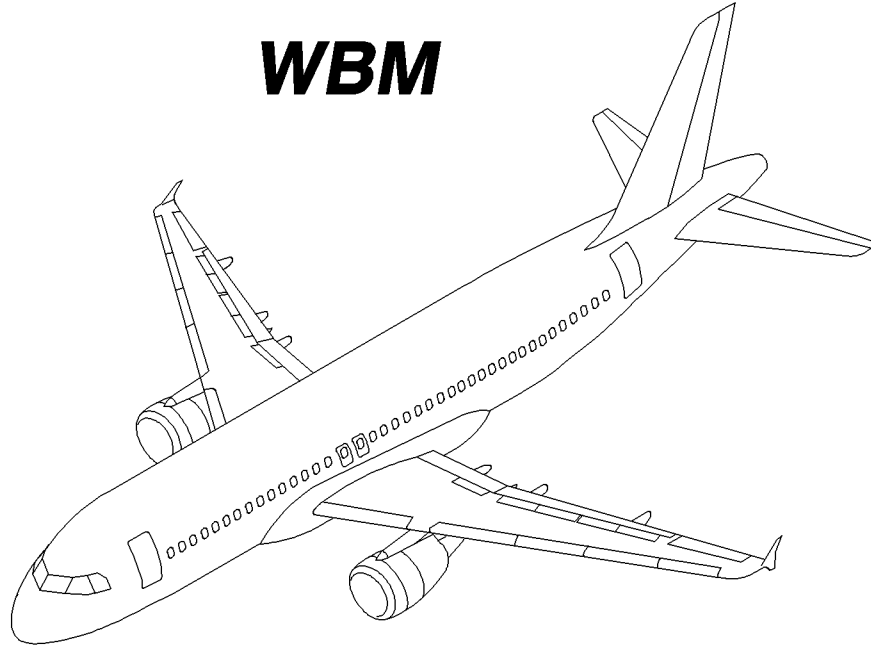




A320

WEIGHT AND BALANCE MANUAL

WBM



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Issue : MAR 88



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 it's 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 (= Devalidated) : The page is devalidated (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.



WEIGHT AND BALANCE MANUAL

TABLE OF CONTENTS

1.00 GENERAL

- 01 – Identification
- 02 – Units of measurement and conversion factors
- 03 – List of abbreviations
- 04 – Aircraft views and main dimensions
- 05 – Reference trihedral and balance scale definition
- 06 – Definition of the reference chord and relevant formulae
- 07 – Weight definitions
- 08 – Location of aircraft main components
- 09 – Stabilizer trim wheel setting
- 10 – Effect of moving components on the aircraft CG

1.10 LIMITATIONS

- 01 – Design weights
- 02 – Design center of gravity limits
- 03 – Fuselage shear loads and bending moments due to payload
- 04 – Floor loading limits
- 05 – Loading of forward cargo hold (compartment 1)
- 06 – Loading of aft cargo hold (compartment 3 and 4)
- 07 – Loading of rear (bulk) cargo hold (compartment 5)
- 08 – Maximum jacking loads
- 09 – Jacking stability
- 10 – Aircraft stability on wheels

1.20 FUEL

- 01 – General
- 02 – Refueling of tanks
- 03 – Fuel management in flight
- 04 – Usable fuel
- 05 – Unusable fuel
- 06 – Unpumpable fuel
- 07 – Defueling procedure prior to weighing



WEIGHT AND BALANCE MANUAL

1.30 FLUIDS

- 01 – General
- 02 – Engine fluids
- 03 – APU oil
- 04 – Hydraulic system fluid
- 05 – Potable water
- 06 – Waste tank

1.40 PERSONNEL

- 01 – General
- 02 – Flight crew members
- 03 – Cabin crew members
- 04 – Passengers
- 05 – In-flight movements

1.50 INTERIOR ARRANGEMENT

- 01 – General
- 02 – Flight compartment stowages
- 03 – Cabin hatracks
- 04 – Galleys
- 05 – Toilets
- 06 – Additional cabin stowage compartments

1.60 CARGO

- 01 – General
- 02 – Cargo hold doors
- 03 – Forward cargo hold (compartment 1)
- 04 – Aft cargo hold (compartment 3 and 4)
- 05 – Rear (bulk) cargo hold (compartment 5)
- 06 – Tie down methods
- 07 – Live animal transport
- 08 – Container transport
- 09 – Pallet transport

1.80 GROUND OPERATIONS

- 01 – General
- 02 – Jacking point locations
- 03 – Jacking static loads
- 04 – Weighing on jacks
- 05 – Weighing on wheels
- 06 – Equipment / Component removal list
- 07 – Aircraft stability control on ground during loading or unloading



WEIGHT AND BALANCE MANUAL

1.90 EXAMPLES

- 01 – General
- 02 – Operational empty weight and CG buildup
- 03 – Payload and fuel vectors
- 04 – Typical loading diagram

2.00 AIRCRAFT WEIGHING REPORTS

|



WEIGHT AND BALANCE MANUAL

CROSS REFERENCE TABLE

THIS TABLE LISTS THE AIRCRAFT, WHICH ARE TAKEN INTO ACCOUNT BY THE CURRENT REVISION,
AND CROSS-REFERENCES THE:

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

REV : 003

MSN	REGISTRATION	MODEL
2649	VP-BJH	A320-232



WEIGHT AND BALANCE MANUAL

LIST OF EFFECTIVE PAGES

N=NEW R=REVISED

REV : 003

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WEIGHT AND BALANCE MANUAL

LIST OF EFFECTIVE PAGES

N=NEW R=REVISED

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WEIGHT AND BALANCE MANUAL

LIST OF EFFECTIVE PAGES

N=NEW R=REVISED

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WEIGHT AND BALANCE MANUAL

LIST OF EFFECTIVE PAGES

N=NEW R=REVISED

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WEIGHT AND BALANCE MANUAL

LIST OF EFFECTIVE PAGES

N=NEW R=REVISED

REV : 003

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WEIGHT AND BALANCE MANUAL

LIST OF FIGURES

<u>Figure</u>		<u>Title</u>
<u>Reference</u>		
1-00-04	:	Aircraft dimensions
1-00-05A	:	Reference axis
1-00-05B	:	Engines reference trihedral
1-00-06A	:	Table of conversion % RC to H-arm
1-00-06B	:	Table of conversion H-arm to % RC
1-00-08A	:	Station diagram for the wing
1-00-08B	:	Station diagram for horizontal tail
1-00-08C	:	Station diagram for vertical tail
1-00-08D	:	Fuselage frame numbering
1-00-08E	:	H-arm table of fuselage frames
1-00-09	:	Take-off horizontal stabilizer trim wheel setting
1-10-02	:	Certified CG limits
1-10-03	:	Permissible fuselage shear loads and bending moments due to payload
1-10-09	:	Aircraft stability on jacks
1-20-02A	:	Refueling : H-arm of fuel
1-20-02B	:	Refueling table
1-20-04A	:	Table of fuel H-arm
1-20-04B	:	Table of fuel H-arm
1-20-04C	:	H-arm and Y-arm of fuel inner cells
1-20-04D	:	H-arm and Y-arm of fuel outer cells
1-20-04E	:	H-arm of fuel center tank
1-40-02	:	Flight compartment arrangement
1-40-03	:	Cabin arrangement

WEIGHT AND BALANCE MANUAL

FigureReferenceTitle

1-60-02A	:	Forward cargo door opening size and stations
1-60-02B	:	Aft cargo door opening size and stations
1-60-02C	:	Rear (bulk) cargo door opening size and stations
1-60-03A	:	Arrangement forward cargo hold (compartment 1)
1-60-03B	:	Tie down points arrangement forward cargo hold
1-60-04A	:	Arrangement aft cargo hold (compartment 3 and 4)
1-60-04B	:	Tie down points arrangement aft cargo hold
1-60-05A	:	Arrangement rear (bulk) cargo hold (compartment 5)
1-60-05B	:	Tie down points arrangement rear (bulk) cargo hold
1-60-05C	:	Maximum dimensions of low density packages (tilted)
1-60-05D	:	Maximum dimensions of low density packages
1-60-05E	:	Maximum dimensions of low density packages
1-60-06	:	Tie down graphic method
1-80-02	:	Landing gear and jacking points geometry
1-80-05A	:	Aircraft jacking points H-arms
1-80-05B	:	CG as a function of A/C weight and nose landing gear load
1-80-07A	:	Typical aircraft loading stability example
1-80-07B	:	Aircraft loading stability chart
1-90-03A	:	Passenger envelopes and vectors
1-90-03B	:	Cargo hold vectors
1-90-03C	:	Fuel vector
1-90-04	:	Typical loading diagram



WEIGHT AND BALANCE MANUAL

<u>Figure</u>		<u>Title</u>
<u>Reference</u>		
1-80-02	:	Landing gear and jacking points geometry
1-80-05	:	CG as a function of A/C weight and nose landing gear load
1-80-07A	:	Typical aircraft loading stability example
1-80-07B	:	Aircraft loading stability chart
1-90-03A	:	Passenger envelopes and vectors
1-90-03B 1/2	:	Cargo hold vectors
1-90-03B 2/2	:	Cargo hold vectors
1-90-03C	:	Fuel vector
1-90-04	:	Typical loading diagram



WEIGHT AND BALANCE MANUAL

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

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
	20049	EQUIPMENT/FURNISHINGS - FLIGHT COMPARTMENT - INSTALL SLIDING TABLES AT PILOT'S STATION -	ALL
	20059	AIR CONDITIONING - CARGO COMPARTMENT - VENTILATION - INSTALL SYSTEM IN AFT COMPARTMENT -	ALL
	20071	FIRE PROTECTION - CARGO COMPARTMENT FIRE EXTINGUISHING - INSTALL A SINGLE SHOT SYSTEM -	ALL
	20084	AIR CONDITIONING - AFT CARGO COMPARTMENT - INSTALL HEATING SYSTEM	ALL
	20109	WATER/WASTE- INSTALL VACUUM TOILET SYSTEM -	ALL
	20165	POWER PLANT - ENGINE - INSTALL IAE V2500 ENGINE RATED AT 25.000 LBS	ALL
	20221	INDICATING/RECORDING SYSTEMS - INSTALL ADDITIONAL SENSORS FOR IAE ENGINES HEALTH MONITORING -	ALL
	20268	WINGS-WING TIP FENCES-INTRODUCE WING TIPS INCLUDING FENCES-	ALL
	20324	FUEL - COUPLING REFUEL/DEFUEL - ADD COUPLING ON LH WING (72T MTOW A/C)	ALL
	20365	MINOR IMPROVEMENTS INTRODUCED FROM A/C 028 - DA ZONE -	ALL
	20653	GENERAL - COMPLEMENT OF BASIC DEFINITION FOLLOWING ESSENTIAL MAP DEVELOPMENT -	ALL
	20802	GENERAL - REINFORCE STRUCTURE FOR MTOW 73,5 T / MLW 64,5 T AND MZFW 60,5 T -	ALL
	21003	WATER/WASTE - RELOCATE POTABLE WATER TANK -	ALL



WEIGHT AND BALANCE MANUAL

LIST OF MAIN MODIFICATIONS AFFECTING THIS MANUAL

REV : 003

M	MOD	TITLE	VALIDITY (MSN)
	21033	LANDING GEAR - NLG - IMPROVE NOSE WHEEL STEERING -	ALL
	21061	MINOR IMPROVEMENTS INTRODUCED FROM A/C 60 - CASA ZONE -	ALL
	21103	EQUIPMENT/FURNISHINGS - CARGO COMPARTMENT - REARRANGE COMPARTMENT 4 INTO TWO ZONES -	ALL
	21146	FUEL - INTRODUCE NEW VALUES OF USABLE FUEL QUANTITIES ON A320-200 -	ALL
	22150	LANDING GEAR - MLG TWIN WHEEL - INTRODUCE A TWO STAGE SHOCK ABSORBER	ALL
	22548	INDICATING/RECORDING SYSTEMS - FWS - INTRODUCE C3 STD	ALL
	23008	POWER PLANT - IAE - INSTALL DERATED V2500-A5 ON A320 A/C	ALL
	23172	EQUIPMENT/FURNISHINGS - CARGO COMPARTMENT - REMOVE SMOKE CHANNELS	ALL
	23624	WINGS - WING TIP GLAZING - ADD VENTILATION AND DRAINAGE HOLES	ALL
	23900	GENERAL - INCREASE DESIGN WEIGHT TO 61T MZFW	ALL
	25802	E/F-INSTALL SET 4G FOR CARGO COMPT COMPONENTS IN REAR CARGO HOLD IN BULK VERSION WITH BULK CARGO DOOR	ALL
	26068	WINGS-MAIN STRUCTURE-MODIFY EDGE LANDING OF STR'S 8 AND 11 FWD AND AFT JOINTS AT ROOT JOINT	ALL
	27276	FLIGHT CONTROLS-ELAC SYSTEM-INTRODUCE ELAC SOFTWARE "L80"	ALL
	27564	HYDRAULIC POWER-GENERAL SECTION 15-19-INTRODUCE MODIFIED IN-LINE CHECK VALVE ZCV63-6-1	ALL
	28330	EQUIPMENT/FURNISHINGS-FWD CARGO COMPT- INSTALL CARGO COMPONENTS FOR CLS CONFIGURATION (SET 4.1B) FOR A320	ALL
	28335	EQUIPMENT/FURNISHINGS-AFT CARGO COMPT- INSTALL CARGO COMPONENTS FOR CLS CONFIGURATION (SET 4.1D) FOR A320	ALL
	28507	PLCRD AND MARKINGS-FWD/AFT CARGO COMPT- INSTL SET 7.1C FOR CLS WITH OCCASIONAL BULK CAPABILITY WITH AND WITHOUT ACT	ALL
	30479	GENERAL - DESIGN WEIGHT - INCREASE A320 DESIGN WEIGHTS TO 77.0 MTOW, 66.0T MLW AND 62.5T MZFW (WV 012)	ALL



WEIGHT AND BALANCE MANUAL

LIST OF MAIN MODIFICATIONS AFFECTING THIS MANUAL

REV : 003

M	MOD	TITLE	VALIDITY (MSN)
	30749	ELEC AND ELEK COMMON INSTL-REPLACE CF,DK TYPE OF WIRES BY WIRES DM TYPE ON VU'S AND NON PRESSURIZED AREAS	ALL
	35577	EQUIPMENT/FURNISHINGS-PAX COMPARTMENT- INSTALL TWO CLASS CABIN LAYOUT FOR RJAO2 VERSION	ALL
	35600	EQUIPMENT/FURNISHINGS- BUFFET AND GALLEY- INSTALL GALLEYS FROM VENDOR MUEHLENBERG FOR RJAO2 VERSION	ALL



WEIGHT AND BALANCE MANUAL

GENERAL

01. Identification

Manufacturer : **AIRBUS S.A.S.**

Airline : **NORDWIND AIRLINES (NWS)**

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

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

B. Conversion factors

	MULTIPLY	BY	TO OBTAIN
WEIGHT	kilograms (kg) pounds (lb)	2.2046 0.4536	pounds (lb) kilograms (kg)
LENGTH	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)
VELOCITY	kilometers per hour (km/h) kilometers per hour (km/h) knots (kt) miles per hour (mph)	0.53996 0.6214 1.852 1.6093	knots (kt) miles per hour (mph) kilometers per hour (km/h) kilometers per hour (km/h)
CAPACITY/ QUANTITY	liters (l) US gallons (US gal)	0.2642 3.785	US gallons (US gal) liters (l)
VOLUME	cubic meters (m ³) cubic feet (ft ³)	35.3147 0.0283	cubic feet (ft ³) cubic meters (m ³)
DENSITY	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)
AREA	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)
PRESSURE	bars pounds per square inch (lb/in ²)	14.5 0.069	pounds per square inch (lb / in ²) bars

WEIGHT AND BALANCE MANUAL

03. List of abbreviationsA. 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 ₂	Oxygen
PAX or PASS	Passengers
P / L	Payload

WEIGHT AND BALANCE MANUAL

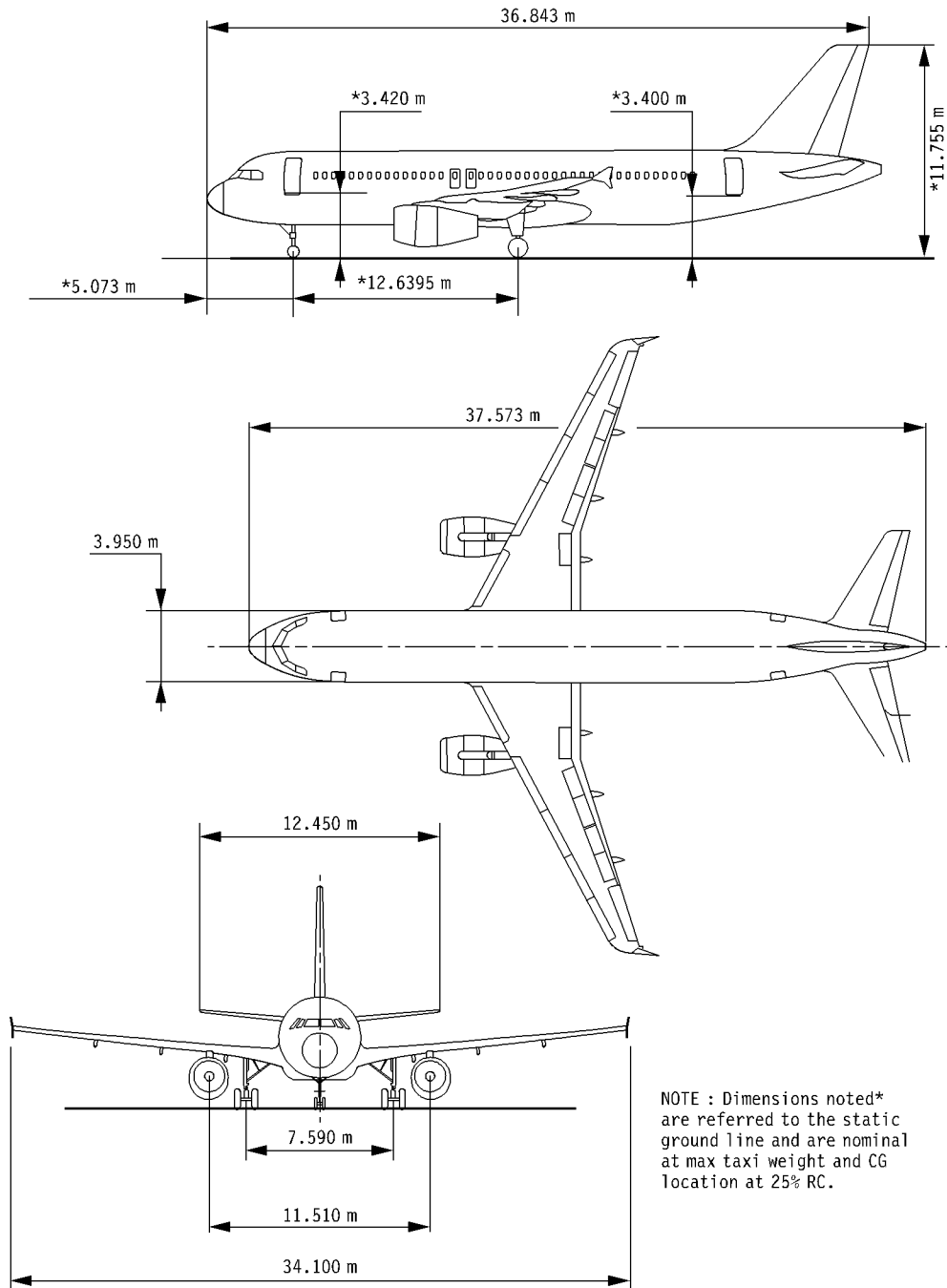
POS	Position
RC	Reference Chord
REF	Reference
RESP	Respectively
REV	Revision
RH	Right Hand
Seq	Sequence
Sin	Sine
Tan	Tangent
TC	Type Certificate
TO	Take-Off
TR	Temporary Revision
TSO	Technical Standard Order
ULD	Unit Load Device
US	United States
W	Weight
WBM	Weight and Balance Manual
Y-ARM	Lateral arm 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

04. Aircraft views and main dimensions

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



Aircraft Dimensions
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 (yoz) located 2.540 meters forward of aircraft nose section.

(02) Vertical plane (xoz) being the aircraft symmetry plane.

(03) Horizontal plane (xoy) 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).

NOWB-01-0005-002-A110AA

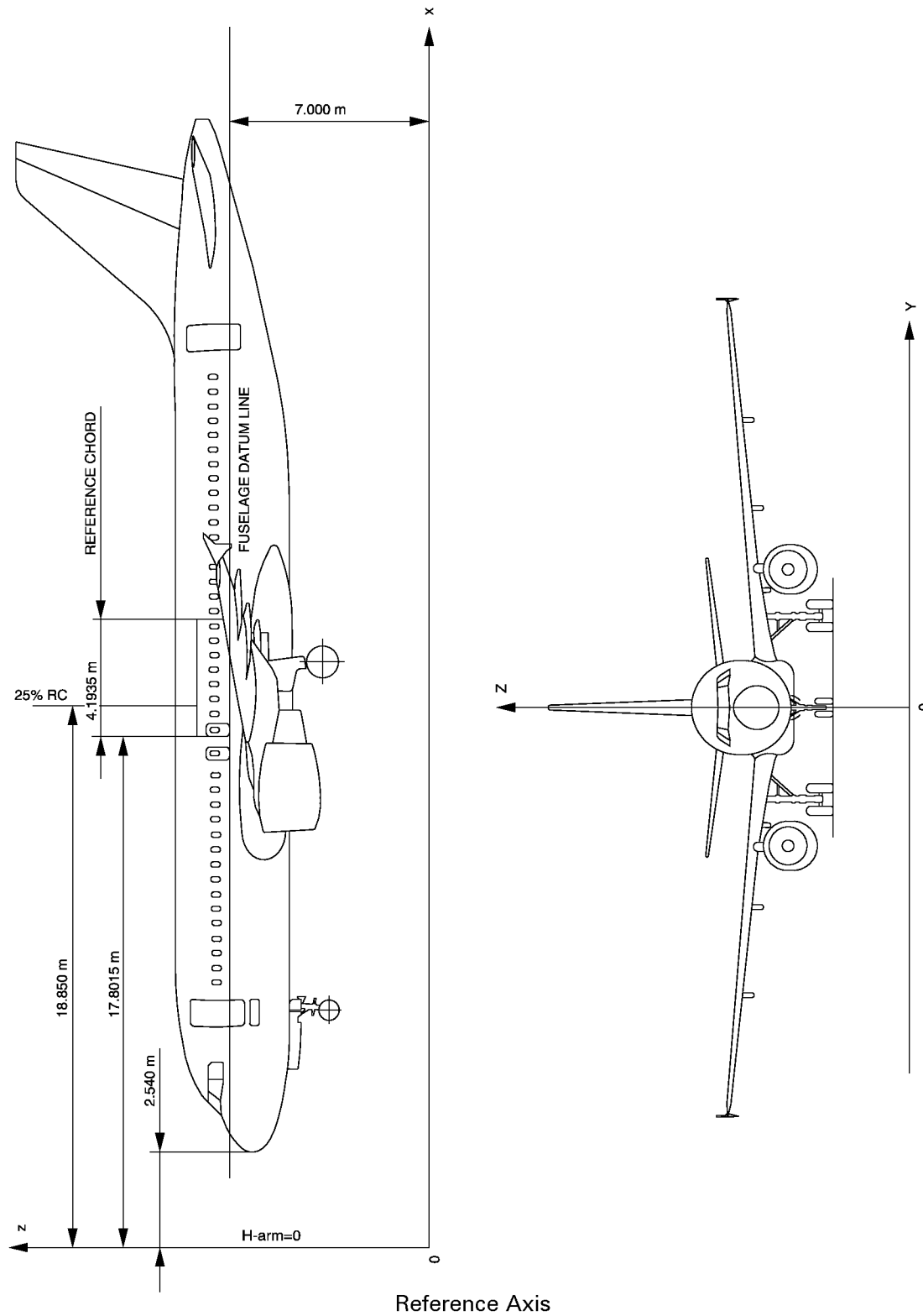
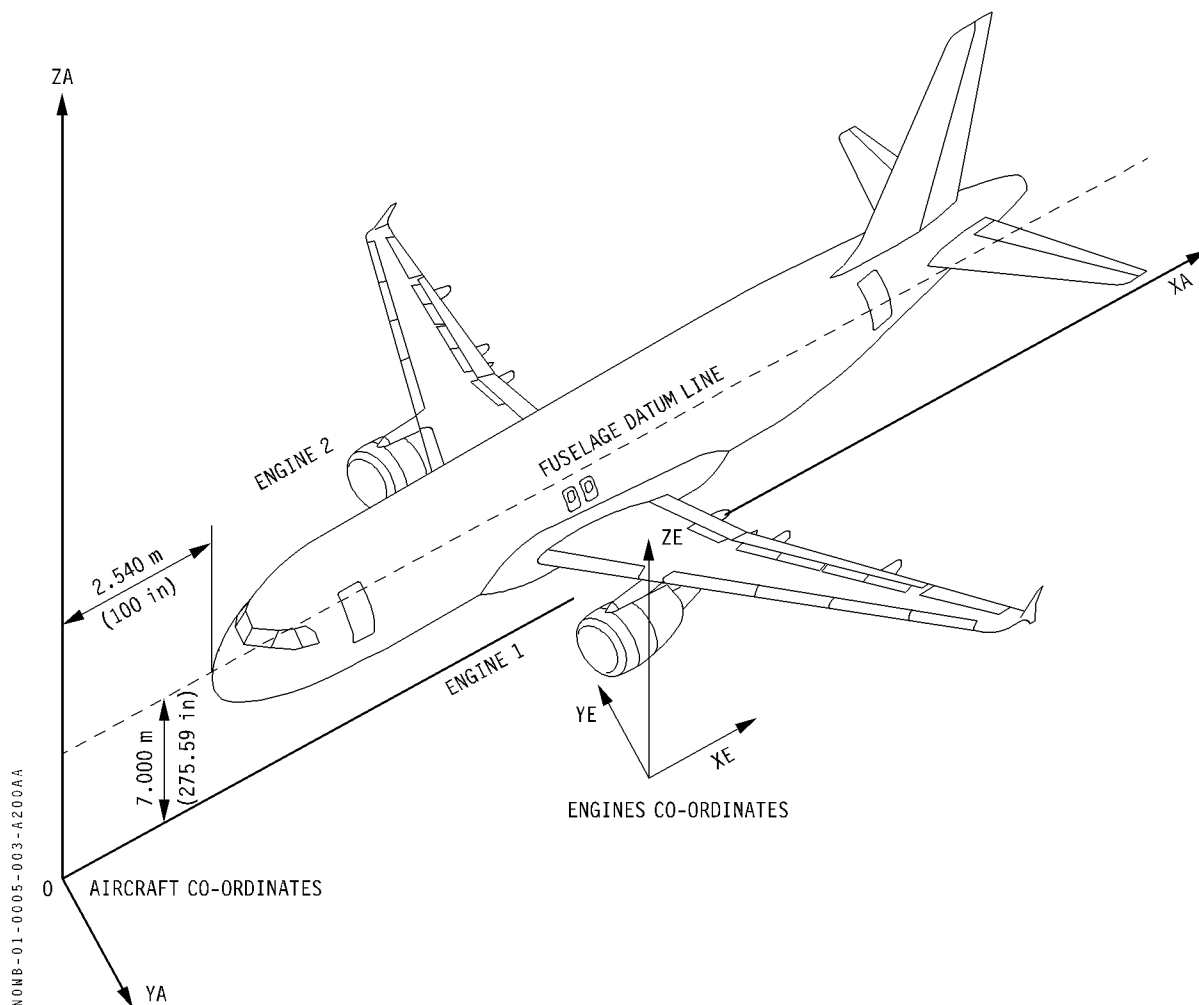


Figure 1-00-05A

Mod : 20268 or 20268 + 20139 + 22129

Seq : 110



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

AIRCRAFT CO-ORDINATES		(m)	(in)
XA	=	$13.157 + 0.999 X_E + 0.0384 Z_E$	$518.00 + 0.999 X_E + 0.0384 Z_E$
YA (Engine 1)	=	$+ 5.641 - 0.0175 X_E + Y_E$	$+ 222.09 - 0.0175 X_E + Y_E$
YA (Engine 2)	=	$- 5.641 + 0.0175 X_E + Y_E$	$- 222.09 + 0.0175 X_E + Y_E$
ZA	=	$5.033 - 0.0384 X_E + 0.999 Z_E$	$198.15 - 0.0384 X_E + 0.999 Z_E$

Engines Reference Trihedral

Figure 1-00-05B



WEIGHT AND BALANCE MANUAL

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.



WEIGHT AND BALANCE MANUAL

% 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
H-ARM (m)										

Table of Conversion % RC to H-arm

Figure 1-00-06A 1 / 2



WEIGHT AND BALANCE MANUAL

% 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	20.565
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
H-ARM (m)										

WN 1.00.06 003 AA 001

Table of Conversion % RC to H-arm

Figure 1-00-06A 2 / 2



WEIGHT AND BALANCE MANUAL

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										

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 O₂ 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

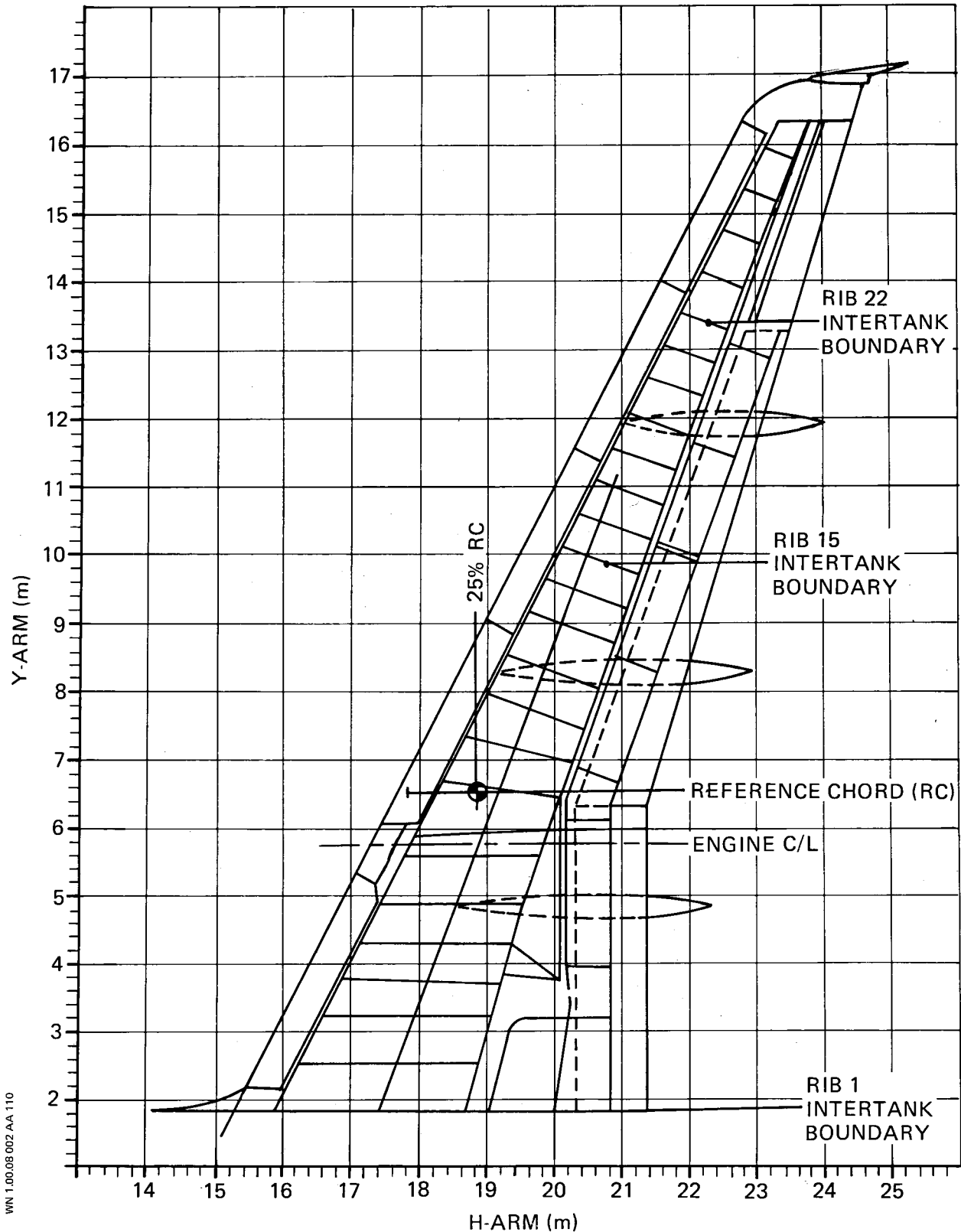
Horizontal tailplane : CASA 3511 D - 5518L001

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.

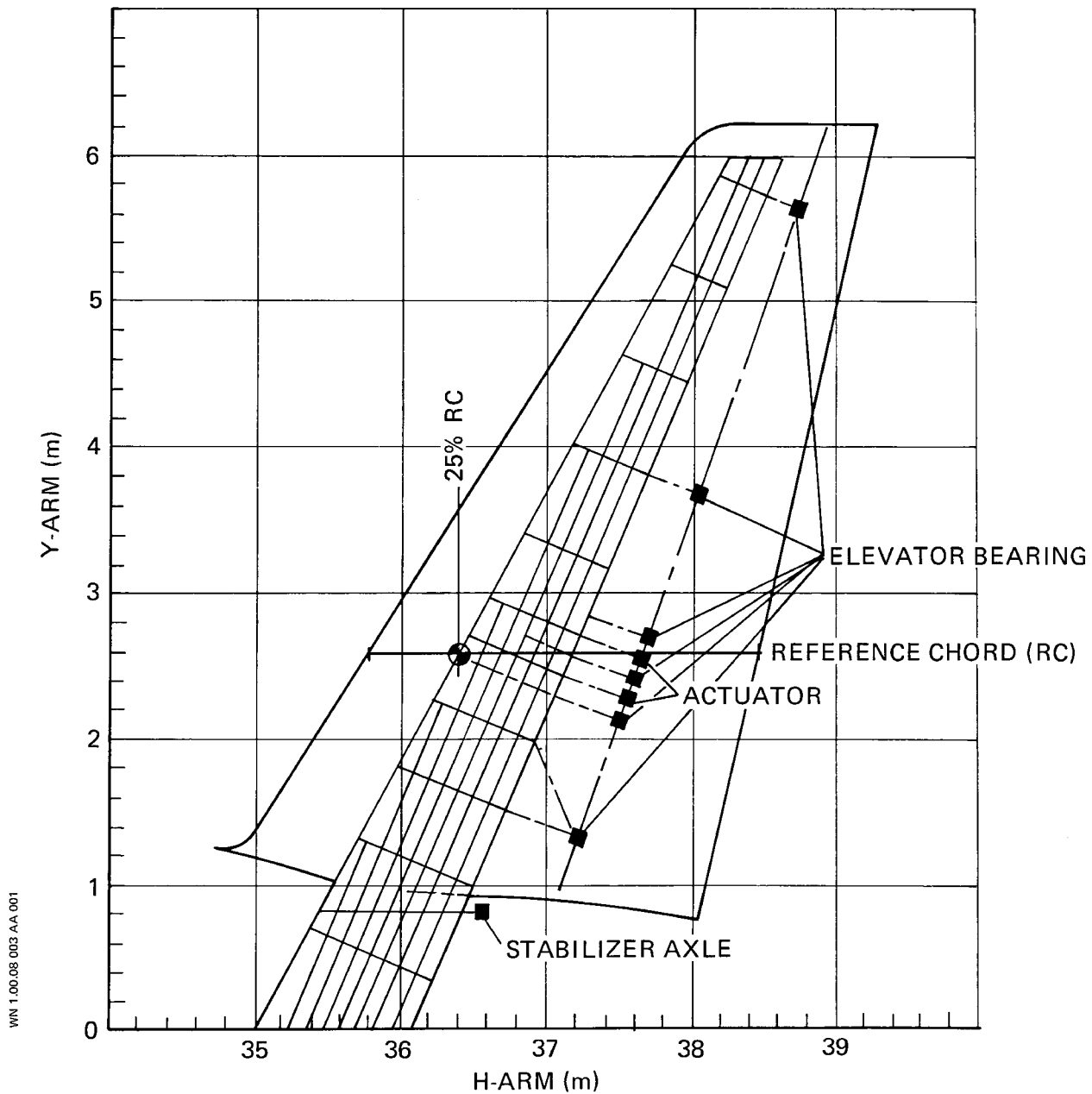
For fuselage frame numbers refer to figure 1-00-08D,

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



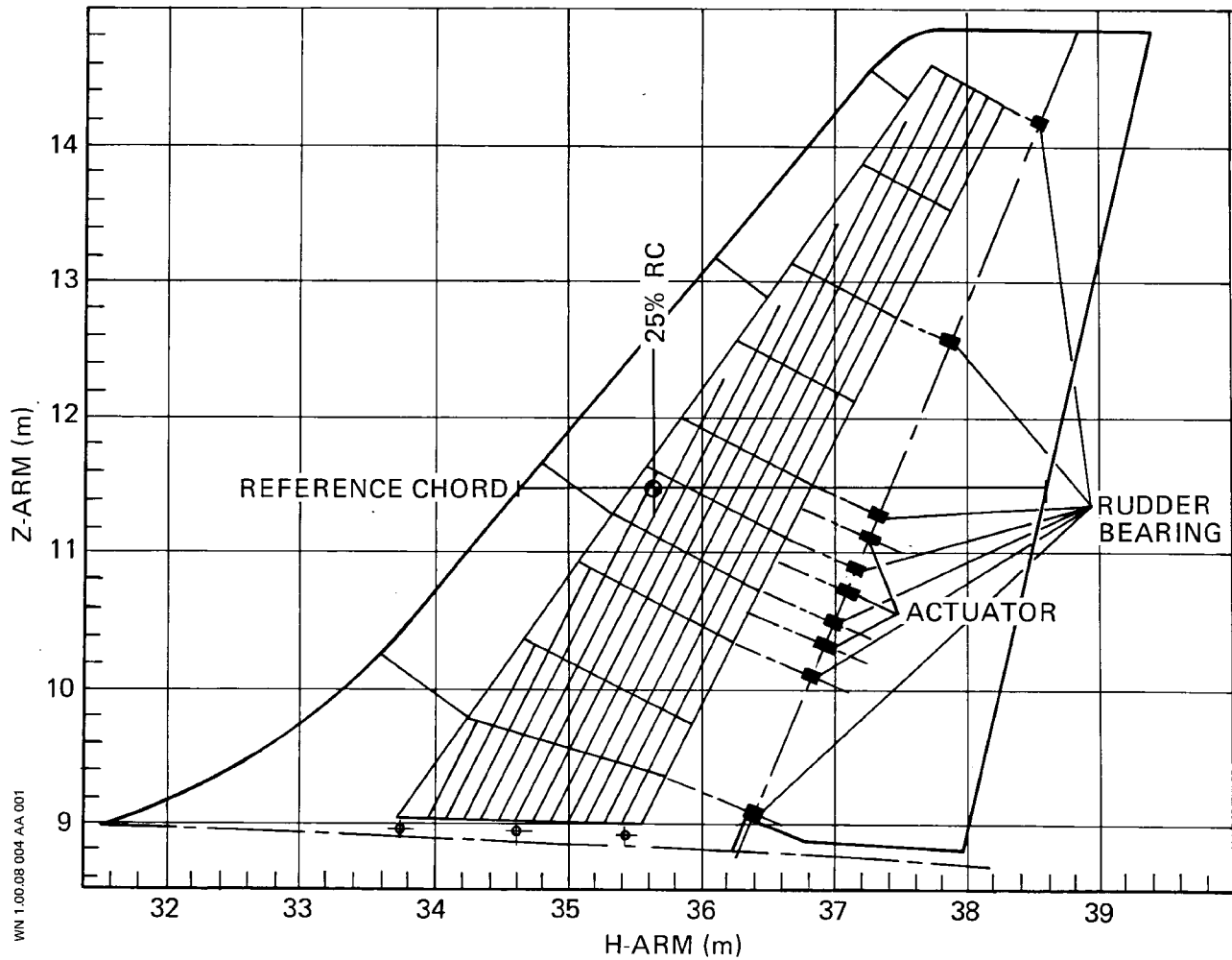
Station Diagram for the Wing

Figure 1-00-08A



Station Diagram for Horizontal Tail

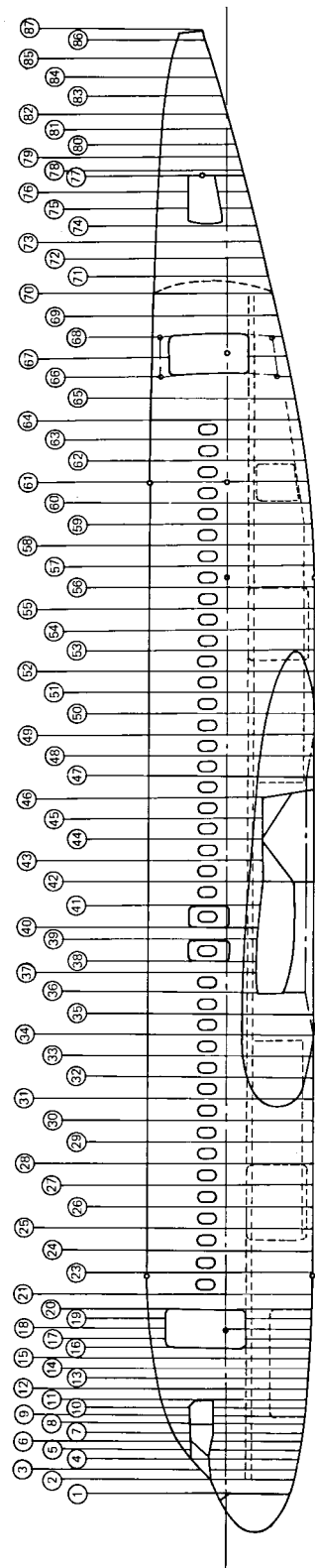
Figure 1-00-08B



Station Diagram for Vertical Tail

Figure 1-00-08C

WN 1.00.08 005 AA 110



Fuselage Frame Numbering

Figure 1-00-08D



WEIGHT AND BALANCE MANUAL

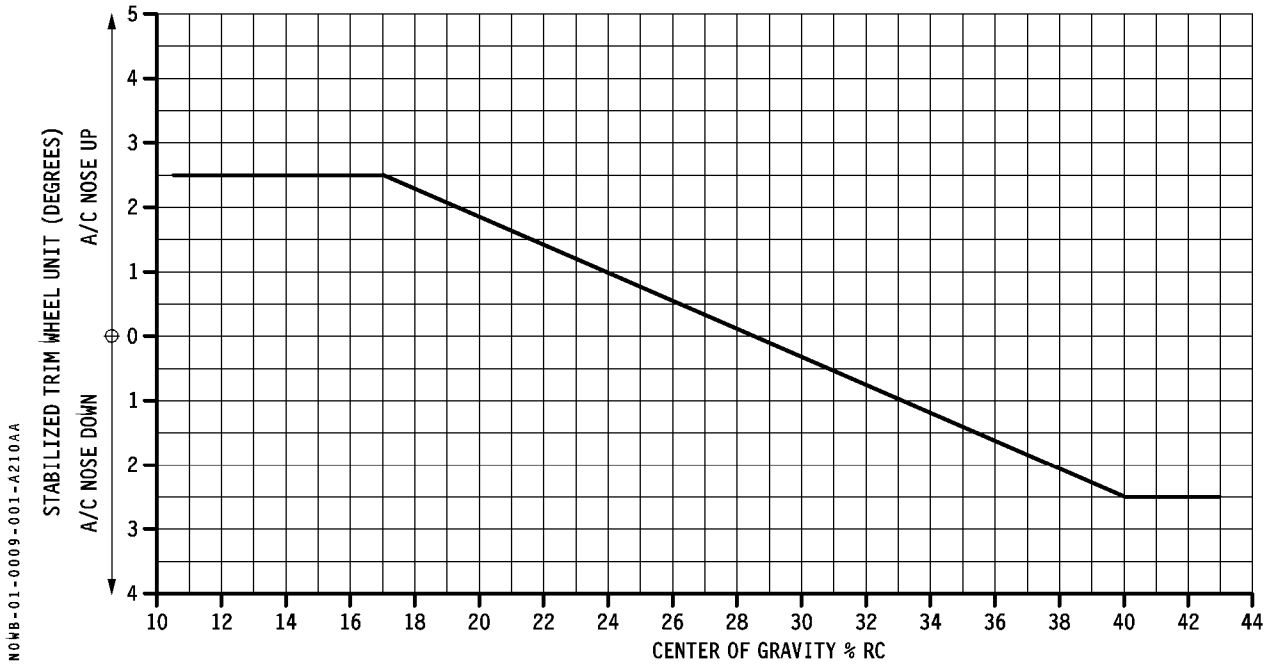
FRAME NUMBER	H-ARM (m)	FRAME NUMBER	H-ARM (m)	FRAME NUMBER	H-ARM (m)	FRAME NUMBER	H-ARM (m)
NOSE	2.540	23	8.966	45	20.295	67	32.074
1	3.500	24	9.500	46	20.828	68	32.571
2	3.850	25	10.033	47	21.361	69	33.096
3	4.090	26	10.566	48	21.895	70	33.655
4	4.330	27	11.100	49	22.428	71	34.055
5	4.546	28	11.633	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.



