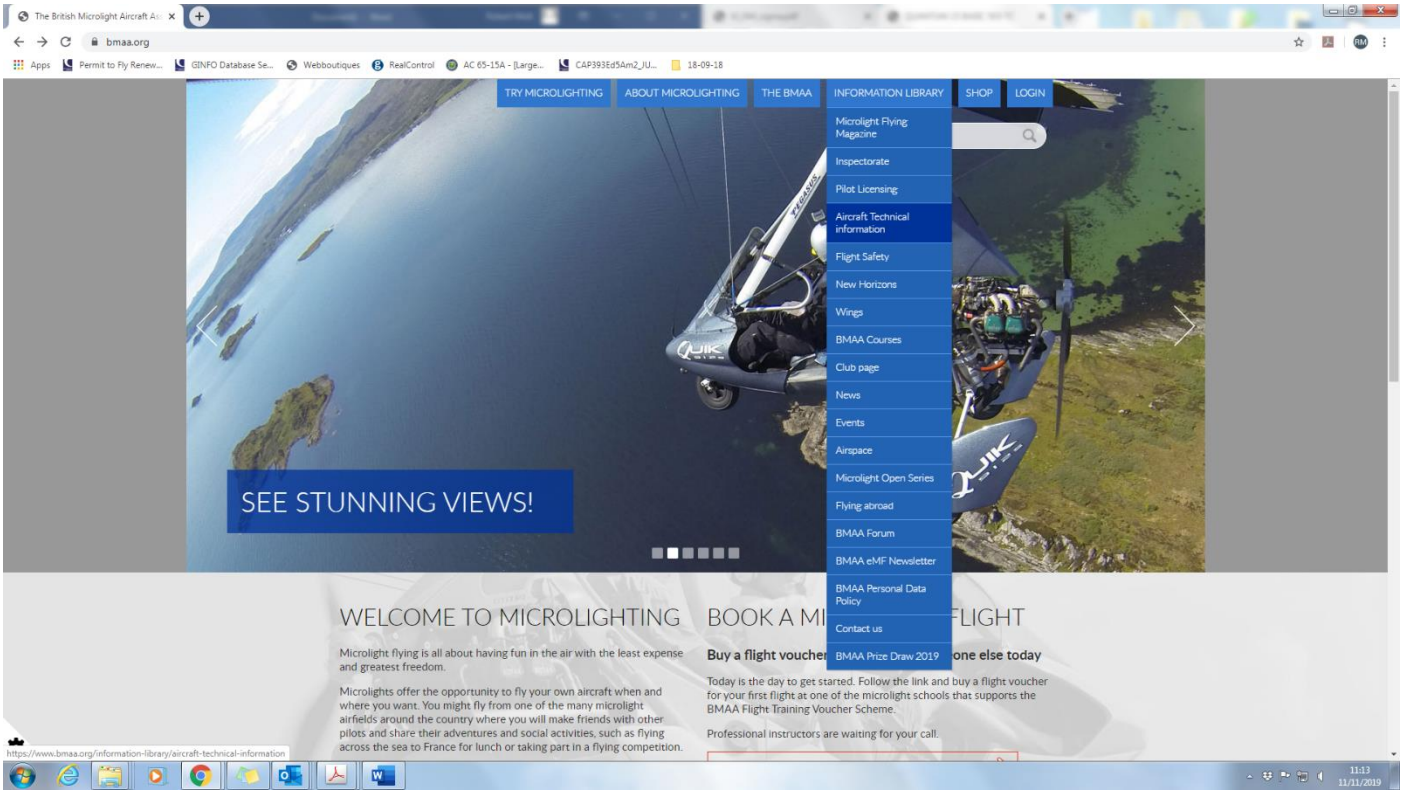
WEIGHT & BALANCE SPREADSHEET GUIDENCE

This is a brief step-by-step screen shot guide to using the new BMAA weight and balance spreadsheet (AW/028 Issue 11).

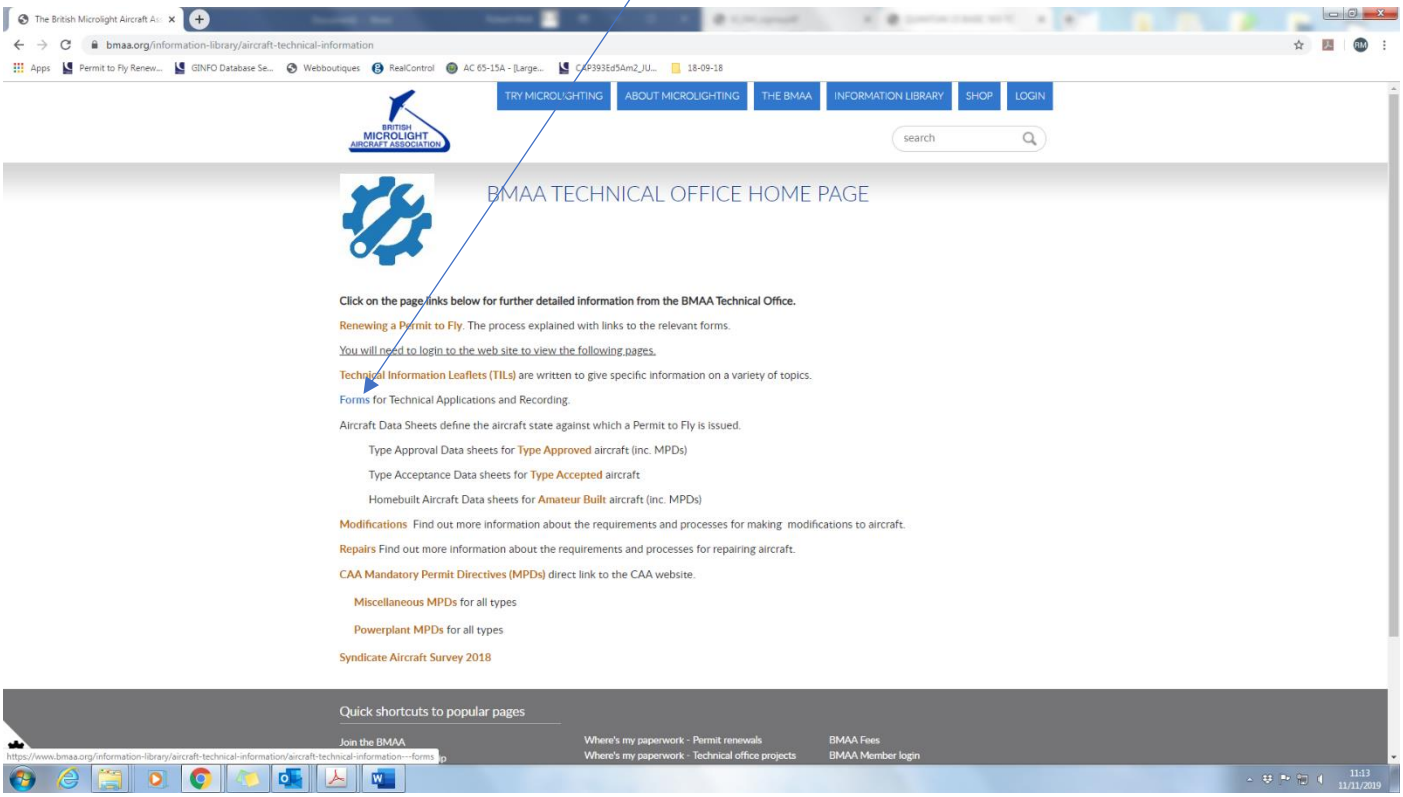
If you have any questions
please contact the BMAA Technical Office
01869 336006

