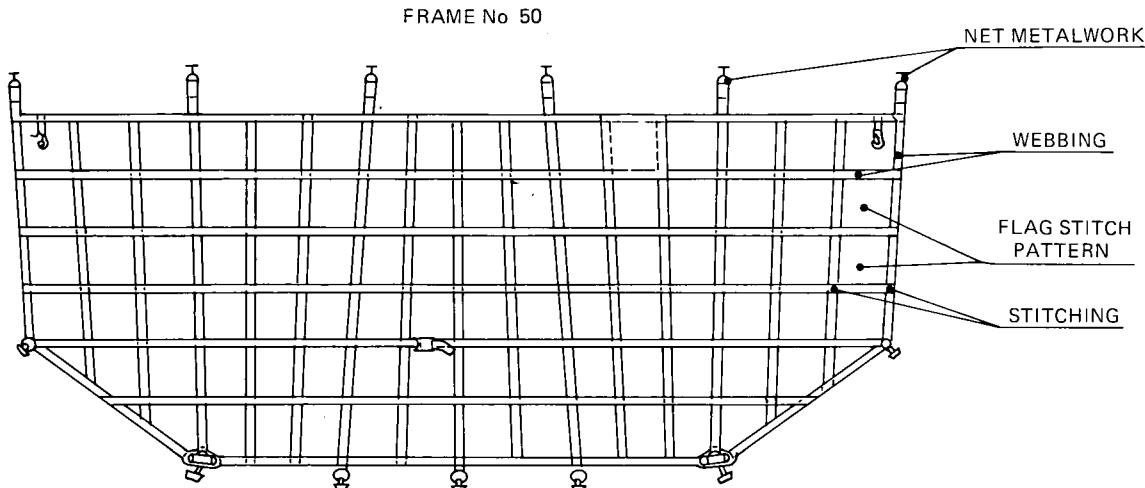
## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	More than one loop detached or missing	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

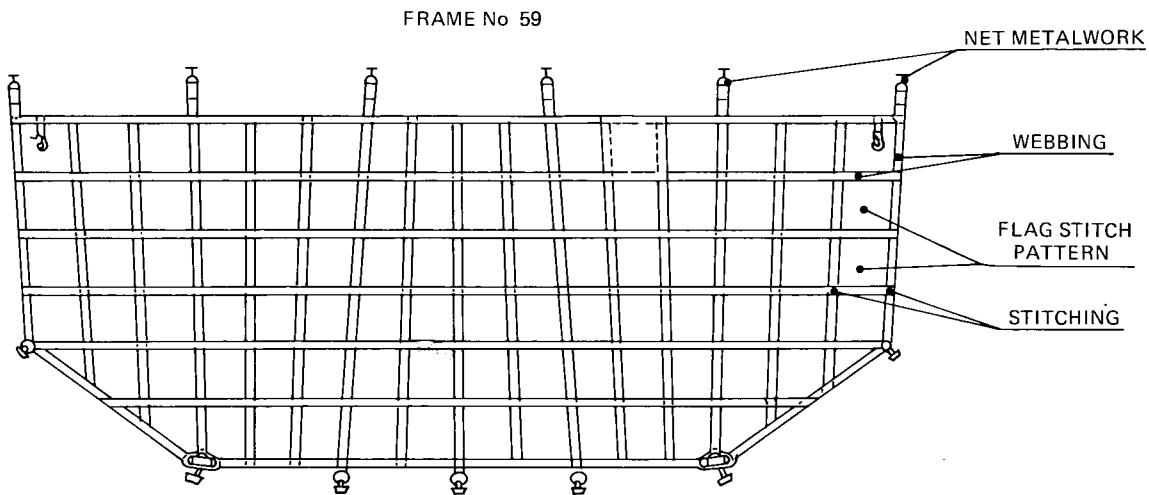
 (c) Divider net type A2 (frame 50)

WNI.1006.007/AA 115



ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 31 and net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 31 and net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

 (d) Divider net type A1 (frame 59)


WN11006.008-AA 115

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32, 41 and 42 must be reduced to 2 426 kg (5 349 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32, 41 and 42 remains unoccupied, or bulk load is restrained individually

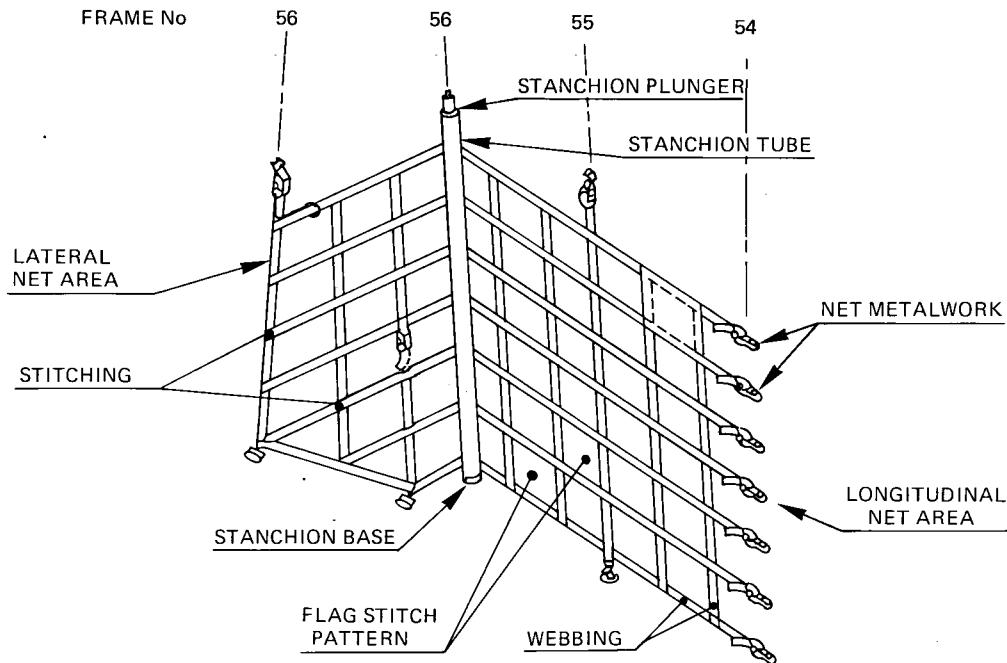
## WEIGHT AND BALANCE MANUAL

## (02) Net at frame 52A/53 for reduction of operational margins installed

The following tables give the load restrictions to be applied when nets are damaged or missing.

 (a) Door net type A

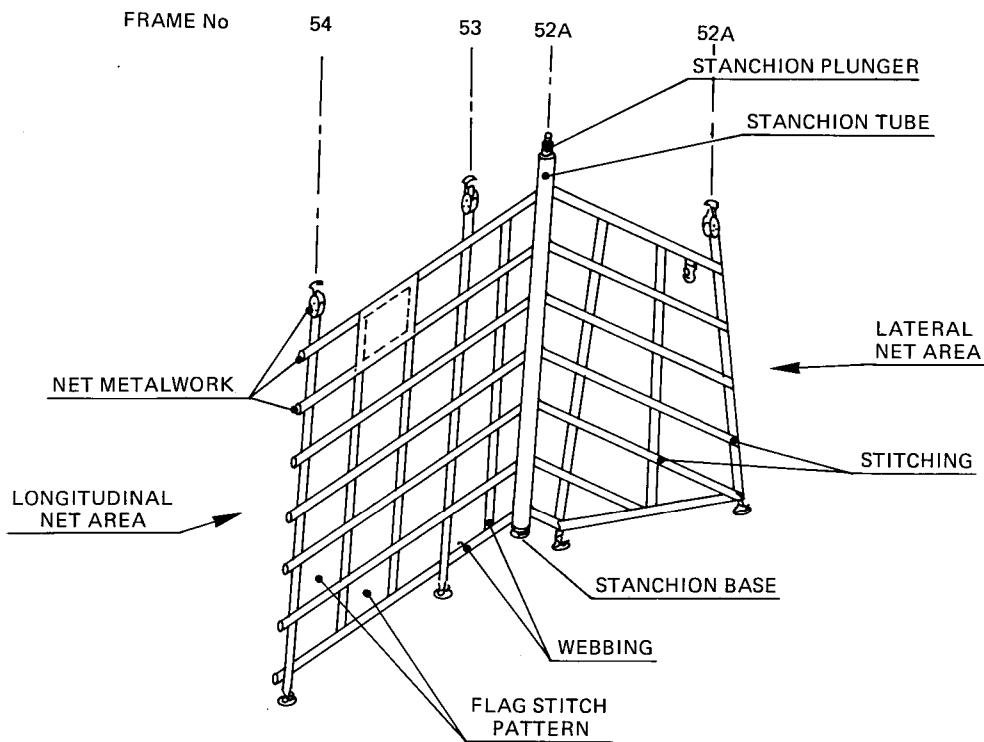
WN1.1006.009-AA 115



ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch patterns affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch patterns affected	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	More than one loop detached or missing	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

(b) Door net type B

WNI.1006.011-AA 115

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch patterns affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch patterns affected	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32 and net section 41 and 42 remains unoccupied, or bulk load is restrained individually

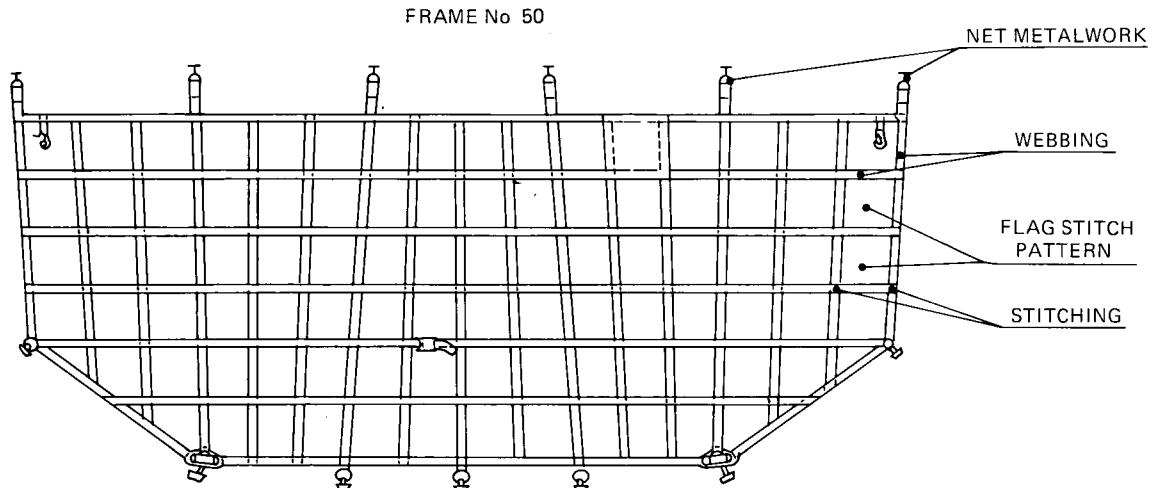
## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32 and net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually.
	All damage exceeding the failures defined above	Net section 32 and net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually.
	More than one loop detached or missing	Net section 32 and net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 32 must be reduced to 844 kg (1 861 lb) and gross weight of net section 41 and 42 must be reduced to 1 583kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 32 and section 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

 (c) Divider net type A2 (frame 50)

WN1.1006.013-AA 115



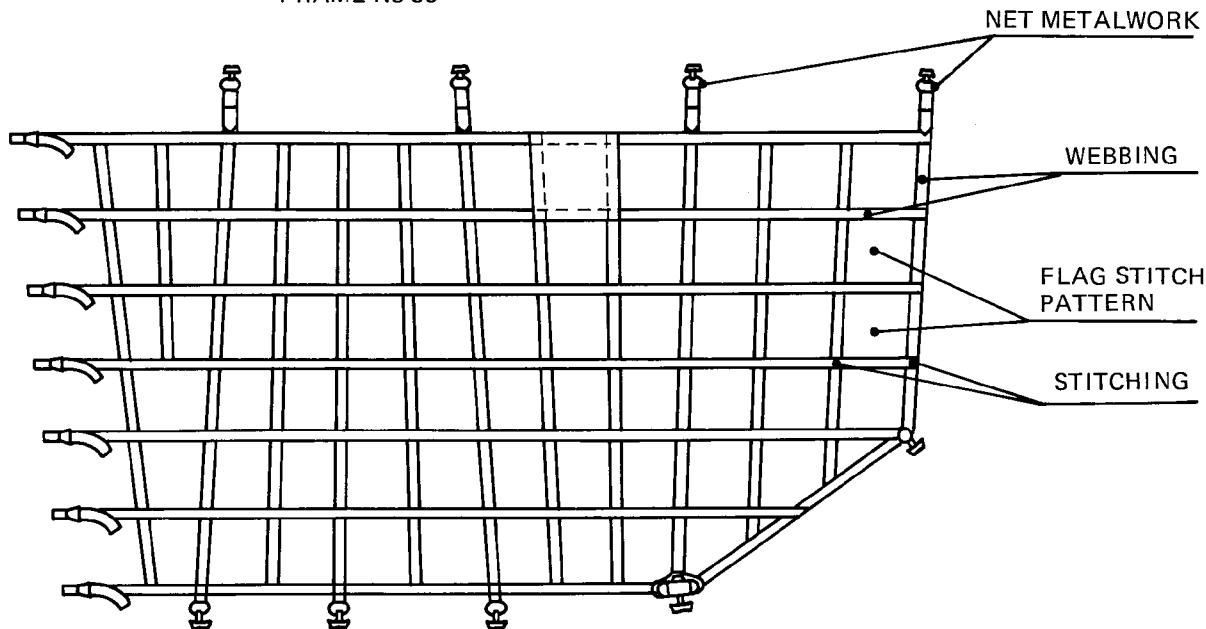
ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32 must be reduced to 844 kg (1 861 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32 must be reduced to 844 kg (1 861 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 31 and net section 32 remain unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net section 31 must be reduced to 976 kg (2 151 lb) and gross weight of net section 32 must be reduced to 844 kg (1 861 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 31 and net section 32 remain unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

 (d) Divider net type C (frame 53)

FRAME No 53

WIN1.1006.014-AA 115



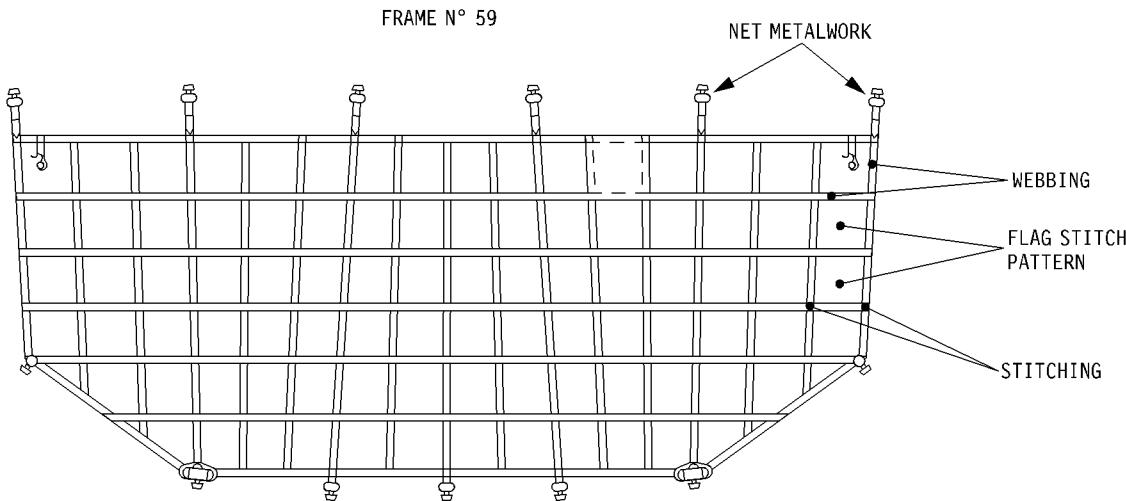
ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No load restrictions but the reduction of operational margins is not allowed or Gross weight of net section 32 must be reduced to 844 kg (1860 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 489 lb) for reduced operational margins or Bulk load is restrained individually for reduced operational margins
	Slight abrasion at webbings or stitchings, but no cuts or severings	No load restrictions but the reduction of operational margins is not allowed or Gross weight of net section 32 must be reduced to 844 kg (1860 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 489 lb) for reduced operational margins or Bulk load is restrained individually for reduced operational margins
	All damage exceeding the failures defined above	No load restrictions but the reduction of operational margins is not allowed or Bulk load is restrained individually for reduced operational margins

## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	No load restrictions but the reduction of operational margins is not allowed or Gross weight of net section 32 must be reduced to 844 kg (1860 lb) and gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 489 lb) for reduced operational margins or Bulk load is restrained individually for reduced operational margins
	All damage exceeding the failures defined above	No load restrictions but the reduction of operational margins is not allowed or Bulk load is restrained individually for reduced operational margins

(e) Divider net type A1 (frame 59)

NOMB-01-1006-016-A115AA



ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of net section 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of net 41 and 42 must be reduced to 1 583 kg (3 488 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Net section 41 and 42 remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

 07. Loading of rear (bulk) cargo hold (compartment 5)

**CAUTION :** THE MAXIMUM LOAD ON THE FLOOR MUST NOT EXCEED THE VALUES SPECIFIED IN PARAGRAPH 1.10.04.

A MINIMUM CLEARANCE OF 51 mm (2 in) TO THE CARGO COMPARTMENT CEILING HAS TO BE RESPECTED.

The rear (bulk) cargo hold (compartment 5) is designed for the carriage of bulk loads with a maximum load density of 240 kg/m<sup>3</sup> (15 lb/ft<sup>3</sup>).

Bulk loads are defined as loose loads, baggage or freight which can be loaded within a net section.

 A. Cargo hold (compartment 5) capacity

The cargo hold has a maximum load capacity of 1 497 kg (3 300 lb).

For loading control purposes the cargo hold is divided into individual sections as given in the table below.

SECTION DESIGNATION	EXTENSION FRAME STATION		MAXIMUM LOAD CAPACITY	
	From	To	(kg)	(lb)
51	59	60	374	825
52	60	62	353	777
53	62	65	770	1 698
Total Compartment 5	59	65	1 497	3 300

The cargo hold is separated from the aft cargo hold (compartment 4) by a removable lateral net at frame station 59.

The arrangement of the cargo hold, cargo hold volumes and average H-arms are given in paragraph 1.60.05.

 B. Restraint conditions

When the certified net restraint system is used, additional tie down is normally not required except as shown in the following.

All individual items of load which by their nature, shape or density may constitute a hazard shall be restrained. Restraint can be achieved by filling the cargo hold or section volumetrically, or by tie down.

Compartments or net sections which are 80 % volumetrically filled are considered to be volumetrically full.

Packages weighing more than 150 kg (330 lb) shall be restrained or individually tied down. Single packages should be tied down.

All single items exceeding the size of a net section are considered as non unitized load.

In case of non unitized load the divider net at frame station 59 can be removed if :

- all items in net sections forward and behind a removed divider net are individually restrained, refer to paragraph 1.60.06,
- no loose cargo left in net sections forward and behind a removed divider net.

 C. Tie down requirements

Tie down of loads to aircraft structure is achieved via tie down straps and nets connected to the tie down points located on the cargo hold floor.

Each tie down point is designed to an ultimate load of 906 kg (2 000 lb), in any direction.

Location of tie down points is given in paragraph 1.60.05

Tie down arrangement via tie down straps and nets or equivalent restraint hardware shall provide evenly distributed loads to the cargo hold floor.

## WEIGHT AND BALANCE MANUAL

### D. Tie down methods

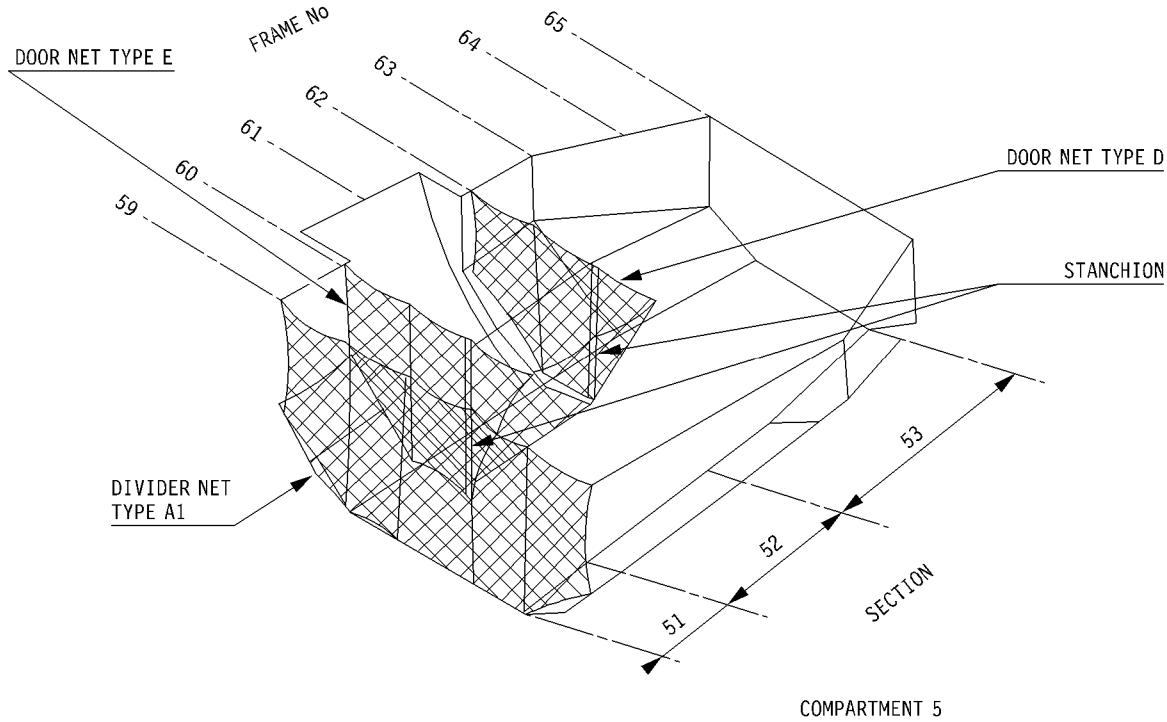
Methods of tie down are given in paragraph 1.60.06.

The load factors below must be used when establishing the ultimate load.

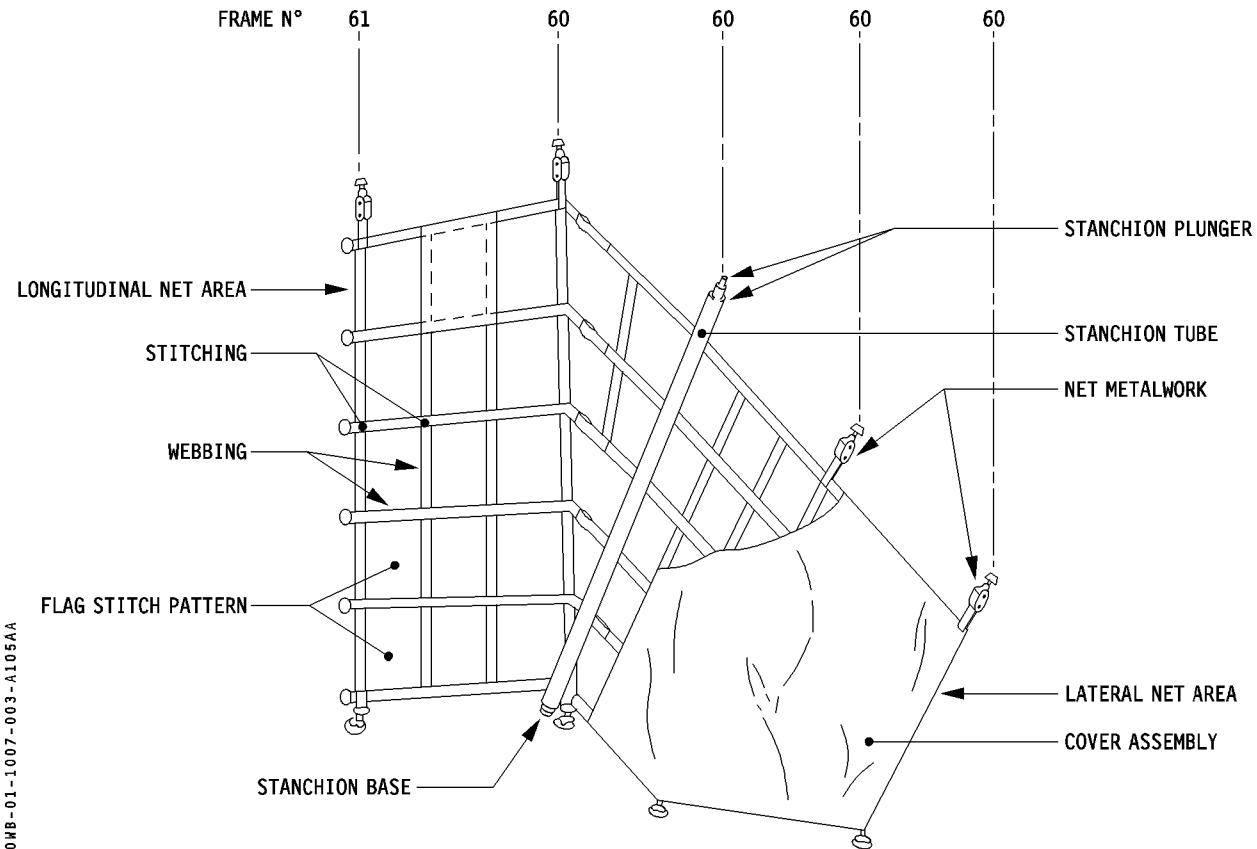
COMPARTMENT NUMBER	LOAD FACTOR			
	FWD	AFT	SIDE	UP
5 (Rear)	1.69	1.12	2.15	4.26

### E. Cargo hold nets malfunction limitations

For layout of the net installation in the rear (bulk) cargo hold (compartment 5) see the illustration below.



The following tables give the load restriction to be applied when nets are damaged or missing.

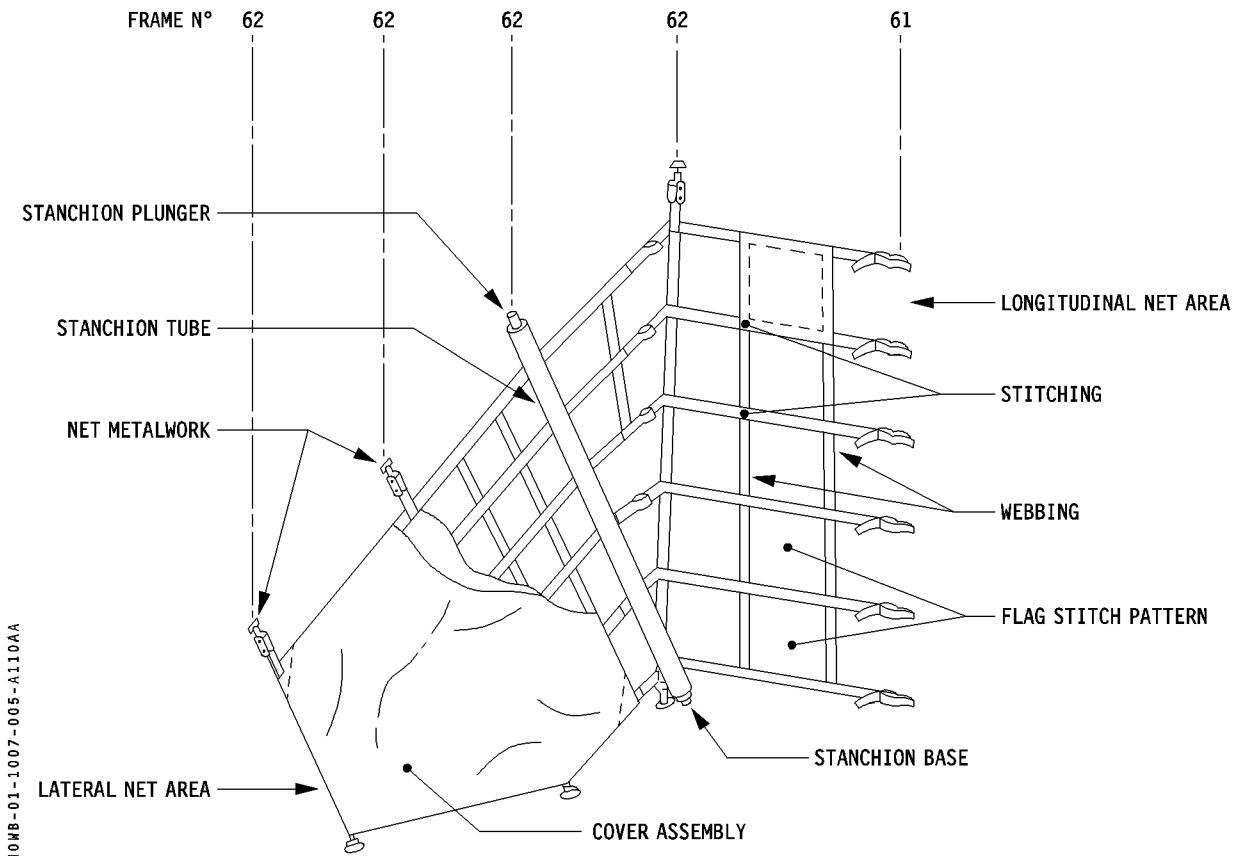
(01) Door net type E

ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	More than one loop detached or missing	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually

NOTE : Damaged or missing cover assemblies and hook on devices do not constitute a loading restriction.

(02) Door net type D


ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains unoccupied, or bulk load is restrained individually

## WEIGHT AND BALANCE MANUAL

ITEM	FAILURE	RESTRICTIONS
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor dents with a maximum depth of 2 millimeters (0.08 inches)	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Metal loops on stanchion tube	One loop detached or missing	No restriction
	Light surface corrosion not affecting function of components	No restriction
	Minor damage not affecting mechanical function of components, e.g. deep scratches on more than one loop	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	More than one loop detached or missing	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually
Base or plunger on stanchion tube	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains empty, or bulk load is restrained individually

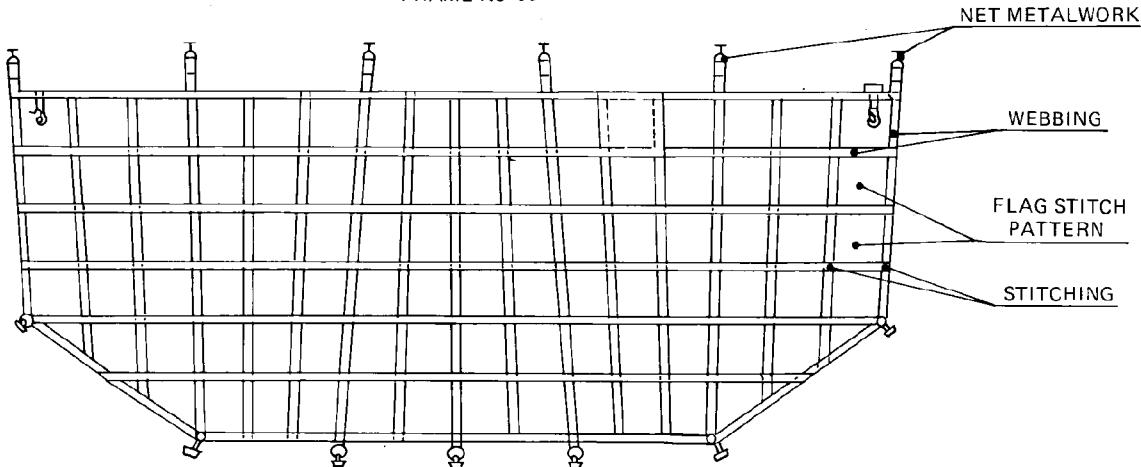
NOTE : Damaged or missing cover assemblies and hook on devices do not constitute a loading restriction.

## WEIGHT AND BALANCE MANUAL

## | (03) Divider net type A1

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ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	Gross weight compartment 5 must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually.
	Slight abrasion at webbings or stitchings, but no cuts or severings	Gross weight of compartment 5 must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually
	All damage exceeding the failures defined above	Compartment 5 remains unoccupied, or bulk load is restrained individually
Net metalwork	Light surface corrosion not affecting function of component	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	Gross weight of cargo hold (compartment 5) must be reduced to 1 123 kg (2 475 lb), or bulk load is restrained individually.
	All damage exceeding the failures defined above	Cargo hold (compartment 5) remains unoccupied, or bulk load is restrained individually.

NOTE : Damaged or missing cover assembly and hook on devices do not constitute a loading restriction.

08. Maximum jacking loadsA. Aircraft jacking points See figure 1-80-02A.

The tables below give the location and maximum permissible static load at :

**CAUTION : A MAXIMUM AIRCRAFT WEIGHT OF 59000 KG (130073 LB) MUST NOT BE EXCEEDED WHEN LIFTING THE AIRCRAFT AT ALL THREE PRIMARY JACKING POINTS SIMULTANEOULY**

(01) The primary jacking points

LOCATION	H-ARM		Y-ARM		MAX LOAD	
	(m)	(in)	(m)	(in)	(kg)	(lb)
FWD fuselage	5.284	208.03	0	0	6932	15282
Wing LH side	20.107	791.61	6.497	255.79	29052	64048
Wing RH side	20.107	791.61	-6.497	-255.79	29052	64048

(02) Auxiliary stabilizing point (safety point)

**CAUTION : THIS SAFETY POINT MUST NOT BE USED FOR LIFTING.**

LOCATION	H-ARM		Y-ARM		MAX LOAD	
	(m)	(in)	(m)	(in)	(kg)	(lb)
Aft fuselage	35.106	1382.13	0	0	2039	4495

B. Landing gear jacking points See figure 1-80-02A.

**CAUTION : WHEN LIFTING THE AIRCRAFT AT INDIVIDUAL LANDING GEAR OR AT ALL THREE JACKING POINTS SIMULTANEOUSLY, THERE ARE NO WEIGHT LIMITATIONS BUT THE AIRCRAFT CENTRE OF GRAVITY MUST BE WITHIN THE LIMITATIONS FOR TAKE-OFF AND LANDING AS SHOWN ON THE CERTIFIED CG LIMITS, FIGURE 1-10-02.**



## WEIGHT AND BALANCE MANUAL

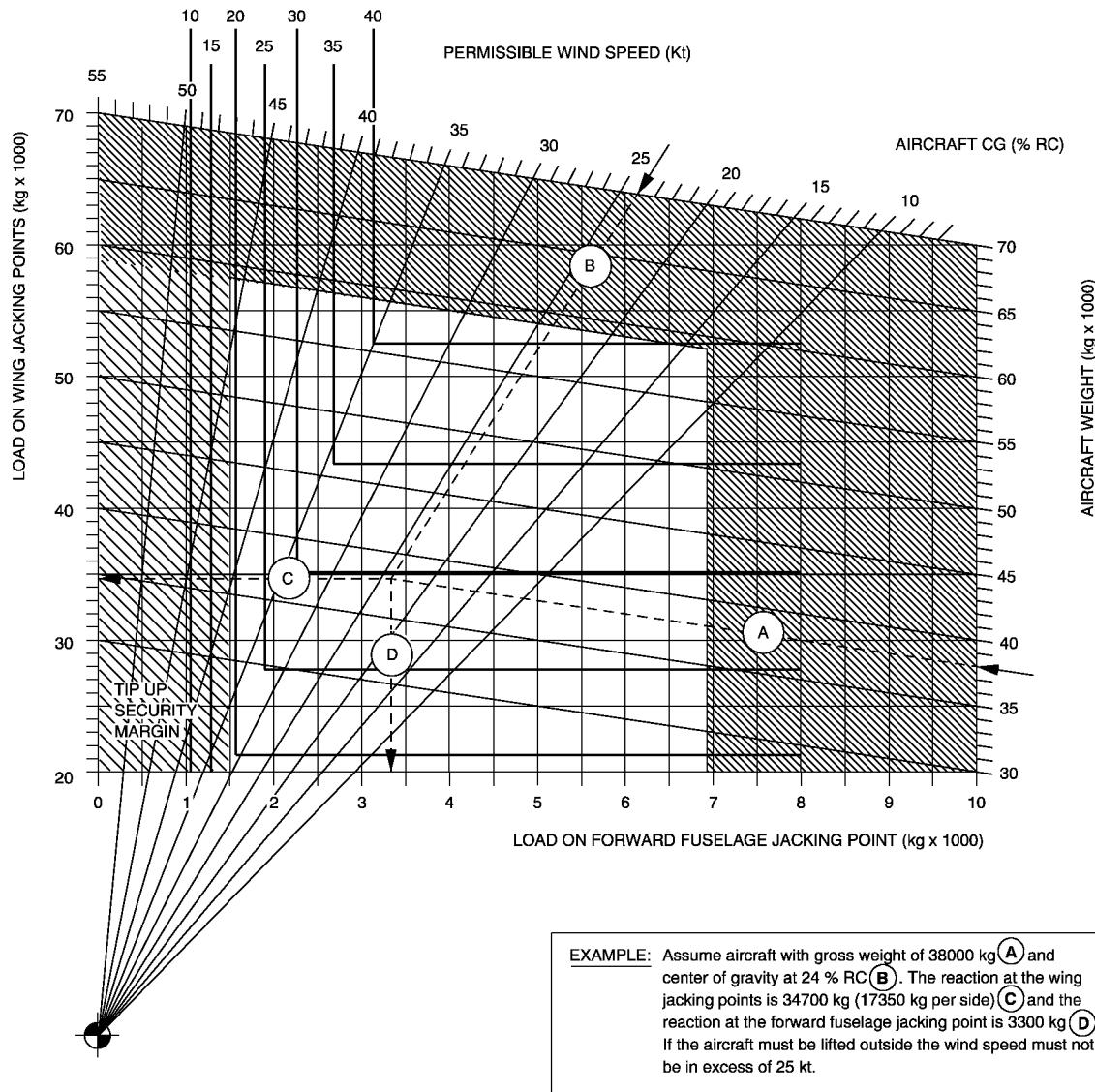
### 09. Aircraft stability on jacks

**CAUTION : IT IS NOT PERMITTED TO LIFT OR JACK THE AIRCRAFT OUTSIDE OF A CLOSED ENVIRONMENT IF THE WIND SPEED IS IN EXCESS OF THE VALUES SHOWN IN FIGURE 1-10-09.**

**CAUTION : JACKING LOAD LIMITATIONS GIVEN IN PARAGRAPH 1.10.08 MUST NOT BE EXCEEDED.**

The figure 1-10-09 shows the stability of the aircraft when supported on the two wing jacking points and the forward fuselage jacking point.

## WEIGHT AND BALANCE MANUAL



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## Aircraft Stability on Jacks

Figure 1-10-09

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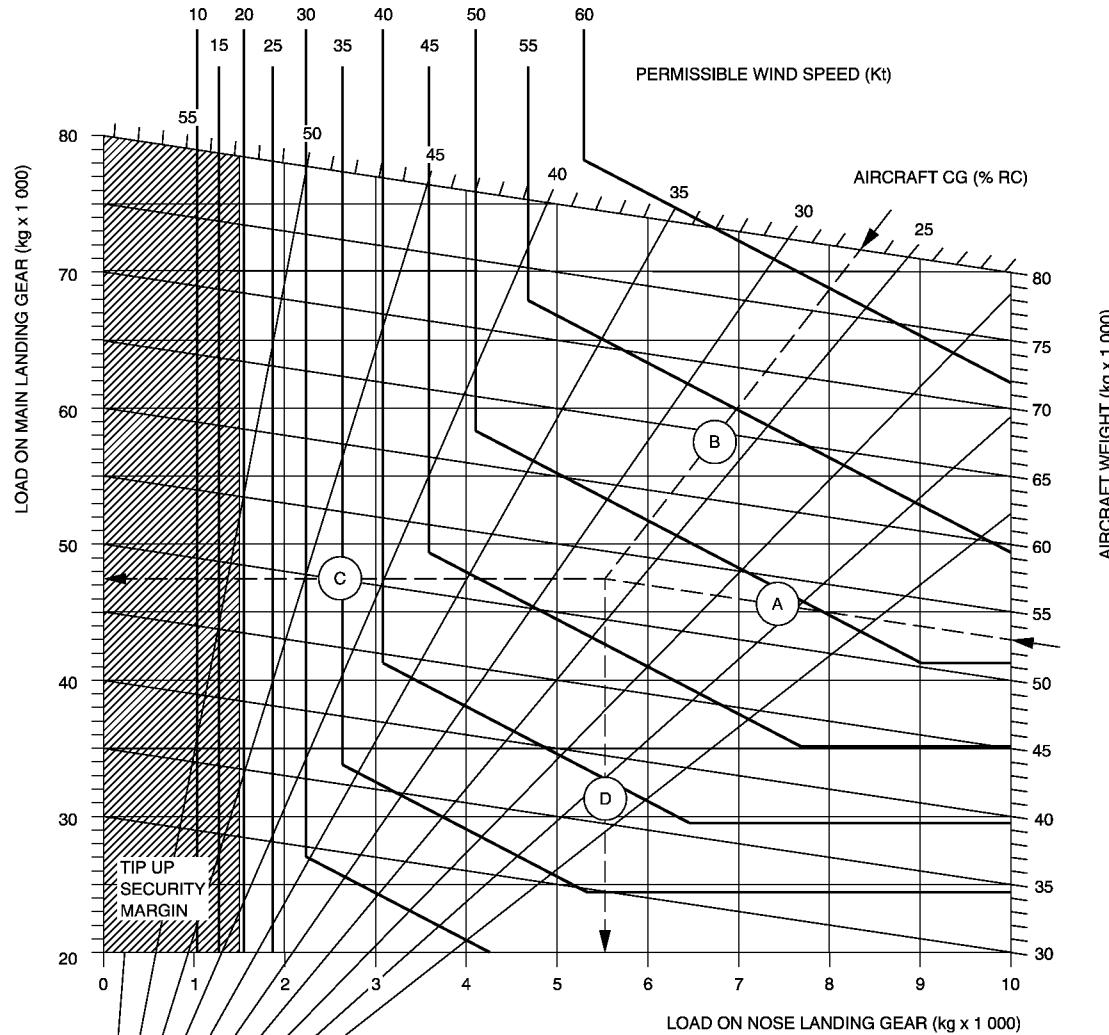
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## 10. Aircraft stability on wheels

**CAUTION : THE STABILITY OF THE AIRCRAFT MUST BE ASSURED DURING EMBARKATION AND DISEMBARKATION OF PASSENGERS AND THE LOADING OR UNLOADING OF BAGGAGE AND CARGO.**

The tip up CG position is considered to be 57% RC H-arm = 20.192 m



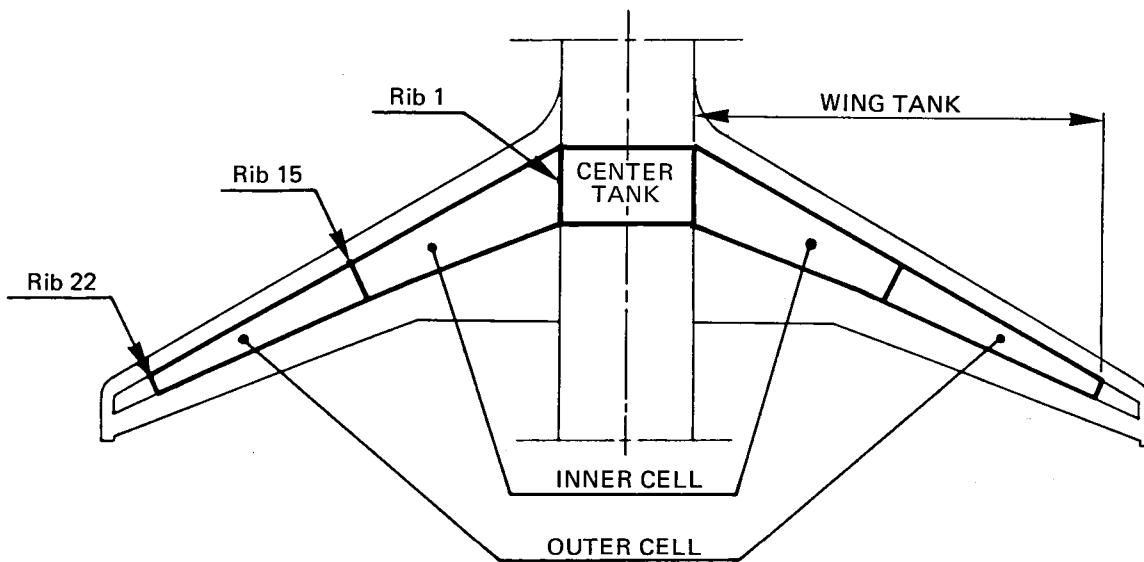
**EXAMPLE:** Assume aircraft with gross weight of 53000 kg (A) and center of gravity at 27 % RC (B). The reaction at the main landing gear is 47500 kg (23750 kg per side) (C) and the reaction at the nose landing gear is 5500 kg (D). The wind speed must not be in excess of 45 kt.

