Your Ref. :

Our Ref. : CAAM/AW/CAMO/2016/03

Date : 10 March 2022

Galaxy Aerospace (M) Sdn. Bhd.
Suite 11-14, Helicopter Centre,
Malaysia International Aerospace Centre,
Sultan Abdul Aziz Shah Airport (MIAC),
47200 Subang, Selangor

Attn: Pn. Zaty Nadhira Binti Mohamed Zuhari
Continuing Airworthiness Management Manger

Dear Madam,

APPROVAL OF MASS AND BALANCE PROGRAMME ISSUE 1 REVISION 3

With reference to your application letter ref. GAM/CAMO/CAAM-MBP/22-214(030)/OA dated 1 March 2022, kindly be advised that your organisation's **Mass and Balance Programme Ref. GAM/CAAM/MBP Issue 1 Revision 3 dated 1 March 2022** is found satisfactory and hereby approved.

The organisation shall conduct an internal training to personnel with regards to changes in the new mass and balance policies and procedures.

Kindly find the enclosed document for your retention:

i) CAAM Approved LEP (page 1 of 1).

Thank You.

"BERKHIDMAT UNTUK NEGARA"

Yours faithfully,

(IDEASRUL BIN AB GHANI)
AIRWORTHINESS DIVISION
for Civil Aviation Authority of Malaysia

MASS AND BALANCE PROGRAMME (MBP)

Organisation	:	GALAXY AEROSPACE (M) SDN. BHD.
CAMO Approval No	:	CAMO/2016/03
Address	:	Suite 11-14, Helicopter Centre, Malaysia International Aerospace Centre (MIAC), Sultan Abdul Aziz Shah Airport, 47200 Subang, Selangor Darul Ehsan
Tel No	:	+603 7734 7226
Fax No	:	+603 7734 7526
MBP Reference No	:	GAM/CAAM/MBP
Issue Number	:	Issue 1
Revision Number	:	Revision 3
Date of Issue	:	04th August 2021
Date of Revision	:	01st March 2022
Copy Number	:	GAM/MBP/MASTER
Copy Holder	:	Technical Library GAM-CAMO

I. List of Effective Pages

MBP Chapter	No of Pages	Issue No.	Revision	Date
I. LIST OF EFFECTIVE PAGES	1	1	3	01/03/2022
II. AMENDMENT RECORD	1	1	3	01/03/2022
III. DISTRIBUTION LIST	1	1	0	04/08/2021
IV. CONTENT	2	1	2	19/11/2021
V. BINDING STATEMENT	1	1	0	04/08/2021
0.0	9	1	2	19/11/2021
1.0	10	1	1	07/09/2021
2.0	8	1	3	01/03/2022
3.0	2	1	0	04/08/2021
4.0	4	1	2	19/11/2021
5.0	3	1	3	01/03/2022

The revised MBP had been internally reviewed for submission to CAAM for final approval		Approved By:
Prepared By:	Verified By:	
Continuing Airworthiness Management Manager	Quality Assurance Manager	Civil Aviation Authority of Malaysia
ZATY NADHIRA BINTI MOHAMED ZUHARI Continuing Airworthiness Management Manager Galaxy Aerospace (M) Sdn Bhd (1040262-D)	OMAR BIN AHMAD Quality Assurance Manager Galaxy Aerospace (M) Sdn. Bhd (1040262-D)	IDEASRUL BIN AB GHANI Senior Assistant Director of Airworthiness Airworthiness Division Civil Aviation Authority of Malaysia (CAAM)
Date: 01-MAR-2022	Date: 01-MAR-2022	Date: 10/03/22

II. Amendment Record

ISSUE NO.	REVISION NO.	REVISION DATE	REASONS FOR CHANGE
1	0	04/08/2021	Introduction of Mass and Balance Programme
1	1	07/09/2021	1. Chapter 0.8 a. Update on Definitions 2. Chapter 1.8 a. Additional on Variation Requirement 3. Appendices a. Update on the Mass and Balance Approval list
1	2	19/11/2021	1. Chapter 0.0 a. Update para. 0.4.i on notification to CAAM prior such changes to MBP take place and include notification requirement for changes of the contracted CAMO/AMO. b. Include para. 0.4.j. for risk assessment process for changes to the MBP. c. Update para. 0.5.i control form number format GAM/CAMO-038 to GAM/C-038. 2. Chapter 4.0 a. Update para. 4.1.i control form number format GAM/CAMO-037 to GAM/C-037. 3. Chapter 5.0 a. Amend title Chapter Appendices to Chapter 5.0. b. Update 5.1 Appendix A and 5.2 Appendix B.
1	3	01/03/2022	1. Chapter 2.0 a. Update para. 2.2 Mass and Balance Process Flowchart (General) on the responsibility of preparing the MBR and MCGS report may either be by WE or by appropriate CAMO personnel. b. Update para. 2.2 Mass and Balance Process Flowchart (General) on the change phrase “issue” to “certify” on MBR and MCGS report by Weighing Engineer. 2. Chapter 5.0 a. Update Appendix A on the list of mass and balance approval for Weighing Engineer.

III. Distribution List

a. This Mass and Balance Programme (MBP) and any subsequent revision are distributed according to recipients. Controlled copy holders will receive future revisions and issues. Holder of the controlled copy will ensure that the copy is maintained up to date and is made available to the concerned staff/manager/executive of the department as and when required.

COPY NUMBER	HOLDER	FORMAT
GAM/MBP/MASTER	Technical Library GAM-CAMO	Hardcopy
GAM/MBP/01	Civil Aviation Authority of Malaysia	Hardcopy
GAM/MBP/02	Galaxy Aerospace Management System Portal	Softcopy

b. Each holder of MBP is personally responsible for the insertion of all revisions. All responsible persons shall have a thorough knowledge with the MBP.

c. Copies are issued to any other agency other than reflected in distribution list or any personnel are considered as un-controlled. These manuals shall be current issue and revision. Un-controlled copy holder will not receive future revisions.

d. The Continuing Airworthiness Management Organisation (CAMO) shall advise all necessary personnel, the Civil Aviation Authority of Malaysia (CAAM) and all other relevant persons according to the distribution list of any changes to the MBP, procedures and forms via email and subsequently upload into the intranet within three working days.

IV. Contents

V. Binding Statement

GALAXY AEROSPACE (M) SDN BHD

MASS AND BALANCE PROGRAMME

This programme defines the organisation and procedures upon which the CAAM approval of **GALAXY AEROSPACE (M) SDN BHD – MASS AND BALANCE PROGRAMME** (MBP) under CAAM Part M is based.

These programmes are by the undersigned and must be complied with to ensure that all the continuing airworthiness activities including weighing activities for aircraft managed by Galaxy Aerospace (M) Sdn. Bhd. is carried out on time and to an approved standard. These programmes shall be reviewed and updated as required.

The programme shall be established in compliance with the requirement issued by the CAAM and the requirements for mass and balance control. The requirement for mass and balance control issued by the holder of the type-certificate and supplemental type-certificate and included in the document containing mass and balance data with acceptable method, technique and practices.

It is accepted that these programmes do not override the necessity of complying with any new or amended regulation published by the CAAM from time to time where these new or amended regulation conflict with these programmes.

It is understood that the CAAM will approve these programmes and any subsequent amendments whilst the CAAM is satisfied that the programme is being followed. It is further understood that the CAAM reserves the right to suspend, vary or revoke the mass and balance programme approval of the organisation, as applicable, if the CAAM has evidence that procedures are not followed, and the standards are not upheld.

I hereby confirm that the organisation will be given the necessary means to follow the rules and procedures established within these publications and that all charges are paid, as prescribed by the CAAM in respect of approved Part M and Mass and Balance Programme approval or contracts and procedures between GAM-GAMO and the contracted operator.