The Spreadsheet can be downloaded from the BMAA website
www.bmaa.org

Click Information Library > Aircraft Technical Information

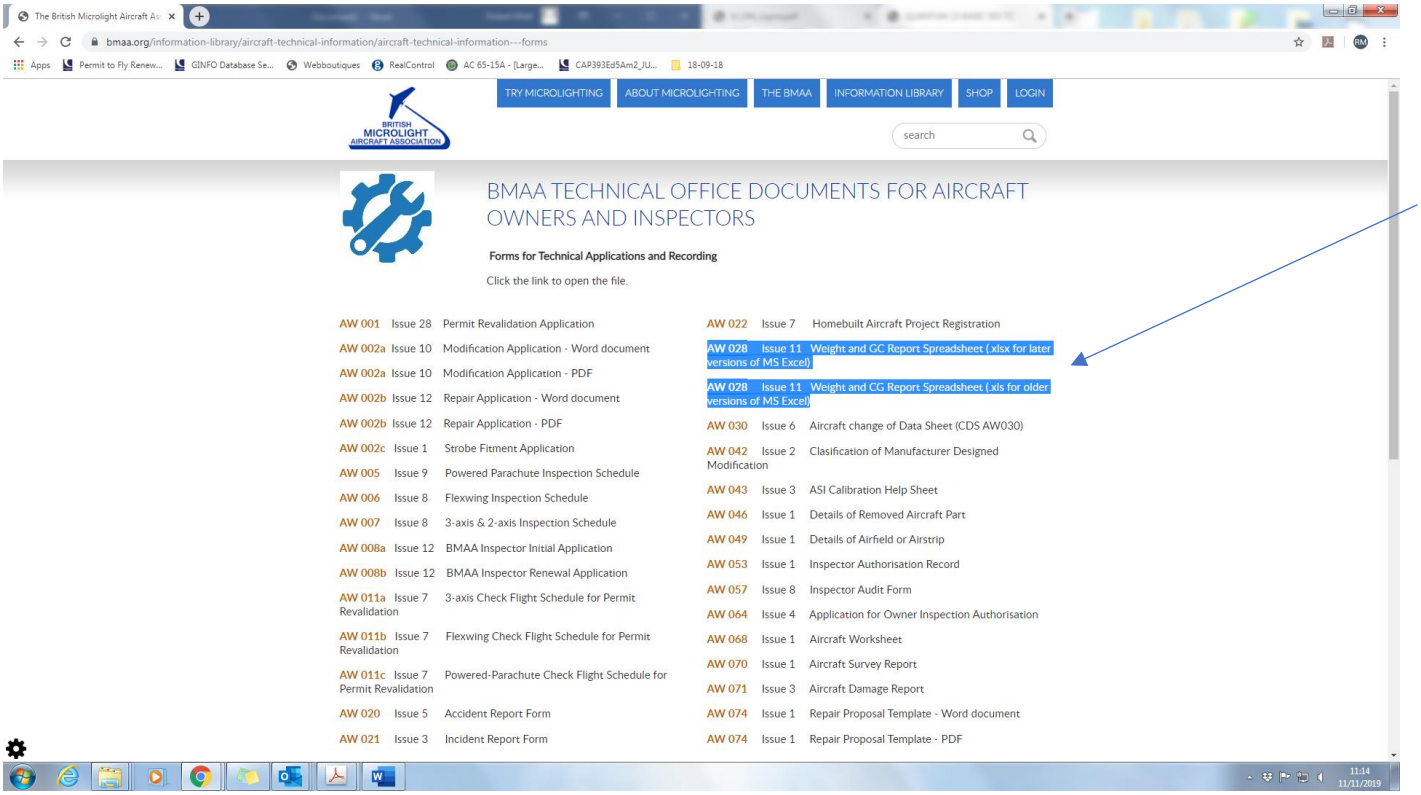


Click Forms

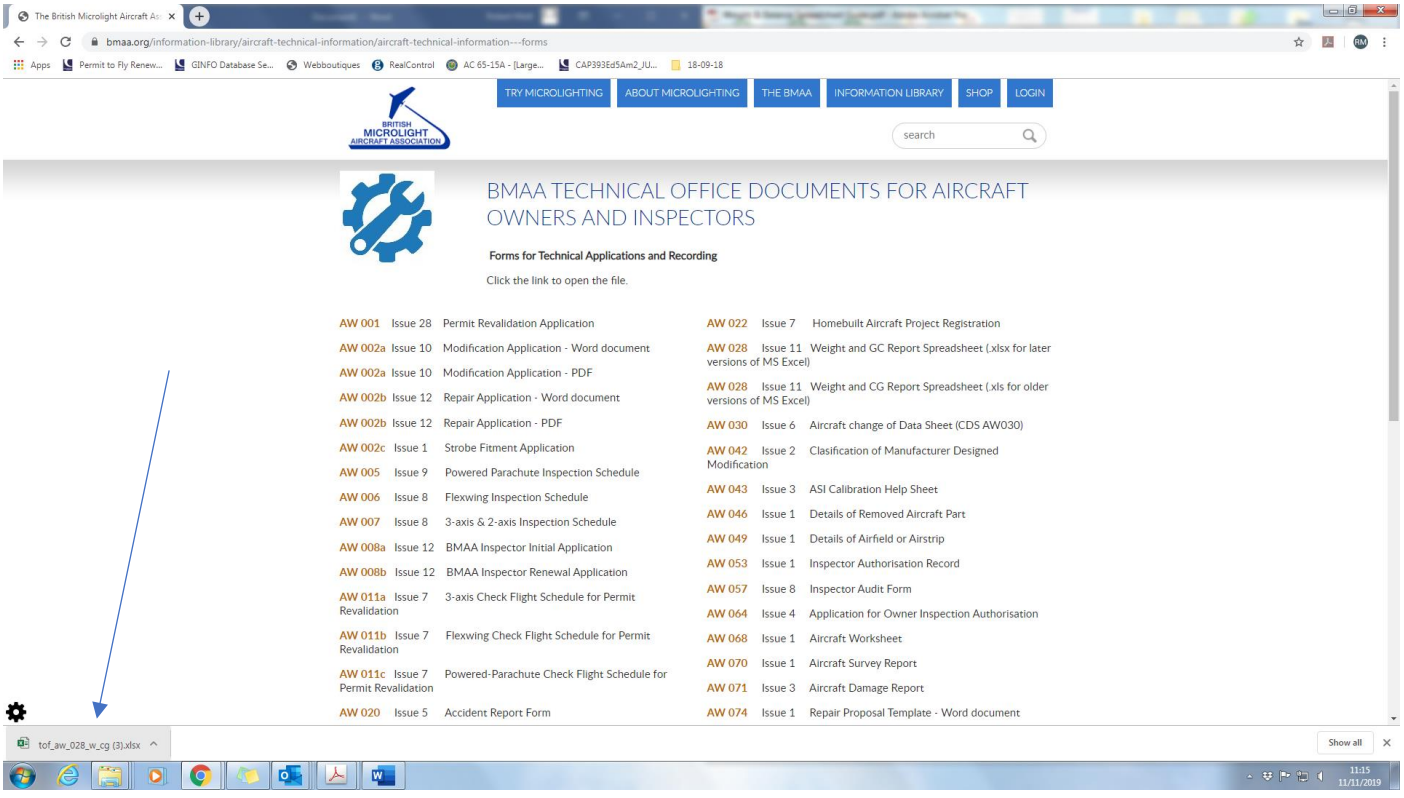


There are two versions:

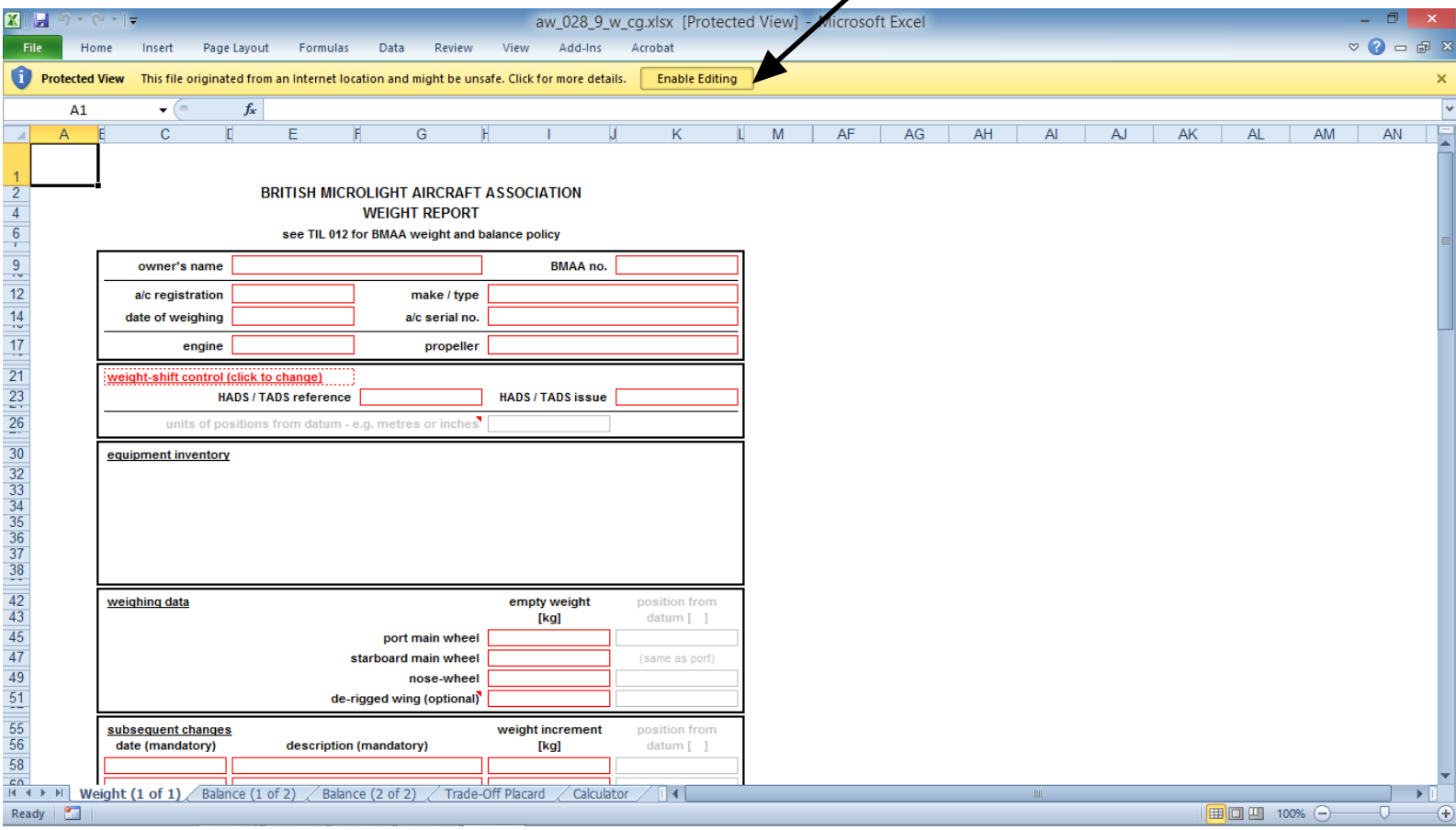
.xls works on older versions of MS Excel (2003 and earlier)
.xlsx works on later MS Excel, Apple and Android devices



