



SECTION 0 - GENERAL

0.0 Flight Manual Approval

Kavanagh Balloons
Approved Hot Air Balloon Flight Manual

Models:

B-77, B-105, B-350, B-400, B-425

C-56, C-65, C-77

D-77, D-84, D-90, D-105

E-120, E-140, E-160, E-180, E-210, E-240, E-260, E-300

EX-60, EX-65

G-450

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Applicable to Serial Numbers as shown in Section 1.2

This manual is specific to the following balloon

Model _____

Serial Number _____

Construction Date _____

Registration Mark _____

Approved By



For the Civil Aviation Safety Authority Australia

Approval Date

23 Oct 2015



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0.1 Log of Revisions

Revision No.	Revised Pages	Approval Date	Approval Signature
1	0-1, 0-3, 0-7, 3-3, 4-17	2nd Sep 2010	
2	0-1, 0-3, 0-7, 0-14, 0-15, 2-3, 3-5, 4-14, 7-12, 7-13, 7-14, 7-15, 7-16, 7-17, 7-18, 7-19, 7-20, 7-21, 7-22, 7-23, 7-24, 7-25, 7-26, 8-4, 8-5, 8-6	22nd May 2012	
3	0-1, 0-3, 0-7, 0-15, 2-1, 2-3, 2-4, 7-20, 7-21, 7-23, 7-24, 7-25, 7-26, 7-27, 7-28, 8-1	23rd Sep 2013	
4	0-1, 0-3, 0-7, 2-1, 7-23	1st Oct 2015	

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0.3 Log of Effective Pages

Page	Revision	Page	Revision	Page	Revision
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0-2	Blank	3-8	Blank	7-4	0
0-3	4	4-1	0	7-5	0
0-4	Blank	4-2	0	7-6	0
0-5	0	4-3	0	7-7	0
0-6	Blank	4-4	0	7-8	0
0-7	4	4-5	0	7-9	0
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2-5	0	4-23	0	7-27	3
2-6	0	4-24	Blank	7-28	Blank
2-7	0	5-1	0	8-1	3
2-8	Blank	5-2	0	8-2	0
3-1	0	5-3	0	8-3	0
3-2	0	5-4	Blank	8-4	2
3-3	1	6-1	0	8-5	2
3-4	0	6-2	0	8-6	2
3-5	2	7-1	0	9-1	0
3-6	0	7-2	0	9-2	Blank

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For Civil Aviation Safety Authority

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- All fuel tanks used must have a padded jacket with water resistant outer and not less than 19mm thick foam.

2.8 Baskets

- A minimum of one hand hold is required per passenger.
- Adequate space for passengers to assume a safe landing position is required in all passenger compartments.
- Where the basket exceeds the length to width ratio of 1.4:1, rotation vents must be fitted to the envelope.
- Where cushioned flooring is fitted to a basket, all drain holes must remain clear.

2.9 Number of Occupants

- The maximum number of occupants is set by the number of available compartments in the basket.
- Open baskets are limited to 7 occupants, including flight crew.
- Partitioned baskets are limited to a maximum of 6 people per passenger compartment and 2 flight crew in the pilot compartment.
- All occupants must have reasonable space to achieve a safe landing position and reasonable comfort levels during the flight.
- All occupants must have access to a minimum of one hand hold eg: rope handle or tank rim.
- The pilot must have adequate space to access and operate all fuel systems and control lines.

2.10 Flight Crew

- Minimum flight crew is one person, however there must be sufficient weight on board so the balloon can be flown in a controlled manner. See Section 2.1 for minimum landing weight.



SECTION 2 - LIMITATIONS

2.1 Gross Certificated Weight

Table 1 - Volume and GCW for each model

Model	Volume		GCW(KG)
	Ft ³	m ³	
B-77	77,500	2195	760
B-105	105,500	2973	1030
B-350	350,000	9911	2800
B-400	400,000	11327	3100
B-425	425,000	12034	3400
C-56	56,000	1586	550
C-65	65,000	1841	635
C-77	77,500	2195	760
D-77	77,500	2195	760
D-84	84,000	2379	824
D-90	90,000	2549	902
D-105	105,500	2973	1030
E-120	120,000	3398	1175
E-140	140,000	3964	1300
E-160	160,000	4531	1400
E-180	180,000	5097	1450
E-210	210,000	5947	1900
E-240	240,000	6796	2000
E-260	260,000	7362	2200
E-300	300,000	8495	2500
EX-60	60,000	1700	580
EX-65	65,000	1841	638
G-450	450,000	12743	3700

- The above table shows the volume and maximum permissible operating weight for each model balloon without regard to ambient conditions.



