HOT AIR BALLOON FLIGHT MANUAL

Approved by EASA under Approval Number EASA.BA.A.01000 on 10 April 2006.

This manual forms part of EASA Type Certificates EASA.BA.012 and EASA.BA.013. Following initial certification as shown above, any subsequent revisions to this manual shall either be directly approved by EASA or be approved under the authority of Cameron Balloons Limited, DOA No. EASA 21J.140.

Any revisions/supplements made by other Approved Organisations must be seperately approved

This Manual is specific to the following balloon:

Model _____ Constructor's Number _____

Registration _____ Year Of Construction _____

Applicable MTOM _____ kg

This balloon is to be operated in compliance with the information and limitations contained herein.

Signed _____ Name _____ Date _____

Authority _____

Manufacturer:

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Record Of MTOM Amendments

Applicable MTOM	Date Of Change	Signature

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Record of Amendments

Amendment Number	Description	Pages Affected	Date	Approval
1	Record of Amendment, List of Effective pages, Contents and List of Supplements Updated. Page 2-2: Permitted Damage increased. Page 4-2: Cylinder Orientation guidance added. Page 5-6: "Total" boxes added to tables. Page 6-10; Caution regarding vapour regulators at low ambient temperature added. 45 was 60. Pages 7-1, 7-2 revised, 7-3 and 7-4 added. Supplement 8.1: Addition of Turtle-120 Special Shape, Colt Sugar Box 90, Buddy-90, Head One-105, Lightbulb-110, Bierkrug-90, Condom -105, Apple-90, RX-105, Tiger 90 and Cup-110. Supplement 8.6: Addition of Record of Amendments, T&C and Cameron burners and burner frame information. Supplement 8.8: Introduction of basket maximum pay-loads and minimum burner requirements in accor-dance with EASA.BA.016. Extension to include T&C envelopes. Supplement 8.9: Kubíček Bottom Ends with Cameron and T&C Envelopes. Supplement 8.12: Addition of Cameron H20, H24, H34, Colt 17A, 21A and Thunder AX6-56S1.Supplement 8.15: Addition of Basket List. Supplement 8.19: Demountable double, triple and quad burners. Supplement 8.21: Deletion of A1 category (moved to type specific supplements), Addition of Basket CB3394, CB3006, CB3027, CB3120, CB3448 and CB3449, added. Type 3 cylinders added to CB950 and CB3175. Supplement 8.22: Addition of Paragraph 22.6.3.10.1. Burner Assemblies CB2051, CB2065, CB2081, CB2089, CB2095, CB2096, CB2097, CB2130, CB2145, CB2298, CB2299 added.Supplement 8.32: Out of Production Hoppers. Supplement 8.33: Sky Bottom Ends with Cameron and Thunder & Colt Envelopes.	i-iii, i-vii, i-viii, i-ix, i-xiv, ixv, i-xvi, 2-2, 2-3, 4-2, 5-6, 6-10, 6-11, 7-1 to 7-4, Supplement 8.1: All, Supplement 8.6: All, Supplement 8.8: All, Supplement 8.9: New Supplement, Supplement 8.12: All, Supplement 8.15: All, Supplement 8.19: New Supplement, Supplement 8.21: All, Supplement 8.22: All, Supplement 8.32: New Supplement, Supplement 8.33: New Supplement,	17:12:2007	Approved by EASA under Approval Number EASA.BA.C.01128
2	Supplement 8.10: Chaize Baskets.	Supplement 8.10: New Supplement,	21:12:2007	Approved by EASA under Approval Number EASA.BA.A.01013
3	Page 9-6 Burner frame applicabilities corrected, key updated, Page 9-8: Assembly CB2424 added, Supplement 8.8: Cameron Burners Added; Supplement 8.9: Baskets K12/K12A/K15 added, Cameron Burners Added. Supplement 8.21: T&C Burner Frame applicabilities updated, key updated.	i-iii, i-vii, i-ix, 9-6, 9-8, Supplement 8.8: All, Supplement 8.9: All, Supplement 8.21: All	01:02:2008	Revision nr Amendment 3 to AFM ref. HABFM-Issue 10 is approved under the authority of DOA nr EASA.21J.140
4	Section 2: Permitted Damage limits revised, TR-77 Variant added. Section 6: TR-77 added, Section 9: TR-77 added, Supplements 8.1 Issue 10: Satzenburger Bottle 56, Colt Flying Jeans, Cameron Cabin and Box 105 added. Supplement 8.2 "Kevron" Load Tapes added, 8.16 Single Airchair added, Supplement 8.21: Issue 6 Basket CB8280 added. Supplement 8.22: Issue 3 Burner assemblies CB2103, CB2104, CB2119 and CB2242 added.	i-iii, i-vii, i-ix,Page2-2 to 2-6, 6-2, 9-2,9-3. Supplement 8.1: All, Supplement 8.2: New Supplement 8.16: New Supplement 8.21: Issue 6 Supplement 8.22: Issue 3	03.03.08	Approved by EASA under Approval Number EASA.BA.C.01145