Dato' Shamsul Kamar Samsudin
Accountable Manager
GALAXY AEROSPACE (M) SDN. BHD. (1040262-D)
Date:

0.0 Introduction

0.1 Preamble

a. According to Civil Aviation Regulation 2016, Regulation 43, an applicant for a certificate of airworthiness or permit to fly of an aircraft shall subject the aircraft to be weighed and the position of its centre of gravity (CG) to be determined at such time and in the manner as the Chief Executive Officer may require for that aircraft.

b. When the aircraft is weighed, the applicant shall prepare a weight schedule within such time and in the manner as may be determined by the Chief Executive Officer showing—

   i. either the basic weight or such other weight as may be approved by the Chief Executive Officer for that aircraft; and
   ii. either the position of the CG of the aircraft at its basic weight or such other position of the CG as may be approved by the Chief Executive Officer for that aircraft.

0.2 Basis of approval

a. This programme forms the basis for Mass and Balance approval of GAM and shows the necessary procedures for mass and balance activities (weighing personnel, equipment, location, procedures, report writing) in accordance with CAAM Civil Aviation Directive.

0.3 Mass and Balance Approval

a. CAAM granted approval to GAM after duly examining that Mass and Balance Programme (MBP) and organisation of the applicant is in accordance with CAAM CAD 6805- Mass And Balance Programme.

0.4 Mass and Balance Programme Management

a. Proposal for changes to the MBP shall be submitted to the Continuing Airworthiness Management Manager (CAMM) by CAMO staff via Management of Change (MOC) (form GAM/QA-011).

b. CAMM shall review and decides in conjunction with the QAM if the changes shall be implemented.

c. Any proposed changes to the programme shall be submitted by CAMM to the CAAM for approval prior to their incorporation in the MBP. In any event, changes may require complying with the latest regulation.

d. All changes shall be issued with Issue No. X and revision No. Y, where X is the issue number and Y is the latest revision number. The new issue number will be reissued if the changes is more than 75% changes to the MBP.

e. The MBP shall be subject to periodic reviews (not exceeding one year), by the CAMO and amended accordingly.

f. Revisions shall always be done wholly by chapter. Incorporation of changes must be confirmed in the Amendment Record.

g. Amended text passages must be highlighted and marked with a vertical line at the left side of the page. The revision number and the date must be changed

h. The revision pages must be distributed to the recipients according to the distribution list.

i. The following significant changes shall be notified to CAAM in writing before such changes take place:

   i. Changes of certifying staff (WE)

   ii. Change of the nominated post holder (AM, QAM and CAMM)

   iii. Change of facilities which could affect the approval.

   iv. Change of the terms of approval

   v. Changes of the contracted CAMO/AMO.

j. Risk assessment on the above changes shall be conducted and provide to CAAM upon request.

0.5 Documentation

a. The MBP defines procedures and refers to existing procedures by a reference number.

b. The GAM Documentation Management System for Mass and Balance approval shall be divided into three hierarchical levels:

   i. Level 1 - POLICY (GAM/CAAM/MBP)

   ii. Level 2 - PROCEDURES

   iii. Level 3 - FORMS

c. Policy is a document, describing general principles and rules concerning the organisation.

d. Procedures are documents defining general functioning rules and detailed operational documents coherent with level 1.

e. Level 3 documents are forms with standard format or template which will be used to document all weighing related work.

f. All mass and balance document level shall be filed and made accessible to the GAM CAMO via electronic copy.

g. All mass and balance document level shall be controlled and managed by CAMO. Proposed amendments to these documents shall be submitted to the CAMM for review and approval via MOC.

h. Revisions to Level 2 and Level 3 documents shall be done document wise, the document(s) affected by MOC must be entirely replaced. Amended text passages must be marked with a vertical line at the left side of the page.

i. All mass and balance document level are controlled by Mass and Balance master list (GAM/C-038).

0.6 Abbreviations

A/C	Aircraft
AFM	Aircraft Flight Manual
AG	Airworthiness Guidance
AM	Accountable Manager
AMO	Approved Maintenance Organisation
AN	Airworthiness Notice
AO	Aircraft's Operator
BCAR	British Civil Aviation Requirement
CAA	Civil Aviation Authority
CAAIP	Civil Aircraft Airworthiness Information and Procedures
CAAM	Civil Aviation Authority of Malaysia
CAD	Civil Aviation Directive
CAGM	Civil Aviation Guidance Material
CAMO	Continuing Airworthiness Management Organisation
CAAM	Continuing Aviation Authority of Malaysia
CG	Centre of Gravity
C of A	Certificate of Airworthiness
CAMM	Continuing Airworthiness Management Manager
CAME	Continuing Airworthiness Management Exposition
CAMP	Continuing Airworthiness Management Procedures
CAMS	Continuing Airworthiness Management System
CRS	Certificate Release to Service
EASA	European Aviation Safety Agency
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
GAM	GALAXY AEROSPACE (M) SDN. BHD.
LAE	Licensed Aircraft Engineer
MBP	Mass and Balance Programme

MBR	Mass and Balance Report
MCAR	Malaysian Civil Aviation Regulation
MCGS	Mass and Centre of Gravity Schedule
MM	Maintenance Manual
MOC	Management of Change
MOE	Maintenance Organisation Exposition
OEM	Original Equipment Manufacturer
OJT	On Job Training
QA	Quality Assurance
QAM	Quality Assurance Manager
QAN	Quality Assurance Notice
PTF	Permit to Fly
TC	Type Certificate
TS	Technical Services
WE	Weighing Engineer

0.7 Reference Documents

1. Aircraft Scales: Doc. No. 561-281-6179	Wireless Weighing Instructions
2. British Civil Aviation Requirement	Sub-Section A5, Chapter A5-4 Weight and Balance of Aircraft. Sub-Section A6, Chapter A6-4 Weight and Balance of Aircraft. Sub-Section A7, Chapter A7-10 Weight and Balance Report.
3. CAP 562 CAAIP	Airworthiness Procedures Leaflet 1-4 'Weight and Balance of Aircraft.
4. Civil Aviation Regulations 2016	CAR 2016 Regulation 43, Regulation 26, Regulation 30, Regulation 33, Regulation 162, Regulation 163, Regulation 189.
5. Civil Aviation Directive-6805 (CAD 6805)	Aircraft Mass and Balance Programme
6. Civil Aviation Guidance Material- 6805 (CAGM 6805)	Aircraft Mass and Balance Programme
7. FAA AC 43.13-1B, Chapter 10:	Weight and Balance
8. Flight Operations Directive FOD No.: 60CA-16	Section 3: Mass and Balance
9. GAM/CAAM/CAME	GAM Continuing Airworthiness Management Exposition
10. GAM/CAAM/MOE	GAM Maintenance Organisation Exposition
11. QAN 001	Management of Change
12. GAM QPM 2.7	GAM Quality Procedure Manual

0.8 Definition

a. **AFM:**

The aircraft flight manual, rotorcraft flight manual or pilot's operating handbook;

b. **Aircraft:**

Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface;

c. **Aircraft Maintenance Organisation (AMO):**

A maintenance organisation approved in accordance with CAD 8601 or CAD 8602.

d. **Basic Weight:**

Basic Weight is the weight of the aircraft and all its basic equipment, plus that of the declared quantity of unusable fuel and unusable oil

e. **Basic Equipment:**

"Basic Equipment" means the unconsumable fluids (e.g. coolant and hydraulic fluid) and equipment which is common to all roles for which the operator intends to use the aircraft.

f. **Basic Equipment List:**

Basic Equipment List means the list of basic equipment included in the empty mass.

g. **Continuing Airworthiness Management Organisation (CAMO):**

An organisation that is approved under MCAR to manage continuing airworthiness of the aircraft.

h. **Crew:**

Person identified as flight crew, cabin crew or other crew as per operational requirements;

i. **Disposable Load:**

Disposable load means the mass of all persons and items of load, including fuel and other consumable fluids, carried in the aircraft, other than the Basic Equipment and variable load.

j. **Empty Mass:**

"Empty mass" means the mass of the aircraft and all its Basic Equipment, plus that of the declared quantity of unusable fuel and unusable oil.

k. **Mass and Balance Package:**

A set of weighing related documents consisting of the existing approved aircraft Mass and Balance Report, the new approved MBR and MCGS and a copy of work sheet on which the aircraft weighing is certified by LAE.

l. **Mass and Balance Report (MBR) and Mass and Centre Of Gravity Schedule (MCGS) Report:**

