Galaxy Aerospace
Airworthiness Expert

[1](AIRCRAFT TYPE)

[2]GAM/MBR/(XX)/(YY)/(ZZZZ)

[3](REV. NO.)

MASS AND BALANCE REPORT

IMPORTANT NOTE

This report contains of Mass and Center of Gravity Schedule (MCGS), Weighing Record (WR), Equipment list and Aircraft Basic Mass and Balance Record.

This report shall be approved by qualified Weighing Engineer (WE) on MCGS and/or WR.

This Mass and Balance Report is approved under GAM privilege and can be used for flight operation.

The superseded report shall be removed from the flight manual prior to insert the latest Mass and Balance report.

The Mass and Balance report supersedes all earlier issues.

The effectivity of the report at the latest revision is specified on the Record of Revisions.

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RECORD OF REVISIONS

[3]Rev. No	[4]Date	[5]Affected Page(s)	[6]Descriptions of Revision

SECTION 1 – MASS AND CENTRE OF GRAVITY SCHEDULE (MCGS)

[7]Aircraft Type / Model	:
[8]Nationality	:
[9]Registration number	:
[10]Aircraft manufacturer/constructor	:
[11]Aircraft serial number	:
[12]Weight limitations – maximum authorised weight in flight	:

[13]CENTRE OF GRAVITY LIMITATIONS

[14]DATUM REFERENCES

PART A – BASIC WEIGHT

[15]The Basic Weight of the aircraft as calculated in Section 2 is	:
[16]The aircraft was weighed on (date)	:
[17]The C.G of the aircraft in the same condition at this weight is	: LONGITUDINAL : LATERAL
[18]The total moment about the datum in this condition is	: LONGITUDINAL : LATERAL

The Basic Weight includes the weight of the total quantity of unusable fuel, oil & fluids in the normal condition and the list of equipment as specified in Section 3 – Basic Equipment List.

PART B – VARIABLE LOAD

The Weights, Lever Arms (Measured Forward or Aft of the Datum defined in Part A) of the Variable Load, which includes the weight of the crew and those items of the equipment including usable fluids other than fuel, which do not form part of the Basic Equipment are shown below:

The Variable Load depends upon the equipment carried for the particular role.

[19]ITEM	[20]DESCRIPTION	[21]WEIGHT (KG/LBS)	[22]ARM (MM/INCH)	
			LONG.	LAT.

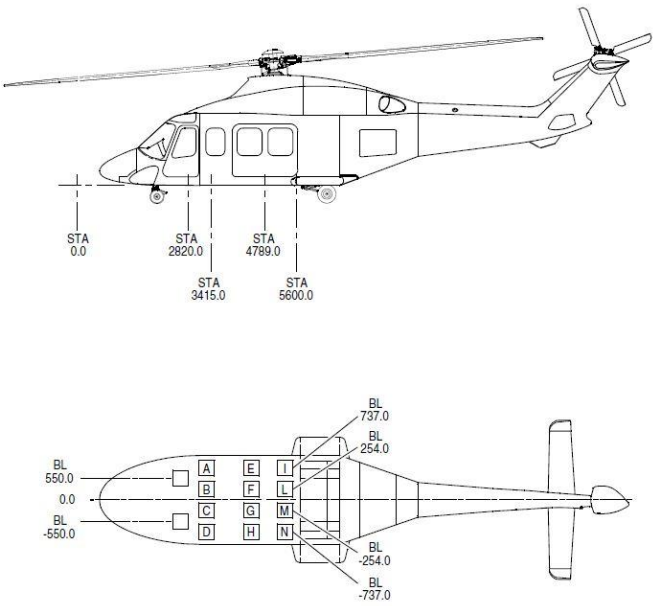
PART C – LOADING INFORMATION (DISPOSABLE LOAD)

It is a requirement of the MCAR that the pilot-in-command satisfies himself before take-off that the load is of such mass, and is so distributed and secured, that it may safely be carried on the intended flight.

Information below is given to enable Disposable Load (Fuel and Pay-Load) to be distributed so that the Maximum Weight and Centre of Gravity Limitations given in the Flight Manual are NOT exceeded.

The appropriate Lever Arms of the Disposable Loads are:-

[23]ITEM	[24]MISCELLANEOUS LOADING DATA	[25]ARM (MM/INCH)	
		LONG.	LAT.
1	FUEL IN TANKS **MAIN TANKS** Total Usable ..... (refer data in A/C approved Flight Manual) [kg/litres] Unusable .....(refer data in A/C approved Flight Manual) [kg/litres] **AUXILIARY TANKS (IF APPLICABLE)** Auxiliary Tank Usable..... (refer data in A/C approved Flight Manual) [kg/litres] Total Usable (Main Plus Auxiliary Tanks)..... (refer data in A/C approved Flight Manual) [kg/litres] Unusable ..... (refer data in A/C approved Flight Manual) [kg/litres] Maximum Total Usable Capacity of fuel tanks (Main Plus Auxiliary Tanks) is (refer data in A/C approved Flight Manual) [kg/litres]. Weight of this quantity of fuel at (refer data in A/C approved Flight Manual) [kg/litres] is (refer data in A/C approved Flight Manual) [kg].		