Amendment Number	Description	Pages Affected	Date	Approval
5	Approval statement revised, Record of Amendments updated, List of effective pages updated, List of supplements removed (now on website). Section 1: Clarification of amendment procedure, Type certificate references now in title only “envelopes” added to Section 1.5. Section 2: Limitations Format revised, 2.17 Z-425LW added , Table 1 now only lists volumes (not variant prefixes). Section 8: Supplement Section revised to allow the use of approved data from old manuals. Section 9: Table 8-CB2941 added. Appendix 2 Load Calculation revised. Supplement 1: Egg-120 (new), House-60, Can-60, Newspaper 90, Flying Lager Bottle 2, Tub-80, Club-90 (all approved data) added. Supplement 9: Ignis double and triple burner added. Supplement 21: CB310-5A, CB994, CB3380 and CB3482 added, Type 2 Cylinders added to CB3018	i-i, i-iv, i-vii, i-ix, i-x, 1-1, 1-2, 2-1, 2-2, 2.5, 2.6, 2-7, 8-1, A2-1 Supp 8.1: All, Supp 8.9 : All, Supp 8.21: All	31:07:2008	Approved by EASA under Approval Number EASA.BA.C.01161
6	Record of Amendments updated. Section 2, Section 5 “35” and “50” Variants added. Section 6 Envelope descriptions tabulated. Section 9 A-225, C-50 and TR-84 added. Supplements incorporated: 8-1 Issues 12 and 13 (Furness -56 Building, Colt Flying Head, Elephant-77, S-Can-100, Inverted Balloon-105, Orange-120, Ball-70, Fire Truck-100, N-120MW, Beer Crate-120), 8-7 Iss 2 (MK21, BMK008, BMK-050 burners added, C-12 basket added) 8-9 Iss 4 (K-16 and K-18 baskets added), 8-21 Issues 8 and 9 (CB3490, CB3497 added)	i-iv, i-vii, i-xiv, 2-6, 5-4, 5-5, 6-1,6-2, 9-1to 9-3, Supp 8.1: All, Supp 8.7 : All, Supp 8.9 : All, Supp 8.21: All	25:06:2009	Approved by EASA under Approval Number EASA.BA.C.01197
7	Record of Amendments updated. LEP updated. Contents updated. Section 2: Windspeed limitation reworded for clarity. Minimum equipment list amended, Pilot qualification deleted, Rates of climb and descent amended (relative wind limit restored from issue 7), 2.13 Deleted (now in Supplement 8.3), 2.14 Tethering limits revised for large balloons, 2.17 A450LW added. Section 3: Approval statement added. Fire in the air amended Section 4: Completely revised Section 5: Cross reference updated, Table 2 and 3 A-450LW added Section 6: Parachute edge tempilabel deleted. Section 9: A-450 LW added, basket applicablity for large balloons amended, Burner frame CB2665 added Table 5A added. 4 tonne karabiner note deleted (already in limitations) Appendix 5 added. Supplements 8.3 and 8.4 Introduced Supplement 8.9 raised to issue 5 (burner frame CB855 added). Supplement 8.21 raised to issue 10 (burner frame CB2475 and basket CB3502 added.	i-iv, i-v, i-vii, i-viii, i-xi to i-xvi, 2-1, 2-3, 2-4, 2-5, 2-7, 3-1, 3-2, 4-1 to 4-20 (4-21 to 4-28 deleted), 5-1, 5-4, 5-5, 6-4, 6-5, 9-1, 9-3 to 9-5, A5-1, A5-2. Supp 8.3 all, Supp 8.4 all, Supp 8.9 all, Supp 8.21 all	29:04:2010	Approved by EASA under Approval Number 10029886

Amendment Number	Description	Pages Affected	Date	Approval
8	Record of Amendments updated, List of effective pages updated, Section 2: 2.10 Abiguity for 340 000 corrected Section 9: Burner Frame CB2371 added to basket CB754. Supplement 8.1: Colt Beer Glass, Colt Flying Kiwi and Super FMG-100 Special Shape added. Supplement 8.21: CB3157 Description corrected, CB947 and CB3505 added, burner frame CB2269 added to basket CB3394	i-v, i-vii, 2-4, 9-6, Supp 8.1: All, Supp 8.21: All,	14:07:2010	Approved by EASA under Approval Number 10030936
9	Record of Amendments updated, List of effective pages updated, Section 9, Table 6: Page 9-5, table completely revised, no new equipment introduced. Page 9-6, Burner Frame CB2192 (older non gimbal style) added to basket CB3360 Appendix 3, A3-1, Conversion factor standardised, reference to tables corrected. Supp. 8-13 Duo Airchair: Addition of Duo Skychariot and Duo Airchair. Supp. 8-14 Cloudhopper Millennium: Addition of part number of chair assembly and applicable cylinders. Supp. 8-15 Wheelchair Baskets: Limitations on occupancy moved from Section 6 to Section 2. Descriptions, cylinder and burner frame applicability updated. Supp. 8-21 Special Baskets: Cylinder and burner frame applicability updated. Baskets CB3520, CB3525 and CB3528 added.	i-v, i-vii, i-viii, 9-5, 9-6, A3-1. Supp 8.13: All, Supp 8.14: All, Supp 8.15: All, Supp 8.21: All.	02:03:2011	Approved by EASA under Approval Number 10034058
10	Record of Amendments updated, List of effective pages updated. Section 6: Description of out of production cylinders moved to new supplement. Section 9: Table 5: Envelopes, Type R baskets added to Z-425, Z-450, Z-600. Table 6: Burner Frames CB750, CB2860 and CB2863 added, burner frame applicability to CB8000 series updated Table 7: out of production cylinders deleted, Table 8: Solenoid and removable burners moved to supplements. Appendix III: Out of production cylinders moved to new supplement, Supplements 8.2-8.4, 8.6-8.8, 8.12-8.16, 8.19-8.20, 8.23-8.26, 8.30, 8.32, 8.35 and 8.36: Maintenance Sections removed (published with Maintenance Manual i10-Amdt 3), editorial updates, previously approved equipment added to 8.13 and 8.16. Supplement 8.21: LBL Burner frame (BA-152-A-002) added to CB994, Baskets CB3196, CB3537, CB3541, CB3543 and CB3545 added. Supplement 8.39: New Supplement, “Out of production cylinders” (approved data)	i-v, i-vii, i-viii, i-xv, 6-10, 6-11, 9-3, 9-5-9-8 A3-1. Supp 8.2-8.4, 8.6-8.8, 8.10, 8.13-8.16, 8.19-8.21, 8.23-8.26, 8.30, 8.32, 8.35, 8.36 and 8.39 All,	25:01:2012	Approved by EASA under Approval Number 10038169