Mass and Balance Report and Mass and Centre of Gravity schedule report is the report which consists of Mass and Centre of Gravity Schedule (MCGS), Mass and Balance Report (MBR), Equipment List and Aircraft Basic Mass and Balance Record.

i. MCGS - It presents the current empty mass, the variable loads and the disposable loads for which the operator intends to use the aircraft for.
ii. MBR - It presents the derivation of the Empty mass and corresponding the CG from the most recent aircraft weighing results and related calculations.
iii. Equipment List- It shows the mass and lever arm of each item fitted on the aircraft during weighing.
iv. Aircraft Basic Mass and Balance Record- It presents current, and continuous record of the mass and CG of each aircraft. Modifications, repairs or other changes affecting either the mass and/or CG of the aircraft is recorded in this section.

m. **MBR and MCGS Signatory:**

MBR and MCGS signatory means a person suitably qualified and acceptable to CAAM to certify the report who is approved by the CAMO.

n. **Operator:**

A person, organisation or enterprise engaged in or offering to engage in an aircraft operation;

o. **Variable Load:**

Variable Load is the weight of the crew, of items such as the crew's baggage, removable units, and other equipment, the carriage of which depends upon the role for which the operator intends to use the aircraft for the particular flight.

p. **Weighing Engineer (WE)**

Weighing Engineer is an MBR and MCGS signatory, a person suitably qualified and acceptable to CAAM to certify the MBR and MCGS report who is approved by the CAMO. These personnel are authorised to supervise during aircraft weighing activity and to certify the MBR and MCGS report according to their personnel approval certificate issued by QA Department.

q. **Weight:**

"Weight" means a quantity to mean mass (i.e. the SI unit is kilogram).

r. **Third Party:**

An organization that engaged GAM for their Mass and Balance activities

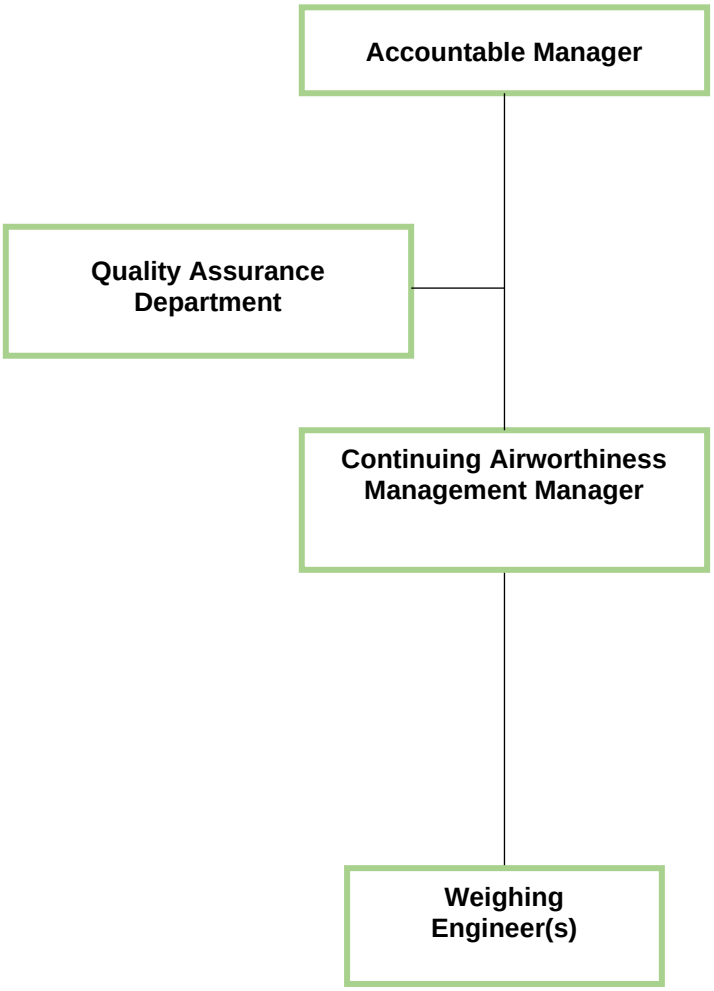
1.0 Organisation

1.1 Applicant

GALAXY AEROSPACE (M) SDN. BHD., (1040262-D)
Suite 11-4, Helicopter Centre,
Malaysia International Aerospace Centre,
Sultan Abdul Aziz Shah Airport,
47200 Subang,
Selangor Darul Ehsan, Malaysia.

Tel : +603 7734 7226
Fax : +603 7734 7526

a. Organisation Chart



1.2 Location and Facilities

a. An aircraft shall only be weighed at CAAM approved maintenance facility subject to authorisation by QA through MOC.

1.3 Weighing Equipment

a. WE shall use the weighing equipment as recommended as per AMM or equivalent (Load Cells or Platform Type).

b. WE shall ensure that the weighing equipment used will enable the mass of the aircraft to be established accurately. It shall be properly calibrated, zeroed and used in accordance with manufacturer's instructions.

c. CAMO to ensure the weighing accuracy is considered satisfactory if the accuracy criteria in table are met by the individual scales/cells of the weighing equipment used:

For a scale/load cell	An accuracy of
1) Below 2000kg	±1 %
2) From 2 000 kg to 20 000 kg	±20 kg
3) Above 20 000 kg	±0.1 %

d. List of weighing equipment available in GAM are listed below:

List of Weighing Equipment	Details of Weighing Equipment
1) Electronic Aircraft Weighing Scale	Manufacturer: Intercomp Model: AC125LP-4C Capacity: 11000 lbs/platform Type: Weighing scales
2) Jackson Wireless Weighing Kit	Manufacturer: Jackson Aircraft Weighing Systems, LLC Model: M2400-4-25CS Capacity: 25000 lbs/cell Type: Weighing cells

e. For weighing equipment not listed in table above, follow procedure for the application to perform the aircraft weighing with the new equipment as per MOC QAN 001.

f. Each weighing equipment shall be calibrated either by the manufacturer, or by an appropriately authorised organization within two years or within a time period defined by the manufacturer of the weighing equipment, whichever is less.

1.4 Duties and Responsibilities

a. Continuing Airworthiness Management Organisation (CAMO)

i. Shall be responsible to develop and maintain the aircraft MBP, prepare the aircraft MBP document and manage the mass and balance control of the aircraft in accordance with CAD 6805.

ii. Shall ensure normal precautions are taken by the AMO consistent with good practices.

iii. Shall ensure that the condition of the aircraft (i.e. the equipment and other items of load such as fluids in tanks) is recorded. The equipment installed shall not differ from that included in the declared list of Basic Equipment associated with the Mass and Balance Report (MBR).

iv. Shall ensure any equipment used for weighing shall be properly calibrated to an acceptable standard, zeroed, and used in accordance with the manufacturer's instructions.

v. Shall ensure that the weighing equipment used will enable the mass of the aircraft to be established accurately.

vi. Shall be responsible for developing appropriate weighing instructions for its particular aircraft as may be agreed by the CAAM if the instructions and recommendations of the aircraft TC holder and weighing scale manufacturer is not available.

vii. Shall ensure at least two independent determinations shall be made, and the aircraft longitudinal datum line, unless specified by the aircraft TC holder, shall be horizontal. The load shall be completely removed from the weighing equipment between determinations. The aircraft gross mass as determined by the two measurements shall be consistent. If not, the measurements shall be repeated until the gross mass, as determined by two consecutive and independent measurements, are consistent.

viii. Responsible to conduct oversight on the AMO during weighing activities to ensure mass and balance of the aircraft is established correctly.

ix. Shall ensure that a current MBR and MCGS report is kept with the aircraft.

x. Shall appoint WE to certify the MBR and MCGS report.

b. Continuing Airworthiness Management Manager (CAMM)

i. Liaison with local Airworthiness Authority (CAAM) on matters related to aircraft mass and balance.

ii. CAMM is directly responsible to the Accountable Manager for the duties assigned to him/her.

iii. CAMM is responsible to ensure the satisfactory accomplishment of the mass and balance activities performed in accordance with the CAAM CAD 6805 and GAM Terms of Approval.