[23]ITEM	[24]MISCELLANEOUS LOADING DATA	[26]MAXIMUM WEIGHT (KG/LBS)	[25]ARM (MM/INCH)	
			LONG.	LATERAL
2	CABIN FLOOR LOADING (refer data in A/C approved Flight Manual) On left hand forward cabin floor Maximum distributed load……			
3	BAGGAGE COMPARTMENT LOADING (refer data in A/C approved Flight Manual) Cargo compartment Maximum Load……			
4	PASSENGER CONFIGURATION (e.g.: passenger seating config- 12 seater) 			

NOTE

1. To obtain the total loaded weight of aircraft, add to the BASIC Weight the weights of the items of variable and disposable load (if not included during weighing - see equipment list) to be carried for the particular role.

2. Loading information (disposable load) and CG envelope chart is available in Approved Flight Manual.

3. it is a requirement of the MCAR 2016 that the pilot-in-command satisfies himself before take-off that the load is of such mass, and is so distributed and secured, that it may safely be carried on the intended flight.

4. CAAM APPROVAL REFERENCE NUMBER: CAMO/2016/03

5. This MCGS was prepared on _____ and supersedes all previous issues.

[27]Prepared by:	(Name, Signature)	Date:	
[28]Checked by:	(Name, Signature)	Date:	
[29]Approved by:	(Name , Signature, Approval Stamp)	Date:	

SECTION 2- MASS AND BALANCE RECORD

PART 2A – WEIGHING RECORD (WR)

[30]Date	
[31]Location	
[32]Equipment	
[33]Model / Part number	
[34]Serial number	
[35]Calibration due date	

[36]MEASUREMENT

All station arms measured from datum, located (refer data in A/C approved Flight Manual).

Distance from datum point to forward jack point is (refer data in A/C approved Flight Manual).

Distance from datum point to LH & RH aft jack points station is (refer data in A/C approved Flight Manual)

Data recorded from the weighing equipment is in lbs, and converted to kg (1 lbs = 0.4535924).
In lateral calculations: Left is negative (-), Right is positive (+).

Weight of fuel: 1 litre @ (refer data in A/C approved Flight Manual) [kg/lbs].

FIRST WEIGHING (All Units in kg/lbs)

JACK POINT			[37]CELL READING	[38]ZERO RTN.	[39]CALIBRATION	[40]ACTUAL WEIGHT
LHD	AFT	RED				
RHD	AFT	YELLOW				
NOSE	FWD	BLUE				
					TOTAL	

SECOND WEIGHING (All Units in kg/lbs)

JACK POINT			[37]CELL READING	[38]ZERO RTN.	[39]CALIBRATION	[40]ACTUAL WEIGHT
LHD	AFT	RED				
RHD	AFT	YELLOW				
NOSE	FWD	BLUE				
					TOTAL	

THIRD WEIGHING (All Units in kg/lbs) (if applicable)

JACK POINT			[37]CELL READING	[38]ZERO RTN.	[39]CALIBRATION	[40]ACTUAL WEIGHT
LHD	AFT	RED				
RHD	AFT	YELLOW				
NOSE	FWD	BLUE				

	TOTAL	

AVERAGE AIRCRAFT WEIGHT

JACK POINT		[41]AVERAGE CELL READING (KG/LBS)	[42]ARM (MM/INCH)		[43]MOMENT (KG.MM/LBS.INCH)	
			LONG.	LAT.	LONG.	LAT.
LHD	AFT					
RHD	AFT					
NOSE	FWD					
TOTAL						

APPENDIX A – ADD THE FOLLOWING ITEM

[44]ITEM	[45]DESCRIPTION OF ITEM	[46]WEIGHT (KG/LBS)	[47]ARM (MM/INCH)		[48]MOMENT (KG.MM/LBS.INCH)	
			LONG.	LAT.	LONG.	LAT.
1.	UNUSABLE FUEL (if applicable)					
TOTAL						

APPENDIX B – SUBSTRACT THE FOLLOWING ITEM

[49]ITEM	[50]DESCRIPTION OF ITEM	[51]WEIGHT (KG/LBS)	[52]ARM (MM/INCH)		[53]MOMENT (KG.MM/LBS.INCH)	
			LONG.	LAT.	LONG.	LONG.
1.	ENGINE OIL (if applicable)					
2.	BRACKET, FWD JACKING (if applicable)					
TOTAL						

CORRECTED CG LOCATION WITH RESPECT TO DATUM LINE

ITEM ADDED AND SUBTRACTED	[54]WEIGHT (KG/LBS)	[55]ARM (MM/INCH)		[56]MOMENT (KG.MM/LBS.INCH)	
		LONG.	LAT.	LONG.	LONG.
AIRCRAFT BASIC WEIGHT					
PLUS – APPENDIX A					
MINUS – APPENDIX B					
CORRECTED BASIC WEIGHT					

REMARKS:

[57]Reason for weighing	:
[58]Weighing condition	:
[59]Hangar doors	:
[60]Main rotor blades	:
[61]Aircraft doors	:
[62]Aircraft attitude	:
[63]Fuel tanks	:
[64]Fluids	:
[65]Rotor Brake	:
[66]Landing Gear	:
[67]Configuration	:

[68]BASIC AIRCRAFT WEIGHING DIMENSIONS [e.g.: as below]

Note 1

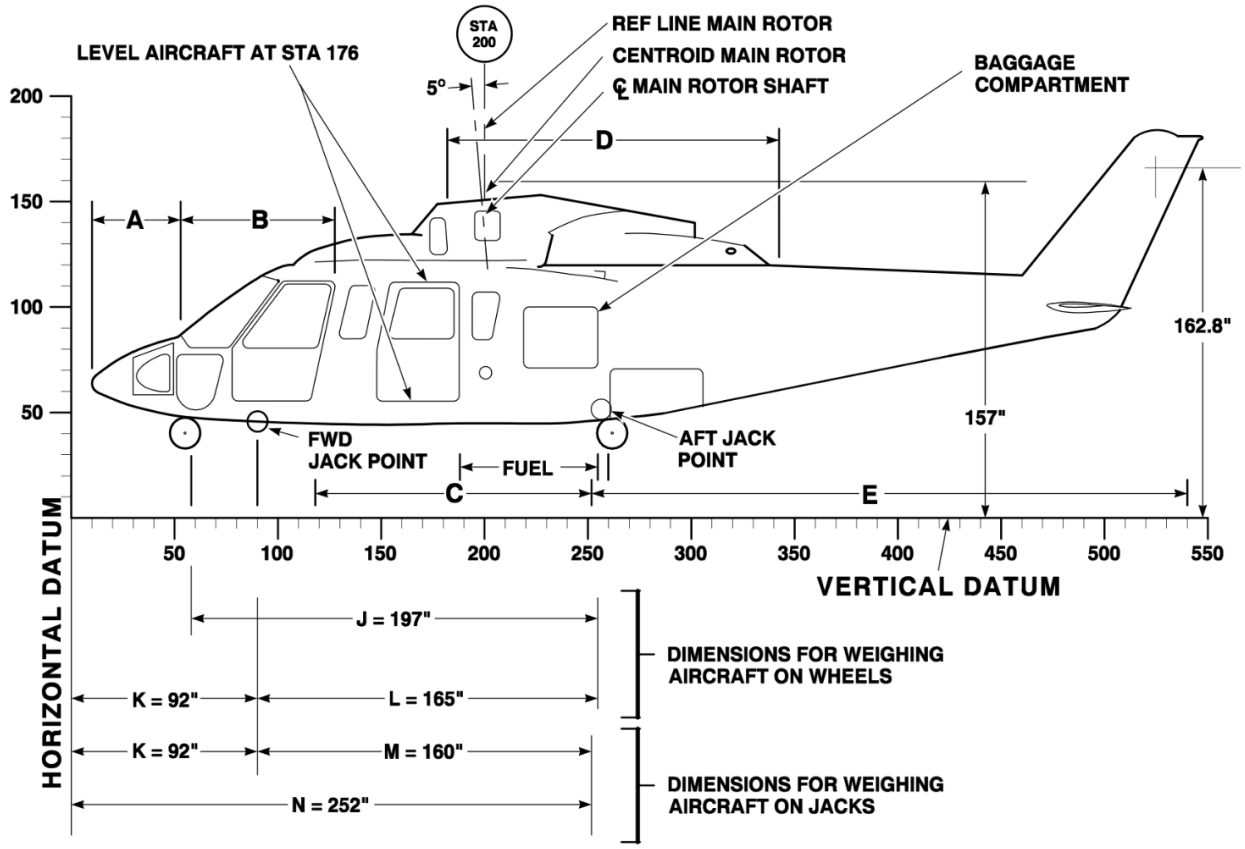
The forward lower Central Cabin is provided by two FWD jack points, only one FWD jack point is assured by using a proper tool which collect both jacking points.

The Station Reference Datum (STA 0) is located 200 inches forward of main rotor centroid. Therefore the STA are positive.