Note: Any new or amended text in the revised page will be indicated by a black vertical line in the right hand margin, and the Amendment Number and the date will be shown at the bottom of the page.

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SECTION 3: EMERGENCY PROCEDURES

SECTION 4: NORMAL PROCEDURES

SECTION 5 - WEIGHT CALCULATIONS

SECTION 6: BALLOON AND SYSTEMS DESCRIPTION

1.1 INTRODUCTION

This balloon flight manual has been prepared to provide pilots and instructors with information for the safe operation of all Cameron manned free hot air balloons.

Revisions to this Manual are published on the Cameron Balloons Limited website at www.cameronballoons.co.uk. Mandatory revisions to this manual will be introduced by Service Bulletin.

Email notification of revisions can be received by subscribing to the Technical Update Service on this website.

1.2 CERTIFICATION BASIS

The types of balloon for which this manual is applicable have been approved by EASA, under the following Type Certificates:

EASA.BA.013: Conventionally shaped envelopes

EASA.BA.012: Cameron 'Special' shaped envelopes

1.3 DEFINITIONS

Checklists are given in blue text, while important information is given in **bold text**.

The following definitions apply to warnings, cautions and notes used in this flight manual.

WARNING: Means the non-observation of the corresponding procedure leads to an immediate or important degradation of flight safety.

CAUTION: Means the non-observation of the corresponding procedure leads to a minor long-term degradation of flight safety.

Note: Draws attention to any special item not directly related to safety, but which is important or unusual.

The Maximum take-off Mass (MTOM) is the maximum permissible total weight of the balloon and all its equipment at take-off, including fuel, instruments, passengers and crew.

The Minimum Landing Mass (MLM) is the minimum permissible total weight of the balloon and all its equipment at landing, including fuel, instruments, passengers and crew.

Throughout this manual, the terms 'mass' and 'weight' are interchangeable and have an identical meaning.

1.4 DESCRIPTION

Envelopes are of sewn construction. Envelopes are made from high tenacity nylon fabric and polyester load-bearing tapes.

The main heat source for balloon flight is a high-output burner fuelled by liquid propane (LPG).

The fuel is carried in liquid form under pressure in metal cylinders.

Occupants are carried in a basket of traditional wickerwork construction.

A full description of the balloons and their systems is given in Section 6.