iv. CAMM shall ensure that the procedures as specified in the MBP and referenced procedures are maintained and followed.

v. CAMM shall ensure the continued airworthiness support of the mass and balance activities by GAM CAMO.

c. Weighing Engineer (WE)

i. Responsible to supervise during aircraft weighing performed by AMO.

ii. Certify MBR and MCGS report as applicable.

iii. Administer MBR and MCGS report.

iv. To ensure that the weighing equipment used will enable the mass of the aircraft to be established accurately. It shall be properly calibrated, zeroed and used in accordance with manufacturer's instructions.

d. Licensed Aircraft Engineer (LAE)

i. LAE in-charge from AMO shall be responsible to perform the aircraft weighing in accordance with the OEM maintenance data.

ii. Issue appropriate release certification upon the completion of the weighing.

e. Quality Assurance Manager (QAM)

i. QAM shall monitor activities carried out and shall at least include the following functions:

1. Monitoring that all activities carried are being performed in accordance with the approved MBP;

2. Monitoring that all contracted maintenance is carried out in accordance with the contract;

3. Monitoring the continued compliance with the requirements of this MBP; and

4. Monitoring that all subcontracted MBP tasks is carried out in accordance with the contractual obligations.

5. Liaison with local Airworthiness Authority (CAAM) on matters related to aircraft mass and balance.

ii. Responsible to perform an audit in accordance with GAM CAME Part 2 (Quality System) on the

1. Facility – to ensure that the facility is suitable for aircraft weighing to be performed and approved by CAAM.

2. Weighing equipment – to ensure that the weighing equipment is properly calibrated and familiar to the WE who will perform the aircraft weighing.

3. WE– to ensure that the WE are certified to perform the aircraft weighing where he / she has appropriate knowledge, experience, qualification and training.

4. LAE – to ensure that the LAE is certified to perform the aircraft weighing where he/she has appropriate knowledge, experience, qualification and training.

5. Maintenance Data – to ensure the maintenance data (e.g. latest OEM manual, previous approved MBR and MCGS report, etc) which to be referred to for performing the aircraft weighing is updated, current and the latest revision.

iii. Compliance monitoring shall include a feedback system to the CAMM to ensure corrective action as necessary.

f. Aircraft Operator

i. Shall ensure that no flight takes place unless the mass and balance control of the aircraft is performed in accordance with the approved MBP. This also includes when the aircraft is operated under permit to fly requirements when the certificate of airworthiness is ceased to be in force.

ii. By derogation to the *para above*, without prejudice to CAAM's PTF requirements, the operator may operate the aircraft under PTF with appropriate flight conditions in the event of mass and balance control of the aircraft is not performed in accordance with the approved MBP.

1.5 Scope of Work

a. GAM CAMO is approved to perform mass and balance activities to the aircraft type as listed below.

DESCRIPTION	AIRCRAFT TYPE
Perform Aircraft Weighing	1. AIRBUS HELICOPTERS AS365 SERIES 2. AIRBUS HELICOPTERS EC120 3. AIRBUS HELICOPTERS EC135 SERIES 4. AIRBUS HELICOPTERS AS350 SERIES 5. AIRBUS HELICOPTERS EC225 6. AIRBUS HELICOPTERS EC155 7. AIRBUS HELICOPTERS AS355 SERIES 8. AIRBUS HELICOPTERS EC130 9. AGUSTAWESTLAND AW139 10. AGUSTAWESTLAND AW189 11. AGUSTAWESTLAND AW119 12. AGUSTAWESTLAND A109 13. SIKORSKY S76 SERIES 14. ROBINSON R44 15. ROBINSON R66 16. CESSNA C172 17. PILATUS PC6 18. CESSNA 208 CARAVAN 19. BEECHCRAFT KING AIR B300 20. TWIN OTTER DHC-6 21. BELL 429
Prepare and Issue Mass and Balance Report (MBR) and Mass and Centre of Gravity Schedule (MCGS) Report	1. AIRBUS HELICOPTERS AS365 SERIES 2. AIRBUS HELICOPTERS EC120 3. AIRBUS HELICOPTERS EC135 SERIES 4. AIRBUS HELICOPTERS AS350 SERIES 5. AIRBUS HELICOPTERS EC225 6. AIRBUS HELICOPTERS EC155 7. AIRBUS HELICOPTERS AS355 SERIES 8. AIRBUS HELICOPTERS EC130 9. AGUSTAWESTLAND AW139 10. AGUSTAWESTLAND AW189 11. AGUSTAWESTLAND AW119 12. AGUSTAWESTLAND A109 13. SIKORSKY S76 SERIES 14. ROBINSON R44 15. ROBINSON R66 16. CESSNA C172 17. PILATUS PC6 18. CESSNA 208 CARAVAN 19. BEECHCRAFT KING AIR B300

DESCRIPTION	AIRCRAFT TYPE
	20. TWIN OTTER DHC-6 21. BELL 429

b. Limitation:

i. ARS shall not perform any weighing activities on the aircraft which endorsed under his/her scope of approval as ARS as stated in CAME Para 5.2 and Company Approval Certificate issued by QA Department.

c. For details on scope of approval for each GAM WE, refer to individual personnel approval certificate issued by QA Department. The WE is authorised to perform the weighing activities under the authority using GAM approval number given restricted to the privilege as stated in the Appendix A and Appendix B.

1.6 Weighing Interval

a. All aircraft shall be reweighed at intervals not exceeding four (4) years, and at such times as CAAM, the aircraft's TC holder, STC holder, modification approval holder or repair approval holder may require. The empty mass and the corresponding CG position shall be determined and entered in the MBR and MCGS report.

1.7 Weighing Requirement

a. The aircraft shall be weighed/ reweighed at the following occasions:

   i. To determined mass and CG of each aircraft prior to issuance of the C of A

   ii. After a major modification where the new mass and balance cannot be calculated based on mass and balance information in the modification documentation.

   iii. After installation of equipment where the new mass and balance cannot be calculated based on reliable mass information for the installed equipment.

   iv. After repainting of the aircraft.

   v. Not exceed 4 years intervals consecutively.

   vi. When ordered by CAMO, CAAM or operators for other reasons

b. By derogation to the *para 1.7 a. i. above*, an aircraft may not be required to be weighed by the operator prior to the issuance C of A in case of newly manufactured aircraft where the mass and CG has been determined by the manufacturer and recorded.

c. By derogation to the *para 1.7 a. i. above*, in the case of a used aircraft, the aircraft may not be required to be weighed by the operator prior to the issuance C of A aircraft if:

   i. The operator is able demonstrate that the aircraft has been last weighed in accordance to procedures equivalent to the MBP.

   ii. The aircraft is unmodified or only minimally modified (i.e. where it is explicitly specified in the modification data there is no appreciable effect on aircraft mass and balance); and

iii. Any changes to mass computed and recorded in the previous MBR and MCGS report.