- The maximum operating weight for any intended flight must be determined from the performance section, (Section 5).
- The minimum landing weight for any model greater than 140,000cu.ft must not be less than 50% of the gross certificated weight.

2.2 Envelope Temperature

- For all models the maximum envelope temperature is 120 degrees Celsius.

2.3 Rate of Climb

- With the exception of the “EX” type balloons, the maximum allowable rate of climb is 1000fpm.
- For “EX” type balloons, the maximum allowable rate of climb is 1600fpm.

WARNING: If there is any damage to the envelope within the acceptable limits shown in 2.11 (1) of this section, the maximum rate of climb must be reduced to 50% of the maximum allowable rate of climb for that model.

2.4 Meteorological conditions

- The balloon must not be launched in winds exceeding 15 knots at ground level.
- Flights must not be conducted if there is extensive convective activity in the area such as thunderstorms and thermals.

2.5 Altitude

- Maximum permissible operating altitude is that height above ground level at which the burner fails to maintain ignition or that height, at which the maximum temperature is reached, whichever happens first.



- For flights above 10,000ft, flight crew and passenger oxygen must be used in accordance with Civil Aviation Regulations.

2.6 Minimum Burner Requirements

- The following table sets out the minimum burner requirements based on envelope volume using a Kavanagh Series 3 or 4 burner in one of four configurations.

Table 2 - Minimum burner requirements

Balloon Volume	Burner Configuration	
	KBS3	KBS4
56 - 90 (1586 - 2549 cu.m)	Single	N/A
105 - 210 (2973 - 5947 cu.m)	Double	Double
240 - 260 (6796 - 7362 cu.m)	Triple	Double
300 - 350 (8495 - 9911 cu.m)	Triple	Triple
400 - 450 (11327 - 12743 cu.m)	Quad	Quad

2.7 Fuel

- Fuel for the burner is LPG. Propane is the preferred fuel but some content of other hydrocarbons is permissible provided that at least the minimum fuel pressure is maintained.
- The normal operating range of the series 1, 2 & 3 burner is (50 - 218 PSI (350 - 1500 KPA). The normal operating range of the series 4 Crossfire burner is (50 - 180 PSI (350 - 1241 KPA). Main burners must not be operated on vapour fuel supply.
- A minimum of two fuel tanks must be carried at all times in balloons fitted with single or double burners. For balloons fitted with triple burners, three tanks must be carried and four tanks if a quad burner is fitted. Additional fuel tanks may be carried.
- There must be one tank fitted for supply of regulated vapour for each vapour supply hose fitted to the burner - not applicable to Series 4 Crossfire burners with liquid pilot lights.
- All fuel tanks must be secured by two approved tank straps.



Table 9 - Load frames

Group	Model	Description	Burner
A	KLF7661-44	4 Pole, 4 Point 760 x 610	A,B,C
B	KLF7676-44	4 Pole, 4 Point 760 x 760	B,C
C	KLF1010-44	4 Pole, 4 Point 1000 x 1000	C,D
	KLF1010-48	4 Pole, 8 Point 1000 x 1000	
D	KLF1210-44	4 Pole, 4 Point 1200 x 1000	C,D,E
	KLF1210-48	4 Pole, 8 Point 1200 x 1000	
E	KLF2010-88	8 pole, 8 Point 2000 x 1000	C,D,E
F	KLF1310-44	4 Pole, 4 point 1300 x 1000	C,D,E
	KLF1310-48	4 Pole, 8 point 1300 x 1000	
G	KLF1710-48	4 Pole, 8 point 1700 x 1000	C,D,E

7.12.4 Burner List

The Series 4 Crossfire burner can only be fitted to a load frame with the -CB, -CB3, -CBS, -CBL, -CBS3 or -CBL3 suffix in the part number.