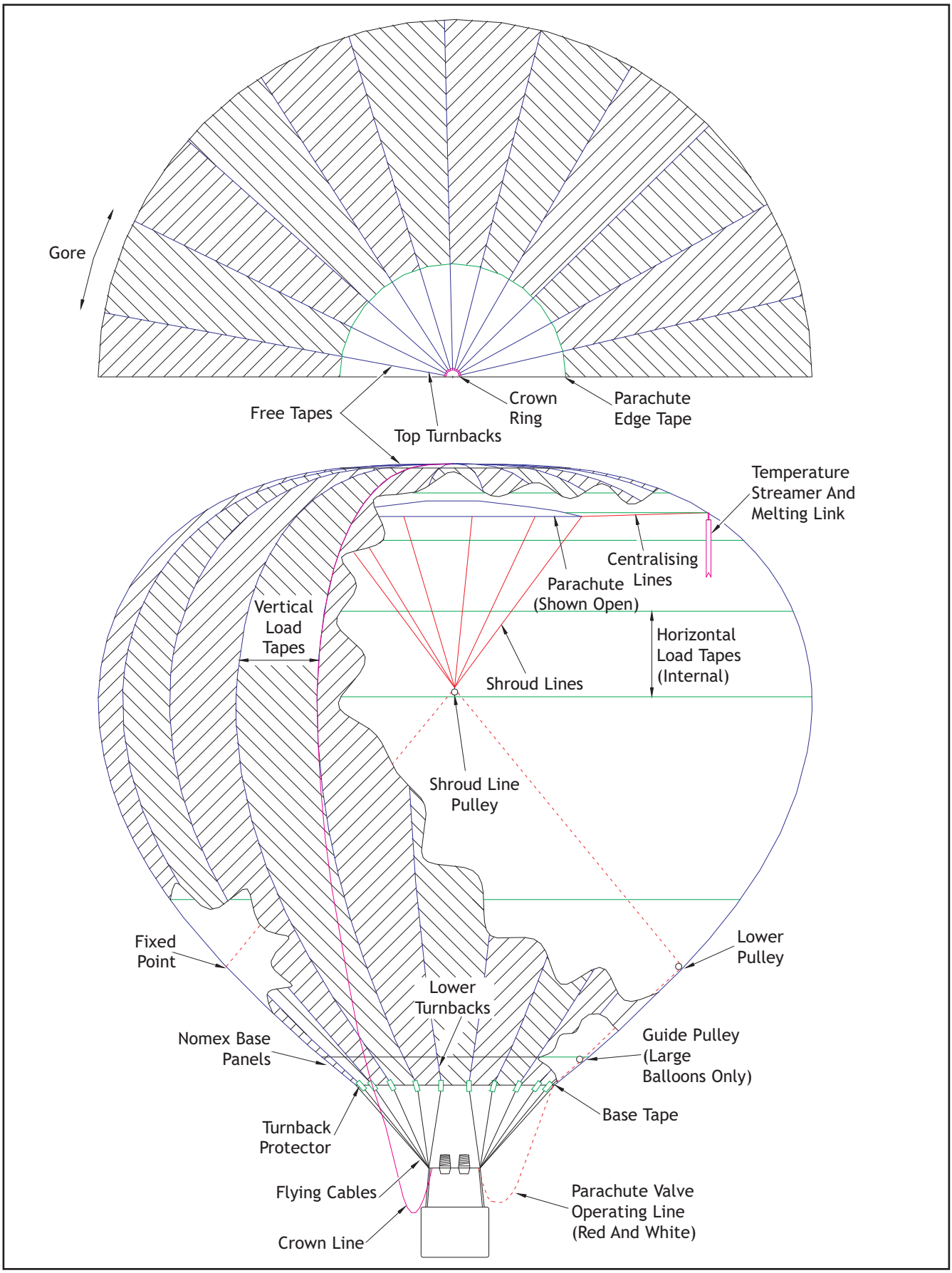
1.5 USE OF OLDER TYPES OF EQUIPMENT

Older types of envelopes, baskets and burners not listed in Issue 10 of Flight Manual may be used provided the appropriate approved Cameron Balloons Flight Manual supplement is used.

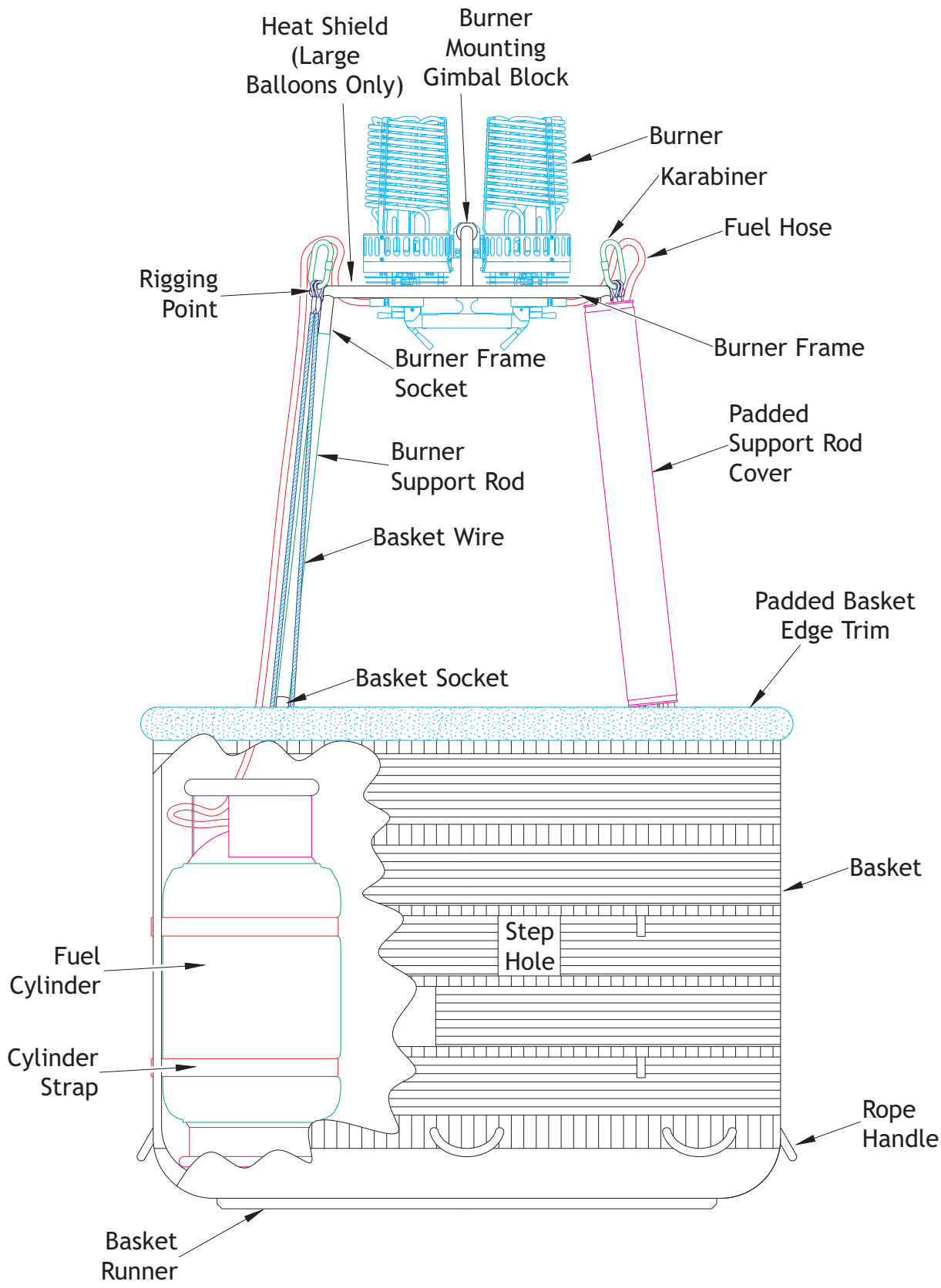
The weights of the envelope basket and burner must be recorded in the Component Weight Record of this manual (Table 4, Section 5) and the appropriate Section of the aircraft logbook.