FUEL01. GeneralA. Fuel tank arrangement

The fuel is contained in three tanks, one in each cantilever wing box and one in the wing box center section. The tank in the cantilever wing box is subdivided into two cells.

Layout and identification of these tanks is shown in the illustration below.

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B. Fuel systems

Each fuel tank is vented via individual vent ducts to a surge tank in the outer section of the wing. Fuel collected in the surge tank is sucked back into the associated wing tanks via a jet pump scavange system. In addition the vent system provides protection for the tanks in the event of refuel cut off failure. For remote cases further protection against over pressure is by burst discs.

In normal conditions, each engine is supplied from the inner cell of its own wing. The center tank feeds both engines, but through independent systems. The tanks are used in the order center - inner cell - outer cell, except during take-off when the center is not used. When the inner cells reach low level, inter cell transfer valves open automatically and the outer cell fuel is transferred to the inner cell under gravity. This sequence provides maximum bending relief to the wing structure. As well as this automatic sequence, the pumps may be controlled manually, if required at any time. A crossfeed pipe and valve allows both engines to be fed from one side or all fuel to be used by one engine.

The aircraft is refueled through a single standard 2.5 inches coupling under the leading edge of the right hand wing. The coupling is connected to a refueling gallery running across the aircraft inside the tanks. The refuel gallery is drained in flight into the wing tanks. From this gallery, branch pipes lead to one refuel valve in the center tank and one refuel valve in each outer cell.

The aircraft can be defueled by using the aircraft pumps and opening the defuel / transfer valve which connects the engine feed system to the refuel gallery. By opening this valve and the tank refuel valves, fuel may be transferred from any tank to any other tank, when the aircraft is on the ground.



## WEIGHT AND BALANCE MANUAL

### C. Fuel volume, density and weight

Fuel quantities in this manual are in liters, and/or US gallons.

Fuel weights are based on a fuel density of 0.785 kg per liter (6.55 lb per US gallon), unless otherwise specified.

02. Refueling of tanks

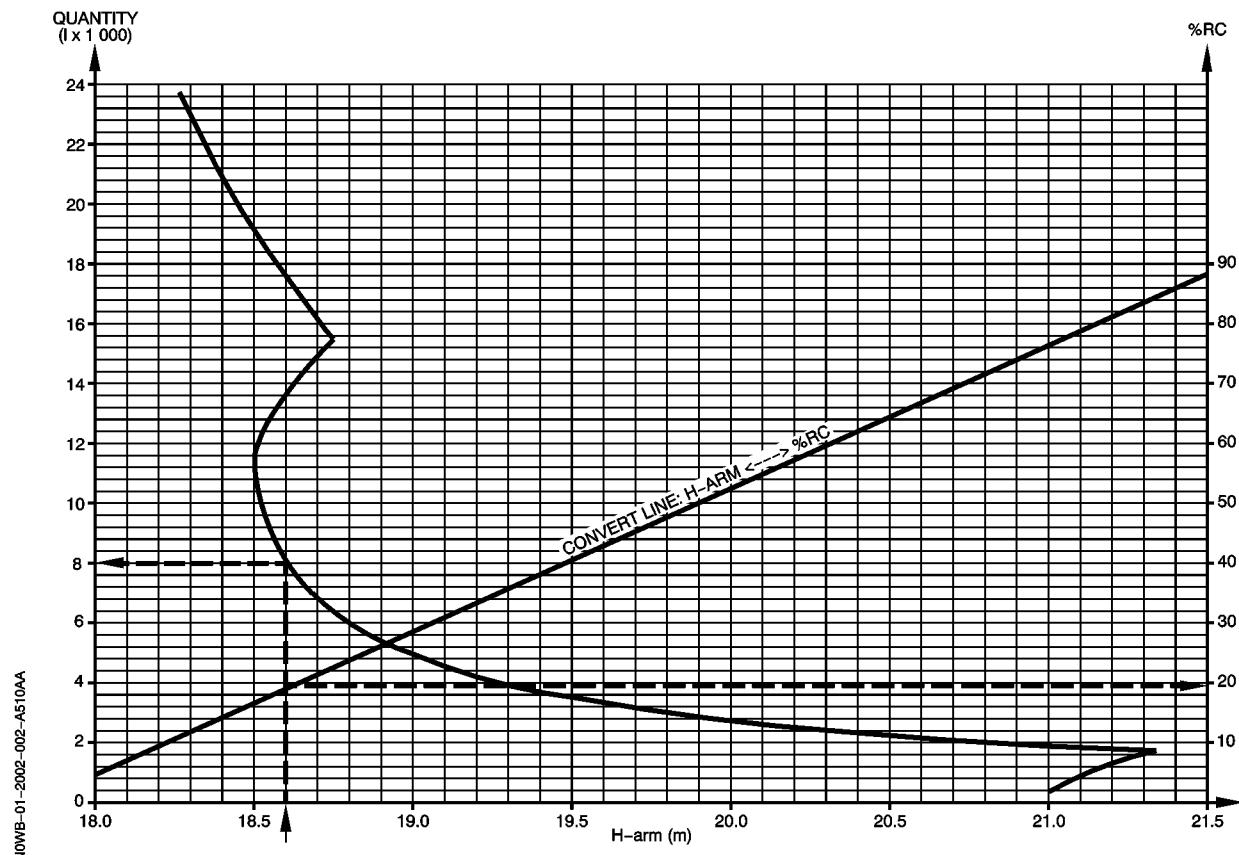
During automatic refueling phase (normal procedure) the quantity of fuel selected is delivered to the three tanks such that :

- A. The outer cells will fill before the inner cells commence filling.
- B. When the outer cells are full the remaining fuel required in the wing tanks enters the inner cells up to the high level quantity.
- C. Any further fuel requirement is contained in the center tank.

NOTE : For the outer cell to start filling, the inter cell transfer valves must be shut. These valves are shut when the low level sensor in the inner cell is submerged in fuel.

Refueling is automatically cut off by the quantity preselector as soon as the selected quantity has been delivered.

The H-arm of fuel as a function of the quantity, during the refueling sequence, when fueling from zero usable fuel level up to the maximum quantity, is shown figures 1-20-02A and 1-20-02B.



Refueling : H-arm of Fuel  
Figure 1-20-02A

## WEIGHT AND BALANCE MANUAL

QUANTITY (l)	H-ARM (m)	QUANTITY (l)	H-ARM (m)
3 800	19.360	15 800	18.731
4 200	19.209	16 200	18.704
4 600	19.086	16 600	18.676
5 000	18.986	17 000	18.647
5 400	18.902	17 400	18.617
5 800	18.833	17 800	18.588
6 200	18.774	18 200	18.559
6 600	18.725	18 600	18.532
7 000	18.683	19 000	18.506
7 400	18.647	19 400	18.481
7 800	18.618	19 800	18.457
8 200	18.592	20 200	18.434
8 600	18.571	20 600	18.411
9 000	18.552	21 000	18.390
9 400	18.536	21 400	18.369
9 800	18.522	21 800	18.350
10 200	18.511	22 200	18.330
10 600	18.502	22 600	18.312
11 000	18.496	23 000	18.294
11 400	18.497	23 400	18.274
11 800	18.504	23 724	18.255
12 200	18.518		
12 600	18.537		
13 000	18.560		
13 400	18.584		
13 800	18.612		
14 200	18.642		
14 600	18.675		
15 000	18.709		
15 400	18.744		
(1) 15 476	18.750		
(2)			

(1) OUTER AND INNER CELLS FULL.

(2) ALL TANKS FULL.

NOTE : The H-arm of fuel below 3800 liters is dependent on the distribution of the quantity remaining in the A/C, refer to paragraph 1.20.03.

Refueling Table  
Figure 1-20-02B



## WEIGHT AND BALANCE MANUAL

### 03. Fuel management in flight

Except for take off, fuel is always used from the center tank first. The wing tank inner cells deplete before the outer cells for reasons explained in paragraph 1.20.01.B.

When fuel in either of the inner cells reduces to approximately 750 kg (1650 lb) fuel in both outer cells is transferred into the inner cells automatically under gravity.

Any other procedure which would result in limitations regarding structure, performance and fuel system operation must be covered by a specific study.

## WEIGHT AND BALANCE MANUAL

 04. Usable Fuel

This is the fuel available for aircraft propulsion.

The table below covers fuel included between the high level shut off system and the unusable level.

LOCATION	CAPACITY		WEIGHT		H-ARM	
	(l)	(US gal)	(kg)	(lb)	(m)	(in)
Outer cell left	864	228.3	678	1 495	21.330	839.76
Inner cell left	6 874	1 816.1	5 396	11 896	18.426	725.43
Centre tank	8 248	2 179.1	6 475	14 273	17.326	682.13
Inner cell right	6 874	1 816.1	5 396	11 896	18.426	725.43
Outer cell right	864	228.3	678	1 495	21.330	839.76
TOTAL	23 724	6 267.9	18 623	41 055	18.255	718.70

The H-arm of fuel for all individual tanks as a function of the quantity is given on tables in figures 1-20-04A and 1-20-04B.

For inner and outer cells the quantity is given per side.

The variation of the H-arm and Y-arm as a function of quantity are given in :

- Figure 1-20-04C for inner cells,
- Figure 1-20-04D for outer cells.

The variation of the H-arm as a function of quantity for center tank is given in figure 1-20-04E.

**WEIGHT AND BALANCE MANUAL**

INNER CELL LEFT OR RIGHT WING		
QUANTITY (l)	H-ARM (m)	Y-ARM (m)
200	17.750	2.195
400	17.723	2.305
600	17.712	2.390
800	17.712	2.464
1 000	17.716	2.531
1 200	17.724	2.593
1 400	17.734	2.652
1 600	17.745	2.707
1 800	17.757	2.760
2 000	17.770	2.811
2 200	17.784	2.859
2 400	17.798	2.905
2 600	17.812	2.949
2 800	17.827	2.993
3 000	17.843	3.035
3 200	17.858	3.077
3 400	17.874	3.119
3 600	17.889	3.161
3 800	17.904	3.204
4 000	17.919	3.249
4 200	17.933	3.295
4 400	17.948	3.344
4 600	17.965	3.398
4 800	17.986	3.461
5 000	18.014	3.535
5 200	18.047	3.621
5 400	18.086	3.716
5 600	18.127	3.817
5 800	18.170	3.923
6 000	18.215	4.033
6 200	18.261	4.147
6 400	18.310	4.265
6 600	18.358	4.384
6 800	18.408	4.504
6 874	18.426	4.550

OUTER CELL LEFT OR RIGHT WING		
QUANTITY (l)	H-ARM (m)	Y-ARM (m)
200	21.009	10.490
400	21.092	10.734
600	21.174	10.958
800	21.287	11.245
864	21.330	11.351

Table of Fuel H-arm  
Figure 1-20-04A



## WEIGHT AND BALANCE MANUAL

CENTER TANK	
QUANTITY (l)	H-ARM (m)
200	17.799
400	17.773
600	17.737
800	17.701
1 000	17.668
1 200	17.638
1 400	17.610
1 600	17.584
1 800	17.560
2 000	17.538
2 200	17.517
2 400	17.498
2 600	17.482
2 800	17.468
3 000	17.456
3 200	17.445
3 400	17.436
3 600	17.428
3 800	17.421
4 000	17.414
4 200	17.408
4 400	17.403
4 600	17.398
4 800	17.393
5 000	17.389
5 200	17.385
5 400	17.382
5 600	17.378
5 800	17.375
6 000	17.373
6 200	17.370
6 400	17.367
6 600	17.365
6 800	17.363
7 000	17.361
7 200	17.359
7 400	17.356
7 600	17.353
7 800	17.348
8 000	17.340
8 200	17.329
8 248	17.326

Table of Fuel H-arm

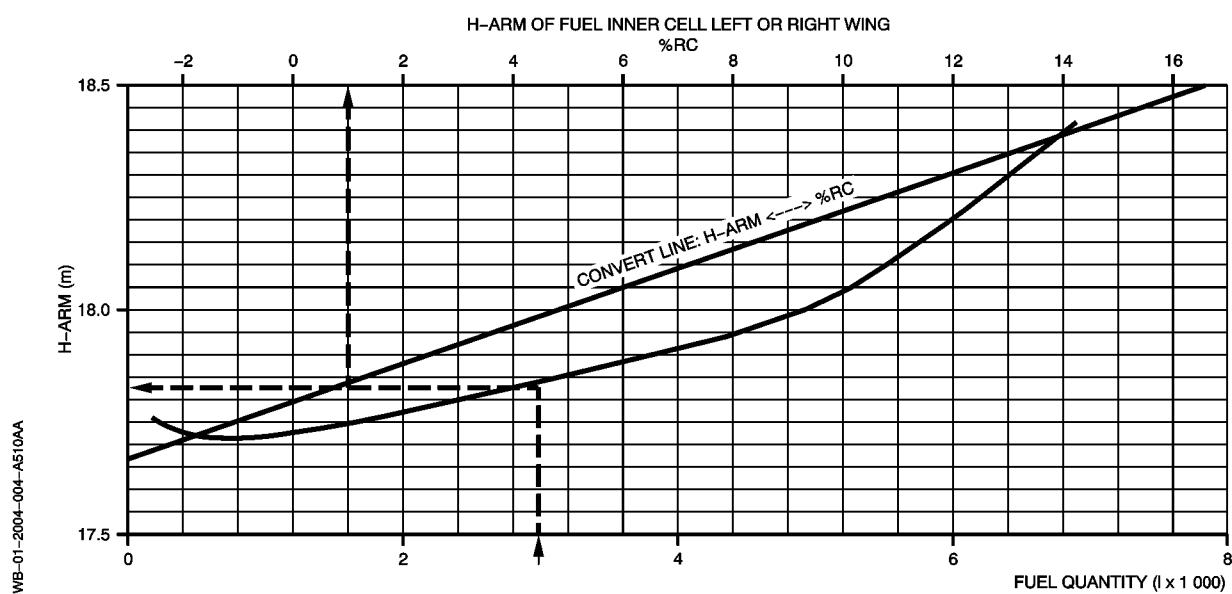
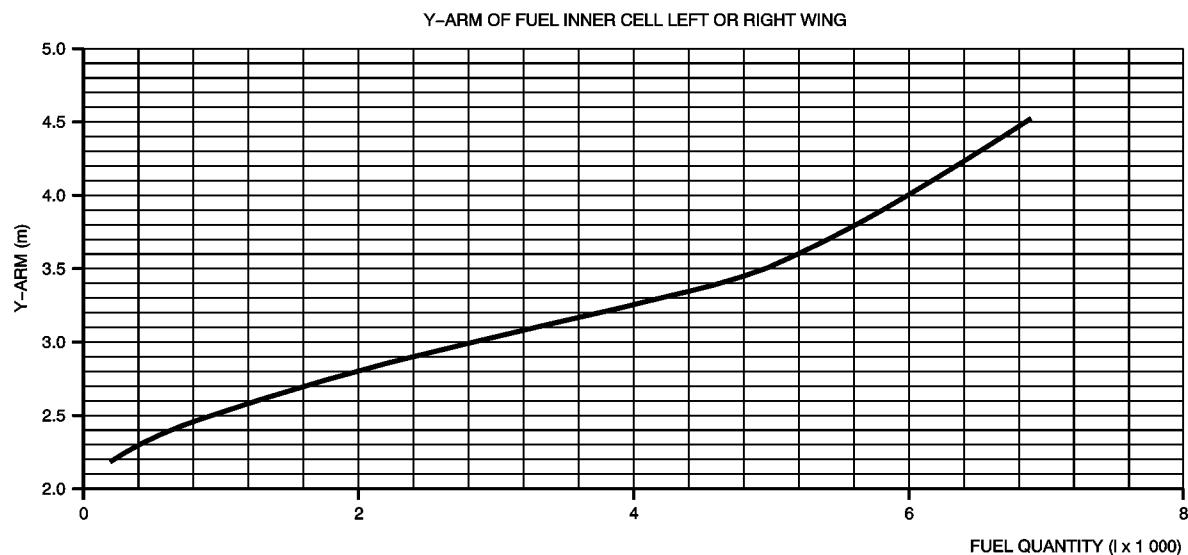
Figure 1-20-04B

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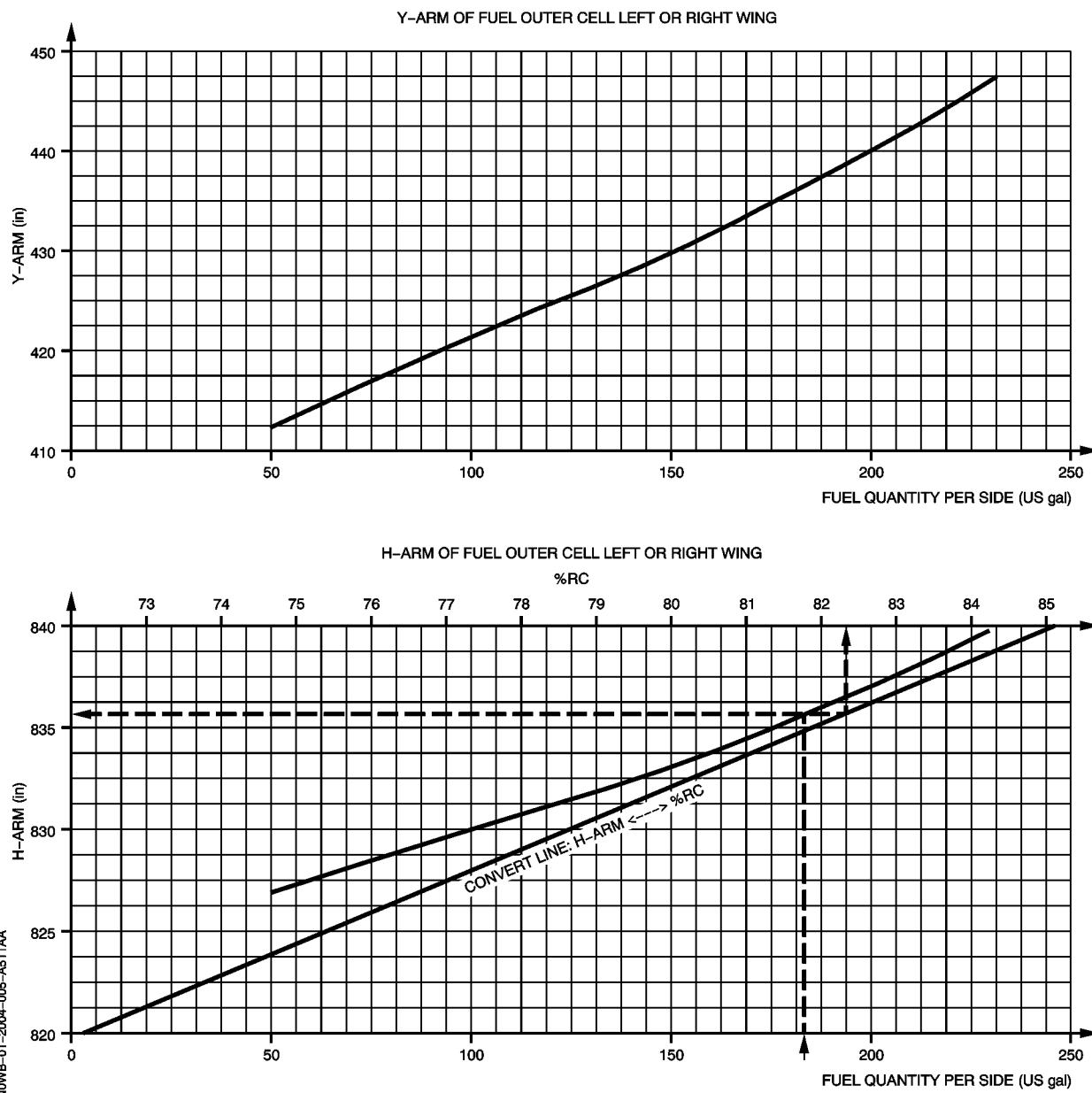
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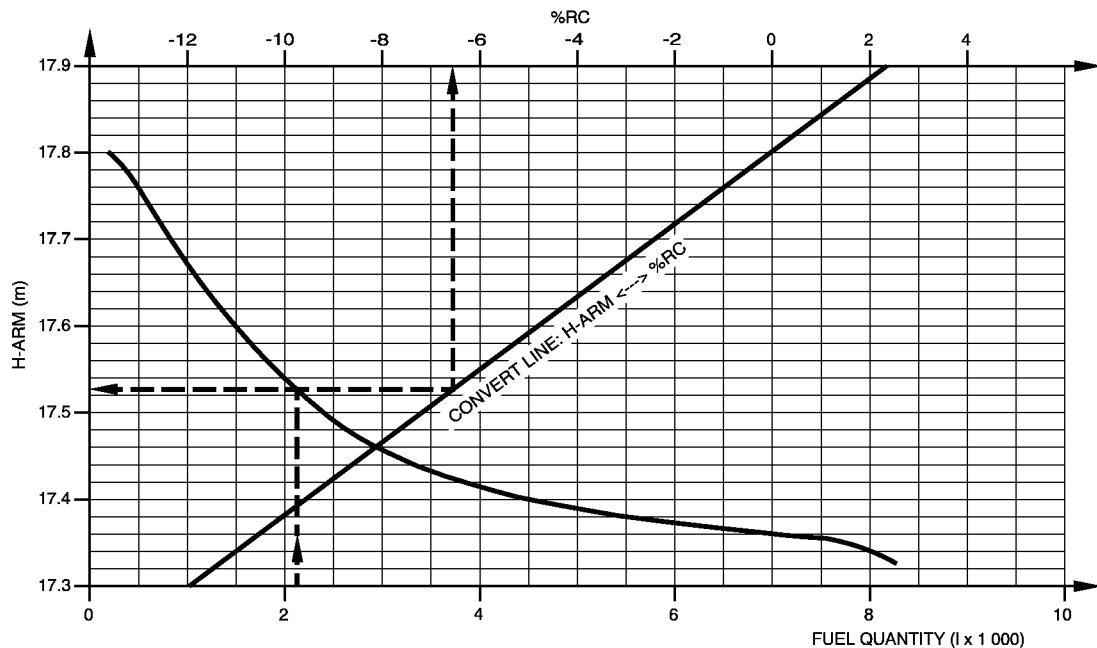
## WEIGHT AND BALANCE MANUAL



H-arm and Y-arm of Fuel Inner Cells  
Figure 1-20-04C



H-arm and Y-arm of Fuel Outer Cells  
Figure 1-20-04D



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## H-arm of Fuel Center Tank

Figure 1-20-04E

Mod : 20024 + 20802 + 160001 or 20024 + 20802 + 160365

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## WEIGHT AND BALANCE MANUAL

05. Unusable fuel

Unusable fuel is the amount of fuel remaining in the tanks and systems after a fuel run out test has been completed in accordance with the current applicable government regulations.

The table below gives the summary of unusable fuel.

LOCATION	QUANTITY		WEIGHT		H-ARM	
	(l)	(US Gal)	(kg)	(lb)	(m)	(in)
Outer Cell Left	2.00	0.5	1.6	3.5	20.986	826.22
Inner Cell Left	14.00	3.7	11.0	24.2	17.813	701.30
Center Tank	23.20	6.1	18.2	40.1	17.802	700.87
Inner Cell Right	14.00	3.7	11.0	24.2	17.813	701.30
Outer Cell Right	2.00	0.5	1.6	3.5	20.986	826.22
Systems	26.40	7.0	20.7	45.7	18.703	736.34
Total	81.60	21.6	64.1	141.2	18.253	718.64

## WEIGHT AND BALANCE MANUAL

 06. Unpumpable fuel

Unpumpable fuel is the fuel remaining in the tanks and systems after having defueled the aircraft to the procedure given in the Maintenance Manual paragraph 28.25.00 page block 301, that is, a pressure defuel using the aircraft pumps only, without bowser suction.

The table below gives the summary of unpumpable fuel at normal ground standing attitude.

LOCATION	QUANTITY		WEIGHT		H-ARM	
	(l)	(US gal)	(kg)	(lb)	(m)	(in)
Surge tank left	0.3	0.1	0.2	0.5	22.363	880.43
Outer cell left	0.4	0.1	0.3	0.7	21.020	827.56
Inner cell left	52.3	13.8	41.1	90.5	17.803	700.91
Surge tank right	0.3	0.1	0.2	0.5	22.363	880.43
Outer cell right	0.4	0.1	0.3	0.7	21.020	827.56
Inner cell right	52.3	13.8	41.1	90.5	17.803	700.91
Center tank	67.0	17.7	52.6	115.9	17.805	700.98
Systems	40.3	10.6	31.6	69.7	18.006	708.90
TOTAL	213.3	56.4	167.4	369.1	17.867	703.42

TABLE OF UNPUMPABLE FUEL

## WEIGHT AND BALANCE MANUAL

07. Defueling procedure prior to weighing

**CAUTION : BEFORE DEFUELING THE AIRCRAFT, SEE THE SAFETY PRECAUTIONS IN THE AIRCRAFT MAINTENANCE MANUAL (AMM) SECTION 12-11-28 PAGE BLOCK 03 AND 28-00-00 PAGE BLOCK 03 AND FOLLOW THE SAFETY PROCEDURES FOR DEFUELING**

Prior to the weighing, the aircraft must be defueled to the undrainable levels. In order to obtain the quantities of Undrainable Fuel referred to in this procedure, the whole procedure must be followed including using a suction pump to remove the drainable fuel (see paragraph T below.)

**NOTE :** Refer to the Table of Unpumpable Fuel on 1-20-06 page 1 for the quantities of unpumpable fuel in each tank. These are approximate estimates, and must not be used for aircraft weighing purposes. The fuel quantities in the Table of Unpumpable Fuel are included to provide an approximate indication of the quantities of fuel which need to be removed from the tanks in order to reach the undrainable fuel level.

At the commencement of the following procedure the aircraft fuel tanks must contain not less than the following quantities :

Wing tanks : 2000 kg (4409 lb) each.  
Center tank : 1000 kg (2204 lb).

- A. Position the aircraft in the ground standing attitude of 0 degrees pitch, 0 degrees roll (+ / - 10'). Measure and record this attitude.

**NOTE :** The wings must be unsupported and engines or an equivalent weight must be fitted.

- B. Connect the bowser via the bulkmeter to the refuel coupling and check that the fuelling vehicle has sufficient capacity to defuel the aircraft.
- C. Select MAN on the center tank mode select push button on the overhead panel (40 VU).
- D. On panel 800 VU (refuel panel) set all refuel switches to SHUT.
- E. On panel 800 VU (refuel panel) set the MODE SELECTOR switch to DEFUEL / TRANSFER.
- F. On the overhead panel (40 VU) open the cross feed valve and select both center tank pumps on.
- G. Open the defuel valve on the fueling vehicle.
- H. When the second FAULT caption of the center tank has been lit continuously for 5 minutes select both center tank pumps to OFF on the overhead panel (40 VU).
- I. On panel 40 VU set the following switches :  
LH TK PUMPS 1 and 2 to ON.  
RH TK PUMPS 1 and 2 to ON.
- J. While wing tank pumps are running, open each engine master switch for approximately 10 seconds to ensure engine feed pump is full down to the engine inlet.
- K. If the APU line has not been run, bleed APU feed line of air.
- L. Allow the pumps to run continuously until the last « LO PR » caption illuminates.
- M. Immediately carry out the following actions.
- N. On panel 40 VU set the following switches :  
LH TK PUMPS 1 and 2 to OFF.  
RH TK PUMPS 1 and 2 to OFF.

## WEIGHT AND BALANCE MANUAL

- O. On the overhead panel (40 VU) close the crossfeed valve.
- P. Check that the inter cell transfer valves are OPEN.
- Q. Close the defuel valve on the fueling vehicle.
- R. On the 800 VU set the MODE SELECTOR switch to OFF.
- S. Select AUTO on the center tank mode select push button on the overhead panel (40 VU).

The aircraft is now in the Unpumpable Fuel condition. Details of the quantities of fuel remaining in the tanks and systems after applying this procedure are given in the "Table of Unpumpable Fuel" on 1-20-06 Page 1.

- T. At each water drain in turn, including the surge tank, connect a suction pump and operate the pump until no further fuel is drained.

The aircraft is now in the Undrainable Fuel condition. Details of the quantities of fuel remaining in the tanks and systems after applying the defueling procedure are given in the "Table of Undrainable Fuel" below.

LOCATION	QUANTITY		WEIGHT		H-ARM	
	(l)	(US gal)	(kg)	(lb)	(m)	(in)
Surge Tank Left	0.3	0.1	0.2	0.5	22.363	880.43
Outer Cell Left	0.4	0.1	0.3	0.7	21.020	827.56
Inner Cell Left	0.5	0.1	0.4	0.9	17.667	695.55
Surge Tank Right	0.3	0.1	0.2	0.5	22.363	880.43
Outer Cell Right	0.4	0.1	0.3	0.7	21.020	827.56
Inner Cell Right	0.5	0.1	0.4	0.9	17.667	695.55
Center Tank	8.0	2.1	6.3	13.8	17.801	700.83
Systems	40.3	10.6	31.6	69.7	18.006	708.90
<b>TOTAL</b>	<b>50.7</b>	<b>13.4*</b>	<b>39.8*</b>	<b>87.7*</b>	<b>18.066</b>	<b>711.26*</b>

\* Rounded value

TABLE OF UNDRAINABLE FUEL

FLUIDS01. General

This section contains information on :

- Engine fluids
- APU oil
- Hydraulic system fluid
- Potable water
- Chemical fluids

Hydraulic fluids are part of manufacturer's empty weight.

Engine oil, IDG oil, APU oil, chemical fluids, and potable water are operator's items.

02. Engine fluidsA. Oil

LOCATION	QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
Engine LH	47.0 (1)	47.0 (1)	16.085
Engine RH	47.0 (1)	47.0 (1)	16.085

*(1) The engine oil includes the engine hydraulic fluid.*

The weights are based on an oil density of 1 kg per liter.



## WEIGHT AND BALANCE MANUAL

### B. Integrated drive generator (IDG) oil

LOCATION	QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
IDG on Engine LH	4.9	4.9	15.387
IDG on Engine RH	4.9	4.9	15.387

The weights are based on an oil density of 1 kg per liter.

### C. Hydraulic fluid

LOCATION	QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
Engine LH	(1)	(1)	(1)
Engine RH	(1)	(1)	(1)

*(1) The engine hydraulic fluid is included in the engine oil.*

The weights are based on an hydraulic fluid density of 1.002 kg per liter.

## WEIGHT AND BALANCE MANUAL

03. APU oil

QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
5	5	37.675

The weight is based on an oil density of 1 kg per liter.

04. Hydraulic system fluid

The engine part is included in paragraph 1.30.02.

LOCATION	QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
Tanks			
a) Green	14	14	18.982
b) Yellow	12	12	18.332
c) Blue	6	6	22.682
Systems	152	152	20.168
Aircraft total	184	184	20.040

The weights are based on an hydraulic fluid density of 1.002 kg per liter.

## WEIGHT AND BALANCE MANUAL

05. Potable water

The aircraft is equipped with a pressurized potable water system.

The waste water from the wash-stand in the toilets and the galleys is evacuated from the aircraft via two electrically heated drainmasts in the forward and aft fuselage.

Potable water for the toilets and galleys is stored in a tank of 200 liters capacity, which is installed in the pressurized underfloor area aft of the forward cargo hold.

ITEM	CAPACITY (l)	WEIGHT (kg)	H-ARM (m)
Tank	200	200	15.546

## WEIGHT AND BALANCE MANUAL

06. Waste tank

The aircraft is equipped with a vacuum waste system.

The waste from the toilet units is stored in one waste tank of 200 liters capacity, which is installed in the pressurized underfloor cabin aft of the rear (bulk) cargo hold.

A control panel is installed in the forward cabin at the purser station.

ITEM	CAPACITY (l)	WEIGHT (kg)	H-ARM (m)
Tank	200	200	32.050

NOTE : The tank is filled with 10 liters of chemical fluid.



## WEIGHT AND BALANCE MANUAL

### PERSONNEL

#### 01. General

This section contains weight and balance information relating to the flight crew, cabin crew and passengers.

#### 02. Flight crew members

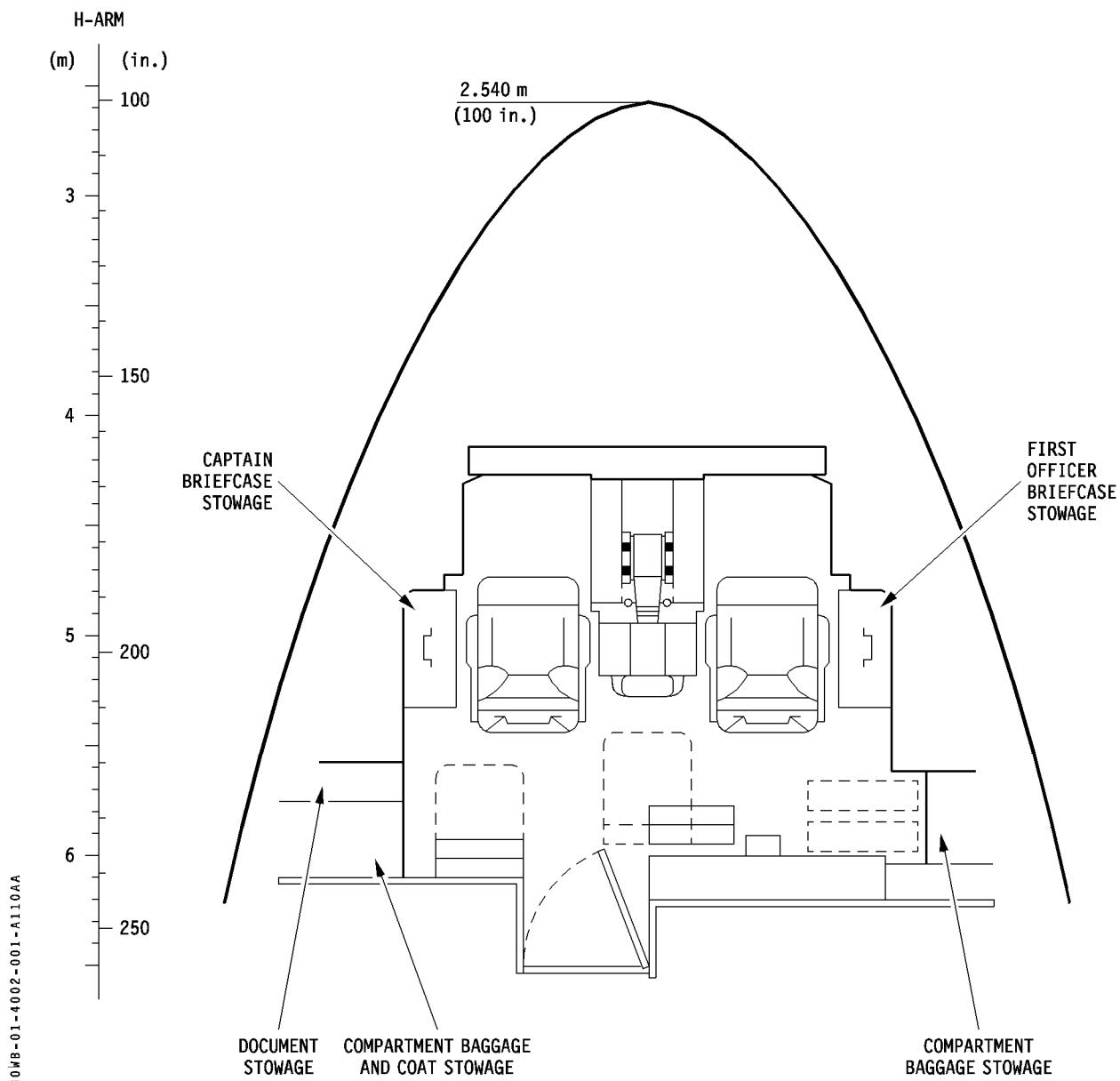
The flight compartment arrangement is shown in figure 1-40-02.

The flight compartment accommodates four occupants :

- Two pilots (Captain and first officer),
- Third occupant : located at the rear of the pedestal,
- Fourth occupant : located to the left rear flight compartment.

The take-off and landing H-arm positions for the flight crew members are shown on the table below.

NUMBER SEAT	FLIGHT CREW	H-ARM	
		(m)	(in)
1	Captain	5.085	200.2
1	First officer	5.085	200.2
1	Third occupant	5.722	225.3
1	Fourth occupant	5.867	231.0



Flight Compartment Arrangement

Figure 1-40-02

Mod : 20047 or 20047 + 20586 + 22802

Seq : 110

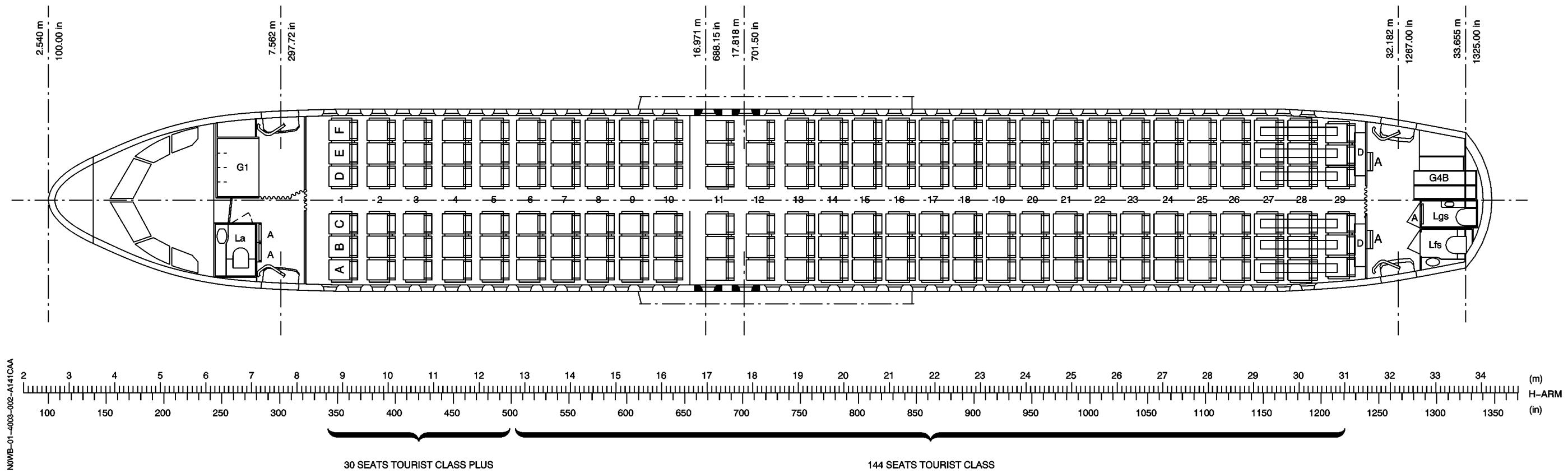
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Page 1  
AUG 95

**03. Cabin crew members**

The cabin compartment is provided with cabin attendant stations as shown in figure 1-40-03 (Cabin arrangement).

The take-off and landing H-arm positions for the cabin crew members are shown on the table below.

NUMBER SEAT	CABIN CREW LOCATION	H-ARM	
		(m)	(in)
2	Aft of toilet La	7.327	288.46
1	FWD of aft door LH	31.841	1 253.58
1	FWD of aft door RH	31.841	1 253.58
1	Aft of aft door CTR	32.515	1 280.12



- A ATTENDANT SEAT (5x)
- D DOGHOUSE (2x)
- G GALLEY (2x)
- L LAVATORY (3x)

Cabin Arrangement

Figure 1-40-03

Mod : 158674

Seq : 141C

## WEIGHT AND BALANCE MANUAL

**04. Passengers**

The seat layout provided for 174 seats mixed class is shown in figure 1-40-03 (Cabin arrangement).

The table given below shows the H-arm of each passenger, considered seated in an upright position ; the seat row numbering conforms to aircraft placards.