1.8 Variation Requirement

a. When there is a need to add new scope of work or change the existing capabilities, the CAMM shall make a request to QAM to initiate the addition or change of capability by raising MOC (GAM/Q-011).

b. The CAMM shall ensure availability of the necessary facilities, tooling and weighing equipment, relevant trained and qualified personnel, provision of technical instructions and manuals and any additional requirements to ensure smooth introduction of the capability.

c. QAM shall evaluate and verify on the following aspects using the Capability Evaluation Checklist (GAM/Q-066).

i. Justification for the proposed change or addition to the existing capabilities through MOC.

ii. Execution of mass and balance activities at CAAM approved maintenance facility subject to QA verification.

iii. Availability of the approved technical manuals/instructions to perform the task.

iv. Adequate tooling and weighing equipment required to perform the task.

v. Availabilty of qualified personnel: WE as an approved signatory (MBR and MCGS Signatory) and LAE with appropriate type rating to perform the mass and balance activities

vi. Additional requirement for mass and balance activities related to third party aircraft is a letter of intention (LOI) and/or written agreement as stated in para 4.2.

d. Once the Mass & Balance Capability Evaluation Checklist (GAM/Q-066) is completed satisfactorily, it signifies that all the necessary tooling, equipment, manuals, facilities and qualified personnel are available and adequate to satisfactorily execute the particular task.

e. When satisfied, QAM shall notify and submit the application to CAAM with the revised MBP for (CAAM) approval on organisation (MBP) variation and/or variation to approved signatory.

f. List of documents to be submitted to CAAM shall include but not limited to:

   i. Organisation (MBP) Variation

      a) Cover Letter

      b) MOC (GAM/Q-011)

      c) Capability Evaluation Checklist (GAM/Q-066)

      d) Revised MBP

   ii. Approved Signatory Variation

      a) Cover Letter

      b) Application for Renewal/Variation of Approved Signatory Approval (CAAM/AW/0105-01) - for application of approved signatory variation

      c) Revised MBP

      d) Weighing Engineer Assessment Checklist (GAM/Q-037A) - for application of approved signatory variation

2.0 Aircraft Weighing Procedures

2.1 General

a. Request shall be submitted to the CAMM via email at least one month prior to actual weighing or any related mass and balance activities.

b. Aircraft weighing shall be performed by AMO in accordance with CAAM CAD 8601 or CAD 8602 as applicable.

c. Aircraft weighing activity shall be supervised by WE to ensure compliance to the requirements of CAAM CAD 6805.

d. Aircraft weighing shall be carried out in accordance with instructions and recommendations of the aircraft TC holder, STC holder and weighing scale manufacturer as applicable.

e. CAMO shall be responsible to coordinate the aircraft weighing activity and raise the worksheet accordingly.

f. For aircraft type, which is not covered under Para 1.5, WE may issue the MBR limited to weighing conversion and/or amendment to the previous approved MBR provided CAAM has granted the concurrence in form of writing.

g. Prior to perform the weighing, WE shall get the details of the aircraft (i.e. empty mass, the corresponding CG position and equipment list) from the previous MBR, details of weighing equipment, and other weighing documents as applicable (i.e. latest revision of AFM, latest revision of OEM manual)

h. Perform aircraft weighing in accordance with process stated in Para 2.4.

i. The WE shall issue the MBR and MCGS report accordingly.

   i. Original copy - CAMO

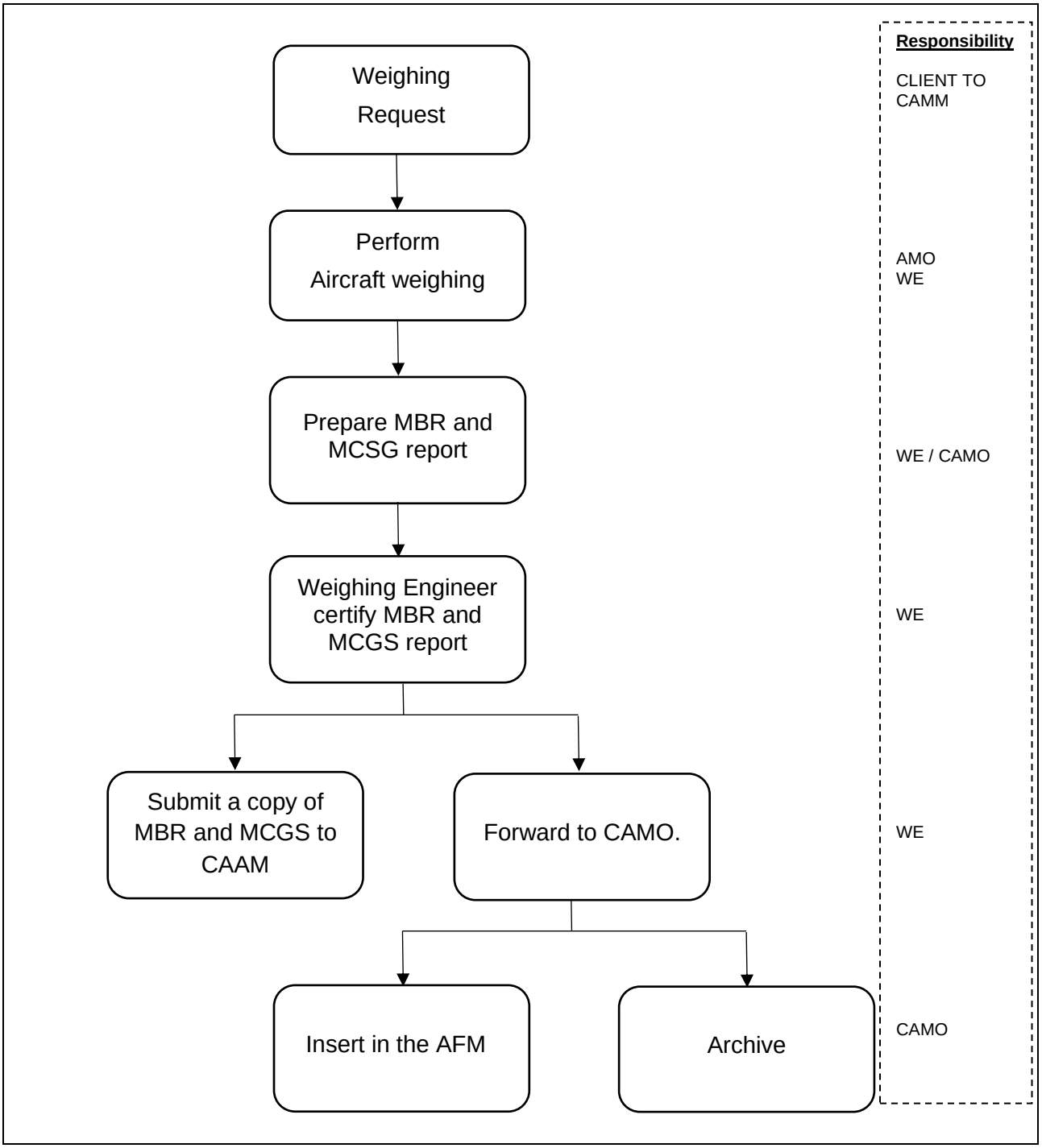
   ii. Duplicate copy- CAAM

j. The MBR and MCGS report shall be made available to the CAAM, and such records shall be retained as per GAM CAME Part 1.3.3 (Preservation of Continuing Airworthiness Records).