These weights are listed in the log book of the balloon the items were originally supplied with, or determined by weighing.

The limitations and procedures given in Sections 2 to 5 of this Flight Manual and supplements apply to all Cameron burner and basket types. The inspection schedule given in Section 6 of the Cameron Balloons Maintenance Manual Issue 10 applies to all Cameron envelope, burner, cylinder and basket types.



Typical Envelope Description



Typical 'Bottom End' Description

2.1 INTRODUCTION

Section 2 details the operating limitations for the balloon and its standard equipment.

The limitations included in this Section and in Section 8 have been approved by EASA.

WARNING: The balloon must not be flown into contact with powerlines.

2.2 WEATHER

1. The balloons must not be flown free, if the surface wind at the time and place of take-off is greater than 15 knots (7.7m/sec) or if the forecast for the planned time and place of landing indicates a significant probability of the surface wind exceeding this speed.

2. The balloon must not be flown if there is extensive thermal activity, any cumulonimbus (thunderstorm) activity in the vicinity of the flight path, or any turbulence which is giving rise to gusts of 10 knots (5.1m.sec) above mean wind speed.

2.3 FUEL

1. The fuel for the burner is LPG. Propane is the preferred fuel, but some content of other hydrocarbons is permissible, provided that minimum fuel pressures are maintained through out the flight. Main and whisper burners must not be operated on a vapour fuel supply.

2. With the exception of single occupancy balloons, a minimum of two independent cylinders with provision to supply pilot lights (double burner) are required, three such cylinders for a triple burner, four for a quadruple burner. Extra cylinders may be used.

2.3.1 Fuel Pressures

1. The fuel pressure must never exceed the system safe working pressure of 15 bar (218psi).

	Balloons <340,000 ft^3 (9630m^3)	Balloons >340,000 ft^3	Balloons >340,000 ft^3 using Shadow, Sirocco or Stratus burners
Maximum fuel Pressure	15 Bar (215 psi)	15 Bar	15 Bar
Minimum fuel Pressure	3 Bar (44 psi)	7 Bar (102 psi)	5.5 bar (80 psi)

CAUTION: Care should be exercised if the fuel pressure is below 5.5bar (80 psi).

2.4 MINIMUM BURNER REQUIREMENTS

Burner Configuration	Permitted Envelope Volume
Single	17,000 ft^3 (481 m^3) - 105,000 ft^3 (2975 m^3)
Double	56,000 ft^3 (1585m^3) - 210,000 ft^3 (5950 m^3)
Triple	140,000 ft^3 (3970 m^3) - 315,000 ft^3 (8920 m^3)
Quad	180,000 ft^3 (5100 m^3) - 600,000 ft^3 (16992m^3)

2.5 PERMITTED DAMAGE

1. No damage is permitted to load tapes or any load bearing part of the suspension system.

2. No damage is permitted to the burner or fuel system.

3. Damage to the fabric below the first horizontal load tape above the Nomex (Cameron) or within 4 m of the Nomex (Thunder & Colt) is limited to holes or tears smaller than 1.5 m (60”) in any direction.

4. Damage to fabric in areas above that defined in 3, but below the upper part of the envelope (defined as the area above the widest horizontal seam between two vertical load tapes) is limited to holes or tears smaller than 50 mm (2”) in any direction. The distance between two adjacent holes must not less than four times the maximum dimension of the larger hole. There must be not more than 15 holes in this section of the envelope and no more than 5 in any one panel.

5. Damage to the fabric in the upper part of the envelope is limited to holes or tears smaller than 12 mm (½”) in any direction. The distance between two adjacent holes must not be less than 50mm (2”). There must be not more than 15 holes in this section of the envelope and there must not be more than 5 holes in any one panel.

6. Any damage outside these limitations must be repaired in accordance with the instructions contained in the Maintenance Manual. Permitted damage, other than that specified in 3, must be repaired prior to an annual or 100 hour inspection.