ROW N°	SEATS (lines A, B, C, D, E, F)					
	H-ARM (m)		H-ARM (in)		NUMBER PAX	
	LH	RH	LH	RH	LH	RH
1		8.872		349.29	3	3
2		9.779		385.00	3	3
3		10.643		419.02	3	3
4		11.506		452.99	3	3
5		12.370		487.01	3	3
6		13.132		517.01	3	3
7		13.894		547.01	3	3
8		14.656		577.01	3	3
9		15.418		607.01	3	3
10		16.180		637.01	3	3
11		17.196		677.01	3	3
12		18.161		715.00	3	3
13		18.923		745.00	3	3
14		19.685		775.00	3	3
15		20.447		805.00	3	3
16		21.209		835.00	3	3
17		21.971		865.00	3	3
18		22.733		895.00	3	3
19		23.495		925.00	3	3
20		24.257		955.00	3	3
21		25.019		985.00	3	3
22		25.781		1 015.00	3	3
23		26.543		1 045.00	3	3
24		27.305		1 075.00	3	3
25		28.067		1 105.00	3	3
26		28.829		1 135.00	3	3
27		29.591		1 165.00	3	3
28		30.353		1 195.00	3	3
29		31.115		1 225.00	3	3

## 05. In-flight movements

A safety margin to allow in-flight movements must be placed within the certified center of gravity limits. This margin must be defined with reasonable movement of crew, service trolleys and passengers to the toilets, galleys and other areas from their places.

The in-flight movements can be expressed in unit balance scale as defined in paragraph 1.00.05.

In this case the forward or aft in-flight movement allowance, for any items, is the summation of the individual in-flight movements, which is determined by entering the appropriate data in the following equations.

$$I_F \text{ unit} = \sum II_F \text{ unit}$$

with

$$II_F \text{ unit} = \frac{W (H\text{-arm}_2 - H\text{-arm}_1)}{1\ 000 \text{ (kgm)}}$$

or

$$II_F \text{ unit} = \frac{W (H\text{-arm}_2 - H\text{-arm}_1)}{100\ 000 \text{ (lb in)}}$$

where :

$I_F$  unit = Total in-flight movement

$II_F$  unit = Individual in-flight movement

W = Weight of item moving

H-arm<sub>1</sub> = H-arm of item before movement

H-arm<sub>2</sub> = H-arm of item after movement

Negative units indicate forward movements and positive units indicate aft movements.

For example, the movement of one passenger from the middle cabin to the forward door area, expressed in unit balance scale is :

W = 75 kg or 165 lb

Middle cabin = 20.000 m or 787.40 in

Forward area = 7.562 m or 297.72 in

$$II_F \text{ unit} = \frac{75 (7.562 - 20.000)}{1\ 000 \text{ (kgm)}} = - 0.9$$

or

$$II_F \text{ unit} = \frac{165 (297.72 - 787.40)}{100\ 000 \text{ (lb in)}} = - 0.8$$

## WEIGHT AND BALANCE MANUAL

INTERIOR ARRANGEMENT01. General

This section describes the different stowage capacities in the flight and cabin compartments, the galleys and toilets.

02. Flight compartment stowages

The general arrangement of the flight compartment is shown in figure 1-40-02.

A. Briefcase stowages

LOCATION	H-ARM		MAX LOAD	
	(m)	(in)	(kg)	(lb)
Left hand (Captain)	5.000	196.85	12	26.45
Right hand (First officer)	5.000	196.85	12	26.45

B. Document stowage

LOCATION	H-ARM		MAX LOAD	
	(m)	(in)	(kg)	(lb)
Aft compartment left side	5.700	224.41	12	26.45

C. Baggage stowages

LOCATION	H-ARM		MAX LOAD	
	(m)	(in)	(kg)	(lb)
Aft compartment left side	5.950	234.25	24	52.91
Aft compartment right side	5.800	228.35	24	52.91

D. Coat stowage

A compartment for coats is provided at the rear left hand side of the flight compartment.

**03. Cabin hatracks**

The general arrangement of the cabin compartment is shown in figure 1-40-03.

Overhead stowage compartments for hand baggage and coats run the length of the passenger compartment, above the passenger seats on RH side and LH side.

LOCATION	H-ARM						MAX LOAD	
	FROM		TO		AVERAGE			
	(m)	(in)	(m)	(in)	(m)	(in)	(kg)	(lb)
LH side	8.151	320.91	31.544	1 241.89	19.848	781.40	841	1 854
RH side	8.151	320.91	31.544	1 241.89	19.848	781.40	841	1 854

NOTE : The total volume of overhead stowage compartments is approximately 9.9 m<sup>3</sup> (348 ft<sup>3</sup>).  
Placard weight of each hatrack shall be observed.

## WEIGHT AND BALANCE MANUAL

04. Galleys

Figure 1.40.03 entitled "Cabin Arrangement" in Chapter 1.40.03 illustrates the galleys that are available in the cabin.

The following table provides the list of the galleys installed in the aircraft, their individual H-ARM and maximum load (MAX LOAD).

The MAX LOAD refers to the maximum authorized weight of the galley that the aircraft floor structure can sustain.

The galley weight includes the galley structure and all of its content.

GALLEY REF N°	GALLEY LOCATION	H-ARM		MAX LOAD	
		(m)	(in)	(kg)	(lb)
G1	Y/C+ - RH	6.691	263.43	700.0	1 543.2
G4B	Y/C - RH	33.199	1 307.05	953.0	2 100.9

NOTE : The galley manufacturer placards must be observed : they can further limit the MAX LOAD due to :

- *The maximum gross weight of the galley*
- *The individual weight capacity of each compartment of the galley.*

**05. Toilets**

The cabin compartment is provided with toilets as shown in figure 1-40-03 (Cabin arrangement).

The table below shows the average H-arm for each toilet.

CABIN LOCATION	REF	H-ARM	
		(m)	(in)
Y/C+ - LH	La	6.611	260.28
Y/C - LH	Lfs	33.256	1 309.29
Y/C - CTR	Lgs	33.304	1 311.18

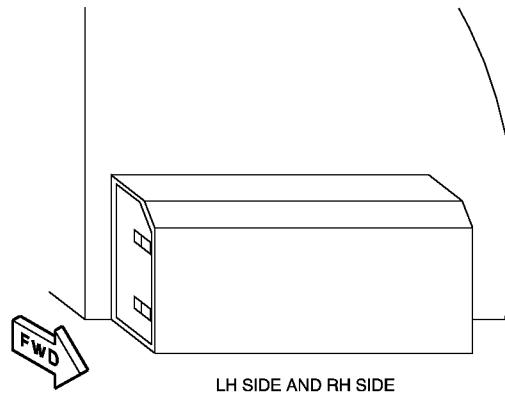
## WEIGHT AND BALANCE MANUAL

**06. Additional Cabin Stowage Compartments**

Figure 1.40.03 entitled "Cabin Arrangement" in Chapter 1.40.03 illustrates the additional stowage units that are available in the cabin.

The following is an illustration of doghouses located in the cabin.

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The following table provides the H-arm and the maximum loading capacity of each stowage unit.

STOWAGE UNIT TYPE	STOWAGE UNIT LOCATION	H-ARM		MAX LOAD	
		(m)	(in)	(kg)	(lb)
Doghouse	Aft of Y/C	LH	31.482	1 239.45	10.0
Doghouse	Aft of Y/C	RH	31.482	1 239.45	10.0

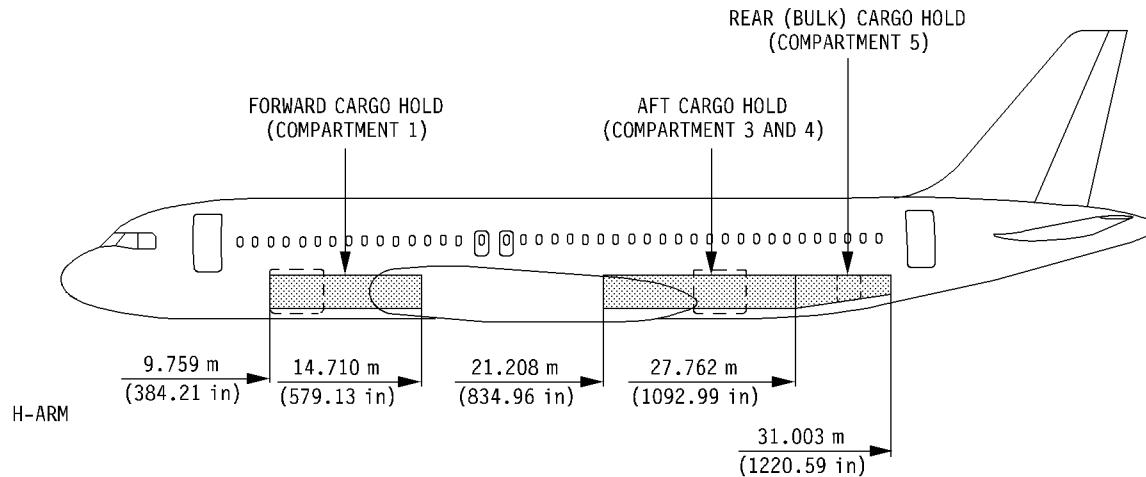
CARGO01. General

The cargo is loaded in three under floor cargo holds, designated forward cargo hold (compartment 1), aft cargo hold (compartments 3 and 4) and rear (bulk) cargo hold (compartment 5).

Aft cargo hold (compartment 3 and 4) and rear (bulk) cargo hold (compartment 5) are separated by a lateral divider net.

The general arrangement of the cargo holds is shown in the illustration below.

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All three cargo holds are designated category C as defined by FAR, Part 25.857.

02. Cargo hold doorsA. Door opening sizes and stations

The three cargo holds are each equipped with an individual access door located on the lower right hand side of the fuselage.

The doors for the forward and aft cargo hold are hydraulically powered. Manual operation using a hand pump is provided for use when hydraulic power is not available.

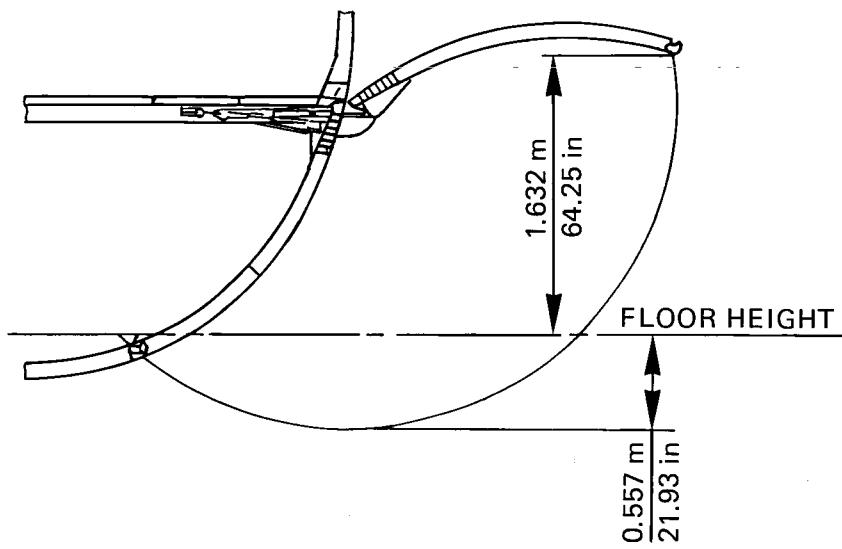
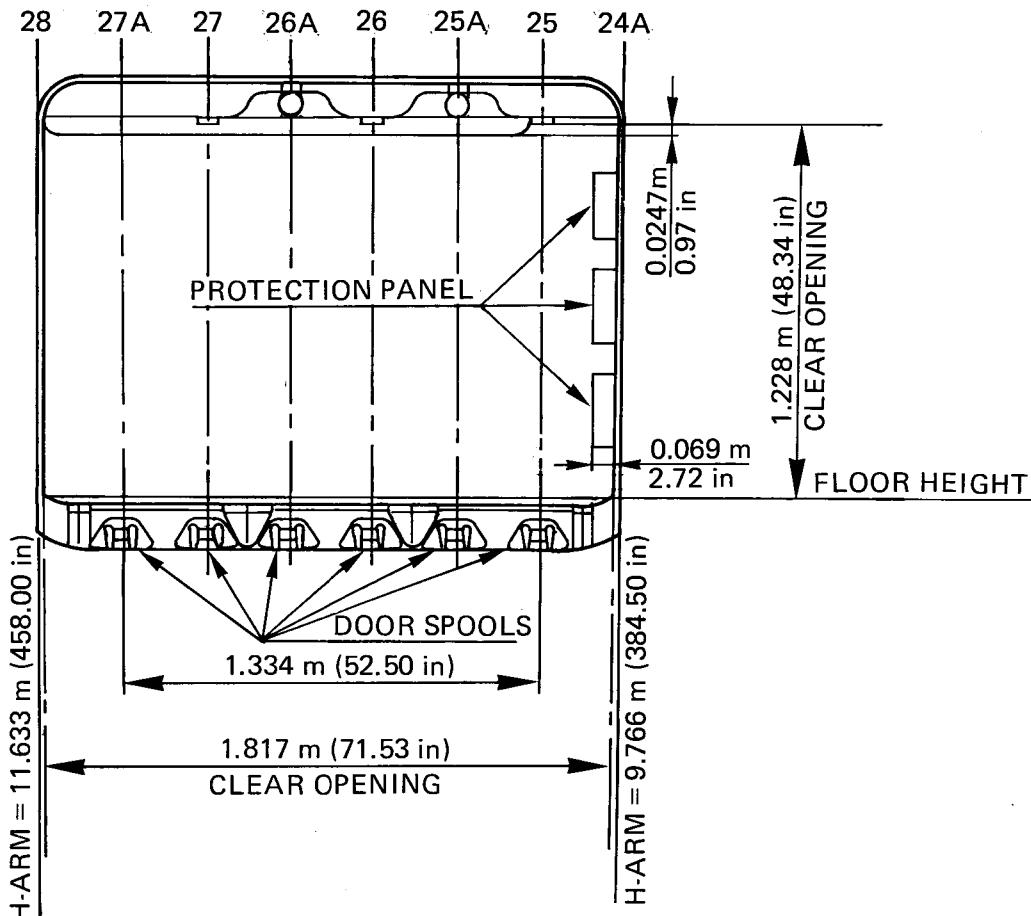
The rear (bulk) cargo door is manually operated from outside or inside the aircraft.

Loading of the rear (bulk) cargo hold (compartment 5) is achieved either through the access door in the aft cargo hold after removal of the lateral divider net at frame station 59, H-arm = 27.762 m (1 092.99 in), or through the rear (bulk) cargo door.

Figure 1-60-02 shows the cargo hold doors opening sizes and the door stations.

## WEIGHT AND BALANCE MANUAL

FRAME No

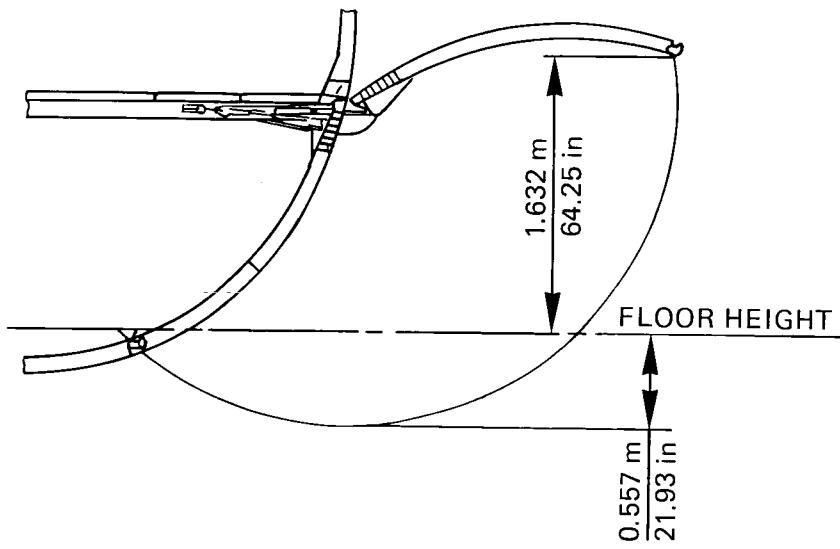
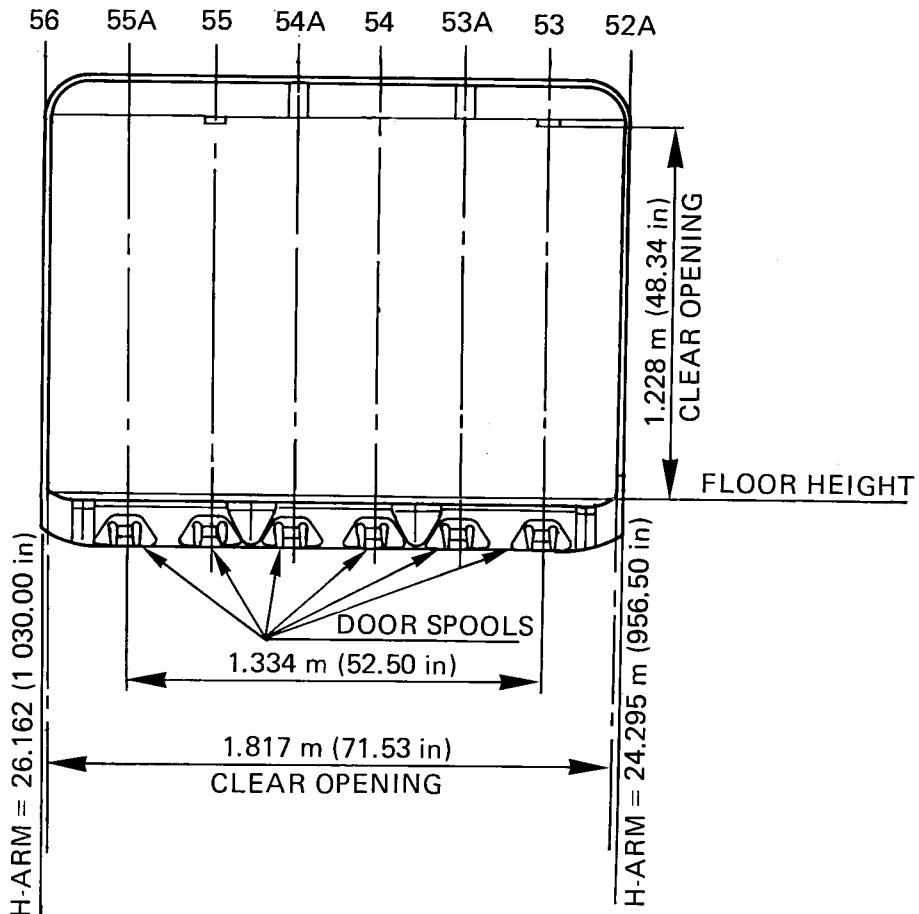


Forward Cargo Door Opening Size and Stations

Figure 1-60-02A

WEIGHT AND BALANCE MANUAL

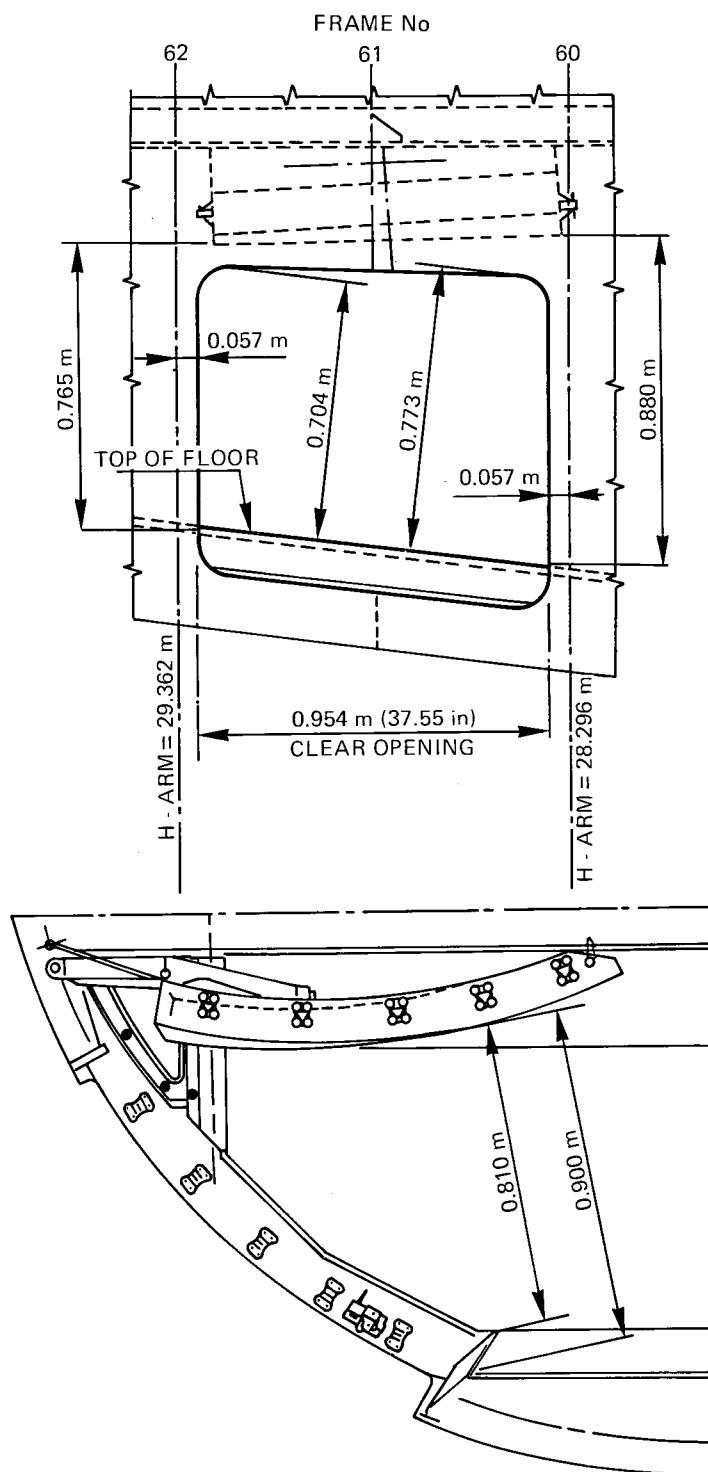
FRAME No



WN 1.60.02 002 AA 001

Aft Cargo Door Opening Size and Stations

Figure 1-60-02B



Rear (Bulk) Cargo Door Opening Size and Stations

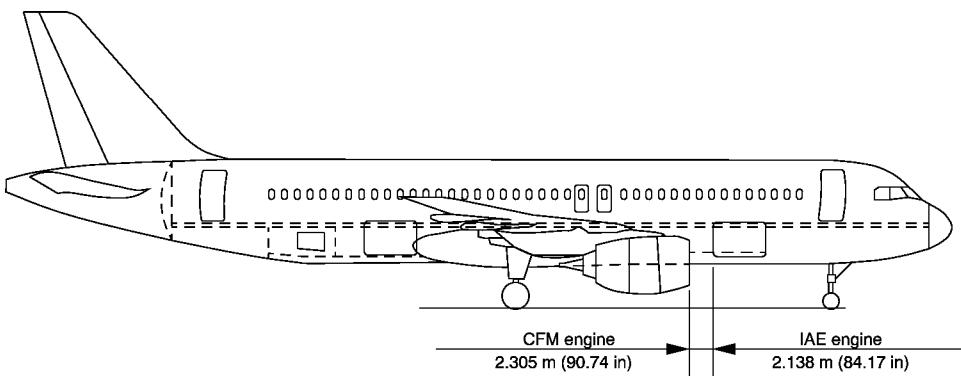
Figure 1-60-02C

Mod : 20029 or 25802 or 20029 + 21897 + 21898 or 20029 + 28330 + 28507 + 33671 or 27375 + 27378 + 28327 + 28330 + 28440  
 or 27375 + 28327 + 28330 + 28335 + 28440 or 20029 + 27375 + 28327 + 28330 + 28440 + 33671

**B. Cargo door clearances****(01) Forward cargo door**

**CAUTION :** A MINIMUM CLEARANCE OF 1.970 METER (78 INCHES) TO THE FUSELAGE SIDE HAS TO BE RESPECTED BEFORE THE DOOR IS OPERATED.

The distance between the rear edge of the forward cargo door and the engine is given in the illustration below.



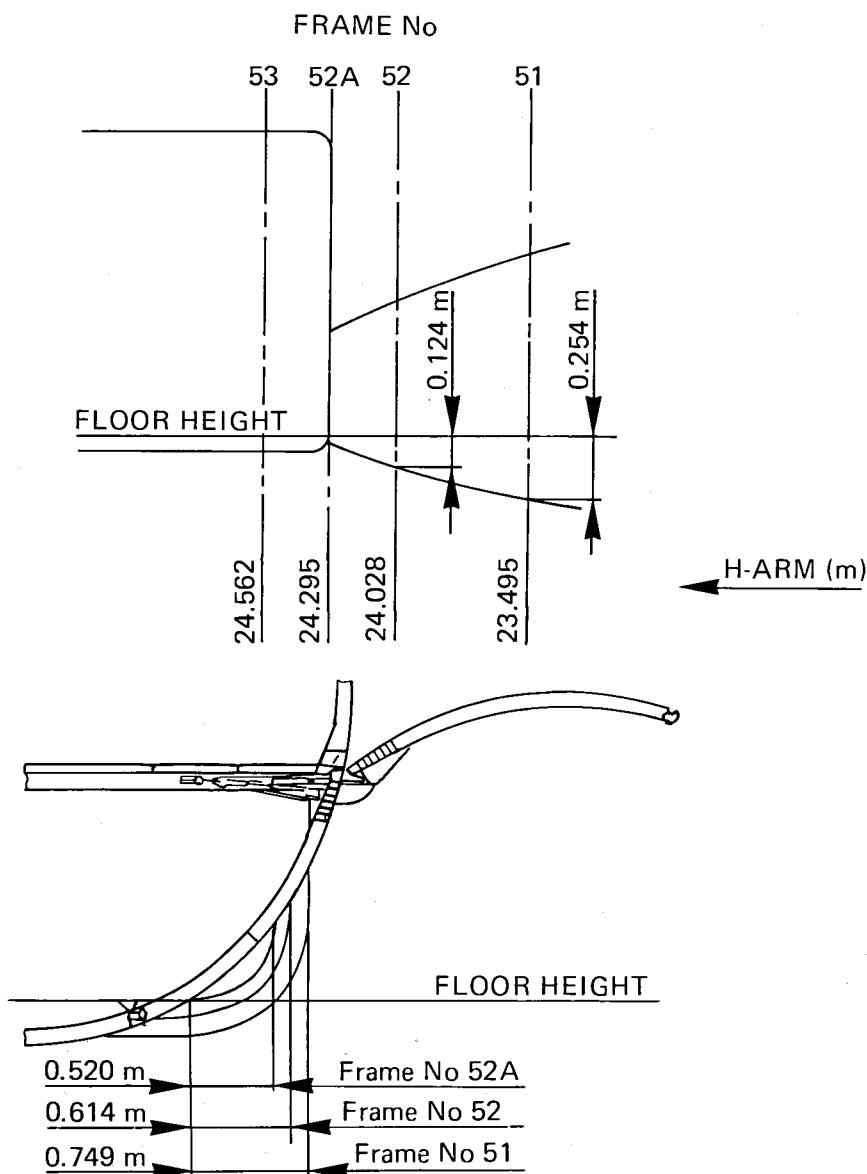
NOWB-01-6002-004-A110AA

The ground clearance for the lower edge of the forward cargo door is approximately 2.0 meters (78.74 inches), but varies dependent on aircraft weight, aircraft CG position, landing gear wheel and tyre sizes.

**(02) Aft cargo door**

**CAUTION :** A MINIMUM CLEARANCE OF 1.970 METER (78 INCHES) TO THE FUSELAGE SIDE HAS TO BE RESPECTED BEFORE THE DOOR IS OPERATED.

For loader handling it has to be considered that the wing/fuselage fairing protrudes from the fuselage and therefore may limit loader movement in the door area. The most important dimensions of the fairing are given in the following illustrations.



WN 1.60.02 005 AA 1110

The ground clearance for the lower edge of the aft cargo door is approximately 2.0 meters (78.74 inches), but varies dependent on aircraft weight, aircraft CG position, landing gear wheel and tyre sizes.

Mod : 20029 or 20449 or 25802 or 20029 + 20642 + 20646 + 21897 + 21898 or 27375 +  
27378 + 28327 + 28330 + 28440 or 27375 + 28327 + 28330 + 28335 + 28440

Seq : 110

 1.60.02  
 Page 5  
 SEP 02

### 03. Forward cargo hold (compartment 1)

**CAUTION :** THE CUMULATIVE LOADS IN THE FORWARD CARGO HOLD AND ITS INDIVIDUAL NET SECTIONS MUST NOT EXCEED THE MAXIMUM PERMISSIBLE LOADS, GIVEN IN PARAGRAPH 1.10.05.A.

The forward cargo hold is designed for the transport of bulk cargo and baggage.

When the certified net restraint system is used, additional tie down is not normally required except as specified in paragraph 1.10.05. If additional restraint is necessary, the tie down requirements can be determined with the methods given in paragraph 1.60.06 and the limitation data given in paragraph 1.10.05.

#### A. General arrangement

The arrangement of the forward cargo hold (compartment 1) and cross sections are shown in figure 1-60-03A.

The cargo hold is divided into individual sections as shown in figure 1-60-03A.

For stowage of loose baggage or cargo, the cargo hold is divided into two net sections by one lateral divider net positioned as shown in figure 1-60-03A.

Lateral and longitudinal door nets are installed around the door to keep the cargo door area free of cargo.

All nets can be removed for loading and unloading procedures.

During loading and unloading sufficient clearance shall be kept to the cargo door frame to prevent damage.

#### B. Cargo hold volumes

Corresponding to specification AS 1825, the maximum usable volume is defined by subtraction of the door area protection volume from the total theoretical volume. Additionally, the reductions due to the protection devices in the area of frame station 24A and the minimum clearances to the ceiling area are considered.

The usable volumes, cross section areas, extensions and H-arms are given in the following table for individual cargo hold sections, net sections and total cargo compartment.

## WEIGHT AND BALANCE MANUAL

SECTION DESIGNATION	FRAME STATIONS	LENGTH (m)	CROSS SECTION AREA (sqm)	USABLE VOLUME		H-ARM (m)		
				(cum)	(cuft)	From	To	Average
11	24A to 28	1.777	2.300	4.090	144	9.856	11.633	10.744
12	28 to 31	1.600	2.984	4.770	169	11.633	13.233	12.433
Sub-Total Net-Section 11 and 12	24A to 31	3.377	–	8.860	313	9.856	13.233	11.544
13	31 to 34	1.477	2.984	4.420	156	13.233	14.710	13.971
Sub-Total Net-Section 13	31 to 34	1.477	–	4.420	156	13.233	14.710	13.971
Total	24A to 34	4.854	–	13.280	469	9.856	14.710	12.283

C. Tie down points arrangement

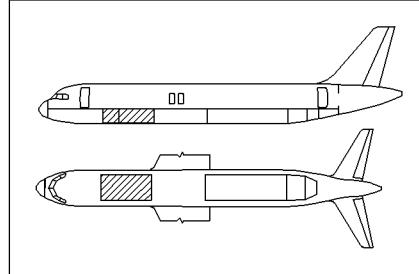
The forward cargo hold is provided with tie down points as shown in figure 1-60-03B.

Tie down points not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.05. Attachment points in the lining and ceiling areas are for net fastening only, therefore restraining of bulk cargo and single items is achieved by tie down to the tie down points in the compartment floor.

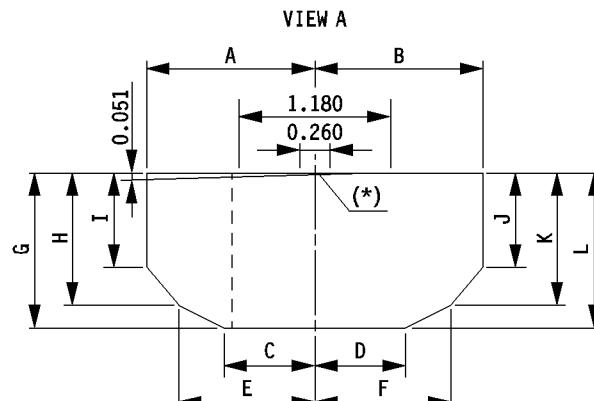
Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.

The tie down point locations and the tie down components are given in figure 1-60-03B.

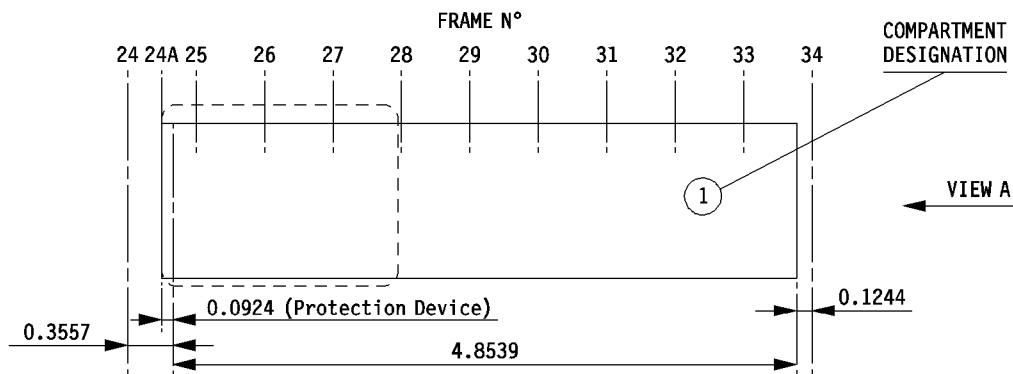
## WEIGHT AND BALANCE MANUAL



NOTE : ALL DIMENSIONS ARE  
GIVEN IN METERS (m).



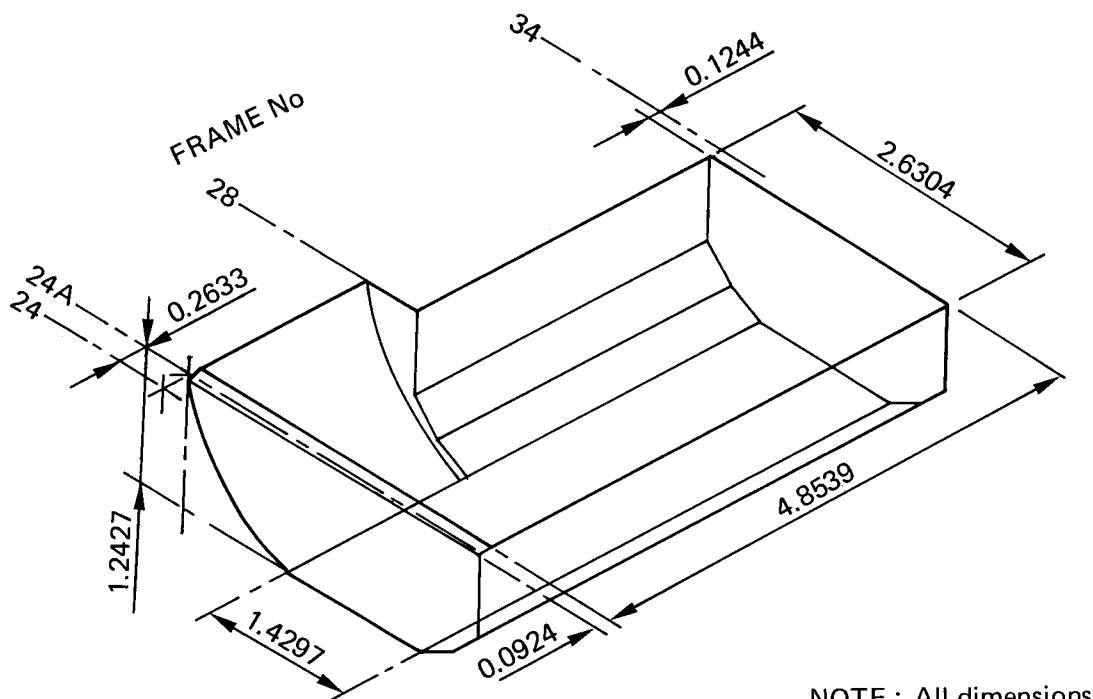
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FRAME STATION	CROSS SECTIONS													
	H-ARM (m)	A (m)	B (m)	C (m)	D (m)	E (m)	F (m)	G (m)	H (m)	I (m)	J (m)	K (m)	L (m)	
24A	9.856	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
25	10.033	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
26	10.566	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
27	11.100	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
28	11.633	0.765 1.315	1.315	0.577 1.315	0.715	— 1.049	1.049	1.243	— 1.065	— 0.797	0.797	1.065	1.243	
29	12.167	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
30	12.700	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
31	13.233	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
32	13.767	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
33	14.300	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
34	14.710	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	

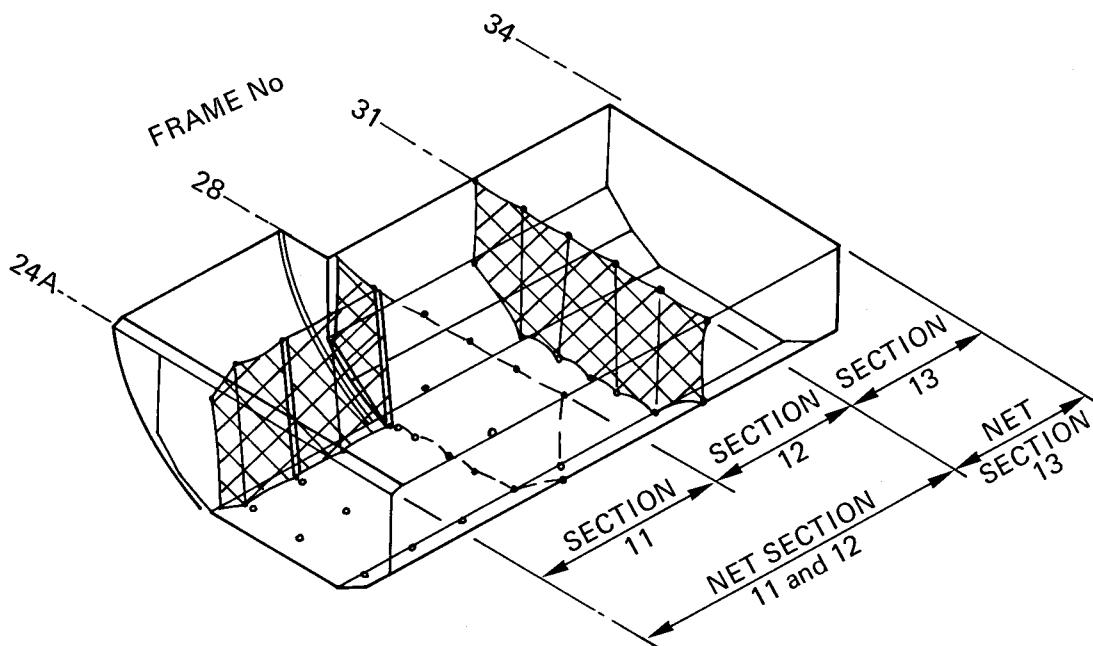
Arrangement Forward Cargo Hold (Compartment 1)

Figure 1-60-03A 1/2



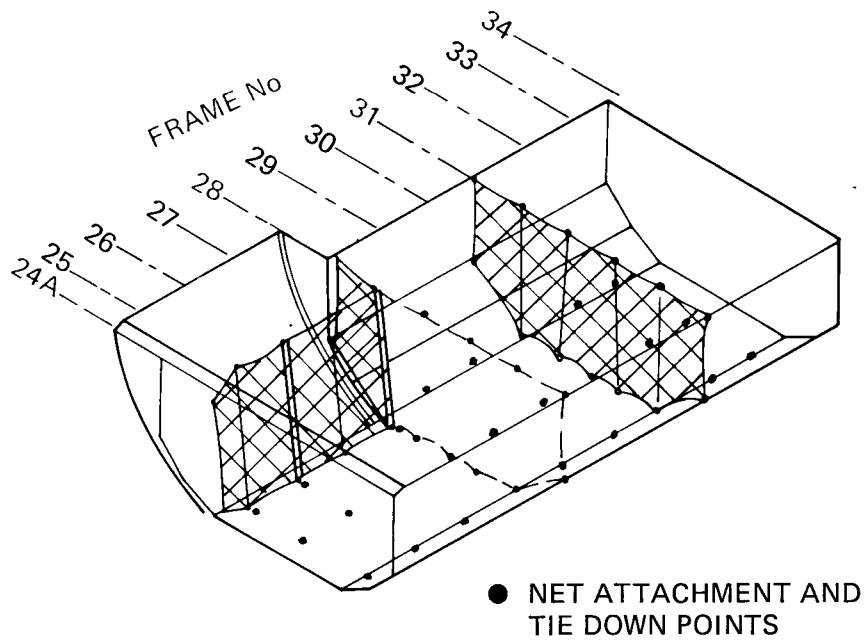
NOTE : All dimensions  
are given in meters (m)

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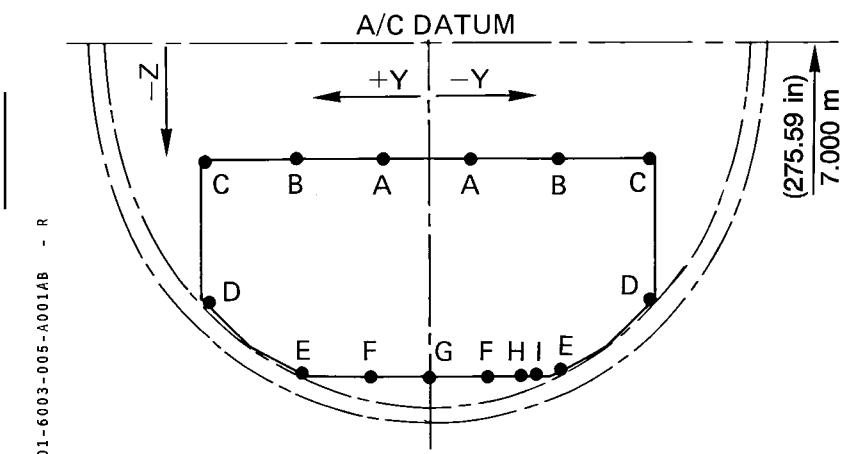
Arrangement Forward Cargo Hold (Compartment 1)

Figure 1-60-03A 2/2

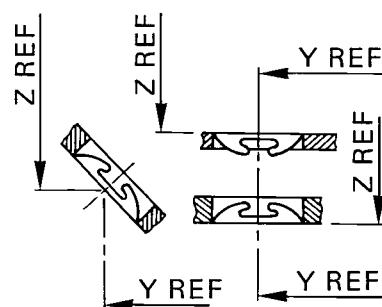


DEFINITION OF REFERENCE POINTS FOR  
NET ATTACHMENT AND TIE DOWN POINTS

DEFINITION OF PLUG AND  
TIE DOWN POINT STATIONS



VIEW IN FLIGHT DIRECTION



Tie Down Points Arrangement Forward Cargo Hold

Figure 1-60-03B 1/2

## WEIGHT AND BALANCE MANUAL

NET ATTACHMENT AND TIE DOWN POINT LOCATIONS										
FRAME STATION	H-ARM (m)	TIE-DOWN POINT STATIONS	REFERENCE POINTS							
			A	B	C	D	E	F	G	I
24A	9.766	H-ARM (m)	–	9.761	–	–	–	–	–	9.761
		Y-ARM (m)	–	+0.765	–	–	–	–	–	+0.765
		Z-ARM (m)	–	– 0.778	–	–	–	–	–	– 1.842
25	10.033	H-ARM (m)	–	10.009	–	–	10.037	–	10.019	10.046
		Y-ARM (m)	–	+0.765	–	–	– 0.776	–	0	+0.526
		Z-ARM (m)	–	– 0.645	–	–	– 1.881	–	– 1.912	– 1.913
26	10.566	H-ARM (m)	–	10.542	–	–	10.570	–	10.552	10.579
		Y-ARM (m)	–	+0.765	–	–	– 0.776	–	0	+0.526
		Z-ARM (m)	–	– 0.645	–	–	– 1.881	–	– 1.912	– 1.913
27	11.100	H-ARM (m)	–	11.076	–	–	11.104	–	11.086	11.113
		Y-ARM (m)	–	+0.765	–	–	– 0.776	–	0	+0.526
		Z-ARM (m)	–	– 0.645	–	–	– 1.881	–	– 1.912	– 1.913
28	11.633	H-ARM (m)	11.610	11.610	11.610	11.650 11.663	11.637 11.663	11.619 11.621	11.619	11.648
		Y-ARM (m)	±0.254	±0.765	±1.292	– 1.284 +1.284	– 0.776 +0.776	– 0.347 +0.310	0	+0.526
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.504 – 1.504	– 1.881 – 1.881	– 1.912 – 1.912	– 1.912	– 1.913
29	12.167	H-ARM (m)	–	–	–	–	12.221	–	12.152	–
		Y-ARM (m)	–	–	–	–	±0.776	–	0	–
		Z-ARM (m)	–	–	–	–	– 1.881	–	– 1.912	–
30	12.700	H-ARM (m)	–	–	–	–	12.704	–	12.686	–
		Y-ARM (m)	–	–	–	–	±0.776	–	0	–
		Z-ARM (m)	–	–	–	–	– 1.881	–	– 1.912	–
31	13.233	H-ARM (m)	13.210	13.210	13.210	13.250	13.238	13.219	13.219	–
		Y-ARM (m)	±0.254	±0.765	±1.292	±1.284	±0.776	±0.347	0	–
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.504	– 1.881	– 1.912	– 1.912	–
32	13.767	H-ARM (m)	–	–	–	–	13.771	–	13.753	–
		Y-ARM (m)	–	–	–	–	±0.776	–	0	–
		Z-ARM (m)	–	–	–	–	– 1.881	–	– 1.912	–
33	14.300	H-ARM (m)	–	–	–	–	14.304	–	14.286	–
		Y-ARM (m)	–	–	–	–	±0.776	–	0	–
		Z-ARM (m)	–	–	–	–	– 1.881	–	– 1.912	–

NOTE : Plugs at reference points A, B, C and D are for net fastening only. Tie down points at reference points E, F, G, H and I not used for net fastening may be used for package restraint.