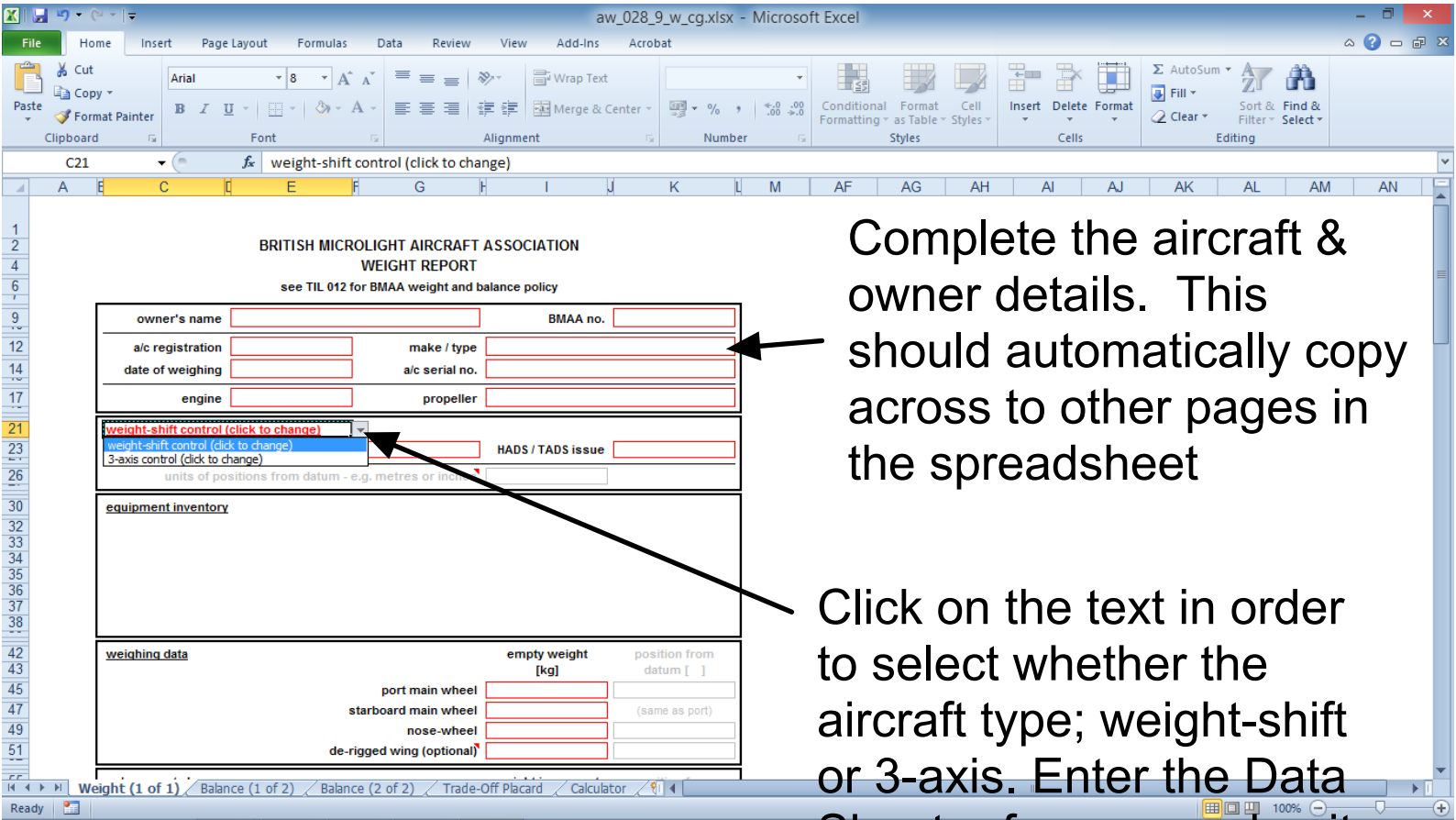
Click or tap on the desired version, then save and open



If you get a warning message, ensure you enable editing



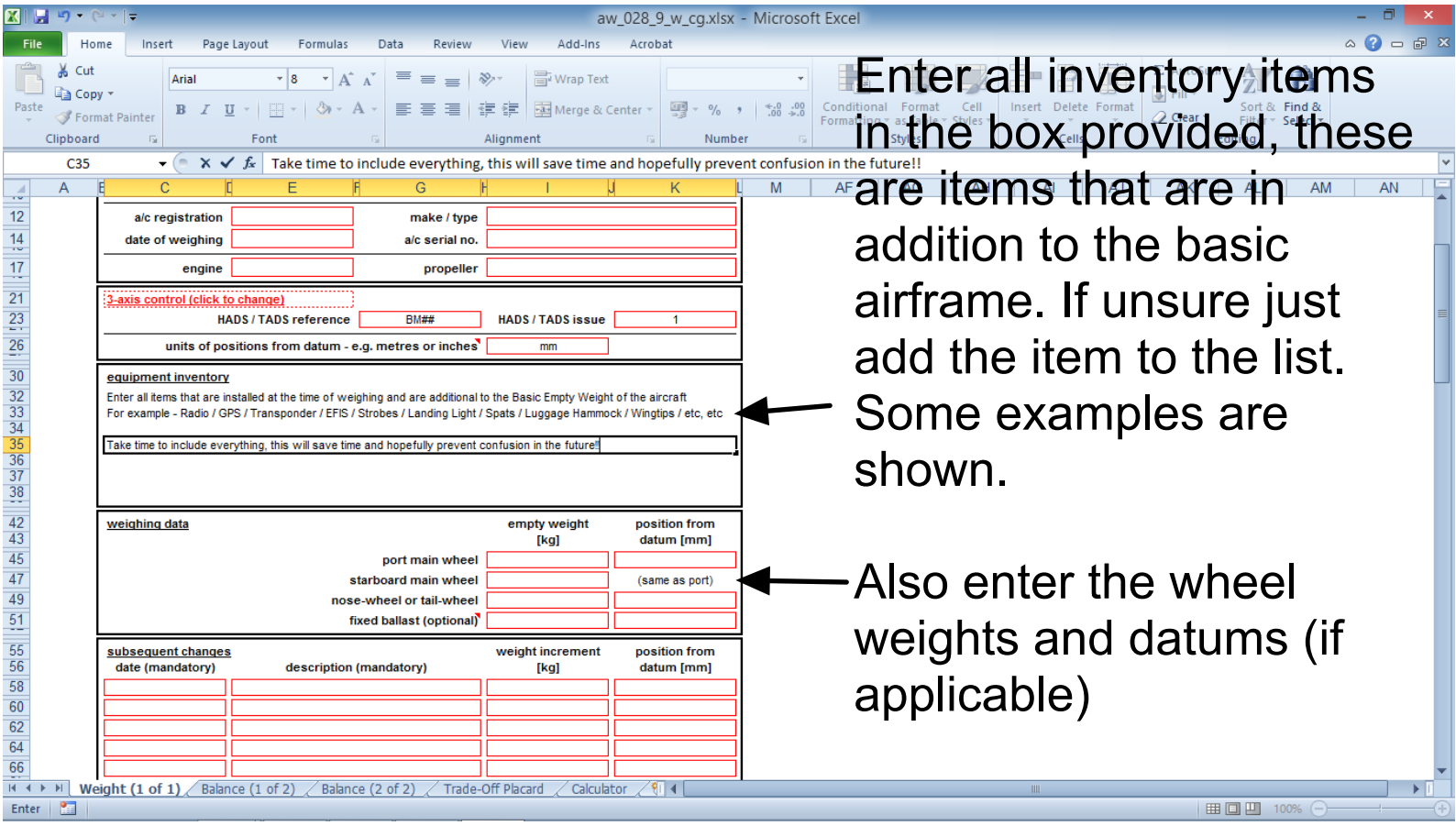
Part 1: Actual Empty Weight & Inventory



Complete the aircraft & owner details. This should automatically copy across to other pages in the spreadsheet