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. <u>Maximum Design Taxi Weight (MTW)</u>	77 400 kg
B. <u>Maximum Design Take-Off Weight (MTOW)</u>	77 000 kg
C. <u>Maximum Design Landing Weight (MLW)</u>	66 000 kg
D. <u>Maximum Design Zero Fuel Weight (MZFW)</u>	62 500 kg
E. <u>Minimum Weight</u>	37 230 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.

A. Forward CG limits

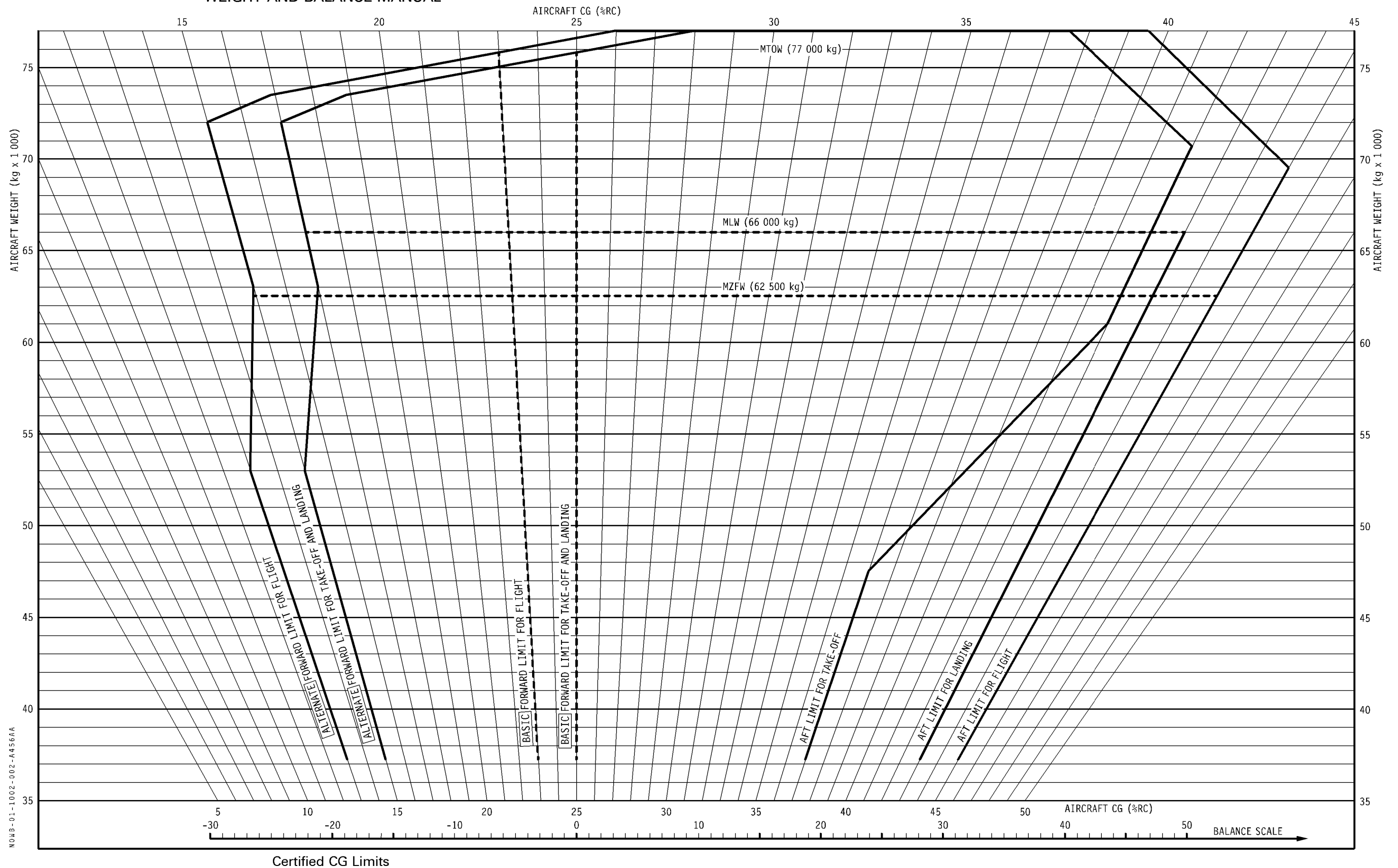
A / C Weight (kg)	For take-off in % RC (landing gear, slats and flaps down)		For flight in % RC (landing gear, slats and flaps up)		For landing in % RC (landing gear, slats and flaps down)	
	BASIC	ALTERNATE	BASIC	ALTERNATE	BASIC	ALTERNATE
37 230 to 53 000	constant	15 constant	constant	13 constant	constant	15 constant
to 63 000		15 linear variation		13 linear variation		15 linear variation
to 66 000		17		15		17
to 72 000		constant		constant		constant
to 73 500		17 linear variation		15 linear variation		17
77 000	25	28	23	26	25	17

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)
37 230 to 47 500	37 constant	45	43
to 61 000	37 linear variation	constant	constant
to 66 000	42		
to 69 500	constant		
70 800 to 77 000	42 linear variation	45 linear variation	43
	37.5	39.5	



WEIGHT AND BALANCE MANUAL



Certified CG Limits

Figure 1-10-02A

Mod : 20165+20802+23008+36331 or 20165+20802+23008+36849 or 20802 + 22093+23843+30479 or
20802+22093+23843+36331 or 20802+22093+23843+36849 or 20165+20802+23008+23900+30479 or
20165+20802+23408+23844+30479 or 20165+20802+23408+23844+36331 or 20165+20802+23408+23844+36849

1.10.02
Page 2
MAY 04

Seq : 456

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 (625.98 in.)) for the forward cantilever section,
- | – frame 42 (H-arm = 18.694 m (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, exclusive of pallets and containers (which are included with the payload),
- 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,

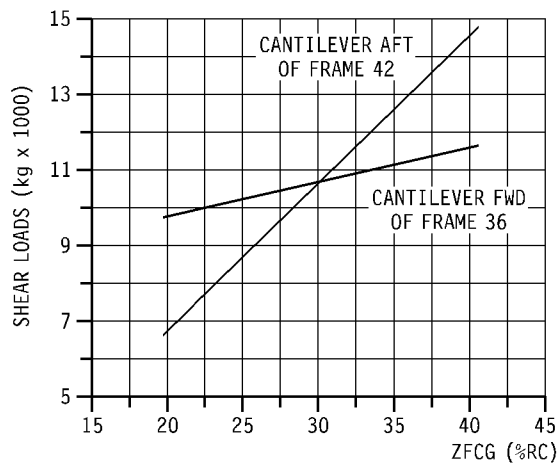
there are no limitations due to shear loads and bending moments.

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



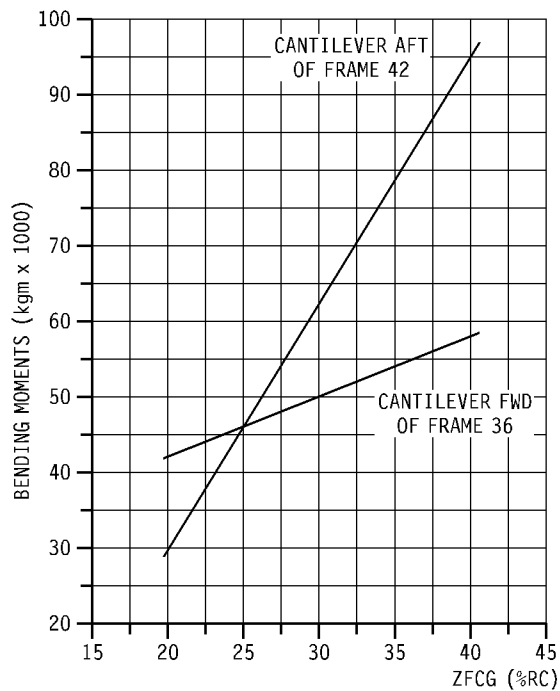
WEIGHT AND BALANCE MANUAL

PERMISSIBLE FUSELAGE SHEAR LOADS DUE TO PAYLOAD



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PERMISSIBLE FUSELAGE BENDING MOMENTS DUE TO PAYLOAD



NOMB-01-1003-002-B211AA

Permissible Fuselage Shear Loads and Bending Moments due to Payload

Figure 1-10-03

Mod : 20802 + 30307 or 20802 + 30479 or 20802 + 34094

Seq : 211

1.10.03
Page 2
FEB 01

04. Floor loading limits

A. 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 in) between rows.

(02) Panels

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

CAUTION : OCCASIONAL TRANSPORT OF LOOSE BULK FREIGHT OR LOOSE BAGGAGE, WITH A MAXIMUM LOAD DENSITY OF 160 kg/m^3 (10 lb/ft^3), MUST BE CARRIED OUT UNDER CONSIDERATION OF THE RELEVANT REQUIREMENTS, GIVEN IN PARAGRAPH 1.10.05.B.

(01) Structure

The floor structure is capable of supporting, via ball mats, rollertracks or via floor panels in the flat and sloping floor areas, a maximum distributed load of 488 kg/m^2 (100 lb/ft^2), 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 612 kg (1 350 lb) on 0.093 m^2 (1 ft^2) 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

CAUTION : OCCASIONAL TRANSPORT OF LOOSE BULK FREIGHT OR LOOSE BAGGAGE, WITH A MAXIMUM LOAD DENSITY OF 160 kg/m^3 (10 lb/ft^3), MUST BE CARRIED OUT UNDER CONSIDERATION OF THE RELEVANT REQUIREMENTS, GIVEN IN PARAGRAPH 1.10.06.B.

(01) Structure

The floor structure is capable of supporting, via ball mats, rollertracks or via floor panels in the flat and sloping floor areas, a maximum distributed load of 488 kg/m^2 (100 lb/ft^2), 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 612 kg ($1\ 350 \text{ lb}$) on 0.093 m^2 (1 ft^2) 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 floor panels in the flat and sloping floor areas a maximum distributed load of 732 kg/m^2 (150 lb/ft^2), 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^2 (1 ft^2) 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)

The forward cargo hold (compartment 1) is equipped with a NAS 3610 class II base plate restraint system and is capable for the transport of ULDs and non unitized load under the conditions of paragraph 1.10.05.A.

After installation of the certified net restraint system, the cargo hold is also capable for the occasional transport of bulk loads on cargo loading system under the conditions of paragraph 1.10.05.B.

A. Transport of ULDs and non unitized load

The aircraft restraint system must be unimpaired and must be used except in the case of floating pallets ; refer to paragraph 1.10.05.A.(05).

(01) Cargo hold (compartment 1) capacity

CAUTION : IN THE CASE OF MALFUNCTION OF ANY PART OF THE CARGO LOADING SYSTEM, RESTRICTIONS MAY BE IMPOSED ON PALLET / CONTAINER GROSS WEIGHTS OR THEIR POSITION IN THE CARGO HOLD. Refer to paragraph 1.10.05.A.(04).

The cargo hold has a maximum load capacity of 3 402 kg (7 500 lb), and accommodates the following unit load devices.

(a) Containers

ULD TYPE	NUMBER	MAXIMUM GROSS WEIGHT (*)		POSITIONS
		(kg)	(lb)	
Half size container LD3-46 NAS 3610-2K2C IATA contour AKG	3	1 134	2 500	11, 12, 13
Full size container LD3-46W NAS 3610-2K2C IATA contour AKH	3	1 134	2 500	11, 12, 13

(*) The gross weight includes the tare weight of the containers.

(b) Pallets

ULD TYPE	NUMBER	MAXIMUM GROSS WEIGHT (*)		POSITIONS
		(kg)	(lb)	
60.4 × 61.5 inches LD3-46P NAS 3610-2K3P	3	1 134	2 500	11, 12, 13

(*) The gross weight includes the tare weight of the pallet nets and igloo.

The height of the loaded pallets must not exceed 46 inches (1.168 m).

WEIGHT AND BALANCE MANUAL

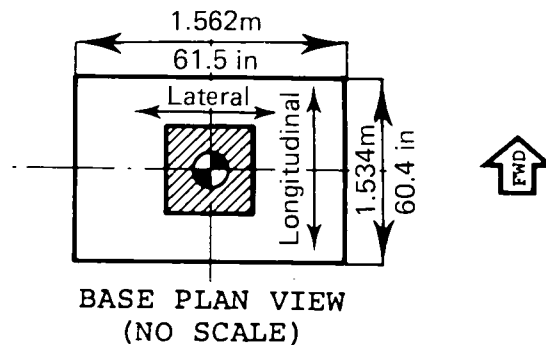
The ULD package must ensure a minimum clearance of 2 inches (51 millimeters) from the cargo door, compartment linings and from ULD on adjacent positions. A minimum clearance of 1.50 inches (38 millimeters) must be respected to the compartment ceiling.

The arrangement of the cargo hold including ULD volumes and positions are given in paragraph 1.60.03A.

NOTE : The cargo hold need not necessarily be loaded with the maximum number of containers or pallets. Any cargo position may remain unoccupied, but all the latches must be raised. This restricts inadvertent movements of a ULD in the case of latch failure.

(02) Center of gravity limits of containers and pallets

The design capacities of the support fittings and structure have been established with the center of gravity of the container and pallet load within the envelopes defined below.



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Maximum center of gravity height is 0.635 meter (25.00 inches) from the bottom of the unit load device. The maximum allowable cargo center of gravity deviation from the unit load device geometric center is

± 0.156 meter (± 6.15 inches) in the lateral direction and

± 0.153 meter (± 6.04 inches) in the longitudinal direction.

(03) Equipment strength

When loaded in aft cargo hold, each ULD as specified in paragraph 1.10.05.A.(01) must be capable of withstanding maximum gross weights in combination with load factors and cargo center of gravity deviations as specified in NAS 3610.

If the ULD does not correspond to this requirement, it must be handled and loaded in such a manner that neither the ULD nor the cargo contained will endanger the aircraft due to accelerations under flight conditions. Refer to paragraph 1.10.05.A.(05) for load factors.

In addition, deflection limits in accordance with specification IATA ULD Technical Manual 50.4 (latest issue) and center of gravity limits as given in paragraph 1.10.05.A.(02) must be considered.

To ensure a minimum of good condition, each ULD must also correspond to IATA specification, Section IV 50/0, Part II (latest issue). Refer to paragraphs 1.60.08 and 1.60.09 for container and pallet transport requirements.

WEIGHT AND BALANCE MANUAL

(04) Cargo equipment malfunction limitations

This paragraph covers only cargo restraint equipment (latches, transport rollers), which prevents the movement of cargo during flight (limitations for flight safety).

A malfunction of such equipment is defined as damaged / inoperative or failed / missing equipment.

Malfunction of equipment which serves only for guidance, handling, etc. of ULDs are not covered.

In case of missing and / or inoperative equipment the safety and efficiency of ground operations may be effected and loading / unloading should be carried out carefully.

It is advisable that missing, inoperative or malfunctioning equipment is repaired or replaced as soon as possible.

(a) Transport roller

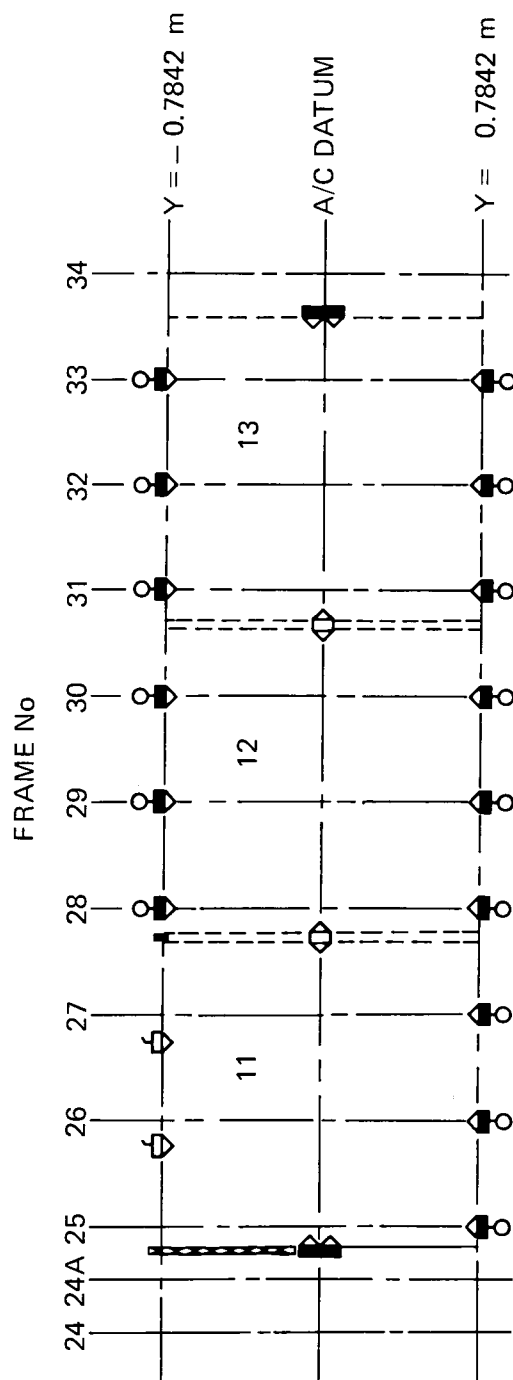
In case of 2 or more damaged or missing rollers per ULD position, the ULD must be empty or the concerned ULD position must be unoccupied.

(b) Key of latch types with restriction requirements

	YZ- Latch (retractable/overrideable)
	YZ- Latch (fixed)
	XZ- Latch two side loaded (retractable)
	XZ- Endstop (fixed)
	Transport roller



NOWB-01-1005-004-A115AA -R



WEIGHT AND BALANCE MANUAL

(c) Container and pallet latching in forward cargo hold, continued

LATCH		CONCERNED ULD POSITION	LATCH FAILURE	ULD WEIGHT REDUCED TO (kg/lb)	REMARK
TYPE	FRAME POSITION				
	24A	11	1 unit or more	0	1.)
	34	13			
	28	11,12	1 unit	0	1.)
	31	12,13			
	28 to 30	12	1 unit	0	2.)
			2 units or more		1.)
	31 to 33	13	1 unit	0	2.)
			2 units or more		1.)
	25 to 27	11	1 unit	0	2.)
			2 units or more		1.)
	25/26 26/27	11	1 unit or more	0	1.)
NO COMBINATION OF THE ABOVE FAILURES PER CONCERNED POSITION IS ALLOWED					
1.) All concerned ULD positions must remain empty. 2.) ULDs must be emptied at each concerned ULD position. Empty ULDs can be transported.					

WEIGHT AND BALANCE MANUAL

(05) Non unitized load

Any cargo which cannot be netted or containerized into ULD as specified in paragraph 1.10.05.A.(01) is to be transported as non unitized load.

Restraining of all individual items of non unitized load must be achieved by tie down in order to secure these loads.

To achieve a flush floor and to prevent the floor mounted cargo loading system items and / or the floor panels from getting damaged, pallets must be used.

Non unitized load may be either carried on standardized pallets latched within the cargo loading system, or on standardized pallets which are restrained to the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor (floating pallets).

The pallet load may extend over the pallet width to the extent that the overhang will not have an adverse effect to the cargo door, compartment linings, equipment, or to cargo on adjacent positions.

Minimum clearance of 2 inches (51 millimeters) shall be respected.

Loads on pallets shall be evenly distributed. Unequal loads exceeding locally the maximum floor loads given in paragraph 1.10.04.B must be suitably supported by load spreaders with sufficient capability of weight distribution.

(a) Latched pallets

Any pallet as specified in paragraphs 1.10.05.A (01) and 1.60.03.A. for the forward cargo hold or standardized pallets with equivalent dimensions and design complying with NAS 3610 requirements may be used.

These pallets must be latched within the cargo loading system.

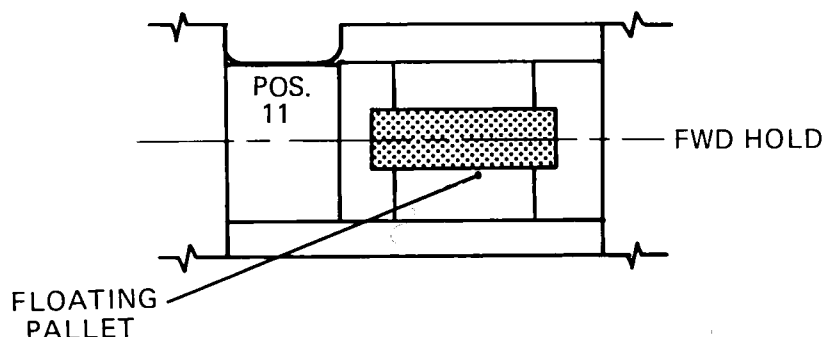
Individual loading limitations as given in paragraphs 1.10.05.A.(01), 1.10.05.A.(02) and 1.10.05.A.(04), and maximum permissible structure loads as given in paragraph 1.10.04.B must be respected.

All individual items of load shall be restrained to the pallet tie down points on the base plate. Tie down arrangement via tie down straps and nets or equivalent restraint hardware to the pallet shall be carried out in good loading practice to avoid damage to the aircraft under flight load conditions, and to provide evenly distributed loads to the pallet rims under consideration of strap or net elongation.

Equipment strength must be in accordance with paragraph 1.10.05.A.(03).

(b) Floating pallets

An individual load which due to its geometry or weight cannot be loaded on to the aircraft and positioned on latched pallets may be transported on one (see following illustration) or more floating pallets.



NOWB-01-1005-006-A117AA - R

WEIGHT AND BALANCE MANUAL

These pallets cannot be located in the door area (ULD position 11) where there are no fixed yz-latches.

Each pallet has to be positioned within the area of the cargo loading system with the base plate supported by the roller tracks and the side rows of the yz-latches.

Standardized pallets with design complying to NAS 3610 requirements and the following dimensions shall be used :

- 60.4 × 61.5 inches pallets equivalent to NAS 3610-2K3P with a maximum gross weight of 1 134 kg (2 500 lb).

Individual loading limitations as given in paragraph 1.10.05.A.(01) and maximum permissible structure loads as given in paragraph 1.10.04.B must be respected.

Maximum center of gravity height for the complete package is 0.635 meter (25.00 inches) from the bottom of the unit load device. The maximum allowable center of gravity deviation from the pallet geometric center is ± 10 percent in the lateral and longitudinal directions.

Cargo must be restrained either to the pallet tie down points on the base plate or as a complete package with the pallet to the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor.

Restraint of pallet to the aircraft must be achieved via tie down straps connected to the pallet tie down points on the base plate and the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor.

Tie down arrangement via tie down straps and nets or equivalent restraint hardware shall be carried out in good loading practice to avoid damage to the aircraft under flight load conditions, and to provide evenly distributed loads to the pallet rims, cargo loading system and aircraft structure under consideration of strap and net elongation.

Equipment strength must be in accordance with paragraph 1.10.05.A.(03).

(b1) Restraint of load to pallet

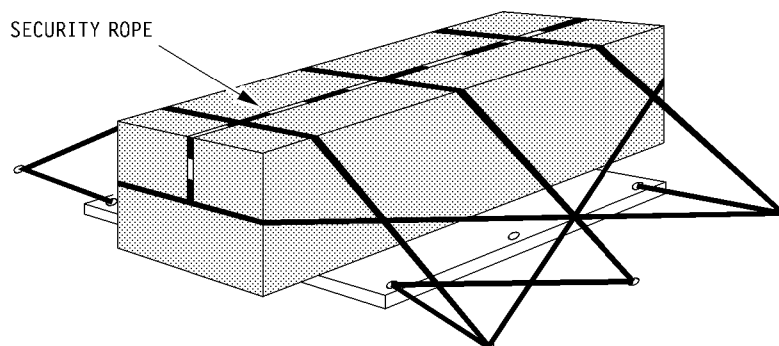
All individual items of load shall be restrained to the pallet tie down points on the base plate via tie down straps and nets or equivalent restraint hardware, which is in good condition and provides the specified strength.

(b2) Restraint of pallet with load to aircraft

Pallet or complete cargo / pallet package must be restrained to the tie down points on the fixed yz-latches in such a way as to prevent any shifting of the pallet. Restraint hardware shall be in good condition and providing it's specified strength.

An example of a typical tie down system is shown in the following illustration.

NOMB-01-1005-008-A117AA



(c) Restraint conditions

(c1) Restraint of load to latched or floating pallets

Tie down points on pallets equivalent to configuration NAS 3610-2K3P for 60.4 × 61.5 inches pallets, with single stud ultimate load capacities of not less than 906 kg (2 000 lb) in any direction, shall be used.

The load application point shall be 0.9 inches (23 millimeters) or more from the bottom of the groove.

(c2) Restraint of floating pallets or pallets with load to aircraft

The tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor are each designed to an ultimate load of 906 kg (2 000 lb) in any direction.

Locations of tie down points are given in paragraph 1.60.03.

(d) Tie down methods

Methods of tie down are given in paragraph 1.60.06.

The load factors given 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

B. Occasional transport of bulk load

**CAUTION : THE MAXIMUM LOAD ON THE FLOOR MUST NOT EXCEED THE VALUES SPECIFIED IN PARAGRAPH 1.10.04.B.
FOR OCCASIONAL TRANSPORT OF BULK LOAD THE DIVIDER NETS ON FRAME C28, C31 AND THE DOOR NETS MUST BE INSTALLED.**

The forward cargo hold (compartment 1) is designed for the occasional transport of bulk loads with an average load density of 160 kg/m³ (10 lb/ft³). For stowing the occasional bulk, the cargo compartments are subdivided by lateral nets into sections.

Occasional bulk is defined as loading of loose baggage and bulk cargo on the floor of the installed cargo loading system.

Occasional transport of bulk load shall not exceed 60 flights per year. More frequent use of the cargo compartments for occasional transport of bulk loads increases the possibility of damage to the lining and floor panels.

When occasional transport of bulk load is done more regularly than once per calendar week, the operator shall visually inspect the floor panels, linings and decompression panels at an interval of 8 days.

(01) Cargo hold (compartment 1) capacity

The cargo hold has a maximum load capacity of 2 100 kg (4 630 lb), resulting from the maximum load capacities of the individual net sections as given in the table below.

NET SECTION DESIGNATION	EXTENSION FRAME STATION		MAXIMUM LOAD CAPACITY	
	From	To	(kg)	(lb)
11	24A	28	635	1 400
12	28	31	762	1 680
13	31	34	703	1 550
Total	24A	34	2 100	4 630

The cargo hold is subdivided by removable lateral nets at frame station 28 and 31.

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

(02) Restraint conditions

The certified net restraint system must be installed. In the case of malfunction of any part of the net restraint system, restrictions may be imposed on the maximum load capacities of the individual net sections. Refer to paragraph 1.10.05.B.(05) for cargo hold nets malfunction limitations.

Packages weighing more than 50 kg (110 lb) shall be loaded into net sections which are filled up to at least 80% of its volume or shall be individually tied down.

All individual items of load which by their nature, shape or density may constitute a hazard shall be surrounded by other cargo to avoid damage to the aircraft, equipment or cargo due to movements under flight load conditions. Refer to paragraph 1.10.05.B.(04) for load factors.

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 28 and / or 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.

(03) 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 fixed YZ-latches and 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.

(04) Tie down methods

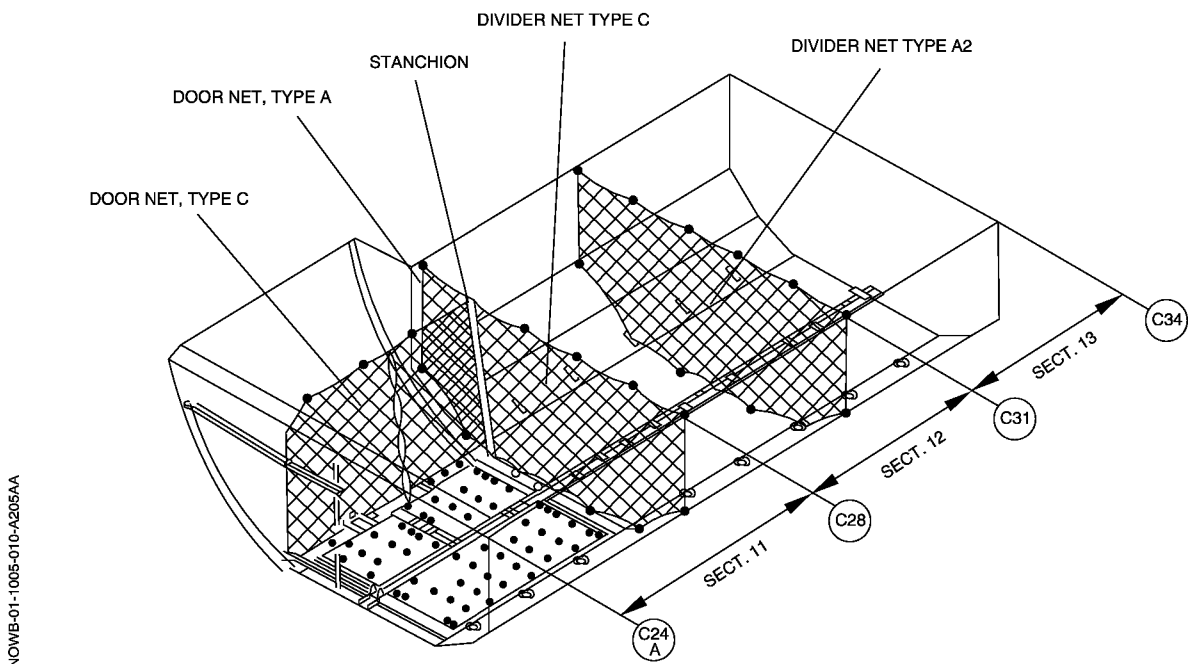
Methods of tie down are given in paragraph 1.60.06.

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

(05) Cargo hold nets malfunction limitations

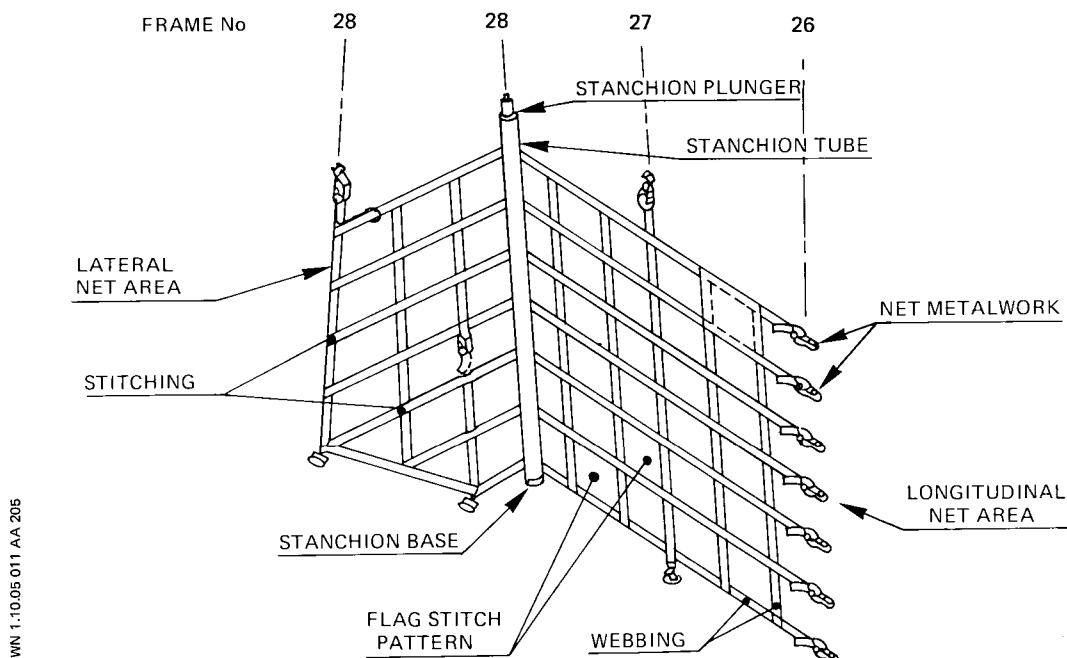
For layout of the net installation in the forward cargo hold (compartment 1) see the illustration below.



WEIGHT AND BALANCE MANUAL

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

(a) Door net type A

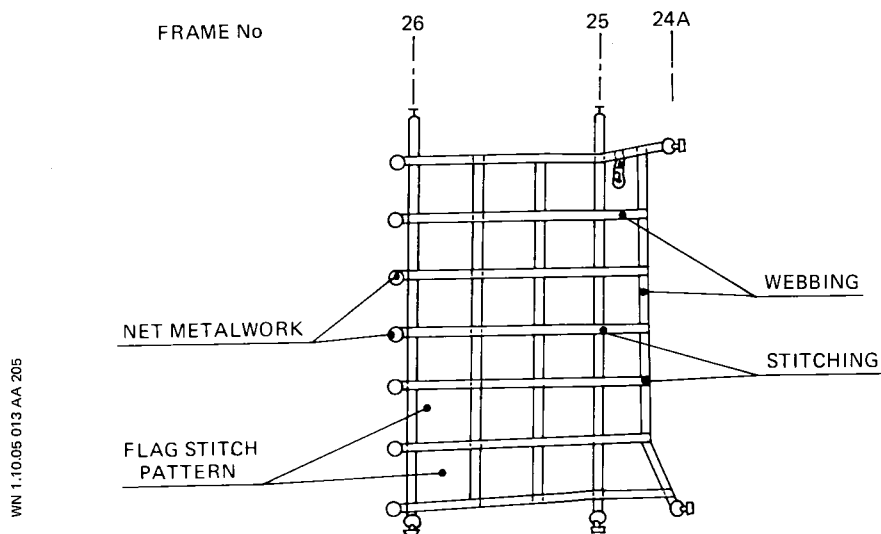


ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain 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)	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain 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	No restriction
	More than one loop detached or missing	Net sections 11 and 12 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain unoccupied, or bulk load is restrained individually

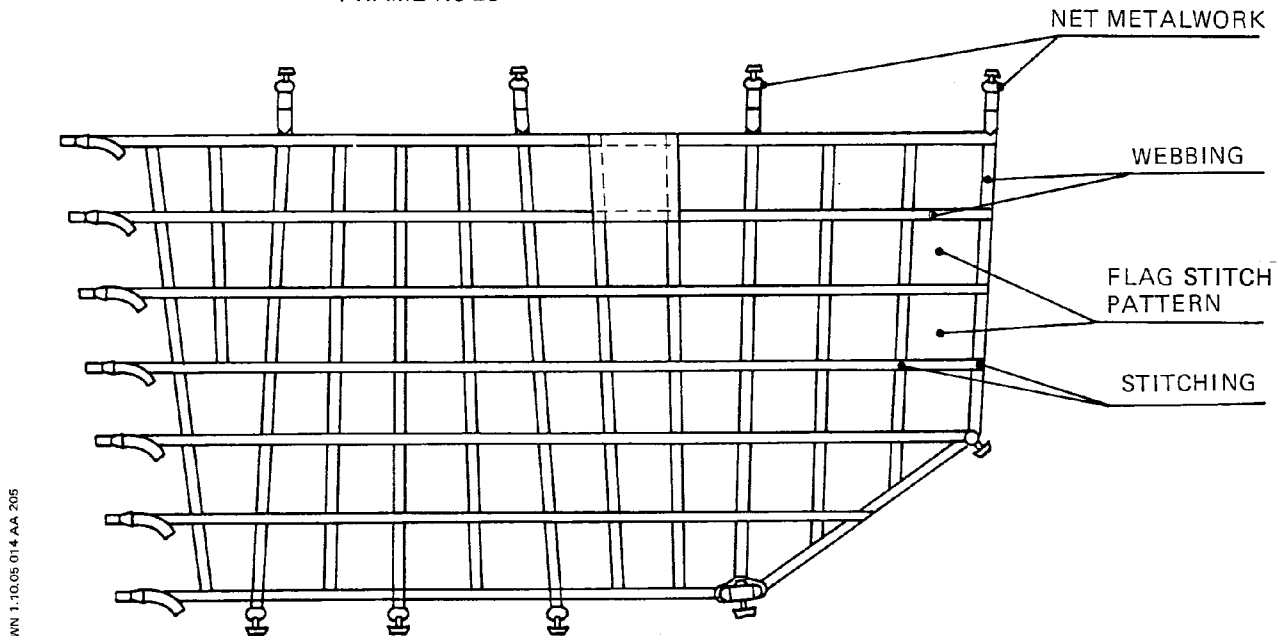
(b) Door net type C



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 restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 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	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain unoccupied, or bulk load is restrained individually

(c) Divider net type C

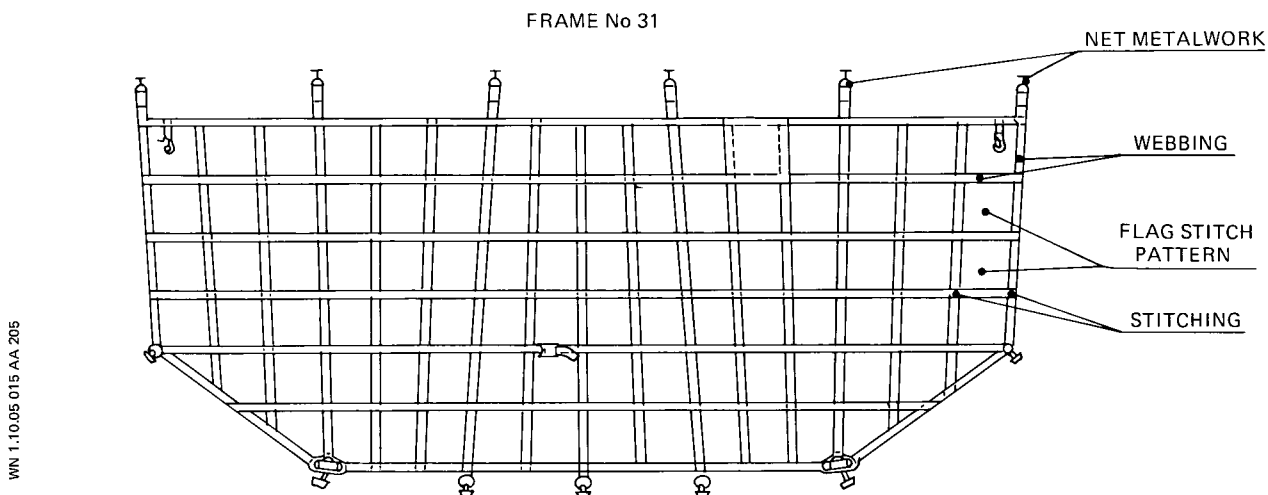
FRAME No 28



WN 1.10.05 014 AA 205

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 restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 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	No restriction
	All damage exceeding the failures defined above	Net sections 11 and 12 remain unoccupied, or bulk load is restrained individually

(d) Divider net type A2



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 restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 12 and 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	No restriction
	All damage exceeding the failures defined above	Net sections 12 and 13 remain unoccupied, or bulk load is restrained individually

WEIGHT AND BALANCE MANUAL

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

The aft cargo hold (compartment 3 and 4) is equipped with a NAS 3610 class II base plate restraint system and is capable for the transport of ULDs and non unitized load under the conditions of paragraph 1.10.06.A.

After installation of the certified net restraint system, the cargo hold is also capable for the occasional transport of bulk loads under the conditions of paragraph 1.10.06.B.

A. Transport of ULDs and non unitized load

The aircraft restraint system must be unimpaired and must be used except in the case of floating pallets ; refer to paragraph 1.10.06.A. (05).

(01) Cargo hold (compartment 3 and 4 capacity)

CAUTION : IN THE CASE OF MALFUNCTION OF ANY PART OF THE CARGO LOADING SYSTEM, RESTRICTIONS MAY BE IMPOSED ON PALLET / CONTAINER GROSS WEIGHTS OR THEIR POSITION IN THE CARGO HOLD.
Refer to paragraph 1.10.06.A.(04).

The cargo hold has a maximum cumulative load capacity of 4 536 kg (10 000 lb), and accommodates the following unit load devices.

(a) Containers

ULD TYPE	NUMBER	MAXIMUM GROSS WEIGHT (*)		POSITIONS
		(kg)	(lb)	
Half size container LD 3-46 NAS 3610-2K2C IATA contour AKG	4	1 134	2 500	31, 32, 41, 42
Full size container LD 3-46W NAS 3610-2K2C IATA contour AKH	4	1 134	2 500	31, 32, 41, 42
Rectangular container LD 3-46R NAS 3610-2K2C IATA contour AKJ	4	1 134	2 500	31, 32, 41, 42

(*) The gross weight includes the tare weight of the containers.

(b) Pallets

ULD TYPE	NUMBER	MAXIMUM GROSS WEIGHT (*)		POSITIONS
		(kg)	(lb)	
60.4 × 61.5 inches LD 3-46P NAS 3610-2K3P	4	1 134	2 500	31, 32, 41, 42

The height of the loaded pallets must not exceed 46 inches (1.168 m).

(*) The gross weight includes the tare weight of the pallet nets and igloo.

WEIGHT AND BALANCE MANUAL

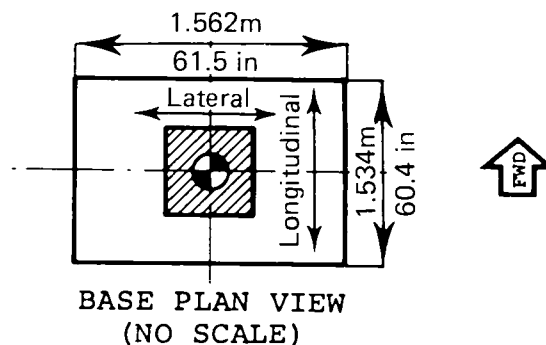
The ULD package must ensure a minimum clearance of 2 inches (51 millimeters) from the cargo door, compartment linings and from ULD on adjacent positions. A minimum clearance of 1.50 inches (38 millimeters) must be respected to the compartment ceiling.

The arrangement of the cargo hold including ULD volumes and positions are given in paragraph 1.60.04A.

NOTE : The cargo hold need not necessarily be loaded with the maximum number of containers or pallets. Any cargo position may remain unoccupied, but all the latches must be raised. This restricts inadvertent movements of a ULD in the case of latch failure.

(02) Center of gravity limits of containers and pallets

The design capacities of the support fittings and structure have been established with the center of gravity of the container and pallet load within the envelopes defined below.



N00B-01-1006-002-4117AA - R

Maximum center of gravity height is 0.640 meter (25.00 inches) from the bottom of the unit load device. The maximum allowable cargo center of gravity deviation from the unit load device geometric center is

± 0.156 meter (± 6.15 inches) in the lateral direction and
± 0.153 meter (± 6.04 inches) in the longitudinal direction.

(03) Equipment strength

When loaded in aft cargo hold, each ULD as specified in paragraph 1.10.06.A.(01) must be capable of withstanding maximum gross weights in combination with load factors and cargo center of gravity deviations as specified in NAS 3610.

If the ULD does not correspond to this requirement, it must be handled and loaded in such a manner that neither the ULD nor the cargo contained will endanger the aircraft due to accelerations under flight conditions. Refer to paragraph 1.10.06.A. (05) for load factors.

In addition, deflection limits in accordance with specification IATA ULD Technical Manual 50.4 (latest issue) and center of gravity limits as given in paragraph 1.10.06.A. (02) must be considered.

To ensure a minimum of good condition, each ULD must also correspond to IATA specification, Section IV 50/0, Part II (latest issue). Refer to paragraphs 1.60.08 and 1.60.09 for container and pallet transport requirements.

(04) Cargo equipment malfunction limitations

This paragraph covers only cargo restraint equipment (latches, transport rollers), which prevents the movement of cargo during flight (limitations for flight safety).

A malfunction of such equipment is defined as damaged / inoperative or failed / missing equipment.

Malfunction of equipment which serves only for guidance, handling, etc. of ULDs are not covered.

In case of missing and/or inoperative equipment the safety and efficiency of ground operations may be effected and loading / unloading should be carried out carefully.

It is advisable that missing, inoperative or malfunctioning equipment is repaired or replaced as soon as possible.

(a) Transport roller

In case of 2 or more damaged or missing rollers per ULD position, the ULD must be empty or the concerned ULD position must be unoccupied.