## Tie Down Points Arrangement Forward Cargo Hold

Figure 1-60-03B 2/2

## WEIGHT AND BALANCE MANUAL

D. Maximum package sizes

The maximum dimensions of cargo packages which will pass through the forward cargo door and which must be restrained in the forward cargo hold (compartment 1) are shown in the following tables.

- Table 1 for upright loading,
- Table 2 for tilted loading.

These dimensions are approximate values and refer to rectangular packages.

(01) Upright loading

Upright loading refers to large or heavy packages loaded with the assistance of mechanical ground support equipment and manœuvred through the door in an upright position.

Table 1

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
1.499	59.0	1.194	47.0	1.643	64.7

(02) Tilted loading

Tilted loading refers to large low density cargo which may require hand manœuvring through the door in a tilted position to avoid obstructions.

Table 2

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
0.250	10.0	0.250	10.0	5.000	197.0
0.500	20.0	0.500	20.0	4.930	194.0
0.750	30.0	0.750	30.0	4.890	192.5

**04. Aft cargo hold (compartment 3 and 4)**

**CAUTION :** THE CUMULATIVE LOADS IN THE AFT CARGO HOLD AND ITS INDIVIDUAL NET SECTIONS AND COMPARTMENTS MUST NOT EXCEED THE MAXIMUM PERMISSIBLE LOADS, GIVEN IN PARAGRAPH 1.10.06.A.

The aft cargo hold is designed for the transport of bulk cargo and baggage.

When the certified net restraint system is used, additional tie down is not normally required except as specified in paragraph 1.10.06. If additional restraint is necessary, the tie down requirements can be determined with the methods given in paragraph 1.60.06 and the limitation data given in paragraph 1.10.06.

**A. General arrangement**

The arrangement of the aft cargo hold (compartment 3 and 4) and cross sections are shown in figure 1-60-04A.

The cargo hold is divided into individual sections and compartments as shown in figure 1-60-04A.

For stowage of loose baggage or cargo, the cargo hold is divided into two net sections by one lateral divider net positioned as shown in figure 1-60-04A and is further divided into two compartments for reduction of operational margins after installation of one lateral divider net at frame station 53.

The aft cargo hold (compartment 3 and 4) is separated from the rear (bulk) cargo hold (compartment 5) by a lateral divider net positioned at frame station 59 (H-arm = 27.762 m).

Lateral and longitudinal door nets are installed around the door to keep the cargo door area free of cargo.

All nets can be removed for loading and unloading procedures.

During loading and unloading sufficient clearance shall be kept to the door frame to prevent damage.

**B. Cargo hold volumes**

Corresponding to specification AS 1825, the maximum usable volume is defined by subtraction of the door area protection volume from the total theoretical water volume. Additionally, the reductions due to the minimum clearances to the ceiling area are considered.

The usable volumes, cross section areas, extensions and H-arms are given in the following table for individual cargo hold sections, net sections, compartments and total cargo compartment.

## WEIGHT AND BALANCE MANUAL

NET SECTION DESIGNATION	FRAME STATIONS	LENGTH (m)	CROSS SECTION AREA (m <sup>2</sup> )	USABLE VOLUME		H-ARM (m)		
				(m <sup>3</sup> )	(ft <sup>3</sup> )	From	To	Average
31	47 to 50	1.754	2.98	5.23	185	21.208	22.962	22.085
Sub-Total Net-Section 31	47 to 50	1.754	–	5.23	185	21.208	22.962	22.085
32	50 to 52A/53	1.600	2.98 variable	4.53	160	22.962	24.562	23.762
Sub-Total Compartment 3	47 to 52A/53	3.354	–	9.76	345	21.208	24.562	22.885
41	52A/53 to 56	1.600	variable 2.33	3.79	134	24.562	26.162	25.362
42	56 to 59	1.600	2.98 2.94	4.75	168	26.162	27.762	26.962
Sub-Total Compartment 4	53 to 59	3.200	–	8.54	301	24.562	27.762	26.162
Sub-Total Net-Section 32, 41 and 42	50 to 59	4.800	–	13.07	461	22.962	27.762	25.362
Total Compartment 3 and 4	47 to 59	6.554	–	18.30	646	21.208	27.762	24.485

**C. Tie down points arrangement**

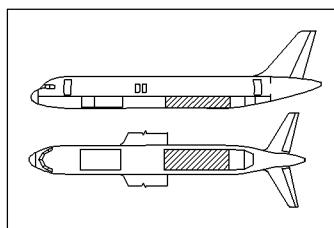
The aft cargo hold is provided with tie down points as shown in figure 1-60-04B.

Tie down points not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.06. Attachment points in the lining and ceiling areas are for net fastening only, therefore re-straining of bulk cargo and single items is achieved by tie down to the tie down points in the compartment floor.

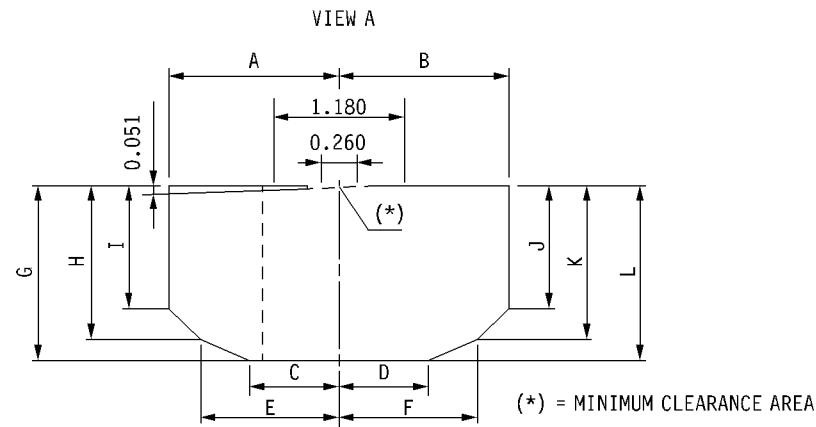
Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.

The tie down point locations and the tie down components are given in figure 1-60-04B.

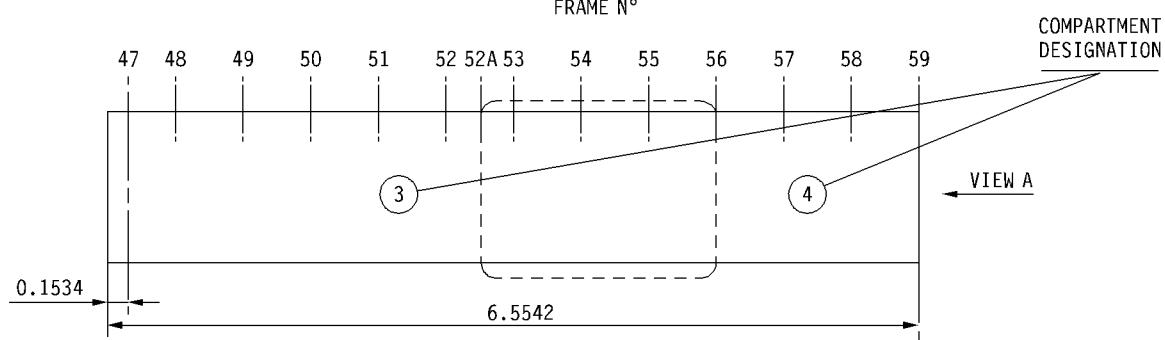
## WEIGHT AND BALANCE MANUAL



NOTE : ALL DIMENSIONS ARE  
GIVEN IN METERS (m).



WOWB-01-6004-003-A213AA



CROSS SECTIONS														
FRAME STATION	H-ARM (m)	(m)												
		A	B	C	D	E	F	G	H	I	J	K	L	
47	21.208	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
48	21.895	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
49	22.428	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
50	22.962	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
51	23.495	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
52	24.028	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
52A	24.295	1.315 0.765	1.315 0.577	0.715 0.577	0.715 0.715	1.049 —	1.049 —	1.243 —	1.065 —	0.797 —	0.797 —	1.065 1.243		
53	24.562	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
54	25.095	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
55	25.629	0.765	1.315	0.577	0.715	—	1.049	1.243	—	—	0.797	1.065	1.243	
56	26.162	0.765 1.315	1.315 0.577	0.577 0.715	0.715 —	1.049 —	1.049 —	1.243 —	1.065 —	0.797 —	0.797	1.065	1.243	
57	26.695	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
58	27.229	1.315	1.315	0.715	0.715	1.049	1.049	1.243	1.065	0.797	0.797	1.065	1.243	
59	27.762	1.315	1.315	0.704	0.704	1.049	1.049	1.208	1.024	0.756	0.756	1.024	1.208	

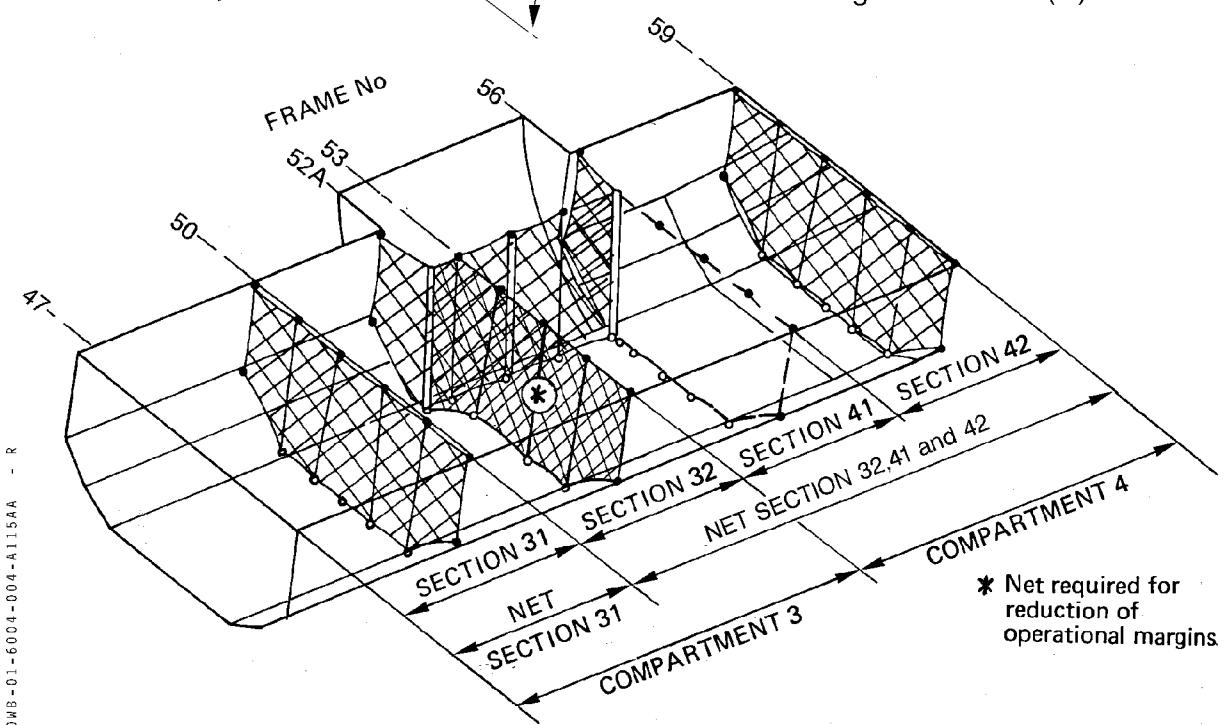
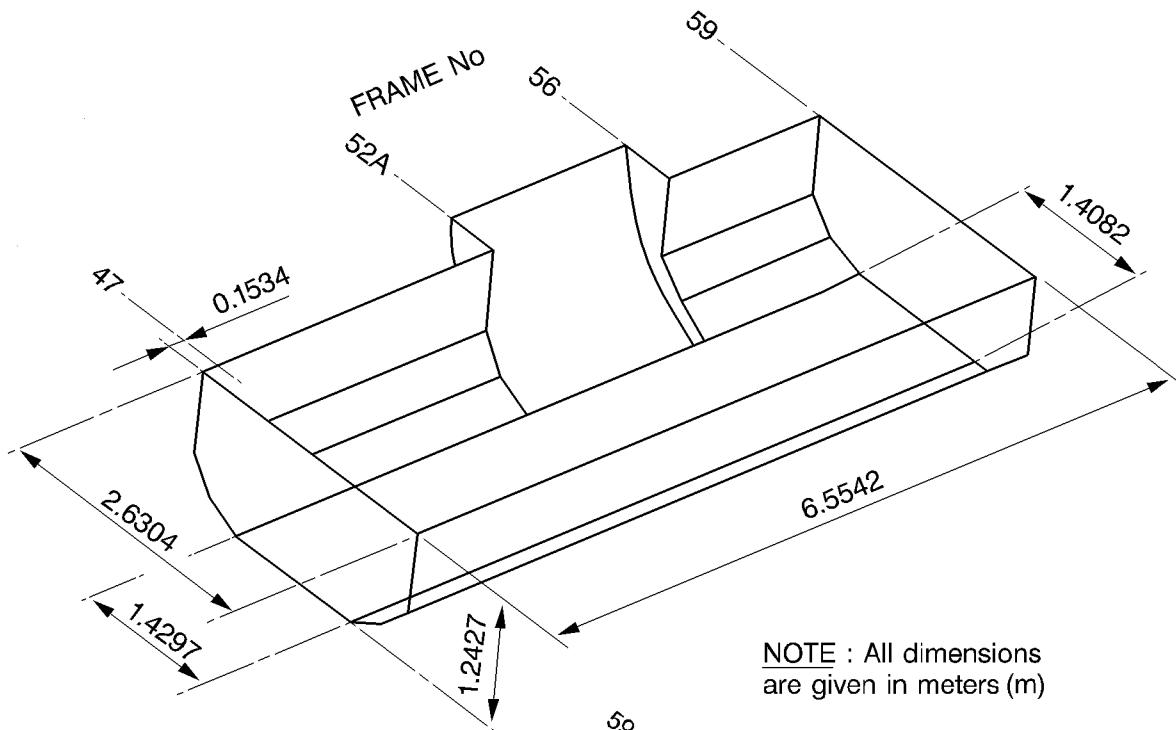
Arrangement Aft Cargo Hold (Compartment 3 and 4)

Figure 1-60-04A 1/2

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Seq : 213

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Page 3  
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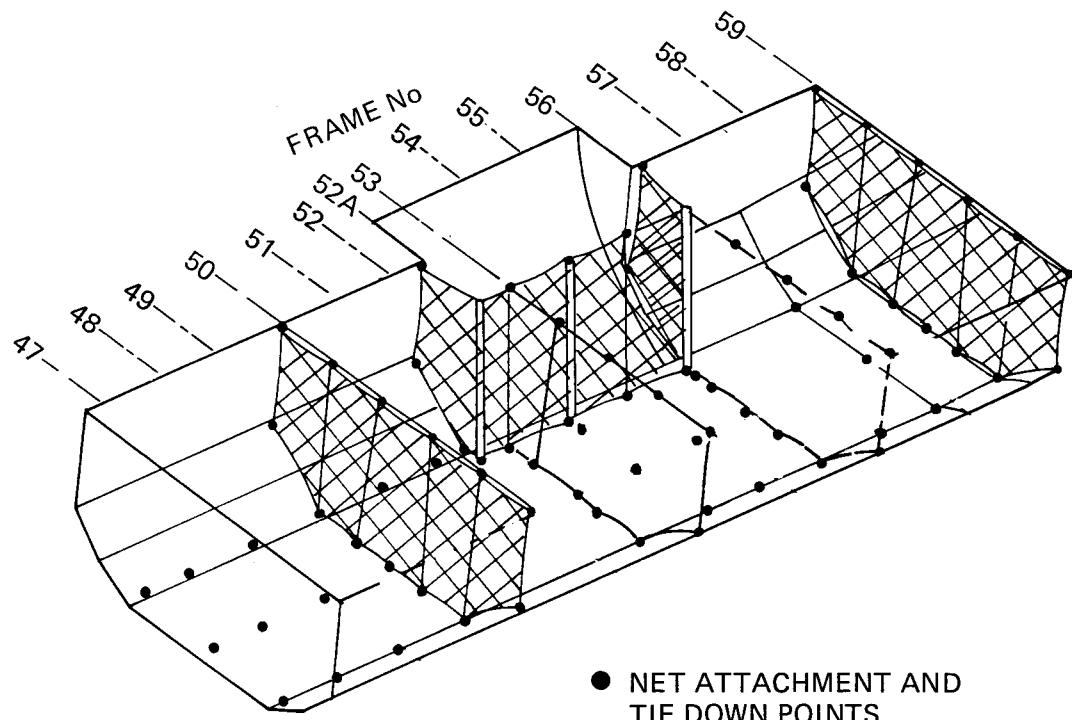
Arrangement Aft Cargo Hold (Compartment 3 and 4)

Figure 1-60-04A 2/2

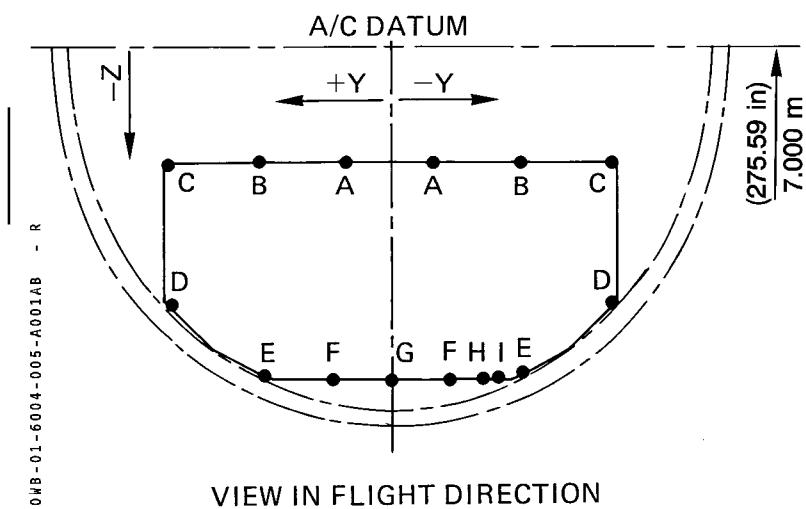
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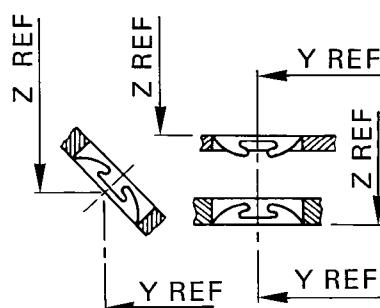


DEFINITION OF REFERENCE POINTS FOR  
NET ATTACHMENT AND TIE DOWN POINTS



Tie Down Points Arrangement Aft Cargo Hold

DEFINITION OF PLUG AND  
TIE DOWN POINT STATIONS



## WEIGHT AND BALANCE MANUAL

FRAME STATION	H-ARM (m)	TIE-DOWN POINT STATIONS	REFERENCE POINTS								
			A	B	C	D	E	F	G	H	I
47	21.361	H-ARM (m)	—	—	—	—	21.363	—	21.347	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
48	21.895	H-ARM (m)	—	—	—	—	21.901	—	21.885	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
49	22.428	H-ARM (m)	—	—	—	—	22.430	—	22.414	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
50	22.962	H-ARM (m)	22.938	22.938	22.938	22.987	22.963	22.947	22.947	—	—
		Y-ARM (m)	±0.254	±0.765	±1.292	±1.284	±0.776	±0.353	0	—	—
		Z-ARM (m)	—0.645	—0.645	—0.664	—1.504	—1.881	—1.912	—1.912	—	—
51	23.495	H-ARM (m)	—	—	—	—	23.497	—	23.481	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
52	24.028	H-ARM (m)	—	—	—	—	24.030	—	24.014	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
52A	24.295	H-ARM (m)	—	24.272	24.272	24.280	24.280	24.280	—	—	—
		Y-ARM (m)	—	+0.765	+1.292	+1.284	+0.776	+0.635	—	—	—
		Z-ARM (m)	—	—0.645	—0.664	—1.504	—1.881	—1.913	—	—	—
53	24.562	H-ARM (m)	24.538	24.538	24.538	24.587	24.564	24.548 24.575	24.548	24.575	24.575
		Y-ARM (m)	±0.254	±0.765	—1.292	—1.284	—0.776	—0.353 +0.310	0	+0.526	+0.577
		Z-ARM (m)	—0.645	—0.645	—0.664	—1.504	—1.881	—1.912 —1.912	—1.912	—1.913	—1.913
54	25.095	H-ARM (m)	—	25.072	—	—	25.097	—	25.081	25.098	25.098
		Y-ARM (m)	—	+0.765	—	—	—0.776	—	0	+0.526	+0.577
		Z-ARM (m)	—	—0.645	—	—	—1.881	—	—1.912	—1.913	—1.913
55	25.629	H-ARM (m)	—	25.605	—	—	25.630	—	25.643	25.641	25.641
		Y-ARM (m)	—	+0.765	—	—	—0.776	—	0	+0.526	+0.577
		Z-ARM (m)	—	—0.645	—	—	—1.881	—	—1.912	—1.913	—1.913
56	26.162	H-ARM (m)	26.138	26.138	26.138	26.187 26.177	26.164 26.192	26.148 26.177	26.148	26.177	26.177
		Y-ARM (m)	±0.254	±0.765	±1.292	—1.284 +1.284	—0.776 +0.776	—0.353 +0.310	0	+0.553	+0.603
		Z-ARM (m)	—0.645	—0.645	—0.664	—1.504 —1.504	—1.881 —1.881	—1.912 —1.912	—1.912	—1.913	—1.913
57	26.695	H-ARM (m)	—	—	—	—	26.697	—	26.681	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
58	27.229	H-ARM (m)	—	—	—	—	27.230	—	27.215	—	—
		Y-ARM (m)	—	—	—	—	±0.776	—	0	—	—
		Z-ARM (m)	—	—	—	—	—1.881	—	—1.912	—	—
59	27.762	H-ARM (m)	27.739	27.739	27.739	27.787	27.785	27.741	27.741	—	—
		Y-ARM (m)	±0.254	±0.765	±1.292	±1.263	±0.796	±0.352	0	—	—
		Z-ARM (m)	—0.645	—0.645	—0.664	—1.480	—1.826	—1.878	—1.878	—	—

NOTE : Plugs at reference points A, B, C and D are for net fastening only. Tie down points at reference points E, F, G, H and I not used for net fastening may be used for package restraint.

## Tie Down Points Arrangement Aft Cargo Hold

Figure 1-60-04B 2/2

Mod : STD or 21103 + 27378 + 28327 + 28440

Seq : 001

**D. Maximum package sizes**

The maximum dimensions of cargo packages which will pass through the aft cargo door and which must be restrained in the aft cargo hold (compartment 3 and 4) are shown in the following tables.

- Table 1 for upright loading,
- Table 2 for tilted loading.

These dimensions are approximate values and refer to rectangular packages.

**(01) Upright loading**

Upright loading refers to large or heavy packages loaded with the assistance of mechanical ground support equipment and manœuvred through the door in an upright position.

Table 1

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
1.499	59.0	1.194	47.0	1.715	67.5

**(02) Tilted loading**

Tilted loading refers to large low density cargo which may require hand manœuvring through the door in a tilted position to avoid obstructions.

Table 2

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
0.250	10.0	0.250	10.0	5.309	209.0
0.500	20.0	0.500	20.0	5.144	202.5
0.750	30.0	0.750	30.0	4.915	193.5

## WEIGHT AND BALANCE MANUAL

05. Rear (bulk) cargo hold (compartment 5)

**CAUTION :** THE CUMULATIVE LOAD IN THE REAR (BULK) CARGO HOLD MUST NOT EXCEED THE MAXIMUM PERMISSIBLE LOAD, GIVEN IN PARAGRAPH 1.10.07.A.

The rear (bulk) cargo hold is designed for the transport of bulk cargo and baggage.

When the certified net restraint system is used, additional tie down is not normally required except as specified in paragraph 1.10.07. If additional restraint is necessary, the tie down requirements can be determined with the methods given in paragraph 1.60.06 and the limitation data given in paragraph 1.10.07.

A. General arrangement

The arrangement of rear (bulk) cargo hold (compartment 5) and cross sections are shown in figure 1-60-05A.

The cargo hold is divided into individual sections as shown in figure 1-60-05A.

The rear (bulk) cargo hold (compartment 5) is separated from the aft cargo hold (compartment 4) by a lateral divider net positioned at frame station 59 (H-arm = 27.762 m).

Lateral and longitudinal door nets are installed around the rear (bulk) cargo door to keep the door area free of cargo.

All nets can be removed for loading and unloading procedures.

Loading and unloading of the rear (bulk) cargo hold is achieved either through the door in the aft cargo hold (compartment 4) after removal of the lateral divider net, or through the rear (bulk) cargo door.

During loading and unloading sufficient clearance shall be kept to the door frames to prevent damage.

B. Cargo hold volumes

Corresponding to specification AS 1825, the maximum usable volume is defined by subtraction of the door area protection volume from the total theoretical water volume. Additionally, the reductions due to the minimum clearances to the ceiling area are considered.

The usable volumes, cross section areas, extensions and H-arms are given in the table below for individual cargo hold sections and the total cargo compartment.

SECTION DESIGNATION	FRAME STATIONS	LENGTH (m)	CROSS SECTION AREA (sqm)	USABLE VOLUME		H-ARM (m)		
				(cum)	(cuft)	From	To	Average
51	59 to 60	0.534	2.931 2.797	1.490	52	27.762	28.296	28.029
52	60 to 62	1.066	1.339 1.247	1.390	49	28.296	29.362	28.829
53	62 to 65	1.641	2.433 1.426	3.040	107	29.362	31.003	30.182
Total	59 to 65	3.241	—	5.920	209	27.762	31.003	29.38

C. Tie down points arrangement

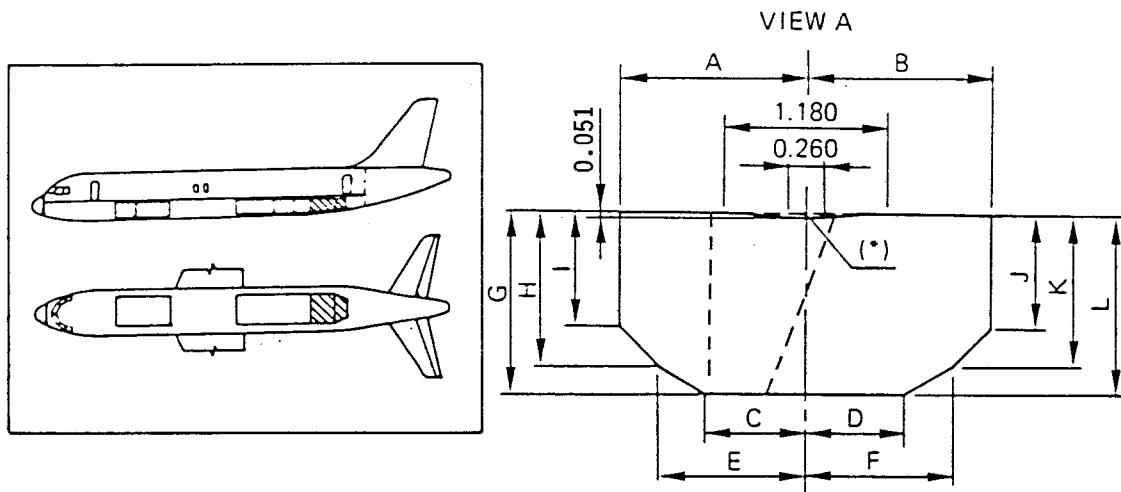
The rear (bulk) cargo hold is provided with tie down points as shown in figure 1-60-05B.

Tie down points not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.07. Attachment points in the lining and ceiling areas are for net fastening only, therefore restraining of bulk cargo and single items is achieved by tie down to the tie down points in the compartment floor.

Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.

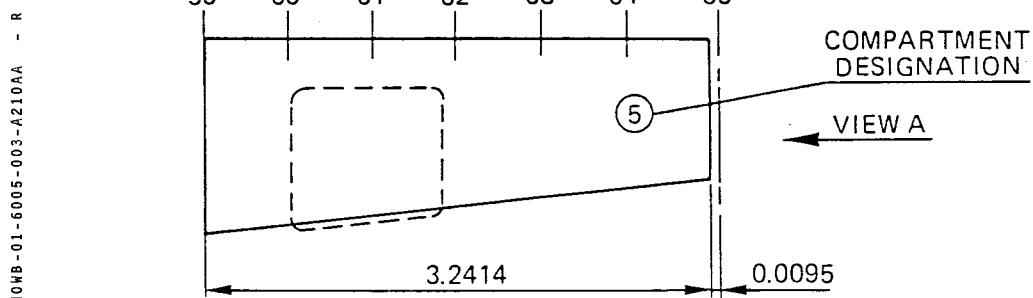
The tie down point locations and the tie down components are given in figure 1-60-05B.

## WEIGHT AND BALANCE MANUAL



NOTE : All dimensions are given in meters (m).

(\*) = MINIMUM CLEARANCE AREA



FRAME STATION	CROSS SECTION (sqm)	H-ARM (m)	CROSS SECTIONS (m)											
			A	B	C	D	E	F	G	H	I	J	K	L
59	2.931	27.762	1.315	1.315	0.704	0.704	1.049	1.049	1.208	1.024	0.756	0.756	1.024	1.208
60	1.339	28.296	—	1.061	0.314	0.684	—	1.049	1.144	—	—	0.682	0.950	1.144
61	1.295	28.829	—	1.061	0.302	0.664	—	1.049	1.081	—	—	0.607	0.876	1.081
62	1.247	29.362	—	1.061	0.290	0.643	—	1.049	1.017	—	—	0.533	0.802	1.017
63	2.252	29.896	1.315	1.315	0.623	0.623	1.049	1.049	0.953	0.728	0.449	0.449	0.728	0.953
64	1.920	30.429	1.076	1.076	0.557	0.557	0.919	0.919	0.889	0.698	0.539	0.539	0.698	0.889
65	1.425	31.003	0.788	0.788	0.477	0.477	—	—	0.820	—	0.655	0.655	—	0.82

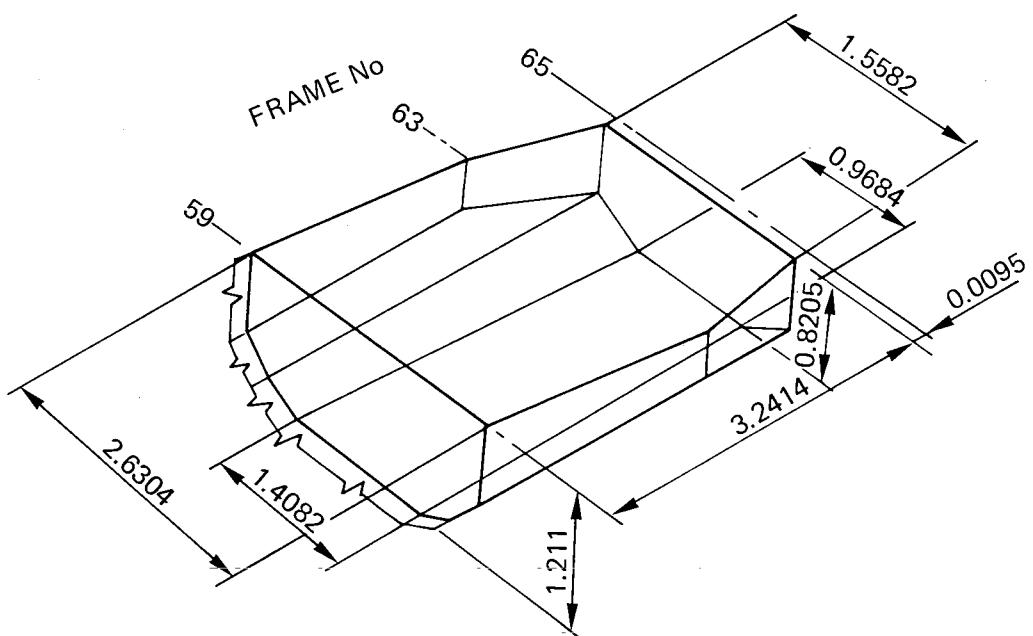
Arrangement Rear (Bulk) Cargo Hold (Compartment 5)

Figure 1-60-05A 1/2

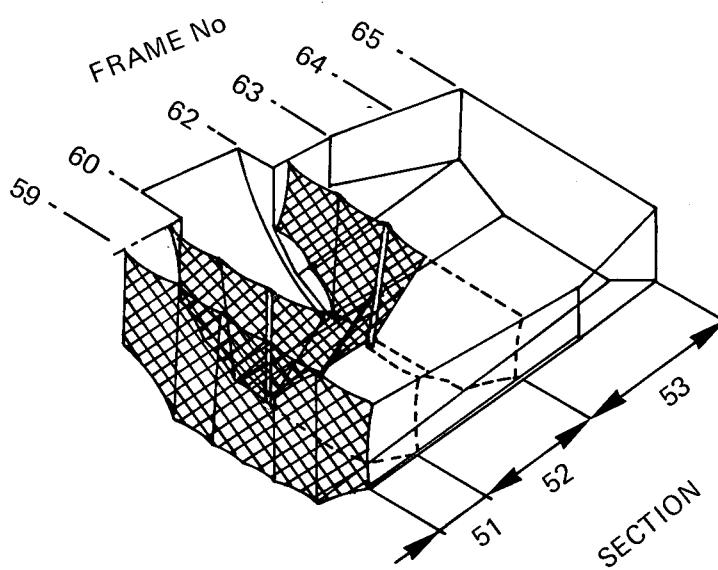
Mod : 20029 + 23172 or 23172 + 25802

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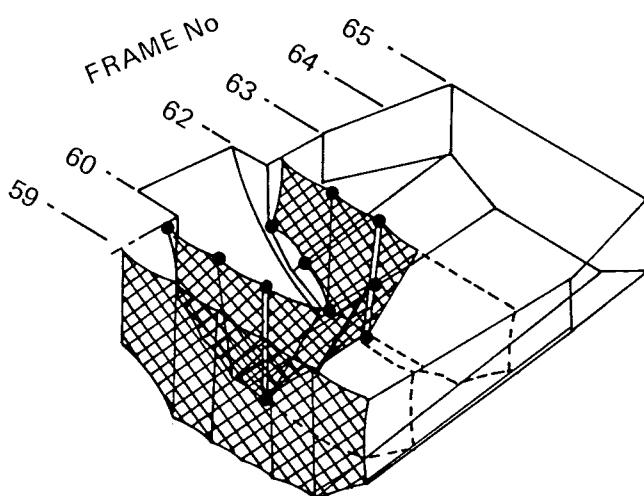
NOTE : All dimensions  
are given in meters (m)



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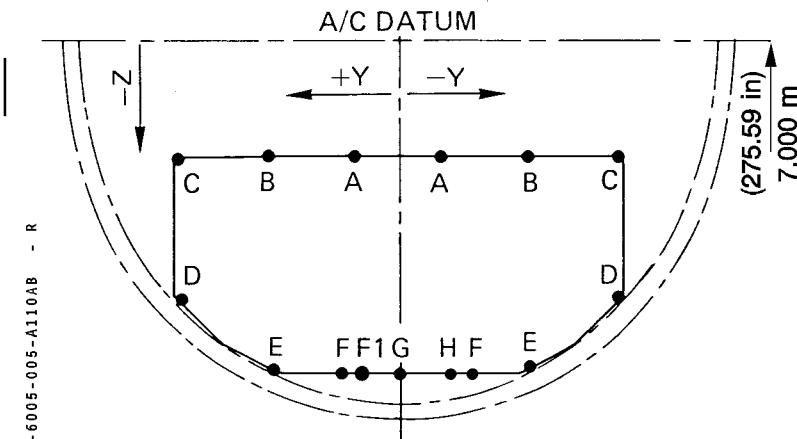
Arrangement Rear (Bulk) Cargo Hold (Compartment 5)

Figure 1-60-05A 2/2

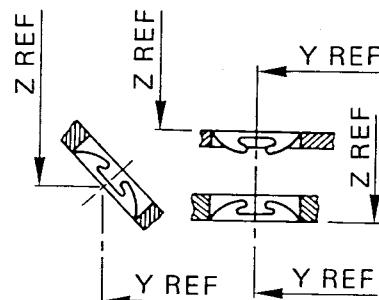


- NET ATTACHMENT  
AND TIE DOWN POINTS

DEFINITION OF REFERENCE POINTS FOR  
NET ATTACHMENT AND TIE DOWN POINTS



DEFINITION OF PLUG AND  
TIE DOWN POINT STATIONS



Tie Down Points Arrangement Rear (Bulk) Cargo Hold

Figure 1-60-05 B 1/2

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## WEIGHT AND BALANCE MANUAL

NET ATTACHMENT AND TIE DOWN POINT LOCATIONS											
FRAME STATION	H-ARM (m)	TIE DOWN POINT STATIONS	REFERENCE POINTS								
			A	B	C	D	E	F	F1	G	
59	27.762	H-ARM (m)	27.748	27.748	27.748	27.787	27.785	27.741	-	27.741	-
		Y-ARM (m)	±0.254	±0.765	±1.292	±1.263	±0.797	±0.352	-	0	-
		Z-ARM (m)	-0.645	-0.645	-0.664	-1.480	-1.827	-1.878	-	-1.878	-
60	28.296	H-ARM (m)	28.272	28.272	28.272	28.321	28.319	28.282	28.282	28.282	28.282
			28.172	28.172	28.172	28.281	28.281	28.282			
		Y-ARM (m)	+0.254	+0.765	+1.292	+1.228	+0.772	+0.345	-0.370	0	-0.319
			-0.254	-0.765	-1.292	-1.292	-0.771	-0.421			
		Z-ARM (m)	-0.645	-0.645	-0.664	-1.441	-1.765	-1.814	-1.814	-1.814	-1.814
61	28.829		-0.645	-0.645	-0.664	-1.380	-1.768	-1.814			
	H-ARM (m)	28.805	-	-	-	28.852	28.815	-	28.815	28.815	
	Y-ARM (m)	+0.254	-	-	-	+0.749	-0.389	-	0	-0.338	
62	29.362	H-ARM (m)	29.338	29.338	29.338	29.387	29.385	29.376	29.376	29.376	29.376
			29.443	29.443	29.443	29.377	29.377	29.376			
		Y-ARM (m)	+0.254	+0.765	+1.292	+1.250	+0.726	+0.328	-0.353	0	-0.302
			-0.254	-0.765	-1.292	-1.252	-0.713	-0.404			
			-0.645	-0.645	-0.664	-1.271	-1.641	-1.687	-1.687	-1.687	-1.687
		Z-ARM (m)	-0.645	-0.645	-0.664	-1.272	-1.651	-1.687			
			-0.645	-0.645	-0.664	-1.497	-	-			
63	29.896	H-ARM (m)	-	-	-	-	29.919	-	-	29.882	-
		Y-ARM (m)	-	-	-	-	±0.703	-	-	0	-
		Z-ARM (m)	-	-	-	-	-1.577	-	-	-1.624	-
64	30.429	H-ARM (m)	-	-	-	-	30.452	-	-	30.415	-
		Y-ARM (m)	-	-	-	-	±0.672	-	-	0	-
		Z-ARM (m)	-	-	-	-	-1.496	-	-	-1.560	-

NOTE : Plugs at reference points A, B, C and D are for net fastening only. Tie down points at reference points E, F, F1, G and H not used for net fastening may be used for package restraint.