Click on the text in order to select whether the aircraft type; weight-shift or 3-axis. Enter the Data Sheet reference and units

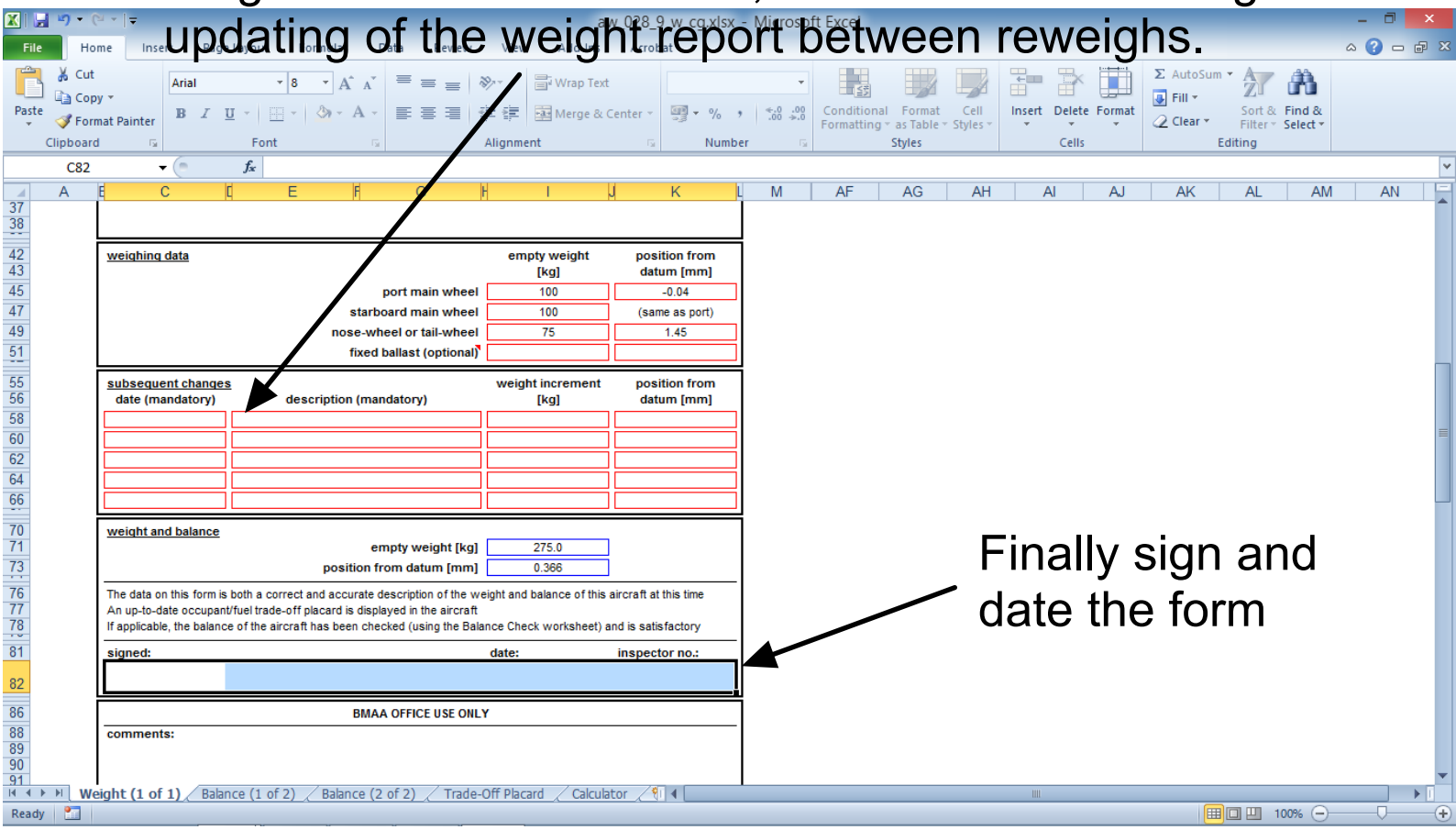
Inventory, Wheel Weights & Empty CG



Enter all inventory items in the box provided, these are items that are in addition to the basic airframe. If unsure just add the item to the list. Some examples are shown.

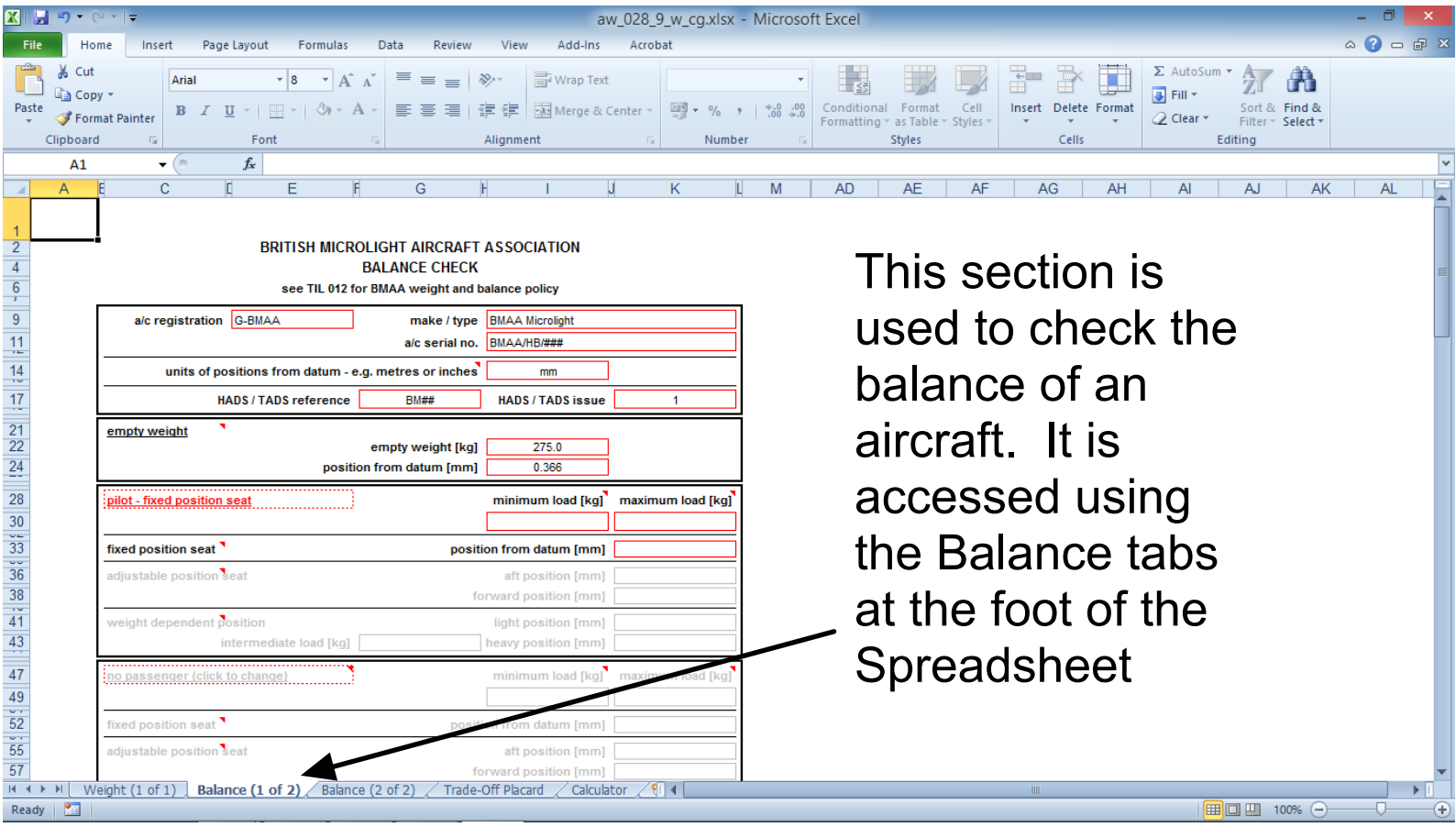
Also enter the wheel weights and datums (if applicable)

Subsequent changes can be accomdated after the wheel weights have been entered, this allows for tracking and updating of the weight report between reweighs.