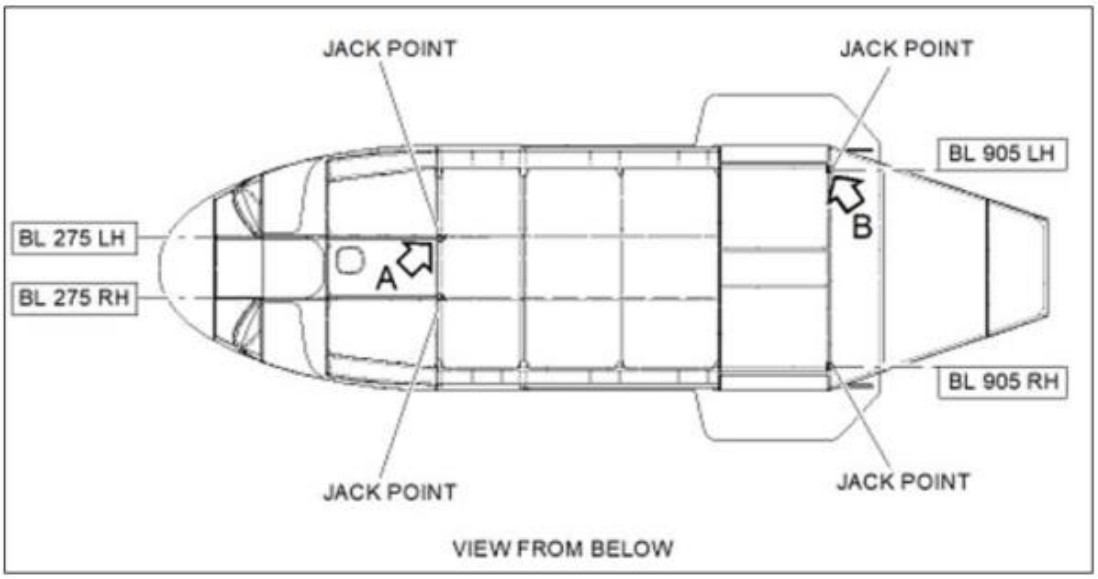
K = Distance from the reference datum (STA 0) to the FWD jackpoint Station of 92.00 inches.
N = Distance from the reference datum (STA 0) to the LH and RH aft jackpoints Station of 252.00 inches.

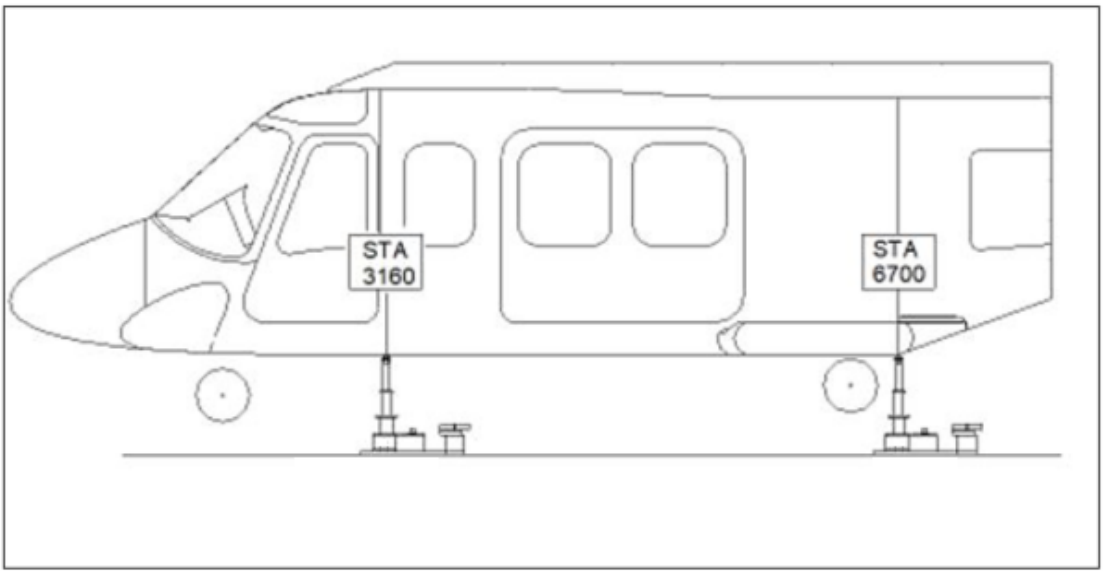
Note 2

The Buttock Line Reference Datum (BL 0) is located on the fuselage Center Line. Therefore the BL are negative on the Left Hand side and positive on the Right Hand side.



[AIRCRAFT & JACK STATION FIGURE]