Note: If any two or more small holes lie within a circle of the same diameter as a permitted hole, they may be considered as one hole for the purposes of paragraphs 4 and 5.

2.6 SAFETY EQUIPMENT (MINIMUM EQUIPMENT)

The following minimum equipment must be carried:

1. Protective gloves must be available to the pilot.

2. Matches or other independent means of ignition in addition to any igniters built into the burner.

3. A Halon 1211 or powder fire extinguisher of minimum size 1kg and conforming to EN3.

4. A rate of climb and descent indicator (variometer) where required (Refer to Section 2.10) .

5. An envelope temperature indicator which may either be of the continuous reading type or a type which gives a warning signal.

6. A time piece.

All minimum equipment must be functional.

2.7 CREW

1. The minimum crew is one pilot.

2. The maximum number of occupants (consisting of crew and passengers) is determined by Sections 2.8, 2.9 and 2.15 below.

2.8 ENVELOPE TEMPERATURE AND LOADING

1. The envelope temperature must not exceed 120ºC, (250ºF).

2. The envelope temperature must be controlled either by use of the envelope thermometer, or by loading according to the loading chart in Section 5.

2.9 WEIGHT RANGE

1. The take-off Mass (TOM) of the balloon must never exceed the Maximum TOM (MTOM) shown in table 1. The applicability of the MTOM, either Standard or Reduced is given on page i-i.

2. If it is desired, for operational or insurance reasons, to alter the MTOM of the balloon, either the Standard or Reduced MTOM, appropriate to the balloon model, may be selected. These permitted MTOM values are shown in Section 2 Table 1. The MTOM in use must be entered as an amendment on page i.i and used for loading calculations.

3. For balloons of 105,000 cu. ft (2975 m^3) and above, the Minimum Landing Mass (MLM) for normal operation must not be less than 50% of the Standard MTOM. For special flights, record attempts etc., with only necessary crew on board, lower masses may be used at the pilot's discretion.

2.10 RATES OF CLIMB AND DESCENT

2.10.1 Conventionally Shaped Balloons (excluding TR Types)

1. For balloons with a volume of 105,000 cu.ft or less, extreme rates of climb, sufficient to cause a relative wind at basket level, should be avoided unless an envelope temperature gauge is fitted.

2. The maximum rate of climb and descent for balloons with a volume of greater than 105,000 cu.ft and less than 340,000 cu.ft is 1000 ft/min (5 m/sec).

3. The maximum rate of climb and descent for balloons with a volume of between 340,000 and 600,000 cu.ft is 800 ft/min (4m/sec).

2.10.2 TR Type Balloons

1. The maximum rate of climb and descent for 'TR' Type balloons is 1700 ft/min (8.5m/sec), except where the RDS is fitted, when the maximum rates of climb and descent are limited to 1000 ft/min (5 m/sec).

2.11 PARACHUTE VALVE

1. The parachute valve must not be held open for periods longer than 3 seconds during flight. The envelope must be allowed to re-inflate fully and the envelope mouth must be seen to be fully open before subsequent operations of the vent.

2. 'TR' Type balloons must not have the parachute valve opened at rates of descent greater than 500ft/min (2.5m/sec).

2.12 RAPID DEFLATION SYSTEMS

1. The parachute valve of the rapid deflation system, when used for the controlled release of hot air during flight, must not be held open for periods longer than 3 seconds. The envelope must be allowed to re-inflate fully between operations of the vent.

2. Use of the rip line is not permitted at heights greater than 2m (6ft) above ground level, except in an emergency.

2.13 DELETED

2.14 TETHERED FLIGHT

Limitations	Balloons <180,000 ft³ (5098 m³)	Balloons >180,000 ft³ <275,000 ft³ (7788 m³)	Balloons >275,000 ft³
Max. Surface wind speed	15 knots (7.7 m/sec)	5 knots (2.5 m/sec)	Calm
Max. Surface wind speed with passengers	10 knots (5.1 m/sec)	5 knots (2.5 m/sec)	Calm
Max. Height above ground (measured from underside of basket)	30m (100ft)	30m (100ft)	30m (100ft)
Maximum Take-Off Mass	limited to 75% of the standard MTOM		

2.15 BASKETS

1. Each compartment must not contain more than six persons.

2. Reasonable space must be provided for each occupant, with regard to both comfort during the flight and to safety during the landing (Refer to Appendix 4).

3. There must be at least one restraint, e.g. hand hold, for each basket occupant.

4. Woven floor baskets must be fitted with load spreading boards when fitted with cylinders with a useable volume greater than 45 litres.

5. Where the ratio of length to width of the basket is greater than 1.4:1 the balloon must be equipped with envelope turning vents to allow the basket to be correctly orientated for landing.

2.16 CYLINDERS

1. All stainless steel, duplex stainless steel and titanium cylinders shall be equipped with an outer, water resistant protective layer at least 25mm thick made from structural cellular foam or similar material.

2. Each cylinder must be secured by a minimum of two cylinder straps. The straps must be of an approved design. Leather straps should not be used to secure cylinders with a useable volume greater than 60 litres.