(b) Key of latch types with restriction requirements



YZ-Latch (retractable/overrideable)



YZ-Latch (fixed)



XZ-Latch two side loaded (retractable)



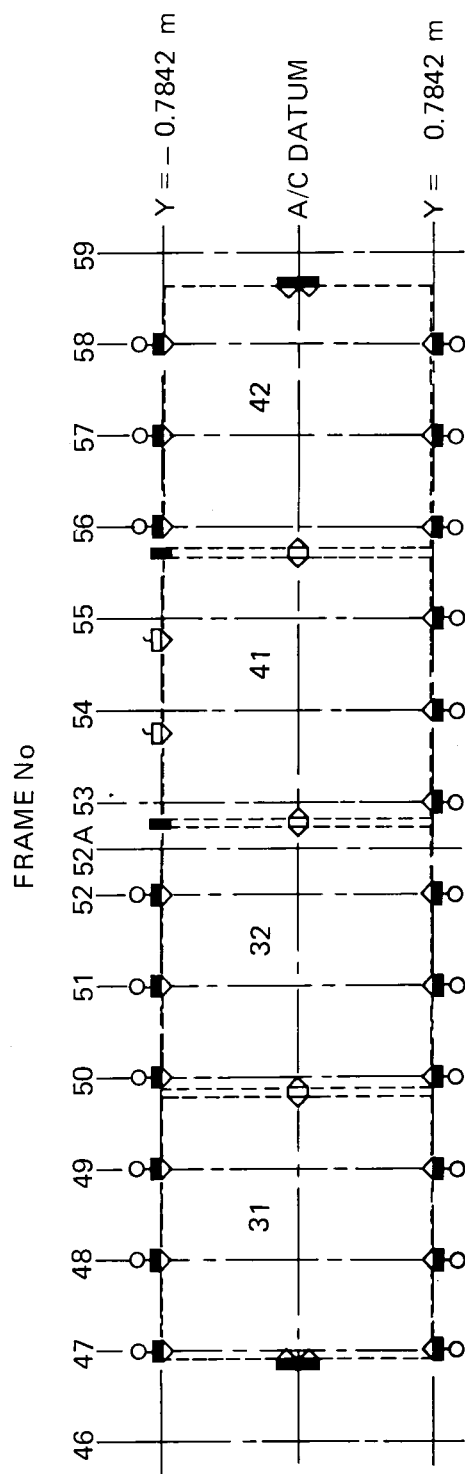
XZ-Endstop (fixed)



Transport roller

WEIGHT AND BALANCE MANUAL

(c) Container and pallet latching in aft cargo hold



NOB-01-1006-004-A212AA -R

WEIGHT AND BALANCE MANUAL

(c) Container and pallet latching in aft cargo hold, continued

LATCH		CONCERNED ULD POSITION	LATCH FAILURE	ULD WEIGHT REDUCED TO (kg/lb)	REMARK
TYPE	FRAME POSITION				
	47	31	1 unit or more	0	1.)
	58/59	42			
	49/50	31, 32	1 unit	0	1.)
	52/53	32, 41			
	55/56	41, 42			
	47 to 49	31	1 unit	0	2.)
			2 units or more		1.)
	50 to 52	32	1 unit	0	2.)
			2 units or more		1.)
	56 to 58	42	1 unit	0	2.)
			2 units or more		1.)
	53 to 55	41	1 unit	0	2.)
			2 units or more		1.)
	53/54 54/55	41	1 unit or more	0	1.)
NO COMBINATION OF THE ABOVE FAILURES PER CONCERNED POSITION IS ALLOWED					
1.) All concerned ULD positions must remain empty.					
2.) ULDs must be emptied at each concerned ULD position. Empty ULDs can be transported.					

WEIGHT AND BALANCE MANUAL

(05) Non unitized load

Any cargo which cannot be netted or containerized into ULD as specified in paragraph 1.10.06.A.(01) is to be transported as non unitized load.

Restraining of all individual items of non unitized load must be achieved by tie down in order to secure these loads.

To achieve a flush floor and to prevent the floor mounted cargo loading system items and/or the floor panels from getting damaged, pallets must be used.

Non unitized load may be either carried on standardized pallets latched within the cargo loading system, or on standardized pallets which are restrained to the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor (floating pallets).

The pallet load may extend over the pallet width to the extent that the overhang will not have an adverse effect to the cargo door, compartment linings, equipment, or to cargo on adjacent positions.

Minimum clearance of 2 inches (51 millimeters) shall be respected.

Loads on pallets shall be evenly distributed. Unequal loads exceeding locally the maximum floor loads given in paragraph 1.10.04.C. must be suitably supported by load spreaders with sufficient capability of weight distribution.

(a) Latched pallets

Any pallet as specified in paragraphs 1.10.06.A.(01) and 1.60.04.A. for the aft cargo hold or standardized pallets with equivalent dimensions and design complying with NAS 3610 requirements may be used.

These pallets must be latched within the cargo loading system.

Individual loading limitations as given in paragraphs 1.10.06.A.(01), 1.10.06.A.(02) and 1.10.06.A.(04), and maximum permissible structure loads as given in paragraph 1.10.04.C. must be respected.

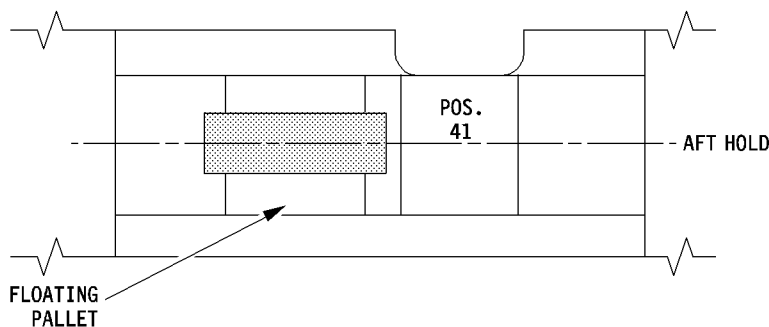
All individual items of load shall be restrained to the pallet tie down points on the base plate.

Tie down arrangement via tie down straps and nets or equivalent restraint hardware to the pallet shall be carried out in good loading practice to avoid damage to the aircraft under flight load conditions, and to provide evenly distributed loads to the pallet rims under consideration of strap or net elongation.

Equipment strength must be in accordance with paragraph 1.10.06.A.(03).

(b) Floating pallets

An individual load which due to its geometry or weight cannot be loaded on to the aircraft and positioned on latched pallets may be transported on one (see following illustration) or more floating pallets.



N01WB-01-1006-006-A203AA

WEIGHT AND BALANCE MANUAL

These pallets cannot be located in the door area (ULD position 41) where there are no fixed yz-latches. Each pallet has to be positioned within the area of the cargo loading system with the base plate supported by the roller tracks and the side rows of the yz-latches.

Standardized pallets with design complying to NAS 3610 requirements and the following dimensions shall be used :

- 60.4 × 61.5 inches pallets equivalent to NAS 3610-2K3P with a maximum gross weight of 1 134 kg (2 500 lb).

Individual loading limitations as given in paragraph 1.10.06.A.(01) and maximum permissible structure loads as given in paragraph 1.10.04.C. must be respected.

Maximum center of gravity height for the complete package is 0.640 meter (25.00 inches) from the bottom of the unit load device. The maximum allowable center of gravity deviation from the pallet geometric center is ± 10 percent in the lateral and longitudinal directions.

Cargo must be restrained either to the pallet tie down points on the base plate or as a complete package with the pallet to the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor.

Restraint of pallet to the aircraft must be achieved via tie down straps connected to the pallet tie down points on the base plate and the tie down points on the fixed yz-latches of the cargo loading system and the cargo hold floor.

Tie down arrangement via tie down straps and nets or equivalent restraint hardware shall be carried out in good loading practice to avoid damage to the aircraft under flight load conditions, and to provide evenly distributed loads to the pallet rims, cargo loading system and aircraft structure under consideration of strap and net elongation.

Equipment strength must be in accordance with paragraph 1.10.06.A.(03).

(b1) Restraint of load to pallet

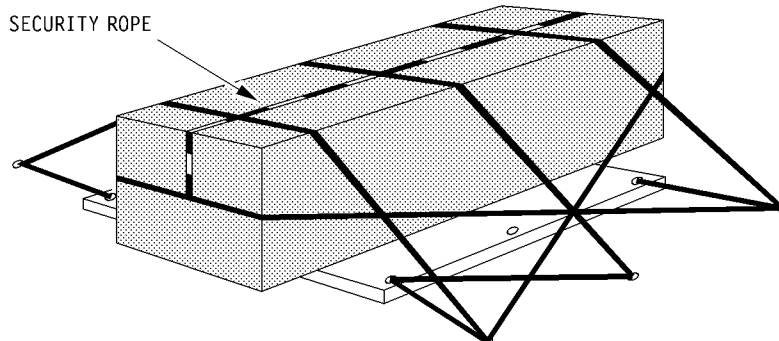
All individually items of load shall be restrained to the pallet tie down points on the base plate via tie down straps and nets or equivalent restraint hardware, which is in good condition and provides the specified strength.

(b2) Restraint of pallet with load to aircraft

Pallet or complete cargo/pallet package must be restrained to the tie down points on the fixed yz-latches in such a way as to prevent any shifting of the pallet. Restraint hardware shall be in good condition and providing it's specified strength.

An example of a typical tie down system is shown in the following illustration.

WEIGHT AND BALANCE MANUAL



NOWB-01-1006-008-A217AA

(c) Restraint conditions

(c1) Restraint of load to latched or floating pallets

Tie down points on pallets equivalent to configuration NAS 3610-2K3P for 60.4 × 61.5 inches pallets, with single stud ultimate load capacities of not less than 906 kg (2 000 lb) in any direction, shall be used.

The load application point shall be 0.9 inches (23 millimeters) or more from the bottom of the groove.

(c2) Restraint of floating pallets or pallets with load to aircraft

The tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor are each designed to an ultimate load of 906 kg (2 000 lb) in any direction.

Locations of tie down points are given in paragraph 1.60.04.B.

(d) Tie down methods

Methods of tie down are given in paragraph 1.60.06.

The load factors given 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

WEIGHT AND BALANCE MANUAL

B. Occasional transport of bulk load

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

FOR OCCASIONAL TRANSPORT OF BULK LOAD THE DIVIDER NETS ON FRAME C50, C53, C56, C59 AND THE DOOR NETS MUST BE INSTALLED.

The aft cargo hold (compartment 3 and 4) is designed for the occasional transport of bulk loads with an average load density of 160 kg/m³ (10 lb/ft³). For stowing the occasional bulk, the cargo compartments are subdivided by lateral nets into sections.

Occasional bulk is defined as loading of loose baggage and bulk cargo on the floor of the installed cargo loading system.

Occasional transport of bulk load shall not exceed 60 flights per year. More frequent use of the cargo compartments for occasional transport of bulk loads increases the possibility of damage to the lining and floor panels.

When occasional transport of bulk load is done more regularly than once per calendar week, the operator shall visually inspect the floor panels, linings and decompression panels at an interval of 8 days.

(01) Cargo hold (Compartment 3 and 4) capacity

The cargo hold has a maximum load capacity of 2 894 kg (6 380 lb), resulting from the maximum load capacities of the individual net sections as given in the table below.

SECTION DESIGNATION	EXTENSION FRAME STATION		MAXIMUM LOAD CAPACITY	
	From	To	(kg)	(lb)
31	47	50	835	1 840
32	50	52A/53	721	1 590
Sub-total (Compartment 3)	47	52A/53	1 556	3 430
41	53	56	581	1 280
42	56	59	757	1 670
Sub-Total (Compartment 4)	53	59	1 338	2 950
Total (Compartment 3 and 4)	47	59	2 894	6 380

The cargo hold is subdivided by removable lateral nets at frame stations 50, 53, 56 and is separated from the rear (bulk) cargo hold (compartment 5) 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 section 1.60.04.B.

(02) Restraint conditions

The certified net restraint system must be installed. In the case of malfunction of any part of the net restraint system, restrictions may be imposed on the maximum load capacities of the individual net sections. Refer to paragraph 1.10.06.B.(05) for cargo hold nets malfunction limitations.

Packages weighing more than 50 kg (110 lb) shall be loaded into net sections which are filled up to at least 80% of its volume or shall be individually tied down.

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

WEIGHT AND BALANCE MANUAL

All individual items of load which by their nature, shape or density may constitute a hazard shall be surrounded by other cargo to avoid damage to the aircraft, equipment or cargo due to movements under flight load conditions. Refer to paragraph 1.10.06.B.(04) for load factors.

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, 53, 56 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.

(03) 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 fixed YZ-latches and 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.B

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

(04) Tie down methods

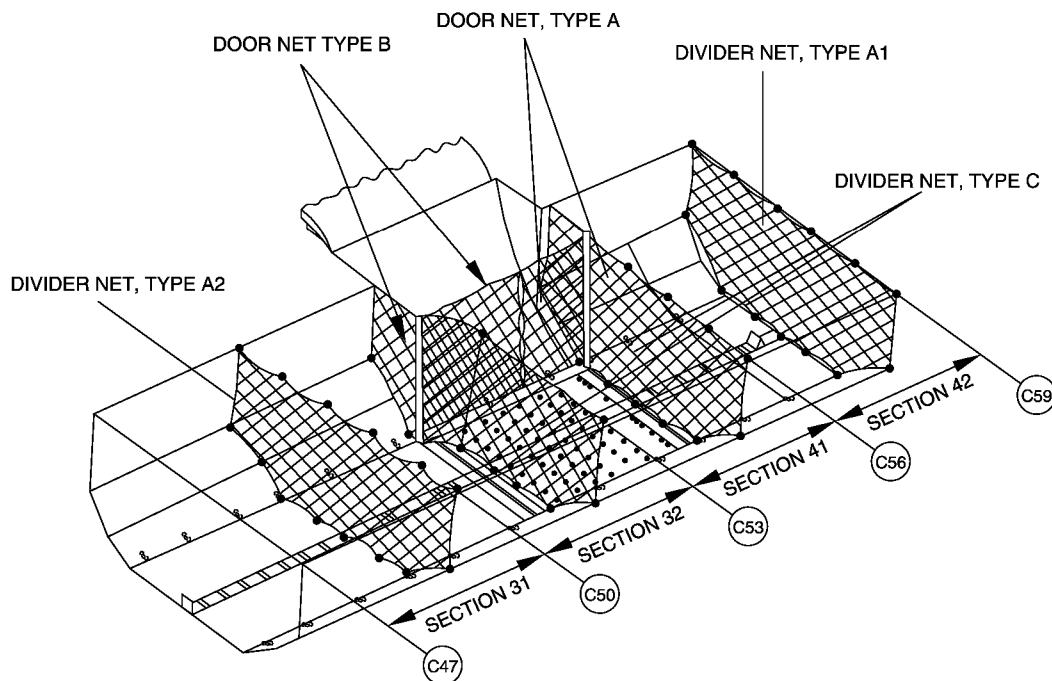
Methods of tie down are given in paragraph 1.60.06.

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

(05) Cargo hold nets malfunction limitations

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

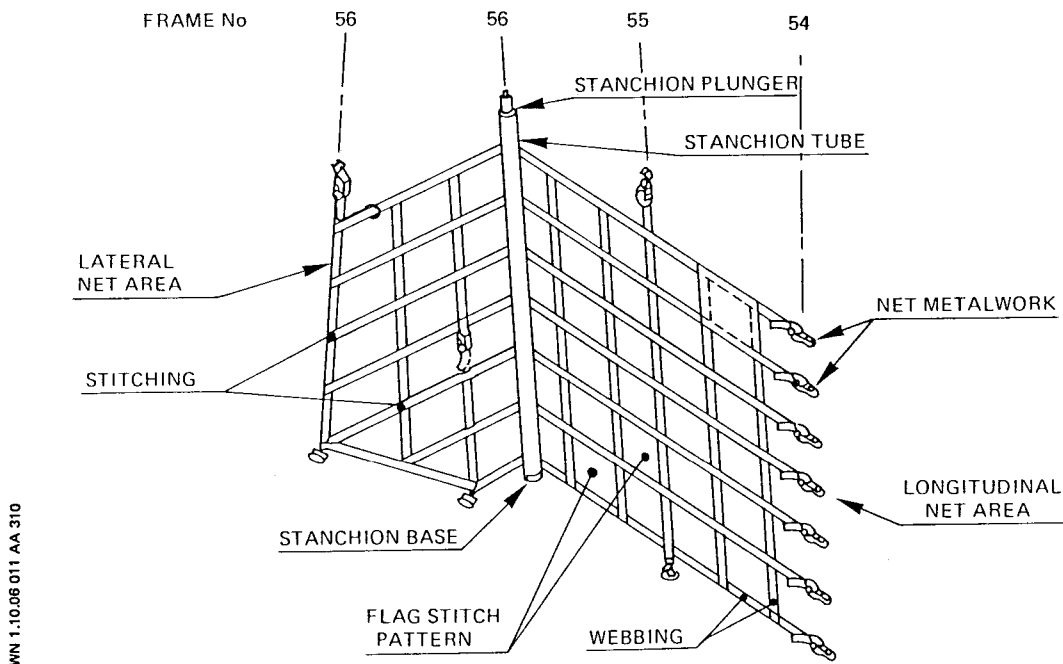


NOWB-01-1006-010-A310AA

WEIGHT AND BALANCE MANUAL

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

(a) Door net type A



WN 1.10.06 011 AA 310

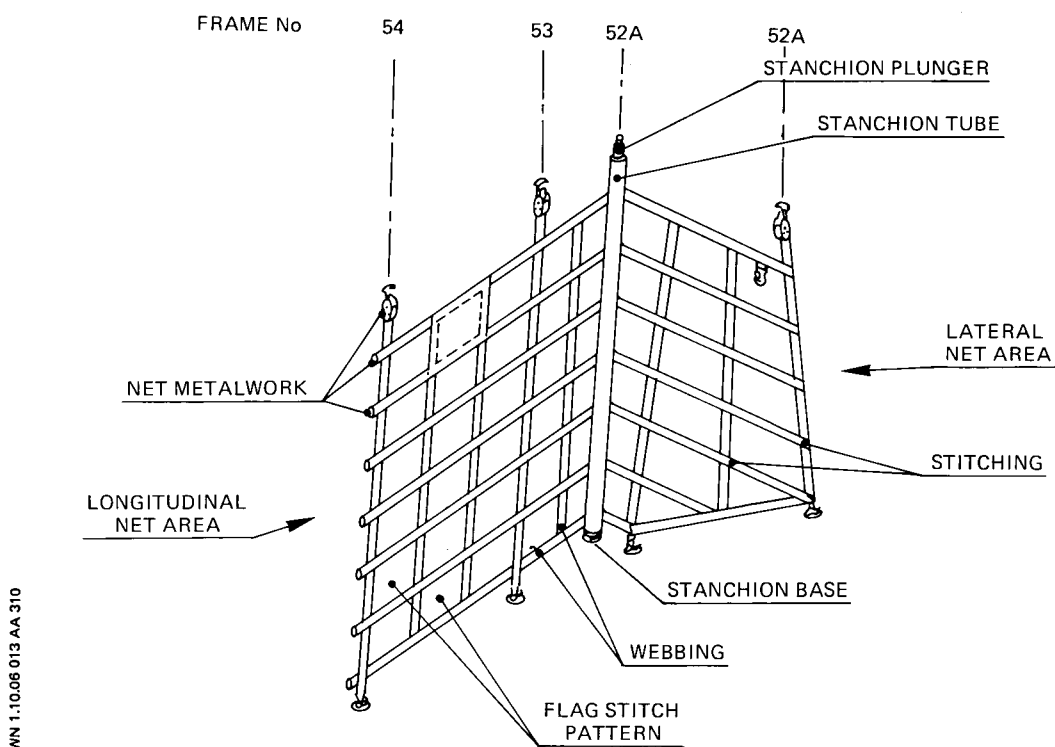
ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 remain 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)	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 remain 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	No restriction
	More than one loop detached or missing	Net sections 41 and 42 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 remain unoccupied, or bulk load is restrained individually

WEIGHT AND BALANCE MANUAL

(b) Door net type B

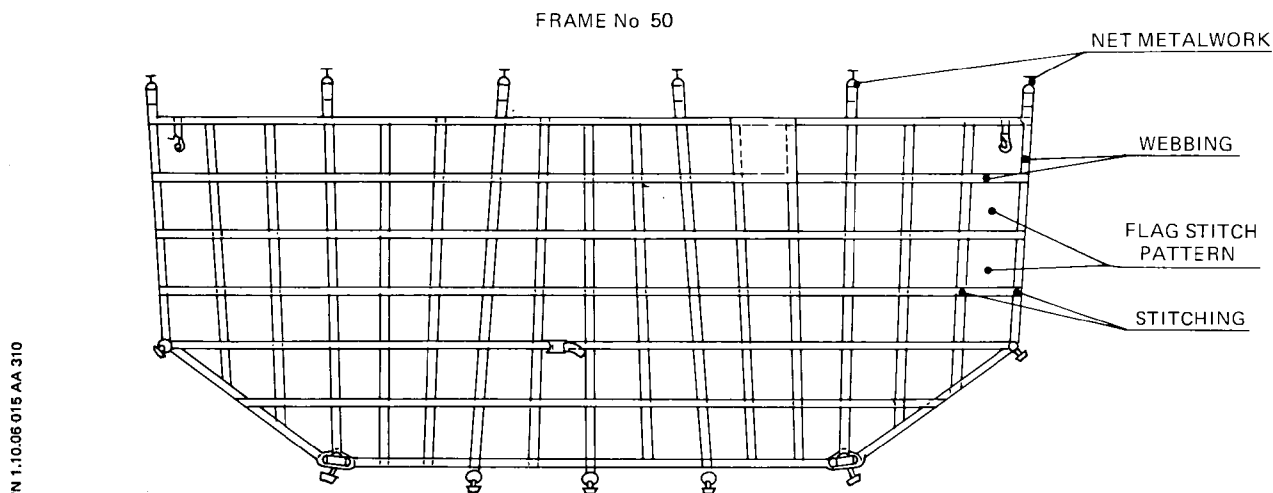


ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 remain 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)	No restriction
	Minor damage not affecting mechanical function of component, e.g. deep scratches	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 remain 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	No restriction
	More than one loop detached or missing	Net sections 32 and 41 remain 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	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 remain unoccupied, or bulk load is restrained individually

(c) Divider net type A2 (frame 50)

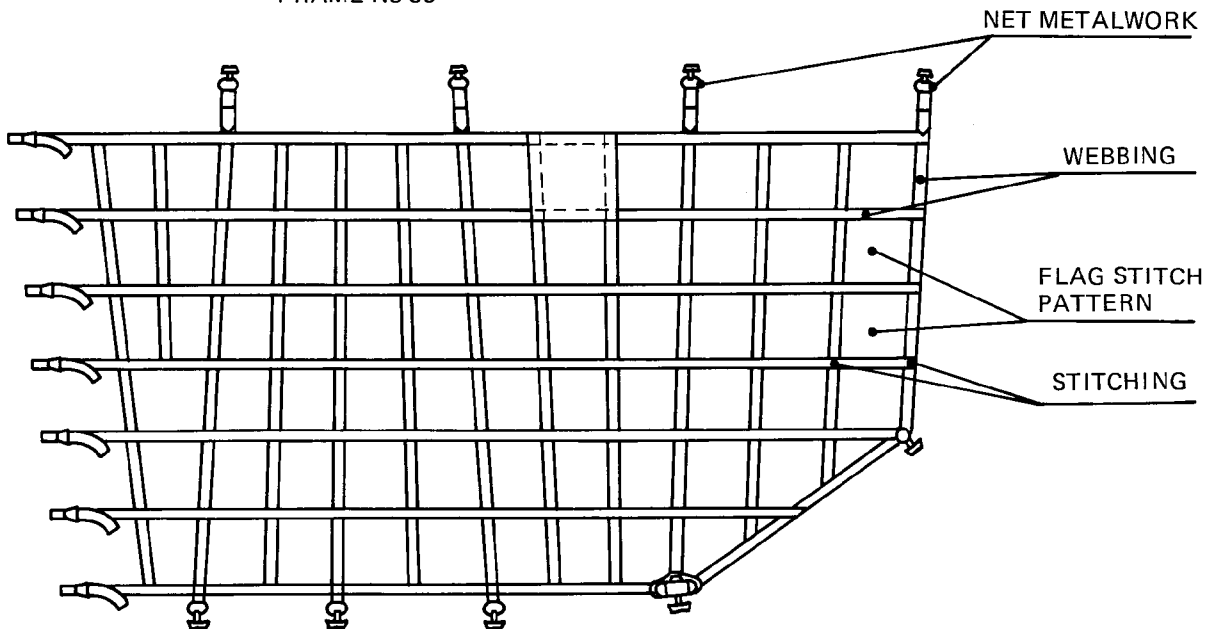


ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 31 and 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	No restriction
	All damage exceeding the failures defined above	Net sections 31 and 32 remain unoccupied, or bulk load is restrained individually

WEIGHT AND BALANCE MANUAL

(d) Divider net type C (frame 53)

FRAME No 53



WN 1.10.06 018 AA 310

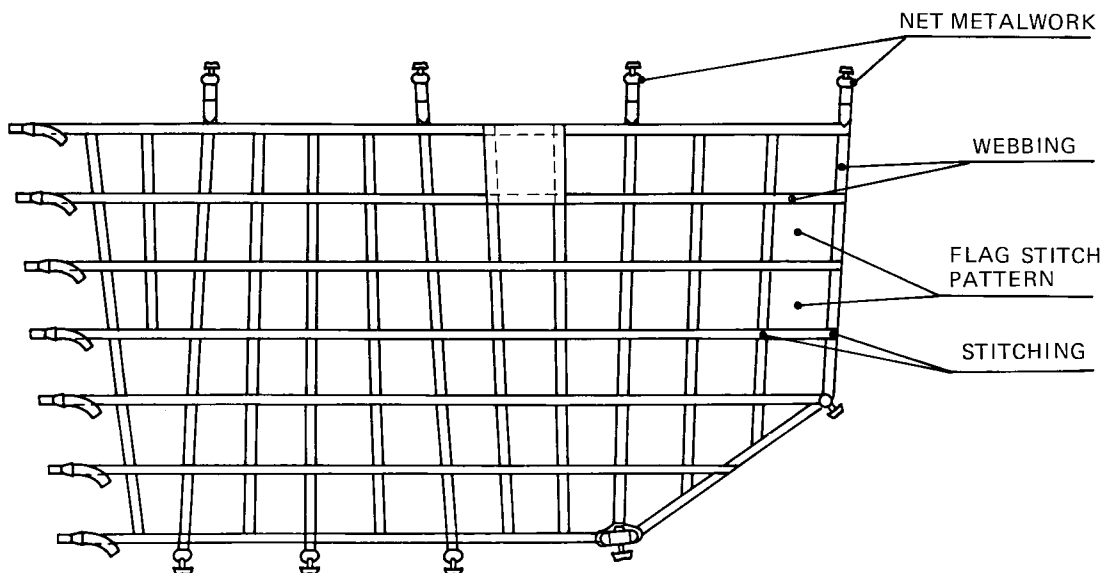
ITEM	FAILURE	RESTRICTIONS
Net webbing	Broken stitching at web intersection, but not more than two flag stitch pattern affected	No restriction
	Broken stitching at web intersection, but not more than four flag stitch pattern affected	No restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 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	No restriction
	All damage exceeding the failures defined above	Net sections 32 and 41 remain unoccupied, or bulk load is restrained individually

WEIGHT AND BALANCE MANUAL

(e) Divider net type C (frame 56)

FRAME No 56

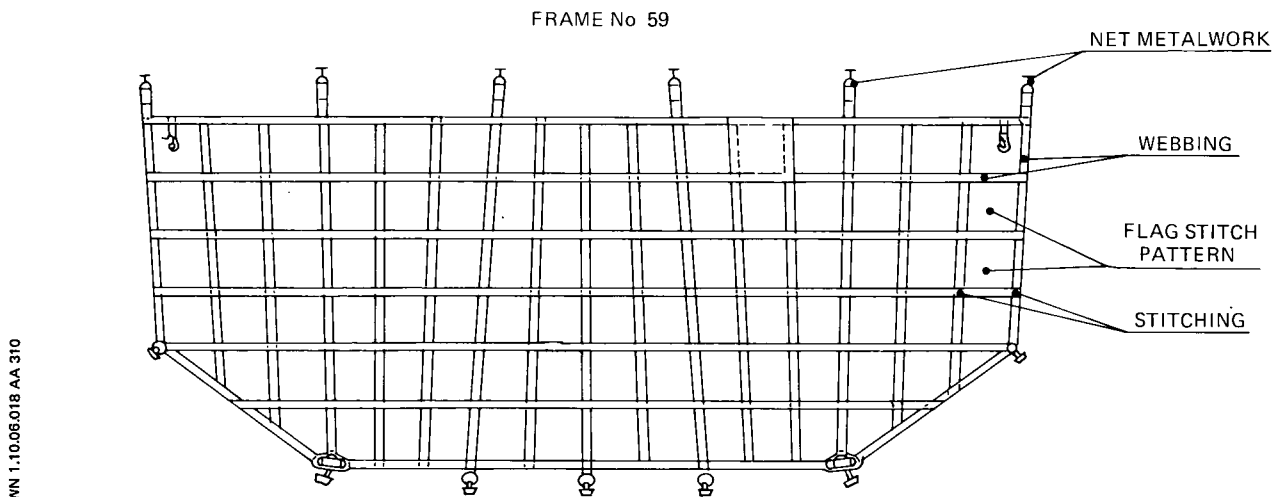
WN 1.10.06 017 AA 310



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 restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 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	No restriction
	All damage exceeding the failures defined above	Net sections 41 and 42 remain unoccupied, or bulk load is restrained individually

WEIGHT AND BALANCE MANUAL

(f) Divider net type A1 (frame 59)



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 restriction
	Slight abrasion at webbings or stitchings, but no cuts or severings	No restriction
	All damage exceeding the failures defined above	Net section 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	No restriction
	All damage exceeding the failures defined above	Net section 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 an average load density of 240 kg/m³ (15 lb/ft³).

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 points 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

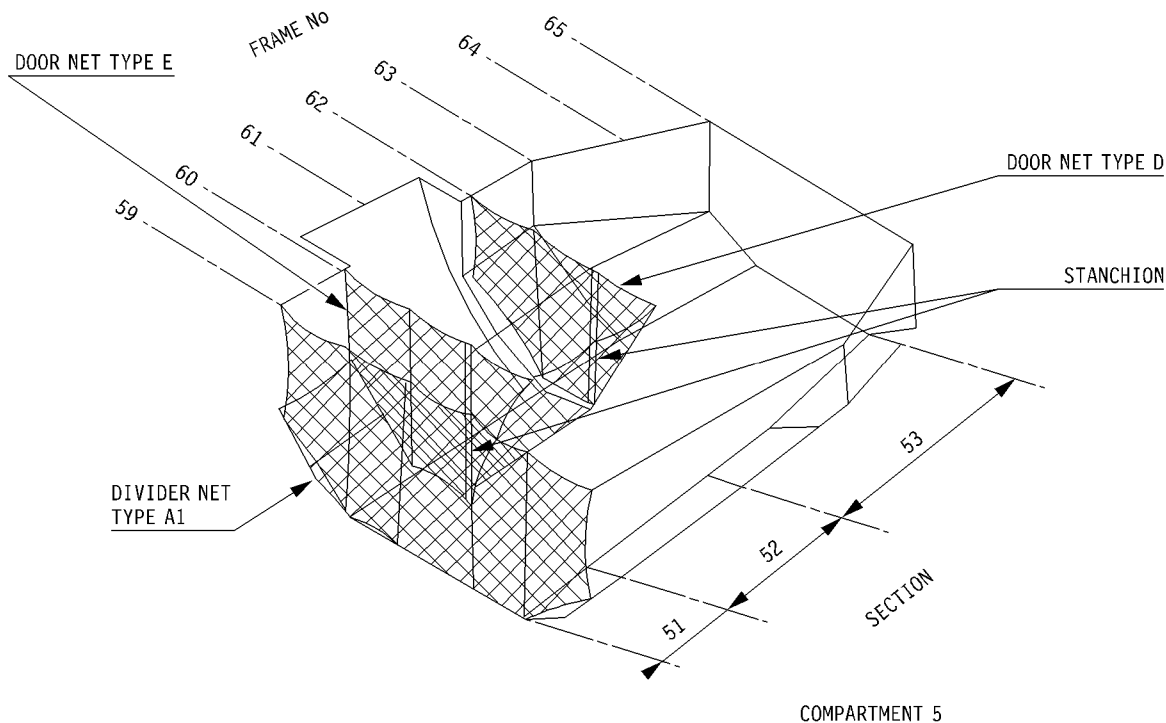
Methods of tie down are given in paragraph 1.60.06.

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

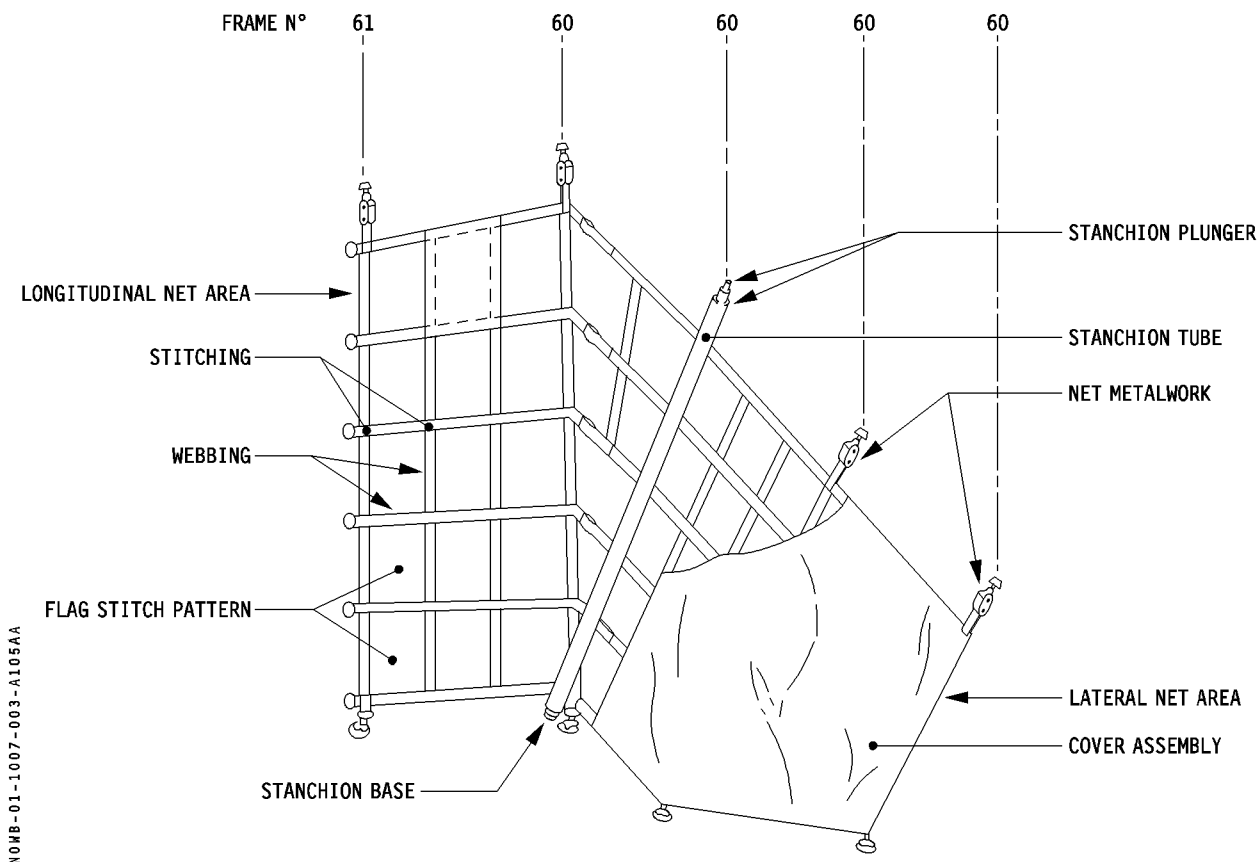
For layout of the net installation in the rear (bulk) cargo hold (compartment 5) see the illustration below.



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

WEIGHT AND BALANCE MANUAL

(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

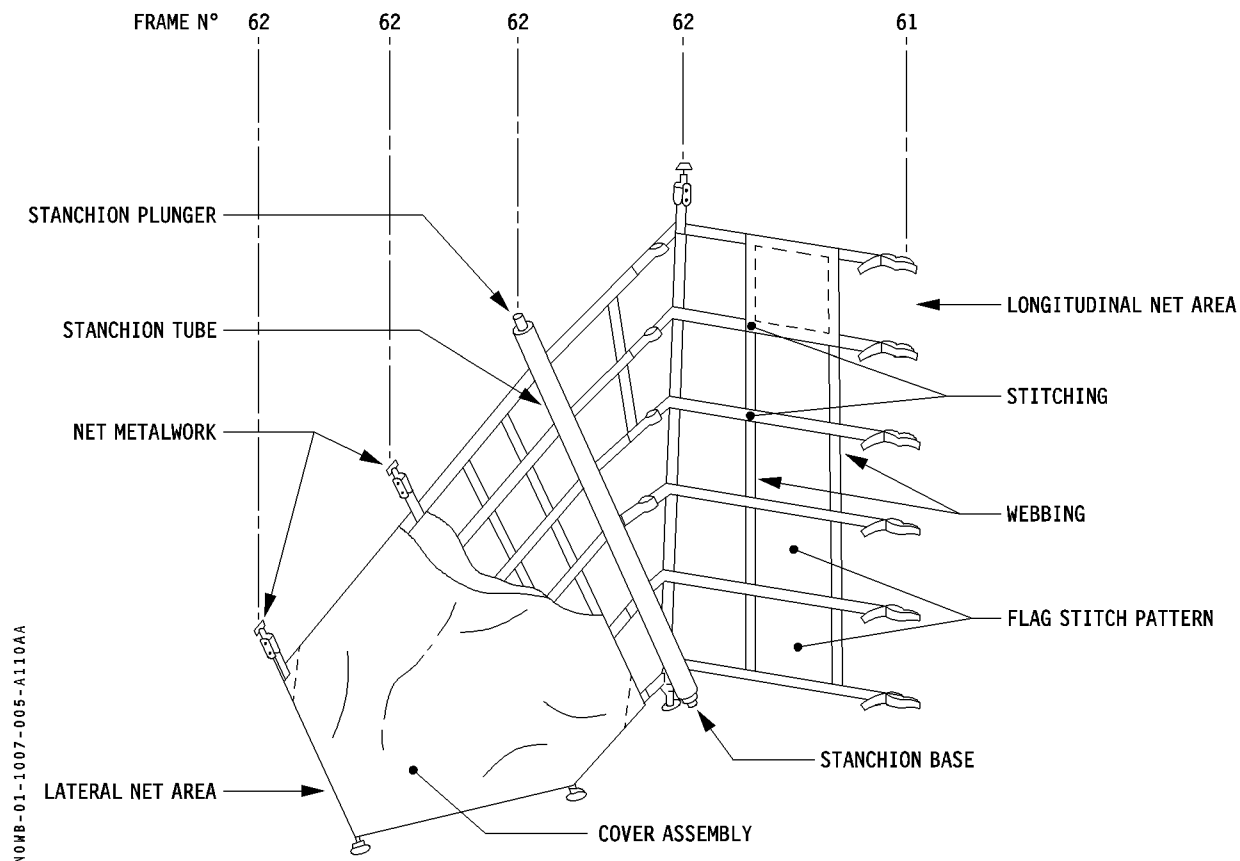
WEIGHT AND BALANCE MANUAL

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.

WEIGHT AND BALANCE MANUAL

(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

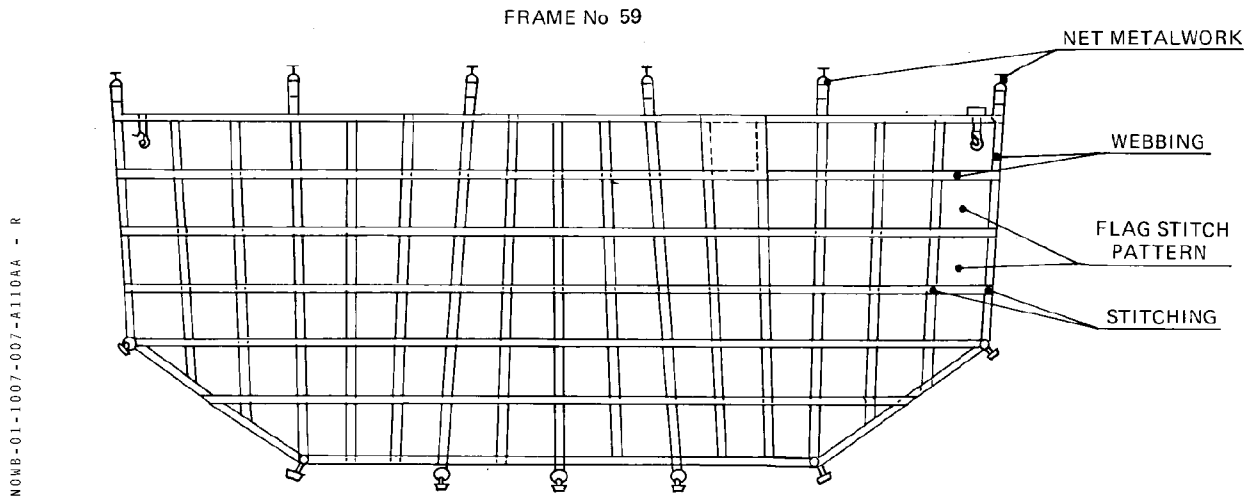
WEIGHT AND BALANCE MANUAL

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



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.

WEIGHT AND BALANCE MANUAL

08. Maximum jacking loads

A. 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 SIMULTANEOUSLY

(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

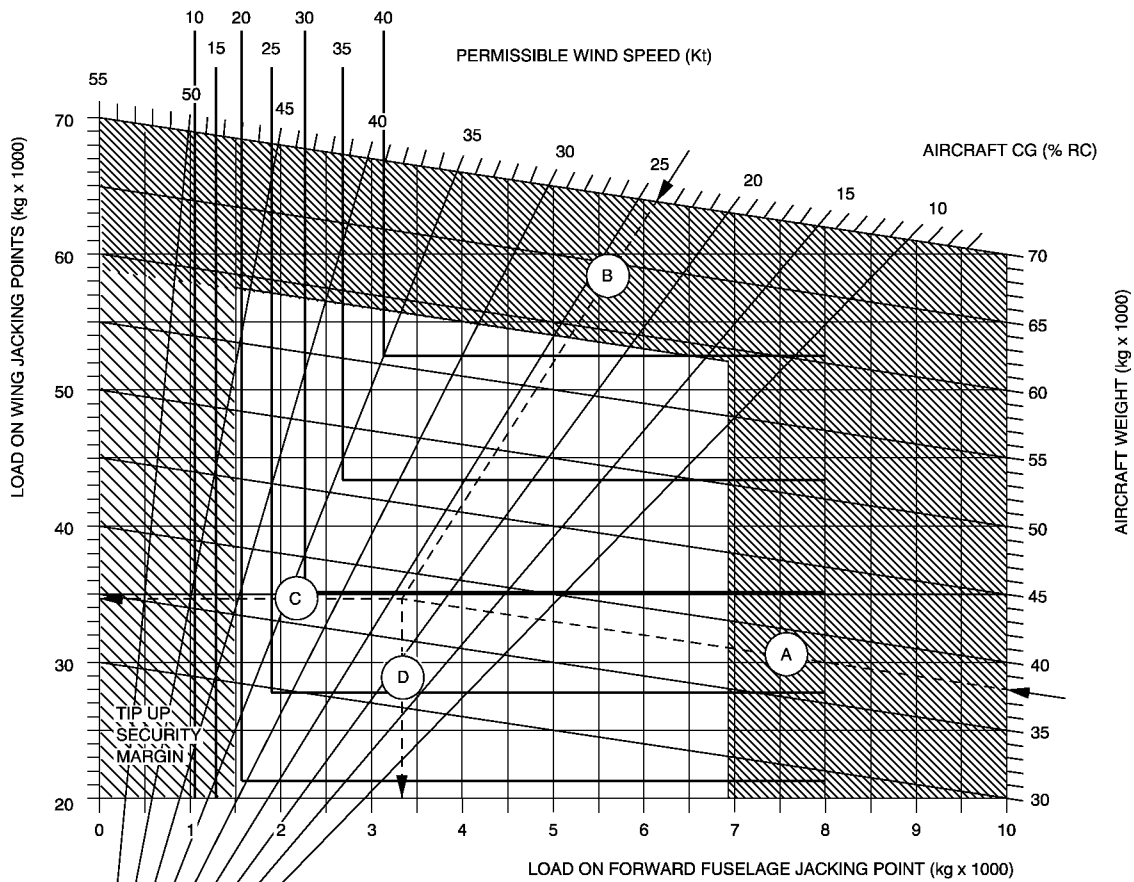
09. Aircraft stability on jacks

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



EXAMPLE: Assume aircraft with gross weight of 38000 kg (A) and center of gravity at 24 % RC (B). The reaction at the wing jacking points is 34700 kg (17350 kg per side) (C) and the reaction at the forward fuselage jacking point is 3300 kg (D). If the aircraft must be lifted outside the wind speed must not be in excess of 25 kt.