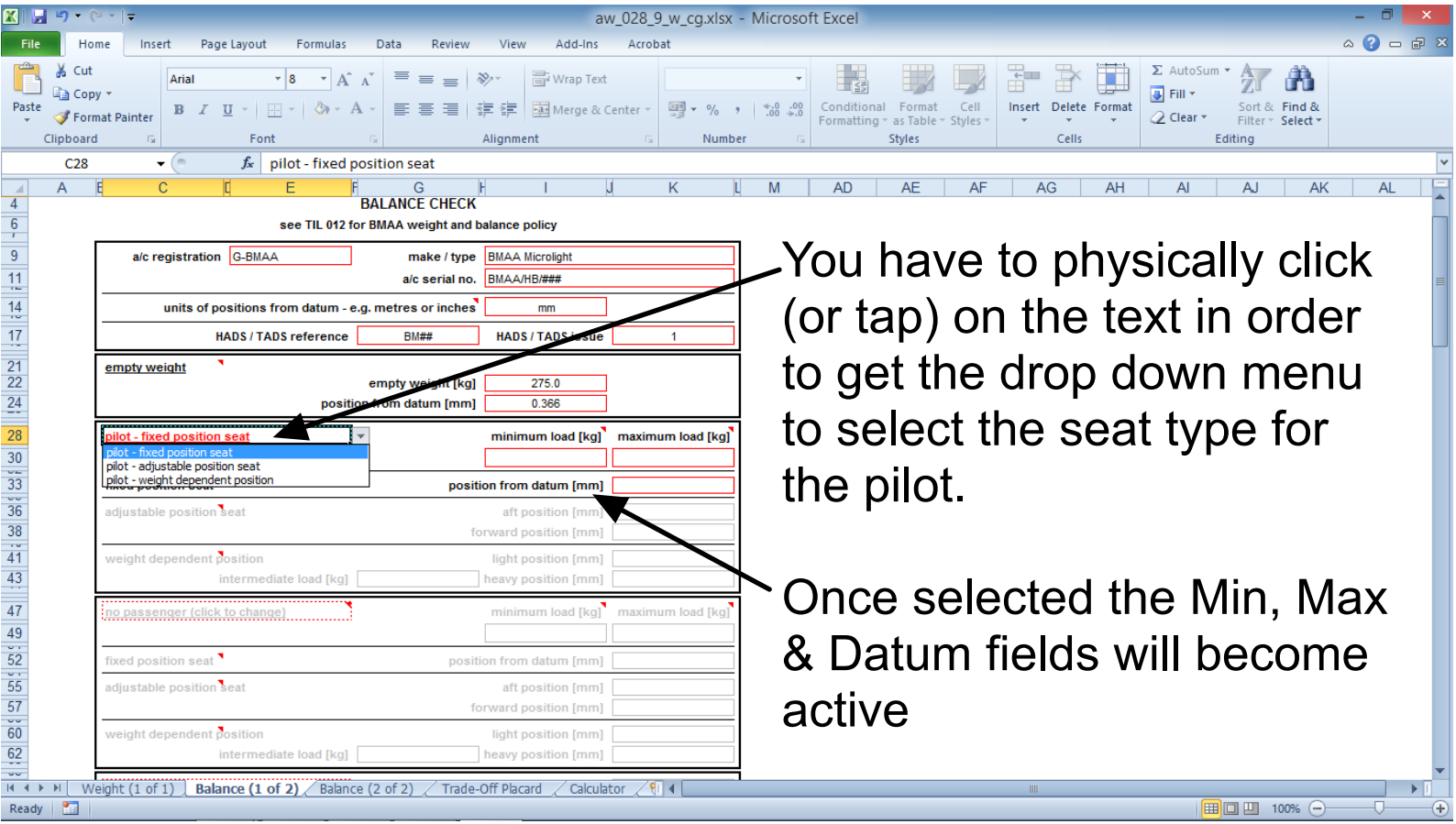
Finally sign and date the form

Part 2: Balance



This section is used to check the balance of an aircraft. It is accessed using the Balance tabs at the foot of the Spreadsheet

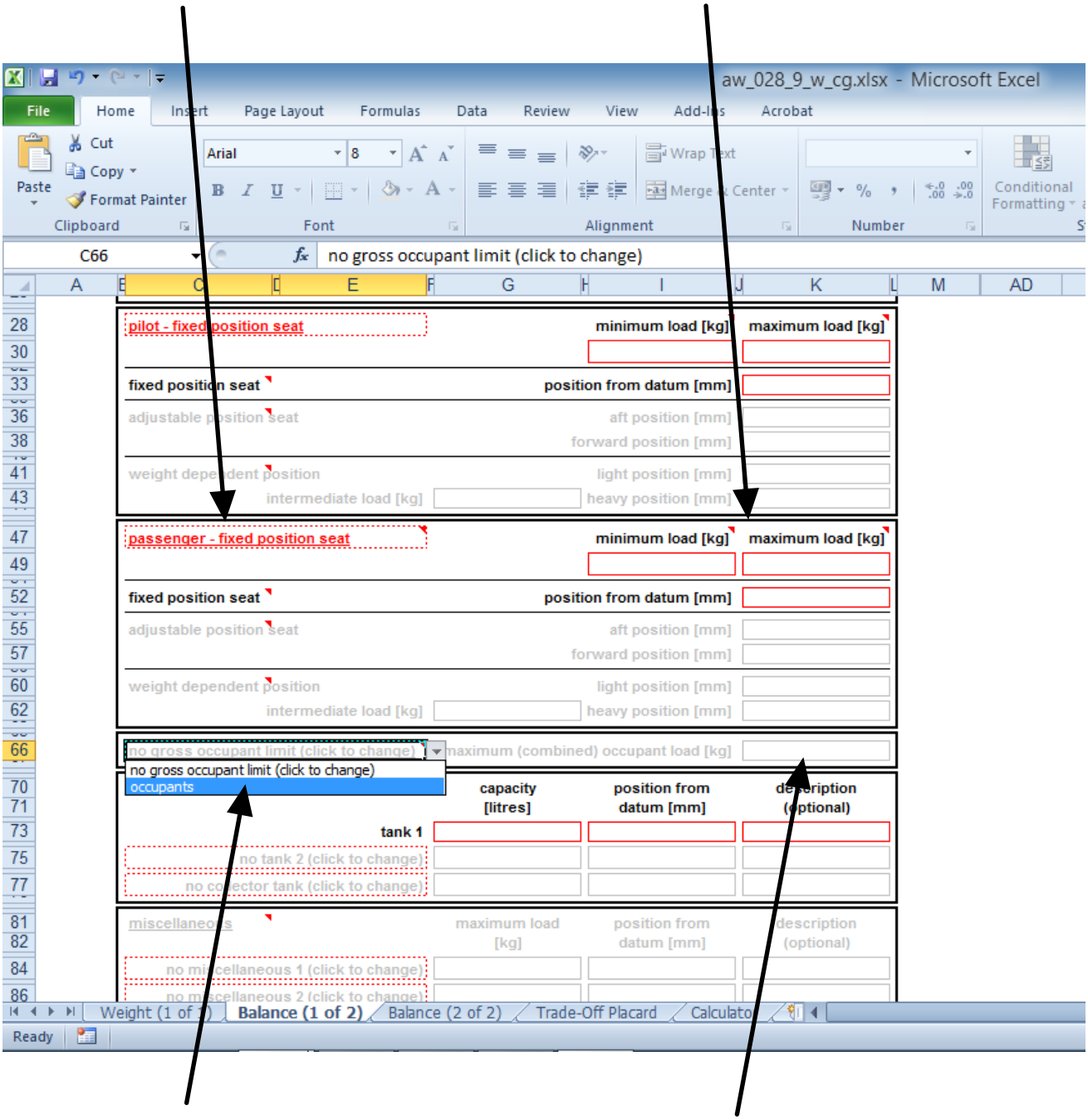
Seat types: Fixed, Adjustable & Weight Dependent



You have to physically click (or tap) on the text in order to get the drop down menu to select the seat type for the pilot.