Table 10 - Burners

Group	Model	Description
A	KBS1-1	Series 1 Single
	KBS1-2	Series 1 Double
B	KBS2-1	Series 2 Single
	KBS3-1	Series 3 Single
C	KBS2-2	Series 2 Double
	KBS3-2	Series 3 Double
D	KBS3-3	Series 3 Triple
E	KBS3-4	Series 3 Quad
F	Reserved	Reserved
G	KBS4-2 Crossfire	Series 4 Crossfire Double
H	KBS4-3 Crossfire	Series 4 Crossfire Triple
I	KBS4-4 Crossfire	Series 4 Crossfire Quad



7.12.1 Envelope list

Table 7 - Envelopes

Model	Burner	Basket	Load Frame	GCW (Kg)
B-77	B,C,G	A,B	A,B	760
B-105	C,G	B	A,B	1030
B-350	D,E,H,I	F,G	E	2800
B-400	E,I	F,G	E	3100
B-425	E,I	F,G	E	3400
C-56	A,B,C,G	A	A,B	550
C-65	A,B,C,G	A	A,B	635
C-77	B,C,G	A,B	A,B	760
D-77	B,C,G	A,B	A,B	760
D-84	B,C,G	B	A,B	824
D-90	C,G	B	A,B	902
D-105	C,G	B	A,B	1030
E-120	C,G	B,C	B,C	1175
E-140	C,G	B,C	B,C	1300
E-160	C,D,G,H	C,D,E	B,C	1400
E-180	C,D,G,H	D,E	C,D	1450
E-210	C,D,E,G,H,I	D,E	D,F,G	1900
E-240	D,E,G,H,I	E,F	D,E,F,G	2000
E-260	D,E,G,H,I	E,F	D,E,F,G	2200
E-300	D,E,H,I	E,F	D,E,F,G	2500
EX-60	B,C,G	A,B	A,B	580
EX-65	B,C,G	A,B	A,B	638
G-450	E,I	G	E	3700



7.12.2 Basket List

The nominal size of each basket is indicated by the numbers following the prefix. Example: The part number for a single tee basket 2.7 metres long by 1.5 metres wide is KST2715.

Table 8 - Baskets

Group	Model	Description	Load Frame	GCW (Kg)
A	KLW1010	Light weight, open	A,B	760
	KLW1110	Light weight, open	A,B	
	KLW1210	Light weight, open	A,B	
	KLW1211	Light weight, open	A,B	
	KOB1010	Standard, open	A,B	
	KOB1110	Standard, open	A,B	
	KOB1210	Standard, open	A,B	
B	KLW1410	Light weight, open	A,B	1400
	KLW1411	Light weight, open	A,B	
	KLW1510	Light weight, open	A,B	
	KLW1511	Light weight, open	A,B	
	KOB1410	Standard, open	A,B	
	KOB1510	Standard, open	A,B	
	KOB1610	Standard, open	A,B	
	KOB1810	Standard, open	A,B	
	C	KMT1812	Mini Tee	
KMT2012		Mini Tee	A,B	
KST1812		Single Tee	A,B	
KST2012		Single Tee	B,C	
KST2014		Single Tee	B,C	
KST2212		Single Tee	C	
KST2214		Single Tee	C	
D	KST2415	Single Tee	C	1800
	KST2515	Single Tee	C	



Table 8 - Baskets (cont)

Group	Model	Description	Load Frame	GCW (Kg)		
E	KST2715	Single Tee	D,F	2200		
	KST2715-A	Single Tee, Large LF	G			
	KST2816	Single Tee	D,F			
	KST2816-A	Single Tee, Large LF	G			
	KST2816-A-UA	Single Tee, Large LF, Door access	G			
	K4DT2715	4 Pole Double Tee	D,F			
	K4DT2815	4 Pole Double Tee	D,F			
F	K4DT2915	4 Pole Double Tee	D,F	2800		
	K4DT3215	4 Pole Double Tee	D,F			
	K8DT3615	8 Pole Double Tee	E			
	G	K8DT4015	8 Pole Double Tee		E	3700
		K8DT4315	8 Pole Double Tee		E	
K8DT4615		8 Pole Double Tee	E			
K8DT5015		8 Pole Double Tee	E			

7.12.3 Load Frame List

Load frame part numbers in table 9 show the base part number for all load frames as configured for the Series 3 burner.

All load frames may be configured for use with the Series 4 Crossfire burner and will have a suffix as follows included in the part number.

-CB	KBS4-2 or KBS4-4 cross bar in a square load frame
-CB3	KBS4-3 cross bar in square frame
-CBS	KBS4-2 or KBS4-4 cross bar in line with short side of the load frame
-CBS3	KBS4-3 cross bar in line with short side of load frame
-CBL	KBS4-2 or KBS4-4 cross bar in line with long side of the load frame
-CBL3	KBS4-3 cross bar in line with long side of the load frame