Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

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Weighing Preparations

1. Effectivity

Weight Control Authority holders, maintenance personnel and others involved in activities related to aircraft weighing.

2. Purpose

To draw attention to the importance of developing written procedures on preparing an aircraft for weighing - either based on existing manufacturers' instructions or on information published in the referenced documents below -, and to recommend general preparatory practices in the absence of any other written guidance.

3. Background

There have been recent reports of some general aviation aircraft being prepared for weighing using improper practices. Reports also indicate that the preparation of aircraft and the weighing activity itself is not being documented properly, making it difficult to determine the configuration of the aircraft in which it was last weighed, and questioning the validity of the data entered on the load data sheet.

The purpose of aircraft weighing is to determine the baseline empty weight and empty weight centre of gravity of Australian aircraft in accordance with the provisions of Civil Aviation Order (CAO) 100.7, with the resultant data published in a load data sheet for the accurate loading of aircraft during its operations.

If a weighing is required, personnel involved in the weighing activity of the aircraft should refer to the relevant written procedures developed based on the manufacturer's instructions. In the absence of manufacturers' instructions, publications referenced below are a source of good practices to develop such written procedures. Alternatively, industry personnel may refer to the general recommendations further in the text.

4. References

1. CASA publication “Weight Control of Aircraft”

   http://www.casa.gov.au/wcmswr/_assets/main/download/orders/cao100/weight_control.pdf

2. FAA Aviation Maintenance Technician Handbook – General; Chapter 4: Aircraft Weight and Balance (FAA-H-8083-30)

   http://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_handbook/

3. FAA Aircraft Weight and Balance Handbook (FAA-H-8083-1B)

   https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/FAA-H-8083-1.pdf

5. Recommendations

In the absence of any other written guidance, industry personnel involved in aircraft weighing may refer to the following list of items, recommended to consider when preparing an aircraft for weighing:

- **Environment:** aircraft weighings should be conducted inside closed hangars on level floor to avoid air movements and floor angles affecting the accuracy of the weighings.

- **State of aircraft:** the aircraft should be cleaned inside and out, and be in a dry state. If the aircraft has been exposed to rain or has been washed, it should be properly dried before the weighing commences.

- **Configuration of aircraft:** all control surfaces must be retracted or in a neutral position.

- **Equipment list:** the equipment state of the aircraft must be checked, making sure all empty weight items are placed in the appropriate position, and all items not part of the empty weight are removed from the aircraft. An equipment list must be raised if there is not one available, documenting the equipment state of the empty aircraft. Any discrepancies must be addressed before the weighing commences, either by adding or removing items as appropriate, or by subsequently adjusting for the weight and moment of the discrepant items when the empty weight and empty weight centre of gravity are determined.

- **Fuel:** fuel tanks should be drained in accordance with the manufacturer's instructions. If draining is not feasible, fuel tanks should be filled to capacity. As unusable fuel is part of the empty weight, subsequent adjustments for the fuel state of the aircraft should be made when the empty weight and empty weight centre of gravity are determined. Care should be taken for applying the appropriate Specific Gravity applicable to the fuel used.

- **Oil and other fluids:** total quantities of oil, engine coolant and hydraulic fluid are part of the empty weight; therefore, all reservoirs and tanks containing such fluids should be filled to capacity.

- **Ballast:** fixed ballast should be in its appropriate position; temporary ballast must be removed or later adjusted for its weight and moment when the empty weight and empty weight centre of gravity are determined.

- **Jacking:** aircraft may only be jacked at the specified jacking points. Jacks shall only be activated simultaneously to avoid any side loads, which may cause the aircraft to slip off the jacks or provide erroneous reading on the load cells.

- **Levelling:** all aircraft must be weighed in a flying attitude as specified by the manufacturer of the aircraft. On most aircraft, the manufacturer has installed levelling devices such as lugs, pins, plates or plumb bobs with grades to allow for the correct positioning of the aircraft. In case the aircraft can only be positioned in the required attitude by placing weighing ballast at one or more locations within the aircraft, the required weight and moment adjustments should be made when the empty weight and empty weight centre of gravity are determined. In case of helicopters, where lateral centre of gravity is required in addition to the longitudinal one, lateral levelling is equally important for positioning the helicopter in the correct attitude for weighing.

- **Reaction points:** to be able to determine the accurate empty weight centre of gravity of the aircraft, the exact reaction points must be known.
    - Oleo struts: if landing gear with oleo struts is used as reaction points, it is important to measure the relevant distances rather than relying on any published information. Differences in oleo strut extensions can vary reaction points to a significant degree.
    - Fixed reaction points: if fixed reaction points are used (such as specified jacking points on the wings or airframe) aircraft records' data for the particular aircraft shall be used.

  The reaction points can be projected to the hangar floor using a plumb bob in order to measure the required dimensions on the hangar floor accurately.
- **Brakes:** if the aircraft is being weighed using its landing gear as reaction points, brakes should be in the "off" position to avoid any side loads developing that would influence the scale readings.
- **Tare weight:** in case the aircraft was weighed using any tare weight (such as tyre chocks or jack pads/adaptors), scale readings and subsequent centre of gravity calculations must be arithmetically adjusted for the weight and moment of the tare used.

The equipment state in which the aircraft was weighed should be properly documented, either by referring to the document, manual or other written procedure used (including the document number and its revision status, if applicable), or by properly documenting the weighing as it has been carried out. Weighing documentation should be clear on what was and what was not included in the empty weight when the empty weight and empty weight centre of gravity were determined for the easy verification of the information entered on the load data sheet and its comparison with future weighing information.

6. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link email address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

Airworthiness and Engineering Branch
Standards Division
Civil Aviation Safety Authority
GPO Box 2005, Canberra, ACT, 2601