## Tie Down Points Arrangement Rear (Bulk) Cargo Hold

Figure 1-60-05B 2/2

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## WEIGHT AND BALANCE MANUAL

 D. Maximum package sizes

 (01) Loading through aft cargo hold door

The maximum dimensions of cargo packages which will pass through the cargo door in the aft cargo hold compartment (3 and 4) and which must be restrained in the rear (bulk) cargo hold (compartment 5) aft of the separation net are shown in the following tables.

- Table 1 for upright loading,
- Table 2 for tilted loading.

These dimensions are approximate values and refer to rectangular packages.

 (a) Upright loading

Upright loading refers to large or heavy packages loaded with the assistance of mechanical ground support equipment and manoeuvred through the door in an upright position.

Table 1

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
1.499	59.0	1.228	48.3	1.748	68.8

 (b) Tilted loading

Tilted loading refers to large low density cargo which may require hand manoeuvring through the door in a tilted position to avoid obstructions.

Table 2

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
0.250	10.0	0.250	10.0	3.240	127.5
0.500	20.0	0.500	20.0	3.240	127.5
0.750	30.0	0.750	30.0	3.240	127.5

 (02) Loading through rear (bulk) cargo door

The maximum dimensions of cargo packages which will pass through the cargo door in the rear (bulk) cargo hold (compartment 5) and which must be restrained in the rear (bulk) cargo hold aft of the separation net are shown in the following.

 (a) Loading of heavy packages

The maximum dimensions given in figure 1-60-05D apply to large or heavy packages which only can be loaded with the assistance of mechanical ground support equipment and in a position parallel to the floor of the cargo hold.

## WEIGHT AND BALANCE MANUAL

These packages must be positioned on the horizontal part of the floor under consideration of the floor loading limits given in paragraph 1.10.04.D.

**(b) Loading of low density packages in a non tilted position**

The maximum dimensions given in figure 1-60-05E apply to low density packages which can be manoeuvred by hand through the door. These dimensions refer to upright loading, but for transport the packages may be lifted on the sloping parts of the cargo hold floor.

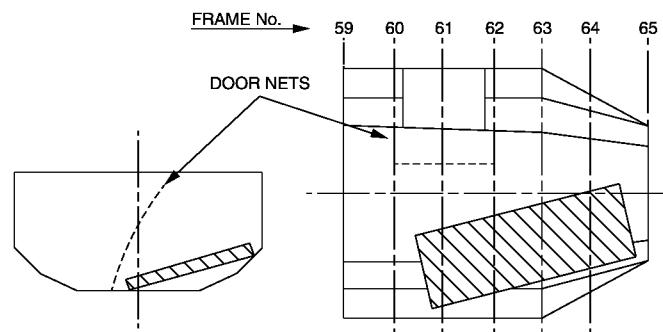
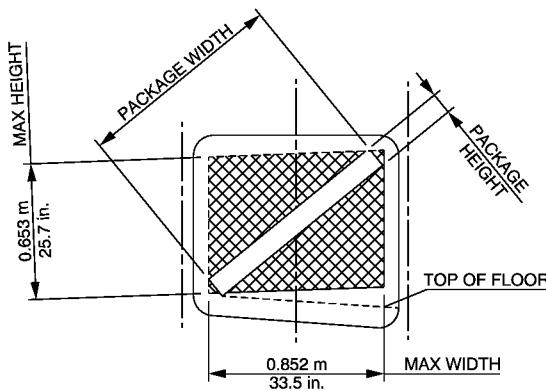
To use the maximum possible length the packages may be positioned with one end on the sloping part of the floor and the other end on the horizontal part of the floor, provided that the floor loading limits given in paragraph 1.10.04.D are observed.

Use of load spreaders on the sloping part of the floor is recommended to avoid too high local loads.

**(c) Loading of low density packages in a tilted position**

The maximum dimensions of low density packages which will pass through the cargo door in a tilted position are given in the table below.

WIDTH		HEIGHT		LENGTH	
(m)	(in)	(m)	(in)	(m)	(in)
0.950	37.4	0.100	3.9	1.930	75.9



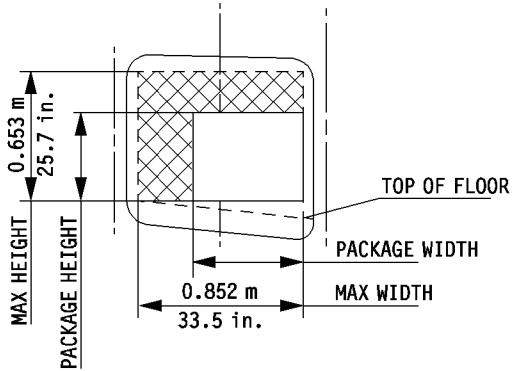
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Maximum Dimensions of Low Density Packages (tilted)

Figure 1-60-05C

## WEIGHT AND BALANCE MANUAL

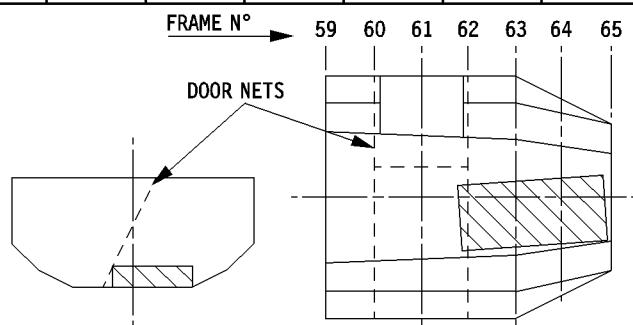
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	PACKAGE WIDTH (m/in)									
	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.850	
	3.9	7.8	11.8	15.7	19.6	23.6	27.5	31.4	33.4	

PACKAGE HEIGHT (m/in)	0.100	2.820	2.670	2.440	2.250	2.050	1.860	1.650	1.480	1.410	MAX. PACKAGE LENGTH (m/in)
		3.9	111.0	105.0	96.0	88.5	80.7	73.2	64.9	58.2	
0.200	2.820	2.620	2.430	2.250	2.050	1.860	1.650	1.480	1.410		
	7.8	111.0	103.0	95.6	88.5	80.7	73.2	64.9	58.2	55.5	
0.300	2.820	2.610	2.430	2.250	2.050	1.860	1.650	1.480	1.410		
	11.8	111.0	102.7	95.6	88.5	80.7	73.2	64.9	58.2	55.5	
0.400	2.820	2.610	2.430	2.250	2.050	1.860	1.650	1.480	1.410		
	15.7	111.0	102.7	95.6	88.5	80.7	73.2	64.9	58.2	55.5	
0.500	2.790	2.610	2.430	2.250	2.050	1.860	1.650	1.480	1.410		
	19.6	109.8	102.7	95.6	88.5	80.7	73.2	64.9	58.2	55.5	
0.600	2.790	2.610	2.430	2.250	2.050	1.860	1.650	1.480	1.410		
	23.6	109.8	102.7	95.6	88.5	80.7	73.2	64.9	58.2	55.5	
0.650	2.790	2.610	2.430	2.250	2.050	1.650	1.650	1.480	1.410		
	25.5	109.8	102.7	95.6	88.5	80.7	64.9	64.9	58.2	55.5	

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## Maximum Dimensions of Heavy Packages

Figure 1-60-05D

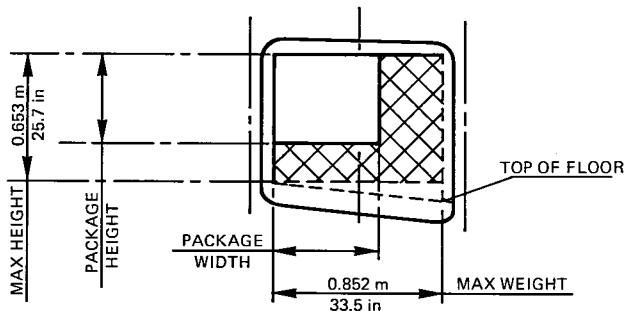
Mod : 20029 or 20449 or 25802

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## WEIGHT AND BALANCE MANUAL

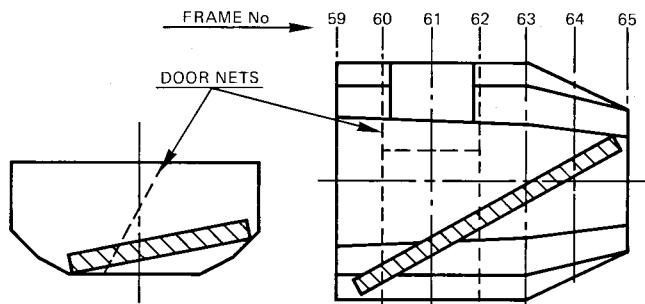
WN 160 05 010 AA 110



	PACKAGE WIDTH (m/in)									
	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.850	
	3.9	7.8	11.8	15.7	19.6	23.6	27.5	31.4	33.4	

PACKAGE HEIGHT (m/in)	MAX PACKAGE LENGTH (m/in)									
	0.100	3.230	3.230	3.210	3.180	3.160	3.100	3.030	2.770	2.680
3.9	127.0	127.0	126.0	125.1	124.4	122.0	119.2	109.0	105.5	
0.200	3.230	3.230	3.210	3.180	3.150	3.070	2.960	2.730	2.650	
7.8	127.0	127.0	126.0	125.1	124.4	120.8	116.5	107.4	104.3	
0.300	3.230	3.210	3.170	3.140	3.040	2.950	2.780	2.600	2.540	
11.8	127.0	126.0	124.8	123.6	119.6	116.1	109.4	102.3	100.0	
0.400	3.190	3.150	3.110	3.010	2.900	2.820	2.620	2.480	2.430	
15.7	125.6	124.2	122.4	118.5	114.1	111.0	103.1	97.6	95.6	
0.500	3.110	3.090	2.910	2.810	2.710	2.570	2.420	2.310	2.280	
19.6	122.4	121.6	114.5	110.6	106.6	101.1	95.2	90.9	89.7	
0.600	2.900	2.730	2.590	2.470	2.340	2.240	2.170	2.110	2.080	
23.6	114.1	107.4	101.9	97.2	92.1	88.1	85.4	83.0	81.8	
0.650	2.700	2.540	2.410	2.290	2.170	2.080	2.020	1.980	1.930	
25.5	106.2	101.1	94.8	90.1	85.4	81.8	79.5	77.9	75.9	

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## Maximum Dimensions of Low Density Packages

Figure 1-60-05E

Mod : 20029 or 20449 or 25802

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06. Tie down methodsA. Forward cargo hold (compartment 1)

The forward cargo hold (compartment 1) is provided with tie down points as shown in figure 1-60-03B.

Only the tie down points located in the cargo hold floor area which are not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.05.

Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.D.

B. Aft cargo hold (compartment 3 and 4)

The aft cargo hold (compartment 3 and 4) is provided with tie down points as shown in figure 1-60-04B.

Only the tie down points located in the cargo hold floor area which are not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.06.

Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.D.

C. Rear (bulk) cargo hold (compartment 5)

The rear (bulk) cargo hold (compartment 5) is provided with tie down points in rows as shown in figure 1-60-05B.

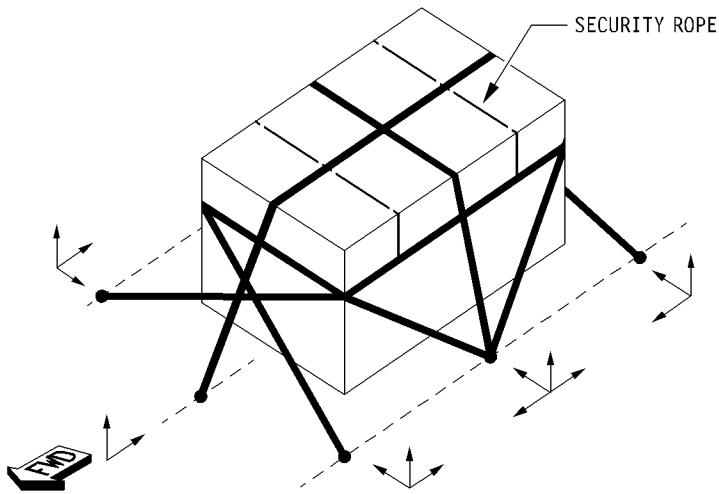
Only the tie down points located in the cargo hold floor area which are not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.07.

Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.D.

D. Tie down evaluation

 (01) Package restraint

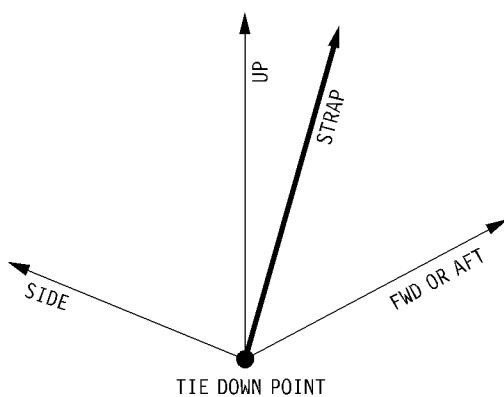
The following diagram shows the general arrangement of tie down of a typical package the pallet rims or the cargo hold floor.



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**NOTE :** Only one end of each strap is shown to simplify the diagram.

For each tie down point the typical load directions are as follows :



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**(02) Component strength determination methods**

The component strength resulted from the angle  $\alpha$  (to the floor) and the angle  $\beta$  (to the forward direction) the tie down strap makes with the ground.

The component strength can be calculated or graphically determinated when the following values are known :

F – the tie down limit strength

$\alpha$  – angle to the floor

$\beta$  – angle to forward direction

The component strength will then be added for each direction, to give the total load strength.

The applied ultimate load will be found by multiplying the relevant ultimate load factor with the package weight of the package which should be tied down.

The relevant ultimate load factor for the forward cargo hold (compartment 1) is given in paragraph 1.10.05.D.

The relevant ultimate load factor for the aft cargo hold (compartment 3 and 4) is given in paragraph 1.10.06.D.

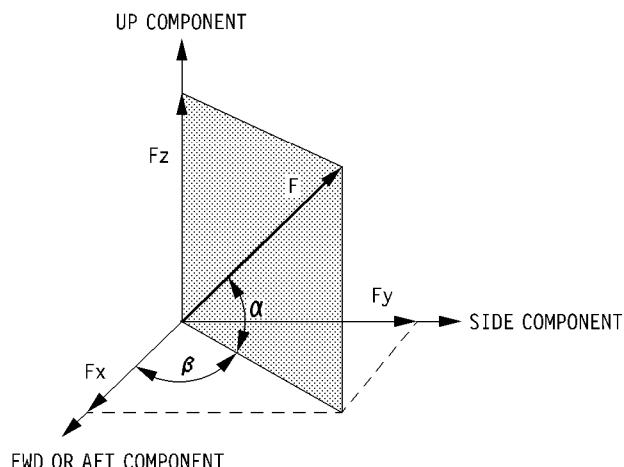
The relevant ultimate load factor for the rear (bulk) cargo hold (compartment 5) is given in paragraph 1.10.07.D.

The subsequent check will show if adequate tie down has been achieved in each direction. The added component strength for a direction must be greater than the concerning applied ultimate load.

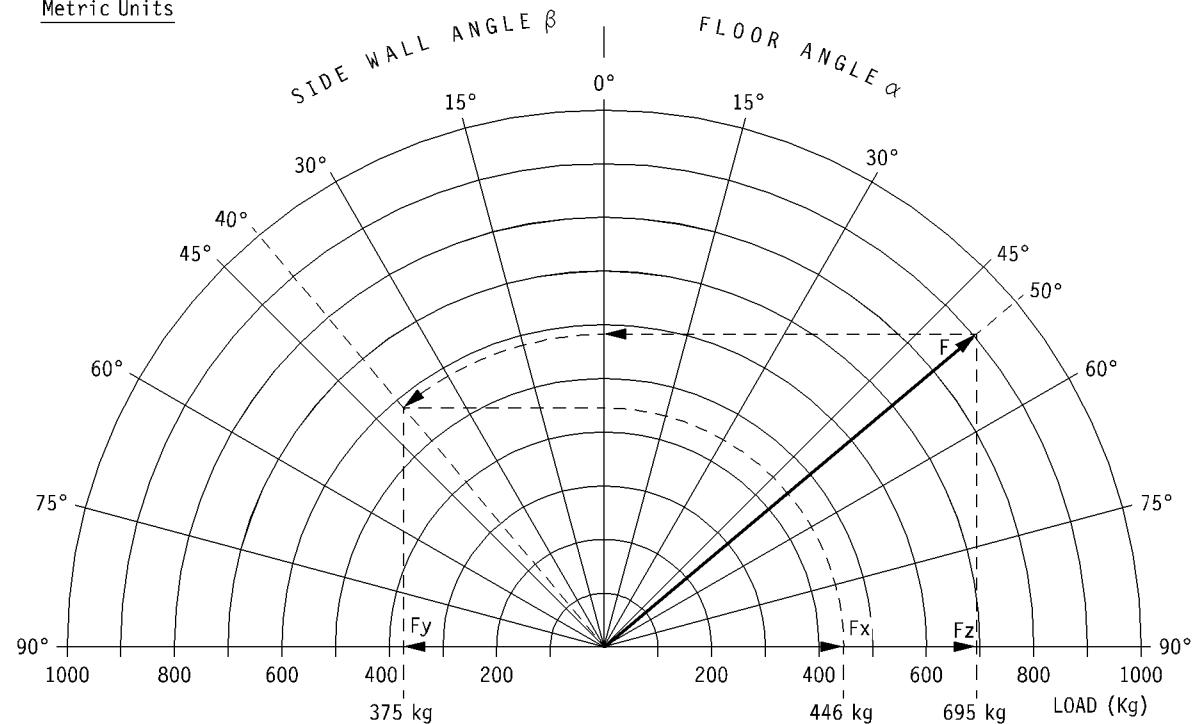
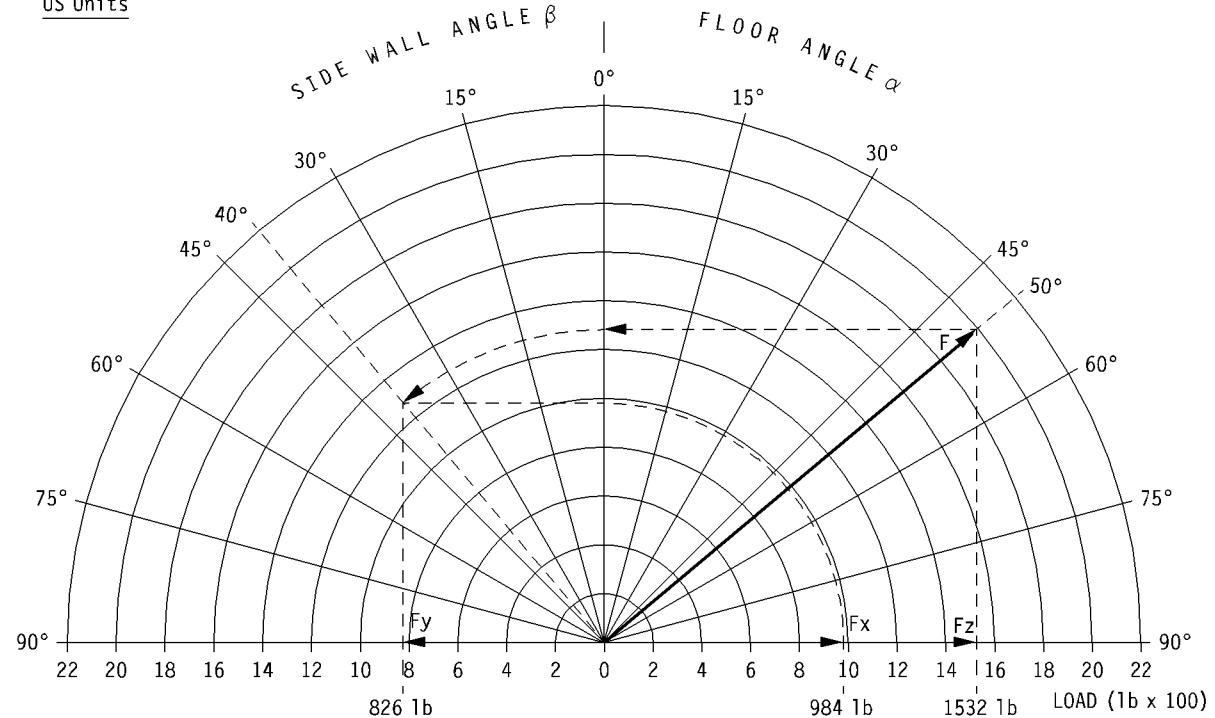
**(a) Graphic method**

The example, assumed in figure 1-60-06 explains the use of the chart for metric and US units.

Considering one tie down point at an ultimate strength of 906 kg (2000 lb) with a strap with  $50^\circ$  to the floor ( $\alpha$ ) and  $40^\circ$  to the forward direction ( $\beta$ ).



## WEIGHT AND BALANCE MANUAL

Metric Units

US Units


NOMB-01-6006-004-A.001AA

Tie Down Graphic Method in Metric and US Units

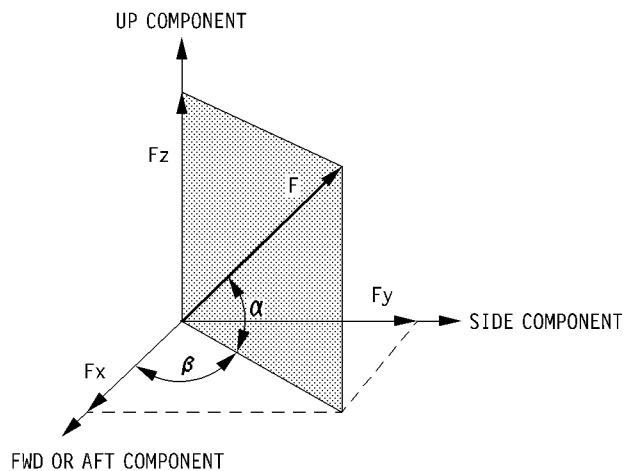
Figure 1-60-06

(b) Equation method

FWD or AFT component  $F_x$  :  $F \times \cos \alpha \times \cos \beta$

SIDE component  $F_y$  :  $F \times \cos \alpha \times \sin \beta$

UP component  $F_z$  :  $F \times \sin \alpha$



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For one tie down point with a load of 906 kg (2 000 lb) with a strap at  $50^\circ$  to the floor ( $\alpha$ ) and  $40^\circ$  to the forward direction ( $\beta$ ) the following allowable loads are applicable :

FWD or AFT component  $F_x$  : 446 kg ( 984 lb)

SIDE component  $F_y$  : 375 kg ( 826 lb)

UP component  $F_z$  : 695 kg (1 532 lb)

## WEIGHT AND BALANCE MANUAL

The single results for different tie down points could be evaluated in the table below, permitting a check of maximum load allowed in any direction.

TIE DOWN POINT	ALLOWABLE kg or lb (F)	ANGLE		COMPONENTS				SIDE	
				UP	FWD	AFT	LEFT	RIGHT	
		$\alpha$	$\beta$						
1									
2									
3									
4									
.									
.									
n									
1) Total ultimate load strength $\Sigma$									
2) Applied ultimate load factor (see paragraph 1.10.05, 06, 07)									
3) Ultimate load (package weight $\times$ ultimate load factor)									
4) CHECK (1 > 3)				OK?	OK?	OK?	OK?	OK?	



## WEIGHT AND BALANCE MANUAL

### 1.80 GROUND OPERATIONS

#### 01. General

This section contains information on jacking points, weighing on jacks or on wheels, CG calculations, and weight and H-arm of items normally removable from the aircraft.

#### 02. Jacking point locations

##### A. Aircraft jacking points

The jacking point locations are shown in figure 1-80-02-A.

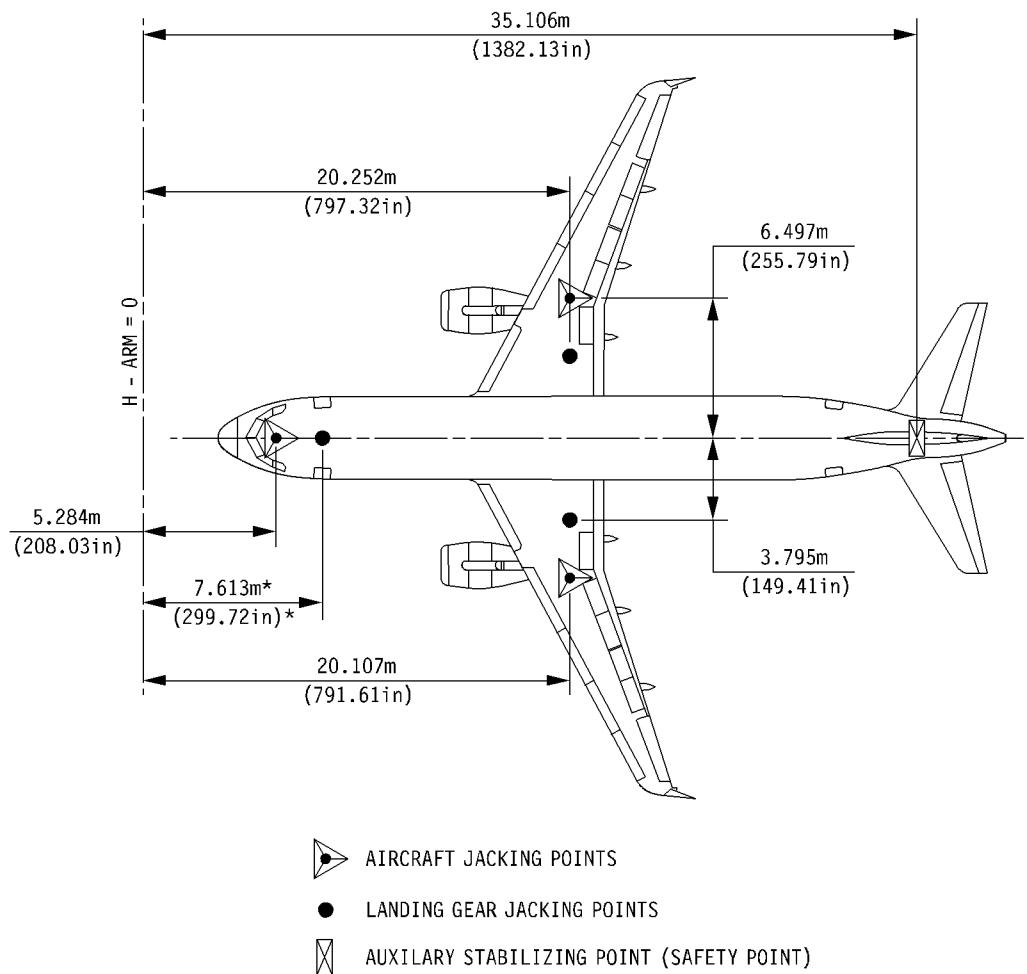
##### B. Landing gear jacking points

The jacking point locations are shown in figure 1-80-02-A.

##### C. Aircraft wheel location

The wheel locations are shown in figure 1-80-02-B.

## WEIGHT AND BALANCE MANUAL



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NOTE : Dimensions noted \* are referred to the static ground line and are nominal at maximum taxi weight and CG location at 25 % RC.

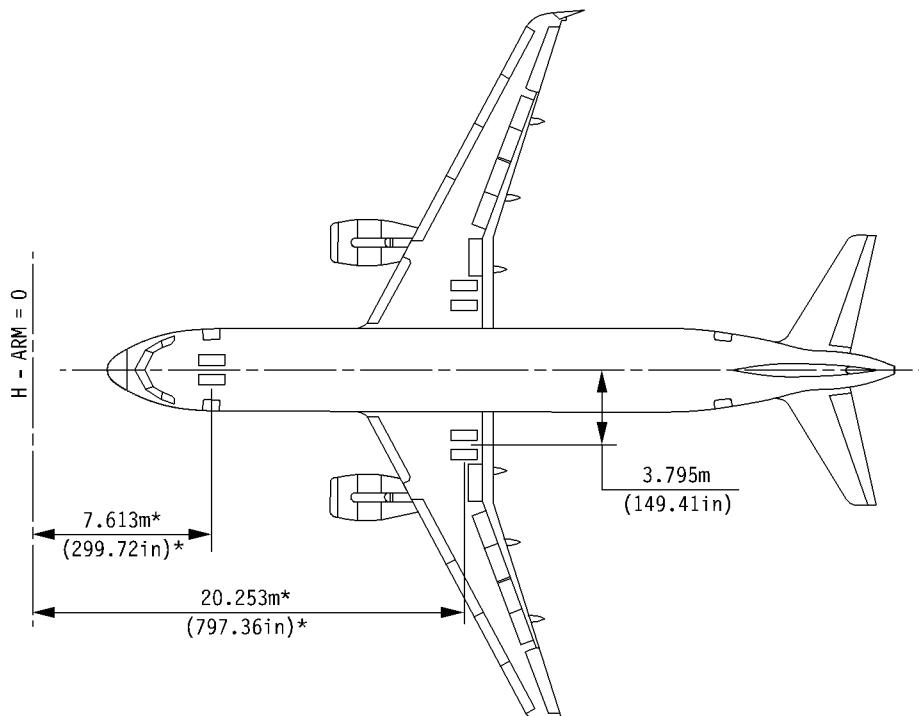
## Aircraft Jacking Points H-ARMS

Figure 1-80-02A

Mod : 20268 or 20268 + 160080 or 20268 + 160500 or 20139 + 20268 + 22129

Seq : 100

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WOWB-01-8002-002-A103AA

**NOTE :** Dimensions noted \* are referred to the static ground line and are nominal at maximum taxi weight and CG location at 25 % RC.

#### Landing Gear H-arms

Figure 1-80-02B

Mod : 20268 or 20268 + 160080 or 20268 + 160500 or 20139 + 20268 + 22129

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## WEIGHT AND BALANCE MANUAL

### 03. Jacking static loads

The maximum jacking loads for each point are given in paragraph 1.10.08. Jack loads, which may be encountered for various aircraft weight and CG combinations, can be determined from the figure 1-10-09.

## WEIGHT AND BALANCE MANUAL

 (04) Weighing on A/C jacks or L/G jacks

CAUTION : THE AIRCRAFT MUST BE LIFTED IN ACCORDANCE WITH AIRCRAFT MAINTENANCE MANUAL CHAPTER 8-10-00.

LIFT THE AIRCRAFT WITH THE THREE JACKS SIMULTANEOUSLY UNTIL ALL THE TIRES ARE CLEAR OF THE GROUND.

Weighing should preferably take place in a closed hangar, to exclude all wind and strong air currents.

The aircraft may be weighed using :

- Loads cells placed on each jack  
or
- Platform scales placed under each jack

The aircraft pitch attitude is measured with a clinometer on the cabin seat tracks adjacent to the main landing gear zone.

| A. Weighing on landing gear jacking points

| The load on each scale is a function of aircraft weight and CG and can be estimated on figure 1-10-09 and the minimum capability required for each one deduced.

| The CG position can be determined by either of the following equation :

| WEIGHTS IN KILOGRAMS

$$| \boxed{H\text{-arm (m)} = 20.302 - 2.738 \sin \alpha - 12.713 \frac{(r + 21)}{w}}$$

$$| \boxed{CG (\% RC) = 59.63 - 65.3 \sin \alpha - 303.2 \frac{(r + 21)}{w}}$$

| WEIGHTS IN POUNDS

$$| \boxed{H\text{-arm (in)} = 799.29 - 107.79 \sin \alpha - 500.51 \frac{(r + 46)}{w}}$$

$$| \boxed{CG (\% RC) = 59.63 - 65.3 \sin \alpha - 303.2 \frac{(r + 46)}{w}}$$

where :

| r : Reaction measured at forward jacking point.

| W : Weight of the aircraft

NOTE : The CG position expressed in % RC can also be evaluated from the diagram in figure 1-10-09.

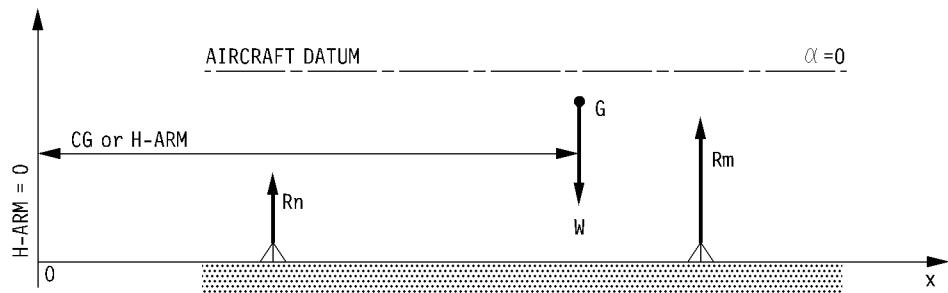
## B. Weighing on aircraft jacks

**CAUTION :** MAXIMUM JACK AND JACK POINT LOADS MUST NOT BE EXCEEDED DURING WEIGHING OPERATIONS. Refer to paragraph 1.10.08.

The weighing is achieved at zero degree pitch attitude.

The load on each scale is a function of aircraft weight and CG and can be estimated on figure 1-10-09 and a minimum capability required for each one deduced.

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The CG position can be determined by either of the following equation :

$$\text{CG } (\% \text{RC}) = \frac{54.98 \text{ Rm} - 298.5 \text{ Rn}}{\text{W}}$$

or

$$\text{H-Arm (m)} = \frac{20.107 \text{ Rm} + 5.284 \text{ Rn}}{\text{W}}$$

or

$$\text{H-Arm (in)} = \frac{791.61 \text{ Rm} + 208.03 \text{ Rn}}{\text{W}}$$

where :

**Rm** : Addition of LH side and RH side reactions measured at wing jacking points.

**Rn** : Reaction measured at forward jacking point.

**W** : Weight of the aircraft, equal to Rm + Rn.

**NOTE :** The CG position expressed in % RC can also be evaluated from the diagram in figure 1-10-09.

**(05) Weighing on wheels**

**CAUTION :** NORMAL CHARGING PRESSURE MUST BE RESTORED ON COMPLETION OF WEIGHING, AND PRIOR TO ANY AIRCRAFT MOVEMENT.

Weighing should preferably take place in a closed hangar to exclude all wind and strong air currents.

The following equipment is required :

- one clinometer for measuring the aircraft pitch attitude,
- two scales for the main landing gear reactions,
- one scale for the nose landing gear reaction.

The load on each scale is a function of aircraft weight and CG and can be estimated on figure 1-80-05, and the minimum capability required for each on deduced.

**CG computation**

The CG position can be determined by either of the following equations :

$$H - \text{arm} = A - B \sin \alpha - \frac{Cr}{w}$$

A = Distance from Aircraft datum to main wheel reaction.

B = Z CG above Main landing gear axle.

C = Distance between Main wheel reaction & Nose wheel reaction.

$\alpha$  = Aircraft pitch attitude (positive nose up)

r = Reaction on Nose landing gear

w = Weighed weight.

$$\text{CG } (\% \text{ RC}) = 59.35 - 65.3 \sin \alpha - 302.6 \frac{(r + 21)}{w}$$

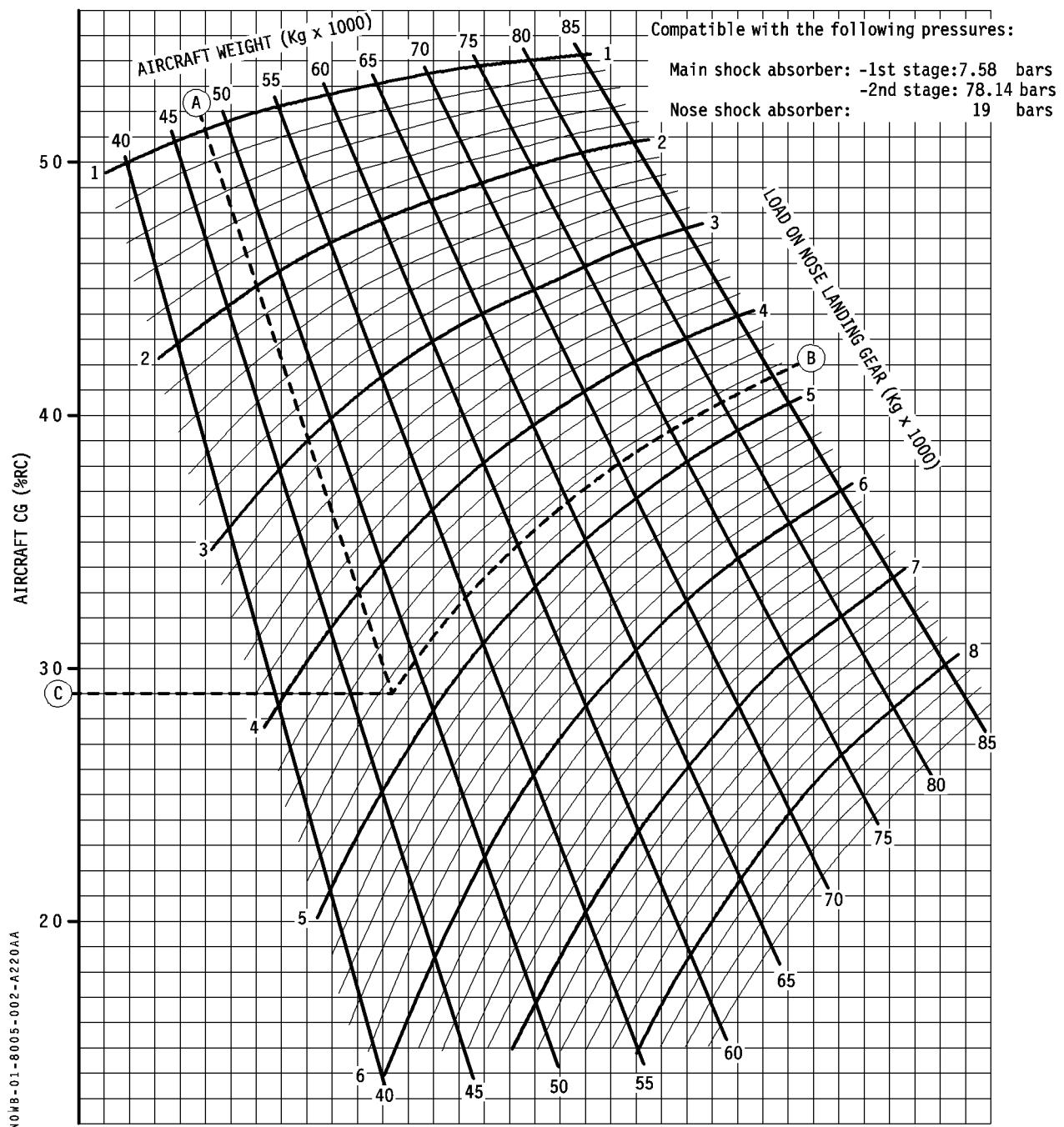
or

$$\text{H-arm (m)} = 20.29 - 2.738 \sin \alpha - 12.690 \frac{(r + 21)}{w}$$

or

$$\text{H-arm (in)} = 798.82 - 107.79 \sin \alpha - 499.61 \frac{(r + 46)}{w}$$

NOTE : The CG position can be also evaluated from the diagram in fig. 1-80-05.



EXAMPLE : Assume aircraft with a gross weight of 47 900 kg **(A)** and the reaction at nose landing gear of 4 700 kg **(B)**, the aircraft CG is 29 % RC **(c)** .

CG as a Function of A / C Weight and Nose Landing Gear Load

Figure 1-80-05

Mod. : 20802 + 22150 or 20139 + 20802 + 22129 + 22150

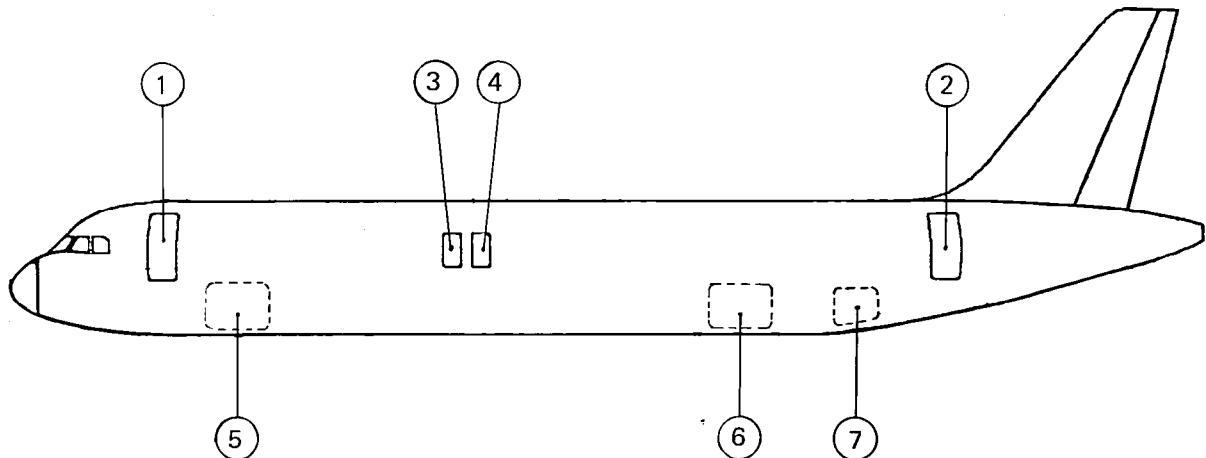
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## WEIGHT AND BALANCE MANUAL

### 06. Equipment / Component removal list

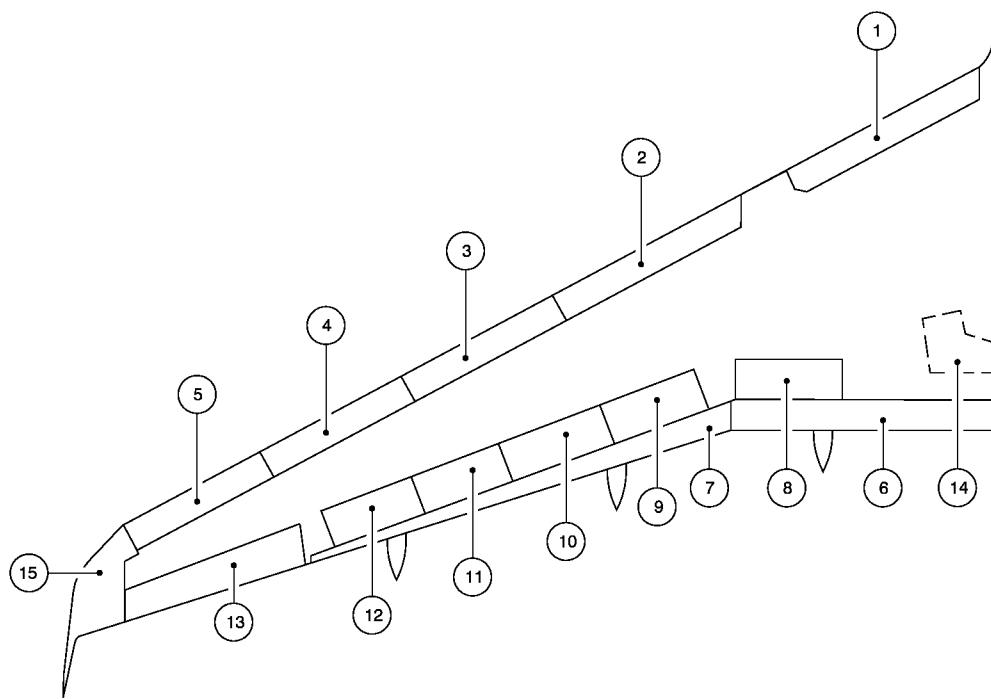
This paragraph lists items normally removable from the aircraft. The list is not a complete component breakdown. The information may be used to determine an approximate aircraft weight and CG for maintenance purposes only.