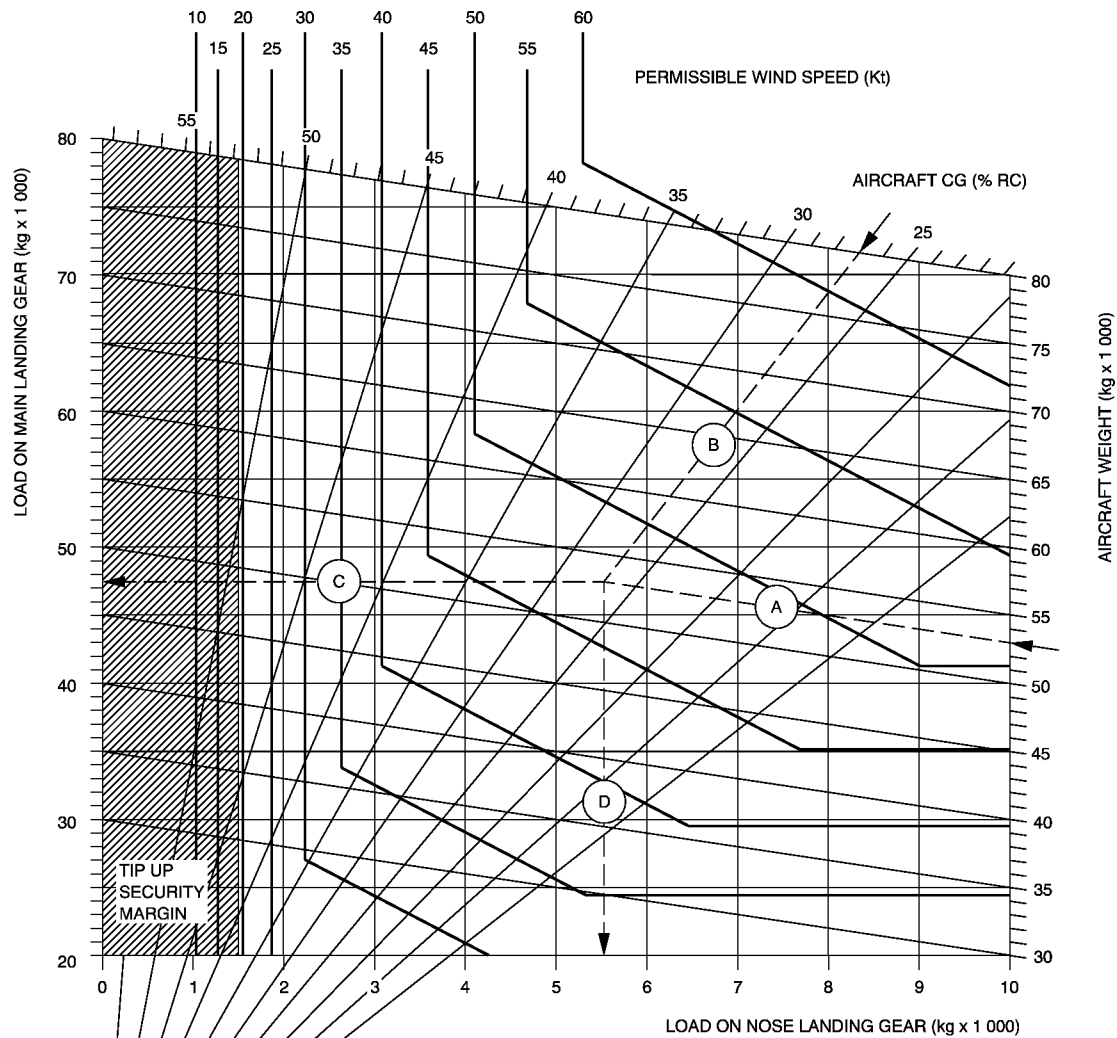
Aircraft Stability on Jacks

Figure 1-10-09

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.

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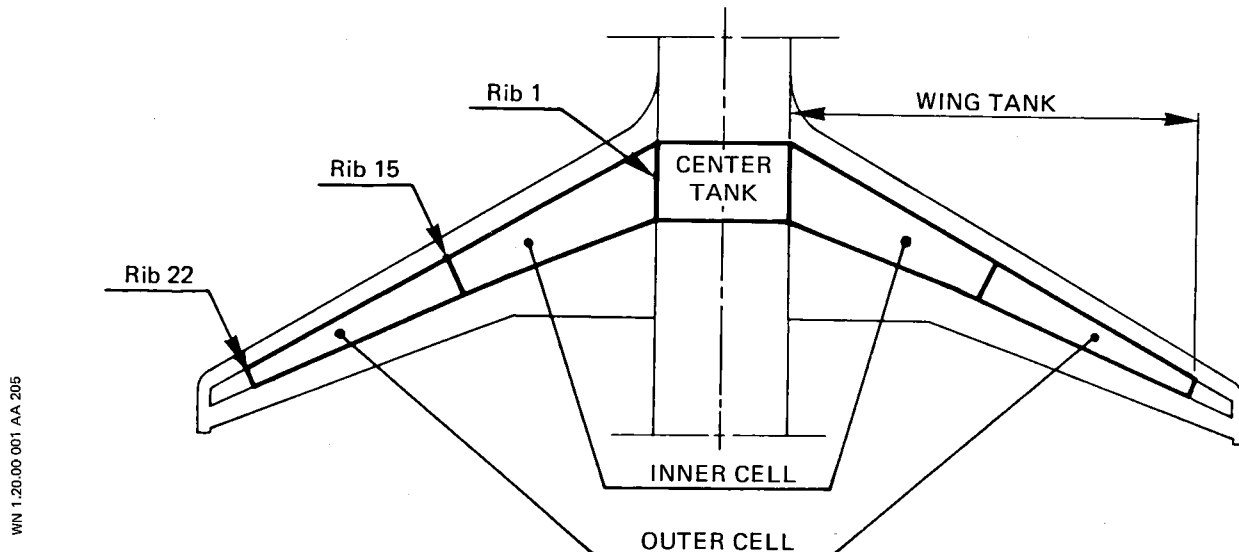
FUEL

01. General

A. Fuel tank arrangement

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

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



WN 1.20.00 001 AA 205

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 scavenge 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 tank 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, or a single standard 2.5 inches coupling under the leading edge of the left hand wing. The couplings are 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 each outer cell and one refuel valve in the center tank.

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

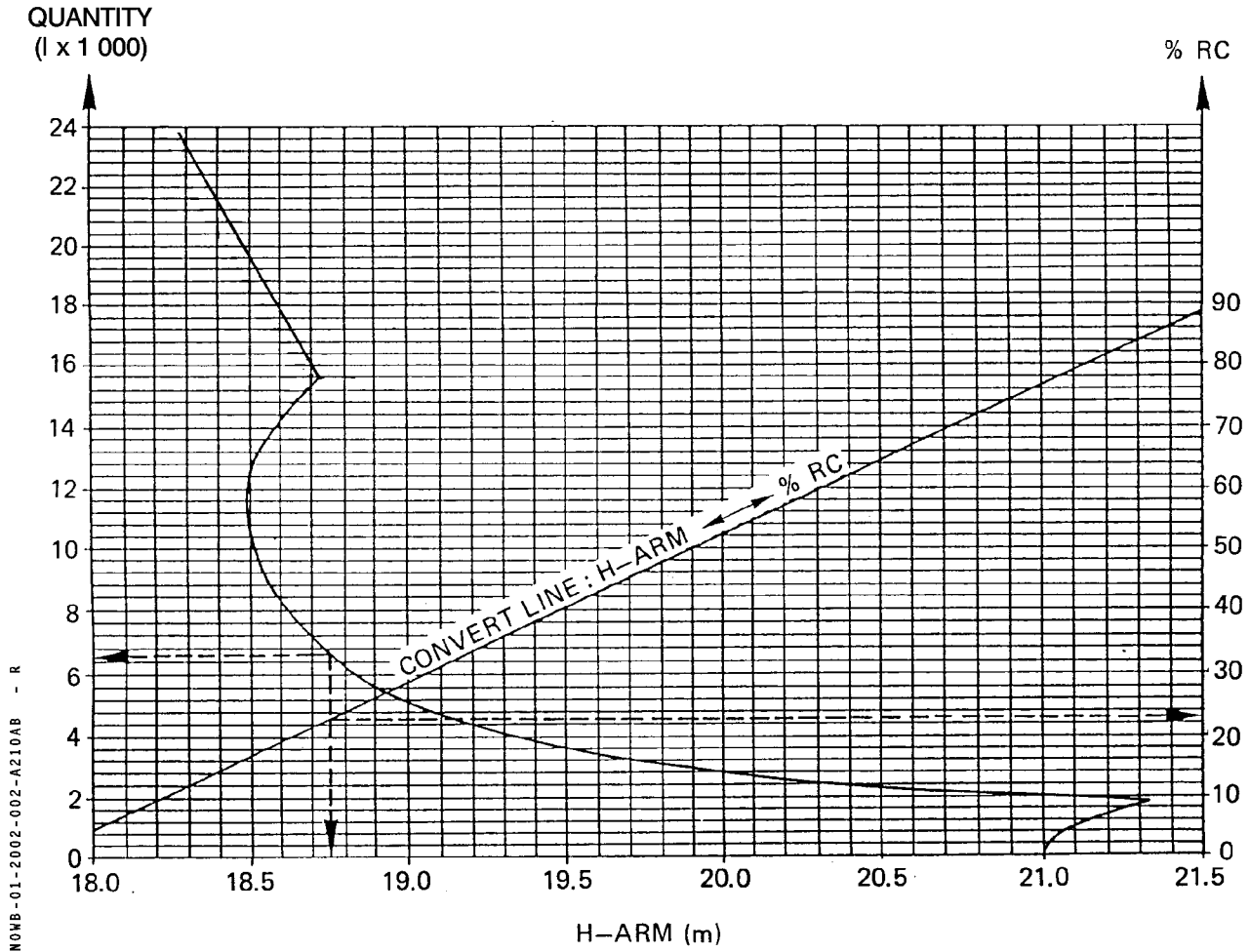
During automatic refueling phase (normal procedure) the quantity of fuel selected is delivered to the three tanks such that :

- 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

Mod : 20024 + 20802 or 20024 + 20802 + 37331 + 37332

Seq : 210

1.20.02
Page 2
JUL 09

WEIGHT AND BALANCE MANUAL

(1)

QUANTITY (l)	H-ARM (m)
3800	19.402
4200	19.248
4600	19.122
5000	19.020
5400	18.916
5800	18.863
6200	18.802
6600	18.751
7000	18.706
7400	18.668
7800	18.636
8200	18.608
8600	18.584
9000	18.564
9400	18.545
9800	18.530
10200	18.517
10600	18.506
11000	18.498
11400	18.495
11800	18.498
12200	18.506
12600	18.519
13000	18.536
13400	18.557
13800	18.581
14200	18.609
14600	18.640
15000	18.673
15400	18.706
15610	18.730

(2)

QUANTITY (l)	H-ARM (m)
15800	18.720
16200	18.698
16600	18.673
17000	18.648
17400	18.620
17800	18.592
18200	18.569
18600	18.537
19000	18.511
19400	18.486
19800	18.462
20200	18.439
20600	18.416
21000	18.395
21400	18.375
21800	18.355
22200	18.336
22600	18.317
23000	18.300
23400	18.283
23800	18.265
23860	18.255

(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

Mod : 20024 + 20802 or 20024 + 20802 + 37331 + 37332

Seq : 210

1.20.02
Page 3
JUL 09



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	880	232.5	691	1523	21.331	839.8
Inner Cell Left	6925	1829.6	5436	11984	18.400	724.41
Outer Cell Right	880	232.5	691	1523	21.331	839.80
Inner Cell Right	6925	1829.6	5436	11984	18.400	724.41
Center Tank	8250	2179.7	6476	14278	17.356	683.31
TOTAL	23860	6303.8	18730	41292	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 variations 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	17.788	2.183
400	17.752	2.299
600	17.736	2.388
800	17.732	2.465
1000	17.735	2.536
1200	17.743	2.601
1400	17.752	2.662
1600	17.763	2.720
1800	17.774	2.775
2000	17.787	2.827
2200	17.799	2.878
2400	17.812	2.926
2600	17.824	2.973
2800	17.837	3.019
3000	17.850	3.063
3200	17.864	3.108
3400	17.877	3.151
3600	17.891	3.194
3800	17.904	3.238
4000	17.917	3.282
4200	17.931	3.328
4400	17.944	3.375
4600	17.959	3.425
4800	17.978	3.484
5000	18.002	3.552
5200	18.030	3.629
5400	18.063	3.713
5600	18.099	3.804
5800	18.138	3.902
6000	18.180	4.005
6200	18.225	4.114
6400	18.273	4.228
6600	18.321	4.344
6800	18.369	4.461
6925	18.400	4.535

OUTER CELL LEFT OR RIGHT WING		
QUANTITY (l)	H-ARM (m)	Y-ARM (m)
200	21.010	10.502
400	21.094	10.751
600	21.174	10.966
800	21.280	11.238
880	21.331	11.364

Table of Fuel H-arm

Figure 1-20-04A

Mod : 20024 + 20802 or 20024 + 20802 + 37331 + 37332

Seq : 210

1.20.04
Page 2
JUL 09

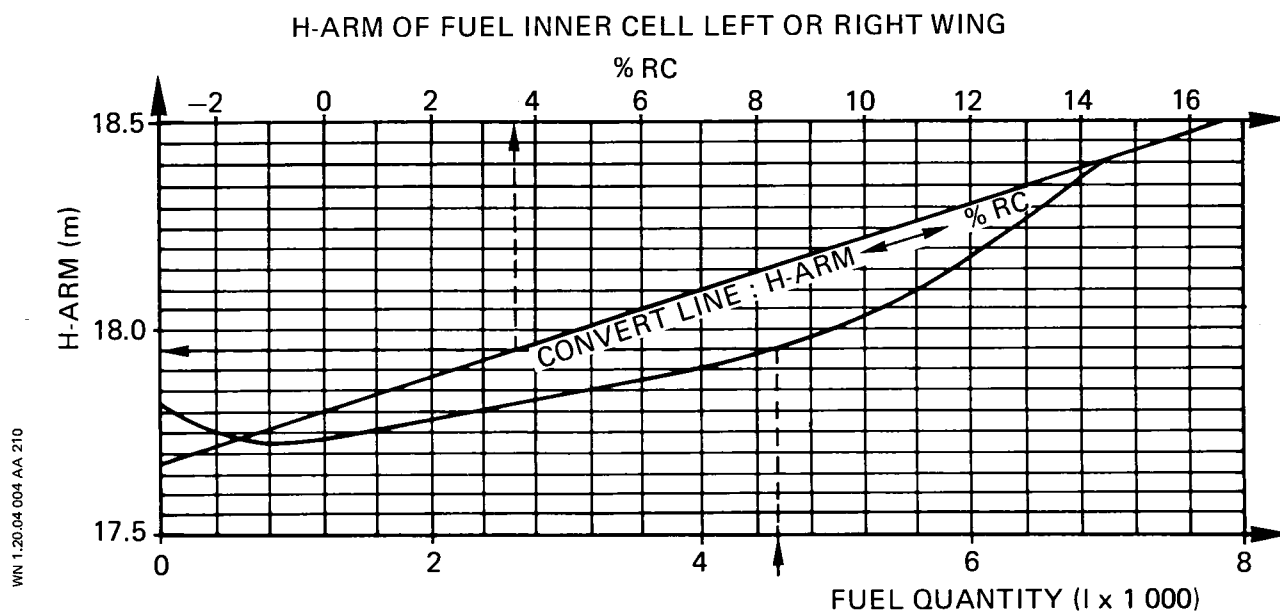
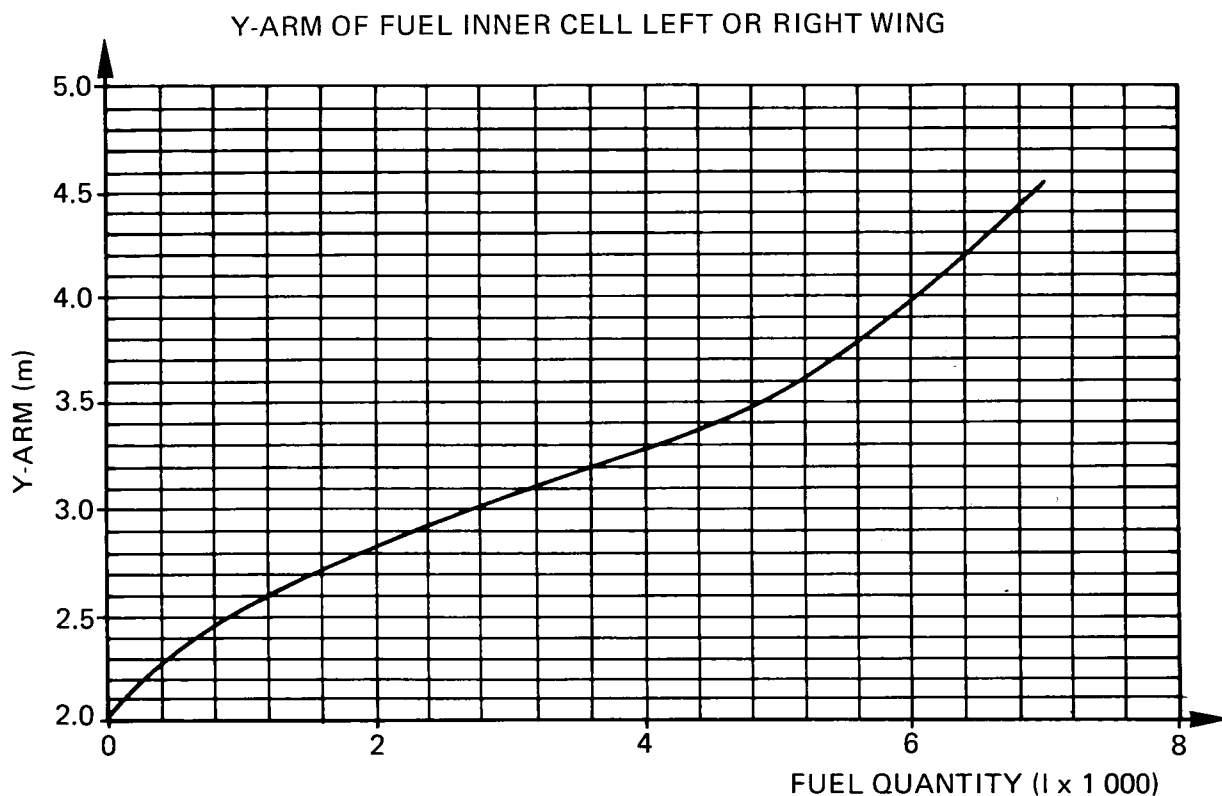


WEIGHT AND BALANCE MANUAL

CENTER TANK	
QUANTITY (l)	H-ARM (m)
200	17.858
400	17.818
600	17.781
800	17.748
1000	17.718
1200	17.689
1400	17.661
1600	17.634
1800	17.608
2000	17.583
2200	17.559
2400	17.537
2600	17.519
2800	17.503
3000	17.489
3200	17.477
3400	17.465
3600	17.457
3800	17.448
4000	17.441
4200	17.434
4400	17.428
4600	17.422
4800	17.417
5000	17.412
5200	17.408
5400	17.403
5600	17.400
5800	17.396
6000	17.393
6200	17.390
6400	17.387
6600	17.384
6800	17.382
7000	17.379
7200	17.377
7400	17.375
7600	17.373
7800	17.370
8000	17.365
8200	17.354
8250	17.356

Table of Fuel H-arm

Figure 1-20-04B



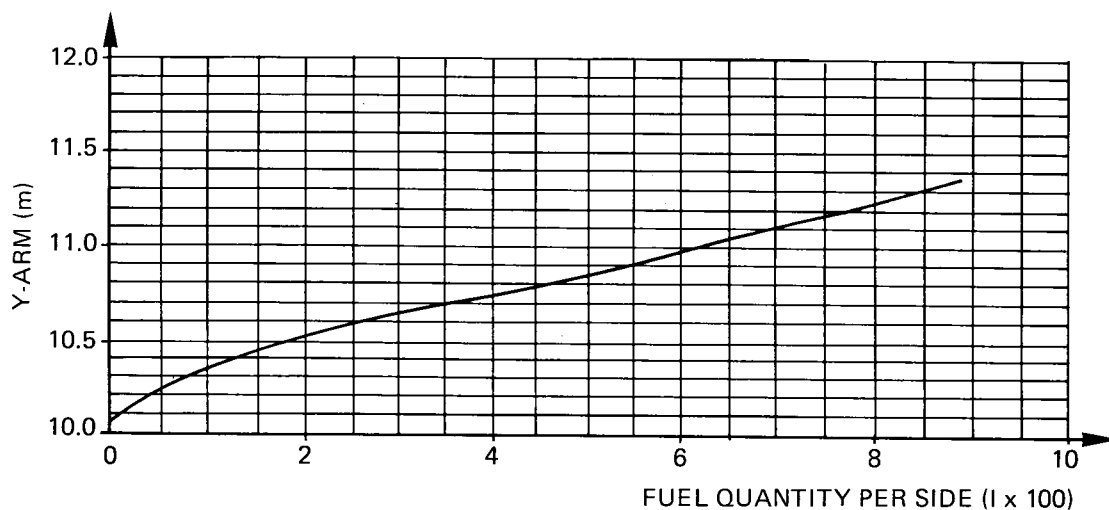
H-arm and Y-arm of Fuel Inner Cells

Figure 1-20-04C

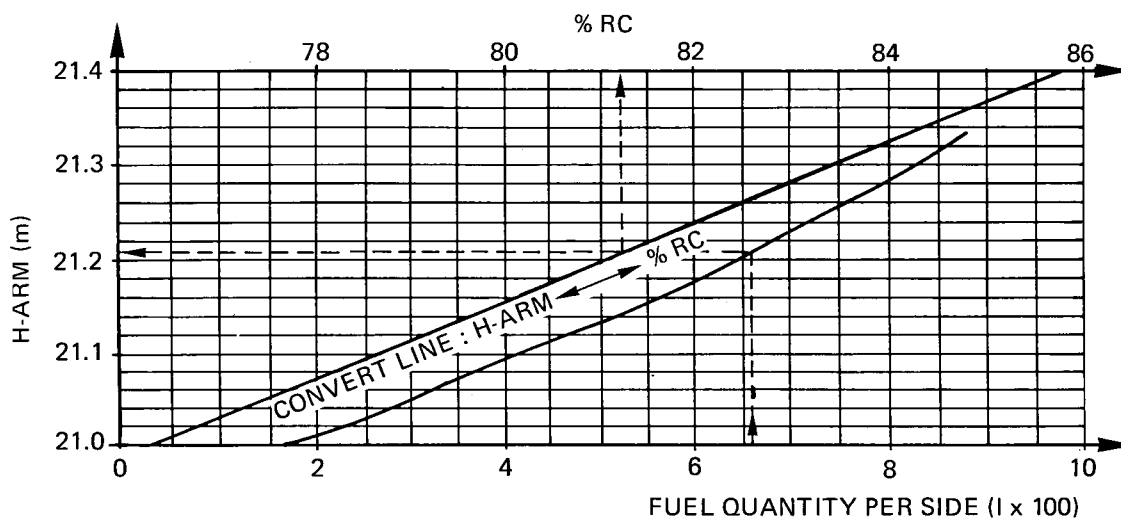
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Seq : 210

Y-ARM OF FUEL OUTER CELL LEFT OR RIGHT WING

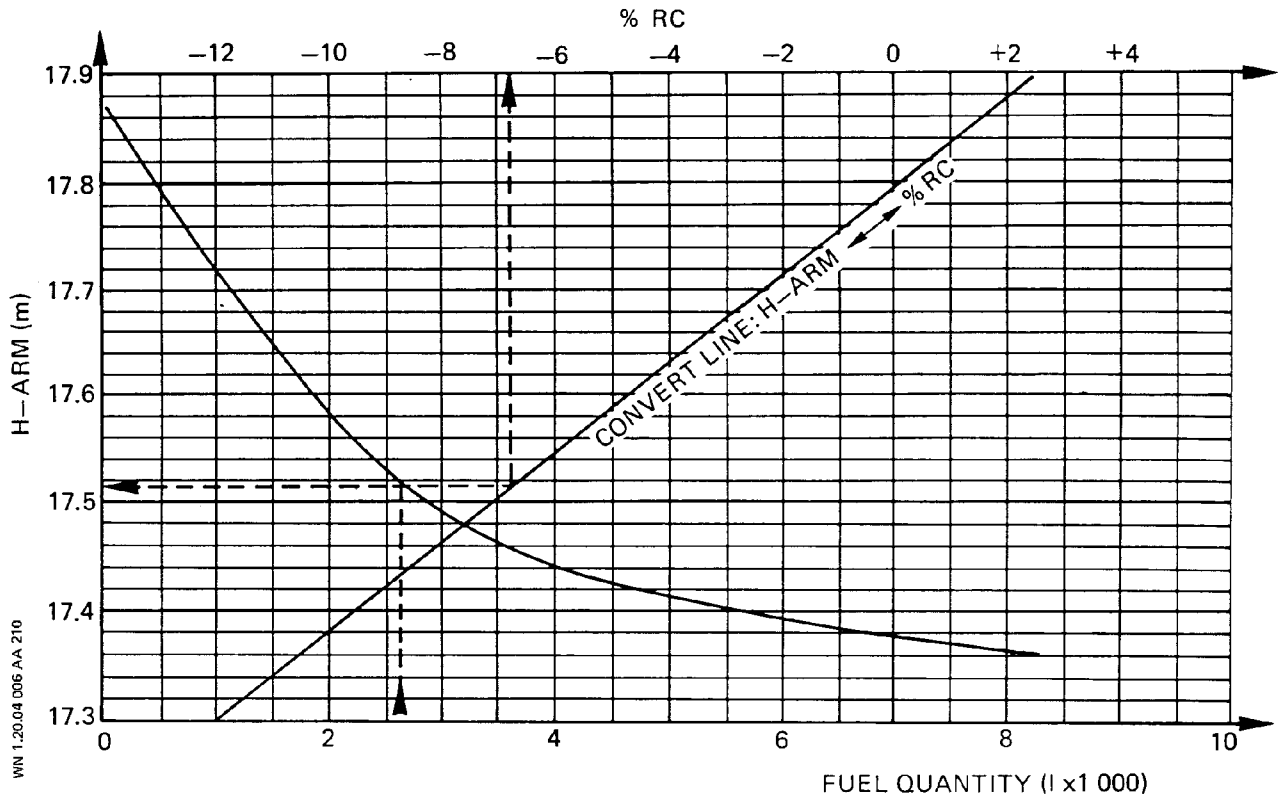


H-ARM OF FUEL OUTER CELL LEFT OR RIGHT WING



H-arm and Y-arm of Fuel Outer Cells

Figure 1-20-04D



H-arm of Fuel Center Tank

Figure 1-20-04E

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	PER AIRCRAFT		H-ARM (m)
	QUANTITY (l)	WEIGHT (kg)	
Outer Cell Left	2.25	1.8	20.985
Inner Cell Left	14.00	11.0	17.867
Center Tank	23.20	18.2	17.834
Inner Cell Right	14.00	11.0	17.867
Outer Cell Right	2.25	1.8	20.985
Systems	26.40	20.7	18.703
Total	82.10	64.5	18.297

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	0.4	22.250	875.98
Outer cell left	0.4	0.1	0.3	0.7	20.985	826.18
Inner cell left	52.3	13.8	41.1	90.6	17.964	707.24
Surge tank right	0.3	0.1	0.2	0.4	22.250	875.98
Outer cell right	0.4	0.1	0.3	0.7	20.985	826.18
Inner cell right	52.3	13.8	41.1	90.6	17.964	707.24
Center tank	67.0	17.7	52.6	116.0	17.830	701.97
Systems	40.3	10.6	31.6	69.7	18.006	708.90
TOTAL	213.3	56.4	167.4	369.1	17.953	706.82

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 RH or LH refuel coupling and check that the fueling 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 the 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	22.250	875.98
Outer Cell Left	0.4	0.1	0.3	0.7	20.985	826.18
Inner Cell Left	0.5	0.1	0.4	0.9	17.840	702.36
Surge Tank Right	0.3	0.1	0.2	0.5	22.250	875.98
Outer Cell Right	0.4	0.1	0.3	0.7	20.985	826.18
Inner Cell Right	0.5	0.1	0.4	0.9	17.840	702.36
Center Tank	8.0	2.1	6.3	13.8	17.830	701.97
Systems	40.3	10.6	31.6	69.7	18.006	708.90
TOTAL	50.7	13.4*	39.8*	87.7*	18.072	711.50*

* Rounded value

TABLE OF UNDRAINABLE FUEL

WEIGHT AND BALANCE MANUAL

FLUIDS

01. General

This section contains information on :

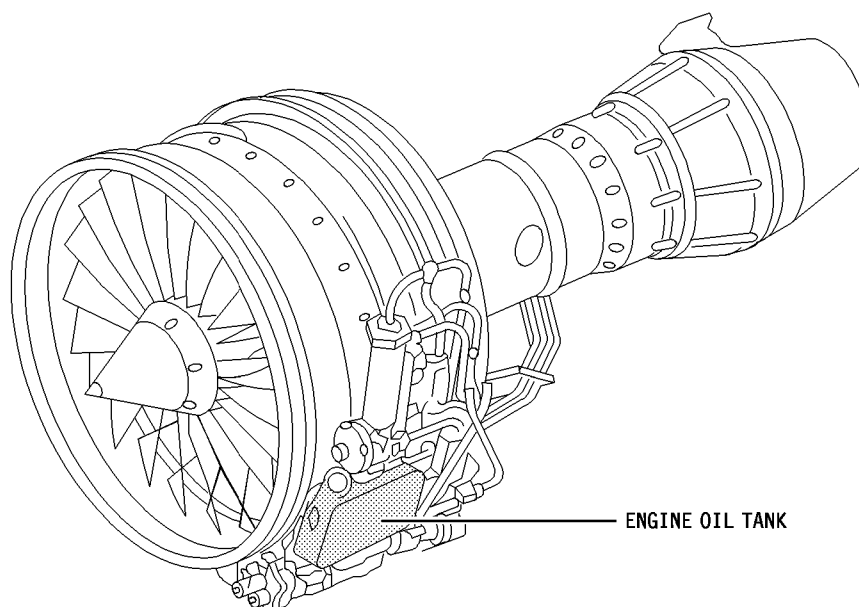
- Engine fluids
- APU oil
- Hydraulic system fluid
- Potable water
- Chemical fluids

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 fluids

A. Oil



04B-01-3000-001-A213AA

LOCATION	QUANTITY (l)	WEIGHT (kg)	H-ARM (m)
Engine LH	24.5	24.5	15.110
Engine RH	24.5	24.5	15.110

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	4.5	4.5	15.369
IDG on Engine RH	4.5	4.5	15.369

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	6	6	15.129
Engine RH	6	6	15.129

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)
<u>Tanks</u>			
a) Green	14	14	18.982
b) Yellow	12	12	18.332
c) Blue	6	6	22.682
<u>Systems</u>	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

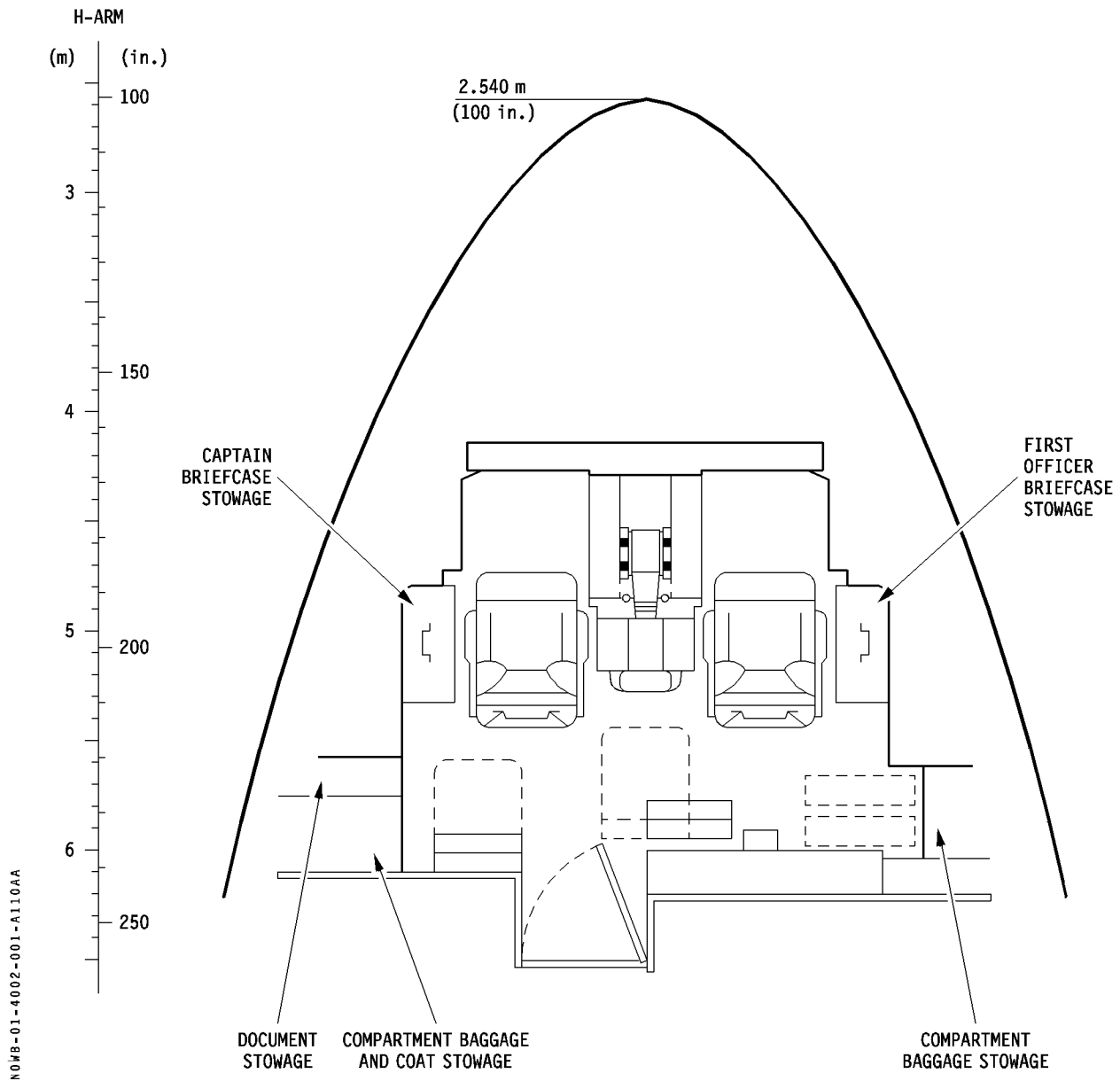
The flight compartment arrangement is shown in figure 1-40-02.

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



WEIGHT AND BALANCE MANUAL

03. Cabin crew members

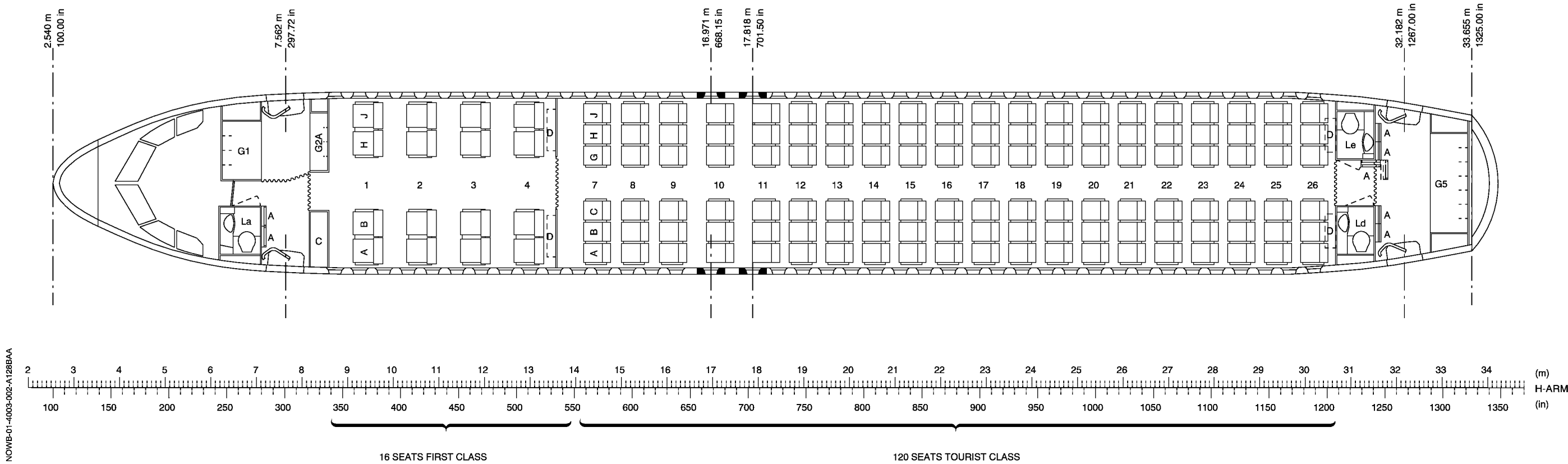
The cabin compartment is provided with cabin attendant stations as shown in figure 1-40-03 (Cabin arrangement).

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	Rear wall of toilet La	7.327	288.46
1	Side wall of toilet Le	31.678	1 247.16
2	Rear wall of toilet Le	31.852	1 254.02
2	Rear wall of toilet Ld	31.852	1 254.02



WEIGHT AND BALANCE MANUAL



NOWB-01-4003-002-A128BAA

- A ATTENDANT SEAT (7×)
- C COAT STOWAGE (1×)
- D DOGHOUSE (4×)
- G GALLEY (3×)
- L LAVATORY (3×)

Cabin Arrangement

Figure 1-40-03

Mod : 151860 or 35577 + 35596 or 35577 + 35600

Seq : 128B

WEIGHT AND BALANCE MANUAL

04. Passengers

The seat layout provided for 136 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, G, H, J)			
	H-ARM (m)	H-ARM (in)	NUMBER PAX	
			LH	RH
1	9.595	377.75	2	2
2	10.763	423.75	2	2
3	11.932	469.75	2	2
4	13.100	515.75	2	2
7	14.656	577.00	3	3
8	15.469	609.00	3	3
9	16.281	641.00	3	3
10	17.183	676.50	3	3
11	18.059	711.00	3	3
12	18.872	743.00	3	3
13	19.685	775.00	3	3
14	20.498	807.00	3	3
15	21.311	839.00	3	3
16	22.123	871.00	3	3
17	22.936	903.00	3	3
18	23.749	935.00	3	3
19	24.562	967.00	3	3
20	25.375	999.00	3	3
21	26.187	1 031.00	3	3
22	27.000	1 063.00	3	3
23	27.813	1 095.00	3	3
24	28.600	1 126.00	3	3
25	29.388	1 157.00	3	3
26	30.163	1 187.50	3	3

WEIGHT AND BALANCE MANUAL

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 :

$I_F \text{ unit}$ = Total in-flight movement

$II_F \text{ unit}$ = Individual in-flight movement

W = Weight of item moving

$H\text{-arm}_1$ = H-arm of item before movement

$H\text{-arm}_2$ = 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 :

$W = 75 \text{ kg or } 165 \text{ lb}$

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.

WEIGHT AND BALANCE MANUAL

03. Cabin hatrack

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 of the cabin.

LOCATION	H-ARM						MAX LOAD	
	FROM		TO		AVERAGE			
	(m)	(in)	(m)	(in)	(m)	(in)	(kg)	(lb)
LH side	8.151	320.91	30.647	1206.57	19.399	763.74	811	1793
RH side	8.600	338.58	30.647	1206.57	19.624	772.60	792	1751

NOTE : The total volume of overhead stowage compartments is approximately 8.5 m³ (300 ft³).
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 H-arm and the maximum loading capacity of all available galleys.

GALLEY REF N°	GALLEY LOCATION	H-ARM		MAX LOAD	
		(m)	(in)	(kg)	(lb)
G1	FWD	6.678	262.91	697.5	1 537.7
G2A	FWD	8.357	329.02	478.4	1 054.7
G5	AFT	33.122	1 304.02	1 275.1	2 811.1

NOTE : MAX LOAD refers to the maximum load that the galley is permitted to apply on the aircraft structure. This MAX LOAD value takes into account the total weight of the galley and all of its contents.

In addition, there is a manufacturer placard in each galley compartment that indicates the maximum loading limit of the considered compartment.

WEIGHT AND BALANCE MANUAL

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)
Forward	La	6.611	260.28
Aft	Ld	31.122	1 225.28
Aft	Le	31.122	1 225.28

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.

A. Stowage units

The following table provides the H-arm and the maximum loading capacity of all available stowage units.

STOWAGE UNIT REF N°	STOWAGE UNIT LOCATION	H-ARM		MAX LOAD	
		(m)	(in)	(kg)	(lb)
C	FWD	8.357	329.02	81.4	179.5

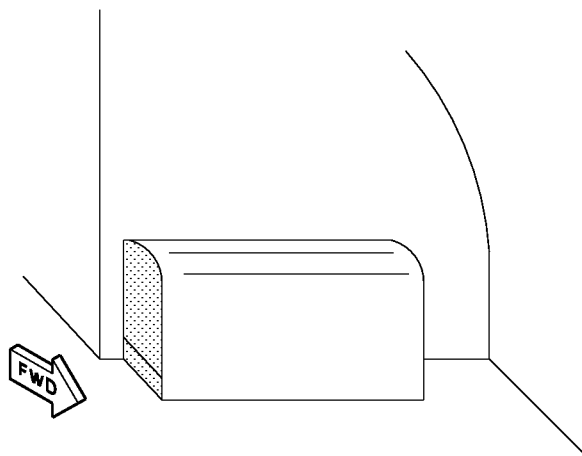
NOTE : MAX LOAD refers to the maximum load that the stowage unit is permitted to apply on the aircraft structure. This MAX LOAD value takes into account the total weight of the stowage unit and all of its contents.

In addition, there is a manufacturer placard in each stowage unit compartment that indicates the maximum loading limit of the considered compartment.

WEIGHT AND BALANCE MANUAL

B. Doghouses

The following is an illustration of doghouses located throughout cabin.



LH SIDE AND RH SIDE

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 F/C compartment	LH	13.629	536.58	15.0	33.0
Doghouse	AFT of F/C compartment	RH	13.629	536.58	15.0	33.0
Doghouse	FWD of lavatory Ld	LH	30.546	1 202.60	10.0	22.0
Doghouse	FWD of lavatory Le	RH	30.546	1 202.60	10.0	22.0

WEIGHT AND BALANCE MANUAL

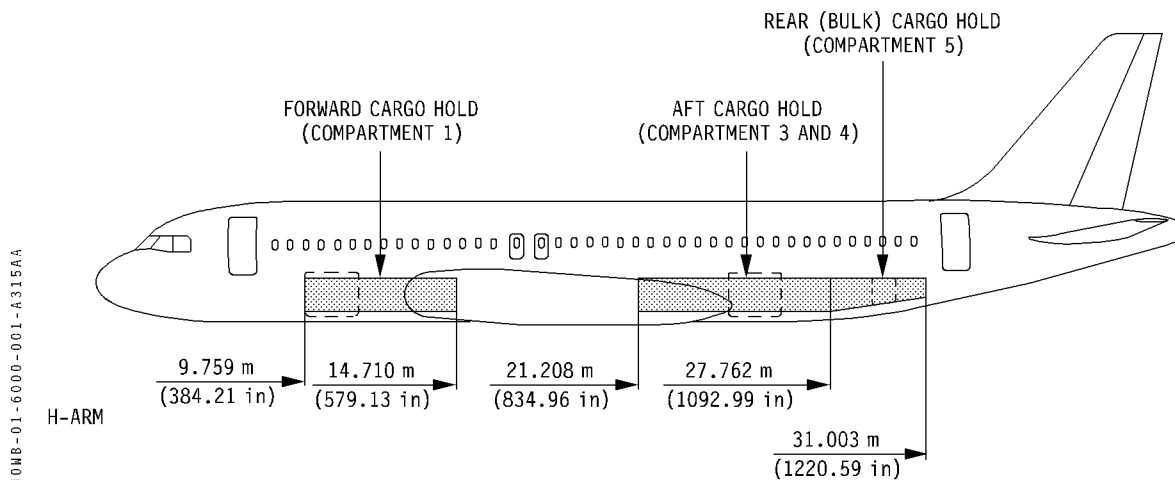
CARGO

01. 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.



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

02. Cargo hold doors

A. 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.

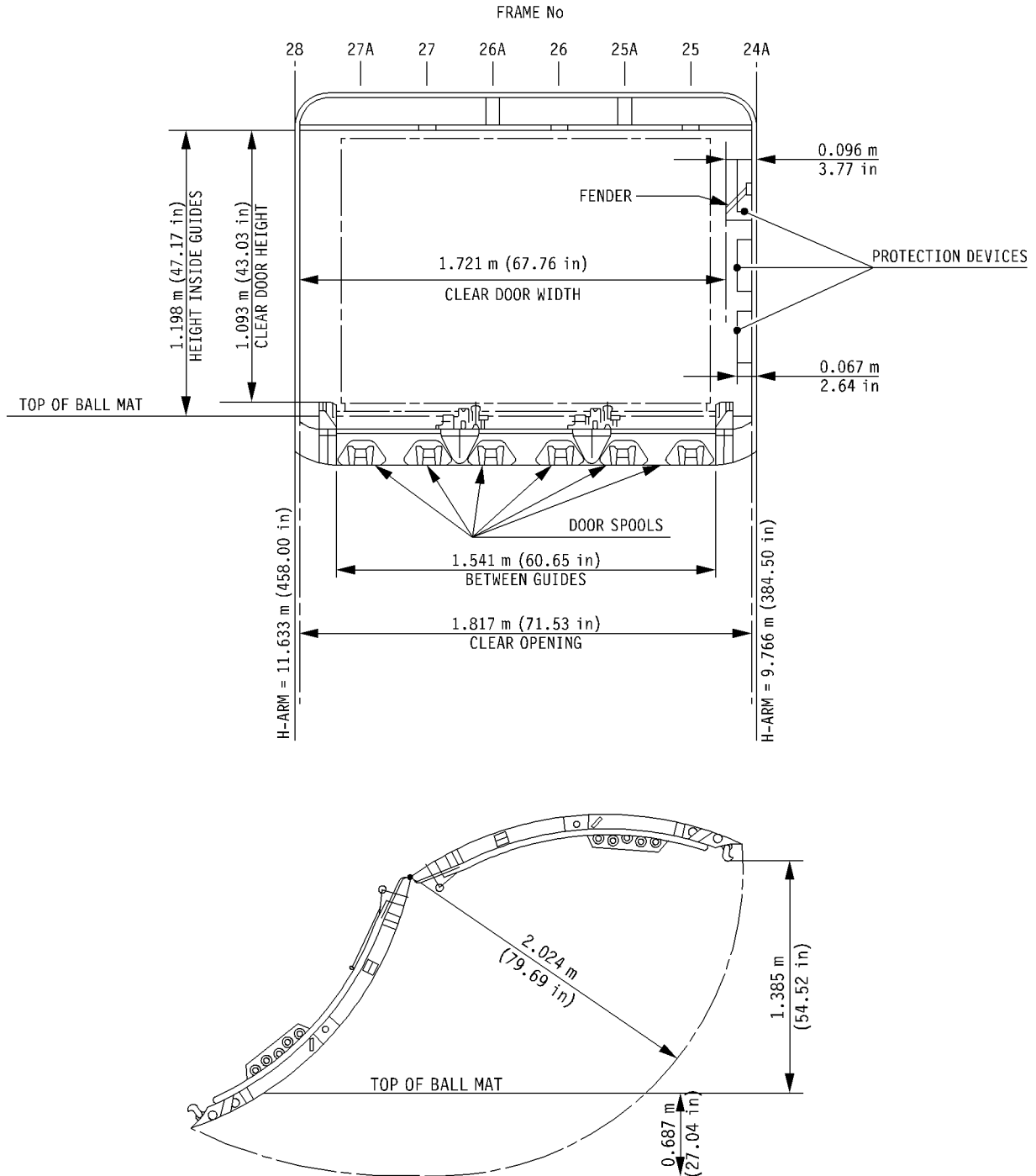
The doors for the forward and aft cargo hold are hydraulically powered. Manual operation using a hand pump is provided for use when hydraulic power is not available.

