Using the Oliver Smith Weight and Balance Spreadsheets

The two spread sheets OSWBM and OSWBI have been devised to make the calculation of the weight and balance of an aircraft to the LAA requirements a simple job. Once the required data is entered on the sheet the programme automatically does all the necessary calculations to ascertain the CG of the aircraft. The resulting data can then be copied onto the standard LAA form

The sheets have been designed for single and two seat aircraft, nose or tailwheel, with up to two tanks and two baggage locations. They could under certain circumstances be used for four seat aircraft (see later)

For metric units use KG and mms, for Imperial units use lbs and inches.

Some of the cells, including all formulae for calculations, are locked and cannot be changed.

The sheet must be completed from the top down. It will not work if one tries to work out say an AFT case before the FWD case. For ease one should have all the required data such as weights, moment arms, CofG limits, maximum AUW to hand.

**Start** by entering the aircraft details etc in the cells of the top 3 lines. It is recommended you now save the sheet in “Save as”

In rows 4 and 5 one the details of the weighing system and the aircraft state can be changed if required.

When moving down the entries, if something is not applicable or not used, enter a zero for both the weight and the arm.

**Empty weight** calcs

Complete the cells for the weights and arms.

If any arm is negative enter a minus sign in front of the number. DO NOT also put in a negative sign

in the weight cell.

There is a spare line in case one wants to add or subtract some item e.g., ballast (see below)

When all inputs are complete the programme will produce the empty weight CG.

**Most FWD** calc

The programme will have filled in the cells for the empty aircraft

Enter the P1, P2 and any baggage loads weights and arms.

Note the LAA require load cases using 55kg (189lbs) max and 55Kg (121lbs) min see LAA TL3.16 for full details.

This will give the no- fuel load case.

Entering the fuel and baggage values will give the total load case

In the far right column the allowable FWD limit value should be entered.

If the FWD limit or Max AUW is exceeded changes need to be made in the loading values.

**Most AFT** calcs

This follows the same route as the most FWD case but you will notice that the arms for the fuel and baggage will have been automatically added.

Add the most Aft limit in the far-right column.

Again if the Limit or Max AUW is exceeded amend the loading values.

**Max AUW and Flight** calcs

This is not an LAA requirement but it makes calculating CG simple for these cases.

One can play around adding and subtracting weights to achieve the max weight and staying inside the CG limits. (the arms will have been automatically added).

Sheet 1

**Four seat aircraft** can be accommodated by using one of the baggage or fuel cells as the rear seat loading position.

Where an aircraft has one fuselage and two wing tanks, with the tanks being on the same arm, can be treated as one tank. Similarly two baggage positions at the same arm can be treated a one.

**Using the “Spare” line** in the empty loading case.

1. Seeing the effect of adding ballast - enter the weight and arm of the ballast.
2. Adding some new equipment eg a Radio, enter its weight and arm.
3. Removing some equipment, enter a negative weight and its arm
4. Changing some equipment, enter the weight difference either positive or negative and

and its arm

1. Moving some equipment e.g., a battery, enter its weight and the total movement in its arm.

i.e., if it were 200 mm fwd. of Datum and it is moved to 1500 aft of datum the total movement

Is 1700mm

**Using the “Spare” line** in the Flight test case

Treat as for the empty load case.

**Notes**

The rows under Notes are not locked and ca be used to enter any pertinent data.

Note from Oliver.

I have discovered a minor snag with C5 -  the LEVEL Reference.

If you type in say “parcel shelf” or “Top Longeron” there is no problem.

However, if you start with an “e” it automatically puts in “electronic scales” and I cannot get

rid of this.

If you wish to have a go yourself the code for unlocking the sheets is 123.

Sheet 2