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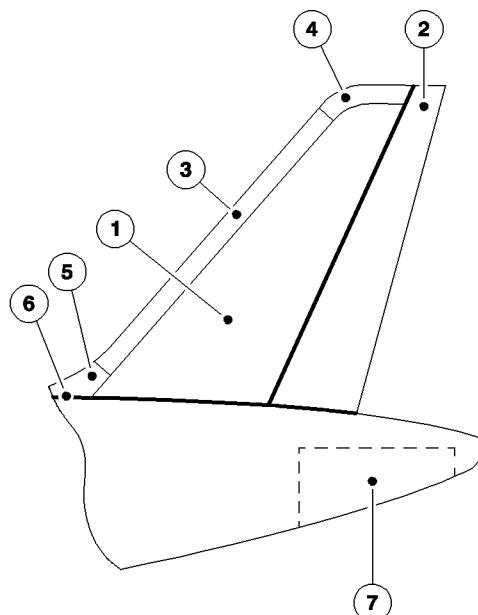
### FUSELAGE

REF. No	EQUIPPED COMPONENT	WEIGHT (kg)	H-ARM (m)
1	CABIN DOOR FWD	98	7.579
2	CABIN DOOR AFT	96	32.085
3	EMERGENCY EXIT	15	16.971
4	EMERGENCY EXIT	15	17.818
5	CARGO DOOR FWD	121	10.700
6	CARGO DOOR AFT	121	25.229
7	BULK DOOR	37	28.859

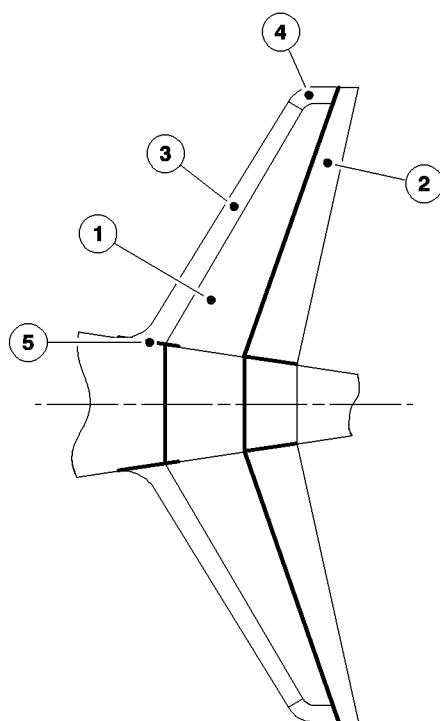

WING

REF No	COMPONENT	WEIGHT (kg)	H - ARM (m)
1	SLATS No 1	39.4	16.470
2	No 2	29.9	18.460
3	No 3	27.0	19.790
4	No 4	24.7	21.070
5	No 5	23.0	22.290
6	FLAPS Inner	114.0	20.716
7	Outer	121.6	21.872
8	SPOILERS No 1	14.9	20.394
9	No 2	13.3	20.824
10	No 3	12.2	21.424
11	No 4	11.7	21.984
12	No 5	14.5	22.519
13	AILERON	24.0	23.582
14	L / G LEG FAIRING	15.4	19.675
15	SHARKLET	91.98	24.195

## WEIGHT AND BALANCE MANUAL


VERTICAL TAIL

REF No	COMPONENT	WEIGHT (kg)	H-ARM (m)
1	BOX, EQUIPPED	364.6	36.003
2	RUDDER	88.4	37.702
3	REMOVABLE LEADING EDGE	47.5	35.332
4	TIP	8.6	37.910
5	DORSAL FIN	25.5	33.067
6	FUSELAGE FAIRINGS	15.4	35.174

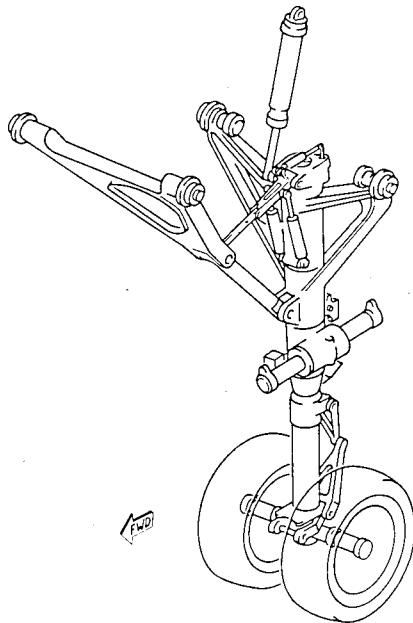

AIRBONE AUXILIARY POWER

REF No	COMPONENT	WEIGHT (kg)	H-ARM (m)
7	AIRBONE AUXILIARY POWER	136	38.155

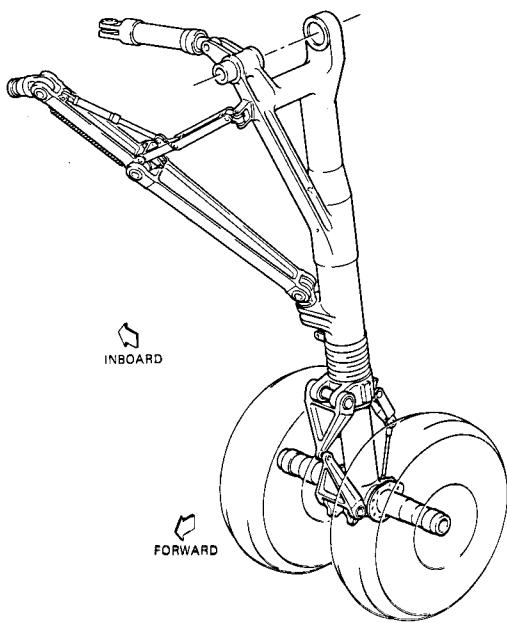
HORIZONTAL TAIL

REF No	COMPONENT	WEIGHT (kg)	H-ARM (m)
1	BOX, EQUIPPED	417.5	36.534
2	ELEVATOR	96.6	38.030
3	REMOVABLE LEADING EDGE	84.2	36.340
4	TIP	6.3	38.476
5	FUSELAGE FAIRING	7.3	37.256

## WEIGHT AND BALANCE MANUAL

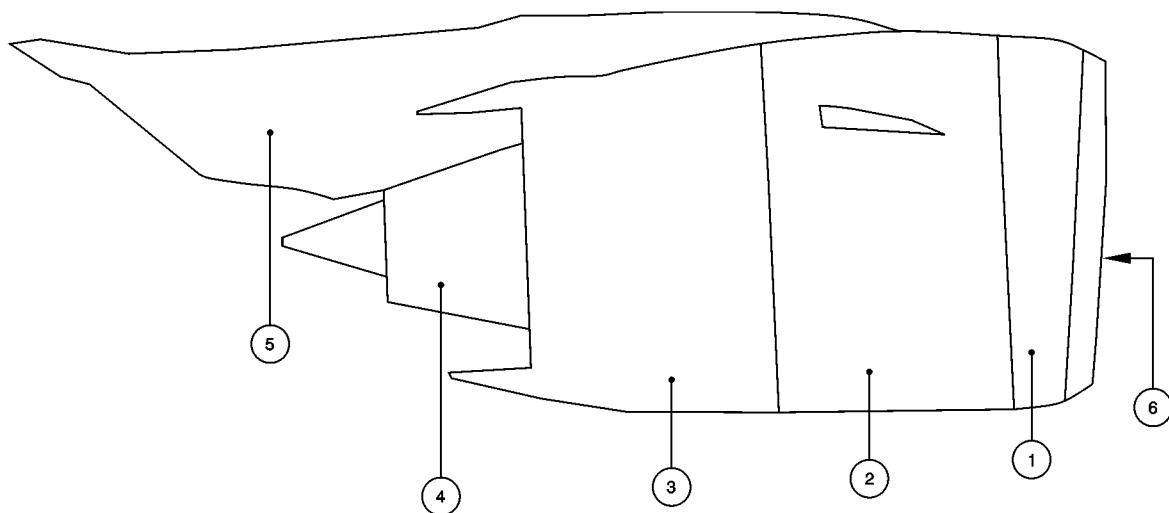

NOSE LANDING GEAR

COMPONENT	WEIGHT (kg)	H-ARM (m)
Landing gear complete	323.2	7.617
Wheel with tire	36.1	7.628


MAIN LANDING GEAR

COMPONENT	WEIGHT (kg)	H-ARM (m)
Landing gear complete	930.5	20.067
Wheel with tire and brake	204.0	20.250

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PYLON AND POD

REF N°	COMPONENT	WEIGHT		H-ARM	
		(kg)	(lb)	(m)	(in)
1	INLET	132	291	14.143	556.81
2	FAN COWL	118	260	14.877	585.71
3	THRUST REVERSER	584	1287	16.469	648.39
4	EXHAUST (NOZZLE & PLUG)	51	112	18.007	708.94
5	PYLON	690	1521	17.325	682.09
6	ENGINE	3302	7279	16.021	630.75

**07. Aircraft stability control during loading and unloading**

**CAUTION :** INDISCRIMINATE LOADING OR UNLOADING OF BAGGAGE AND CARGO SIMULTANEOUSLY WITH THE MOVEMENT OF PASSENGERS EMBARKING OR DISEMBARKING MAY PRODUCE UNACCEPTABLY LARGE SHIFTS IN THE AIRCRAFT CG POSITION OR GROUND STANDING ATTITUDE.

THE GRAPHICAL METHOD PRESENTED IS NOT APPLICABLE FOR A FUEL VOLUME BELOW 3800 l (1000 USgal). PLEASE REFER TO CHAPTER 1.10.10 (AIRCRAFT STABILITY ON WHEELS).

The tip up position is a function of aircraft weight, CG and attitude due to the inclination of the landing gear strut.

In practice the theoretical tip up CG position is considered to be at an aircraft CG of 57 % RC, H-arm = 20.192 m (794.95 in).

The figure 1-80-07B provides a graphical method to control Aircraft stability during loading and unloading.

**EXAMPLE :** See figure 1-80-07A

### **OEW, OEW CG AND FUEL ON BOARD**

- Enter **A/C OEW** and **CG** : point **(OEW)**  
eg. 43 500 KG at 36 % RC
- From this point **(OEW)** thus obtained draw a vertical line to the point **(A)**.
- From the point **(A)** enter the fuel quantity on board in the fuel effect curve to obtain the point **(B)**  
eg. fuel quantity 10 000 KG
- From this point **(B)** draw a vertical line to the point **(C)**

### **CARGO/BAGGAGE IN HOLDS**

- In the cargo box starting from the point **(0)**, draw on the scale **LOAD IN FWD CARGO** an arrow representing the load in the forward cargo hold to obtain the point **(D)**  
eg. load in forward cargo hold 1 500 KG
- From this point draw an arrow representing the load in the aft cargo hold to obtain the point **(E)**  
eg. load in aft cargo hold 3 000 KG
- From this point draw a vertical line to the point **(F)**
- Draw a horizontal line in the direction of the arrow to represent the load in the bulk cargo hold to obtain the point **(G)**  
eg. load in bulk hold 300 KG

### **STABILITY CHECK**

- On the scale **NUMBER OF PAX ALLOWED** check between the lines **(GH)** and **(BC)** the number of passengers allowed in the aft cabin  
eg. 103 passengers allowed
- If the number of passengers allowed is greater than the number of passengers possible in the aft cabin the stability of the a/c is assured.
- If the number of passengers allowed is less than the number of passengers positioned in the aft cabin precautions must be taken to prevent aircraft tipping.  
eg. unload aft and/or bulk hold before unloading forward hold  
point **(F)** becomes point **(F1)** point **(H)** becomes point **(H1)**  
or put passengers in the fwd cabin point **(B)** becomes **(B1)**; point **(C)** becomes point **(C1)**  
or use a combination of the above actions.

**IN EITHER CASE THE NUMBER OF PASSENGERS ALLOWED IN THE AFT CABIN IS INCREASED.**

Remarks :

The aft cabin is defined as that part of the cabin aft of the main landing gear axle position.

The passenger weight used in the graph is 75 kg including hand baggage.

For other passenger and baggage weights it is necessary to convert the allowed number of passengers using the formula :

N : Number of passengers at 75 kg

N<sub>1</sub> : Number of passengers at New Weight

N<sub>w</sub> : New weight of one passenger

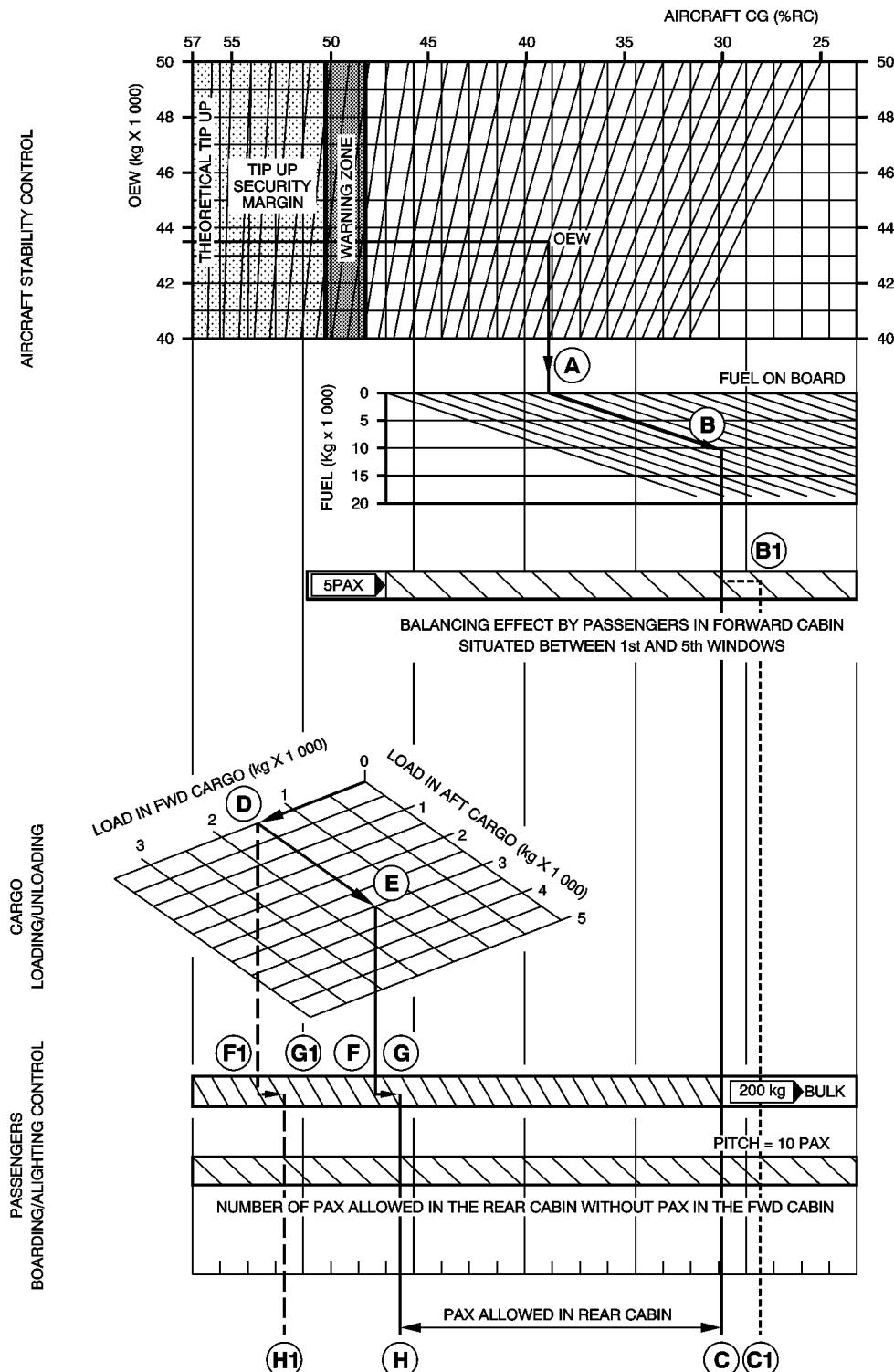
$$N_1 = \frac{N \times 75}{N_w}$$

e.g. N = 103, N<sub>w</sub> = 82 kg

$$N_1 = \frac{103 \times 75}{82} = 94$$

103 passengers at 75 kg give the same effect as 94 passengers at 82 kg.

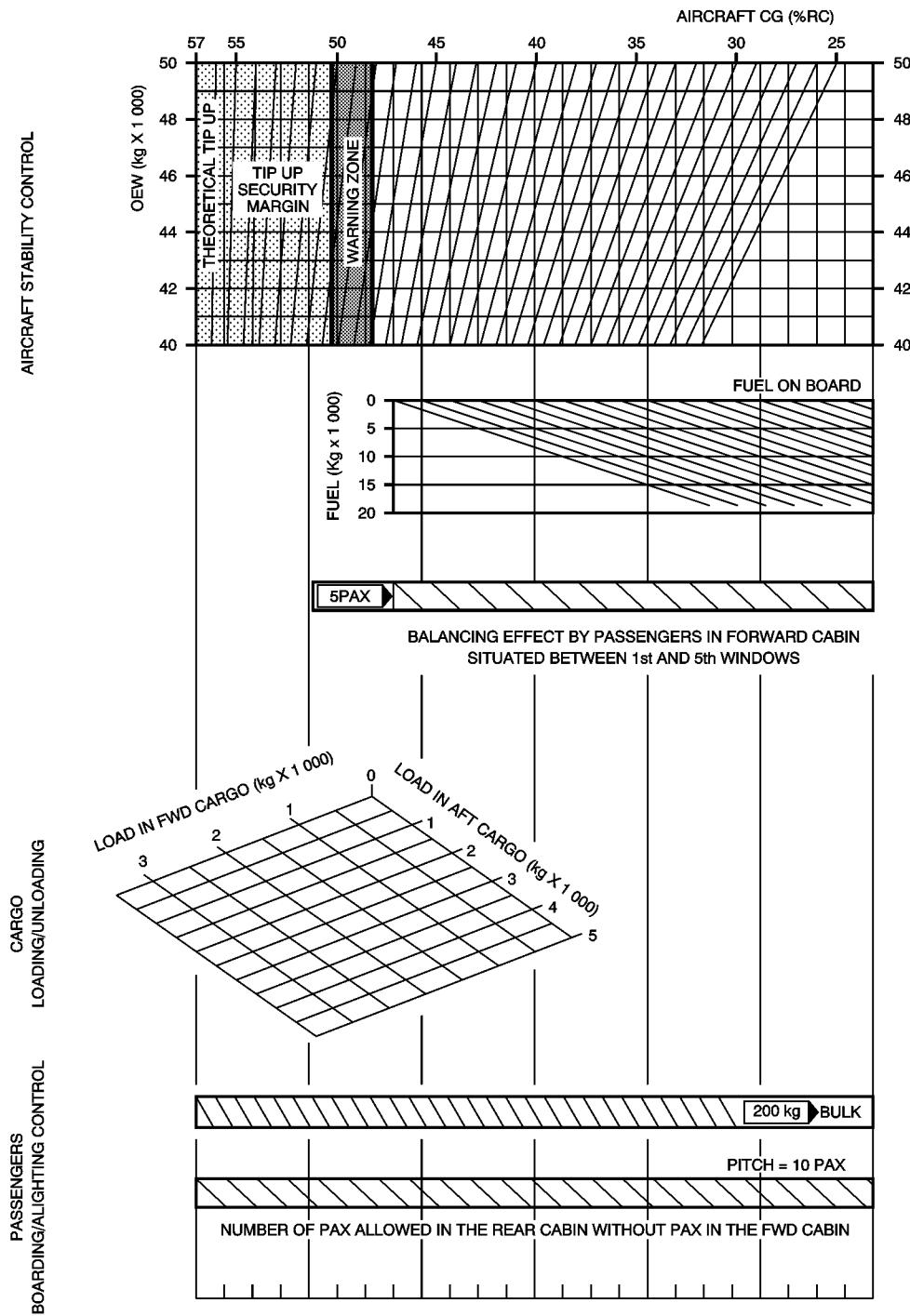
## WEIGHT AND BALANCE MANUAL



Aircraft Loading Stability Chart

Figure 1-80-07A

## WEIGHT AND BALANCE MANUAL



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Aircraft Loading Stability Chart

Figure 1-80-07B

## 1.90 EXAMPLES

### 01. General

This section contains :

- An example of operational empty weight and CG buildup,
- The vectors of cargo, passengers and fuel,
- A typical loading diagram.

With the following assumptions (can be different from the operational ones)

- Passenger weight
- MEW and OEW values.

### 02. Operational empty weight and CG buildup

The table below gives buildup of operational empty weight and CG buildup.

CAUTION : THIS IS ONLY AN EXAMPLE.

THE FOLLOWING VALUES FOR MEW, OPERATOR's ITEMS ARE ONLY ASSUMPTIONS.  
THEN IT IS THE RESPONSABILITY OF THE OPERATOR TO CALCULATE AND USE THE  
CORRECT VALUES.

ITEM	WEIGHT (kg)	H-ARM (m)	MOMENT (kgm)
MEW	37 230	18.744	697 839
Operator's items	3 199	19.415	62 109
– Unusable fuel			
– Oil for engines, IDG and APU			
– Water			
– Waste tank precharge			
– Aircraft documents and tool kit			
– Passenger seats			
– Passenger life vests			
– Galley structure and fixed equipment			
– Catering removable equipment			
– Catering allowance			
– Emergency equipment			
– Crew and baggage			
– Ancillary parts			
OEW	40 429	18.797	759 948

$$\text{OEW-Center of Gravity} \quad \frac{18.797 - 17.8015}{0.041935} = 23.8 \% \text{ RC}$$

### 03. Payload and fuel vectors

These vectors are to the same scale as and may be superimposed over the CG diagram in figure 1-10-02.

#### A. Passenger envelopes and vectors

Seating variations are based on the window-aisle-center seating law, assuming that passengers will occupy seats forward to aft, or aft to forward.

With six abreast seats and one aisle the seating occupation is :

- two window seats,
- two aisle seats,
- two center seats.

The passenger envelopes and vectors are shown in figure 1-90-03A.

#### B. Cargo hold vectors

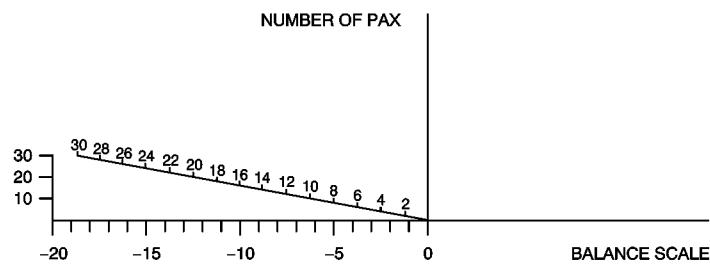
The vector of each cargo hold is defined in figure 1-90-03B with the following assumptions :

- for the forward cargo hold (compartment 1) :  
freight loaded at the average CG of the individual cargo hold sections, net sections and total cargo compartment, up to the maximum load capacities.
- for the aft cargo hold (compartment 3 and 4) :  
freight loaded at the average CG of the individual cargo hold sections, net sections and total cargo compartment, up to the maximum load capacities.
- for the rear (bulk) cargo hold (compartment 5) :  
freight loaded at the average CG of the cargo compartment, up to the maximum load capacity.

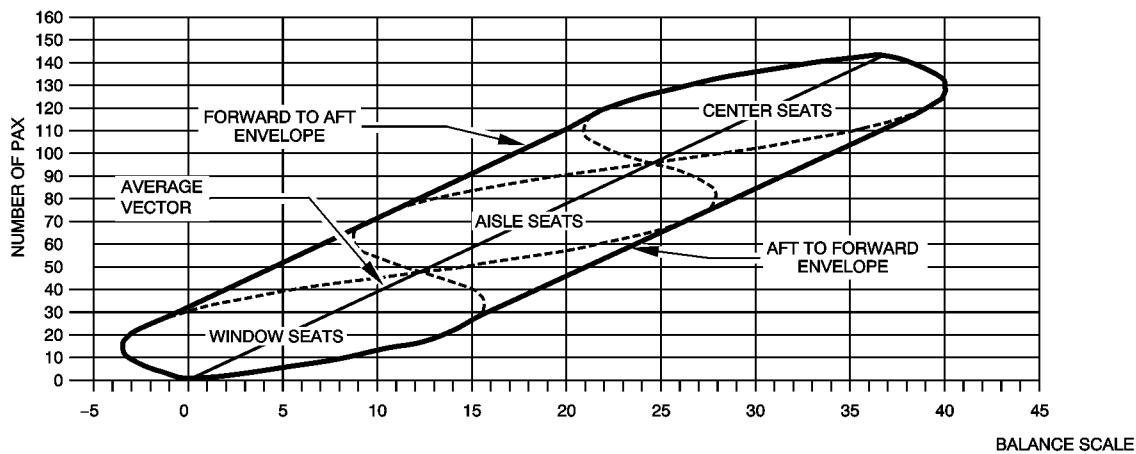
#### C. Fuel vector

The vector of fuel is shown in figure 1-90-03C.

## WEIGHT AND BALANCE MANUAL



Tourist class plus passenger vectors  
(30 maximum)



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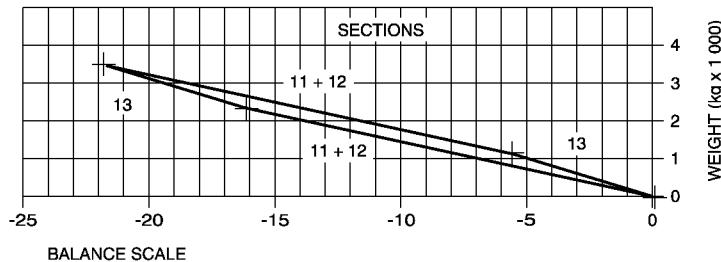
- Tourist class passenger envelopes  
(144 maximum)
- Window seats (48 passengers)
- Aisle seats (48 passengers)
- Center seats (48 passengers)

## Passenger Envelopes and Vectors

Figure 1-90-03A

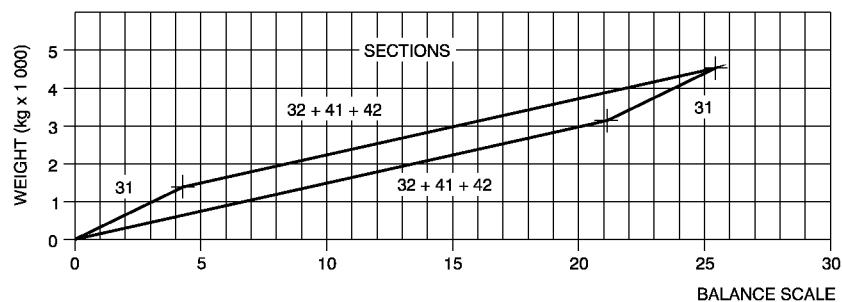
## WEIGHT AND BALANCE MANUAL

## FORWARD CARGO HOLD LOADED WITH BULK

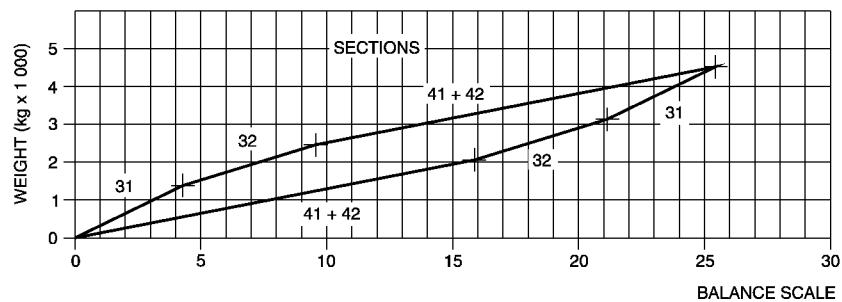


## AFT CARGO HOLD LOADED WITH BULK

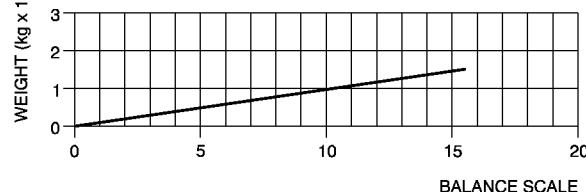
A. Net at frame 52A/53 for reduction of operational margins not installed



B. Net at frame 52A/53 for reduction of operation margins installed

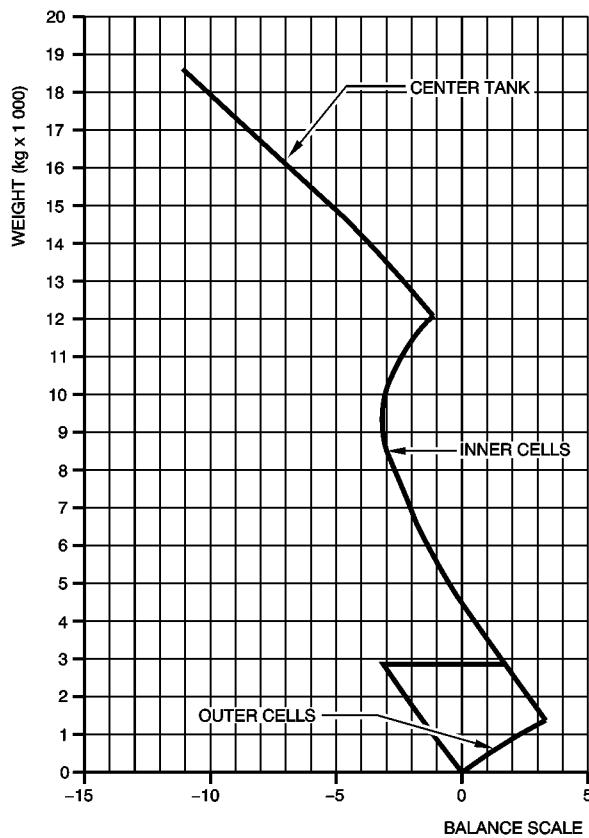


## REAR (BULK) CARGO HOLD



## Cargo Hold Vectors

Figure 1-90-03B

**WEIGHT AND BALANCE MANUAL**


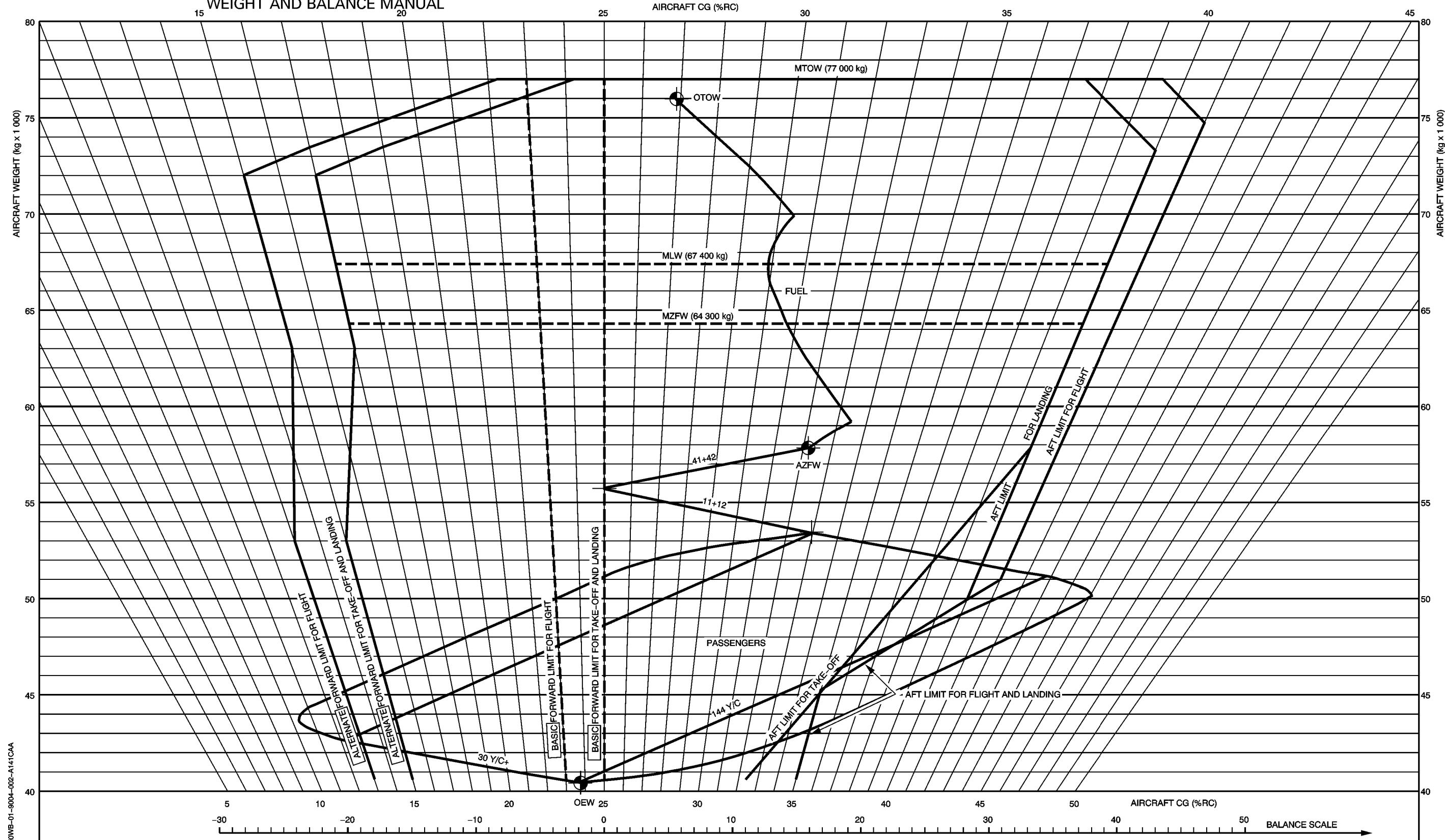
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Fuel Vector  
Figure 1-90-03C

**04. Typical loading diagram**

The figure 1-90-04 shows an example of the loading diagram. The items used are those previously defined.

## WEIGHT AND BALANCE MANUAL



Typical Loading Diagram

Figure 1-90-04

Mod : 158674

Seq : 141C

**A320**  
WEIGHT AND BALANCE MANUAL

**2.00 AIRCRAFT WEIGHING REPORT**

**2-00-01. Weighing date and place**

Date of Weighing: October 7, 2016 Reference: RP1635997

Place of Weighing: TOULOUSE

**2-00-02. Aircraft identification**

This weighing report is relative to aircraft:

Manufacturer	AIRBUS
Type	A320-251N
Version	GE CAPITAL AVIATION SERVICES / AZUL FINANCE LLC (30 Y/C+ ; 144 Y/C)
Manufacturer serial number	07186

**2-00-03. OEW and MEW results**

	<u>Weight</u> (kg)	<u>C G</u> (% RC)
Operational Empty Weight (OEW):	45774	26.3
Manufacturer's Empty Weight (MEW):	40300	24.1

Author:  
SAFRAN ENGINEERING  
Subcontractor for AIRBUS

Approved on: October 11, 2016  
by: HIGHLEY, PHILIP  
EGWOC  
AIRBUS SAS

Authorized on: October 11, 2016  
by: FAVIER, ARNAUD  
EGWMT  
Airbus Operations SAS

 **A320**  
WEIGHT AND BALANCE MANUAL

## **2-00 AIRCRAFT WEIGHING REPORT**

2.00.01	Weighing date and place	1 / 1
2.00.02	Aircraft identification	1 / 1
2.00.03	OEW and MEW results	1 / 1

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### **2-10 DEFINITIONS**

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### **2-20 WEIGHING RESULTS**

2.20.01	Aircraft weighing	1 / 5
2.20.02	Results of weighing	2 / 5
2.20.03	Basic corrected weight established from weighing	3 / 5
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2.20.05	Operator's Items weight summary	5 / 5

### **2-30 WEIGHING CHECK LIST**

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 **A320**  
WEIGHT AND BALANCE MANUAL

**2-10-01. Manufacturer's Empty Weight (MEW)**

The weight of structure, power plant, systems, furnishings and other items of equipment that are an integral part of the aircraft configuration, including the fluids contained in closed systems. The weights of all operator's items are excluded.

**2-10-02. Operational Empty Weight (OEW)**

The Operational Empty Weight in this report is defined as:

The Manufacturer's Empty Weight derived from weighing plus operator's items.

The operator's items include Airbus allowances for:

- Documents and tool kits
- Ancillary parts
- Waste tank precharge
- Potable water
- Catering (comestibles and consumables) and galley removable equipment
- Flight crew and their hand baggage

**CAUTION**

The OEW in this report serves as a basis for the calculation of ACTUAL WEIGHT and CG of the aircraft in service.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ACCOUNT FOR:

Items not included in the OEW which are installed after delivery but prior to entry into service of the aircraft.

Replacement of the Airbus allowances by actual quantities and weights of the items according to the mission.

 **A320**  
WEIGHT AND BALANCE MANUAL

**2-20-01. Aircraft weighing**

The aircraft was weighed on wheels at Airbus France S.A.S. weighing platforms TRAYVOU (Ref: 43648-43649-43652)

The aircraft was defueled before the weighing using the procedure defined in paragraph 1.20.07.

The zero reading of the weighing platforms was checked and verified before the aircraft was positioned on them.

Hangar doors were closed during the weighing.

The aircraft was in following configuration:

- Passenger, service, cargo, maintenance and undercarriage doors closed.
- All tools and protection devices removed.
- Without pallet and container.
- Flaps, slats, airbrakes and spoilers retracted.
- Horizontal tailplane at 0° position.
- Engine, APU and IDG oil at normal level.
- Hydraulic tanks filled at normal level.
- Tires and shock absorbers at normal operating pressure.
- Water tank empty.
- Waste tank drained.

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-02. Results of weighing**

**VALUES MEASURED**

(pitch attitude in decimal degrees, weights in kilograms)

a) Pitch attitude ( Alpha ) = -0.47 °

Reaction force measured

b) Reaction force on nose L/G (r) = 4865 kg

c) Reaction force on LH main L/G = 19580 kg

d) Reaction force on RH main L/G = 19690 kg

Weighed Weight ( $W = b + c + d$ ) = 44135 kg

**H-ARM CALCULATION IN METERS**

(Refer to weighing on wheel groups in 1.80.05)

$\sin(\text{Alpha}) = -0.00820296$

$H\text{-Arm} = \frac{20.29 - 2.738 \sin(\text{Alpha}) - 12.69(r + 21.0)}{W} = 18.908 \text{ m}$

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-03. Basic corrected weight established from weighing**

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Weighed Weight ( <i>Refer to 02, Results of weighing</i> )	44135	18.908	834505
- Items not belonging to the aircraft definition (to be removed)			
Fuel remaining in the aircraft	-39.800	18.066	-719
Carpet protection in cockpit	-4.000	5.100	-20
Carpet protection in cabin	-2.000	20.109	-40
Cocoto kit	-16.300	7.316	-119
- Installed items not conforming to the aircraft definition (to be changed)			
- Items missing from the MEW (to be added):			
• Items not included in the weighing check list			
• Items detailed in the weighing check list	6.100	9.388	57
- Parts of operational items missing at weighing (to be added).			
Basic corrected weight	44079.000		833664

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-04. OEW and MEW established from weighing**

OPERATING EMPTY WEIGHT (OEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44079.000		833664
Operator's items missing (detailed in the weighing check list)	1694.890	18.710	31711
OEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	45773.890	18.905 26.3 %RC	865375

MANUFACTURER EMPTY WEIGHT (MEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44079.000		833664
Operator's items installed (detailed in the weighing check list)	-3779.334	19.983	-75522
MEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	40299.666	18.813 24.1 %RC	758142



## WEIGHT AND BALANCE MANUAL

## 2-20-05. Operator's Items weight summary

OPERATOR'S ITEMS	TOTAL		INSTALLED		MISSING	
	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)
Unusable Fuel	64.100	18.253	0.000	0.000	64.100	18.253
Oil for engines, IDG and APU	108.800	17.014	108.800	17.014	0.000	0.000
Water	200.000	15.546	0.000	0.000	200.000	15.546
Waste tank precharge	10.000	32.050	0.000	0.000	10.000	32.050
Aircraft documents and tool Kit	21.980	7.125	1.280	5.767	20.700	7.209
Passenger seats	2874.440	19.786	2874.440	19.786	0.000	0.000
Passenger life vests	80.040	20.246	80.040	20.246	0.000	0.000
Galley structure and fixed equipment	281.600	21.903	281.600	21.903	0.000	0.000
Catering removable equipment	192.910	21.658	192.910	21.658	0.000	0.000
Catering allowance	820.090	20.948	0.000	0.000	820.090	20.948
Emergency equipment	240.264	20.083	240.264	20.083	0.000	0.000
Crew and baggage	580.000	16.868	0.000	0.000	580.000	16.868
<b>TOTAL</b>	<b>5474.224</b>	<b>19.589</b>	<b>3779.334</b>	<b>19.983</b>	<b>1694.890</b>	<b>18.710</b>

**A320**  
WEIGHT AND BALANCE MANUAL

**2-30. Weighing check list**

The weighing check list is used to record the configuration of the aircraft at time of weighing by indicating the quantity required (column "R") and the actual quantity fitted (column "F") for each item. The item applicability to the "Manufacturer's Empty Weight" (MEW) is indicated by "V" in column "MEW". The weighing check list is also used to adjust the weighed weight of the aircraft to the OEW and MEW conditions.