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



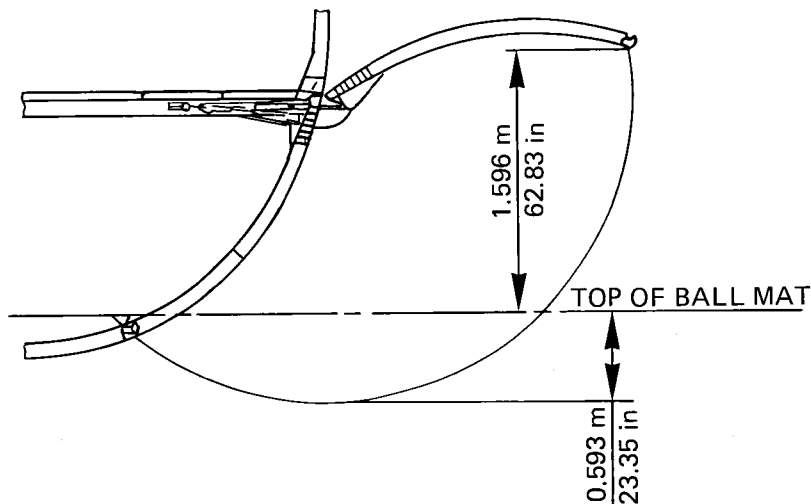
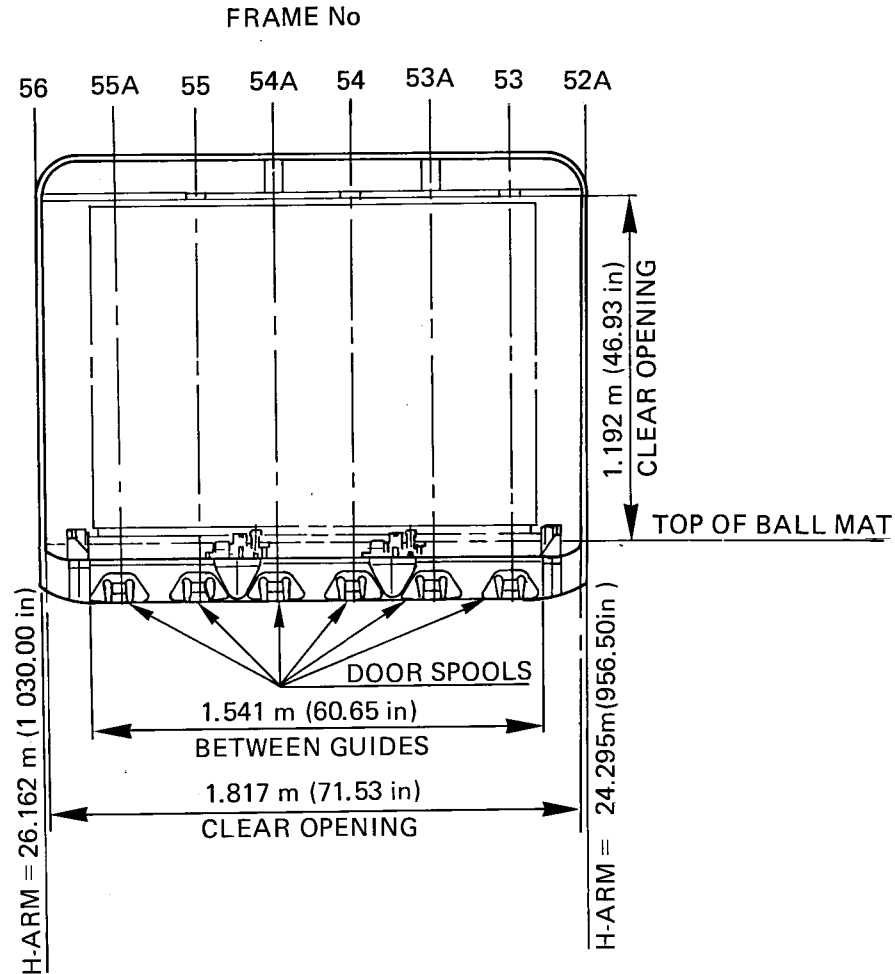
Forward Cargo Door Opening Size and Stations
Figure 1-60-02A

Mod : 20646 + 21897 or 28330 + 28507 or 27375 + 28327 + 28440

Seq : 216

1.60.02
Page 1
JUN 06

WEIGHT AND BALANCE MANUAL



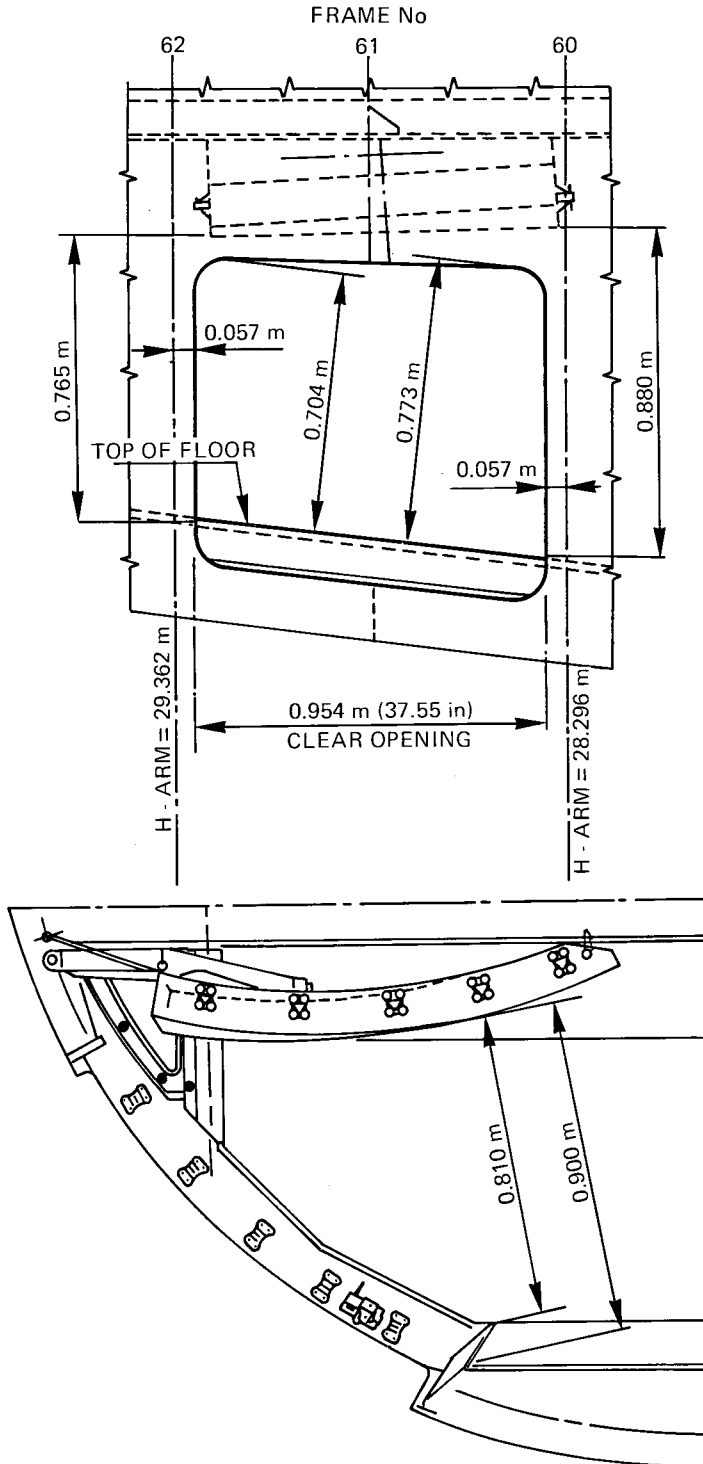
Aft Cargo Door Opening Size and Stations

Figure 1-60-02B

Mod : 20040 or 21898 or 20642 + 21898 or 28335 + 28507 or 28335 + 28521 or 28521 + 33671 or 27375 + 27378
+ 28327 + 28330 + 28335 + 28440

Seq : 100

1.60.02
Page 2
MAR 91



WN 1.60.02 003 AB 110

Rear (Bulk) Cargo Door Opening Size and Stations

Figure 1-60-02C

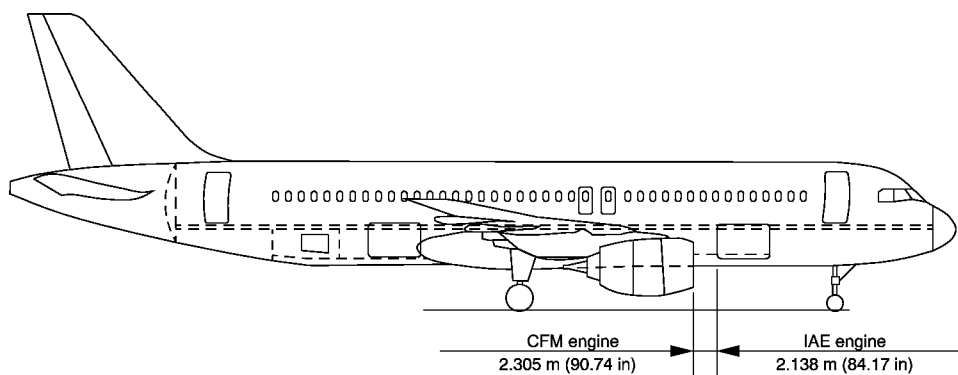
Mod : 20029 or 25802 or 20029 + 21897 + 21898 or 20029 + 28330 + 28507 + 33671 or 27375 + 27378 + 28327 + 28330 + 28440
or 27375 + 28327 + 28330 + 28335 + 28440 or 20029 + 27375 + 28327 + 28330 + 28440 + 33671

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.

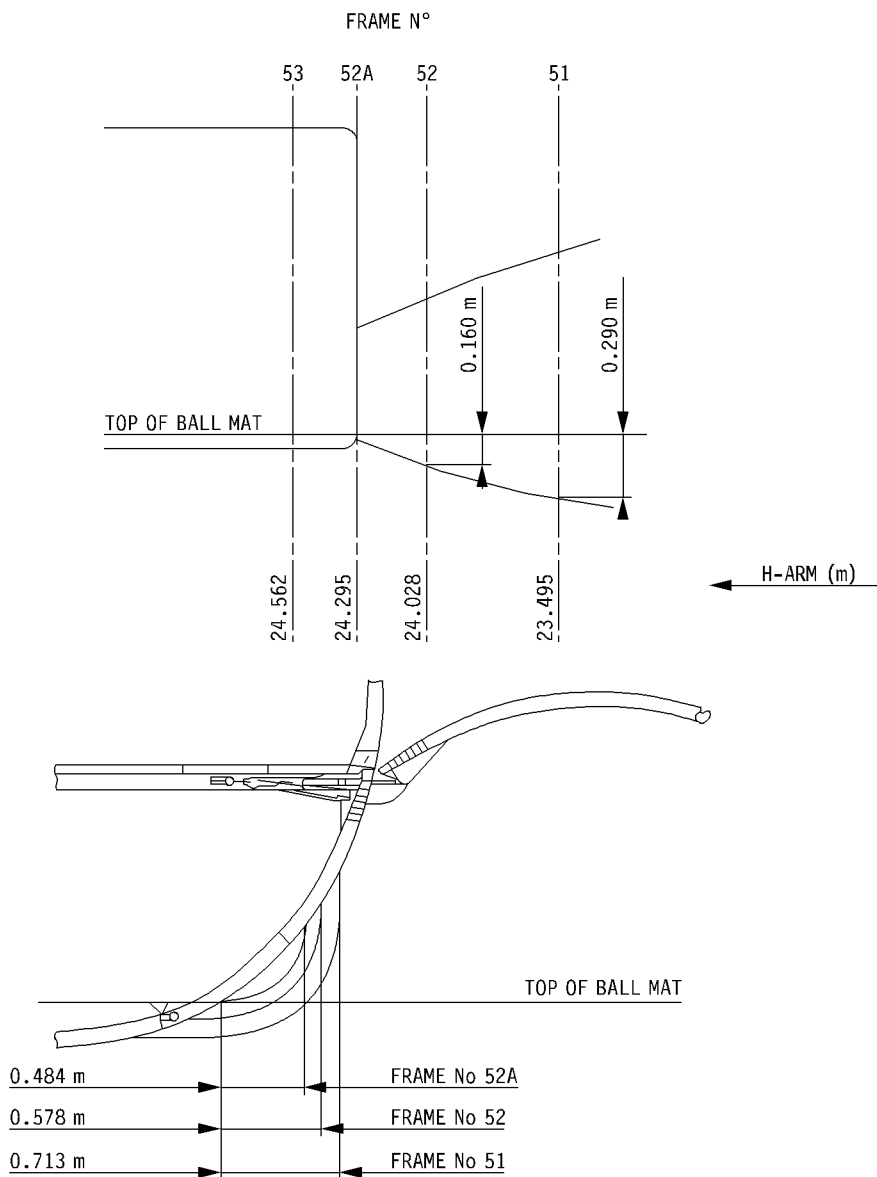
(02) Aft cargo door

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.

WEIGHT AND BALANCE MANUAL

NOWB-01-6002-005-A210AA



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

WEIGHT AND BALANCE MANUAL

03. Forward cargo hold (compartment 1)

The forward cargo hold (compartment 1) is provided with a semi-automatic loading system for the transport of ULDs and non unitized load under the conditions of paragraph 1.10.05.A.

The cargo hold is also capable for the occasional transport of bulk loads under the conditions of paragraph 1.10.05.B, after installation of the certified net restraint system.

A. Loading with ULDs and non unitized load

CAUTION : THE CUMULATIVE LOAD IN THE FORWARD CARGO HOLD MUST NOT EXCEED THE MAXIMUM PERMISSIBLE, GIVEN IN PARAGRAPH 1.10.05.A.(01).

IT IS PROHIBITED TO CARRY LOOSE BULK FREIGHT OR LOOSE BAGGAGE IN THIS HOLD.

THE CG POSITION OF EACH ULD MUST BE IN ACCORDANCE WITH THE REQUIREMENTS IN PARAGRAPH 1.10.05.A.(02).

The cargo hold is capable of housing the following unit load devices.

- 3 – half size containers LD 3 – 46 (NAS 3610-2K2C, IATA contour AKG)
- or
- 3 – full size containers LD 3 – 46W (NAS 3610-2K2C, IATA contour AKH)
- or
- 3 – rectangular containers LD 3 – 46R (NAS 3610-2K2C, IATA contour AKJ)
- or
- 3 – 60.4 × 61.5 inches pallets LD 3 – 46P (NAS 3610-2K3P)

The ULD numbering conforms to IATA recommendation, the arrangement of the forward cargo hold is shown in figure 1-60-03A.

NOTE : The cargo hold need not necessarily be loaded with the maximum number of containers or pallets ; any station may remain unoccupied, see note in paragraph 1.10.05.A.(01).

(01) The table below gives the typical volume and H-arms of the half size containers LD 3 – 46 (NAS 3610-2K2C, IATA contour AKG), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
11	3.11	110	9.930	11.470	10.700
12	3.11	110	11.502	13.042	12.272
13	3.11	110	13.074	14.614	13.844

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.05.A.(01).

WEIGHT AND BALANCE MANUAL

- (02) The table below gives the typical volume and H-arms of the full size containers LD 3 – 46W, (NAS 3610-2K2C, IATA contour AKH), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
11	3.68	130	9.930	11.470	10.700
12	3.68	130	11.502	13.042	12.272
13	3.68	130	13.074	14.614	13.844

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.05.A.(01).

- (03) The table below gives the typical volume and H-arms of the rectangular containers LD 3 - 46R (NAS 3610-2K2C, IATA contour AKJ), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
11	2.55	90	9.930	11.470	10.700
12	2.55	90	11.502	13.042	12.272
13	2.55	90	13.074	14.614	13.844

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.05.A.(01).

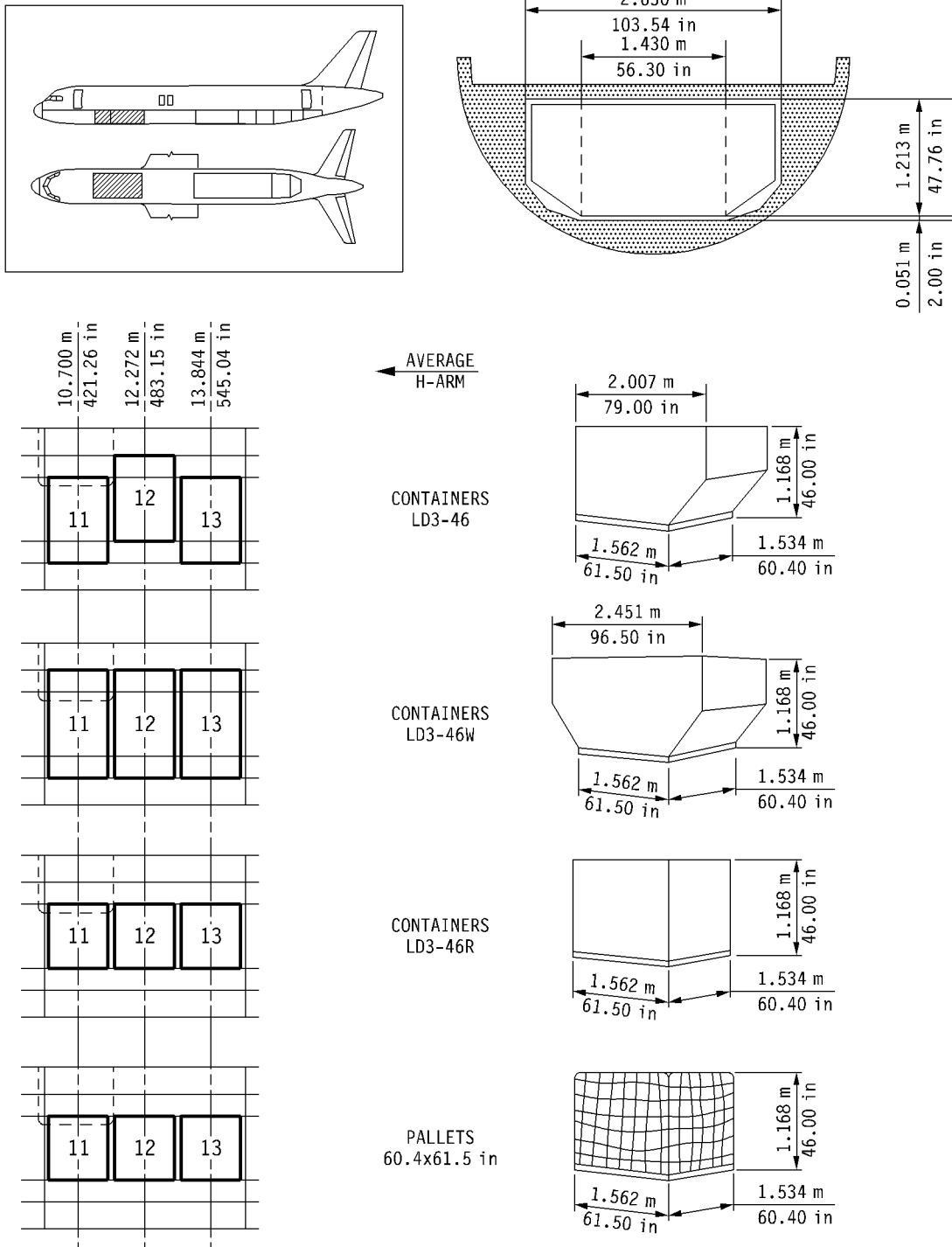
- (04) The table below gives the typical volume and H-arms of the 60.4 × 61.5 inches pallets LD 3-46P (NAS 3610-2K3P), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
11	2.55	90	9.930	11.470	10.700
12	2.55	90	11.502	13.042	12.272
13	2.55	90	13.074	14.614	13.844

(*) Effective volume for igloo or net.

The maximum gross weight permissible per pallet and contents is given in paragraph 1.10.05.A.(01).

WEIGHT AND BALANCE MANUAL



Arrangement Forward Cargo Hold (Compartment 1) for ULD Transport

Figure 1-60-03A

Mod : 20106 or 21897 or 20065 + 20619 or 28330 + 28507 or 20065 + 20106 + 23172 or 20646 + 21897 + 23172 or 23172 + 27375 + 28330 + 28440

WEIGHT AND BALANCE MANUAL

B. Occasional loading with bulk load

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.B.

The cargo hold is also capable for the occasional transport of bulk loads, provided the certified net restraint system is installed.

When the certified net restraint system is used, additional tie down is not normally required except as specified in paragraph 1.10.05.B. 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.B.

(01) General arrangement

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

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

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

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.

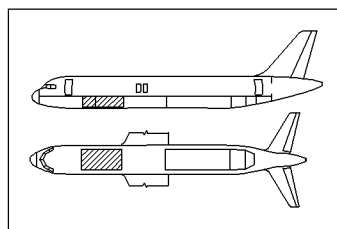
(02) Cargo hold volumes

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.

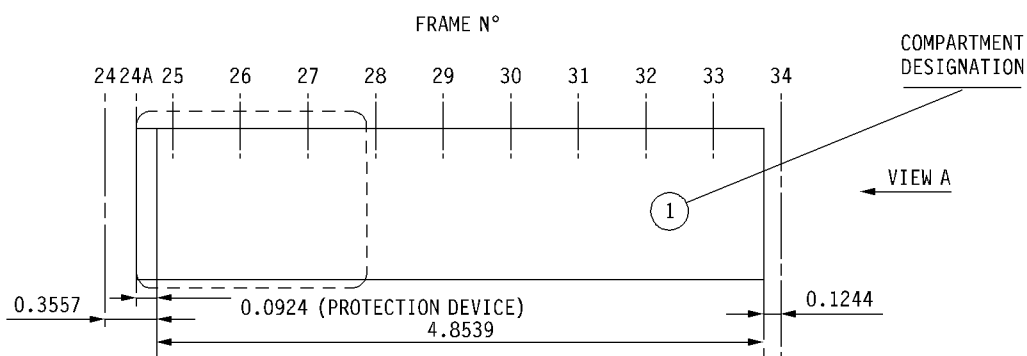
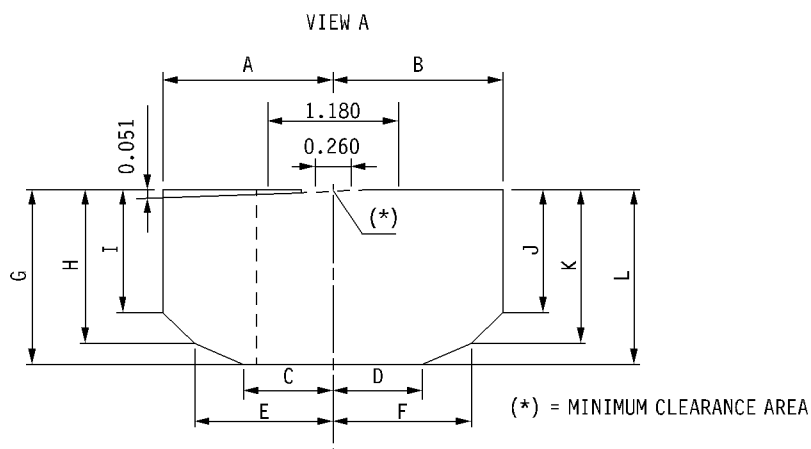
The usable volumes, cross section areas, extensions and H-arms are given in the table below for the individual net sections and total cargo compartment.

NET 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	3.960	140	9.856	11.633	10.744
12	28 to 31	1.600	2.984	4.760	168	11.633	13.233	12.433
13	31 to 34	1.477	2.984	4.390	155	13.233	14.710	13.971
Total	24A to 34	4.854	–	13.110	463	9.856	14.710	12.283

WEIGHT AND BALANCE MANUAL



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



CROSS SECTIONS													
FRAME STATION	H-ARM (m)	A	B	C	D	E	F	G	H	I	J	K	L
24A	9.856	0.765	1.315	0.577	0.715	–	1.049	1.207	–	–	0.797	1.065	1.207
25	10.033	0.765	1.315	0.577	0.715	–	1.049	1.207	–	–	0.797	1.065	1.207
26	10.566	0.765	1.315	0.577	0.715	–	1.049	1.207	–	–	0.797	1.065	1.207
27	11.100	0.765	1.315	0.577	0.715	–	1.049	1.207	–	–	0.797	1.065	1.207
28	11.633	0.765 1.315	1.315	0.577 1.315	0.715	– 1.049	1.049	1.207	– 1.065	– 0.797	0.797	1.065	1.207
29	12.167	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
30	12.700	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
31	13.233	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
32	13.767	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
33	14.300	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
34	14.710	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207

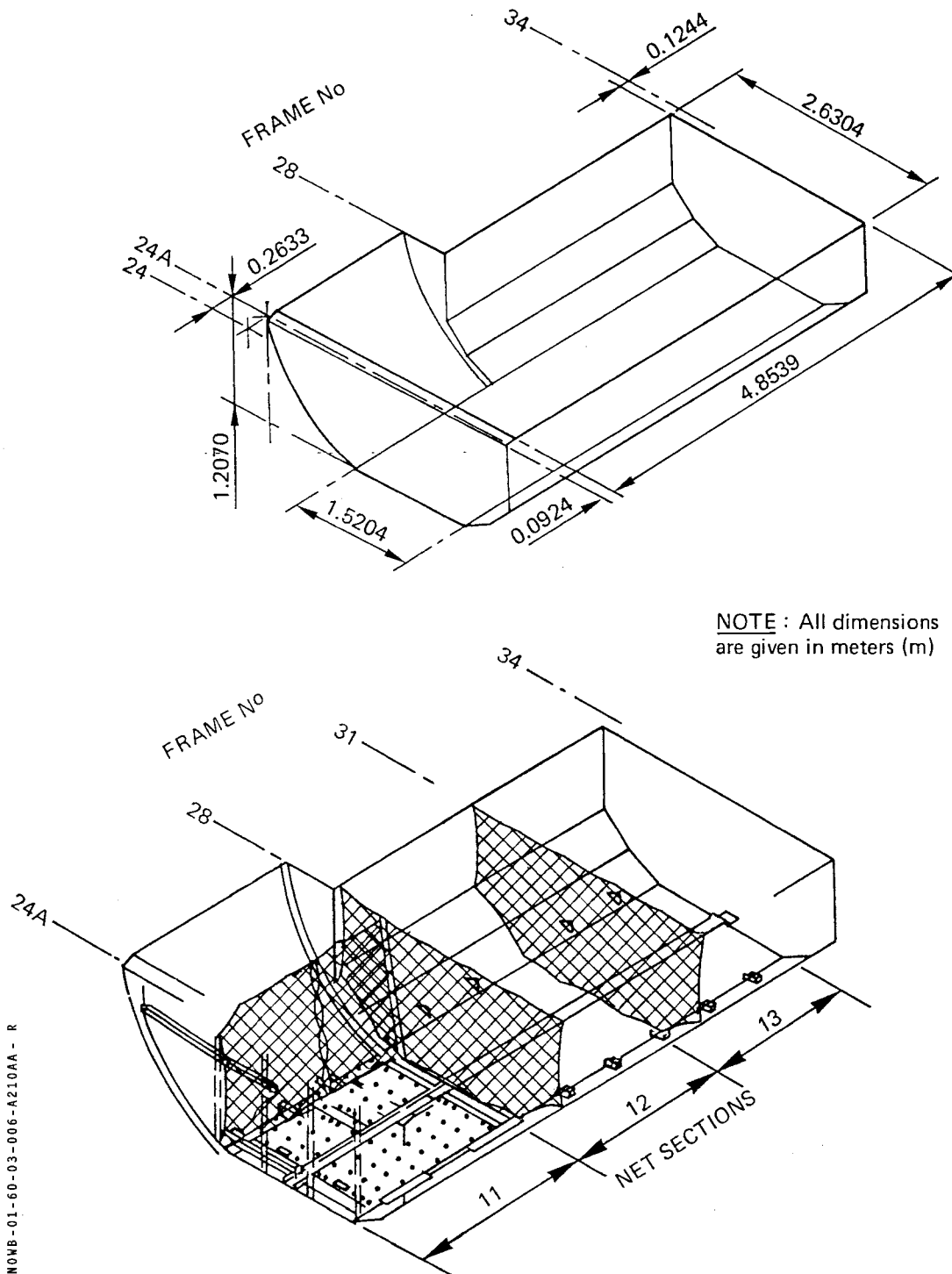
Arrangement Forward Cargo Hold (Compartment 1) for Occasional Loading with Bulk Load

Figure 1-60-03B 1/2

Mod : 20065 + 20106 + 23172 or 23172 + 28330 + 28507

Seq : 310

1.60.03
Page 5
FEB 03



Arrangement Forward Cargo Hold (Compartment 1) for Occasional Loading with Bulk Load

Figure 1-60-03B 2/2

Mod : 20106 or 28330 + 28507

Seq : 210

WEIGHT AND BALANCE MANUAL

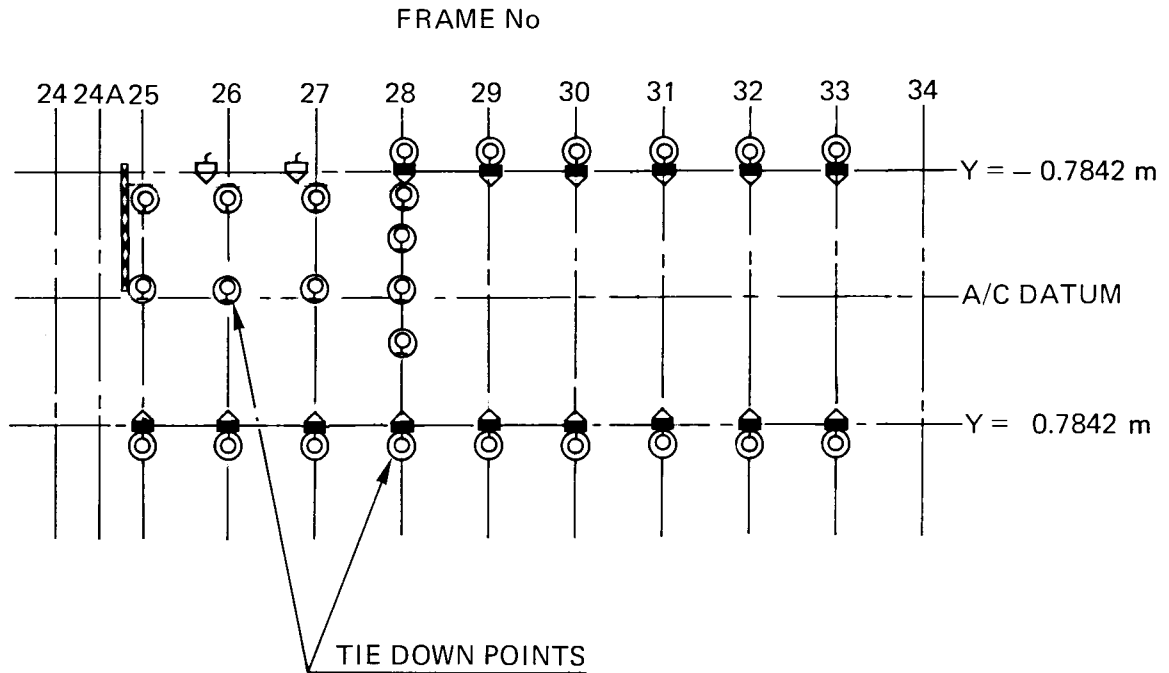
(03) Tie down points arrangement

The forward cargo hold is provided with tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor as shown in figure 1-60-03C.

Tie down points not required for net fastening may be used for the restraint of packages under the conditions of paragraphs 1.10.05.A and 1.10.05.B. Attachment points in the lining and ceiling areas are for net fastening only.

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

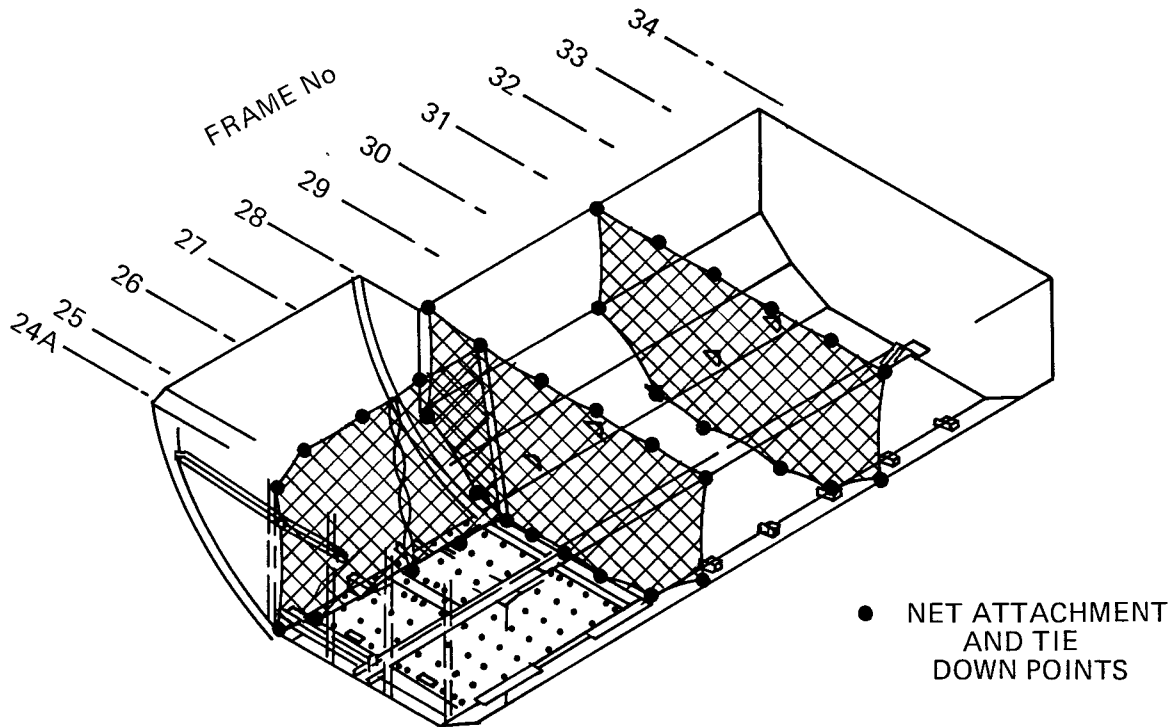
The tie down point locations and the tie down components are given in figure 1-60-03C.



WN 1.60.03 008 AB 210

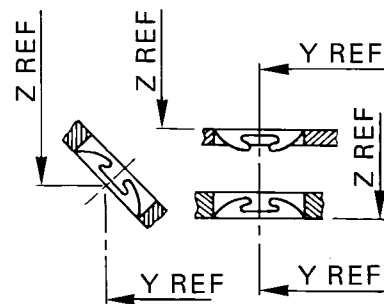
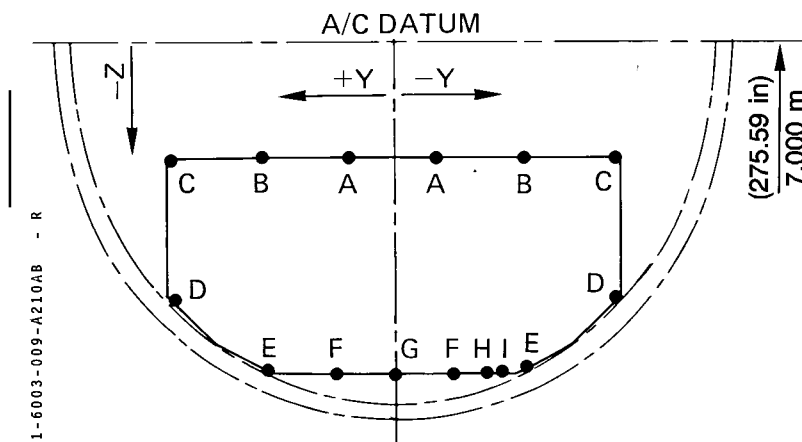
Tie Down Points Arrangement Forward Cargo Hold

Figure 1-60-03C 1/3



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 1-60-03C 2/3



WEIGHT AND BALANCE MANUAL

NET ATTACHMENT AND TIE DOWN POINT LOCATIONS											
FRAME STATION	H-ARM (m)	TIE-DOWN POINT STATION	REFERENCE POINTS								
			A	B	C	D	E	F	G	H	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	–	–	–	–	–	–	10.046
		Y-ARM (m)	–	+0.765	–	–	–	–	–	–	+0.577
		Z-ARM (m)	–	– 0.645	–	–	–	–	–	–	– 1.913
26	10.566	H-ARM (m)	–	10.542	–	–	–	–	–	–	10.579
		Y-ARM (m)	–	+0.765	–	–	–	–	–	–	+0.577
		Z-ARM (m)	–	– 0.645	–	–	–	–	–	–	– 1.913
27	11.100	H-ARM (m)	–	11.076	–	–	–	–	–	–	11.113
		Y-ARM (m)	–	+0.765	–	–	–	–	–	–	+0.577
		Z-ARM (m)	–	– 0.645	–	–	–	–	–	–	– 1.913
28	11.633	H-ARM (m)	11.610	11.610	11.610	11.650	11.637	11.619	11.619	–	11.648
						11.663	–	11.621			
		Y-ARM (m)	±0.254	±0.765	±1.292	– 1.284	– 0.836	– 0.347	0	–	+0.577
						+1.284	–	+0.310			
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.504	– 1.835	– 1.912	– 1.911	–	– 1.913
						– 1.504	–	– 1.912			
29	12.167	H-ARM (m)	–	–	–	–	–	–	–	–	–
		Y-ARM (m)	–	–	–	–	–	–	–	–	–
		Z-ARM (m)	–	–	–	–	–	–	–	–	–
30	12.700	H-ARM (m)	–	–	–	–	–	–	–	–	–
		Y-ARM (m)	–	–	–	–	–	–	–	–	–
		Z-ARM (m)	–	–	–	–	–	–	–	–	–
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	±0.836	±0.347	0	–	–
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.504	– 1.835	– 1.912	– 1.912	–	–
32	13.767	H-ARM (m)	–	–	–	–	–	–	–	–	–
		Y-ARM (m)	–	–	–	–	–	–	–	–	–
		Z-ARM (m)	–	–	–	–	–	–	–	–	–
33	14.300	H-ARM (m)	–	–	–	–	–	–	–	–	–
		Y-ARM (m)	–	–	–	–	–	–	–	–	–
		Z-ARM (m)	–	–	–	–	–	–	–	–	–

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

Tie Down Points Arrangement Forward Cargo Hold

Figure 1-60-03C 3/3

Mod : 20106 or 28330 + 28507

Seq : 210

1.60.03
Page 10
MAY 91

WEIGHT AND BALANCE MANUAL

(04) 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.

(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	1.194	47.0	1.524	60.0

(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	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

WEIGHT AND BALANCE MANUAL

04. Aft cargo hold (compartment 3 and 4)

The aft cargo hold (compartment 3 and 4) is provided with a semi-automatic loading system for the transport of ULDs and non unitized load under the conditions of paragraph 1.10.06.A.

The cargo hold is also capable for the occasional transport of bulk loads under the conditions of paragraph 1.10.06.B, after installation of the certified net restraint system.

A. Loading with ULDs and non unitized load

CAUTION : THE CUMULATIVE LOAD IN THE AFT CARGO HOLD MUST NOT EXCEED THE MAXIMUM PERMISSIBLE, GIVEN IN PARAGRAPH 1.10.06.A.(01).

IT IS PROHIBITED TO CARRY LOOSE BULK FREIGHT OR LOOSE BAGGAGE IN THIS HOLD.

THE CG POSITION OF EACH ULD MUST BE IN ACCORDANCE WITH THE REQUIREMENTS IN PARAGRAPH 1.10.06.A.(02).

The cargo hold is capable of housing the following unit load devices.

- 4 – half size containers LD 3 – 46 (NAS 3610-2K2C, IATA contour AKG)
- or
- 4 – full size containers LD 3 – 46W (NAS 3610-2K2C, IATA contour AKH)
- or
- 4 – rectangular containers LD 3 – 46R (NAS 3610-2K2C, IATA contour AKJ)
- or
- 4 – 60.4 × 61.5 inches pallets LD3-46P (NAS 3610-2K3P)

The ULD numbering conforms to IATA recommendation, the arrangement of the aft cargo hold is shown in figure 1-60-04A.

NOTE : The cargo hold need not necessarily be loaded with the maximum number of containers or pallets ; any station may remain unoccupied, see note in paragraph 1.10.06.A.(01).

(01) The table below gives the typical volume and H-arms of the half size containers LD 3 – 46 (NAS 3610-2K2C, IATA contour AKG), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
31	3.11	110	21.314	22.854	22.084
32	3.11	110	22.886	24.426	23.656
41	3.11	110	24.459	25.999	25.229
42	3.11	110	26.031	27.571	26.801

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.06.A.(01).

WEIGHT AND BALANCE MANUAL

- (02) The table below gives the typical volume and H-arms of the full size containers LD 3 - 46W, (NAS 3610-2K2C, IATA contour AKH), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
31	3.68	130	21.314	22.854	22.084
32	3.68	130	22.886	24.426	23.656
41	3.68	130	24.459	25.999	25.229
42	3.68	130	26.031	27.571	26.801

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.06.A.(01).

- (03) The table below gives the typical volume and H-arms of the rectangular containers LD 3 - 46R, (NAS 3610-2K2C, IATA contour AKJ), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
31	2.55	90	21.314	22.854	22.084
32	2.55	90	22.886	24.426	23.656
41	2.55	90	24.459	25.999	25.229
42	2.55	90	26.031	27.571	26.801

(*) Net volume without shelves.

The maximum gross weight permissible for certified or uncertified ULD and contents is given in paragraph 1.10.06.A.(01).

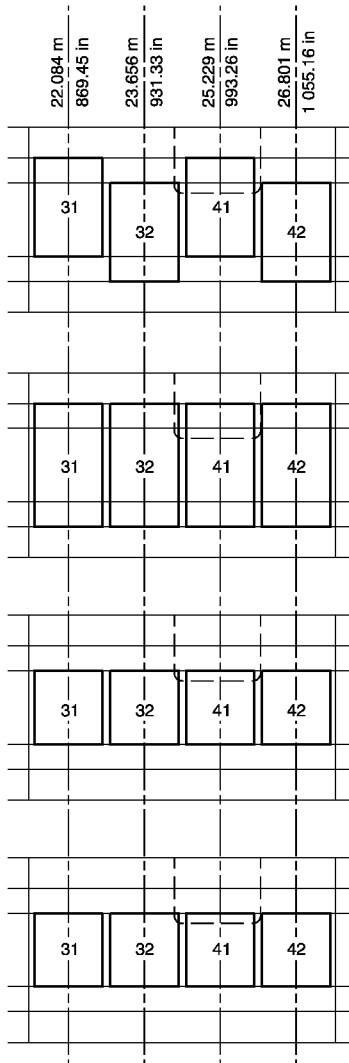
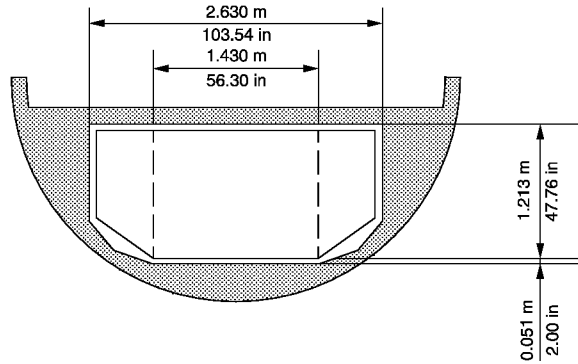
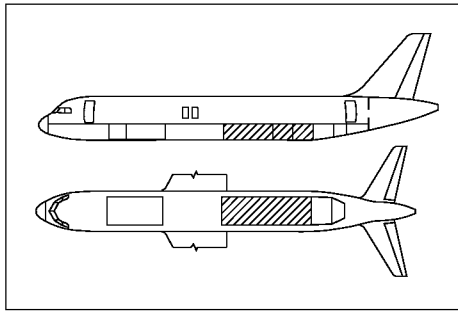
- (04) The table below gives the typical volume and H-arms of the 60.4 × 61.5 inches pallets LD3-46P (NAS 3610-2K3P), maximum height allowable 1.168 m (46.00 in).