Once selected the Min, Max & Datum fields will become active

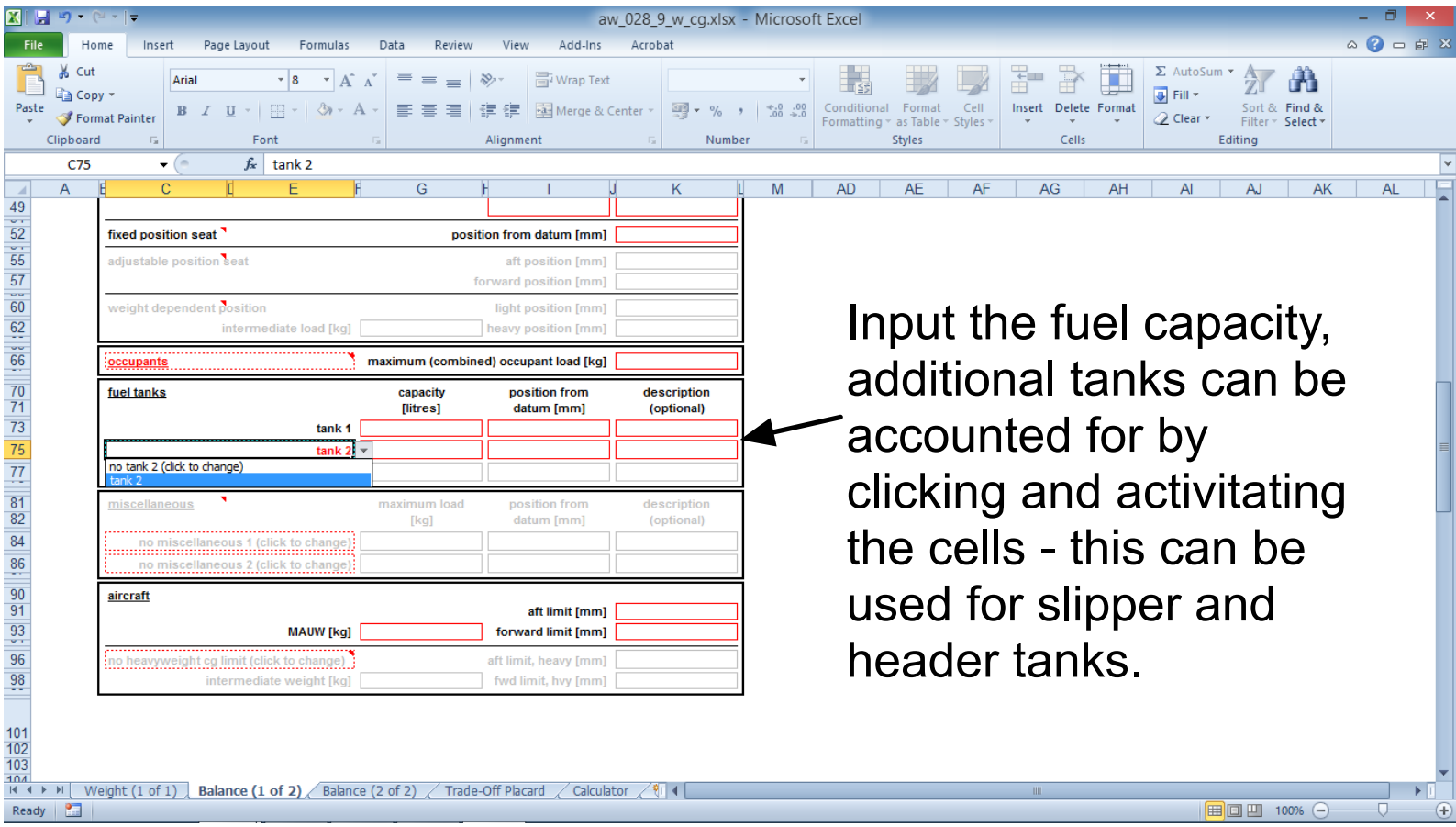
Passenger: Repeat the last step in order to activate the passenger cell, again you have the option to choose fixed, adjustable of weight dependent positions.



If applicable to the type activate the Maximum Occupant Load cell by clicking on it. Note this is used when the maximum cockpit weight is less than the maximum combined seat & baggage limits. *For example the C42 can have 120kg in either seat, but the overall cockpit limit is only 172kg (not 240kg!). The aircraft data sheet should provide the data.*

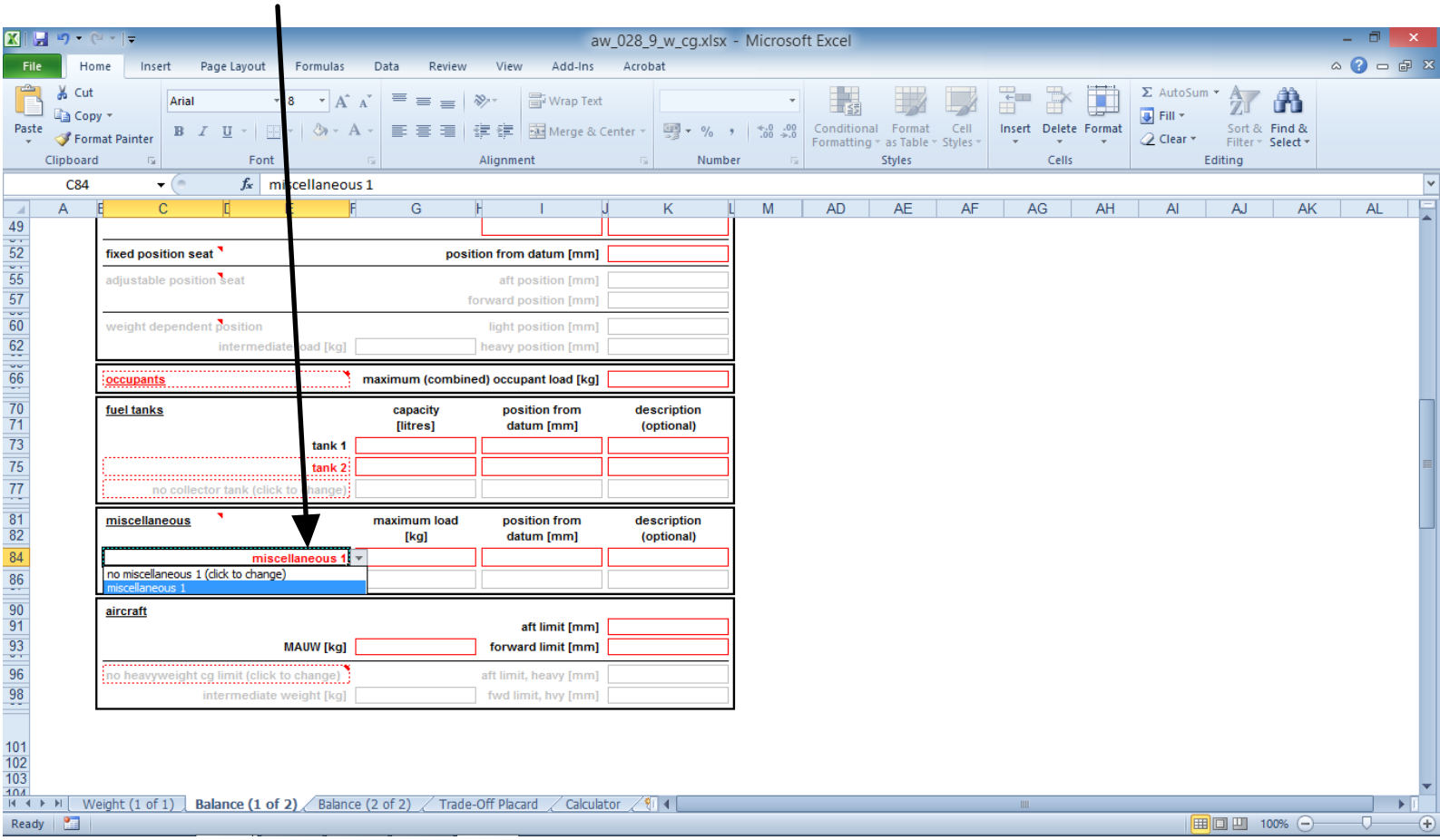
If the type is not limited, like the Skyranger, then there is no need to activate this function in the Spreadsheet, you can leave it greyed out.

Fuel:

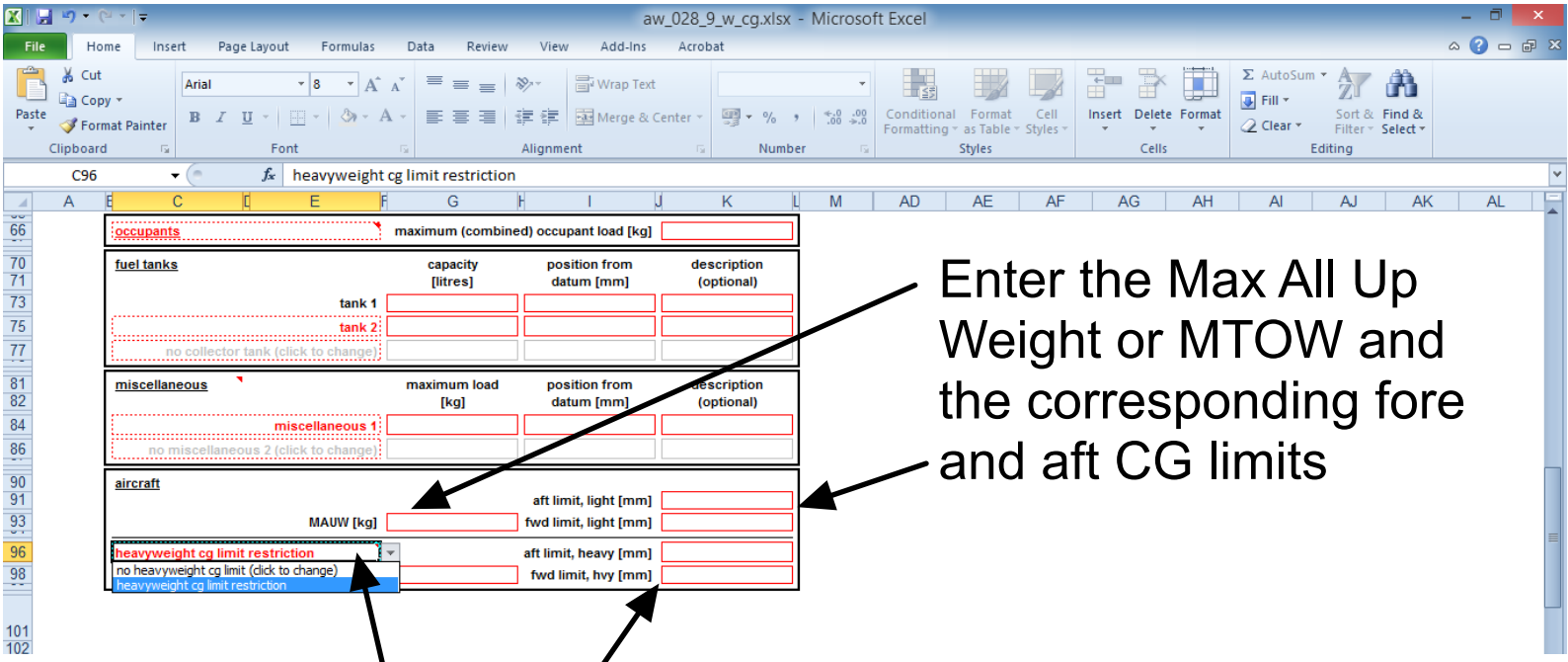


Input the fuel capacity, additional tanks can be accounted for by clicking and activitating the cells - this can be used for slipper and header tanks.