Included in the weighing check list are:

- Items which have alternates which may be substituted.
- Loose or easily removable items of equipment.
- Operator's items: The weights given in the weighing check list are those of complete items. If some parts are missing at weighing, see paragraph 2-20-03.

The weighing check list is not complete list of all items of equipment on the aircraft. Accordingly items considered as permanently fixed are not included in the list.



## WEIGHT AND BALANCE MANUAL

### 2-30-01. Table of compartments and subdivisions

#### 10. ELECTRONIC COMPARTMENT

- 101 Battery and radar
- 102 Electronic rack 80 VU
- 103 Electronic rack 90 VU
- 104 Inertial navigation

#### 20. FLIGHT DECK

- 201 Emergency equipment
- 202 Crew seats

#### 30. CABIN

- 301 Attendant seats
- 302 Passenger seats \*
- 303 Passenger life vests \*
- 305 Doghouse, stowages, partitions, curtains and carpets
- 306 Galley structure and fixed equipment
- 307 Emergency equipment
- 309 Ancillary parts

\* see also chapter 2-30-02 page 16/16

#### 40. FLIGHT RECORDERS AND RA TRANSCEIVERS

- 401 Flight recorders
- 402 RA transceivers

#### 50. ADDITIONAL OPERATOR'S ITEMS

- 501 Fuel, oil, water, fluids
- 502 Aircraft documents and tool kit
- 503 Catering removable equipment
- 504 Catering allowance
- 505 Crew and baggage

#### 60. TIRES

- 601 Nose and main landing gear tires

#### 70. CARGO COMPARTMENTS

- 701 Forward hold cargo nets
- 702 Aft hold cargo nets
- 703 Bulk hold cargo nets



## WEIGHT AND BALANCE MANUAL

## 2-30-02. Equipment list

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
10		<u>ELECTRONIC COMPARTMENT</u>					
101		<u>BATTERY AND RADAR</u>					
1	2PB1	BAT-1 2758	SAFT DPT	25.320	5.794	1	V
2	2PB2	BAT-2 2758	SAFT DPT	25.320	6.828	1	V
3	1SQ1	XCVR-WEATHER RADAR, 1 822-1710-411	ROCKWELL COLLINS INC AIR	11.500	3.915	1	V
102		<u>ELECTRONIC RACK 80 VU</u>					
1	1CA1	FMGC-1 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
2	1CA2	FMGC-2 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
3	1CC1	FAC-1 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
4	1CC2	FAC-2 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
5	1CE1	SEC-1 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
6	1CE2	SEC-2 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
7	2CE1	ELAC-1 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
8	2CE2	ELAC-2 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
9	3CE1	FCDC-1 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
10	3CE2	FCDC-2 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
11	21CV	SFC 1 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
12	22CV	SFCC 2 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
13	10HQ	AEVC 87292325V07	THALES AVIONICS	1.700	9.388	1	V
14	1KS1	EIU-1 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
15	1KS2	EIU-2 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
16	9RA	CONTROLLER - COCKPIT 100-2500-04	SECURAPLANE TEC	1.500	9.388	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	10RC1	XCVR-MVDR, 1 822-2763-020	4.610	9.388	1	1	V
18	10RC2	XCVR-MVDR, 2 822-2763-020	4.610	9.388	1	1	V
19	3RE1	XCVR-HF, 1 822-0990-003	12.600	9.388	1	1	V
20	101RH	CIDS DIRECTOR 1 Z014H000333B	5.000	9.388	1	1	V
21	102RH	CIDS DIRECTOR 2 Z014H000333B	5.000	9.388	1	1	V
22	1RN	AMU AMU4031SA140204	3.570	9.388	1	1	V
23	2RP1	RECEIVER-ADF, 1 822-0299-020	3.090	9.388	1	1	V
24	3RS1	RECEIVER-VOR/MKR, 1 822-0297-020	3.920	9.388	1	1	V
25	3RS2	RECEIVER-VOR/MKR, 2 822-0297-020	3.920	9.388	1	1	V
26	2SD1	INTRG-DME, 1 822-2325-020	4.940	9.388	1	1	V
27	2SD2	INTRG-DME, 2 822-2325-020	4.940	9.388	1	1	V
28	1000SG	CMPTR-T/TISS 9005000-11203	8.000	9.388	1	1	V
29	1SH1	XPDR-ATC/MODE S, 1 7517800-12401	5.600	9.388	1	1	V
30	2TV	DAR 2243800-364	6.000	9.388	1	0	V
31	2TV1	MEMORY MEDIA (DAR) 2234641-008	0.100	9.388	1	0	V
32	10TV	DMU/FDIU (FDIMU) 2234320-02-02	4.300	9.388	1	1	V
33	1TW	CFDIU C12860AA04	5.215	9.388	1	1	V
34	1TX1	ATSU LA2T0G20705C070	4.580	9.388	1	1	V
35	1WT1	DMC-1 1982660116	9.374	9.388	1	1	V
36	1WT2	DMC-2 1982660116	9.374	9.388	1	1	V
37	1WT3	DMC-3 1982660116	9.374	9.388	1	1	V
38	1WV1	SDAC-1 350E5500206	5.760	9.388	1	1	V
39	1WV2	SDAC-2 350E5500206	5.760	9.388	1	1	V
40	1WW1	FWC-1 350E053021717	6.100	9.388	1	1	V
41	1WW2	FWC-2 350E053021717	6.100	9.388	1	1	V

Reference: RP1635997

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## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
103		<u>ELECTRONIC RACK 90 VU</u>					
1	1CE3	SEC-3	4.640	5.080	1	1	V
2	5GA1	B372CAM0100 LGCIU-1	5.900	5.080	1	1	V
3	5GA2	80-178-03-88013 LGCIU-2	5.900	5.080	1	1	V
4	10GG	80-178-03-88013 BSCU	11.000	5.080	1	1	V
5	1HA1	E21327107 BMC-1	2.000	5.080	1	1	V
6	1HA2	70418A010101 BMC-2	2.000	5.080	1	1	V
7	47HH	70418A010101 CONT-AIR COND SYSTEM	4.500	5.080	1	1	V
8	57HH	1803B0000-04 CONT-AIR COND SYSTEM	4.500	5.080	1	1	V
9	11HL	1803B0000-04 PRESS CONT 1	2.250	5.080	1	1	V
10	12HL	PRESS CONT 2 20791-13AD	2.250	5.080	1	1	V
11	100HW	20791-13AD CSAS CONTROL UNIT	4.000	5.080	1	1	V
12	7QJ	3959A0000K06 FLSCU-1	3.710	5.080	1	1	V
13	9QJ	30042-0601 FLSCU-2	3.710	5.080	1	1	V
14	3QT	30042-0601 FQIC	4.900	5.080	1	1	V
15	40RT1	30320-0202 MMR-1	5.000	5.080	1	1	V
16	40RT2	822-1821-430 MMR-2	5.000	5.080	1	1	V
17	24XG	822-1821-430 GAPCU	5.830	5.080	1	1	V
18	1XU1	1700667D GCU-1	4.000	5.080	1	1	V
19	1XU2	767584M GCU-2	4.000	5.080	1	1	V
19		767584M INERTIAL NAVIGATION					
1	1FP1	ADIRU-1 HG2030BE04	6.960	8.464	1	1	V
2	1FP2	ADIRU-2 HG2030BE04	6.960	8.464	1	1	V
3	1FP3	ADIRU-3 HG2030BE04	6.960	8.464	1	1	V

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WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
20		<b><u>FLIGHT DECK</u></b>					
201		<b><u>EMERGENCY EQUIPMENT</u></b>					
1	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.085	2	2	
2	FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	5.590	2	2	
3	DESCENT DEVICE-EMERGENCY 208724-0	AERAZUR	0.472	5.794	2	2	
4	FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	5.794	1	1	
5	AXE-CRASH EIS76014-10000	EIS AIRCRAFT GMBH	1.100	5.893	1	1	
6	GLOVES FKK8-35KL	BENNETT SAFETYWEAR LTD	0.250	5.893	1	1	
7	SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.480	5.917	1	1	
8	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.922	1	1	
9	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	6.067	1	1	
202		<b><u>CREW SEATS</u></b>					
1	SEAT-CAPTAIN TAAI3-03PE22-01	EADS SOGERMA	39.200	5.085	1	1	V
2	SEAT-F/O TAAI3-03CE22-01	EADS SOGERMA	39.200	5.085	1	1	V
3	SEAT-THIRD OCCUPANT 16800-01-00	ZODIAC SEATS FRANCE	15.300	5.677	1	1	V
4	SEAT-FOURTH OCCUPANT 2510154-03-00	EADS SOGERMA	6.800	6.067	1	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
30		<u>CABIN</u>					
301		<u>ATTENDANT SEATS</u>					
1		CABIN ATTENDANT SEAT 2128-75TE00BCW1 GOODRICH CORPOR	13.100	7.127	1	1	V
2		CABIN ATTENDANT SEAT 2128-75UE00BCW1 GOODRICH CORPOR	12.700	7.127	1	1	V
3		CABIN ATTENDANT SEAT 2128-75RE00BCW1 GOODRICH CORPOR	12.900	31.641	2	2	V
4		CABIN ATTENDANT SEAT 2428-81BE03G0CW CHEMISCHE FABRI	11.100	32.715	1	1	V
302		<u>PASSENGER SEATS (for individual H-Arm refer to last page(s) ch 2.30)</u>					
1	S01	TRIPLE SEAT Y/C 878801-422 WEBER AIRCRAFT	89.240		1	1	
2	S02	TRIPLE SEAT Y/C 878801-421 WEBER AIRCRAFT	89.950		1	1	
3	S03	TRIPLE SEAT Y/C 878801-404 WEBER AIRCRAFT	49.480		3	3	
4	S04	TRIPLE SEAT Y/C 878801-403 WEBER AIRCRAFT	49.560		3	3	
5	S05	TRIPLE SEAT Y/C 878801-408 WEBER AIRCRAFT	48.530		1	1	
6	S06	TRIPLE SEAT Y/C 878801-407 WEBER AIRCRAFT	48.630		1	1	
7	S07	TRIPLE SEAT Y/C 878801-410 WEBER AIRCRAFT	47.920		1	1	
8	S08	TRIPLE SEAT Y/C 878801-409 WEBER AIRCRAFT	47.650		1	1	
9	S09	TRIPLE SEAT Y/C 878801-412 WEBER AIRCRAFT	48.510		1	1	
10	S10	TRIPLE SEAT Y/C 878801-411 WEBER AIRCRAFT	48.600		1	1	
11	S11	TRIPLE SEAT Y/C 878801-406 WEBER AIRCRAFT	48.680		19	19	
12	S12	TRIPLE SEAT Y/C 878801-405 WEBER AIRCRAFT	48.600		19	19	
13	S13	TRIPLE SEAT Y/C 878801-414 WEBER AIRCRAFT	48.670		1	1	
14	S14	TRIPLE SEAT Y/C 878801-413 WEBER AIRCRAFT	48.670		1	1	
15	S15	TRIPLE SEAT Y/C 878801-416 WEBER AIRCRAFT	48.400		1	1	
16	S16	TRIPLE SEAT Y/C 878801-415 WEBER AIRCRAFT	48.190		1	1	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	S17	TRIPLE SEAT Y/C 878801-418	WEBER AIRCRAFT	33.040		1	1
18	S18	TRIPLE SEAT Y/C 878801-417	WEBER AIRCRAFT	33.000		1	1
303		PASSENGER LIFE VESTS (for individual H-Arm refer to last page(s) ch 2.30)					
1		LIFE VEST,PAX (Required: 174 Fitted: 174) P01202-201	EASTERN AERO MA	0.460	-	-	
305		DOGHOUSE, STOWAGES, PARTITIONS, CURTAINS AND CARPETS					
1		CURTAIN PV100404	LANTAL TEXTILES	1.850	6.976	1	1
2		NTF FWD 471R6756	GERFLOR	9.300	7.261	1	1
3		CURTAIN PV100405	LANTAL TEXTILES	1.620	8.026	1	1
4		PARTITION LH D252-74731-018-00	EADS AIRBUS GMB	19.000	8.040	1	1
5		PARTITION RH D252-74731-021-00	EADS AIRBUS GMB	15.000	8.040	1	1
6		CARPET FT02219200LS700	LANTAL TEXTILES	144.800	19.793	1	1
7		DOGHOUSE LH 113517K	MUEHLENBERG INT	7.920	31.482	1	1
8		DOGHOUSE RH 113518K	MUEHLENBERG INT	7.940	31.482	1	1
9		PARTITION RH 101576J	MUEHLENBERG INT	47.000	31.574	1	1
10		PARTITION LH 101597E	MUEHLENBERG INT	60.700	31.574	1	1
11		CURTAIN PV100406	LANTAL TEXTILES	1.430	31.587	1	1
12		NTF AFT 471R6756	GERFLOR	11.500	32.418	1	1
306		GALLEY STRUCTURE AND FIXED EQUIPMENT					
1		GALLEY 1 601851-004701	DRIESSEN AEROSP	107.200	6.691	1	1
2		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	6.691	2	2
3		GALLEY 4B 601891-001601	DRIESSEN AEROSP	155.200	33.199	1	1
4		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	33.199	1	1



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
307		<u>EMERGENCY EQUIPMENT</u>					
1	LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	7.127	2	2	
2	FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	7.127	2	2	
3	SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.480	7.127	2	2	
4	FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	7.127	1	1	
5	TOOL MANUAL RELEASE 995000	BE AEROSPACE	0.014	7.127	2	2	
6	MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	7.136	1	1	
7	ESCAPE SLIDE FWD LH/RH D31516-717	AIR CRUISERS CO	25.000	7.562	2	2	
8	DECORATIVE COVER FWD 62367-303	AIR CRUISERS CO	2.400	7.562	2	2	
9	POCKET,INFANT LIFE VEST A256-70815-022-00	EADS AIRBUS GMB	0.230	8.833	2	2	
10	LIFE VEST,INFANT P0640-201	EASTERN AERO MA	0.500	8.833	5	5	
11	PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.240	8.833	1	1	
12	POCKET,DEMO KIT A256-70815-068-00	EADS AIRBUS GMB	0.230	16.971	2	2	
13	LIFE VEST,DEMO P01202-201D	EASTERN AERO MA	0.270	16.971	2	2	
14	SEAT BELT (DEMO) 2010-6-011-2256	AMSAFE AVIATION	0.170	16.971	2	2	
15	DEMONSTRATION MASK 289-1001	AVOX SYSTEMS IN	0.080	16.971	2	2	
16	ESCAPE SLIDE OW.LH D31865-111	AIR CRUISERS CO	32.400	21.360	1	1	
17	ESCAPE SLIDE OW.RH D31865-112	AIR CRUISERS CO	32.400	21.360	1	1	
18	PRESSURE BOTTLE OWS LH/RH 60592-201	AIR CRUISERS CO	7.200	21.360	2	2	
19	MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	31.295	1	1	
20	PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.240	31.482	3	3	
21	LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	31.641	2	2	
22	FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	31.641	2	2	
23	SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.480	31.641	2	2	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
24		FIRE EXTINGUISHER 74-20	2.250	31.641	2	2	
25		TOTAL WALTHER F TOOL MANUAL RELEASE	0.014	31.641	2	2	
26		995000 BE AEROSPACE ESCAPE SLIDE AFT LH/RH	25.000	32.182	2	2	
27		D31517-717 AIR CRUISERS CO DECORATIVE COVER AFT	2.400	32.182	2	2	
28		62371-303 AIR CRUISERS CO LIFE VEST,CABIN CREW	0.460	32.715	1	1	
29		P01202-201C EASTERN AERO MA FLASHLIGHT	0.660	32.715	1	1	
30		P2-07-0015-002 DME CORPORATION TOOL MANUAL RELEASE	0.014	32.715	1	1	
31		995000 BE AEROSPACE LIFE VEST,SPARE	0.460	33.199	5	5	
309		P01202-201 EASTERN AERO MA <u>ANCILLARY PARTS</u>					
1		LITERATURE POCKET A252-89532-026-00 EADS AIRBUS GMB	0.360	8.040	6	6	V

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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
40		<b><u>FLIGHT RECORDERS AND RA TRANSCEIVERS</u></b>					
401		<b><u>FLIGHT RECORDERS</u></b>					
1		TRANSMITTER-ELT S1851501-01	KANNAD	1.980	31.295	1	V
2		CVR 2100-1226-02	L-3 COMMUNICATIONS CORP	4.520	35.126	1	V
3		DFDR 2100-4245-00	L-3 COMMUNICATIONS CORP	4.830	35.126	1	V
402		<b><u>RA TRANSCEIVERS</u></b>					
1		RA1 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V
2		RA2 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
50		<b><u>ADDITIONAL OPERATOR'S ITEMS</u></b>					
501		<b><u>FUEL, OIL, WATER, FLUIDS</u></b>					
1		IDG OIL	4.900	15.387	2	2	
2		WATER	200.000	15.546	1	0	
3		ENGINE OIL	47.000	16.085	2	2	
4		UNUSABLE FUEL	64.100	18.253	1	0	
5		WASTE TANK FLUID	10.000	32.050	1	0	
6		APU OIL	5.000	37.675	1	1	
502		<b><u>AIRCRAFT DOCUMENTS AND TOOL KIT</u></b>					
1		FLIGHT KIT 1	1.080	5.767	1	1	
2		FLIGHT KIT 3	0.050	5.767	4	4	
3		A/C DOCUMENTS	8.700	5.767	1	0	
4		SUITCASE ASSY FLIGHT KIT 2 D2567045301400 EADS AIRBUS GMB	12.000	8.254	1	0	
503		<b><u>CATERING REMOVABLE EQUIPMENT</u></b>					
1		STANDARD UNIT/CONTAINER G1 DLH294 DRIESSEN AIRCRA	2.830	6.691	3	3	
2		WASTE TROLLEY FULL-SIZE G1 TG605005 DRIESSEN AIRCRA	16.520	6.691	1	1	
3		MEAL TROLLEY FULL-SIZE G1 TK605017 DRIESSEN AIRCRA	17.880	6.691	3	3	
4		WASTE BIN G1 WA601003 DRIESSEN AIRCRA	5.340	6.691	1	1	
5		STANDARD UNIT/CONTAINER G4B DLH294 DRIESSEN AIRCRA	2.830	33.199	10	10	
6		WASTE TROLLEY FULL-SIZE G4B TG605005 DRIESSEN AIRCRA	16.520	33.199	1	1	
7		MEAL TROLLEY FULL-SIZE G4B TK605017 DRIESSEN AIRCRA	17.880	33.199	2	2	
8		MEAL TROLLEY HALF-SIZE G4B TL604064 DRIESSEN AIRCRA	11.500	33.199	2	2	
9		WASTE BIN G4B WA601003 DRIESSEN AIRCRA	5.340	33.199	1	1	


  
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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
504		<u>CATERING ALLOWANCE</u>					
	1	CATERING GALLEY 1	379.010	6.691	1	0	
505	2	CATERING GALLEY 4B	441.080	33.199	1	0	
		<u>CREW AND BAGGAGE</u>					
505	1	FLIGHT CREW	90.000	5.085	2	0	
	2	ATTENDANT AFT LAV A	80.000	7.327	2	0	
	3	ATTENDANT AFT PART LH	80.000	31.841	1	0	
	4	ATTENDANT AFT PART RH	80.000	31.841	1	0	
	5	ATTENDANT FWD LAV G	80.000	32.515	1	0	


  
**WEIGHT AND BALANCE MANUAL**

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
60		<b><u>TIRES</u></b>					
601		<b><u>NOSE AND MAIN LANDING GEAR TIRES</u></b>					
1		TIRE-NLG, 1/2 309Q62-1	23.450	7.605	2	2	V
2		TIRE-MLG, 1/2/3/4 467Q02-3	91.200	20.250	4	4	V


  
 WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
70		<b><u>CARGO COMPARTMENTS</u></b>					
701		<b><u>FORWARD HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE C AC40-0217200	AMSAFE BRIDPORT	1.200	10.033	1 1	V
2		DOOR NET TYPE A AC40-0217000	AMSAFE BRIDPORT	3.500	11.633	1 1	V
3		DIVIDER NET TYPE A2 AC40-0209500	AMSAFE BRIDPORT	3.000	13.233	1 1	V
702		<b><u>AFT HOLD CARGO NETS</u></b>					
1		DIVIDER NET TYPE A2 AC40-0209500	AMSAFE BRIDPORT	3.000	22.962	1 1	V
2		DOOR NET TYPE B AC40-0217100	AMSAFE BRIDPORT	3.200	24.829	1 1	V
3		DOOR NET TYPE A AC40-0217000	AMSAFE BRIDPORT	3.500	25.895	1 1	V
4		DIVIDER NET TYPE A1 AC40-0217500	AMSAFE BRIDPORT	4.500	27.762	1 1	V
703		<b><u>BULK HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE E AC40-0217400	AMSAFE BRIDPORT	3.550	28.295	1 1	V
2		DOOR NET TYPE D AC40-0217300	AMSAFE BRIDPORT	3.670	29.362	1 1	V



WEIGHT AND BALANCE MANUAL

**PASSENGER SEATS AND LIFE VEST LAYOUT**

ROW	LEFT			RIGHT		
	SEAT	VEST	H-ARM (m)	SEAT	VEST	H-ARM (m)
1	S02	3	8.872	S01	3	8.872
2	S04	3	9.779	S03	3	9.779
3	S04	3	10.643	S03	3	10.643
4	S04	3	11.506	S03	3	11.506
5	S12	3	12.370	S11	3	12.370
6	S12	3	13.132	S11	3	13.132
7	S12	3	13.894	S11	3	13.894
8	S12	3	14.656	S11	3	14.656
9	S12	3	15.418	S11	3	15.418
10	S06	3	16.180	S05	3	16.180
11	S08	3	17.196	S07	3	17.196
12	S10	3	18.161	S09	3	18.161
13	S12	3	18.923	S11	3	18.923
14	S12	3	19.685	S11	3	19.685
15	S12	3	20.447	S11	3	20.447
16	S12	3	21.209	S11	3	21.209
17	S12	3	21.971	S11	3	21.971
18	S12	3	22.733	S11	3	22.733
19	S12	3	23.495	S11	3	23.495
20	S12	3	24.257	S11	3	24.257
21	S12	3	25.019	S11	3	25.019
22	S12	3	25.781	S11	3	25.781
23	S12	3	26.543	S11	3	26.543
24	S12	3	27.305	S11	3	27.305
25	S12	3	28.067	S11	3	28.067
26	S12	3	28.829	S11	3	28.829
27	S14	3	29.591	S13	3	29.591
28	S16	3	30.353	S15	3	30.353
29	S18	3	31.115	S17	3	31.115

\* Item missing at weighing



## WEIGHT AND BALANCE MANUAL

### **2.00 AIRCRAFT WEIGHING REPORT**

#### **2-00-01. Weighing date and place**

Date of Weighing: November 3, 2016 Reference: RP1639819 Issue 2

Place of Weighing: TOULOUSE

#### **2-00-02. Aircraft identification**

This weighing report is relative to aircraft:

Manufacturer	AIRBUS
Type	A320-251N
Version	AZUL LINHAS AEREAS BRASILEIRAS S/A / GE CAPITAL AVIATION SERVICES LLC (30 Y/C+; 144 Y/C)
Manufacturer serial number	07283

#### **2-00-03. OEW and MEW results**

	<u>Weight</u> (kg)	<u>C G</u> (% RC)
Operational Empty Weight (OEW):	45763	26.1
Manufacturer's Empty Weight (MEW):	40296	23.9

Author: Liehr, Sascha EGWOC Airbus Operations GmbH	Approved on: November 15, 2016 by: Jelski, Ludwik EGWOC Airbus Operations GmbH	Authorized on: November 15, 2016 by: Roelle, Stefan EGWOC Airbus Operations GmbH
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 **A320**  
WEIGHT AND BALANCE MANUAL

## **2-00 AIRCRAFT WEIGHING REPORT**

2.00.01	Weighing date and place	1 / 1
2.00.02	Aircraft identification	1 / 1
2.00.03	OEW and MEW results	1 / 1

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WEIGHT AND BALANCE MANUAL

**2-10-01. Manufacturer's Empty Weight (MEW)**

The weight of structure, power plant, systems, furnishings and other items of equipment that are an integral part of the aircraft configuration, including the fluids contained in closed systems. The weights of all operator's items are excluded.

**2-10-02. Operational Empty Weight (OEW)**

The Operational Empty Weight in this report is defined as:

The Manufacturer's Empty Weight derived from weighing plus operator's items.

The operator's items include Airbus allowances for:

- Documents and tool kits
- Ancillary parts
- Waste tank precharge
- Potable water
- Catering (comestibles and consumables) and galley removable equipment
- Flight crew and their hand baggage

**CAUTION**

The OEW in this report serves as a basis for the calculation of ACTUAL WEIGHT and CG of the aircraft in service.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ACCOUNT FOR:

Items not included in the OEW which are installed after delivery but prior to entry into service of the aircraft.

Replacement of the Airbus allowances by actual quantities and weights of the items according to the mission.

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-01. Aircraft weighing**

The aircraft was weighed on wheels at Airbus France S.A.S. weighing platforms TRAYVOU (Ref: 43648-43649-43652)

The aircraft was defueled before the weighing using the procedure defined in paragraph 1.20.07.

The zero reading of the weighing platforms was checked and verified before the aircraft was positioned on them.

Hangar doors were closed during the weighing.

The aircraft was in following configuration:

- Passenger, service, cargo, maintenance and undercarriage doors closed.
- All tools and protection devices removed.
- Without pallet and container.
- Flaps, slats, airbrakes and spoilers retracted.
- Horizontal tailplane at 0° position.
- Engine, APU and IDG oil at normal level.
- Hydraulic tanks filled at normal level.
- Tires and shock absorbers at normal operating pressure.
- Water tank empty.
- Waste tank drained.

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WEIGHT AND BALANCE MANUAL

**2-20-02. Results of weighing**

**VALUES MEASURED**

(pitch attitude in decimal degrees, weights in kilograms)

$$\text{a) Pitch attitude (Alpha)} = -0.45^\circ$$

Reaction force measured

$$\text{b) Reaction force on nose L/G (r)} = 4895 \text{ kg}$$

$$\text{c) Reaction force on LH main L/G} = 19650 \text{ kg}$$

$$\text{d) Reaction force on RH main L/G} = 19580 \text{ kg}$$

$$\text{Weighed Weight (W = b + c + d)} = \boxed{44125 \text{ kg}}$$

**H-ARM CALCULATION IN METERS**

(Refer to weighing on wheel groups in 1.80.05)

$$\sin(\text{Alpha}) = -0.00785390$$

$$\text{H-Arm} = \frac{20.29 - 2.738 \sin(\text{Alpha}) - 12.69(r + 21.0)}{W} = \boxed{18.898 \text{ m}}$$

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-03. Basic corrected weight established from weighing**

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Weighed Weight ( <i>Refer to 02, Results of weighing</i> )	44125	18.898	833874
- Items not belonging to the aircraft definition (to be removed)			
Fuel remaining in the aircraft	-39.800	18.066	-719
Carpet protection in cockpit	-4.000	5.100	-20
Carpet protection in cabin	-2.000	20.109	-40
Cocoto kit	-16.300	7.316	-119
- Installed items not conforming to the aircraft definition (to be changed)			
- Items missing from the MEW (to be added):			
• Items not included in the weighing check list			
• Items detailed in the weighing check list	6.100	9.388	57
- Parts of operational items missing at weighing (to be added).			
Basic corrected weight	44069.000		833033

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-04. OEW and MEW established from weighing**

OPERATING EMPTY WEIGHT (OEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44069.000		833033
Operator's items missing (detailed in the weighing check list)	1693.920	18.708	31690
OEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	45762.920	18.896 26.1 %RC	864723

MANUFACTURER EMPTY WEIGHT (MEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44069.000		833033
Operator's items installed (detailed in the weighing check list)	-3773.414	19.977	-75381
MEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	40295.586	18.802 23.9 %RC	757652



## WEIGHT AND BALANCE MANUAL

## 2-20-05. Operator's Items weight summary

OPERATOR'S ITEMS	TOTAL		INSTALLED		MISSING	
	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)
Unusable Fuel	64.100	18.253	0.000	0.000	64.100	18.253
Oil for engines, IDG and APU	108.800	17.014	108.800	17.014	0.000	0.000
Water	200.000	15.546	0.000	0.000	200.000	15.546
Waste tank precharge	10.000	32.050	0.000	0.000	10.000	32.050
Aircraft documents and tool Kit	21.980	7.125	1.280	5.767	20.700	7.209
Passenger seats	2866.060	19.779	2866.060	19.779	0.000	0.000
Passenger life vests	80.040	20.246	80.040	20.246	0.000	0.000
Galley structure and fixed equipment	282.100	21.848	282.100	21.848	0.000	0.000
Catering removable equipment	193.880	21.662	193.880	21.662	0.000	0.000
Catering allowance	819.120	20.946	0.000	0.000	819.120	20.946
Emergency equipment	241.254	20.109	241.254	20.109	0.000	0.000
Crew and baggage	580.000	16.868	0.000	0.000	580.000	16.868
<b>TOTAL</b>	<b>5467.334</b>	<b>19.584</b>	<b>3773.414</b>	<b>19.977</b>	<b>1693.920</b>	<b>18.708</b>

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WEIGHT AND BALANCE MANUAL

**2-30. Weighing check list**

The weighing check list is used to record the configuration of the aircraft at time of weighing by indicating the quantity required (column "R") and the actual quantity fitted (column "F") for each item. The item applicability to the "Manufacturer's Empty Weight" (MEW) is indicated by "V" in column "MEW". The weighing check list is also used to adjust the weighed weight of the aircraft to the OEW and MEW conditions.

Included in the weighing check list are:

- Items which have alternates which may be substituted.
- Loose or easily removable items of equipment.
- Operator's items: The weights given in the weighing check list are those of complete items. If some parts are missing at weighing, see paragraph 2-20-03.

The weighing check list is not complete list of all items of equipment on the aircraft. Accordingly items considered as permanently fixed are not included in the list.



## WEIGHT AND BALANCE MANUAL

### 2-30-01. Table of compartments and subdivisions

#### 10. ELECTRONIC COMPARTMENT

- 101 Battery and radar
- 102 Electronic rack 80 VU
- 103 Electronic rack 90 VU
- 104 Inertial navigation

#### 20. FLIGHT DECK

- 201 Emergency equipment
- 202 Crew seats

#### 30. CABIN

- 301 Attendant seats
- 302 Passenger seats \*
- 303 Passenger life vests \*
- 305 Doghouse, stowages, partitions, curtains and carpets
- 306 Galley structure and fixed equipment
- 307 Emergency equipment
- 309 Ancillary parts

\* see also chapter 2-30-02 page 16/16

#### 40. FLIGHT RECORDERS AND RA TRANSCEIVERS

- 401 Flight recorders
- 402 RA transceivers

#### 50. ADDITIONAL OPERATOR'S ITEMS

- 501 Fuel, oil, water, fluids
- 502 Aircraft documents and tool kit
- 503 Catering removable equipment
- 504 Catering allowance
- 505 Crew and baggage

#### 60. TIRES

- 601 Nose and main landing gear tires

#### 70. CARGO COMPARTMENTS

- 701 Forward hold cargo nets
- 702 Aft hold cargo nets
- 703 Bulk hold cargo nets



## WEIGHT AND BALANCE MANUAL

## 2-30-02. Equipment list

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
10		<b>ELECTRONIC COMPARTMENT</b>					
101		<b>BATTERY AND RADAR</b>					
1	2PB1	BAT-1 2758	SAFT DPT	25.320	5.794	1	V
2	2PB2	BAT-2 2758	SAFT DPT	25.320	6.828	1	V
3	1SQ1	XCVR-WEATHER RADAR, 1 822-1710-411	ROCKWELL COLLINS INC AIR	11.500	3.915	1	V
102		<b>ELECTRONIC RACK 80 VU</b>					
1	1CA1	FMGC-1 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
2	1CA2	FMGC-2 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
3	1CC1	FAC-1 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
4	1CC2	FAC-2 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
5	1CE1	SEC-1 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
6	1CE2	SEC-2 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
7	2CE1	ELAC-1 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
8	2CE2	ELAC-2 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
9	3CE1	FCDC-1 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
10	3CE2	FCDC-2 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
11	21CV	SFC 1 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
12	22CV	SFCC 2 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
13	10HQ	AEVC 87292325V07	THALES AVIONICS	1.700	9.388	1	V
14	1KS1	EIU-1 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
15	1KS2	EIU-2 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
16	9RA	CONTROLLER - COCKPIT 100-2500-04	SECURAPLANE TEC	1.500	9.388	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	10RC1	XCVR-MVDR, 1 822-2763-020	4.610	9.388	1	1	V
18	10RC2	XCVR-MVDR, 2 822-2763-020	4.610	9.388	1	1	V
19	3RE1	XCVR-HF, 1 822-0990-003	12.600	9.388	1	1	V
20	101RH	CIDS DIRECTOR 1 Z014H000333B	5.000	9.388	1	1	V
21	102RH	CIDS DIRECTOR 2 Z014H000333B	5.000	9.388	1	1	V
22	1RN	AMU AMU4031SA140204	3.570	9.388	1	1	V
23	2RP1	RECEIVER-ADF, 1 822-0299-020	3.090	9.388	1	1	V
24	3RS1	RECEIVER-VOR/MKR, 1 822-0297-020	3.920	9.388	1	1	V
25	3RS2	RECEIVER-VOR/MKR, 2 822-0297-020	3.920	9.388	1	1	V
26	2SD1	INTRG-DME, 1 822-2325-020	4.940	9.388	1	1	V
27	2SD2	INTRG-DME, 2 822-2325-020	4.940	9.388	1	1	V
28	1000SG	CMPTR-T/TISS 9005000-11203	8.000	9.388	1	1	V
29	1SH1	XPDR-ATC/MODE S, 1 7517800-12401	5.600	9.388	1	1	V
30	2TV	DAR 2243800-364	6.000	9.388	1	0	V
31	2TV1	MEMORY MEDIA (DAR) 2234641-008	0.100	9.388	1	0	V
32	10TV	DMU/FDIU (FDIMU) 2234320-02-02	4.300	9.388	1	1	V
33	1TW	CFDIU C12860AA04	5.215	9.388	1	1	V
34	1TX1	ATSU LA2T0G20705C070	4.580	9.388	1	1	V
35	1WT1	DMC-1 1982660116	9.374	9.388	1	1	V
36	1WT2	DMC-2 1982660116	9.374	9.388	1	1	V
37	1WT3	DMC-3 1982660116	9.374	9.388	1	1	V
38	1WV1	SDAC-1 350E5500206	5.760	9.388	1	1	V
39	1WV2	SDAC-2 350E5500206	5.760	9.388	1	1	V
40	1WW1	FWC-1 350E053021717	6.100	9.388	1	1	V
41	1WW2	FWC-2 350E053021717	6.100	9.388	1	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W	
					R	F		
103		<u>ELECTRONIC RACK 90 VU</u>						
1	1CE3	SEC-3	4.640	5.080	1	1	V	
2	5GA1	B372CAM0100 LGCIU-1	5.900	5.080	1	1	V	
3	5GA2	80-178-03-88013 LGCIU-2	5.900	5.080	1	1	V	
4	10GG	80-178-03-88013 BSCU	11.000	5.080	1	1	V	
5	1HA1	E21327107	MESSIER BUGATTI SA	2.000	5.080	1	1	V
6	1HA2	BMC-1	LIEBHERR-AEROSPACE	2.000	5.080	1	1	V
7	47HH	70418A010101 BMC-2	LIEBHERR-AEROSPACE	4.500	5.080	1	1	V
8	57HH	CONT-AIR COND SYSTEM 1803B0000-04	LIEBHERR-AEROSP	4.500	5.080	1	1	V
9	11HL	CONT-AIR COND SYSTEM 1803B0000-04	LIEBHERR-AEROSP	2.250	5.080	1	1	V
10	12HL	PRESS CONT 1	NORD-MICRO AG &	2.250	5.080	1	1	V
11	100HW	PRESS CONT 2	NORD-MICRO AG &	2.250	5.080	1	1	V
12	3959A0000K06	CSAS CONTROL UNIT	LIEBHERR-AEROSP	4.000	5.080	1	1	V
13	7QJ	30042-0601	SIMMONDS PRECISION PRODUCTS	3.710	5.080	1	1	V
14	9QJ	FLSCU-1	SIMMONDS PRECISION PRODUCTS	3.710	5.080	1	1	V
15	3QT	30042-0601	SIMMONDS PRECISION PRODUCTS	4.900	5.080	1	1	V
16	30320-0202	FLSCU-2	SIMMONDS PRECISION PRODUCTS	5.000	5.080	1	1	V
17	40RT1	FQIC	SIMMONDS PRECISION PRODUCTS	5.000	5.080	1	1	V
18	822-1821-430	MMR-1	ROCKWELL COLLINS INC AIR	5.000	5.080	1	1	V
19	40RT2	822-1821-430	ROCKWELL COLLINS INC AIR	5.000	5.080	1	1	V
20	24XG	GAPCU	ROCKWELL COLLINS INC AIR	5.830	5.080	1	1	V
21	1700667D	1700667D	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
22	1XU1	GCU-1	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
23	767584M	767584M	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
24	1XU2	GCU-2	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
25	767584M	767584M	HAMILTON SUNDSTRAND CORP					
104		<u>INERTIAL NAVIGATION</u>						
1	1FP1	ADIRU-1	HONEYWELL SENSOR AND	6.960	8.464	1	1	V
2	1FP2	HG2030BE04 ADIRU-2	HONEYWELL SENSOR AND	6.960	8.464	1	1	V
3	1FP3	HG2030BE04 ADIRU-3	HONEYWELL SENSOR AND	6.960	8.464	1	1	V
		HG2030BE04 ADIRU-4	HONEYWELL SENSOR AND					

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WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
20		<b><u>FLIGHT DECK</u></b>					
201		<b><u>EMERGENCY EQUIPMENT</u></b>					
1	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.085	2	2	
2	FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	5.590	2	2	
3	DESCENT DEVICE-EMERGENCY 208724-0	AERAZUR	0.472	5.794	2	2	
4	FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	5.794	1	1	
5	AXE-CRASH EIS76014-10000	EIS AIRCRAFT GMBH	1.100	5.893	1	1	
6	GLOVES FKK8-35KL	BENNETT SAFETYWEAR LTD	0.250	5.893	1	1	
7	SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.470	5.917	1	1	
8	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.922	1	1	
9	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	6.067	1	1	
202		<b><u>CREW SEATS</u></b>					
1	SEAT-CAPTAIN TAAI3-03PE22-01	EADS SOGERMA	39.200	5.085	1	1	V
2	SEAT-F/O TAAI3-03CE22-01	EADS SOGERMA	39.200	5.085	1	1	V
3	SEAT-THIRD OCCUPANT 16800-01-00	ZODIAC SEATS FRANCE	15.300	5.677	1	1	V
4	SEAT-FOURTH OCCUPANT 2510154-03-00	EADS SOGERMA	6.800	6.067	1	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
30		<b><u>CABIN</u></b>					
301		<b><u>ATTENDANT SEATS</u></b>					
1		CABIN ATTENDANT SEAT 2128-75TE00BCW1 GOODRICH CORPOR	13.100	7.127	1	1	V
2		CABIN ATTENDANT SEAT 2128-75UE00BCW1 GOODRICH CORPOR	12.900	7.127	1	1	V
3		CABIN ATTENDANT SEAT 2128-75RE00BCW1 GOODRICH CORPOR	12.900	31.641	2	2	V
4		CABIN ATTENDANT SEAT 2428-81BE03G0CW CHEMISCHE FABRI	11.100	32.715	1	1	V
302		<b><u>PASSENGER SEATS (for individual H-Arm refer to last page(s) ch 2.30)</u></b>					
1	S01	TRIPLE SEAT Y/C 878801-422 WEBER AIRCRAFT	89.220		1	1	
2	S02	TRIPLE SEAT Y/C 878801-421 WEBER AIRCRAFT	89.580		1	1	
3	S03	TRIPLE SEAT Y/C 878801-404 WEBER AIRCRAFT	49.370		3	3	
4	S04	TRIPLE SEAT Y/C 878801-403 WEBER AIRCRAFT	49.470		3	3	
5	S05	TRIPLE SEAT Y/C 878801-408 WEBER AIRCRAFT	48.440		1	1	
6	S06	TRIPLE SEAT Y/C 878801-407 WEBER AIRCRAFT	47.990		1	1	
7	S07	TRIPLE SEAT Y/C 878801-410 WEBER AIRCRAFT	47.760		1	1	
8	S08	TRIPLE SEAT Y/C 878801-409 WEBER AIRCRAFT	47.580		1	1	
9	S09	TRIPLE SEAT Y/C 878801-412 WEBER AIRCRAFT	48.350		1	1	
10	S10	TRIPLE SEAT Y/C 878801-411 WEBER AIRCRAFT	48.400		1	1	
11	S11	TRIPLE SEAT Y/C 878801-406 WEBER AIRCRAFT	48.530		19	19	
12	S12	TRIPLE SEAT Y/C 878801-405 WEBER AIRCRAFT	48.570		19	19	
13	S13	TRIPLE SEAT Y/C 878801-414 WEBER AIRCRAFT	48.310		1	1	
14	S14	TRIPLE SEAT Y/C 878801-413 WEBER AIRCRAFT	48.400		1	1	
15	S15	TRIPLE SEAT Y/C 878801-416 WEBER AIRCRAFT	47.670		1	1	
16	S16	TRIPLE SEAT Y/C 878801-415 WEBER AIRCRAFT	47.850		1	1	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	S17	TRIPLE SEAT Y/C 878801-418	WEBER AIRCRAFT	32.570	1	1	
18	S18	TRIPLE SEAT Y/C 878801-417	WEBER AIRCRAFT	32.520	1	1	
303		PASSENGER LIFE VESTS (for individual H-Arm refer to last page(s) ch 2.30)					
1		LIFE VEST,PAX (Required: 174 Fitted: 174) P01202-201	EASTERN AERO MA	0.460	-	-	
305		DOGHOUSE, STOWAGES, PARTITIONS, CURTAINS AND CARPETS					
1		NTF FWD 471R6756	GERFLOR	9.400	7.261	1 1	V
2		PARTITION LH D252-74731-018-00	EADS AIRBUS GMB	19.000	8.040	1 1	V
3		PARTITION RH D252-74731-021-00	EADS AIRBUS GMB	15.000	8.040	1 1	V
4		CARPET FT02219200LS700	LANTAL TEXTILES	144.300	19.793	1 1	V
5		DOGHOUSE LH 113517K	MUEHLENBERG INT	8.000	31.482	1 1	V
6		DOGHOUSE RH 113518K	MUEHLENBERG INT	8.000	31.482	1 1	V
7		PARTITION RH 101576L	MUEHLENBERG INT	47.000	31.574	1 1	V
8		PARTITION LH 101597E	MUEHLENBERG INT	60.700	31.574	1 1	V
9		NTF AFT 471R6756	GERFLOR	11.500	32.418	1 1	V
306		GALLEY STRUCTURE AND FIXED EQUIPMENT					
1		GALLEY 1 601851-004701	DRIESSEN AEROSP	108.000	6.691	1 1	
2		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	6.691	2 2	
3		GALLEY 4B 601891-001601	DRIESSEN AEROSP	154.900	33.199	1 1	
4		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	33.199	1 1	
307		EMERGENCY EQUIPMENT					
1		LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	7.127	2 2	
2		FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	7.127	2 2	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
3		SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.470	7.127	2	2
4		FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	7.127	1	1
5		TOOL MANUAL RELEASE 995000	BE AEROSPACE	0.014	7.127	2	2
6		MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	7.136	1	1
7		ESCAPE SLIDE FWD LH/RH D31516-717	AIR CRUISERS CO	25.000	7.562	2	2
8		DECORATIVE COVER FWD 62367-303	AIR CRUISERS CO	2.400	7.562	2	2
9		POCKET,INFANT LIFE VEST A256-70815-022-00	EADS AIRBUS GMB	0.230	8.833	2	2
10		LIFE VEST,INFANT P0640-201	EASTERN AERO MA	0.500	8.833	5	5
11		OXYGEN MASK 289-601-248	AVOX SYSTEMS IN	0.130	8.833	2	2
12		PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.240	8.833	1	1
13		POCKET,DEMO KIT A256-70815-068-00	EADS AIRBUS GMB	0.230	16.971	2	2
14		LIFE VEST,DEMO P01202-201D	EASTERN AERO MA	0.270	16.971	2	2
15		SEAT BELT (DEMO) 2010-6-011-2256	AMSAFE AVIATION	0.170	16.971	2	2
16		DEMONSTRATION MASK 289-1001	AVOX SYSTEMS IN	0.080	16.971	2	2
17		ESCAPE SLIDE OW.LH D31865-111	AIR CRUISERS CO	32.400	21.360	1	1
18		ESCAPE SLIDE OW.RH D31865-112	AIR CRUISERS CO	32.400	21.360	1	1
19		PRESSURE BOTTLE OWS LH/RH 60592-201	AIR CRUISERS CO	7.200	21.360	2	2
20		MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	31.295	1	1
21		OXYGEN MASK 289-601-248	AVOX SYSTEMS IN	0.130	31.482	6	6
22		PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.240	31.482	3	3
23		LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	31.641	2	2
24		FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	31.641	2	2
25		SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.470	31.641	2	2
26		FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	31.641	2	2
27		TOOL MANUAL RELEASE 995000	BE AEROSPACE	0.014	31.641	2	2