2.17 ENVELOPE RIGGING

1. The following envelope types must be rigged using 4 tonne karabiners; Z-375, Z-400, Z-425LW, Z-450 and A-450LW.

TABLE 1: ENVELOPE WEIGHT LIMITS AND VOLUMES

Variant	Volume		Standard MTOM		Reduced MTOM		FAI Class. AX
	ft³	m³	kg	lb	kg	lb	
25	25 000	708	227	500	227	500	4
31	31 450	890	285	629	285	629	4
35	35 000	991	317	700	317	700	5
42	42 000	1190	381	840	381	840	5
50	50 000	1416	453	1000	453	1000	6
56	56 000	1586	508	1120	499	1100	6
60	60 000	1700	544	1200	499	1100	7
65	65 000	1841	590	1300	499	1100	7
69	69 000	1954	626	1380	499	1100	7
70	70 000	1982	635	1400	499	1100	7
77	77 500	2195	703	1550	499	1100	7
80	80 000	2266	726	1600	499	1100	8
84	84 000	2379	762	1680	499	1100	8
90	90 000	2549	816	1800	499	1100	8
100	100 000	2832	907	2000	907	2000	8
105	105 000	2974	952	2100	952	2100	8
120	120 000	3398	1088	2400	999	2202	9
133	133 000	3767	1206	2660	999	2202	9
140	140 000	3965	1270	2800	999	2202	9
145	145 000	4106	1315	2900	999	2202	10
150	150 000	4248	1361	3000	999	2202	10
160	160 000	4531	1451	3200	999	2202	10
180	180 000	5098	1633	3600	999	2202	10
200	200 000	5664	1814	4000	999	2202	10
210	210 000	5947	1905	4200	999	2202	10
225	225 000	6372	2041	4500	1999	4406	11
240	240 000	6797	2177	4800	1999	4406	11
250	250 000	7080	2268	5000	1999	4406	11
260	260 000	7363	2358	5200	1999	4406	11
275	275 000	7788	2494	5500	1999	4406	11
300	300 000	8496	2721	6000	2699	5951	11
315	315 000	8920	2857	6300	2699	5951	11
340	340 000	9629	2857	6300	2699	5951	12

Table 1: Envelope Weight Limits And Volumes (continued)

Variant	Volume		Standard MTOM		Reduced MTOM		FAI Class. AX
	ft³	m³	kg	lb	kg	lb	
340 HL	340 000	9629	3084	6800	2699	5951	12
350	350 000	9912	3175	7000	2699	5951	12
375	375 000	10620	3401	7500	2699	5951	12
400	400 000	11328	3628	8000	2699	5951	12
415	415 000	11753	3764	8300	2699	5951	12
425LW	425 000	12036	3662	8075	2699	5951	13
450LW	450 000	12744	3815	8410	2699	5951	13
450	450 000	12744	4082	9000	2699	5951	13
530	530 000	15010	4807	10600	2699	5951	13
600	600 000	16992	5089	11215	5089	11215	13

Note: Table 1 lists the complete range of envelopes produced by Cameron Balloons Limited.

The applicable envelope data in Table 1 corresponds to the specific envelope Type and Variant given on page i-i and in Table 4.

For details of Type Approval, reference should be made to the appropriate Type Certificate.

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3.1 INTRODUCTION

Section 3 provides checklists and amplified procedures for coping with emergencies that may occur. This Section is approved by EASA.

3.2 AVOIDANCE OF DANGEROUS OBSTACLES AT LOW LEVEL

The pilot must decide whether to climb or to make an emergency landing.

3.2.1 Emergency Climb

Single Burners:

Emergency climbs should be made by operating one main burner valve and one whisper burner valve. The main burner valve and whisper burner valve used must be fed from independent fuel supplies.

Double, Triple and Quad Burners:

Emergency climbs should be made by operating the main burner valve on each burner unit simultaneously.

Note: The operation of two burners from a single fuel supply using the crossflow valve will not give maximum burner power.

3.2.2 Emergency Landing

Emergency landings can be made by partially opening the parachute valve, Rapid Deflation System or Velcro rip panel at heights of 15m (50 ft) or less.

3.3 CONTACT WITH ELECTRIC POWER LINES

Contact with electric power wires is extremely dangerous and can result in serious or fatal injuries. It should be avoided at all costs.

If contact with power wires cannot be avoided, initiate a rapid descent so that contact with the wires will be made by the envelope instead of the basket assembly.

Shut off all the fuel supplies at the cylinder valves and vent the fuel hoses before contact.

If the balloon is caught in the power wires, do not touch any metallic parts.

If the basket is not in contact with the ground remain in it, if possible, until the electrical power is shut off.

If it is necessary to leave the basket, do not place the body in contact with the ground and any part of the balloon at the same time.

Do not attempt to recover the balloon until the electricity authority has been contacted, and has indicated that it is safe to do so.

3.4 FIRE - IN THE AIR

Shut off the fuel supply at the cylinder valve and vent the hoses through the burner.

Put out fire with extinguisher.

Identify the cause of the fire and decide if it is possible to relight the burner. If not, the procedure for a hard landing (Section 3.8) must be followed.

3.5 FIRE - ON THE GROUND

Shut off the fuel supply at the cylinder valve and send all persons not directly fighting the fire to a safe distance.