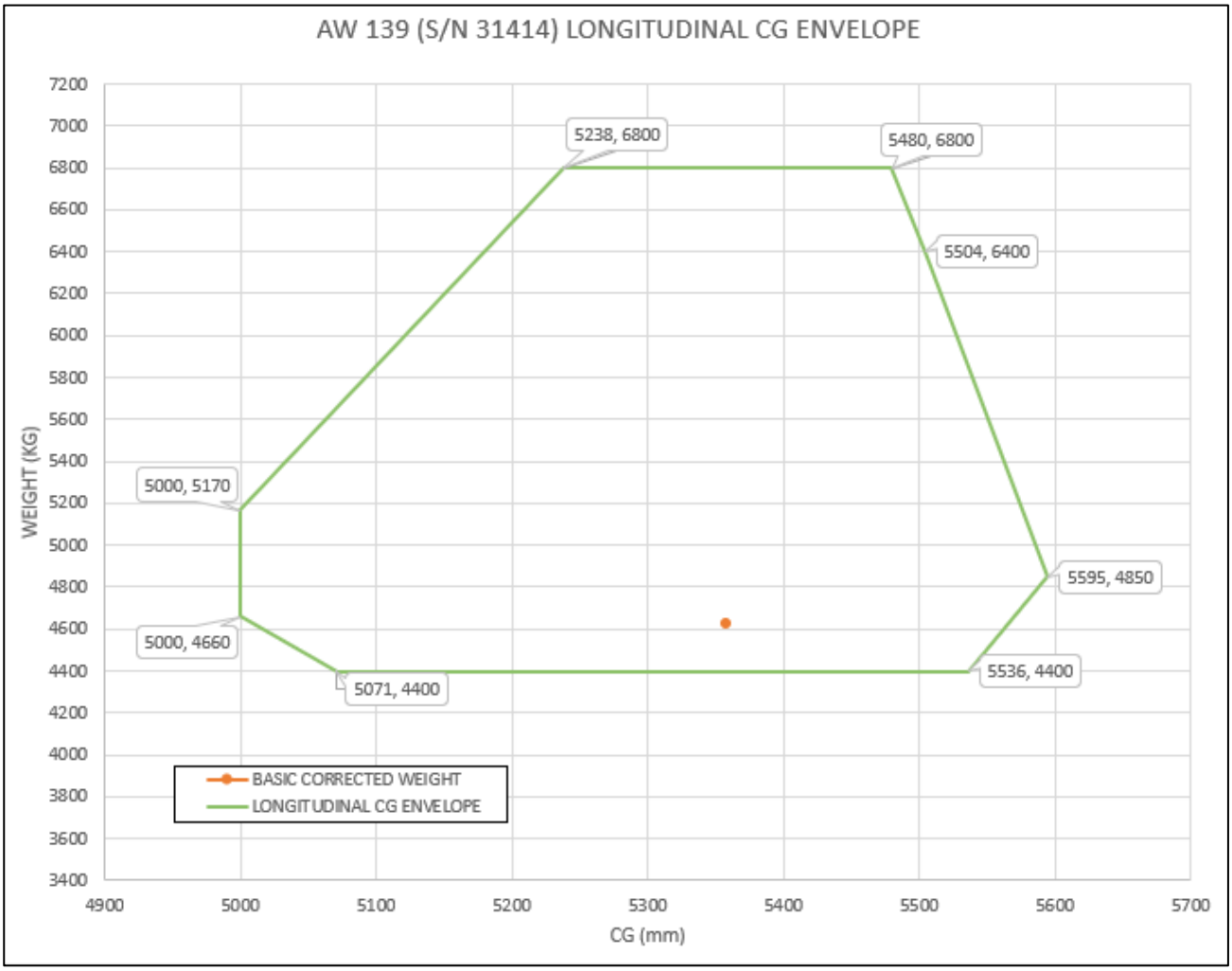


[AIRCRAFT & JACK STATION FIGURE]

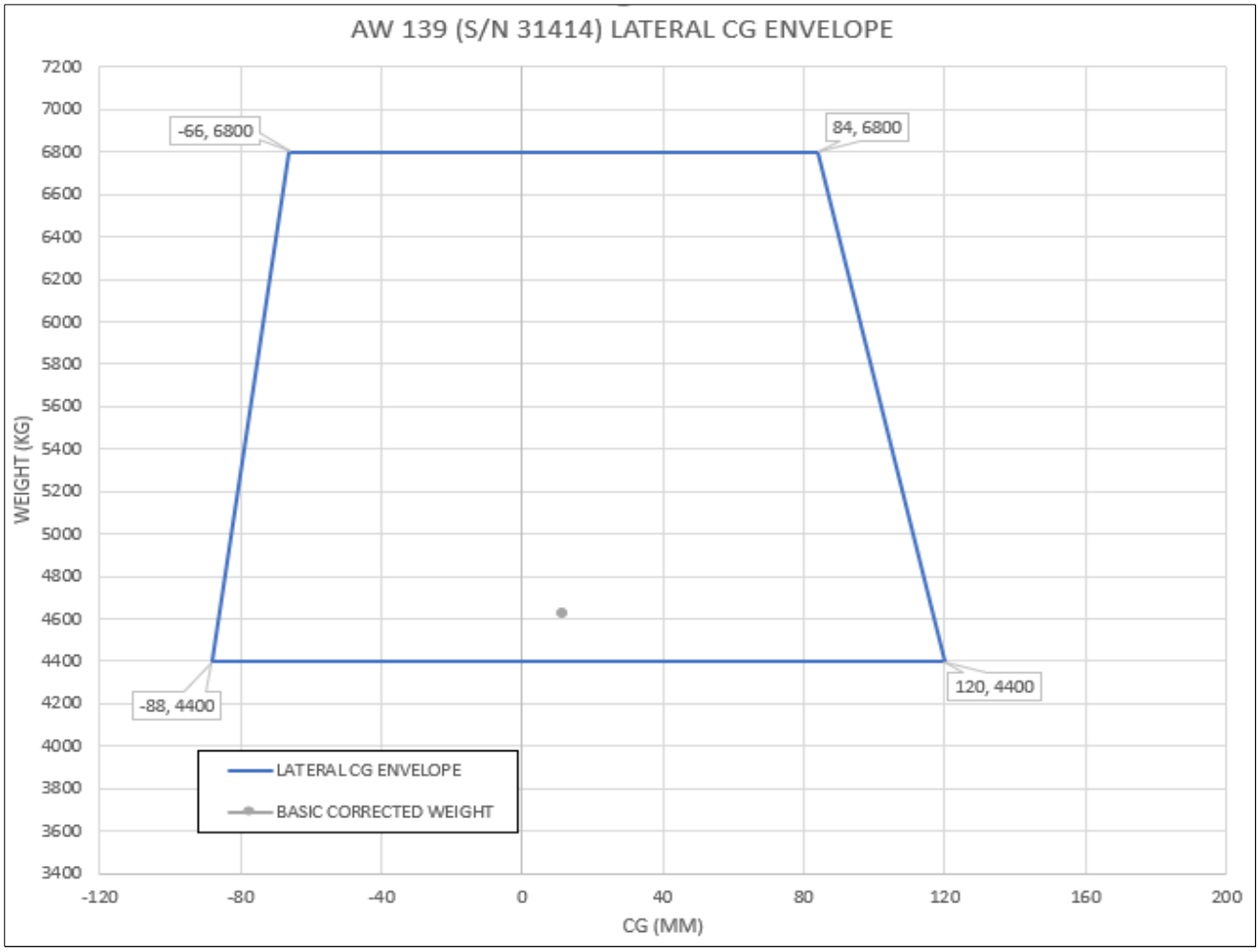
[69]LONGITUDINAL AND LATERAL CG ENVELOPE CHART