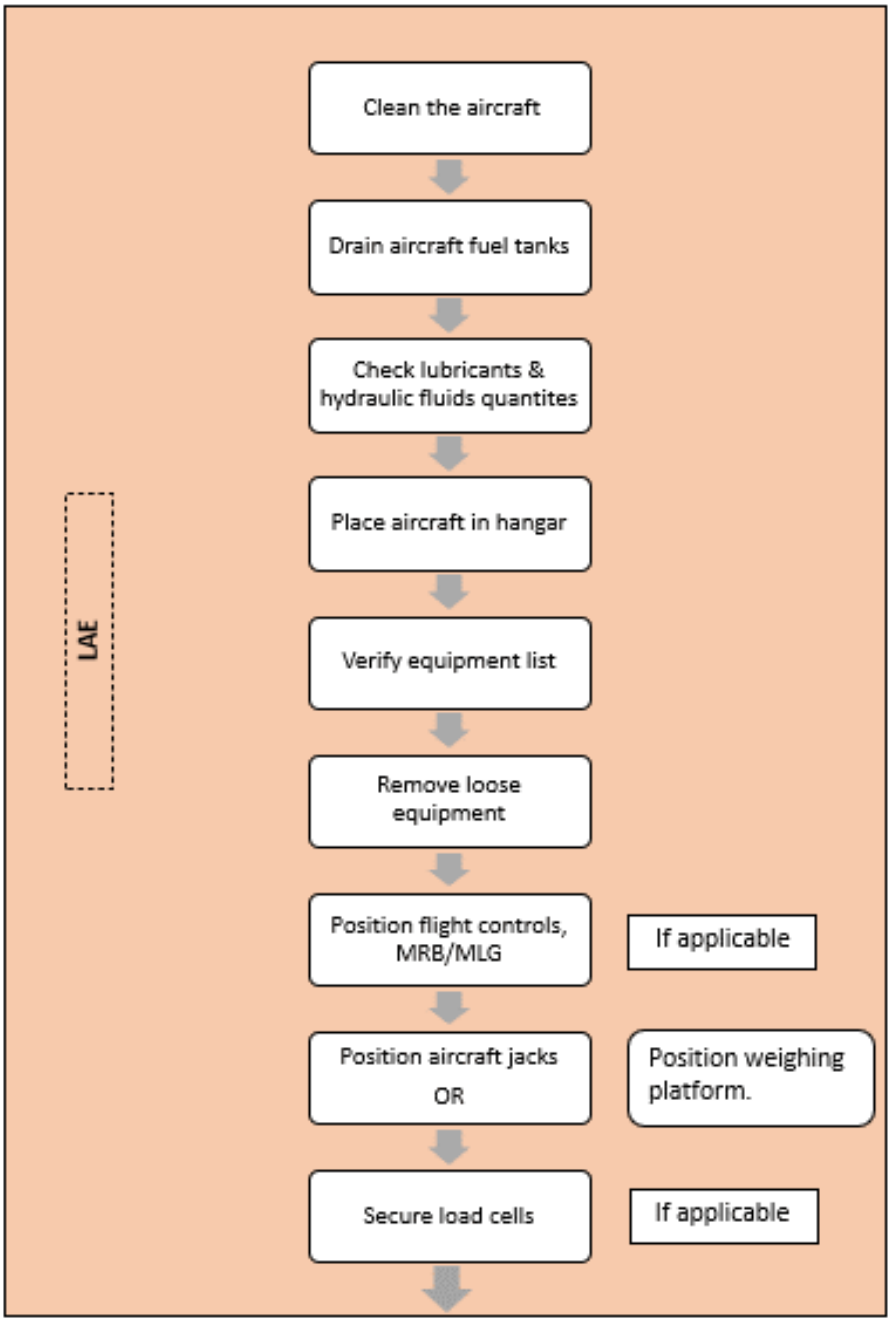
k. When the MBR and MCGS report is reissued/revised, the last issue/revision, shall be retained with the aircraft records for at least six (6) months.

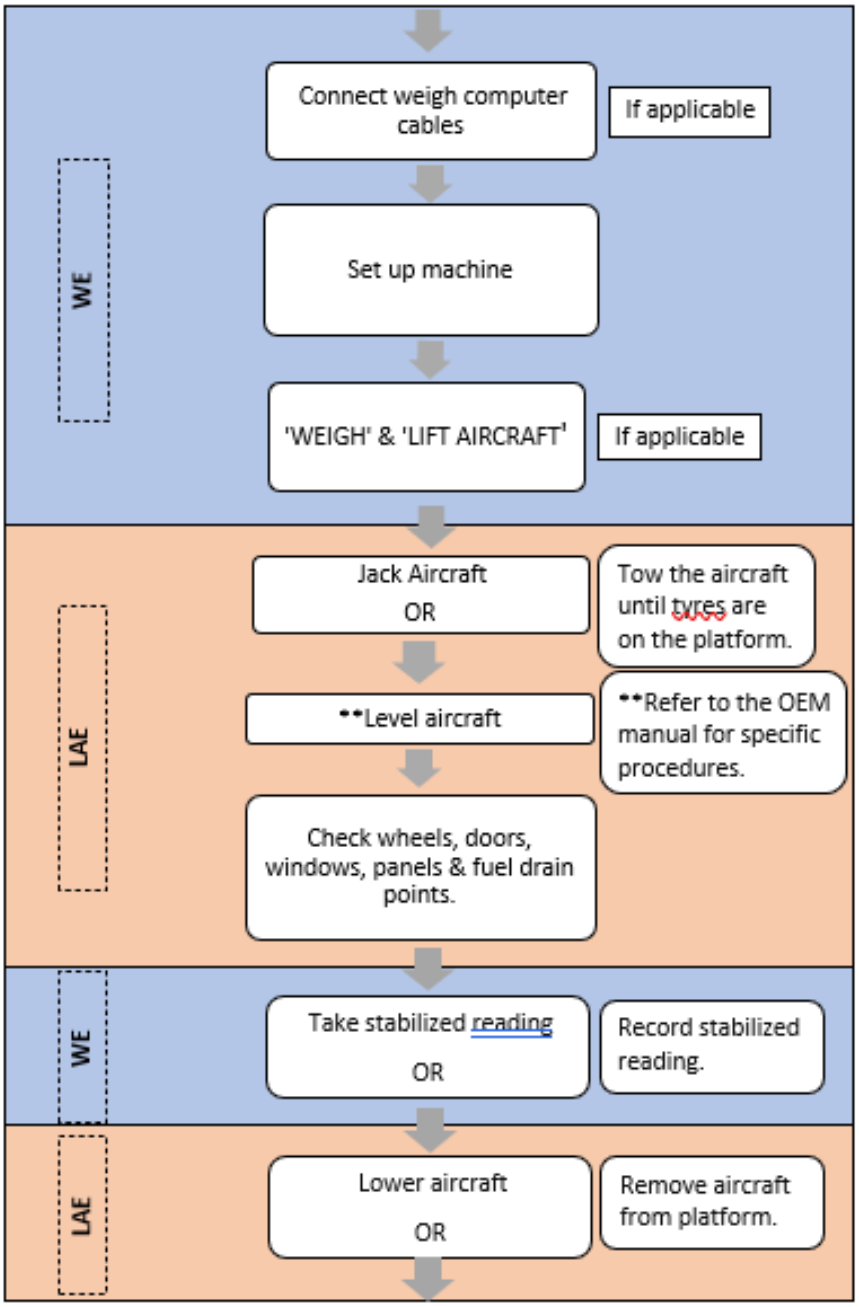
l. If an applicable AFM pages are used as the MBR and MCGS, the applicable pages shall be submitted to the CAAM for approval and incorporation into the AFM.

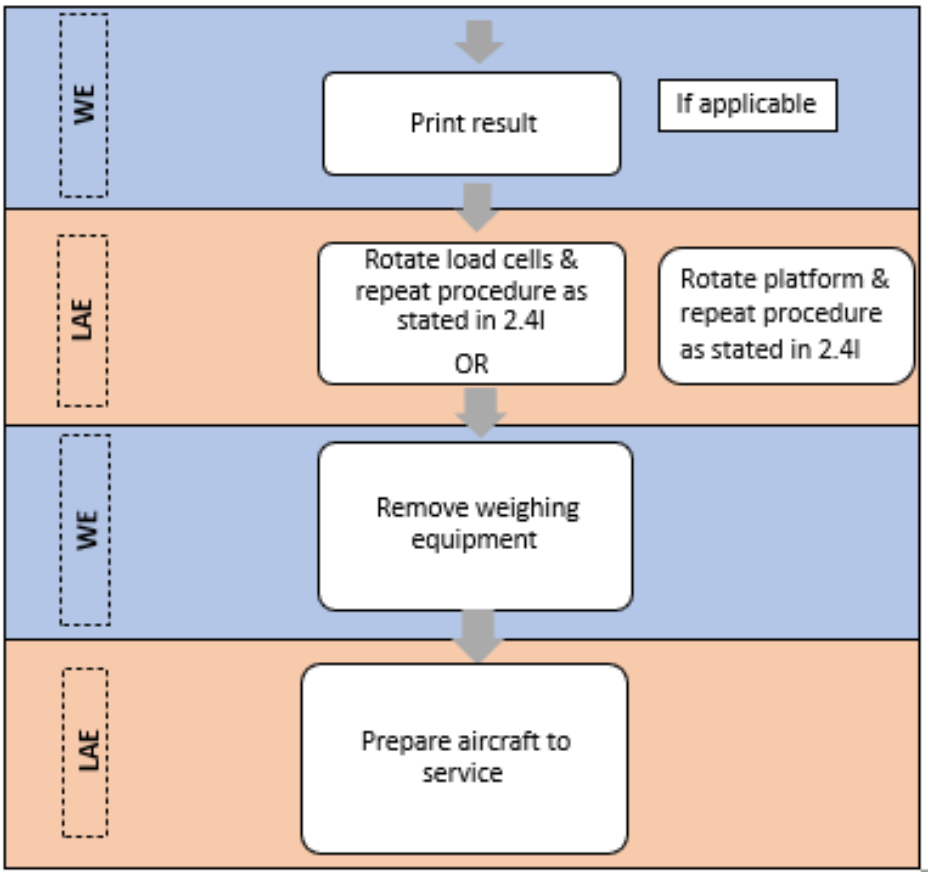
2.2 Mass and Balance Process Flowchart (General)



2.3 Standard Aircraft Weighing Process Flowchart




WE
Connect weigh computer cables
If applicable
Set up machine
'WEIGH' & 'LIFT AIRCRAFT'
If applicable
LAE
Jack Aircraft
OR
Tow the aircraft until tyres are on the platform.
**Level aircraft
**Refer to the OEM manual for specific procedures.
Check wheels, doors, windows, panels & fuel drain points.
WE
Take stabilized reading
OR
Record stabilized reading.
LAE
Lower aircraft
OR
Remove aircraft from platform.