Miscellaneous Items: This is will mainly be used for baggage capacity, again you need to activate the function before being able to use it



Weight & CG limitations:



Weight Dependent CG Limitations:

A limited number of types, such as the C42, have variable CG limits depending upon the MAUW/MTOW. The spreadsheet can accomodate such scenarios.

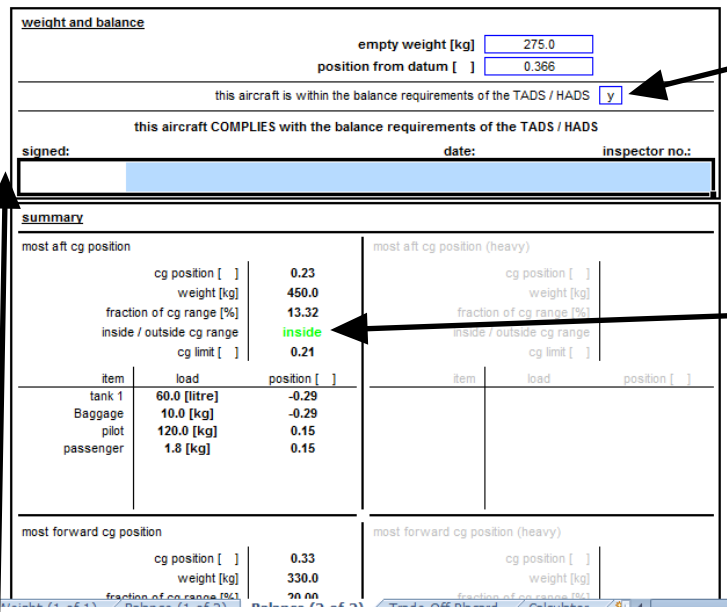
As previous first you need to activate the function by clicking or tapping on the section. Then additional CG limits become available. Enter the values with reference to the aircraft data sheet.

Be sure to match the correct CG limits to the corresponding MAUW limit. For example in the case of the C42:

MAUW	Aft CG Limit	Forward CG Limit
472.5kg	560mm	366mm
≤450kg	560mm	350mm

Finally click on the Balance 2 of 2 tab to see the results

Part 3: Result



weight and balance

empty weight [kg]	275.0
position from datum [ ]	0.366
this aircraft is within the balance requirements of the TADS / HADS	y

this aircraft COMPLIES with the balance requirements of the TADS / HADS

signed: date: inspector no.:

summary

most aft cg position		most aft cg position (heavy)	
cg position [ ]	0.23	cg position [ ]	
weight [kg]	450.0	weight [kg]	
fraction of cg range [%]	13.32	fraction of cg range [%]	
inside / outside cg range	inside	inside / outside cg range	
cg limit [ ]	0.21	cg limit [ ]	

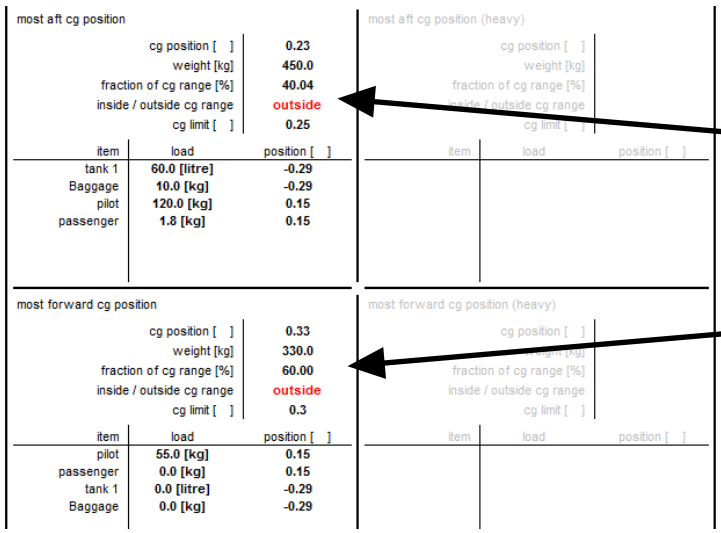
item	load	position [ ]
tank 1	60.0 [litre]	-0.29
Baggage	10.0 [kg]	-0.29
pilot	120.0 [kg]	0.15
passenger	1.8 [kg]	0.15

most forward cg position		most forward cg position (heavy)	
cg position [ ]	0.33	cg position [ ]	
weight [kg]	330.0	weight [kg]	

The spreadsheet will indicate (Y or N) whether the aircraft remains within limitations in all legal loading condition.

The spreadsheet provides a breakdown of the most forward and most aft loading scenarios.

In this case the result is inside by 13.32%



most aft cg position		most aft cg position (heavy)	
cg position [ ]	0.23	cg position [ ]	
weight [kg]	450.0	weight [kg]	
fraction of cg range [%]	40.04	fraction of cg range [%]	
inside / outside cg range	outside	inside / outside cg range	
cg limit [ ]	0.25	cg limit [ ]	

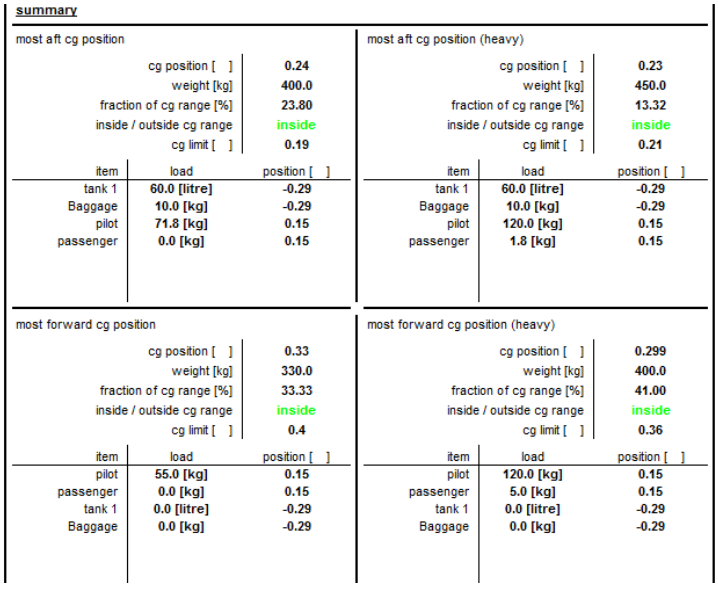
item	load	position [ ]
tank 1	60.0 [litre]	-0.29
Baggage	10.0 [kg]	-0.29
pilot	120.0 [kg]	0.15
passenger	1.8 [kg]	0.15

most forward cg position		most forward cg position (heavy)	
cg position [ ]	0.33	cg position [ ]	
weight [kg]	330.0	weight [kg]	
fraction of cg range [%]	60.00	fraction of cg range [%]	
inside / outside cg range	outside	inside / outside cg range	
cg limit [ ]	0.3	cg limit [ ]	

item	load	position [ ]
pilot	55.0 [kg]	0.15
passenger	0.0 [kg]	0.15
tank 1	0.0 [litre]	-0.29
Baggage	0.0 [kg]	-0.29

In this case the results are outside by some margin.