(refer A/C approved Flight Manual and result from calculated excel)

E.g.:



[LONGITUDINAL CG ENVELOPE CHART]



[LATERAL CG ENVELOPE CHART]

PART 2B – EQUIPMENT LIST

(refer OEM equipment list or equivalent and physically inspected). E.g.:

[70]NO	[71]EQUIPMENT	[72]QTY	[73]WEIGHT (KG/ LBS)	[74]LONG. ARM (MM/ INCH)
POWER PLANT SYSTEM				
1.				
2.				
TRANSMISSION AND ROTORS				
3.				
4.				
FUEL SYSTEM				
5.				
6.				
HYDRAULIC SYSTEM				
7.				
8.				
UTILITY HYDRAULIC SYSTEM AND LANDING GEAR				
9.				
10.				
ELECTRICAL SYSTEM				
11.				
12.				
INSTRUMENTS				
13.				
14.				
AVIONIC SYSTEM – RIGHT NOSE EQUIPMENT				
15				
16				
17.				
AVIONIC SYSTEM – LEFT NOSE EQUIPMENT				
18.				
19.				
AVIONIC SYSTEM – NOSE ANTENNAS INSTALLATION				
20.				

21.				
[70]NO	**[71]EQUIPMENT**	**[72]QTY**	**[73]WEIGHT (KG/ LBS)**	**[74]LONG. ARM (MM/ INCH)**
AVIONIC SYSTEM – UPPER DECK ANTENNAS				
22.				
23.				
AVIONIC SYSTEM – FUSELAGE ANTENNAS				
24.				
25.				
AVIONIC SYSTEM – REAR SECTION				
26.				
27.				
AVIONIC SYSTEM – TAIL EQUIPMENT				
28.				
29.				
AVIONIC SYSTEM – TAIL ANTENNAS				
30.				
31.				
MISCELLANEOUS EQUIPMENT				
32.				
33.				
AUXILIARY EQUIPMENT – MISCELLANEOUS/VIBRATION ATTENUATION				
34.				
35.				
AUXILIARY EQUIPMENT – AIR VENTILATION, HEATING, CONDITIONING				
36.				
37.				
38.				
AUXILIARY EQUIPMENT – AUTOPILOT				
39.				
40.				
AUXILIARY EQUIPMENT – COMMUNICATIONS				
41.				

42.				
[70]NO	**[71]EQUIPMENT**	**[72]QTY**	**[73]WEIGHT (KG/ LBS)**	**[74]LONG. ARM (MM/ INCH)**
AUXILIARY EQUIPMENT – EQUIPMENT/FURNISHINGS				
43.				
44.				
AUXILIARY EQUIPMENT – FUEL				
45.				
46.				
AUXILIARY EQUIPMENT – RAIN PROTECTION				
47.				
48.				
AUXILIARY EQUIPMENT – INDICATING/RECORDING				
49.				
50.				
AUXILIARY EQUIPMENT – LIGHTS				
51.				
52.				
AUXILIARY EQUIPMENT – NAVIGATION				
53.				
54.				
AUXILIARY EQUIPMENT – DOORS, FOOTSTEPS				
55.				
56.				
AUXILIARY EQUIPMENT – FUSELAGE STRUCTURE				
57.				
58.				
AUXILIARY EQUIPMENT – WINDOWS				
59.				
60.				
AUXILIARY EQUIPMENT – MAIN ROTOR DRIVE				

61.				
[70]NO	**[71]EQUIPMENT**	**[72]QTY**	**[73]WEIGHT (KG/ LBS)**	**[74]LONG. ARM (MM/ INCH)**
62.				
AUXILIARY EQUIPMENT – CREW ESCAPE AND SAFETY				
63.				
64.				
AUXILIARY EQUIPMENT – IMAGES RECORDING				
65.				
66.				
AUXILIARY EQUIPMENT – STRUCTURAL				
67.				
68.				
OTHERS				
69.				
70.				