POSITION ULD	TYPICAL VOLUME (*)		H-ARM (m)		
	(cum)	(cuft)	From	To	Average
31	2.55	90	21.314	22.854	22.084
32	2.55	90	22.886	24.426	23.656
41	2.55	90	24.459	25.999	25.229
42	2.55	90	26.031	27.571	26.801

(*) Effective volume for igloo or net.

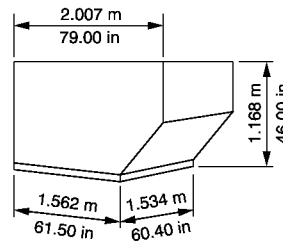
The maximum gross weight permissible per pallet and contents is given in paragraph 1.10.06.A.(01).

WEIGHT AND BALANCE MANUAL

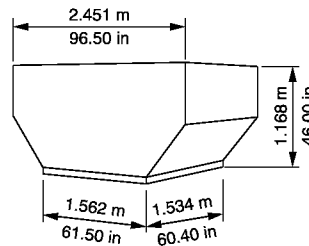


← AVERAGE
H - ARM

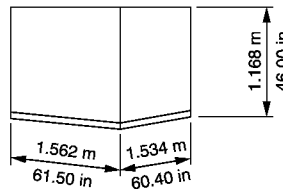
CONTAINERS
LD3 - 46



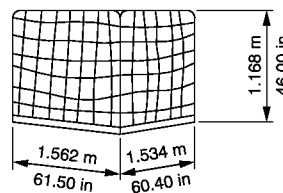
CONTAINERS
LD3 - 46W



CONTAINERS
LD3 - 46R



PALLETS
60.4 x 61.5 in



Arrangement Aft Cargo Hold (Compartment 3 and 4) for ULD Transport

Figure 1-60-04A

Mod : 20107 + 21103 or 21103 + 21898 or 20040 + 20107 + 21103 or 20040 + 20620 + 21103 or 21103 + 28335 + 28507 or 20586
+ 21103 + 28335 + 28507 or 20642 + 21103 + 21898 + 23172 or 21103 + 23172 + 28327 + 28335 + 28440

B. Occasional loading with bulk load

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

The cargo hold is also capable for the occasional transport of bulk loads, provided the certified net restraint system is installed.

When the certified net restraint system is used, additional tie down is not normally required except as specified in paragraph 1.10.06.B. 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.B.

(01) General arrangement

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

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

For stowage of loose baggage or cargo, the cargo hold is divided into four net sections by three lateral divider net positioned as shown in figure 1-60-04B.

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.

(02) 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.

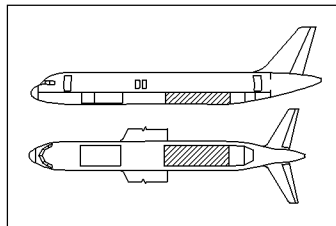
The usable volumes, cross section areas, extensions and H-arms are given in the following table for individual net sections and total cargo compartment.



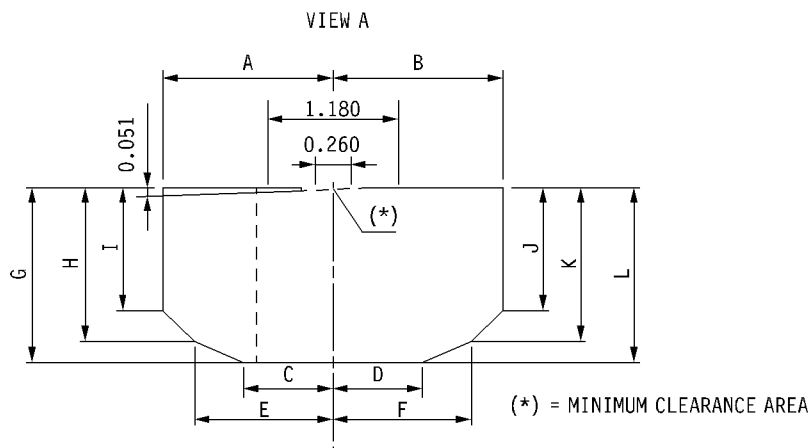
WEIGHT AND BALANCE MANUAL

NET SECTION DESIGNATION	FRAME STATIONS	LENGTH (m)	CROSS SECTION AREA (sqm)	USABLE VOLUME		H-ARM (m)		
				(cum)	(cuft)	From	To	Average
31	47 to 50	1.754	2.984	5.210	184	21.208	22.962	22.085
32	50 to 52A/53	1.600	2.984 2.300	4.500	159	22.962	24.562	23.762
Sub-Total (Compartment 3)	47 to 52A/53	3.354	–	9.710	343	21.208	24.562	22.885
41	53 to 56	1.600	2.300	3.630	128	24.562	26.162	25.362
42	56 to 59	1.600	2.984 2.931	4.730	167	26.162	27.762	26.962
Sub-Total (Compartment 4)	53 to 59	3.200	–	8.360	295	24.562	27.762	26.162
Total (Compartment 3 +4)	47 to 59	6.554	–	18.070	638	21.208	27.762	24.485

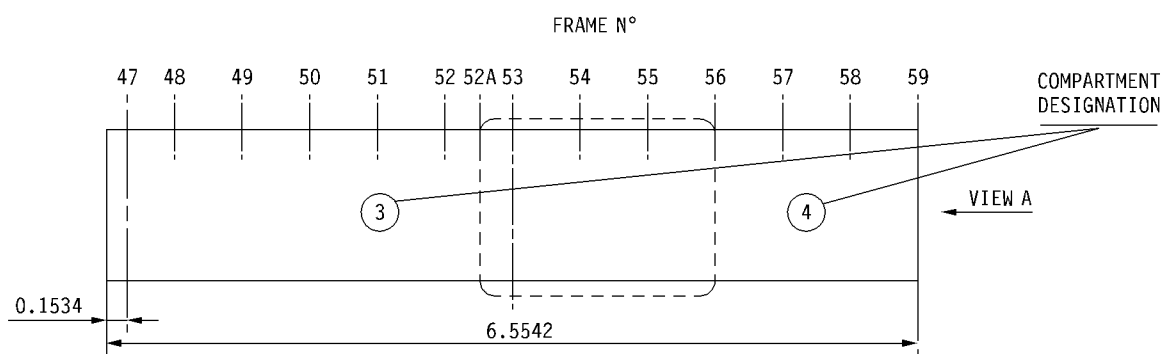
WEIGHT AND BALANCE MANUAL



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



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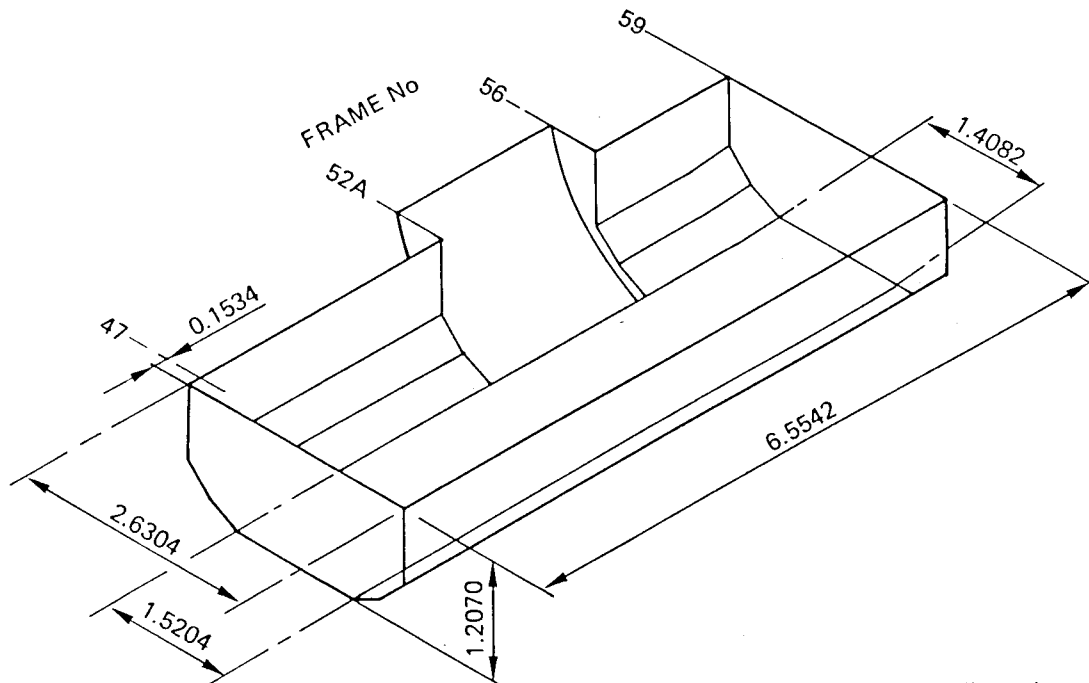
CROSS SECTIONS													
FRAME STATION	H-ARM (m)	A	B	C	D	E	F	G	H	I	J	K	L
		(m)											
47	21.208	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
48	21.895	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
49	22.428	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
50	22.962	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
51	23.495	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
52	24.028	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
52A	24.295	1.315 0.765	1.315	0.760 0.577	0.760	1.049 -	1.049	1.207	1.065 -	0.797 -	0.797	1.065	1.207
53	24.562	0.765	1.315	0.577	0.760	-	1.049	1.207	-	-	0.797	1.065	1.207
54	25.095	0.765	1.315	0.577	0.760	-	1.049	1.207	-	-	0.797	1.065	1.207
55	25.629	0.765	1.315	0.577	0.760	-	1.049	1.207	-	-	0.797	1.065	1.207
56	26.162	0.765 1.315	1.315	0.577 0.760	0.760	- 1.049	1.049	1.207	- 1.065	- 0.797	0.797	1.065	1.207
57	26.695	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
58	27.229	1.315	1.315	0.760	0.760	1.049	1.049	1.207	1.065	0.797	0.797	1.065	1.207
59	27.762	1.315	1.315	0.704	0.704	1.049	1.049	1.172	1.024	0.756	0.756	1.024	1.172

Arrangement Aft Cargo Hold (Compartment 3 and 4) for Occasional Loading with Bulk Load

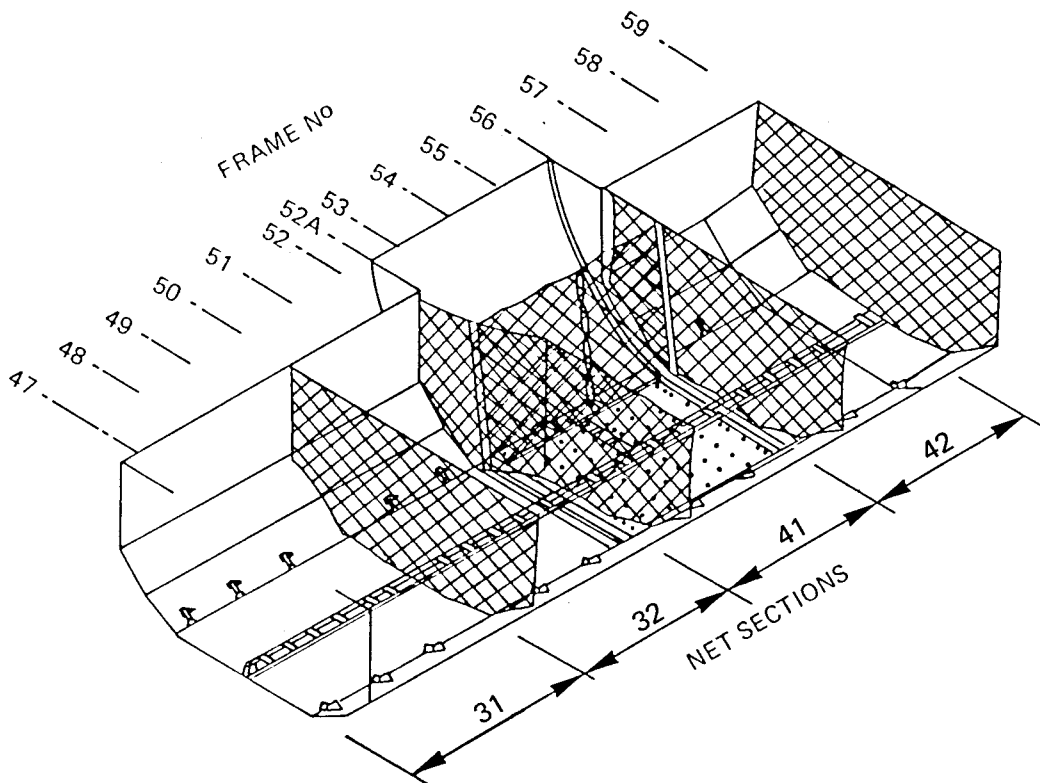
Figure 1-60-04B 1/2

Mod : 20107 + 21103 + 23172 or 21103 + 23172 + 28335 + 28507

Seq : 400



NOTE : All dimensions are given in meters (m)



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Arrangement Aft Cargo Hold (Compartment 3 and 4) for Occasional Loading with Bulk Load

Figure 1-60-04B 2/2

Mod : 20107 + 21103 or 21103 + 28335 + 28507 or 20040 + 20107 + 21103 + 23172

Seq : 310

WEIGHT AND BALANCE MANUAL

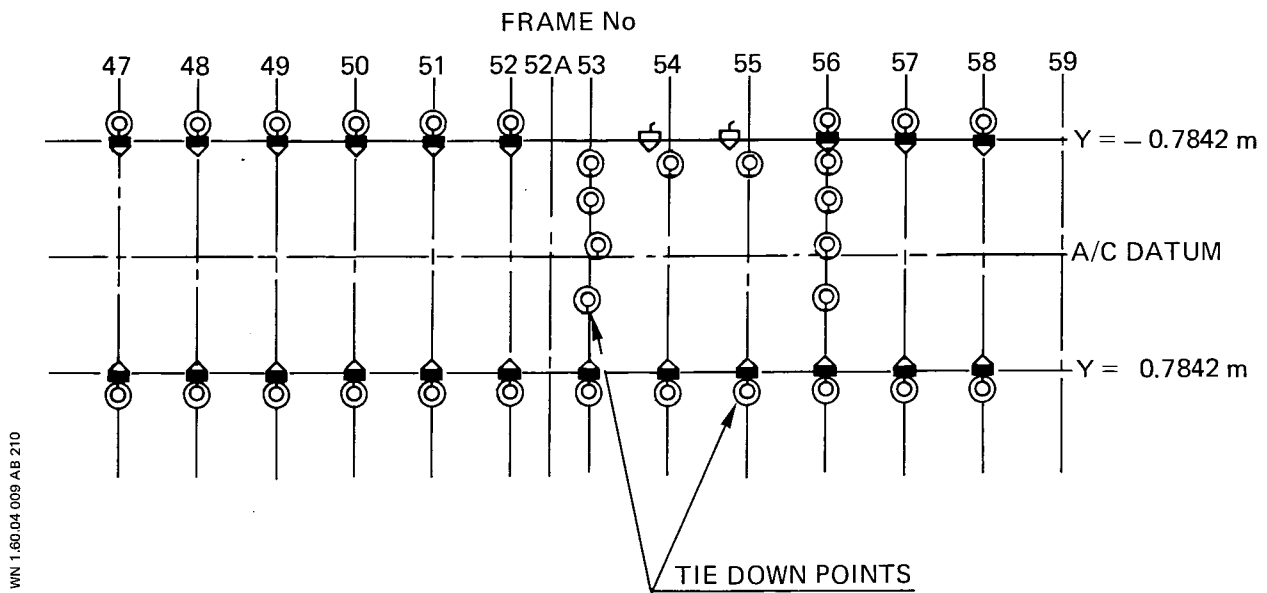
(03) Tie down points arrangement

The aft cargo hold is provided with tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor as shown in figure 1-60-04C.

Tie down points not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.06.A and 1.10.06.B. Attachment points in the lining and ceiling areas are for net fastening only.

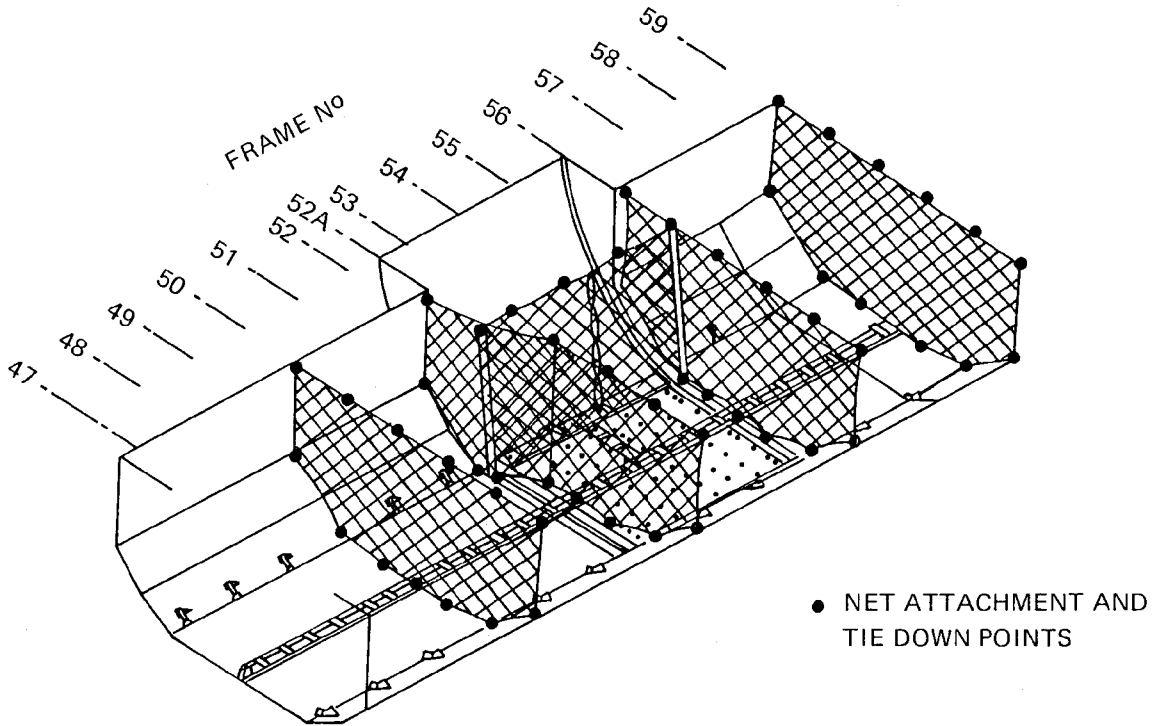
Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.

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

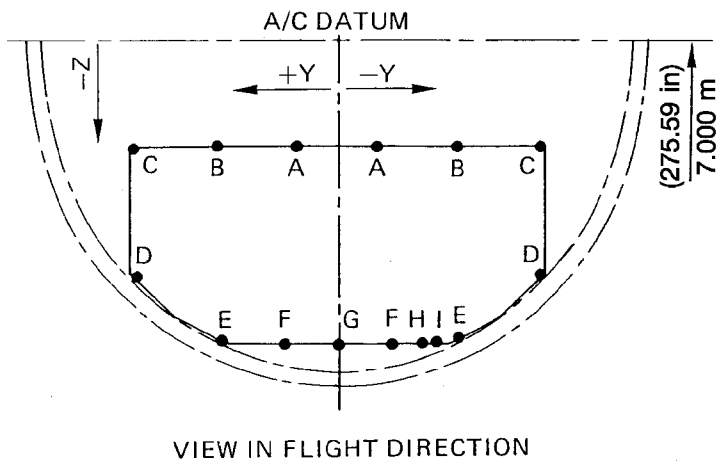


Tie Down Points Arrangement Aft Cargo Hold

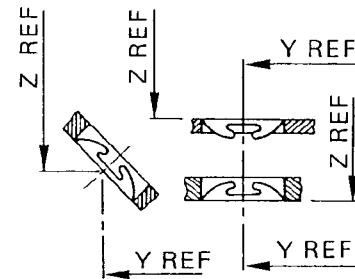
Figure 1-60-04C 1/3



DEFINITION OF REFERENCE POINTS FOR
NET ATTACHMENT AND TIE DOWN POINTS



DEFINITION OF PLUG AND
TIE DOWN POINT STATIONS



Tie Down Points Arrangement Aft Cargo Hold

Figure 1-60-04C 2/3

WEIGHT AND BALANCE MANUAL

NET ATTACHMENT AND TIE DOWN POINT LOCATIONS											
FRAME STATION	H-ARM (m)	TIE-DOWN POINT STATION	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	24.548	–	24.575
								24.575			
		Y-ARM (m)	±0.254	±0.765	– 1.292	– 1.284	– 0.776	– 0.353	0	–	+0.577
								+0.310			
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.504	– 1.881	– 1.912	– 1.912	–	– 1.913
								– 1.912			
54	25.095	H-ARM (m)	–	25.072	–	–	25.097	–	25.081	–	25.098
		Y-ARM (m)	–	+0.765	–	–	– 0.776	–	0	–	+0.577
		Z-ARM (m)	–	– 0.645	–	–	– 1.881	–	– 1.912	–	– 1.913
55	25.629	H-ARM (m)	–	25.605	–	–	25.630	–	25.643	–	25.641
		Y-ARM (m)	–	+0.765	–	–	– 0.776	–	0	–	+0.577
		Z-ARM (m)	–	– 0.645	–	–	– 1.881	–	– 1.912	–	– 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
		Y-ARM (m)	±0.254	±0.765	±1.292	– 1.284 +1.284	– 0.776 +0.776	– 0.353 +0.310	0	–	+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
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 and I not used for net fastening may be used for package restraint.

Tie Down Points Arrangement Aft Cargo Hold

Figure 1-60-04C 3/3

Mod : 20107 or 28335 + 28507

Seq : 210

1.60.04
Page 11
AUG 88

WEIGHT AND BALANCE MANUAL

(04) 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.

(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	1.194	47.0	1.524	60.0

(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	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



WEIGHT AND BALANCE MANUAL

C. Tie down points arrangement

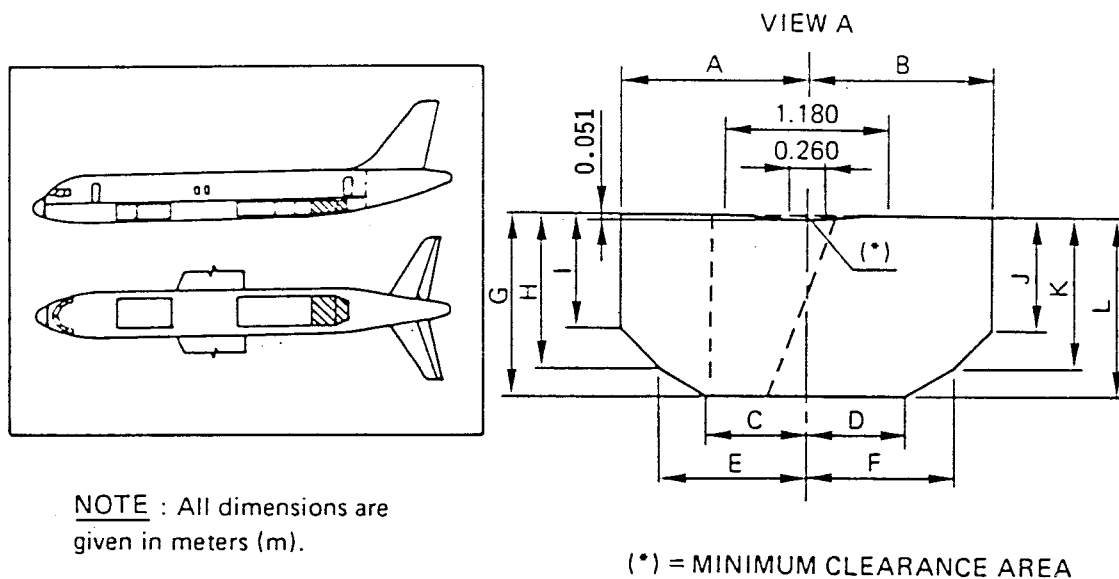
The rear (bulk) cargo hold is provided with tie down points as shown in figure 1-60-05B.

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.

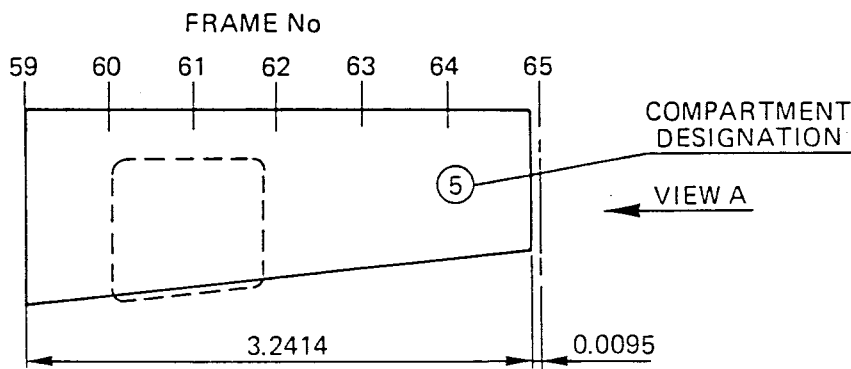
Tie down requirements for packages may be determined by the methods given in paragraph 1.60.06.

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

WEIGHT AND BALANCE MANUAL



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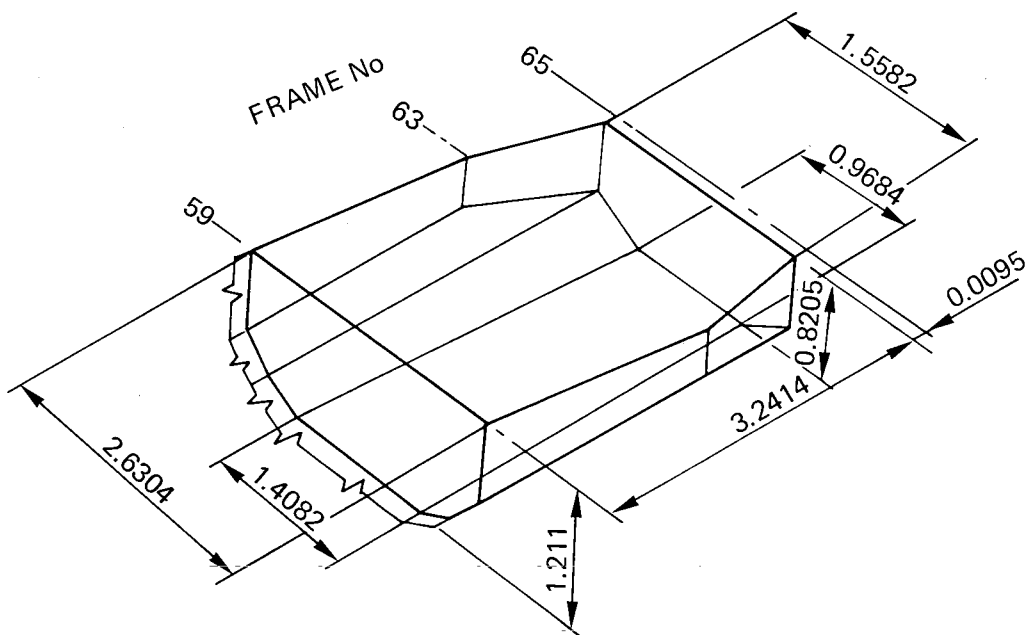
CROSS SECTIONS														
FRAME STATION	CROSS SECTION	H-ARM	A	B	C	D	E	F	G	H	I	J	K	L
	(sqm)	(m)	(m)											
59	2.931	27.762	1.315	1.315	0.704	0.704	1.049	1.049	1.208	1.024	0.756	0.756	1.024	1.208
60	1.339	28.296	–	1.061	0.314	0.684	–	1.049	1.144	–	–	0.682	0.950	1.144
61	1.295	28.829	–	1.061	0.302	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)

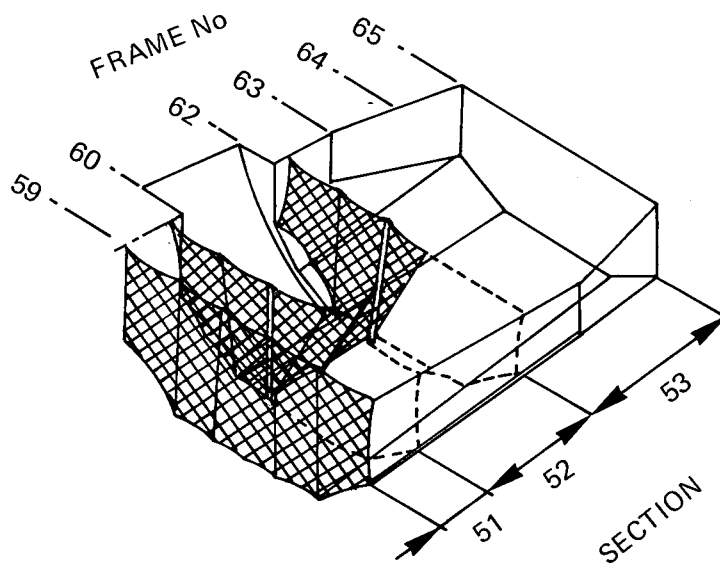
Figure 1-60-05A 1/2

Mod : 20029 + 23172 or 23172 + 25802

Seq : 210

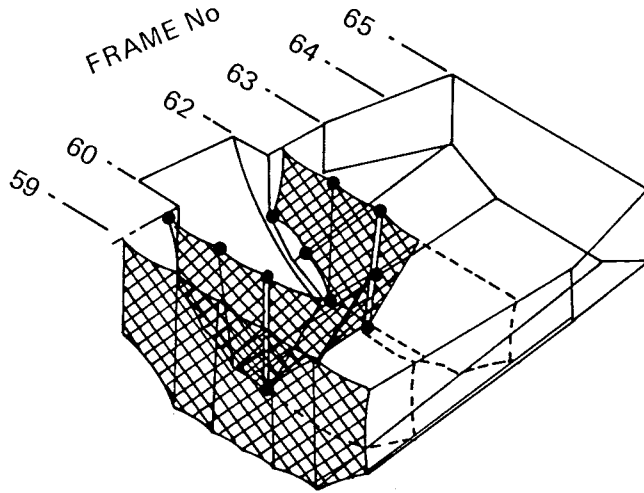


NOTE : All dimensions are given in meters (m)



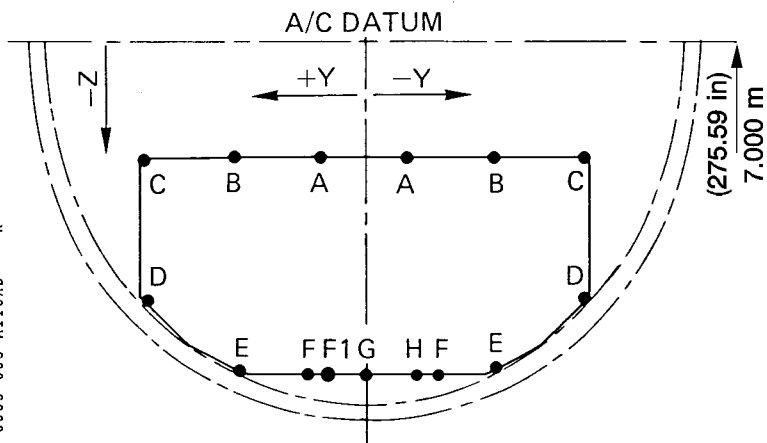
Arrangement Rear (Bulk) Cargo Hold (Compartment 5)

Figure 1-60-05A 2/2



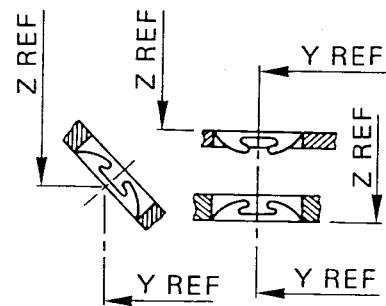
- NET ATTACHMENT AND TIE DOWN POINTS

DEFINITION OF REFERENCE POINTS FOR
NET ATTACHMENT AND TIE DOWN POINTS



VIEW IN FLIGHT DIRECTION

DEFINITION OF PLUG AND
TIE DOWN POINT STATIONS



Tie Down Points Arrangement Rear (Bulk) Cargo Hold

Figure 1-60-05 B 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	F1	G	H
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
			– 0.645	– 0.645	– 0.664	– 1.380	– 1.768	– 1.814			
61	28.829	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
		Z-ARM (m)	– 0.645	–	–	–	– 1.703	– 1.751	–	– 1.751	– 1.751
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		29.376			
		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		– 0.404			
		Z-ARM (m)	– 0.645	– 0.645	– 0.664	– 1.271	– 1.641	– 1.687	– 1.687	– 1.687	– 1.687
			– 0.645	– 0.645	– 0.664	– 1.272		– 1.687			
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

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	1.194	47.0	1.524	60.0

(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.

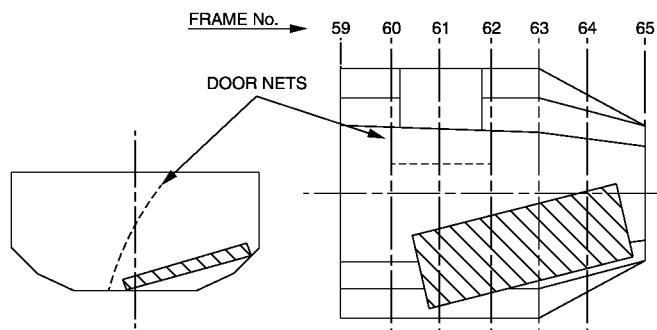
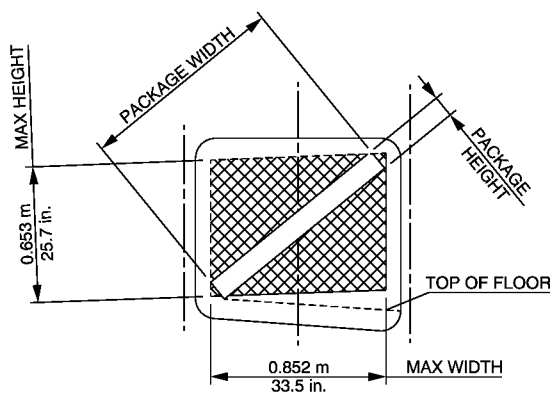
To use the maximum possible length the packages may be positioned with one end on the sloping part of the floor and the other end on the horizontal part of the floor, provided that the floor loading limits given in paragraph 1.10.04.D are observed.

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



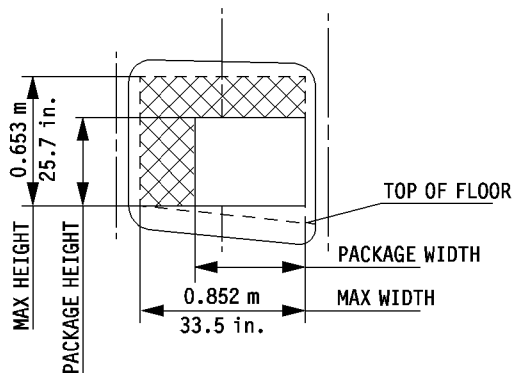
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Maximum Dimensions of Low Density Packages (tilted)

Figure 1-60-05C

WEIGHT AND BALANCE MANUAL

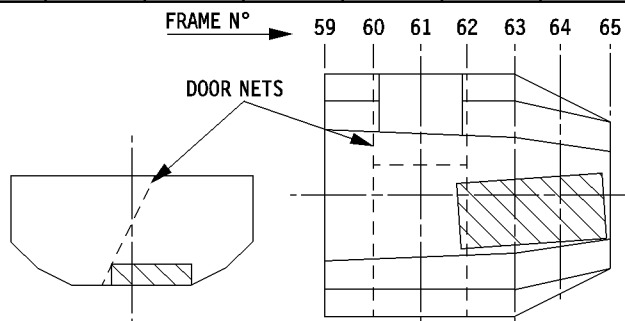
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		PACKAGE WIDTH (m/in)								
		0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.850
		3.9	7.8	11.8	15.7	19.6	23.6	27.5	31.4	33.4
PACKAGE HEIGHT (m/in)	0.100	2.820	2.670	2.440	2.250	2.050	1.860	1.650	1.480	1.410
	3.9	111.0	105.0	96.0	88.5	80.7	73.2	64.9	58.2	55.5
	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

MAX.
PACKAGE
LENGTH
(m/in)

NOMB-01-6005-009-B110AA

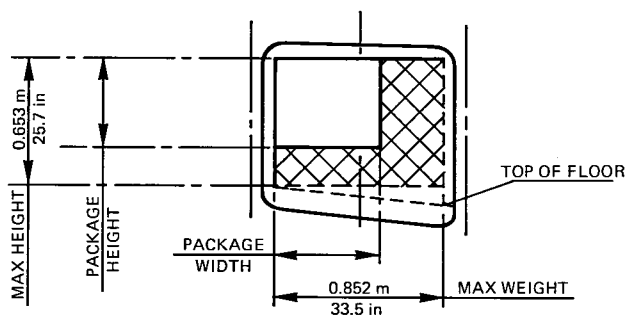


Maximum Dimensions of Heavy Packages

Figure 1-60-05D

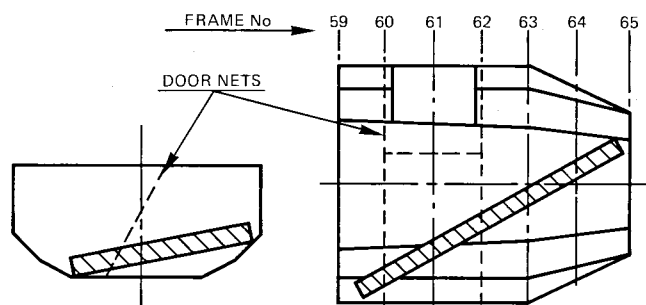
WEIGHT AND BALANCE MANUAL

WN 1.60.05 010 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)	0.100	3.230	3.230	3.210	3.180	3.160	3.100	3.030	2.770	2.680	MAX PACKAGE LENGTH (m/in)
	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

06. Tie down methods

A. Forward cargo hold (compartment 1)

The forward cargo hold (compartment 1) is provided with tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor as shown in figure 1-60-03C 1/3.

These points may be used for the restraint of floating pallets under the conditions of paragraph 1.10.05.A.(05).

Tie down requirements for load to pallet and pallet with load to aircraft may be determined by the methods given in paragraph 1.60.06.D.

The cargo hold is also provided with net attachment and tie down points as shown in figures 1-60-03C 2/3 and 1-60-03C 3/3.

These points are to be used for installation of the certified net restraint system in the case of occasional transport of bulk load.

B. Aft cargo hold (compartment 3 and 4)

The aft cargo hold (compartment 3 and 4) is provided with tie down points on the fixed yz-latches of the cargo loading system and on the cargo hold floor as shown in figure 1-60-04C 1/3.

These points may be used for the restraint of floating pallets under the conditions of paragraph 1.10.06.A. (05).

The tie down requirements for load to pallet and pallet with load to aircraft may be determined by the methods given in paragraph 1.60.06.D.

The cargo hold is also provided with net attachment and tie down points as shown in figures 1-60-04C 2/3 and 1-60-04C 3/3.

These points are to be used for installation of the certified net restraint system in the case of occasional transport of bulk load.

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

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

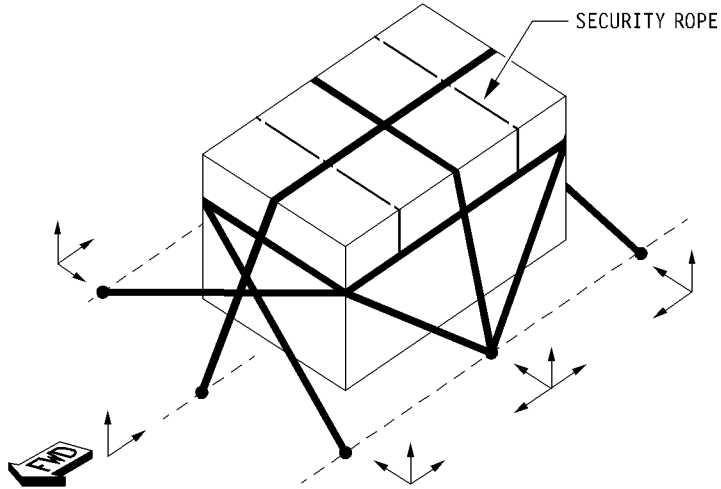
Only the tie down points located in the cargo hold floor area which are not required for net fastening may be used for the restraint of packages under the conditions of paragraph 1.10.07.

Tie down requirements for packages may be determined by the methods given in paragraph 1-60-06.D.

D. Tie down evaluation

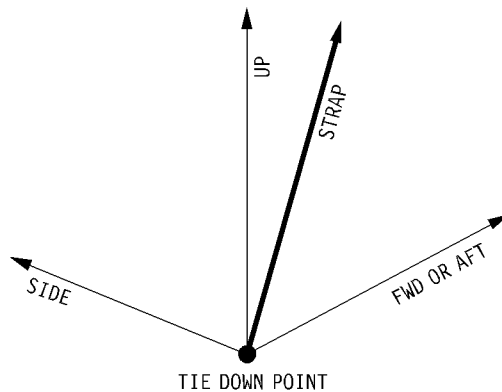
(01) Package restraint

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



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 :



(02) Component strength determination methods

The component strength resulted from the angle α (to the floor) and the angle β (to the forward direction) the tie down strap makes with the ground.

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

F – the tie down limit strength

α – angle to the floor

β – 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.A.(05).

The relevant ultimate load factor for the aft cargo hold (compartment 3 and 4) is given in paragraph 1.10.06.A.(05).

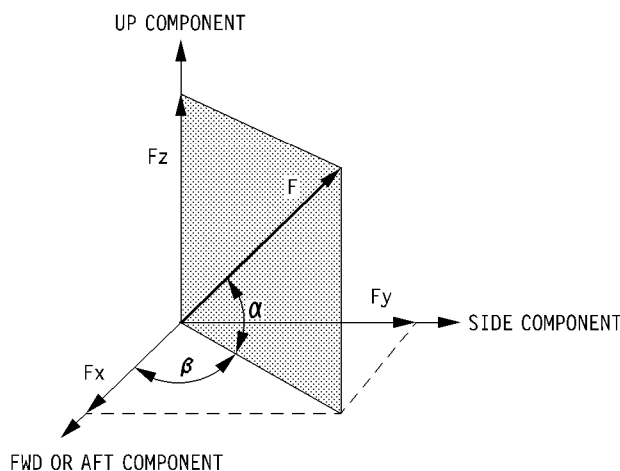
The relevant ultimate load factor for the rear (bulk) cargo hold (compartment 5) is given in paragraph 1.10.07.D.

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° to the floor (α) and 40° to the forward direction (β).