WE
Print result
If applicable
LAE
Rotate load cells & repeat procedure as stated in 2.4l
OR
Rotate platform & repeat procedure as stated in 2.4l
WE
Remove weighing equipment
LAE
Prepare aircraft to service

2.4 Standard Weighing Procedures (To be performed by nominated LAE, unless marked with *)

a. When weighing an aircraft, normal precautions should be taken consistent with good practices including but not limited to:

   i. checking for completeness of the aircraft and equipment.

   ii. determining that fluids are properly accounted for.

   iii. defuel the aircraft (refer instructions and recommendations of the aircraft TC holder)

   iv. ensuring that the aircraft is clean; and

   v. ensuring that weighing is accomplished in an enclosed building (still air), where possible on firm relatively level ground or surface.

NOTE: To avoid any weighing error caused by wind, aircraft should be weighed in a draught free condition where possible and hangar doors are to be closed.

b. Review basic equipment list of aircraft to be weighed. Check that all equipment's are in their respective locations (as in flight). Update above list to reflect any changes.

c. Remove all loose articles or equipment which will not be included in above basic equipment list.

d. Position all Flight Controls and Main Rotor Blades or Main Landing Gear (where applicable) in weighing configuration.

e. For load cell type weighing scale:

NOTE: Only general instruction provided. Aircraft weighing shall be carried out in accordance with instructions and recommendations of the aircraft TC holder and weighing equipment manufacturer as applicable.

   i. Position aircraft jacks under jacking points of the aircraft. Secure ring jack adapters on aircraft jacks. Ensure the ring adapters are centred flush on ram before tightening set screws (if applicable).

NOTE: Ring jack adapters come with weighing kit.

   ii. Secure the load cells (Red, Yellow, Blue or Green) on ring jack adapters.

NOTE: Ensure that load cells are fully threaded into ring jack adapters and are not touching the aircraft

WIRED LOAD CELL

iii. *****Connect weigh computer cables to load cells. Observe cables and load cells according to colour coding.

CAUTION: The cables and load cells (colours) are not interchangeable.

iv. *****Check power source voltage and connect correct power cable to weigh computer. Power up and update weigh computer "SET UP". Record the calibration date; and

v. *****Select "WEIGH" mode on the weight computer when aircraft is ready for weighing. When "LIFT AIRCRAFT" message flashes the aircraft is ready for jacking; or

NOTE: Prior to entering "WEIGH" mode, check all load cells are not touching the aircraft, load cells cables are not crossed, and aircraft wheels brakes are released before jacking

WIRELESS LOAD CELL

vi. *Power "ON" the weighing device**.** Check the connection signal.

vii. *Reset all the load cell reading to ZERO using zero all buttons. Check each channel for ZERO and the aircraft is ready for jack.

NOTE: Prior to entering the next weighing procedure, check all load cells are not touching the aircraft, load cells cables are not crossed, and aircraft wheels brakes are released before jacking.

viii. Jack aircraft up in level attitude to prevent inducing side loads into jack points that could cause jacks to slip off the pads or overload jack points and damage structure.

f. For platform type, push or move the aircraft with tow truck until each tyre is located on the weighing platform then detach from the tow truck.

g. Level the aircraft (refer to aircraft manufacturer maintenance data for detail procedure).

h. Check that all wheels are clear off ground, remove inclinometer or any other measuring equipment if applicable. Check that all doors, windows and panels are closed and check all aircraft fuel drain points for fuel (where applicable).

i. *Allow weigh computer reading to stabilize and record the measurement.

j. For load cell type weighing scale: Lower aircraft in level position slowly until all load cells are completely clear of jacking points. For platform type weighing scale: Push or move the aircraft until all the tyres are off the platform.

CAUTION: To obtain error free and good zero return, it is important the load cells or platforms are completely clear of aircraft and related interface hardware (connectors, cables, cells) are not removed, distributed or disconnected.

k. *Allow weigh computer reading to stabilize and record the measurement.

l. Rotate the load cells or the platform and note their new locations. Repeat weighing procedure item “e” to “k”, until two sets of two consecutive and independent measurements are obtained, and the figures are within tolerance of ± 10lbs or 5kg.

m. Remove all related weighing equipment and prepare aircraft for return to service.

n. Upon completion of aircraft weighing, LAE shall sign the maintenance release to service on the work sheet.

3.0 Approved Weighing Engineer (WE)

3.1 Approval Process

a. WE shall be nominated by the CAMO. An authorisation can only be issued by the CAMO when formally approved as an approved signatory by the CAAM. The Application for Renewal/Variation of Approved Signatory Approval (CAAM/AW/0105-01) should be used for the initial CAAM approval accompanied with prescribed fee.

3.2 Requirement for Weighing Engineer (WE):

a. Basic Qualification**.**

   i. An appropriate license issued in accordance with CAAM CAD 1 or relevant engineering degree acceptable to the CAAM;

b. Experiences:

   i. At least 2 years of practical experience in preparing aircraft MBR and MCGS report (at minimum 3 aircraft MBR and MCGS report must be prepared); and

   ii. Attended relevant aircraft mass and balance training; and

   iii. A comprehensive knowledge on requirements and procedures of mass and balance of aircraft. Following are the required training:

      1. CAME Training
      2. MBP Training
      3. Air Legislation Training
      4. Safety Management System Training
      5. Human Factors Training- Initial
      6. Related General Familiarization Training
      7. Mass and Balance Training- Training covers both theory and practical aspect of aircraft weighing activities which include but not limited to the element of applicable airworthiness requirements, personnel involved in weighing, weighing equipment, facility and maintenance data related to aircraft weighing.
      8. Practical training is conducted ‘OJT’ basis where candidate is directly involved in weighing aircraft under supervision of WE.

c. GAM WE shall be provided with all the basic training specified above and continued qualification as per Para 3.3 below to ensure that they remain current and adept in terms of technical knowledge, procedures, and human factors.

3.3 Renewal/ Variation of Weighing Engineer (WE):

a. Maintaining qualification- The QAM shall evaluate the approval for each qualified WE at least once a year.

b. The renewal/ variation of approved WE shall follow the procedure as stated in GAM Quality Procedure Manual (QPM) 2.7- Issue of Personnel Authorisations.

c. Continuation Training every two (2) years:

   i. CAME Training- Refresher

   ii. MBP Training- Refresher

   iii. Human Factors Training- Refresher

d. Related General Familiarization and Legislation Training shall be attended by the nominated WE for variation application.

e. Withdrawal / Suspension of Qualification-

   i. Whenever any condition for revalidation of company approval is not met, or for any reason on rationale after due investigation, company approval granted to the WE can be limited, suspended, or revoked by QAM.

   ii. Following conditions may lead to limitation, suspension or revocation of company approval.

      1. Certification has been performed for an aircraft beyond scope / limitation of authorisation, or

      2. The WE approval has expired, or

      3. Continuation training has not been provided to the WE.

   iii. Re-issuance of revoked authorization shall be processed in a similar manner as for the initial issuance of company approval.