NOTE

1. CAAM APPROVAL REFERENCE NUMBER: CAMO/2016/03

2. This WR and Equipment List were prepared on _____ and supersedes all previous issues.

[75]Prepared by:	(Name, Signature)	Date:	
[76]Checked by:	(Name, Signature)	Date:	
[77]Approved by:	(Name , Signature, Approval Stamp)	Date:	

APPENDIX – AIRCRAFT BASIC MASS AND BALANCE RECORD

(CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING MASS AND BALANCE)

[1]AIRCRAFT TYPE		[12]SERIAL NUMBER							[10]REGISTRATION			
[78]DATE	[79]DESCRIPTION OF ARTICLE OR MODIFICATION		WEIGHT CHANGE						[82]RUNNING TOTAL BASIC AIRCRAFT			[83]SIGN & STAMP
			[80]ADDED (+)			[81]REMOVED (-)						
			WEIGHT (KG/LBS)	ARM (MM/INCH)	MOMENT (KG.MM / LBS.INCH)	WEIGHT (KG/LBS)	ARM (MM/INCH)	MOMENT (KG.MM / LBS.INCH)	*WEIGHT (KG/LBS)	ARM (MM/ INCH)	MOMENT (KG.MM / LBS.INCH)	
		LONGITUDINAL										
		LATERAL										
		LONGITUDINAL										
		LATERAL										
		LONGITUDINAL										
		LATERAL										
		LONGITUDINAL										
		LATERAL										

*** The aircraft weight has been calculated based on the last aircraft weighing, and the known mass and CG changes**

NO	ITEM	INSTRUCTIONS
1	Aircraft Type	Indicate the type of the aircraft
2	Document no	Document reference no is in the format: GAM/MBR/XX/YY/ZZZZ, where; XX denotes year of perform weighing, YY denotes running number of the year and, ZZZ denotes the aircraft registration number without nationality prefix (9M).
3	Rev. No.	Indicate revision number for each document
4	Rev. Date / Date	Indicate the revision date for each document. The Rev Date is DD/MM/YYYY where; DD denotes day, MM denotes month and, YYYY denotes year.
5	Affected Page(s)	State the affected pages of the MBR revision
6	Description of Revision	State the details of the revision
SECTION 1 – MASS AND CENTRE OF GRAVITY SCHEDULE (MCGS)		
7	Aircraft Type / Model	State the type and model of the aircraft
8	Nationality	State the nationality of the aircraft
9	Registration number	State the registration number of the aircraft
10	Aircraft manufacturer/constructor	State the manufacturer of the aircraft
11	Aircraft serial number	State the serial number(S/N) of the aircraft
12	Weight limitations – maximum authorised weight in flight	State weight limitations of the aircraft as per TCDS
13	Centre of Gravity Limitations	State the centre of gravity limitations of the aircraft. Refer figure/table in aircraft approved Flight Manual
14	Datum References	State the datum references for the aircraft. Refer figure/table in aircraft approved Flight Manual.
PART A – BASIC WEIGHT		
15	The Basic Weight of the aircraft as calculated in Section 2 is	State the corrected basic weight of the aircraft as calculated.

NO	ITEM	INSTRUCTIONS
16	The aircraft was weighed on (date)	State the date aircraft was weighed on with format DD.MM.YYYY, where; DD denotes day, MM denotes month and, YYYY denotes year.
17	The C.G of the aircraft in the same condition at this weight is	State the longitudinal and lateral arm for the C.G as calculated in Section 2.
18	The total moment about the datum in this condition is	State the longitudinal and lateral moment as calculated in Section 2.
PART B – VARIABLE LOAD (Only approved configuration can be include in evidence e.g. Statement of compliance (SOC) and declaration compliance (DC)		
19	Item	State the item no in sequence.
20	Description	State the description of the variable load (pilot / co-pilot)
21	Weight	State the actual weight of the variable load.
22	Arm	State the longitudinal and lateral arm of the variable load.
PART C – LOADING INFORMATION (DISPOSABLE LOAD)		
23	Item	State the item no in sequence.
24	Miscellaneous Loading Data	State the disposable load. Refer data in aircraft approved flight manual.
25	Arm	State the longitudinal and lateral arm of the disposable load.
26	Maximum Weight	State the maximum weight of the disposable load. Refer data in aircraft approved flight manual.
27	Prepared by	State the name and endorsed with signature and date for personnel that prepare Section 1 – MCGS.
28	Checked by	State the name and endorsed with signature and date for personnel that checked the Section 1 – MCGS.
29	Approved by	State the name and endorsed with signature, approval stamp and date for Weighing Engineer that certifies Section 1 – MCGS.
SECTION 2 – MASS AND BALANCE RECORD		