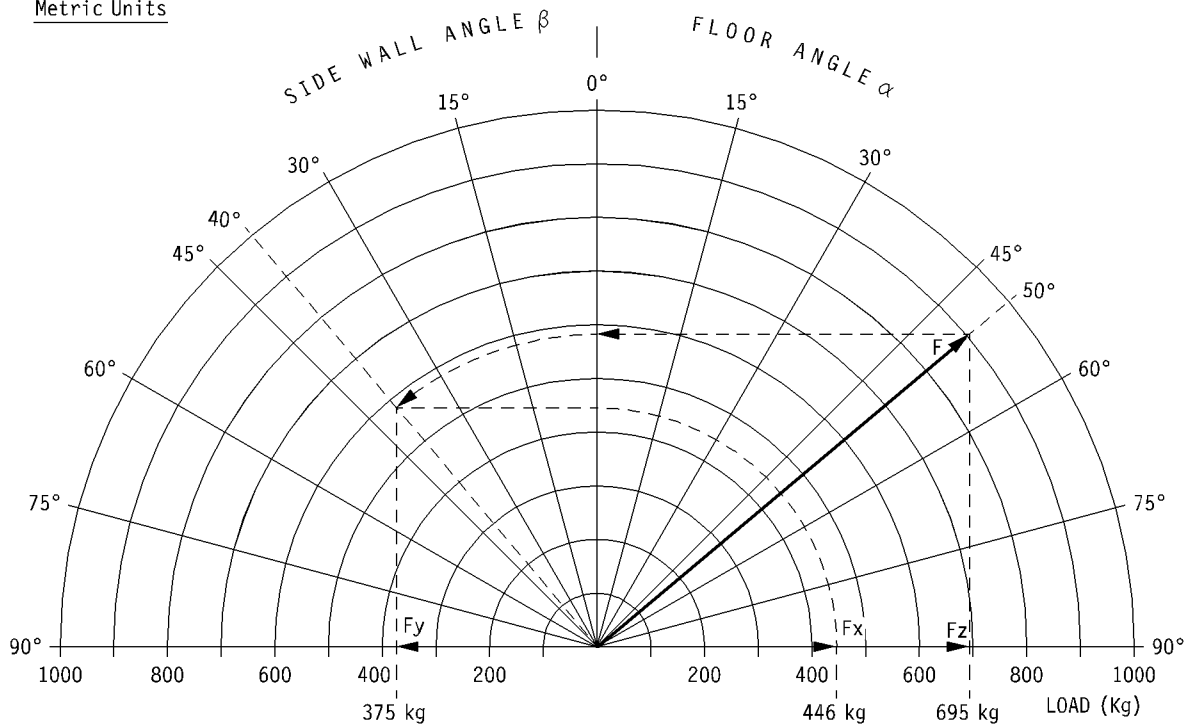


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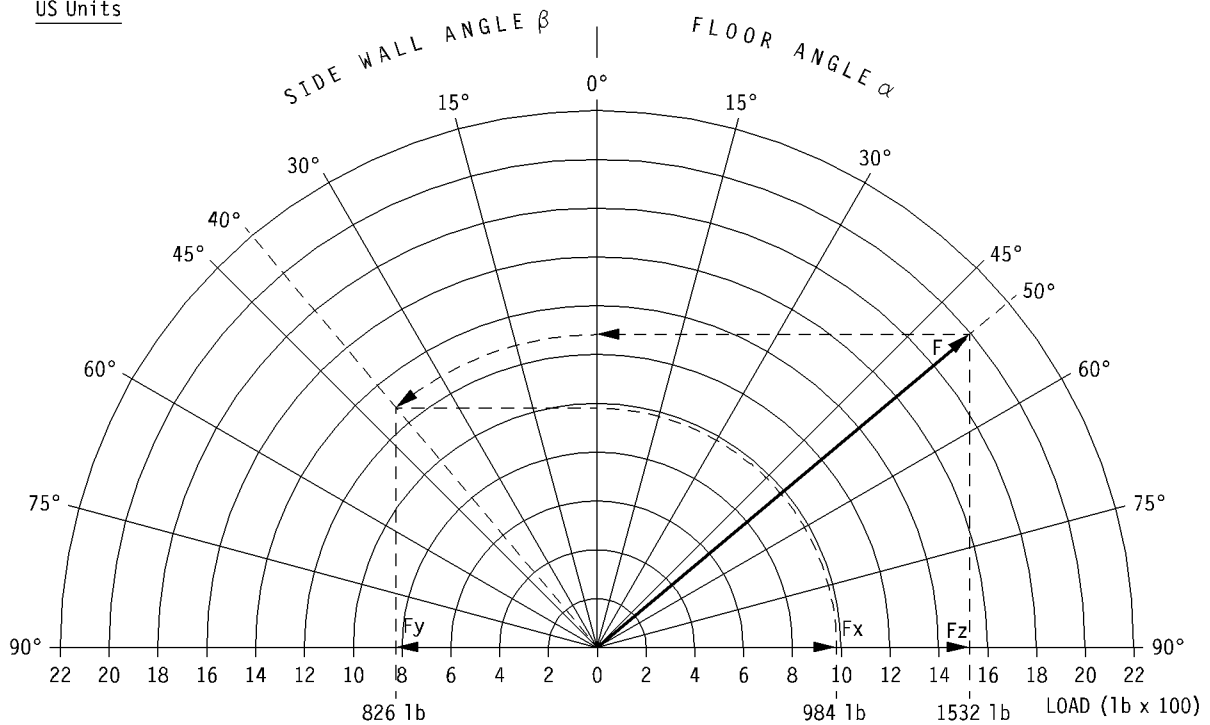


WEIGHT AND BALANCE MANUAL

Metric Units



US Units



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Tie Down Graphic Method in Metric and US Units

Figure 1-60-06

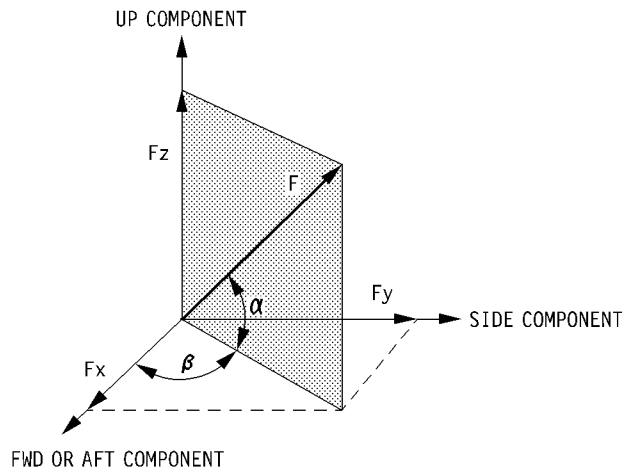
WEIGHT AND BALANCE MANUAL

(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 : $F \times \sin \alpha$



For one tie down point with a load of 906 kg (2 000 lb) with a strap at 50° to the floor (α) and 40° to the forward direction (β) 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)

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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				
		α	β	UP	FWD	AFT	SIDE	
							LEFT	RIGHT
1								
2								
3								
4								
.								
.								
.								
n								
1) Total ultimate load strength Σ								
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?

07. Live animal transport

The aft cargo hold (compartment 3 and 4) and the rear (bulk) cargo hold (compartment 5) are equipped with a heating and ventilation system for the transport of livestock.

A. Live animal transport in aft cargo hold (compartment 3 and 4)

For transport in the aft cargo hold (compartment 3 and 4) shall be penned or crated in special pallet/container modules or in container/crates which are placed and restrained on pallets or in containers.

Any container or pallet as specified in paragraph 1.10.06.A(01) may be used.

Container and/or pallet loading and restraint hardware must be in accordance with the limitations given in paragraphs 1.10.04.C and 1.10.06.A.

The live animal cargo units shall be designed to restrain the live animals, to withstand handling operations during loading and unloading procedures and to withstand forces resulting from aircraft flight conditions. Refer to paragraph 1.10.06.A. (05) for load factors.

To minimize cleaning of the cargo compartment and to prevent contamination within the air-conditioning system, the live animal cargo should be treated as wet freight and the live animal containers should be designed to keep animals waste inside.

B. Live animal transport in rear (bulk) cargo (compartment 5)

The rear (bulk) cargo hold (compartment 5) is designed for the transport of bulk freight/non unitized load.

For transport in this cargo hold live animals shall be placed in suitable cages and pet cannels.

The animal containers and crates should be tied down or restrained in order to be secured against movements at take-off, landing and during flight.

Animal containers / crates loading and restraint hardware must be in accordance with the limitations given in paragraphs 1.10.04.D and 1.10.07.

The live animal cargo units shall be designed to restrain the live animals, to withstand handling operations during loading and unloading procedures and to withstand forces resulting from aircraft flight conditions. Refer to paragraph 1.10.07.D for load factors.

To minimize cleaning of the cargo compartment and to prevent contamination within the air-conditioning system, the live animal cargo should be treated as wet freight and the live animal containers should be designed to keep animals waste inside.

NOTE : Damaged or missing separation net or cover may restrict the performance of bulk cargo compartment ventilation and heating systems.

08. Container transport

CAUTION : CONTAINER LOADING MUST BE IN ACCORDANCE WITH PARAGRAPHS 1.10.05.A AND 1.10.06.A.
CONTAINERS WITH DAMAGED BASE PLATES MUST NOT BE TRANSPORTED.

The forward and aft cargo hold are equipped with a NAS 3610 class II restraint system approved for the transport of pallets and containers as specified in paragraphs 1.10.05.A and 1.10.06.A.

The layout of the cargo loading systems allows container transport on all container positions as given in paragraphs 1.10.05.A.(01) and 1.10.06.A.(01).

Containers with dimensions and edge configurations as for NAS 3610 types defined in paragraphs 1.10.05.A and 1.10.06.A and with design complying with the requirements of TSO-C90 shall be used.

To ensure a minimum of good condition, the container must also correspond to IATA Specification, Section IV 50/0, Part II. Deflection limits shall be in accordance with Specification IATA ULD Technical Manual 50/4. Refer to paragraphs 1.10.05.A.(03) and 1.10.06.A.(03) for equipment strength.

If containers do not correspond to these requirements, they must be handled and loaded in such a manner that neither the container nor the cargo contained will endanger the aircraft due to accelerations under flight conditions. Refer to paragraphs 1.10.05.A.(05) and 1.10.06.A.(05) for load factors.

Single loads exceeding 150 kg (330 lb) or loads which could constitute a hazard to the aircraft by their density or shape must be either individually restrained to the container base plate, or must be integrated in crushable cargo filling the container to at least 80 % of its maximum volume.

Crushable cargo must meet the following requirements :

- The cargo shall be able to form smooth contours to act as a load spreader in the case of a crash.
- Single cargo pieces shall not consist of large rigid units, shall be deformable and must not have sharp edges which could cut the container wall. No sharp edges shall result from deformation or destruction of the cargo.
- The cargo shall have a load density between 80 kg/cum (5 lb/cuft) and 240 kg/cum (15 lb/cuft) under consideration of maximum position gross weights and entire ULD volume.

Loads in damaged containers must be individually restrained to the container base plate.

Restraint hardware shall comply with corresponding NAS 3610 configurations providing evenly distributed loads to the container base plate. Maximum floor loads as given in paragraphs 1.10.04.B and 1.10.04.C must be respected.

The maximum center of gravity deviations must be in accordance with paragraphs 1.10.05.A.(02) and 1.10.06.A.(02).

09. Pallet transport

CAUTION : PALLET LOADING MUST BE IN ACCORDANCE WITH PARAGRAPHS 1.10.05.A AND 1.10.06.A.

The forward and aft cargo hold are equipped with a NAS 3610 class II restraint system approved for the transport of pallets and containers as specified in paragraphs 1.10.05.A and 1.10.06.A.

The layout of the cargo loading systems allows pallet transport on all pallet positions as given in paragraphs 1.10.05.A.(01) and 1.10.06.A.(01).

Pallet with dimensions and edge configurations as for NAS 3610 types defined in paragraphs 1.10.05.A. and 1.10.06.A. shall be used. Design of pallets and nets shall also comply with the requirements of TSO-C90.B.

To ensure a minimum of good conditions, pallets and nets must also correspond to IATA Specification, Section IV 50/0, Part II. Deflection limits shall be in accordance with Specification IATA ULD Technical Manual 50/4. Refer to paragraphs 1.10.05.A.(03) and 1.10.06.A.(03) for equipment strength.

If pallet/net configurations do not correspond to these requirements, they must be handled and loaded in such a manner that neither the pallet nor the cargo will endanger the aircraft due to accelerations under flight conditions. Refer to paragraphs 1.10.05.A (05) and 1.10.06.A (05) for load factors.

Single loads exceeding 150 kg (330 lb) or loads which could constitute a hazard to the aircraft by their density or shape must be restrained on the pallet by an adjustable net. It has to be ensured that the net can not be damaged or destroyed by the cargo, either by appropriate methods or by covering the load with crushable cargo. Refer to paragraph 1.60.08 for definition of crushable cargo.

Restraint hardware shall comply with corresponding NAS 3610 configurations providing evenly distributed loads to the pallet rims. Maximum floor loads as given in paragraphs 1.10.04.B. and 1.10.04.C. must be respected.

The maximum center of gravity deviations must be in accordance with paragraphs 1.10.05.A.(02) and 1.10.06.A.(02).



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.

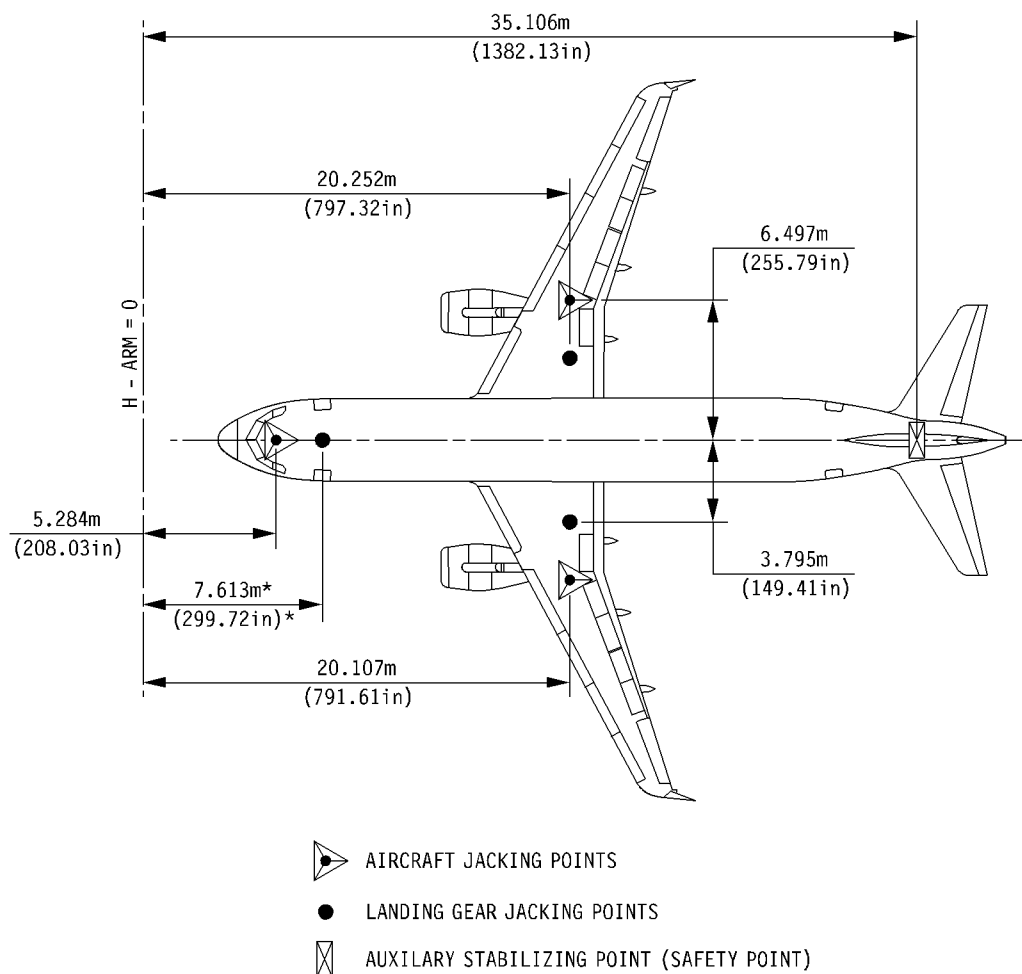
B. Landing gear jacking points

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



NDWB-01-8002-001-A100FA

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

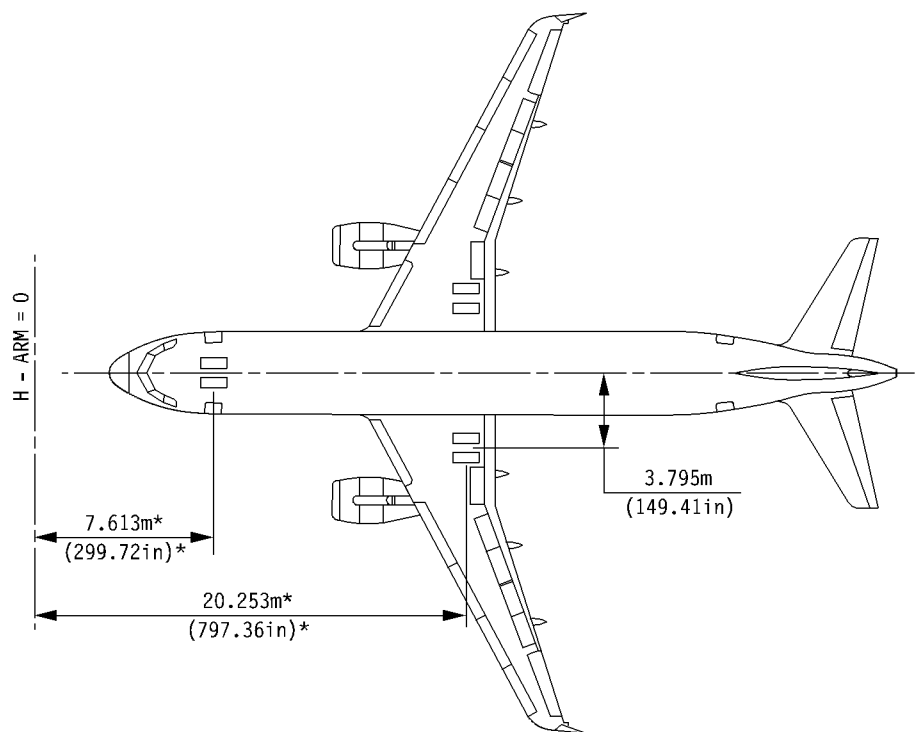
Aircraft Jacking Points H-ARMS

Figure 1-80-02A

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

Seq : 100

1.80.02
Page 1
JUN 07



N00B-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 + 160500 or 20139 + 20268 + 22129

Seq : 103

1.80.02
Page 2
JUN 07



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 TREE 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

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

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

WEIGHTS IN POUNDS

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

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

where :

r : Reaction measured at forward jacking point.

W : Weight of the aircraft

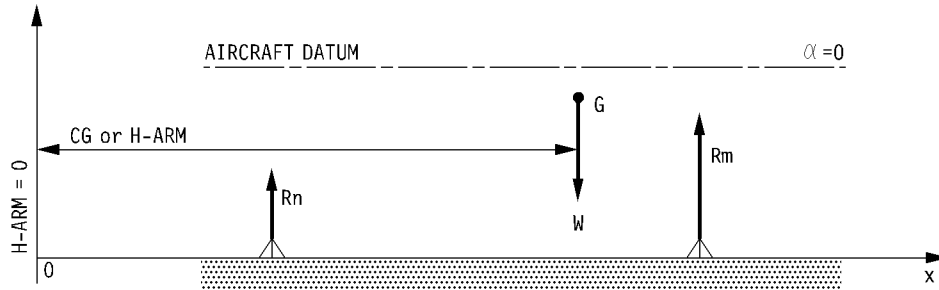
NOTE : The CG position expressed in % RC can also be evaluated from the diagram in figure 1-10-09.

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.



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

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

or

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

or

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

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.

WEIGHT AND BALANCE MANUAL

(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.

α = Aircraft pitch attitude (positive nose up)

r = Reaction on Nose landing gear

w = Weighed weight.

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

or

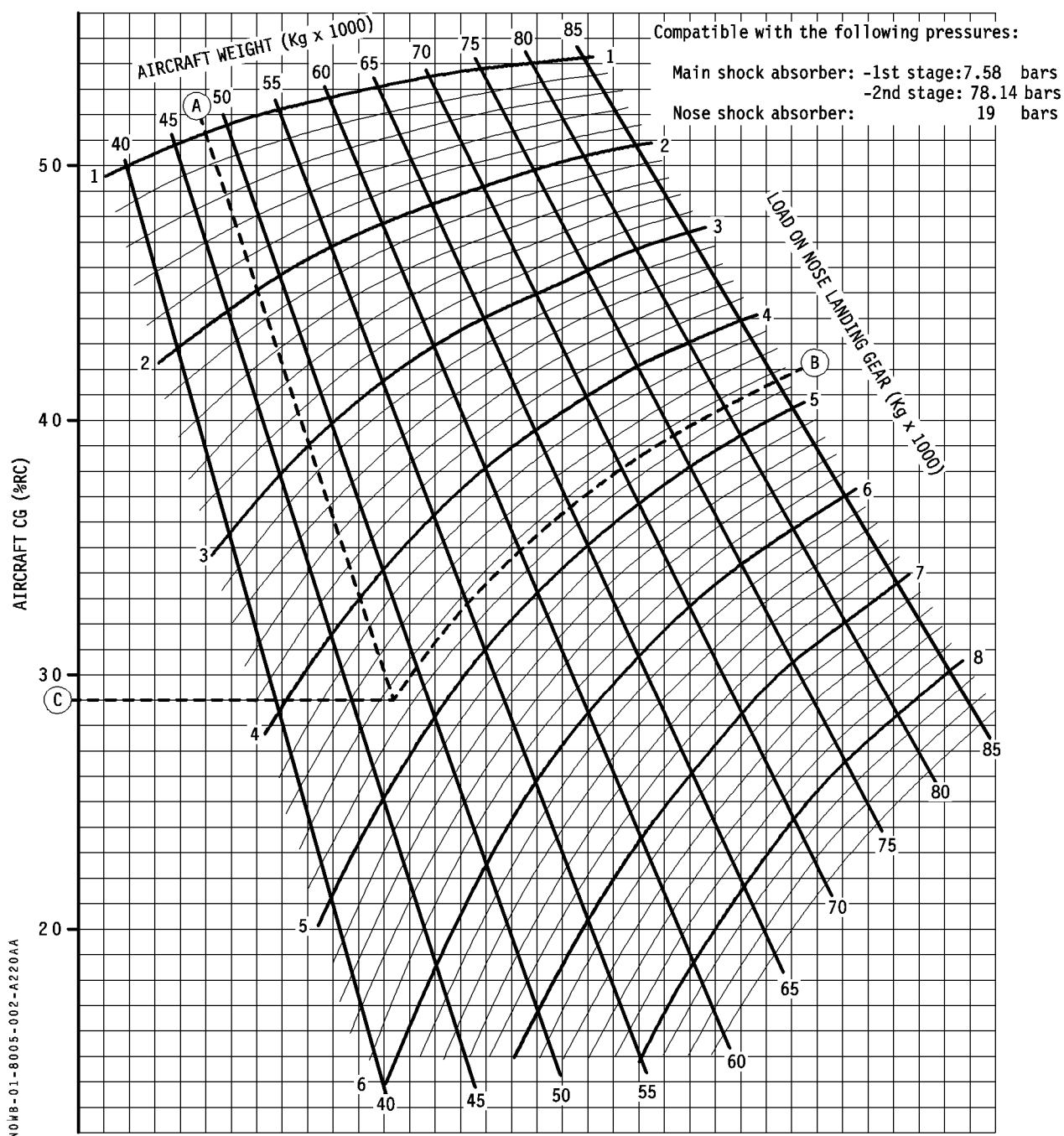
$$H\text{-arm (m)} = 20.29 - 2.738 \sin \alpha - 12.690 \frac{(r + 21)}{w}$$

or

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

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

WEIGHT AND BALANCE MANUAL



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

Seq : 220

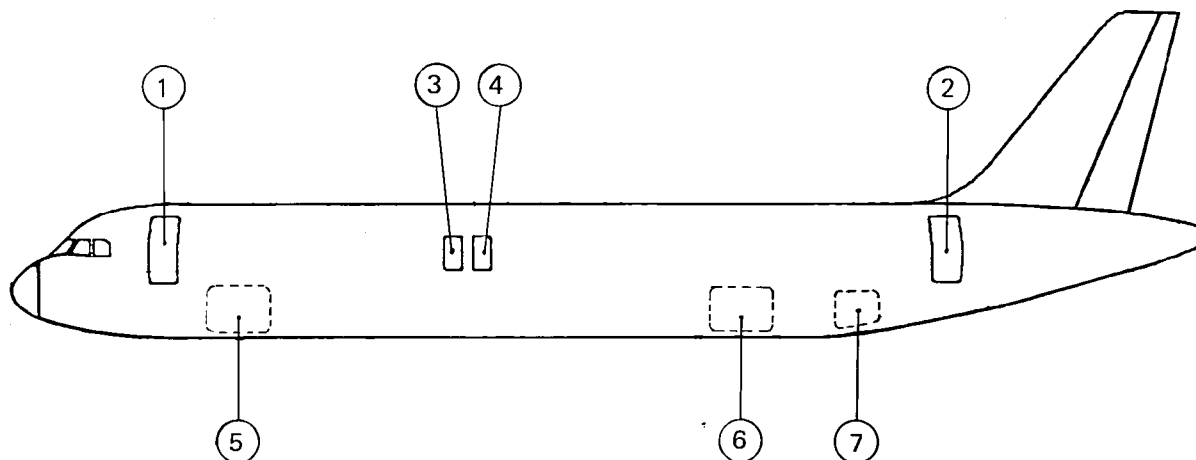
1.80.05
Page 2
MAR 92

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.

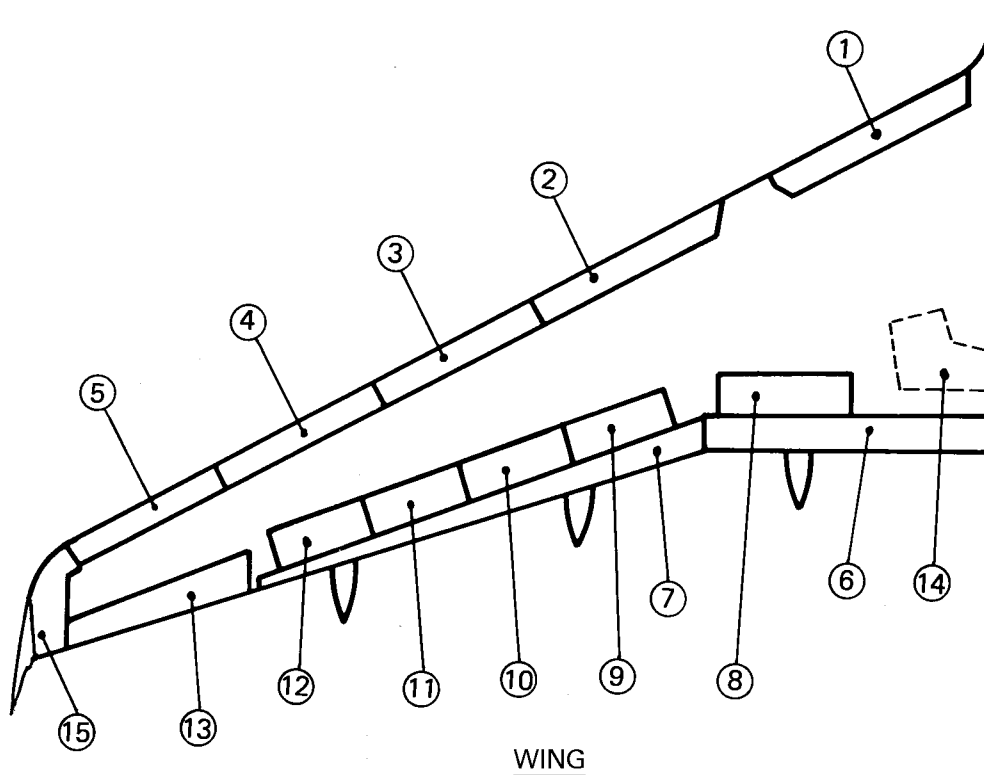
WN 1.80.06.001 AA 110



FUSELAGE

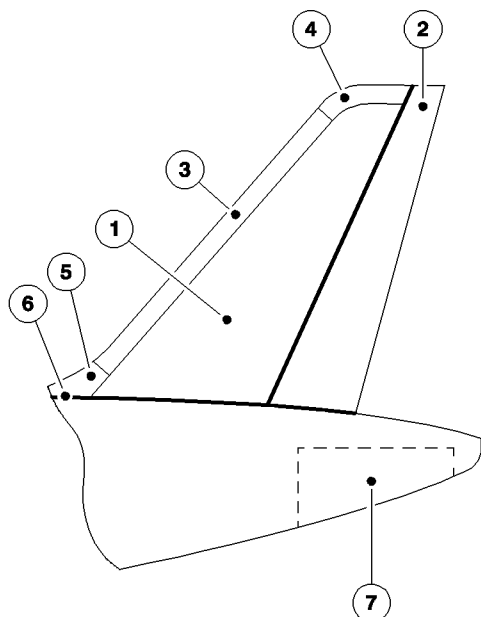
REF. No	EQUIPPED COMPONENT	WEIGHT (kg)	H-ARM (m)
1	CABIN DOOR FWD	98	7.579
2	CABIN DOOR AFT	96	32.085
3	EMERGENCY EXIT	15	16.971
4	EMERGENCY EXIT	15	17.818
5	CARGO DOOR FWD	121	10.700
6	CARGO DOOR AFT	121	25.229
7	BULK DOOR	37	28.859

WN 1.80.06 002 AA 120



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	TIP		26.1	23.960

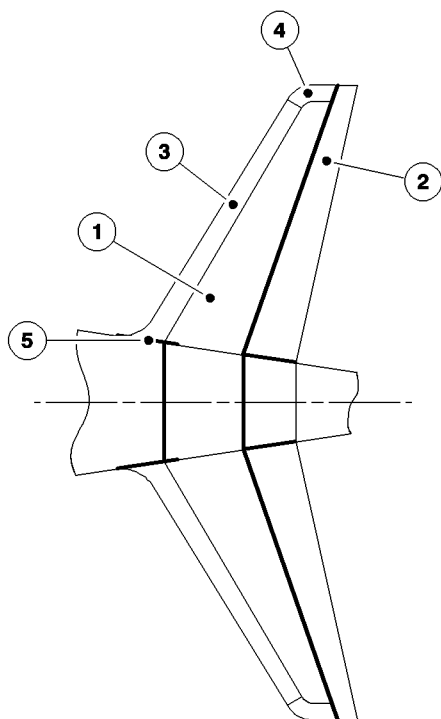


VERTICAL TAIL

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

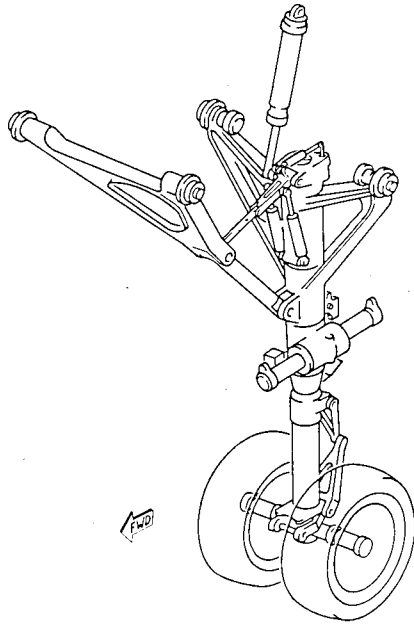


HORIZONTAL TAIL

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

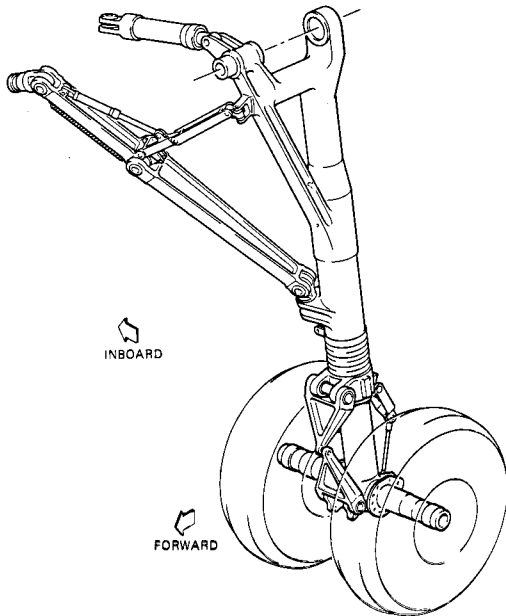
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WEIGHT AND BALANCE MANUAL



NOSE LANDING GEAR

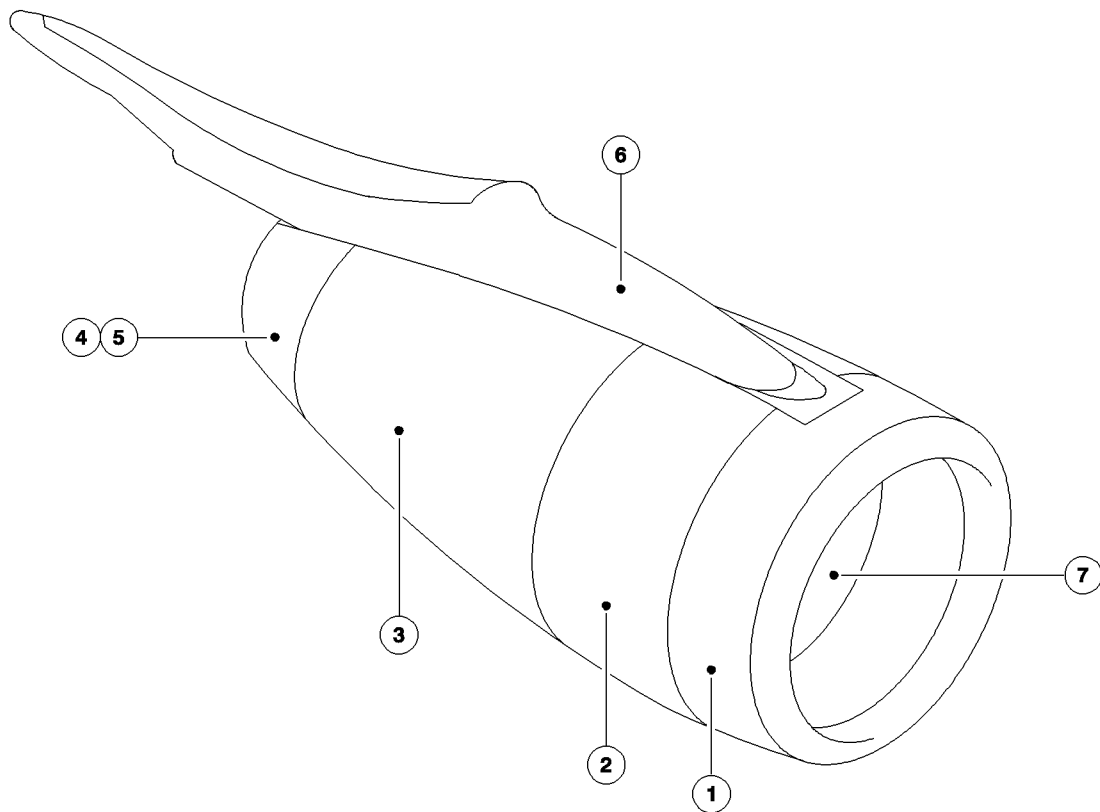
COMPONENT	WEIGHT (kg)	H-ARM (m)
Landing gear complete	323.2	7.617
Wheel with tire	36.1	7.628



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

WN 1.80.06 004 AA 001



N04B-01-8006-005-A200AA

PYLON AND POD

REF N°	COMPONENT	WEIGHT		H-ARM	
		(kg)	(lb)	(m)	(in)
1	INLET	121	266	14.110	555.51
2	FAN COWL	98	215	15.120	595.27
3	THRUST REVERSER	518	1141	16.524	650.55
4	COMMON NOZZLE ASSEMBLY	84	186	18.100	712.60
5	JET PIPE AND PRIMARY PLUG	17	38	18.840	741.73
6	PYLON	570	1257	17.514	689.53
7	ENGINE	3582	7896	16.063	632.40

WEIGHT AND BALANCE MANUAL

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 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 28 % 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 2 500 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 **(O)** , 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 maintain 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.



WEIGHT AND BALANCE MANUAL

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

N₁ : Number of passengers at New Weight

N_w : New weight of one passenger

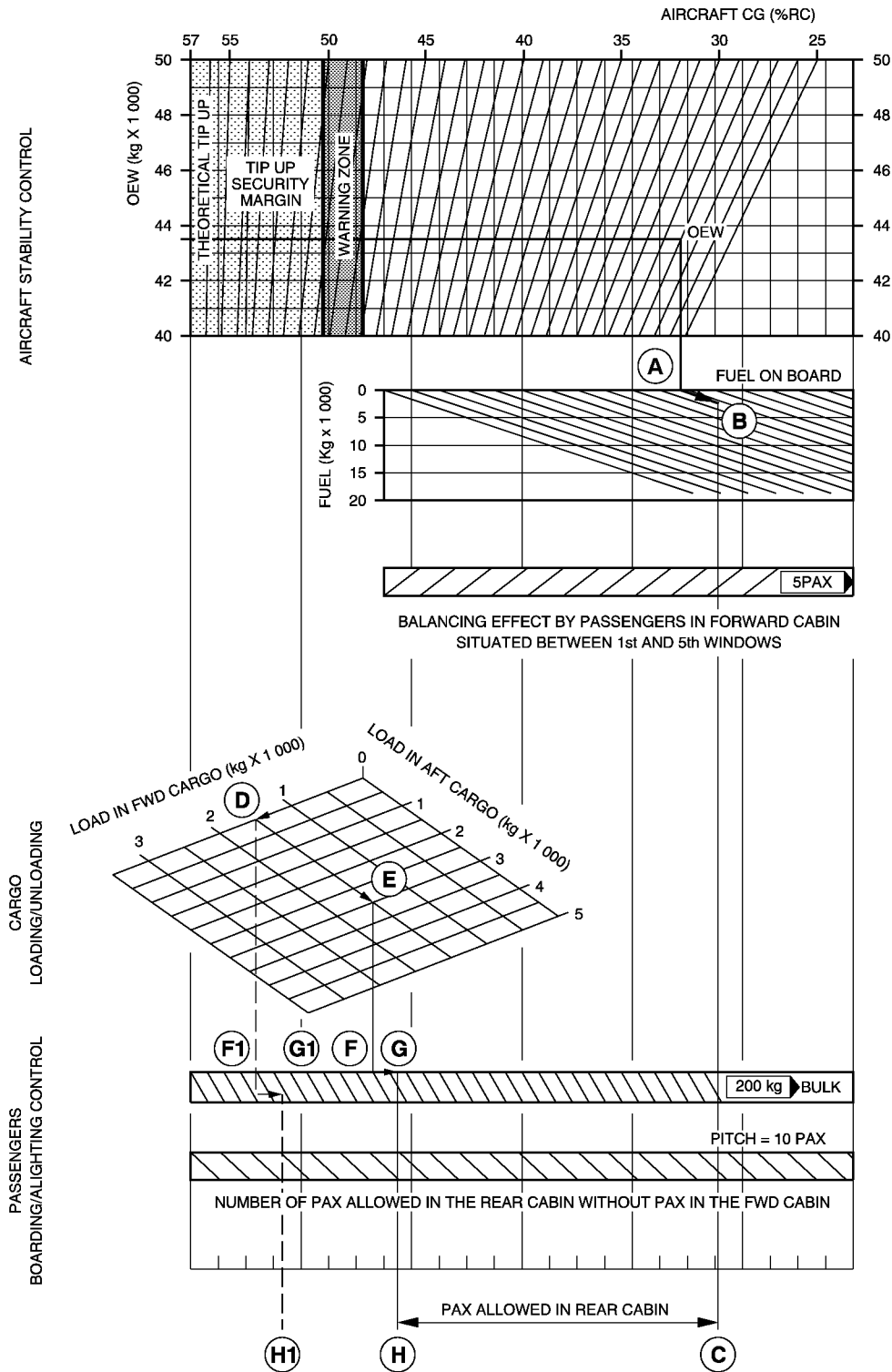
$$N_1 = \frac{N \times 75}{N_w}$$

eg. N = 103, N_w = 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

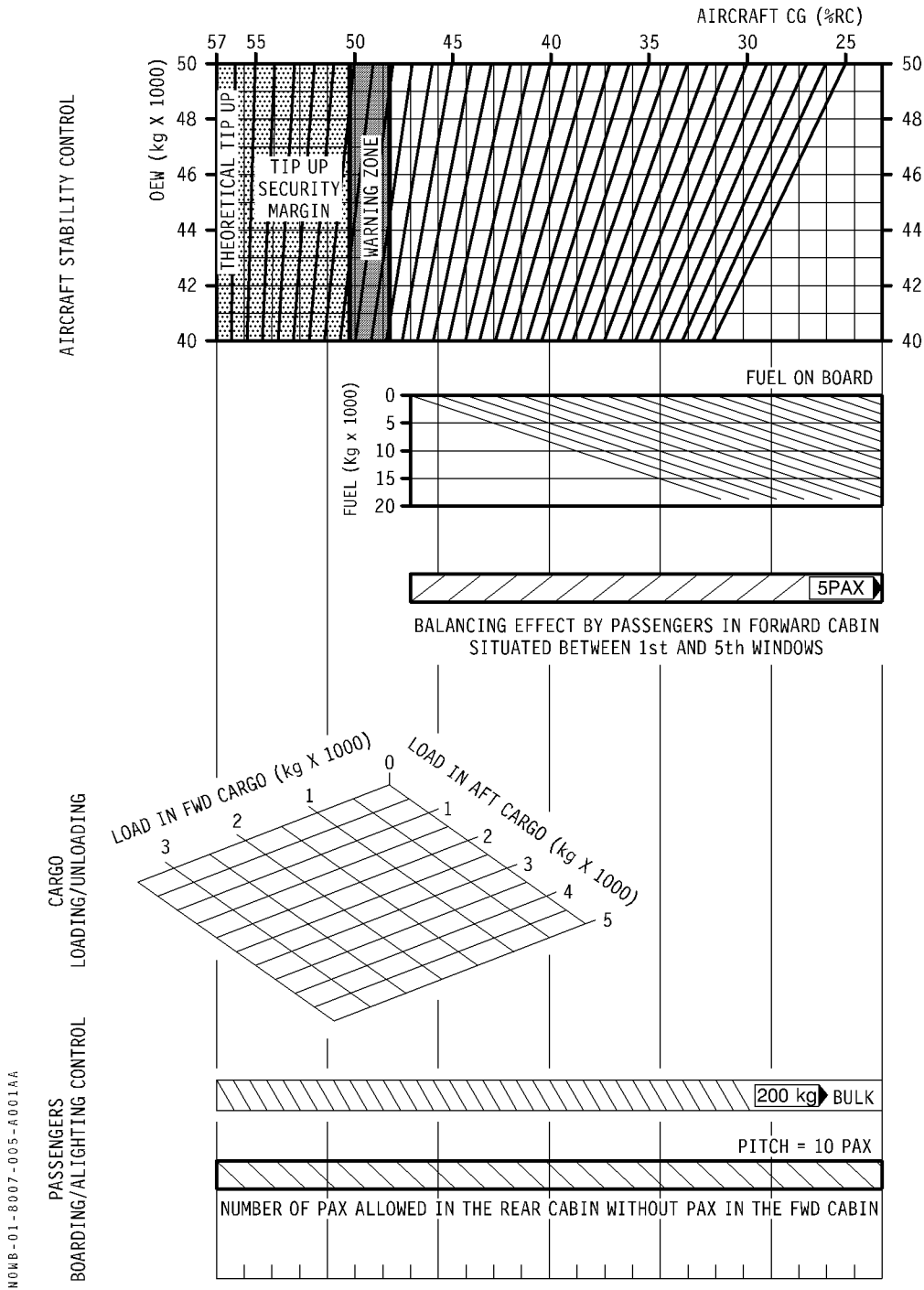


Aircraft Loading Stability Chart

Figure 1-80-07B

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WEIGHT AND BALANCE MANUAL



Aircraft Loading Stability Chart

Figure 1-80-07B

WEIGHT AND BALANCE MANUAL

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
<u>Operator's items</u>	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

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

WEIGHT AND BALANCE MANUAL

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 vectors of each cargo hold are defined in figure 1-90-03B with the following assumptions :

(01) Transport of ULDs

- for the forward cargo hold (compartment 1) :
the containers and / or pallets at maximum weight, loaded forward to aft and aft to forward.
- for the aft cargo hold (compartment 3 and 4) :
the containers and / or pallets at maximum weight, loaded forward to aft and aft to forward.
- for the rear (bulk) cargo hold (compartment 5) :
freight loaded at the average CG of the cargo compartment, up to the maximum load capacity.

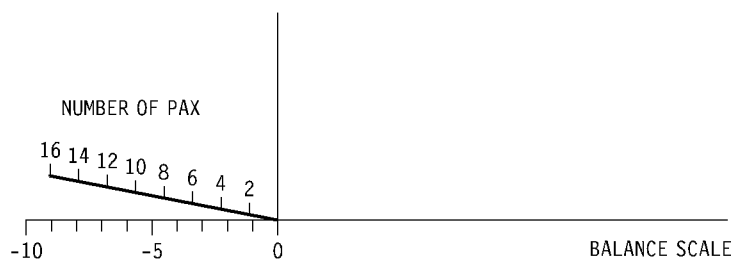
(02) Occasional transport of bulk load

- for the forward cargo hold (compartment 1) :
freight loaded at the average CG of the individual 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 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.

