BGA AIRWORTHINESS AND MAINTENANCE PROCEDURES

PART 4, LEAFLET 4-2

AIRCRAFT WEIGHT AND BALANCE (simple method)

INTRODUCTION

1. This leaflet contains information for calculating the basic weight and centre of gravity schedule for powered aircraft where a cockpit loading placard is not required

2. Information required;
   1) Aircraft Datum
   2) Datum of weighing points
   3) Levelling points for weighing
   4) Unusable Fuel and tank capacity if full
   5) C of G of usable and un-usable fuel

2. With aircraft in correct attitude weigh the main wheels and tail/nose wheel or use jacking points and record.
3. If actual weighing datums are not known, plumb down and mark floor and measure from known datum point.
4. Calculate the basic C of G as follows;

	Weight of mains	x	arm from datum	=	moment
+	Weight of tail/nose	x	arm from datum	=	moment
+	Weight of unusable fuel	x	arm from datum	=	moment
=	Total weight		C of G		Total moment
Minus	Weight of usable fuel	x	arm from datum	=	moment
=	Empty weight		Empty C of G		Empty moment

Add the weights and moments. Divide the total moment by the total weight to give the C of G. If the aircraft was weighed with full fuel deduct the usable fuel weight and moment before calculating the empty C of G.
If any of the weighing points are in front of the datum the moment becomes a minus (-).

See examples over page.

5. A list of equipment fitted or carried by the aircraft at the time of weighing should be compiled. This becomes the list of basic equipment. Light aircraft are normally weighed with full oil and fluids. (excluding fuel). If basic equipment items were removed for weighing the weight and stowed position should be caculated and added to the basic equipment list and empty weight to form the basic weight.
6. The weights and moment arms of additional items that may change with a configuration change and should be listed in Additional items e.g. Propeller type.
7. The weight and moment arm of Pilot is the Variable load
8. The weights and moment arm of passengers, fuel, oil and baggage becomes the disposable load
9. Either use Metric or Imperial units do not mix. Normally use whatever the flight manual limitations are quoted in.
10. Refer to the flight manual for C of G of items.
11. Use BGA 211 for Weight and Centre of Gravity Schedule

12. Examples of weight and balance calculations (Units Lbs. or Kgs not specified)

Aircraft "A"

Aircraft weighed without usable fuel			
	Weight	Arm	Moment
Main Wheels (Total)	450	55	24750
Tail Wheel	75	185	13875
Un-usable fuel	5	60	300
Total	530	73.4	38925

Basic weight is 530 and C of G is 73.4 aft of datum

Aircraft "B"

Aircraft weighed with full fuel (Datum 55"forward of wing leading edge)			
	Weight	Arm	Moment
Main Wheels (Total)	700	50	35000
Tail Wheel	80	210	16800
Un-usable fuel	5	60	300
Usable fuel	- 135	60	- 8100
Total	650	67.7	44000

Basic weight is 650 and C of G is 67.7 aft of datum

Aircraft "B"

Aircraft weighed with full fuel with wing L/E as datum point (wing leading edge 55" behind datum)			
	Weight	Arm	Moment
Main Wheels (Total)	700	-5	- 3500
Tail Wheel	80	155	12400
Un-usable fuel	5	5	25
Usable fuel	-135	5	- 675
Total	650	12.7	8250

Basic weight is 650 and C of G is 12.7 behind wing leading edge. Add distance form wing L/E to datum to show C of G position.
Note: Some aircraft use the wing leading edge as the datum.