4.0 Mass and Balance Report (MBR) and Mass and Centre of Gravity Schedule (MCGS) report

4.1 General

a. MBR and MCGS report shall be issued for every aircraft by the CAMO. The report shall be completed and certified by WE.

b. The MBR and MCGS report shall present:

   i. MCGS - Derivation of the Empty mass and corresponding the CG from the most recent aircraft weighing results and related calculations in accordance with Regulation 43 of MCAR.

   ii. MBR - Current empty mass, the variable loads and the disposable loads for which the operator intends to use the aircraft for.

   iii. Equipment List - Current Basic Equipment list showing the mass and lever arm of each item or make reference to the document in which such a list is included.

   iv. Aircraft Basic Mass and Balance Record - Current, and continuous record of the mass and CG of each aircraft including modifications, repairs or other changes affecting either the mass and/or CG of the aircraft.

c. The MBR and MCGS report shall be revised and certified by WE when:

   i. the cumulative change to the mass and balance record is more than plus or minus 0.5% of the maximum certified landing mass; or

   ii. the cumulative change in the CG position record exceeds 0.5% of the mean aerodynamic chord (MAC). In the case of helicopters and airplanes that do not have a MAC-based CG envelope, whenever the cumulative change in the CG position exceeds 0.5% of the total CG range; or

   iii. prescribed by the TC or STC holder of an aircraft (e.g. in the aircraft flight manual or weight and balance manual) if the threshold is lesser than as specified in paragraph i) and ii) above

d. When an MBR and MCGS report is required to be revised pursuant to para 4.1 c, the mass changes may be computed provided the mass and CG location of the modifications are known. Otherwise, the aircraft shall be reweighed. If the aircraft has not been reweighed, the revised MBR and MCGS report shall contain a statement that calculations have been based on the last aircraft and the known mass and CG changes.

e. A statement shall be made in the MCGS to the effect that 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.

f. CAMO shall maintain a complete, current, and continuous record of the mass and CG of each aircraft. Details of modifications, repairs or other changes affecting either the mass and/or CG of the aircraft shall be recorded.

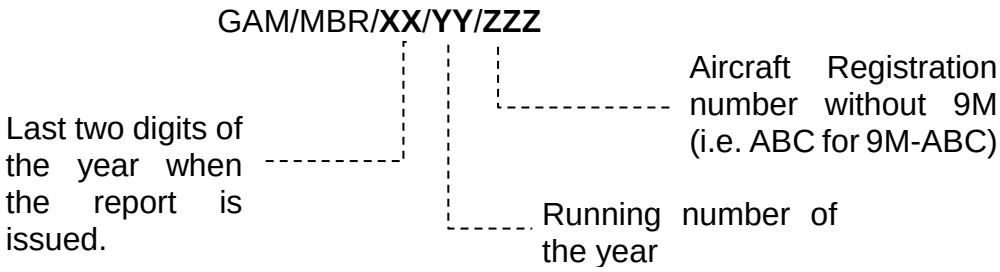
g. Where a change occurs in the items included in either the empty mass or, if applicable, the operating mass of an aircraft, the appropriate list of equipment associated to the MBR, as applicable, shall be amended by the CAMO.

h. The MBR and MCGS report shall be made available to the CAAM, and such records shall be retained by CAMO and produced to CAAM at any material time. The previous report shall be stamp “SUPERSEDED” on the front page.

i. The MBR and MCGS report shall be issued via form GAM/C-037. The data recorded in the MBR and MCGS report shall be sufficient to enable empty mass and empty mass CG position to be accurately determined.

j. The MBR and MCGS report shall include the following information:

   i. Reference number and date;
   ii. Aircraft type and model;
   iii. Aircraft serial number;
   iv. Nationality and aircraft registration marks;
   v. A statement stating that the report superseded all earlier issues;
   vi. Shall indicate the landing gear positions (retracted or extended) to which the derived CG position is related;
   vii. The date and reference number of the MBR upon which the MCGS is based, should be specified; and
   viii. Report reference number as indicated below:



k. The datum to which the CG limits relate is defined in the MCGS and this may be different from the datum defined in the AFM. When a different datum is used it should be adequately defined, its precise relationship to the datum in the AFM should be given, and any lever arms and moments which appear in any part of the Schedule should be consistent with the datum so declared.

l. In the case of helicopters, it may be necessary to present lever arms and moments about more than one axis, depending on the CG limits specified in the AFM.

m. If the CAAM, the CAMO or the operator is of the opinion that adequate mass control has not been exercised over an aircraft during the modification or repair embodiment, a new empty mass and empty CG position shall be determined by weighing for the aircraft.

n. For aircraft the Maximum Total Mass Authorised of which does not exceed 5700 kg, a copy of the MBR should be included in the AFM, if a AFM is applicable, or if this is not the case, displayed or retained in the aircraft in a suitably identified stowage.

o. In case where a CAMO could not identify a qualified WE for a particular type of aircraft (e.g. first-of-type aircraft), the CAMO shall submit the completed MBR and MCGS report to CAAM for approval. The CAMO shall remain responsible for the supervision of aircraft during weighing and the data recorded and computed in the MBR and MCGS report.

p. The CAMO shall ensure that the MBR and MCGS report is prepared and checked independently prior to certifying it or submitting for CAAM's approval.

4.2 Mass and Balance Report (MBR) and Mass and Centre of Gravity Schedule (MCGS) Contract

a. In absence of WE, the CAMO may contract another CAMO with appropriate capability to certify the MBR and MCGS report. In such cases,

a written agreement shall be made available between the two organizations provided the contracted CAMO could demonstrate:

i. It has the same aircraft type approved in its MBP; or

ii. It has the same airworthiness category of the aircraft approved in its MBP, and the WE has attended relevant aircraft mass and balance training.

4.3 Continuity of Validity

a. An approved MBR or MCGS issued based on the last aircraft weighing before the date of validity of CAAM CAD 6805 shall continue to be valid under the CAD until –

i. The next aircraft reweighing is required as per para 1.7

ii. The MBR and the MCGS is required to be revised in accordance with para 4.1 c and 4.1 m; or

iii. As required by CAAM as per para 1.6 and 4.1 m.

5.0 APPENDICES

5.1 Appendix A

a. List of Mass and Balance Approval for WE.

NO.	MANUFACTURER	AIRCRAFT TYPE	NUR FARHANA BINTI OTHMAN		ISMAIL BIN SULAIMAN		MOHD ARIFIN BIN MD MATAR		REMARKS
			GAM W002 WBA		GAM W004 WBA		GAM W005 WBA		
			PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	
1	AIRBUS HELICOPTERS	AS365	-	-	-	-	-	-	
		EC120	X	X	X	X	-	-	
		EC135	-	-	-	-	-	-	
		AS350	-	-	-	-	-	-	
		EC225	-	-	-	-	-	-	
		EC155	X	X	-	-	-	-	
		AS355	X	X	-	-	-	-	
		EC130	-	-	-	-	-	-	
2	LEONARDO HELICOPTERS	AW139	X	X	-	-	X	X	
		AW189	X	X	-	-	X	X	
		AW119	X	X	-	-	-	-	
		A109	X	X	X	X	-	-	
3	SIKORSKY	S76B	X	X	-	-	-	-	

NO.	MANUFACTURER	AIRCRAFT TYPE	NUR FARHANA BINTI OTHMAN		ISMAIL BIN SULAIMAN		MOHD ARIFIN BIN MD MATAR		REMARKS
			GAM W002 WBA		GAM W004 WBA		GAM W005 WBA		
			PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	PERFORM WEIGHING	APPROVED MBR & MCGS REPORT	
		S76C	-	-	-	-	-	-	
		S76C++	X	X	-	-	-	-	
4	BEECHCRAFT	B300	-	-	-	-	X	X	
5	TWIN OTTER	DHC-6	-	-	-	-	-	-	
6	ROBINSON	R44	X	X	-	-	-	-	
		R66	X	X	-	-	-	-	
7	BELL TEXTRON CANADA LTD.	BELL 429	X	X	X	X	-	-	

Legends:

X – Approval for the aircraft type

5.2 Appendix B

a. Refer list of Mass and Balance Approval Holder (form ref. GAM/C-042) latest revision for GAM CAMO fleets.