NO	ITEM	INSTRUCTIONS
PART 2A – WEIGHING RECOR (WR)		
30	Date	State the date aircraft was weighed on with format DD.MM.YYYY, where; DD denotes day, MM denotes month and, YYYY denotes year.
31	Location	State the location of the weighing activity
32	Equipment	State the equipment used for weighing
33	Model / Part number	State the weighing equipment model / part number
34	Serial number	State the weighing equipment serial number
35	Calibration due date	State the calibration due date of the weighing equipment
36	Measurement	State the location of the reference datum and the distance from datum point to the jacking points. Refer data in the aircraft approved Flight Manual
37	Cell reading	State the cell reading obtained at aircraft weighing
38	Zero Rtn	State the cell reading when all load sensors are clear of the aircraft (zero return).
39	Calibration	State the compensate value to achieve ‘0’ reading in case reading obtain in 38 is not 0.
40	Actual Weight	State the corrected weight after calibration.
41	Average Cell Reading	State the average cell reading and total average aircraft weight
42	Arm	State the longitudinal and lateral arm for each jack point in mm/inch.
43	Moment	Calculate and state the longitudinal and lateral moment for each jack point.
44	Item	State the item no. in sequence
45	Description of Item	State the details of the item to be added.
46	Weight	State the weight of the added item
47	Arm	State the longitudinal and lateral arm for each added item.
48	Moment	Calculate and state the longitudinal and lateral moment for each added item.

NO	ITEM	INSTRUCTIONS
49	Item	State the item no. in sequence
50	Description of Item	State the details of the item to be subtracted
51	Weight	State the weight of the subtracted item
52	Arm	State the longitudinal and lateral arm for each subtracted item.
53	Moment	Calculate and state the longitudinal and lateral moment for each subtracted item.
54	Weight	State the weight accordingly and calculate the corrected basic weight
55	Arm	State the longitudinal and lateral arm accordingly and calculate the corrected C.G.
56	Moment	State the moment accordingly and calculate the corrected moment of the datum.
57	Reason for weighing	State the reason for the aircraft to be weighing
58	Weighing condition	State the condition of the weighing performed for example inside hangar, etc.
59	Hangar doors	State the condition of the hangar doors during aircraft weighing.
60	Main rotor blades	State the condition of the main rotor blade during aircraft weighing as per stated in approved manual (ex: must be aligned with the tail boom)
61	Aircraft doors	State the condition of the aircraft doors during aircraft weighing.
62	Aircraft attitude	State the position or level of the aircraft longitudinal and lateral
63	Fuel tanks	State the condition of fuel tank, either fully drained or fully fuelled/ others.
64	Fluids	State the fluid condition of the aircraft or refer type certificate data sheet
65	Rotor brake	State the rotor brake condition during aircraft weighing (engaged or disengaged)
66	Landing Gear	State the landing gear position (retracted or extended) to which the derived CG position is related.
67	Configuration	State the seat configuration of the aircraft during aircraft weighing

NO	ITEM	INSTRUCTIONS
68	Basic Aircraft Weighing Dimensions	Define the aircraft weighing dimensions (aircraft station, jacking station etc.) as defined in the maintenance manual. Refer example above in the section of this instruction form.
69	Longitudinal and Lateral CG envelope Chart	Define the longitudinal and lateral CG envelope chart for the aircraft as per the flight manual and the calculated CG. Refer example above in the section of this instruction form.
PART 2B – EQUIPMENT LIST		
70	No.	State the item no. in sequence.
71	Equipment	State the description of the equipment installed on aircraft during aircraft weighing.
72	Qty	State the number of quantities of the equipment installed on aircraft during aircraft weighing.
73	Weight	State the weight of the equipment installed on aircraft
74	Long. Arm	State the longitudinal arm of the equipment installed on aircraft.
75	Prepared by	State the name and endorsed with signature and date for personnel that prepare Section 2 – Mass and Balance Record.
76	Checked by	State the name and endorsed with signature and date for personnel that checked the Section 2 – Mass and Balance Record.
77	Approved by	State the name and endorsed with signature, approval stamp and date for Weighing Engineer that certifies Section 2 – Mass and Balance Record.
APPENDIX – AIRCRAFT BASIC MASS AND BALANCE RECORD		
78	Date	State the date of the aircraft weighing or date of modification embodiment for calculated mass and CG changes.
79	Description of Article or Modification	State the description of the mass and balance changes activities.
80	Added (+)	Fill in the details of the added weight, arm and moment.

NO	ITEM	INSTRUCTIONS
81	Removed (-)	Fill in the details of the removed weight, arm and moment.
82	Running Total Basic Aircraft	Calculate and state the running total basic aircraft weight, arm, and moment. Note: The aircraft weight has been calculated based on the last aircraft weighing, and the known mass and CG changes.
83	Sign & Stamp	WE shall certify by signing and stamped on the column for the mass and CG changes.