Naturally this would warrant investigation to determine the cause.



summary

most aft cg position		most aft cg position (heavy)	
cg position [ ]	0.24	cg position [ ]	0.23
weight [kg]	400.0	weight [kg]	450.0
fraction of cg range [%]	23.80	fraction of cg range [%]	13.32
inside / outside cg range	inside	inside / outside cg range	inside
cg limit [ ]	0.19	cg limit [ ]	0.21

item	load	position [ ]	item	load	position [ ]
tank 1	60.0 [litre]	-0.29	tank 1	60.0 [litre]	-0.29
Baggage	10.0 [kg]	-0.29	Baggage	10.0 [kg]	-0.29
pilot	71.8 [kg]	0.15	pilot	120.0 [kg]	0.15
passenger	0.0 [kg]	0.15	passenger	1.8 [kg]	0.15

most forward cg position		most forward cg position (heavy)	
cg position [ ]	0.33	cg position [ ]	0.299
weight [kg]	330.0	weight [kg]	400.0
fraction of cg range [%]	33.33	fraction of cg range [%]	41.00
inside / outside cg range	inside	inside / outside cg range	inside
cg limit [ ]	0.4	cg limit [ ]	0.36

item	load	position [ ]	item	load	position [ ]
pilot	55.0 [kg]	0.15	pilot	120.0 [kg]	0.15
passenger	0.0 [kg]	0.15	passenger	5.0 [kg]	0.15
tank 1	0.0 [litre]	-0.29	tank 1	0.0 [litre]	-0.29
Baggage	0.0 [kg]	-0.29	Baggage	0.0 [kg]	-0.29

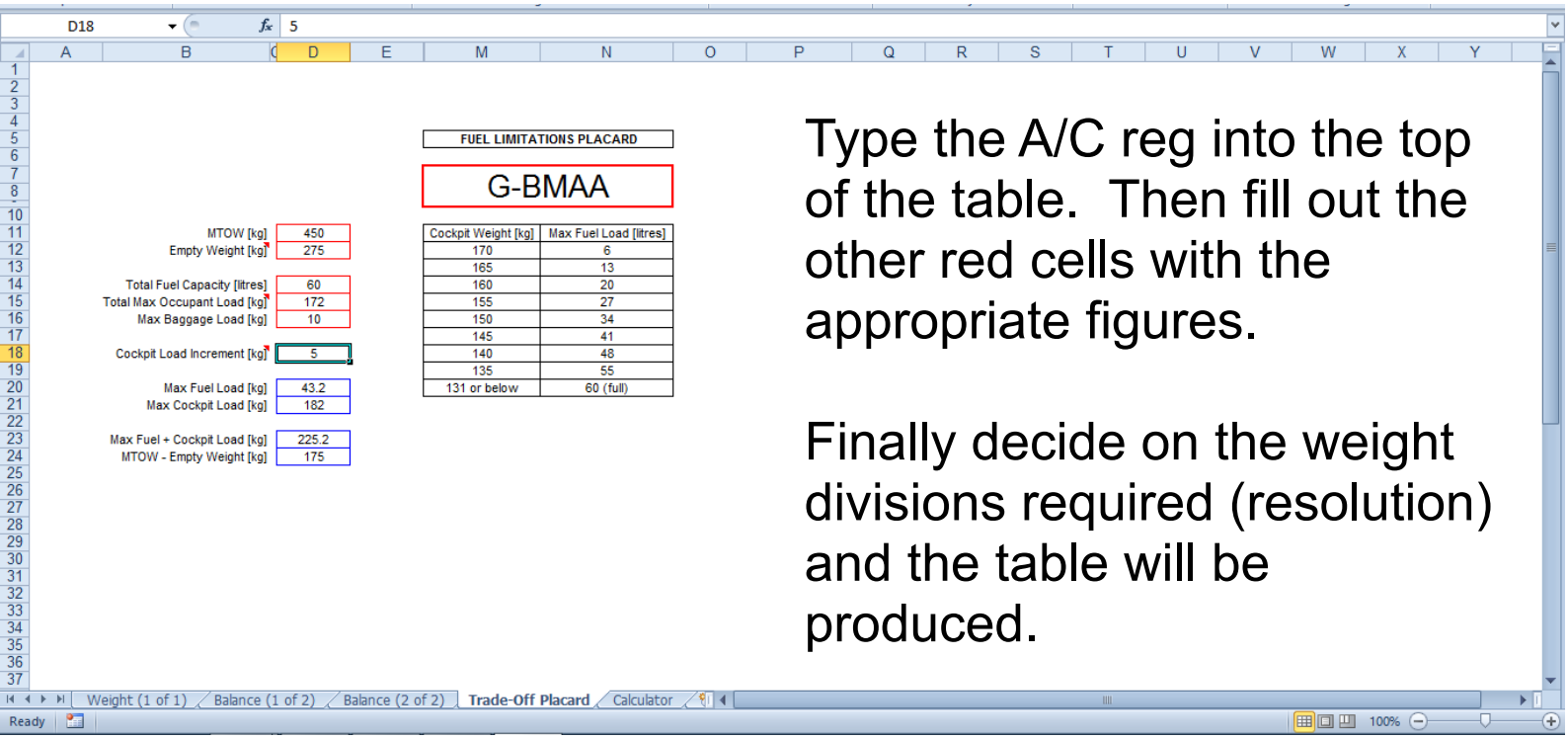
Variable CG Limits:

With variable CG limitations, the spreadsheet will return results for both MAUW figures specified, this case 472.5kg (heavy condition) and 450kg (light condition)

****Don't forget to sign and date the report****

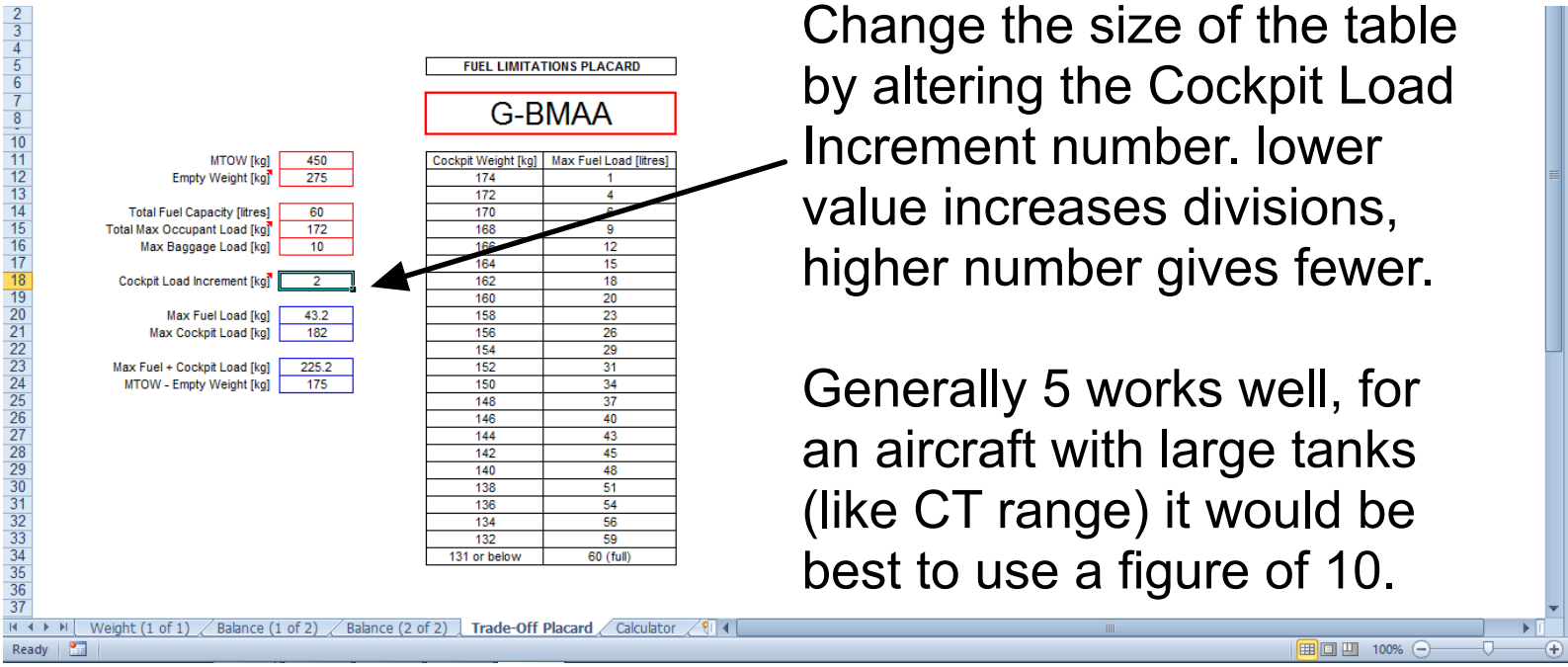
Part 4: Fuel Trade-off Placard

If the aircraft can be loaded over the MAUW, then a Fuel Trade-off Placard must be produced.



Type the A/C reg into the top of the table. Then fill out the other red cells with the appropriate figures.

Finally decide on the weight divisions required (resolution) and the table will be produced.



Change the size of the table by altering the Cockpit Load Increment number. lower value increases divisions, higher number gives fewer.

Generally 5 works well, for an aircraft with large tanks (like CT range) it would be best to use a figure of 10.

PLACARDING & LOGBOOK:

Do not forget to make a logbook entry with the wheel weights and empty CG location. All placards must be updated. Finally the report (all pages) must be submitted to the BMAA Tech Office for checking and final approval.