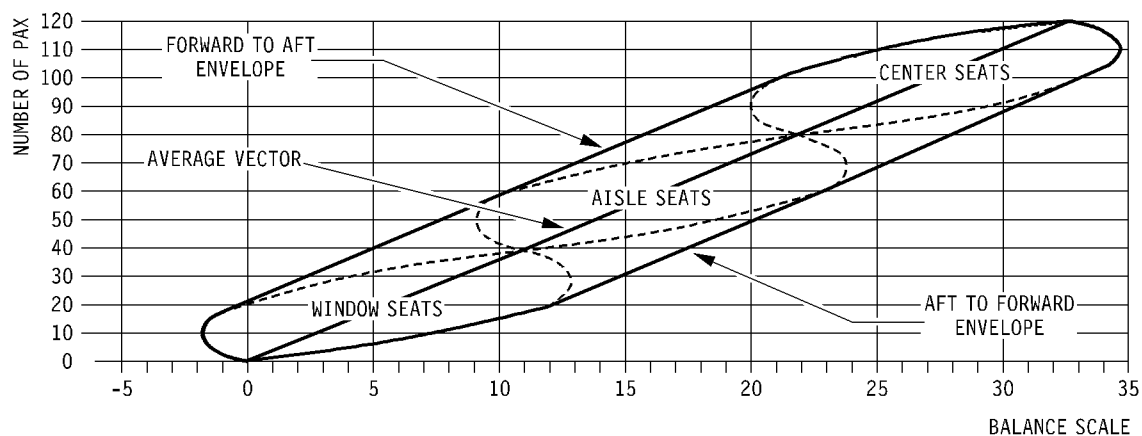
C. Fuel vector

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

WEIGHT AND BALANCE MANUAL



First class passenger vectors
(16 maximum)



- Tourist class passenger envelopes
(120 maximum)
- Window seats (40 maximum)
- Aisle seats (40 maximum)
- Center seats (40 maximum)

Passenger Envelopes and Vectors

Figure 1-90-03A

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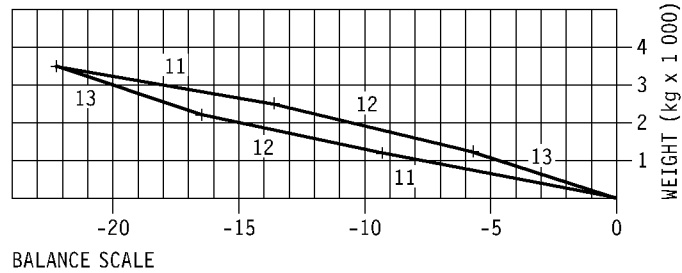
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Page 2
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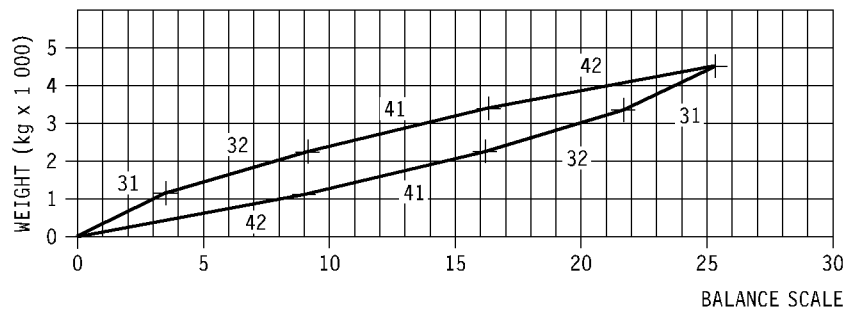


WEIGHT AND BALANCE MANUAL

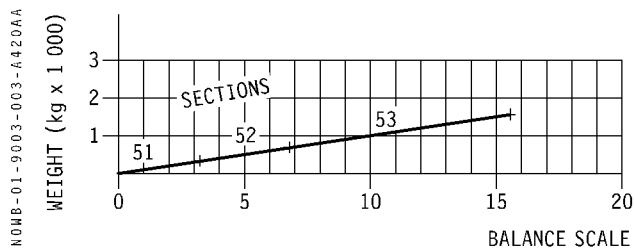
FORWARD CARGO HOLD LOADED WITH CONTAINERS OR PALLETS



AFT CARGO HOLD LOADED WITH CONTAINERS OR PALLETS



REAR (BULK) CARGO HOLD



Cargo Hold Vectors

Figure 1-90-03B 1/2

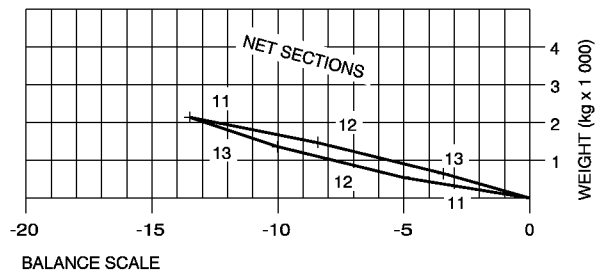
Mod : 21103 + 28330 + 28335 + 28507 or 20106 + 20107 + 21103

Seq : 420

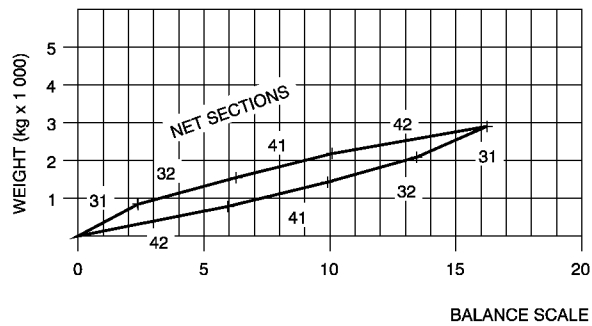


WEIGHT AND BALANCE MANUAL

FORWARD CARGO HOLD LOADED WITH OCCASIONAL BULK CARGO



AFT CARGO HOLD LOADED WITH OCCASIONAL BULK LOAD



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Cargo Hold Vectors

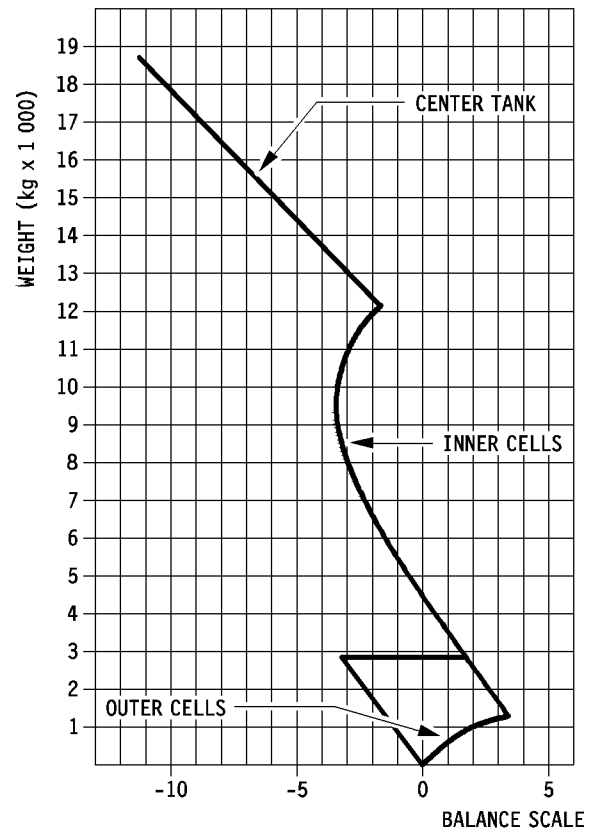
Figure 1-90-03B 2/2

Mod : 21103 + 28330 + 28507 or 21103 + 28330 + 28335 + 28507 or 20040 + 20065 + 20106 + 20107 + 21103

Seq : 315

1.90.03
Page 3A
OCT 02

WEIGHT AND BALANCE MANUAL



N0MB-01-9003-004-A210AA

Fuel Vector

Figure 1-90-03C

Mod : 20024 + 20802 or 20024 + 20802 + 37331 + 37332

Seq : 210

1.90.03
Page 4
JUL 09



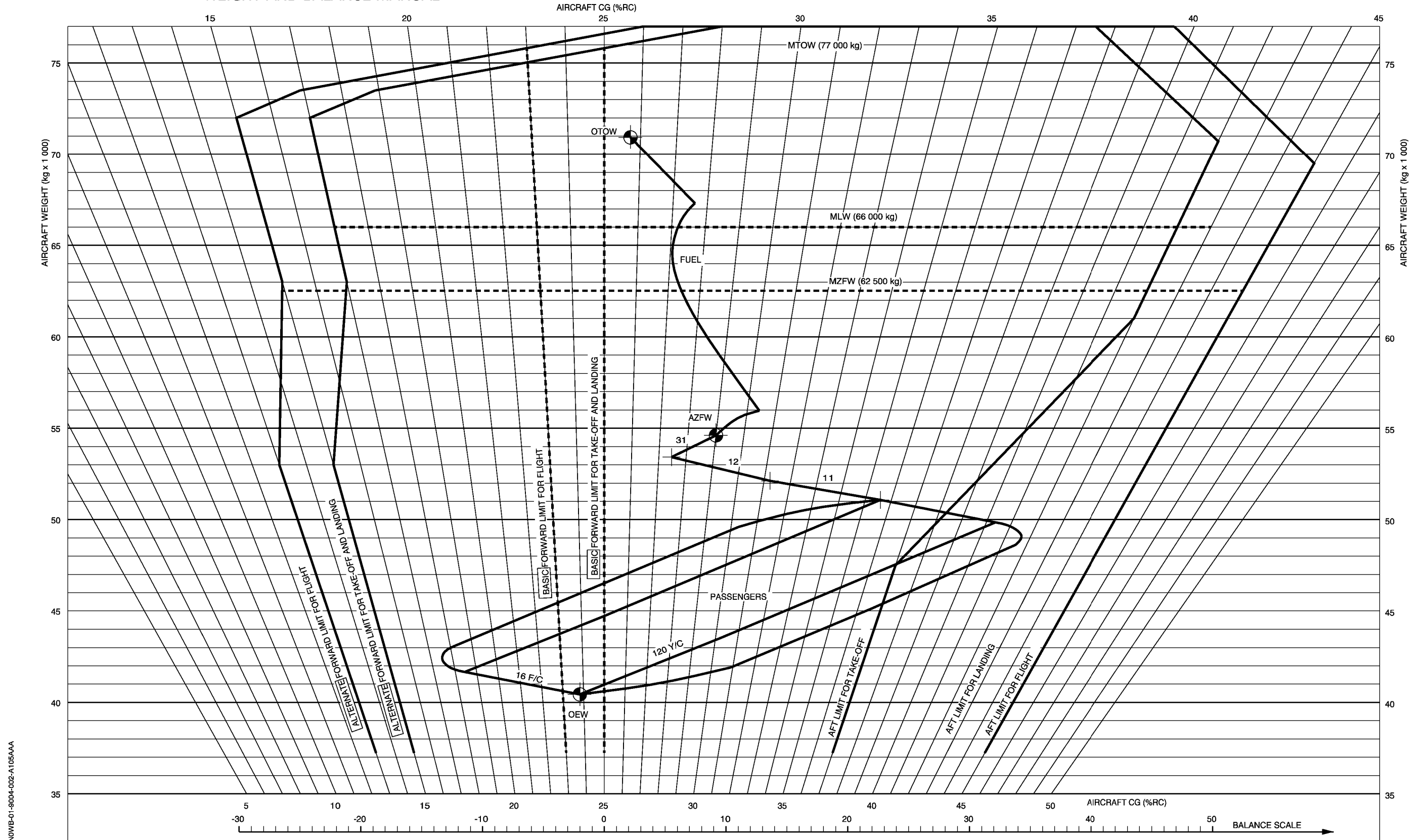
WEIGHT AND BALANCE MANUAL

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 : 35577 or 151860

1.90.04
Page 2
SEP 11

Seq : 105A



WEIGHT AND BALANCE MANUAL

2. AIRCRAFT WEIGHING REPORTS

CONTENTS

2.00 DEFINITIONS

- 01. Manufacturer's Empty Weight (MEW)
- 02. Operational Empty Weight (OEW)

2.10 DELIVERY WEIGHING REPORT

- 01. Weighing date and place
- 02. Aircraft identification
- 03. OEW and MEW results
- 04. Aircraft weighing
- 05. Results of weighing
- 06. Basic corrected weight established from weighing
- 07. OEW and MEW established from weighing
- 08. Operator's item weight summary

2.20 WEIGHING CHECK LIST

- 01. Table of compartments and subdivisions
- 02. Equipment list

LIST OF EFFECTIVE PAGES OF CHAPTER 2

M	CH.SEC.SS	PAGE	SEQ	DATE
	2.00.00	1	2649	JAN 06
	2.00.01	1	2649	16 JAN 06
	2.10.00	1	2649	16 JAN 06
	2.10.04	1	2649	16 JAN 06
	2.10.05	1	2649	16 JAN 06
	2.10.06	1	2649	16 JAN 06
	2.10.07	1	2649	16 JAN 06
	2.10.08	1	2649	16 JAN 06
	2.20.00	1	2649	16 JAN 06
	2.20.01	1	2649	16 JAN 06
	2.20.02	1 to 17	2649	16 JAN 06



WEIGHT AND BALANCE MANUAL

2.00 DEFINITIONS

01. Manufacturer's Empty Weight (MEW)

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

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 :

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

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.



WEIGHT AND BALANCE MANUAL

2.10 DELIVERY WEIGHING REPORT

Date : January 16,2006

01. Weighing date and place

Reference : EGWC 449.8221 / 06

Date of weighing : January 16,2006

Place of weighing : TOULOUSE

02. Aircraft identification

This weighing report is relative to aircraft :

Manufacturer	AIRBUS
Type	A320-232
Version	ALAFCO AVIATION LEASE AND FINANCE CO. LTD / ROYAL JORDANIAN AIRLINES (16 F/C, 120 Y/C)
Manufacturer serial number	2649

03. OEW and MEW results

	<u>Weight</u> (kg)	<u>CG</u> (% RC)
Operational Empty Weight (OEW)	45563	29.7
Manufacturer's Empty Weight (MEW)	38595	23.4

Performed by : S. ROQUES
EGWT
Airbus France S.A.S

Approved by : R. SEARS
EGWC
AIRBUS



WEIGHT AND BALANCE MANUAL

04. Aircraft weighing

The aircraft was weighed on wheels at Airbus France S.A.S. weighing platforms TRAYVOU (Ref: 97723-97721-97722)

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 the following configuration :

- All tools and protection devices removed.
- Passenger, service, cargo, maintenance and undercarriage doors closed.
- 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 tanks empty.
- Without pallet and container.
- Waste tank chemical fluid at nominal level



WEIGHT AND BALANCE MANUAL

05. Results of weighing

A. Values measured

(pitch attitude in decimal degrees, weights in kilograms)

a) Pitch attitude (Alpha) = -0.62°

b) Reaction force on nose L/G = 4762 kg

c) Reaction force on LH main L/G = 19140 kg

d) Reaction force on RH main L/G = 19540 kg

Weighed weight ($W=b+c+d$) = 43442 kg

B. H-arm calculations in meters (see paragraph 1.80.05)

$\sin(\alpha)$ = -0.0108208

H-arm = $20.29 - 2.738 \sin(\alpha) - 12.69 (r + 21) / W$ = 18.922 m



WEIGHT AND BALANCE MANUAL

06. Basic corrected weight established from weighing

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kgm)
Weighed weight (paragraph 05)	43442	18.922	822010
-Items not belonging to the aircraft definition (to be removed).			
Carpet protection in cabin	-2.000	20.109	-40
Carpet protection in cockpit	-4.000	5.100	-20
Flight test emergency transmitter	-3.070	17.180	-53
Fuel remaining in the aircraft	-39.700	18.060	-717
-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			
Furnishing panel in cockpit	0.750	4.500	3
♦ Items detailed in the weighing check list			
-Parts of operational items missing at weighing (to be added).			
Basic corrected weight	43393.980		821183

WEIGHT AND BALANCE MANUAL

07. OEW and MEW established from weighing

A. Operating Empty Weight (OEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kgm)
Basic corrected weight (paragraph 06)	43393.980		821183
Operator's items missing (detailed in the weighing check list)	2169.170	21.490	46615
OEW CG in meters	45563.150	19.046	867798
CG in %RC = (H-arm-17.8015)/0.041935		29.7 %RC	

B. Manufacturer Empty Weight (MEW)

ITEM DESCRIPTION	WEIGHT (kg)	H-ARM (m)	MOMENT (kgm)
Basic corrected weight (paragraph 06)	43393.980		821183
Operator's items installed (detailed in the weighing check list)	-4798.835	20.052	-96226
MEW CG in meters	38595.145	18.784	724957
CG in %RC = (H-arm-17.8015)/0.041935		23.4 %RC	



WEIGHT AND BALANCE MANUAL

08. Operator's item 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	64.500	18.297	0.000	0.000	64.500	18.297
Oil For Engines, IDG and APU	63.000	16.938	63.000	16.938	0.000	0.000
Water	200.000	15.546	0.000	0.000	200.000	15.546
Toilet fluid / Waste tank	10.000	32.050	10.000	32.050	0.000	0.000
Aircraft documents and tool kit	22.000	7.126	13.300	8.015	8.700	5.767
Passenger seats	3066.200	19.387	3066.200	19.387	0.000	0.000
Passenger life vests	78.880	21.184	78.880	21.184	0.000	0.000
Galley structure and fixed equipment	714.570	22.578	714.570	22.578	0.000	0.000
Catering removable equipment	444.030	20.711	444.030	20.711	0.000	0.000
Catering allowance	1165.720	23.431	0.000	0.000	1165.720	23.431
Emergency equipment	419.105	20.369	408.855	20.270	10.250	24.336
Crew and baggage	720.000	20.434	0.000	0.000	720.000	20.434
TOTAL	6968.005	20.500	4798.835	20.052	2169.170	21.490



WEIGHT AND BALANCE MANUAL

2.20 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 the MEW conditions.

Included in the check list are :

- Loose or easily removable items or equipment.
- Items which have alternates which may be substituted.
- 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 2.10.06.

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

01. Table of compartments and subdivisions

10. **Electronic compartment**

- 101 Battery and radar
- 102 Electronic rack 80VU
- 103 Electronic rack 90VU
- 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
- 308 Video and audio equipment
- 309 Ancillary parts

* see also chapter 2.20.02 page 17

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 L/G tires

70. **Cargo compartments**

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



WEIGHT AND BALANCE MANUAL

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	1	V
2	2PB2	BAT-2 2758 SAFT DPT	25.320	6.828	1	1	V
3	1SQ1	XCVR-WEATHER RADAR, 1 822-1710-202 ROCKWELL COLLINS INC	12.000	3.915	1	1	V
102		<u>ELECTRONIC RACK 80VU</u>					
1	1CA1	FMGC-1 C13042BA01 THALES AVIONICS SA	9.918	9.388	1	1	V
2	1CA2	FMGC-2 C13042BA01 THALES AVIONICS SA	9.918	9.388	1	1	V
3	1CC1	FAC-1 B397BAM0617 THALES AVIONICS SA	7.409	9.388	1	1	V
4	1CC2	FAC-2 B397BAM0617 THALES AVIONICS SA	7.409	9.388	1	1	V
5	1CE1	SEC-1 B372BAM0511 THALES AVIONICS SA	7.600	9.388	1	1	V
6	1CE2	SEC-2 B372BAM0511 THALES AVIONICS SA	7.600	9.388	1	1	V
7	2CE1	ELAC-1 3945128206 THALES AVIONICS SA	9.200	9.388	1	1	V
8	2CE2	ELAC-2 3945128206 THALES AVIONICS SA	9.200	9.388	1	1	V
9	3CE1	FCDC-1 115370-1318 LITEF "LITTON TECHNI	3.150	9.388	1	1	V
10	3CE2	FCDC-2 115370-1318 LITEF "LITTON TECHNI	3.150	9.388	1	1	V
11	21CV	SFCC 1 49-170-11 LIEBHERR-AEROSP	9.600	9.388	1	1	V
12	22CV	SFCC 2 49-170-11 LIEBHERR-AEROSP	9.600	9.388	1	1	V
13	2EV	EVMU 241-247-012-005 VIBROMETER AG	2.407	9.388	1	1	V
14	10HQ	AEVC 87292325V06 THALES AVIONICS SA	1.690	9.388	1	1	V
15	1KS1	EIU-1 3957985205 THALES AVIONICS SA	3.336	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	
16	1KS2	EIU-2 3957985205 THALES AVIONICS SA	3.336	9.388	1	1	V
17	311MK	I.F.E.CONTROLLER 177716-103 THALES AVIONICS	5.440	9.388	1	1	V
18	312MK	I.F.E.SERVER 177900-103 THALES AVIONICS	9.980	9.388	1	1	V
19	1RC1	XCVR-VHF, 1 822-1250-020 ROCKWELL COLLINS INC	3.946	9.388	1	1	V
20	1RC2	XCVR-VHF, 2 822-1250-020 ROCKWELL COLLINS INC	3.946	9.388	1	1	V
21	1RC3	XCVR-VHF, 3 822-1250-020 ROCKWELL COLLINS INC	3.946	9.388	1	1	V
22	3RE1	XCVR-HF, 1 822-0990-003 ROCKWELL COLLINS INC	12.600	9.388	1	1	V
23	101RH	CIDS DIRECTOR 1 Z014H000131A KID-SYSTEME GMB	5.000	9.388	1	1	V
24	102RH	CIDS DIRECTOR 2 Z014H000131A KID-SYSTEME GMB	5.000	9.388	1	1	V
25	1RN	AMU AMU4031SA110101 TEAM	5.000	9.388	1	1	V
26	2RP1	RECEIVER-ADF, 1 066-50014-0202 HONEYWELL INTL INC D	3.400	9.388	1	1	V
27	3RS1	RECEIVER-VOR/MKR, 1 066-50012-0212 HONEYWELL INTL INC D	4.600	9.388	1	1	V
28	3RS2	RECEIVER-VOR/MKR, 2 066-50012-0212 HONEYWELL INTL INC D	4.600	9.388	1	1	V
29	2SD1	INTRG-DME, 1 822-0329-020 ROCKWELL COLLINS INC	5.940	9.388	1	1	V
30	2SD2	INTRG-DME, 2 822-0329-020 ROCKWELL COLLINS INC	5.940	9.388	1	1	V
31	1SG	CMPTR-TCAS 822-1293-322 ROCKWELL COLLINS INC	8.200	9.388	1	1	V
32	1SH1	XPDR-ATC/MODE S, 1 822-1338-021 ROCKWELL COLLINS INC	5.534	9.388	1	1	V
33	1SH2	XPDR-ATC/MODE S, 2 822-1338-021 ROCKWELL COLLINS INC	5.534	9.388	1	1	V
34	10TV	DMU/FDIU (FDIMU) ED48A100 SAGEM DEFENSE S	4.300	9.388	1	1	V
35	1TW	CFDIU C12860AA02 THALES AVIONICS SA	5.215	9.388	1	1	V
36	1TX1	ATSU LA2T0G20705C070 AIRBUS FRANCE	4.580	9.388	1	1	V
37	1WT1	DMC-1 1982660116 THALES AVIONICS SA	9.374	9.388	1	1	V
38	1WT2	DMC-2 1982660116 THALES AVIONICS SA	9.374	9.388	1	1	V
39	1WT3	DMC-3 1982660116 THALES AVIONICS SA	9.3/4	9.388	1	1	V
40	1WV1	SDAC-1 350E5500202 AIRBUS FRANCE	5.760	9.388	1	1	V

2.20.02



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
41	1WV2	SDAC-2 350E5500202	5.760	9.388	1	1	V
42	1WW1	FWC-1 350E053020606	6.080	9.388	1	1	V
43	1WW2	FWC-2 350E053020606	6.080	9.388	1	1	V
44	1WZ	GPWC 965-1676-001	3.175	9.388	1	1	V
103		<u>ELECTRONIC RACK 90VU</u>					
1	1CE3	SEC-3 B372BAM0511	7.600	5.080	1	1	V
2	5GA1	LGCIU-1 664700500A4D	5.900	5.080	1	1	V
3	5GA2	LGCIU-2 664700500A4D	5.900	5.080	1	1	V
4	10GG	BSCU E21327004	11.000	5.080	1	1	V
5	1HA1	BMC-1 785-002-8	1.720	5.080	1	1	V
6	1HA2	BMC-2 785-002-8	1.720	5.080	1	1	V
7	10HC	AFT CARGO HEAT CONTROL 600611-00-601	3.300	5.080	1	1	V
8	47HH	CONT-AIR COND SYSTEM 1803B0000-01	4.700	5.080	1	1	V
9	57HH	CONT-AIR COND SYSTEM 1803B0000-01	4.700	5.080	1	1	V
10	11HL	PRESS CONT 1 20791-02AB	2.250	5.080	1	1	V
11	12HL	PRESS CONT 2 20791-02AB	2.250	5.080	1	1	V
12	7QJ	FLSCU-1 30042-0000-0501	3.710	5.080	1	1	V
13	9QJ	FLSCU-2 30042-0000-0501	3.710	5.080	1	1	V
14	3QT	FQIC SIC5059-13-10	4.900	5.080	1	1	V
15	40RT1	MMR-1 822-1152-121	5.000	5.080	1	1	V
16	40RT2	MMR-2 822-1152-121	5.000	5.080	1	1	V
17	24XG	GAPCU 1700667D	5.830	5.080	1	1	V
18	1XU1	GCU-1 767584J	4.000	5.080	1	1	V
19	1XU2	GCU-2 767584J	4.000	5.080	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	
104		<u>INERTIAL NAVIGATION</u>					
1	1FP1	ADIRU-1 HG2030AE22	7.760	8.464	1	1	V
2	1FP2	ADIRU-2 HG2030AE22	7.760	8.464	1	1	V
3	1FP3	ADIRU-3 HG2030AE22	7.760	8.464	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	
20		<u>FLIGHT DECK</u>					
201		<u>EMERGENCY EQUIPMENT</u>					
1		FLASHLIGHT P2-07-0001-214 DME CORP	0.645	4.475	2	2	
2		LIFE VEST,FLIGHT CREW 63600-101 AIR CRUISERS CO	0.580	5.085	2	2	
3		DESCENT DEVICE -EMERGENCY 208724-0 AERAZUR	0.472	5.794	2	2	
4		EXTINGUISHER-PORTABLE FIRE 74-20 TOTAL FEUERSCHUTZ GM	2.185	5.794	1	1	
5		AXE -CRASH 680-0040-000 THALES AVIONICS ELEC	1.050	5.893	1	1	
6		GLOVES FKK8-35KL BENNETT SAFETYWEAR L	0.250	5.893	1	0	
7		HOOD-SMOKE 15-40F11 AIR LIQUIDE	2.400	5.917	1	1	
8		LIFE VEST,FLIGHT CREW 63600-101 AIR CRUISERS CO	0.580	5.922	1	1	
9		LIFE VEST,FLIGHT CREW 63600-101 AIR CRUISERS CO	0.580	6.067	1	1	
202		<u>CREW SEATS</u>					
1		SEAT-CAPTAIN TAAI3-03PE00-01 EADS SOGERMA	39.200	5.085	1	1	V
2		SEAT-F/O TAAI3-03CE00-01 EADS SOGERMA	39.200	5.085	1	1	V
3		SEAT-THIRD OCCUPANT 16800-01-00 SICMA AERO SEAT	15.300	5.677	1	1	V
4		SEAT-FOURTH OCCUPANT 2510154-01-00 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 WA50BYU3YS11123 SICMA AERO SEAT	14.400	7.127	1	1	V
2		CABIN ATTENDANT SEAT WA44BYU3YS11123 SICMA AERO SEAT	14.800	7.127	1	1	V
3		CABIN ATTENDANT SEAT RI 47FYU3YS10123 SICMA AERO SEAT	21.000	31.552	1	1	V
4		CABIN ATTENDANT SEAT DN11TYU3YS10123 SICMA AERO SEAT	24.200	31.652	1	1	V
5		CABIN ATTENDANT SEAT DN11SYU3YS10123 SICMA AERO SEAT	24.200	31.652	1	1	V
302		<u>PASSENGER SEATS</u> (H-arm of required quantity)					
	S01	DOUBLE SEAT 830-21-01-11 KEIPER RECARO G	103.200	11.348	4	4	
	S02	DOUBLE SEAT 830-22-01-11 KEIPER RECARO G	103.100	11.348	4	4	
	S03	TRIPLE SEAT 3510D369-32-021 KEIPER RECARO G	67.800	14.656	1	1	
	S04	TRIPLE SEAT 3510D369-31-022 KEIPER RECARO G	67.700	14.656	1	1	
	S05	TRIPLE SEAT 3510D369-31-031 KEIPER RECARO G	56.100	16.281	1	1	
	S06	TRIPLE SEAT 3510D369-32-031 KEIPER RECARO G	55.800	16.281	1	1	
	S07	TRIPLE SEAT 3510D369-31-042 KEIPER RECARO G	55.500	17.183	1	1	
	S08	TRIPLE SEAT 3510D369-32-041 KEIPER RECARO G	55.500	17.183	1	1	
	S09	TRIPLE SEAT 3510D369-32-052 KEIPER RECARO G	55.600	18.059	1	1	
	S10	TRIPLE SEAT 3510D369-31-051 KEIPER RECARO G	55.600	18.059	1	1	
	S11	TRIPLE SEAT 3510D369-32-012 KEIPER RECARO G	56.000	21.069	4	4	
	S12	TRIPLE SEAT 3510D369-32-011 KEIPER RECARO G	56.000	22.936	8	8	
	S13	TRIPLE SEAT 3510D369-31-011 KEIPER RECARO G	56.000	23.081	10	10	
	S14	TRIPLE SEAT 3510D369-31-012 KEIPER RECARO G	56.000	24.552	5	5	
	S15	TRIPLE SEAT 3510D369-32-062 KEIPER RECARO G	55.600	27.813	1	1	

2.20.02



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
	S16	TRIPLE SEAT 3510D369-32-061	55.600	28.994	2	2	
	S17	TRIPLE SEAT 3510D369-31-071	46.300	30.163	1	1	
	S18	TRIPLE SEAT 3510D369-32-072	46.300	30.163	1	1	
		KEIPER RECARO G					
303		PASSENGER LIFE VESTS (H-arm of required quantity)					
		LIFE VEST (Required: 136 Fitted : 136) 63600-101	0.580	21.184	-	-	
		AIR CRUISERS CO					
305		DOGHOUSE, STOWAGES, PARTITIONS, CURTAINS AND CARPETS					
1		CURTAIN 716190-2480	2.150	7.142	1	1	V
2		NTF FWD 473675620WTBY	19.500	7.399	1	1	V
3		CURTAIN 710190-2480	1.360	8.128	1	1	V
4		STOWAGE LH 104223	36.000	8.357	1	1	V
5		DOGHOUSE LH 113295A	8.670	13.629	1	1	V
6		DOGHOUSE RH 113296A	8.690	13.629	1	1	V
7		CURTAIN 708200-2480	1.100	13.780	2	2	V
8		MCD CENTER AD1624-3E	2.700	13.780	1	1	V
9		PARTITION LH D252-74006-112-00	15.000	13.780	1	1	V
10		PARTITION RH D252-74006-115-00	15.000	13.780	1	1	V
11		CARPET MA4234LS609-700	135.000	19.857	1	1	V
12		DOGHOUSE LH 113209L	8.290	30.546	1	1	V
13		DOGHOUSE RH 113210L	8.210	30.546	1	1	V
14		CURTAIN 714190-2480	1.830	31.587	1	1	V
15		NTF AFT 473675620WTBZ	16.500	32.595	1	1	V
		WULFMEYER					



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
306		<u>GALLEY STRUCTURE AND FIXED EQUIPMENT</u>					
1		COFFEEMAKER 64753-001-003 BRITAX AIRCRAFT	7.270	6.678	1	1	
2		ESPRESSO MACHINE HFE95-20D IACOBUCCI SPA	12.000	6.678	1	1	
3		GALLEY 1 106242 MUEHLENBERG,ALB	135.000	6.678	1	1	
4		OVEN 8202-66-0000-01 SELL GMBH PREMI	27.400	6.678	1	1	
5		OVEN 8202-16-0000-01 SELL GMBH PREMI	27.400	6.678	1	1	
6		GALLEY 2A 106116A MUEHLENBERG,ALB	81.000	8.357	1	1	
7		COFFEEMAKER 64753-001-003 BRITAX AIRCRAFT	7.270	33.122	2	2	
8		GALLEY 5 106241 MUEHLENBERG,ALB	292.500	33.122	1	1	
9		OVEN 8202-66-0000-01 SELL GMBH PREMI	27.400	33.122	2	2	
10		OVEN 8202-16-0000-01 SELL GMBH PREMI	27.400	33.122	2	2	
11		WATER HEATER 62197-001-001 BRITAX AIRCRAFT	7.860	33.122	1	1	
307		<u>EMERGENCY EQUIPMENT</u>					
1		FIRE EXTINGUISHER 74-20 TOTAL WALTHER F	2.250	7.127	2	2	
2		FLASH LIGHT P2-07-0001-214 DME CORPORATION	0.660	7.127	2	2	
3		LIFE VEST,CABIN CREW 63600-101 AIR CRUISERS CO	0.580	7.127	2	2	
4		SMOKE HOOD 15-40F11 AIR LIQUIDE L S	2.560	7.127	2	2	
5		TOOL MANUAL RELEASE 995000 BE AEROSPACE	0.014	7.127	2	2	
6		COVER, SLIDE RAFT FWD 62364-301 AIR CRUISERS CO	2.200	7.562	2	2	
7		ESCAPE SLIDE FWD LH/RH D30664-309 AIR CRUISERS CO	46.000	7.562	2	2	
8		EXTENSION BELT,INFANT 2010-5-011-2251 AMSAFE,INC.	0.200	8.700	5	5	
9		LIFE VEST,INFANT P0640-103 EASTERN AERO MA	0.500	8.700	5	0	
10		LIFE VEST,SPARE 63600-101 AIR CRUISERS CO	0.580	8.700	4	4	
11		OXYGEN MASK 289-601-248 AVOX SYSTEMS IN	0.130	8.700	1	1	

2.20.02



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
12		POCKET A256-70815-014-00 EADS AIRBUS GMB	0.150	8.700	1	1	
13		POCKET CPL A256-70827-000-00 EADS AIRBUS GMB	0.060	8.700	1	1	
14		POCKET,INFANT LIFE VEST A256-70815-022-00 EADS AIRBUS GMB	0.280	8.700	1	1	
15		POCKET,SPARE LIFE VEST A256-70815-020-00 EADS AIRBUS GMB	0.220	8.700	1	1	
16		PORTABLE OXYGEN CYL 9700F1ABF23AM	4.600	8.700	1	1	
17		SURVIVAL KIT 60128-103 AIR CRUISERS CO	9.150	9.233	2	2	
18		DEMONSTRATION MASK 289-1001 AVOX SYSTEMS IN	0.080	9.766	1	1	
19		EMERG.RADIO BEACON S1823502-03 THALES AVIONICS	2.100	9.766	1	1	
20		LIFE VEST,DEMO 63914-101 AIR CRUISERS CO	0.410	9.766	1	1	
21		MEGAPHONE A12SA FEDERAL SIGNAL	1.610	9.766	1	1	
22		OXYGEN MASK 289-601-248 AVOX SYSTEMS IN	0.130	9.766	1	1	
23		POCKET CPL A256-70827-000-00 EADS AIRBUS GMB	0.060	9.766	1	1	
24		POCKET,DEMO KIT A256-70815-068-00 EADS AIRBUS GMB	0.220	9.766	1	1	
25		PORTABLE OXYGEN CYL 9700F1ABF23AM	4.600	9.766	1	1	
26		SEAT BELT (DEMO) 2010-6-011-2251 AMSAFE,INC.	0.170	9.766	1	1	
27		DEMONSTRATION MASK 289-1001 AVOX SYSTEMS IN	0.080	16.971	2	2	
28		LIFE VEST,DEMO 63914-101 AIR CRUISERS CO	0.410	16.971	2	2	
29		LIFELINE 505256-401 AMSAFE,INC.	1.500	16.971	4	4	
30		POCKET,DEMO KIT A256-70815-068-00 EADS AIRBUS GMB	0.220	16.971	2	2	
31		SEAT BELT (DEMO) 2010-6-011-2251 AMSAFE,INC.	0.170	16.971	2	2	
32		ESCAPE SLIDE OW.LH D31865-111 AIR CRUISERS CO	32.400	21.360	1	1	
33		ESCAPE SLIDE OW.RH D31865-112 AIR CRUISERS CO	32.400	21.360	1	1	
34		RESERVOIR ASSY OWS LH/RH 60592-201 AIR CRUISERS CO	7.200	21.360	2	2	
35		SURVIVAL KIT 60128-103 AIR CRUISERS CO	9.150	29.629	2	2	
36		EXTENSION BELT,INFANT 2010-5-011-2251 AMSAFE,INC.	0.200	30.163	15	15	

2.20.02



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
37		EXTENSION BELT,SPARE 2010-1-791-1169 AMSAFE,INC.	0.190	30.163	6	6	
38		LIFE VEST,INFANT P0640-103 EASTERN AERO MA	0.500	30.163	15	0	
39		LIFE VEST,SPARE 63600-101 AIR CRUISERS CO	0.580	30.163	6	6	
40		MEGAPHONE A12SA FEDERAL SIGNAL	1.610	30.163	1	1	
41		OXYGEN MASK 289-601-248 AVOX SYSTEMS IN	0.130	30.163	1	1	
42		POCKET A256-70815-014-00 EADS AIRBUS GMB	0.150	30.163	3	3	
43		POCKET CPL A256-70827-000-00 EADS AIRBUS GMB	0.060	30.163	1	1	
44		POCKET, SPARE BELT A256-70815-030-00 EADS AIRBUS GMB	0.120	30.163	1	1	
45		POCKET,INFANT LIFE VEST A256-70815-022-00 EADS AIRBUS GMB	0.280	30.163	3	3	
46		POCKET,SPARE LIFE VEST A256-70815-020-00 EADS AIRBUS GMB	0.220	30.163	2	2	
47		PORTABLE OXYGEN CYL 9700F1ABF23AM AVOX SYSTEMS IN	4.600	30.163	1	1	
48		SEAT BELT, SPARE B/C 2010-1-011-1169 AMSAFE,INC.	0.190	30.163	2	2	
49		SEAT BELT, SPARE Y/C 2010-1-791-9006 AMSAFE,INC.	0.190	30.163	2	2	
50		EMERG.RADIO BEACON S1823502-03 THALES AVIONICS	2.100	30.543	1	1	
51		OXYGEN MASK 289-601-248 AVOX SYSTEMS IN	0.130	30.657	2	2	
52		POCKET CPL A256-70827-000-00 EADS AIRBUS GMB	0.060	30.657	2	2	
53		PORTABLE OXYGEN CYL 9700F1ABF23AM AVOX SYSTEMS IN	4.600	30.657	2	2	
54		FLASH LIGHT P2-07-0001-214 DME CORPORATION	0.660	31.552	1	1	
55		LIFE VEST,CABIN CREW 63600-101 AIR CRUISERS CO	0.580	31.552	1	1	
56		SMOKE HOOD 15-40F11 AIR LIQUIDE L S	2.560	31.552	1	1	
57		TOOL MANUAL RELEASE 995000 BE AEROSPACE	0.014	31.552	1	1	
58		FIRE EXTINGUISHER 74-20 TOTAL WALTHER F	2.250	31.652	2	2	
59		FLASH LIGHT P2-07-0001-214 DME CORPORATION	0.660	31.652	4	4	
60		LIFE VEST,CABIN CREW 63600-101 AIR CRUISERS CO	0.580	31.652	4	4	
61		SMOKE HOOD 15-40F11 AIR LIQUIDE L S	2.560	31.652	4	4	

2.20.02



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
62		TOOL MANUAL RELEASE 995000	0.014	31.652	1	1	
63		COVER, SLIDE RAFT AFT 62369-301	2.500	32.182	2	2	
64		ESCAPE SLIDE AFT LH/RH D30665-309	45.800	32.182	2	2	
308		<u>VIDEO AND AUDIO EQUIPMENT</u>					
1		SYSTEM CONTROL UNIT 177792-803	7.000	8.255	1	1	V
2		VIDEO REPRODUCER UNIT 177908-101	3.400	8.255	1	1	V
3		LCD 15" A299000-1	9.000	8.585	2	2	V
4		LCD 4,8" 177788-403	4.950	13.780	6	6	V
309		<u>ANCILLARY PARTS</u>					
1		LITERATURE POCKET A252-89547-004-00	0.500	8.585	4	4	V
2		MAGAZINE RACK ASSY(2) A252-89516-072-00	0.850	8.585	2	2	V
3		LITERATURE POCKET A252-89512-054-00	0.350	13.780	6	6	V
4		MAGAZINE RACK ASSY(1) A252-89517-070-00	0.460	30.657	2	2	V



WEIGHT AND BALANCE MANUAL

ITEM N°	FIN OR REF.	ITEM DESCRIPTION	UNIT WEIGHT (kg)	H-ARM (m)	QTY		M E W
					R	F	
40		<u>FLIGHT RECORDERS AND RA TRANSCEIVERS</u>					
401		<u>FLIGHT RECORDERS</u>					
1		CVR 980-6022-001 HONEYWELL INTL INC D	10.125	35.126	1	1	V
2		DFDR 980-4700-042 HONEYWELL INTER	6.050	35.126	1	1	V
402		<u>RA TRANSCEIVERS</u>					
1		RA 1 TRANSCEIVER 9599-607-14942 THALES OPTRONIQUE	4.750	26.429	1	1	V
2		RA 2 TRANSCEIVER 9599-607-14942 THALES OPTRONIQUE	4.750	26.429	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	
50		<u>ADDITIONAL OPERATOR'S ITEMS</u>					
501		<u>FUEL, OIL, WATER, FLUIDS</u>					
1		ENGINE OIL	24.500	15.110	2	2	
2		IDG OIL	4.500	15.369	2	2	
3		WATER	200.000	15.546	1	0	
4		UNUSABLE FUEL	64.500	18.297	1	0	
5		WASTE TANK FLUID	10.000	32.050	1	1	
6		APU OIL	5.000	37.675	1	1	
502		<u>AIRCRAFT DOCUMENTS AND TOOL KIT</u>					
1		A/C DOCUMENTS	8.700	5.767	1	0	
2		FLIGHT KIT 1-(GROUND SAFETY LOCKS : MLG(2),NLG(1))	1.080	5.767	1	1	
3		FLIGHT KIT 3-(SAFETY PIN-ESCAPE SLIDE LEVER (4))	0.050	5.767	4	4	
4		CASE(FLIGHT KIT 2)	3.360	8.254	1	1	
5		1107-004-70 ESTOR SA FLIGHT KIT 2 EADS AIRBUS GMB	8.660	8.254	1	1	
503		<u>CATERING REMOVABLE EQUIPMENT</u>					
1		HOT CUP G1 DRIESSEN DLH549-017	1.280	6.678	1	1	
2		STANDARD UNIT/CONTAINER G1 DRIESSEN DLH294-083	2.860	6.678	3	3	
3		TROLLEY FULL-SIZE G1 DRIESSEN TK075029	27.400	6.678	4	4	
4		FOLDING TROLLEY C DRIESSEN TV026001	9.750	8.357	1	1	
5		STANDARD UNIT/CONTAINER G2A DRIESSEN DLH294-083	2.860	8.357	7	7	
6		TROLLEY HALF-SIZE G2A DRIESSEN TL060031	16.300	8.357	4	4	
7		HOT CUP G5 DRIESSEN DLH549-017	1.280	33.122	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	
8		STANDARD UNIT/CONTAINER G5	2.860	33.122	12	12	
		DLH294-083 DRIESSEN					
9		TROLLEY FULL-SIZE G5	27.400	33.122	6	6	
		TK075029 DRIESSEN					
10		WASTE TROLLEY FULL SIZE G5	29.600	33.122	1	1	
		TG047006 DRIESSEN					
504		<u>CATERING ALLOWANCE</u>					
1		CATERING GALLEY 1	307.540	6.678	1	0	
2		CATERING GALLEY 2A	127.780	8.357	1	0	
3		CATERING GALLEY 5	730.400	33.122	1	0	
505		<u>CREW AND BAGGAGE</u>					
1		FLIGHT CREW	80.000	5.085	2	0	
2		ATTENDANT AFT LAV A	80.000	7.327	2	0	
3		ATTENDANT SIDE LAV E	80.000	31.678	1	0	
4		ATTENDANT AFT LAV D	80.000	31.852	2	0	
5		ATTENDANT AFT LAV E	80.000	31.852	2	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		<u>TIRES</u>					
601		<u>NOSE AND MAIN L/G TIRES</u>					
1		TIRE-NLG, 1/2 M08201 MICHELIN MANUFACTURE	21.000	7.605	2	2	V
2		TIRE-MLG, 1/2/3/4 M01103 MICHELIN MANUFACTURE	75.500	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		<u>CARGO COMPARTMENTS</u>					
702		<u>AFT HOLD CARGO NETS</u>					
1		DIVIDER NET TYPE A1 AC40-0217500 BRIDPORT AVIATI	4.500	27.762	1	1	V
703		<u>BULK HOLD CARGO NETS</u>					
1		DOOR NET TYPE E AC40-0217400 BRIDPORT AVIATI	3.550	28.295	1	1	V
2		DOOR NET TYPE D AC40-0217300 BRIDPORT AVIATI	3.670	29.362	1	1	V



WEIGHT AND BALANCE MANUAL

PASSENGER SEATS AND LIFE VESTS LAYOUT

R O W	LEFT			RIGHT		
	SEAT	VEST	H-ARM (m)	SEAT	VEST	H-ARM (m)
1	S01	2	9.595	S02	2	9.595
2	S01	2	10.763	S02	2	10.763
3	S01	2	11.932	S02	2	11.932
4	S01	2	13.100	S02	2	13.100
7	S04	3	14.656	S03	3	14.656
8	S13	3	15.469	S11	3	15.469
9	S05	3	16.281	S06	3	16.281
10	S07	3	17.183	S08	3	17.183
11	S10	3	18.059	S09	3	18.059
12	S13	3	18.872	S12	3	18.872
13	S14	3	19.685	S12	3	19.685
14	S13	3	20.498	S11	3	20.498
15	S13	3	21.311	S12	3	21.311
16	S14	3	22.123	S12	3	22.123
17	S13	3	22.936	S11	3	22.936
18	S13	3	23.749	S12	3	23.749
19	S14	3	24.562	S12	3	24.562
20	S13	3	25.375	S11	3	25.375
21	S13	3	26.187	S12	3	26.187
22	S14	3	27.000	S12	3	27.000
23	S13	3	27.813	S15	3	27.813
24	S13	3	28.600	S16	3	28.600
25	S14	3	29.388	S16	3	29.388
26	S17	3	30.163	S18	3	30.163

* Item missing at weighing
Seq : 2649

2.20.02
Page 17
16 JAN 06