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
28		ESCAPE SLIDE AFT LH/RH D31517-717 AIR CRUISERS CO	25.000	32.182	2	2	
29		DECORATIVE COVER AFT 62371-303 AIR CRUISERS CO	2.400	32.182	2	2	
30		LIFE VEST,CABIN CREW P01202-201C EASTERN AERO MA	0.460	32.715	1	1	
31		FLASHLIGHT P2-07-0015-002 DME CORPORATION	0.660	32.715	1	1	
32		TOOL MANUAL RELEASE 995000 BE AEROSPACE	0.014	32.715	1	1	
33		LIFE VEST,SPARE P01202-201 EASTERN AERO MA	0.460	33.199	5	5	
309		<u>ANCILLARY PARTS</u>					
1		LITERATURE POCKET A252-89532-026-00 EADS AIRBUS GMB	0.360	8.040	6	6	V

**A320**  
WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
40		<b><u>FLIGHT RECORDERS AND RA TRANSCEIVERS</u></b>					
401		<b><u>FLIGHT RECORDERS</u></b>					
1		TRANSMITTER-ELT S1851501-01	KANNAD	1.980	31.295	1	V
2		CVR 2100-1226-02	L-3 COMMUNICATIONS CORP	4.520	35.126	1	V
3		DFDR 2100-4245-00	L-3 COMMUNICATIONS CORP	4.830	35.126	1	V
402		<b><u>RA TRANSCEIVERS</u></b>					
1		RA1 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V
2		RA2 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
50		<b><u>ADDITIONAL OPERATOR'S ITEMS</u></b>					
501		<b><u>FUEL, OIL, WATER, FLUIDS</u></b>					
1		IDG OIL	4.900	15.387	2	2	
2		WATER	200.000	15.546	1	0	
3		ENGINE OIL	47.000	16.085	2	2	
4		UNUSABLE FUEL	64.100	18.253	1	0	
5		WASTE TANK FLUID	10.000	32.050	1	0	
6		APU OIL	5.000	37.675	1	1	
502		<b><u>AIRCRAFT DOCUMENTS AND TOOL KIT</u></b>					
1		FLIGHT KIT 1	1.080	5.767	1	1	
2		FLIGHT KIT 3	0.050	5.767	4	4	
3		A/C DOCUMENTS	8.700	5.767	1	0	
4		SUITCASE ASSY FLIGHT KIT 2 D2567045301400 EADS AIRBUS GMB	12.000	8.254	1	0	
503		<b><u>CATERING REMOVABLE EQUIPMENT</u></b>					
1		STANDARD UNIT/CONTAINER G1 DLH294 DRIESSEN AIRCRA	2.860	6.691	3	3	
2		WASTE TROLLEY FULL-SIZE G1 TG605005 DRIESSEN AIRCRA	16.600	6.691	1	1	
3		MEAL TROLLEY FULL-SIZE G1 TK605017 DRIESSEN AIRCRA	17.900	6.691	3	3	
4		WASTE BIN G1 WA601003 DRIESSEN AIRCRA	5.500	6.691	1	1	
5		STANDARD UNIT/CONTAINER G4B DLH294 DRIESSEN AIRCRA	2.860	33.199	10	10	
6		WASTE TROLLEY FULL-SIZE G4B TG605005 DRIESSEN AIRCRA	16.600	33.199	1	1	
7		MEAL TROLLEY FULL-SIZE G4B TK605017 DRIESSEN AIRCRA	17.900	33.199	2	2	
8		MEAL TROLLEY HALF-SIZE G4B TL604064 DRIESSEN AIRCRA	11.500	33.199	2	2	
9		WASTE BIN G4B WA601003 DRIESSEN AIRCRA	5.500	33.199	1	1	


  
**WEIGHT AND BALANCE MANUAL**

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
504		<u>CATERING ALLOWANCE</u>					
	1	CATERING GALLEY 1	378.620	6.691	1	0	
505	2	CATERING GALLEY 4B	440.500	33.199	1	0	
		<u>CREW AND BAGGAGE</u>					
505	1	FLIGHT CREW	90.000	5.085	2	0	
	2	ATTENDANT AFT LAV A	80.000	7.327	2	0	
	3	ATTENDANT AFT PART LH	80.000	31.841	1	0	
	4	ATTENDANT AFT PART RH	80.000	31.841	1	0	
	5	ATTENDANT FWD LAV G	80.000	32.515	1	0	


  
**WEIGHT AND BALANCE MANUAL**

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
60		<b><u>TIRES</u></b>					
601		<b><u>NOSE AND MAIN LANDING GEAR TIRES</u></b>					
1		TIRE-NLG, 1/2 309Q62-1	23.450	7.605	2	2	V
2		TIRE-MLG, 1/2/3/4 467Q02-3	91.200	20.250	4	4	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
70		<b><u>CARGO COMPARTMENTS</u></b>					
701		<b><u>FORWARD HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE C AC40-0217200 AMSAFE BRIDPORT	1.200	10.033	1	1	V
2		DOOR NET TYPE A AC40-0217000 AMSAFE BRIDPORT	3.500	11.633	1	1	V
3		DIVIDER NET TYPE A2 AC40-0209500 AMSAFE BRIDPORT	3.000	13.233	1	1	V
702		<b><u>AFT HOLD CARGO NETS</u></b>					
1		DIVIDER NET TYPE A2 AC40-0209500 AMSAFE BRIDPORT	3.000	22.962	1	1	V
2		DOOR NET TYPE B AC40-0217100 AMSAFE BRIDPORT	3.200	24.829	1	1	V
3		DOOR NET TYPE A AC40-0217000 AMSAFE BRIDPORT	3.500	25.895	1	1	V
4		DIVIDER NET TYPE A1 AC40-0217500 AMSAFE BRIDPORT	4.500	27.762	1	1	V
703		<b><u>BULK HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE E AC40-0217400 AMSAFE BRIDPORT	3.550	28.295	1	1	V
2		DOOR NET TYPE D AC40-0217300 AMSAFE BRIDPORT	3.670	29.362	1	1	V



## WEIGHT AND BALANCE MANUAL

## PASSENGER SEATS AND LIFE VEST LAYOUT

ROW	LEFT			RIGHT		
	SEAT	VEST	H-ARM (m)	SEAT	VEST	H-ARM (m)
1	S02	3	8.872	S01	3	8.872
2	S04	3	9.779	S03	3	9.779
3	S04	3	10.643	S03	3	10.643
4	S04	3	11.506	S03	3	11.506
5	S12	3	12.370	S11	3	12.370
6	S12	3	13.132	S11	3	13.132
7	S12	3	13.894	S11	3	13.894
8	S12	3	14.656	S11	3	14.656
9	S12	3	15.418	S11	3	15.418
10	S06	3	16.180	S05	3	16.180
11	S08	3	17.196	S07	3	17.196
12	S10	3	18.161	S09	3	18.161
13	S12	3	18.923	S11	3	18.923
14	S12	3	19.685	S11	3	19.685
15	S12	3	20.447	S11	3	20.447
16	S12	3	21.209	S11	3	21.209
17	S12	3	21.971	S11	3	21.971
18	S12	3	22.733	S11	3	22.733
19	S12	3	23.495	S11	3	23.495
20	S12	3	24.257	S11	3	24.257
21	S12	3	25.019	S11	3	25.019
22	S12	3	25.781	S11	3	25.781
23	S12	3	26.543	S11	3	26.543
24	S12	3	27.305	S11	3	27.305
25	S12	3	28.067	S11	3	28.067
26	S12	3	28.829	S11	3	28.829
27	S14	3	29.591	S13	3	29.591
28	S16	3	30.353	S15	3	30.353
29	S18	3	31.115	S17	3	31.115

\* Item missing at weighing



## WEIGHT AND BALANCE MANUAL

**2.00 AIRCRAFT WEIGHING REPORT****2-00-01. Weighing date and place**

Date of Weighing: November 14, 2016 Reference: RP1640983

Place of Weighing: TOULOUSE

**2-00-02. Aircraft identification**

This weighing report is relative to aircraft:

Manufacturer	AIRBUS
Type	A320-251N
Version	INTERNATIONAL LEASE FINANCE CORPORATION / AZUL LINHAS AEREAS BRASILEIRAS S/A (30 Y/C+ ; 144 Y/C)
Manufacturer serial number	07291

**2-00-03. OEW and MEW results**

	<u>Weight</u> (kg)	<u>C G</u> (% RC)
Operational Empty Weight (OEW):	45746	26.2
Manufacturer's Empty Weight (MEW):	40272	24.0

Author: SAFRAN ENGINEERING Subcontractor for AIRBUS	Approved on: November 15, 2016 by: LAWNIEZAK, CHRISTIAN EGWOC Airbus Operations SAS	Authorized on: November 15, 2016 by: FAVIER, ARNAUD EGWMT Airbus Operations SAS
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 **A320**  
WEIGHT AND BALANCE MANUAL

## **2-00 AIRCRAFT WEIGHING REPORT**

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2.00.02	Aircraft identification	1 / 1
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**2-10-01. Manufacturer's Empty Weight (MEW)**

The weight of structure, power plant, systems, furnishings and other items of equipment that are an integral part of the aircraft configuration, including the fluids contained in closed systems. The weights of all operator's items are excluded.

**2-10-02. Operational Empty Weight (OEW)**

The Operational Empty Weight in this report is defined as:

The Manufacturer's Empty Weight derived from weighing plus operator's items.

The operator's items include Airbus allowances for:

- Documents and tool kits
- Ancillary parts
- Waste tank precharge
- Potable water
- Catering (comestibles and consumables) and galley removable equipment
- Flight crew and their hand baggage

**CAUTION**

The OEW in this report serves as a basis for the calculation of ACTUAL WEIGHT and CG of the aircraft in service.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ACCOUNT FOR:

Items not included in the OEW which are installed after delivery but prior to entry into service of the aircraft.

Replacement of the Airbus allowances by actual quantities and weights of the items according to the mission.

 **A320**  
WEIGHT AND BALANCE MANUAL

**2-20-01. Aircraft weighing**

The aircraft was weighed on wheels at Airbus France S.A.S. weighing platforms TRAYVOU (Ref: 43648-43649-43652)

The aircraft was defueled before the weighing using the procedure defined in paragraph 1.20.07.

The zero reading of the weighing platforms was checked and verified before the aircraft was positioned on them.

Hangar doors were closed during the weighing.

The aircraft was in following configuration:

- Passenger, service, cargo, maintenance and undercarriage doors closed.
- All tools and protection devices removed.
- Without pallet and container.
- Flaps, slats, airbrakes and spoilers retracted.
- Horizontal tailplane at 0° position.
- Engine, APU and IDG oil at normal level.
- Hydraulic tanks filled at normal level.
- Tires and shock absorbers at normal operating pressure.
- Water tank empty.
- Waste tank drained.

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-02. Results of weighing**

**VALUES MEASURED**

(pitch attitude in decimal degrees, weights in kilograms)

a) Pitch attitude ( Alpha ) = -0.52 °

Reaction force measured

b) Reaction force on nose L/G (r) = 4880 kg

c) Reaction force on LH main L/G = 19600 kg

d) Reaction force on RH main L/G = 19670 kg

Weighed Weight ( $W = b + c + d$ ) = 44150 kg

**H-ARM CALCULATION IN METERS**

(Refer to weighing on wheel groups in 1.80.05)

$\sin(\text{Alpha}) = -0.00907559$

$H\text{-Arm} = \frac{20.29 - 2.738 \sin(\text{Alpha}) - 12.69(r + 21.0)}{W} = 18.906 \text{ m}$



## WEIGHT AND BALANCE MANUAL

**2-20-03. Basic corrected weight established from weighing**

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Weighed Weight ( <i>Refer to 02, Results of weighing</i> )	44150	18.906	834700
- Items not belonging to the aircraft definition (to be removed)			
Fuel remaining in the aircraft	-39.800	18.066	-719
Carpet protection in cockpit	-4.000	5.100	-20
Carpet protection in cabin	-2.000	20.109	-40
Cocoto kit	-16.300	7.316	-119
Light rain water on aircraft	-41.800	22.330	-933
- Installed items not conforming to the aircraft definition (to be changed)			
- Items missing from the MEW (to be added):			
• Items not included in the weighing check list			
• Items detailed in the weighing check list	6.100	9.388	57
- Parts of operational items missing at weighing (to be added).			
Basic corrected weight	44052.200		832926

**A320**  
WEIGHT AND BALANCE MANUAL

**2-20-04. OEW and MEW established from weighing**

OPERATING EMPTY WEIGHT (OEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44052.200		832926
Operator's items missing (detailed in the weighing check list)	1693.470	18.708	31681
OEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	45745.670	18.900 26.2 %RC	864607

MANUFACTURER EMPTY WEIGHT (MEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kg·m)
Basic corrected weight (paragraph 03)	44052.200		832926
Operator's items installed (detailed in the weighing check list)	-3780.284	19.982	-75538
MEW CG in meters CG in %RC = (H-Arm - 17.8015)/0.04194	40271.916	18.807 24.0 %RC	757388



## WEIGHT AND BALANCE MANUAL

## **2-20-05. Operator's Items weight summary**

OPERATOR'S ITEMS	TOTAL		INSTALLED		MISSING	
	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)	WEIGHT (kg)	H-ARM (m)
Unusable Fuel	64.100	18.253	0.000	0.000	64.100	18.253
Oil for engines, IDG and APU	108.800	17.014	108.800	17.014	0.000	0.000
Water	200.000	15.546	0.000	0.000	200.000	15.546
Waste tank precharge	10.000	32.050	0.000	0.000	10.000	32.050
Aircraft documents and tool Kit	21.980	7.125	1.280	5.767	20.700	7.209
Passenger seats	2874.220	19.784	2874.220	19.784	0.000	0.000
Passenger life vests	80.040	20.246	80.040	20.246	0.000	0.000
Galley structure and fixed equipment	280.700	21.886	280.700	21.886	0.000	0.000
Catering removable equipment	194.330	21.655	194.330	21.655	0.000	0.000
Catering allowance	818.670	20.948	0.000	0.000	818.670	20.948
Emergency equipment	240.914	20.097	240.914	20.097	0.000	0.000
Crew and baggage	580.000	16.868	0.000	0.000	580.000	16.868
<b>TOTAL</b>	<b>5473.754</b>	<b>19.588</b>	<b>3780.284</b>	<b>19.982</b>	<b>1693.470</b>	<b>18.708</b>

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WEIGHT AND BALANCE MANUAL

**2-30. Weighing check list**

The weighing check list is used to record the configuration of the aircraft at time of weighing by indicating the quantity required (column "R") and the actual quantity fitted (column "F") for each item. The item applicability to the "Manufacturer's Empty Weight" (MEW) is indicated by "V" in column "MEW". The weighing check list is also used to adjust the weighed weight of the aircraft to the OEW and MEW conditions.

Included in the weighing check list are:

- Items which have alternates which may be substituted.
- Loose or easily removable items of equipment.
- Operator's items: The weights given in the weighing check list are those of complete items. If some parts are missing at weighing, see paragraph 2-20-03.

The weighing check list is not complete list of all items of equipment on the aircraft. Accordingly items considered as permanently fixed are not included in the list.



## WEIGHT AND BALANCE MANUAL

### 2-30-01. Table of compartments and subdivisions

#### 10. ELECTRONIC COMPARTMENT

- 101 Battery and radar
- 102 Electronic rack 80 VU
- 103 Electronic rack 90 VU
- 104 Inertial navigation

#### 20. FLIGHT DECK

- 201 Emergency equipment
- 202 Crew seats

#### 30. CABIN

- 301 Attendant seats
- 302 Passenger seats \*
- 303 Passenger life vests \*
- 305 Doghouse, stowages, partitions, curtains and carpets
- 306 Galley structure and fixed equipment
- 307 Emergency equipment
- 309 Ancillary parts

\* see also chapter 2-30-02 page 16/16

#### 40. FLIGHT RECORDERS AND RA TRANSCEIVERS

- 401 Flight recorders
- 402 RA transceivers

#### 50. ADDITIONAL OPERATOR'S ITEMS

- 501 Fuel, oil, water, fluids
- 502 Aircraft documents and tool kit
- 503 Catering removable equipment
- 504 Catering allowance
- 505 Crew and baggage

#### 60. TIRES

- 601 Nose and main landing gear tires

#### 70. CARGO COMPARTMENTS

- 701 Forward hold cargo nets
- 702 Aft hold cargo nets
- 703 Bulk hold cargo nets



## WEIGHT AND BALANCE MANUAL

## 2-30-02. Equipment list

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
10		<u>ELECTRONIC COMPARTMENT</u>					
101		<u>BATTERY AND RADAR</u>					
1	2PB1	BAT-1 2758	SAFT DPT	25.320	5.794	1	V
2	2PB2	BAT-2 2758	SAFT DPT	25.320	6.828	1	V
3	1SQ1	XCVR-WEATHER RADAR, 1 822-1710-411	ROCKWELL COLLINS INC AIR	11.500	3.915	1	V
102		<u>ELECTRONIC RACK 80 VU</u>					
1	1CA1	FMGC-1 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
2	1CA2	FMGC-2 C13208AA00	THALES AVIONICS SA	7.000	9.388	1	V
3	1CC1	FAC-1 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
4	1CC2	FAC-2 C13206AA00	THALES AVIONICS SA	5.600	9.388	1	V
5	1CE1	SEC-1 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
6	1CE2	SEC-2 B372CAM0100	THALES AVIONICS SA	4.640	9.388	1	V
7	2CE1	ELAC-1 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
8	2CE2	ELAC-2 3945129100	THALES AVIONICS SA	9.200	9.388	1	V
9	3CE1	FCDC-1 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
10	3CE2	FCDC-2 115370-1521	LITEF "LITTON TECHNISCHE"	3.150	9.388	1	V
11	21CV	SFC 1 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
12	22CV	SFCC 2 200301E00000308	DIEHL AEROSPACE	8.100	9.388	1	V
13	10HQ	AEVC 87292325V07	THALES AVIONICS	1.700	9.388	1	V
14	1KS1	EIU-1 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
15	1KS2	EIU-2 777461-1-1	INTERTECHNIQUE-EROS	1.800	9.388	1	V
16	9RA	CONTROLLER - COCKPIT 100-2500-04	SECURAPLANE TEC	1.500	9.388	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	10RC1	XCVR-MVDR, 1 822-2763-020	4.610	9.388	1	1	V
18	10RC2	XCVR-MVDR, 2 822-2763-020	4.610	9.388	1	1	V
19	3RE1	XCVR-HF, 1 822-0990-003	12.600	9.388	1	1	V
20	101RH	CIDS DIRECTOR 1 Z014H000333B	5.000	9.388	1	1	V
21	102RH	CIDS DIRECTOR 2 Z014H000333B	5.000	9.388	1	1	V
22	1RN	AMU AMU4031SA140204	3.570	9.388	1	1	V
23	2RP1	RECEIVER-ADF, 1 822-0299-020	3.090	9.388	1	1	V
24	3RS1	RECEIVER-VOR/MKR, 1 822-0297-020	3.920	9.388	1	1	V
25	3RS2	RECEIVER-VOR/MKR, 2 822-0297-020	3.920	9.388	1	1	V
26	2SD1	INTRG-DME, 1 822-2325-020	4.940	9.388	1	1	V
27	2SD2	INTRG-DME, 2 822-2325-020	4.940	9.388	1	1	V
28	1000SG	CMPTR-T/TISS 9005000-11203	8.000	9.388	1	1	V
29	1SH1	XPDR-ATC/MODE S, 1 7517800-12401	5.600	9.388	1	1	V
30	2TV	DAR 2243800-364	6.000	9.388	1	0	V
31	2TV1	MEMORY MEDIA (DAR) 2234641-008	0.100	9.388	1	0	V
32	10TV	DMU/FDIU (FDIMU) 2234320-02-02	4.300	9.388	1	1	V
33	1TW	CFDIU C12860AA04	5.215	9.388	1	1	V
34	1TX1	ATSU LA2T0G20705C070	4.580	9.388	1	1	V
35	1WT1	DMC-1 1982660116	9.374	9.388	1	1	V
36	1WT2	DMC-2 1982660116	9.374	9.388	1	1	V
37	1WT3	DMC-3 1982660116	9.374	9.388	1	1	V
38	1WV1	SDAC-1 350E5500206	5.760	9.388	1	1	V
39	1WV2	SDAC-2 350E5500206	5.760	9.388	1	1	V
40	1WW1	FWC-1 350E053021717	6.100	9.388	1	1	V
41	1WW2	FWC-2 350E053021717	6.100	9.388	1	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W	
					R	F		
103		<u>ELECTRONIC RACK 90 VU</u>						
1	1CE3	SEC-3	4.640	5.080	1	1	V	
2	5GA1	B372CAM0100 LGCIU-1	5.900	5.080	1	1	V	
3	5GA2	80-178-03-88013 LGCIU-2	5.900	5.080	1	1	V	
4	10GG	80-178-03-88013 BSCU	11.000	5.080	1	1	V	
5	1HA1	E21327107	MESSIER BUGATTI SA	2.000	5.080	1	1	V
6	1HA2	BMC-1	LIEBHERR-AEROSPACE	2.000	5.080	1	1	V
7	47HH	70418A010101 BMC-2	LIEBHERR-AEROSPACE	4.500	5.080	1	1	V
8	57HH	CONT-AIR COND SYSTEM 1803B0000-04	LIEBHERR-AEROSP	4.500	5.080	1	1	V
9	11HL	CONT-AIR COND SYSTEM 1803B0000-04	LIEBHERR-AEROSP	2.250	5.080	1	1	V
10	12HL	PRESS CONT 1 20791-13AD	NORD-MICRO AG &	2.250	5.080	1	1	V
11	100HW	PRESS CONT 2 20791-13AD	NORD-MICRO AG &	4.000	5.080	1	1	V
12	7QJ	CSAS CONTROL UNIT 3959A0000K06	LIEBHERR-AEROSP	3.710	5.080	1	1	V
13	9QJ	FLSCU-1 30042-0601	SIMMONDS PRECISION PRODUCTS	3.710	5.080	1	1	V
14	3QT	FLSCU-2 30042-0601	SIMMONDS PRECISION PRODUCTS	4.900	5.080	1	1	V
15	40RT1	FQIC 30320-0202	SIMMONDS PRECISION PRODUCTS	5.000	5.080	1	1	V
16	40RT2	MMR-1 822-1821-430	ROCKWELL COLLINS INC AIR	5.000	5.080	1	1	V
17	24XG	MMR-2 822-1821-430	ROCKWELL COLLINS INC AIR	5.000	5.080	1	1	V
18	1XU1	GAPCU 1700667D	HAMILTON SUNDSTRAND CORP	5.830	5.080	1	1	V
19	1XU2	GCU-1 767584M	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
19	1XU2	GCU-2 767584M	HAMILTON SUNDSTRAND CORP	4.000	5.080	1	1	V
104		<u>INERTIAL NAVIGATION</u>						
1	1FP1	ADIRU-1 HG2030BE04	HONEYWELL SENSOR AND	6.960	8.464	1	1	V
2	1FP2	ADIRU-2 HG2030BE04	HONEYWELL SENSOR AND	6.960	8.464	1	1	V
3	1FP3	ADIRU-3 HG2030BE04	HONEYWELL SENSOR AND	6.960	8.464	1	1	V



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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
20		<b><u>FLIGHT DECK</u></b>					
201		<b><u>EMERGENCY EQUIPMENT</u></b>					
1	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.085	2	2	
2	FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	5.590	2	2	
3	DESCENT DEVICE-EMERGENCY 208724-0	AERAZUR	0.472	5.794	2	2	
4	FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	5.794	1	1	
5	AXE-CRASH EIS76014-10000	EIS AIRCRAFT GMBH	1.100	5.893	1	1	
6	GLOVES FKK8-35KL	BENNETT SAFETYWEAR LTD	0.250	5.893	1	1	
7	SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.490	5.917	1	1	
8	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	5.922	1	1	
9	LIFE VEST,FLIGHT CREW P01202-201C	EASTERN AERO MA	0.460	6.067	1	1	
202		<b><u>CREW SEATS</u></b>					
1	SEAT-CAPTAIN TAAI3-03PE22-01	EADS SOGERMA	39.200	5.085	1	1	V
2	SEAT-F/O TAAI3-03CE22-01	EADS SOGERMA	39.200	5.085	1	1	V
3	SEAT-THIRD OCCUPANT 16800-01-00	ZODIAC SEATS FRANCE	15.300	5.677	1	1	V
4	SEAT-FOURTH OCCUPANT 2510154-03-00	EADS SOGERMA	6.800	6.067	1	1	V



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
30		<u>CABIN</u>					
301		<u>ATTENDANT SEATS</u>					
1		CABIN ATTENDANT SEAT 2128-75TE00BCW1 GOODRICH CORPOR	13.100	7.127	1	1	V
2		CABIN ATTENDANT SEAT 2128-75UE00BCW1 GOODRICH CORPOR	12.900	7.127	1	1	V
3		CABIN ATTENDANT SEAT 2128-75RE00BCW1 GOODRICH CORPOR	12.900	31.641	2	2	V
4		CABIN ATTENDANT SEAT 2428-81BE03G0CW CHEMISCHE FABRI	11.100	32.715	1	1	V
302		<u>PASSENGER SEATS (for individual H-Arm refer to last page(s) ch 2.30)</u>					
1	S01	TRIPLE SEAT Y/C 878801-422 WEBER AIRCRAFT	89.220		1	1	
2	S02	TRIPLE SEAT Y/C 878801-421 WEBER AIRCRAFT	89.490		1	1	
3	S03	TRIPLE SEAT Y/C 878801-404 WEBER AIRCRAFT	49.460		3	3	
4	S04	TRIPLE SEAT Y/C 878801-403 WEBER AIRCRAFT	49.370		3	3	
5	S05	TRIPLE SEAT Y/C 878801-408 WEBER AIRCRAFT	48.400		1	1	
6	S06	TRIPLE SEAT Y/C 878801-407 WEBER AIRCRAFT	48.220		1	1	
7	S07	TRIPLE SEAT Y/C 878801-410 WEBER AIRCRAFT	48.850		1	1	
8	S08	TRIPLE SEAT Y/C 878801-409 WEBER AIRCRAFT	47.810		1	1	
9	S09	TRIPLE SEAT Y/C 878801-412 WEBER AIRCRAFT	48.530		1	1	
10	S10	TRIPLE SEAT Y/C 878801-411 WEBER AIRCRAFT	48.630		1	1	
11	S11	TRIPLE SEAT Y/C 878801-406 WEBER AIRCRAFT	48.690		19	19	
12	S12	TRIPLE SEAT Y/C 878801-405 WEBER AIRCRAFT	48.690		19	19	
13	S13	TRIPLE SEAT Y/C 878801-414 WEBER AIRCRAFT	48.400		1	1	
14	S14	TRIPLE SEAT Y/C 878801-413 WEBER AIRCRAFT	48.440		1	1	
15	S15	TRIPLE SEAT Y/C 878801-416 WEBER AIRCRAFT	48.170		1	1	
16	S16	TRIPLE SEAT Y/C 878801-415 WEBER AIRCRAFT	47.990		1	1	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
17	S17	TRIPLE SEAT Y/C 878801-418	WEBER AIRCRAFT	32.700	1	1	
18	S18	TRIPLE SEAT Y/C 878801-417	WEBER AIRCRAFT	32.660	1	1	
303		PASSENGER LIFE VESTS (for individual H-Arm refer to last page(s) ch 2.30)					
1		LIFE VEST,PAX (Required: 174 Fitted: 174) P01202-201	EASTERN AERO MA	0.460	-	-	
305		DOGHOUSE, STOWAGES, PARTITIONS, CURTAINS AND CARPETS					
1		NTF FWD 471R6756	GERFLOR	10.900	7.261	1	V
2		PARTITION LH D252-74731-018-00	EADS AIRBUS GMB	19.000	8.040	1	V
3		PARTITION RH D252-74731-021-00	EADS AIRBUS GMB	15.000	8.040	1	V
4		CARPET FT02219200LS700	LANTAL TEXTILES	145.100	19.793	1	V
5		DOGHOUSE LH 113517K	MUEHLENBERG INT	7.970	31.482	1	V
6		DOGHOUSE RH 113518K	MUEHLENBERG INT	7.990	31.482	1	V
7		PARTITION RH 101576L	MUEHLENBERG INT	47.000	31.574	1	V
8		PARTITION LH 101597E	MUEHLENBERG INT	60.700	31.574	1	V
9		NTF AFT 471R6756	GERFLOR	11.500	32.418	1	V
306		GALLEY STRUCTURE AND FIXED EQUIPMENT					
1		GALLEY 1 601851-004701	DRIESSEN AEROSP	107.000	6.691	1	
2		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	6.691	2	
3		GALLEY 4B 601891-001601	DRIESSEN AEROSP	154.500	33.199	1	
4		BEVERAGE MAKER 9001-01-0000-01	SELL GMBH PREMI	6.400	33.199	1	
307		EMERGENCY EQUIPMENT					
1		LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	7.127	2	
2		FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	7.127	2	



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
3		SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.490	7.127	2	2
4		FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	7.127	1	1
5		TOOL MANUAL RELEASE 995000	BE AEROSPACE	0.014	7.127	2	2
6		MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	7.136	1	1
7		ESCAPE SLIDE FWD LH/RH D31516-717	AIR CRUISERS CO	25.000	7.562	2	2
8		DECORATIVE COVER FWD 62367-303	AIR CRUISERS CO	2.400	7.562	2	2
9		POCKET,INFANT LIFE VEST A256-70815-022-00	EADS AIRBUS GMB	0.230	8.833	2	2
10		LIFE VEST,INFANT P0640-201	EASTERN AERO MA	0.500	8.833	5	5
11		OXYGEN MASK 289-601-248	AVOX SYSTEMS IN	0.130	8.833	2	2
12		PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.130	8.833	1	1
13		POCKET,DEMO KIT A256-70815-068-00	EADS AIRBUS GMB	0.230	16.971	2	2
14		LIFE VEST,DEMO P01202-201D	EASTERN AERO MA	0.270	16.971	2	2
15		SEAT BELT (DEMO) 2010-6-011-2256	AMSAFE AVIATION	0.170	16.971	2	2
16		DEMONSTRATION MASK 289-1001	AVOX SYSTEMS IN	0.080	16.971	2	2
17		ESCAPE SLIDE OW.LH D31865-111	AIR CRUISERS CO	32.400	21.360	1	1
18		ESCAPE SLIDE OW.RH D31865-112	AIR CRUISERS CO	32.400	21.360	1	1
19		PRESSURE BOTTLE OWS LH/RH 60592-201	AIR CRUISERS CO	7.200	21.360	2	2
20		MEGAPHONE ACREM1A	ACR ELECTRONICS	1.610	31.295	1	1
21		OXYGEN MASK 289-601-248	AVOX SYSTEMS IN	0.130	31.482	6	6
22		PORTABLE OXYGEN CYL 3552AAAWAACXCD	AVOX SYSTEMS IN	2.130	31.482	3	3
23		LIFE VEST,CABIN CREW P01202-201C	EASTERN AERO MA	0.460	31.641	2	2
24		FLASHLIGHT P2-07-0015-002	DME CORPORATION	0.660	31.641	2	2
25		SMOKE HOOD 15-40F80	AIR LIQUIDE L S	2.490	31.641	2	2
26		FIRE EXTINGUISHER 74-20	TOTAL WALTHER F	2.250	31.641	2	2
27		TOOL MANUAL RELEASE 995000	BE AEROSPACE	0.014	31.641	2	2



## WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
28		ESCAPE SLIDE AFT LH/RH D31517-717 AIR CRUISERS CO	25.000	32.182	2	2	
29		DECORATIVE COVER AFT 62371-303 AIR CRUISERS CO	2.400	32.182	2	2	
30		LIFE VEST,CABIN CREW P01202-201C EASTERN AERO MA	0.460	32.715	1	1	
31		FLASHLIGHT P2-07-0015-002 DME CORPORATION	0.660	32.715	1	1	
32		TOOL MANUAL RELEASE 995000 BE AEROSPACE	0.014	32.715	1	1	
33		LIFE VEST,SPARE P01202-201 EASTERN AERO MA	0.460	33.199	5	5	
309		<u>ANCILLARY PARTS</u>					
1		LITERATURE POCKET A252-89532-026-00 EADS AIRBUS GMB	0.360	8.040	6	6	V

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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
40		<b><u>FLIGHT RECORDERS AND RA TRANSCEIVERS</u></b>					
401		<b><u>FLIGHT RECORDERS</u></b>					
1		TRANSMITTER-ELT S1851501-01	KANNAD	1.980	31.295	1	V
2		CVR 2100-1226-02	L-3 COMMUNICATIONS CORP	4.520	35.126	1	V
3		DFDR 2100-4245-00	L-3 COMMUNICATIONS CORP	4.830	35.126	1	V
402		<b><u>RA TRANSCEIVERS</u></b>					
1		RA1 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V
2		RA2 ALT. TRANSCEIVER 822-0334-020	ROCKWELL COLLINS INC AIR	4.750	26.429	1	V



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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
50		<b><u>ADDITIONAL OPERATOR'S ITEMS</u></b>					
501		<b><u>FUEL, OIL, WATER, FLUIDS</u></b>					
1		IDG OIL	4.900	15.387	2	2	
2		WATER	200.000	15.546	1	0	
3		ENGINE OIL	47.000	16.085	2	2	
4		UNUSABLE FUEL	64.100	18.253	1	0	
5		WASTE TANK FLUID	10.000	32.050	1	0	
6		APU OIL	5.000	37.675	1	1	
502		<b><u>AIRCRAFT DOCUMENTS AND TOOL KIT</u></b>					
1		FLIGHT KIT 1	1.080	5.767	1	1	
2		FLIGHT KIT 3	0.050	5.767	4	4	
3		A/C DOCUMENTS	8.700	5.767	1	0	
4		SUITCASE ASSY FLIGHT KIT 2 D2567045301400 EADS AIRBUS GMB	12.000	8.254	1	0	
503		<b><u>CATERING REMOVABLE EQUIPMENT</u></b>					
1		STANDARD UNIT/CONTAINER G1 DLH294 DRIESSEN AIRCRA	2.860	6.691	3	3	
2		WASTE TROLLEY FULL-SIZE G1 TG605005 DRIESSEN AIRCRA	16.750	6.691	1	1	
3		MEAL TROLLEY FULL-SIZE G1 TK605017 DRIESSEN AIRCRA	17.950	6.691	3	3	
4		WASTE BIN G1 WA601003 DRIESSEN AIRCRA	5.450	6.691	1	1	
5		STANDARD UNIT/CONTAINER G4B DLH294 DRIESSEN AIRCRA	2.860	33.199	10	10	
6		WASTE TROLLEY FULL-SIZE G4B TG605005 DRIESSEN AIRCRA	16.750	33.199	1	1	
7		MEAL TROLLEY FULL-SIZE G4B TK605017 DRIESSEN AIRCRA	17.950	33.199	2	2	
8		MEAL TROLLEY HALF-SIZE G4B TL604064 DRIESSEN AIRCRA	11.500	33.199	2	2	
9		WASTE BIN G4B WA601003 DRIESSEN AIRCRA	5.450	33.199	1	1	


  
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ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
504		<u>CATERING ALLOWANCE</u>					
	1	CATERING GALLEY 1	378.370	6.691	1	0	
505	2	CATERING GALLEY 4B	440.300	33.199	1	0	
		<u>CREW AND BAGGAGE</u>					
505	1	FLIGHT CREW	90.000	5.085	2	0	
	2	ATTENDANT AFT LAV A	80.000	7.327	2	0	
	3	ATTENDANT AFT PART LH	80.000	31.841	1	0	
	4	ATTENDANT AFT PART RH	80.000	31.841	1	0	
	5	ATTENDANT FWD LAV G	80.000	32.515	1	0	


  
**WEIGHT AND BALANCE MANUAL**

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
60		<b><u>TIRES</u></b>					
601		<b><u>NOSE AND MAIN LANDING GEAR TIRES</u></b>					
1		TIRE-NLG, 1/2 309Q62-1	23.450	7.605	2	2	V
2		TIRE-MLG, 1/2/3/4 467Q02-3	91.200	20.250	4	4	V

**A320**  
WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
70		<b><u>CARGO COMPARTMENTS</u></b>					
701		<b><u>FORWARD HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE C AC40-0217200           AMSAFE BRIDPORT	1.200	10.033	1	1	V
2		DOOR NET TYPE A AC40-0217000           AMSAFE BRIDPORT	3.500	11.633	1	1	V
3		DIVIDER NET TYPE A2 AC40-0209500           AMSAFE BRIDPORT	3.000	13.233	1	1	V
702		<b><u>AFT HOLD CARGO NETS</u></b>					
1		DIVIDER NET TYPE A2 AC40-0209500           AMSAFE BRIDPORT	3.000	22.962	1	1	V
2		DOOR NET TYPE B AC40-0217100           AMSAFE BRIDPORT	3.200	24.829	1	1	V
3		DOOR NET TYPE A AC40-0217000           AMSAFE BRIDPORT	3.500	25.895	1	1	V
4		DIVIDER NET TYPE A1 AC40-0217500           AMSAFE BRIDPORT	4.500	27.762	1	1	V
703		<b><u>BULK HOLD CARGO NETS</u></b>					
1		DOOR NET TYPE E AC40-0217400           AMSAFE BRIDPORT	3.550	28.295	1	1	V
2		DOOR NET TYPE D AC40-0217300           AMSAFE BRIDPORT	3.670	29.362	1	1	V



## WEIGHT AND BALANCE MANUAL

## PASSENGER SEATS AND LIFE VEST LAYOUT

ROW	LEFT			RIGHT		
	SEAT	VEST	H-ARM (m)	SEAT	VEST	H-ARM (m)
1	S02	3	8.872	S01	3	8.872
2	S04	3	9.779	S03	3	9.779
3	S04	3	10.643	S03	3	10.643
4	S04	3	11.506	S03	3	11.506
5	S12	3	12.370	S11	3	12.370
6	S12	3	13.132	S11	3	13.132
7	S12	3	13.894	S11	3	13.894
8	S12	3	14.656	S11	3	14.656
9	S12	3	15.418	S11	3	15.418
10	S06	3	16.180	S05	3	16.180
11	S08	3	17.196	S07	3	17.196
12	S10	3	18.161	S09	3	18.161
13	S12	3	18.923	S11	3	18.923
14	S12	3	19.685	S11	3	19.685
15	S12	3	20.447	S11	3	20.447
16	S12	3	21.209	S11	3	21.209
17	S12	3	21.971	S11	3	21.971
18	S12	3	22.733	S11	3	22.733
19	S12	3	23.495	S11	3	23.495
20	S12	3	24.257	S11	3	24.257
21	S12	3	25.019	S11	3	25.019
22	S12	3	25.781	S11	3	25.781
23	S12	3	26.543	S11	3	26.543
24	S12	3	27.305	S11	3	27.305
25	S12	3	28.067	S11	3	28.067
26	S12	3	28.829	S11	3	28.829
27	S14	3	29.591	S13	3	29.591
28	S16	3	30.353	S15	3	30.353
29	S18	3	31.115	S17	3	31.115

\* Item missing at weighing