Put out fire with extinguisher.

WARNING: **If the fire is not extinguished immediately, ensure that all remaining persons retreat to a safe distance, as an explosion will occur if the fire continues and causes the cylinders to rupture.**

If the balloon is inflated the pilot must pull the parachute operating / rip line to prevent the balloon becoming airborne while the passengers exit. The pilot should exit the balloon last with the parachute operating / rip line in hand to ensure that the balloon does not become airborne.

Note: If a dry powder fire extinguisher has been used, it is very important that all traces of the powder residue are removed from the balloon and associated equipment. The powder becomes extremely corrosive once it has been used on a fire or exposed to the atmosphere, and can cause damage.

3.6 DAMAGE TO ENVELOPE IN FLIGHT

Heat to replace lost lift while maintaining a steady rate of descent.

Remain at very low altitude and land as soon as possible.

Do not burn if the air loss from the balloon is sufficient to cause the mouth to close, as damage to suspension tapes could cause a catastrophic failure.

If the rate of descent cannot be controlled, consider jettisoning all disposable ballast, including fuel cylinders which are not in use, if it is possible to do so without endangering people or property on the ground.

3.7 ACCIDENTAL OPERATION OF THE RAPID DEFLATION SYSTEM

If the rip line is accidentally pulled in flight the vent will start to operate. The pilot will be warned by the difference in feel as the panel starts to open.

The rip line should immediately be released, and the panel closed by pulling on the venting line.The burner must be operated to replace lost heat.

WARNING: The panel will not automatically re-close on release of the rip line.

3.8 PREPARATION FOR A HARD LANDING

There are two possible hard landing situations. A burner or envelope failure results in a 'heavy' landing where the speed is mostly vertical, whereas a weather emergency may cause a 'fast' landing where the speed is mostly horizontal.

In a heavy landing the occupants should brace against vertical compression, with their knees only slightly bent. The rope handles or cylinder rims should be firmly held.

In a fast landing the basket may tip forward violently on impact, tending to throw the occupants out. The occupants should adopt a low down position (knees well bent) with their back or shoulder pressed against the leading edge of the basket, head level with the basket edge and rope handles or cylinder rims firmly held.

Remind passengers not to leave the basket until told to do so.

Extinguish the pilot light(s), shut the fuel off at all cylinders in use and empty the hoses if time permits.

The parachute operating / rip line should be firmly gripped before touchdown.

3.9 ENVELOPE OVER TEMPERATURE

Descend to the minimum practical altitude and keep to low rates of climb and descent. If the temperature remains too high, land as soon as possible.

Note: If the balloon is not overloaded for the altitude and ambient temperature it is extremely unlikely that the envelope temperature limits will be exceeded in normal flight.

3.10 BURNER FAILURE

Burner Unit Malfunction:

Transfer control to another burner unit or to the other fuel supply (single burner).

Shut off the fuel supply to the defective burner unit at the cylinder valve.

Vent fuel from the defective burner unit and supply hose.

Land as soon as possible.

Note: If the blast valve fails in the open position, its flow can be controlled by opening and closing the cylinder valve (liquid offtake).

Crossflow Valve Leak (Stealth, Shadow and Stratus burners only)-

Close the two blast valves connected by the crossflow valve.

Transfer control to the whisper burners or burners not connected by the crossflow valve. Land as soon as possible.

Note: Crossflow valve leaks are only evident with the main burner operating.

If a fuel leak cannot be controlled, shut off all fuel including the pilot light and brief passengers for a hard landing (Section 3.8).

Note: If the main fuel hoses are removed from the support rod covers they are long enough to reach fuel cylinders at the opposite end of the basket.

CAUTION: Care should be taken when operating with the fuel hoses outside of the support rod covers, as the liquid fuel pressure can cause the hose to deflect when the blast or whisper valve is operated. This may change the direction of the burner and flame.

3.11 PILOT LIGHT FAILURE

If a pilot light is extinguished for any reason, it should be relit.

Each burner unit is fitted with a pilot light, single burners having two independent pilot lights. All burners will operate with one failed pilot light. The failed pilot light should be turned off and a landing made as soon as possible.

On double burners or pairs of burners the crossflow valve, if fitted, should be opened to ensure reliable ignition of both burners from the remaining pilot light. If the pilot light fails on the single unit of a triple burner then control should be maintained on another burner.

If all pilot lights fail the following procedure should be adopted:

1. Shut off all fuel supplies at the cylinder valve.

2. Lock one whisper burner valve (Shadow, Stealth and Sirocco burners) fully open or lock one main burner valve open using the blast valve latch (Stratus Burner).

3. Partially open the fuel supply to this burner at the cylinder valve, to permit a small amount of fuel to enter the burner.

4. Light the burner with a match or other igniter.

WARNING: do not use the igniter built into the burner, as it will not ignite the fuel

5. Fully open the fuel supply to the burner, using the cylinder liquid valve to control the flight of the balloon.

6. Partially close the cylinder liquid valve to a fractional setting, regulating the burner to maintain a pilot setting.

7. Land as soon as possible.

Note: Do not leave one cylinder providing the pilot setting, with main fuel taken from another, because prolonged restricted flow of liquid will cause freezing of the valves.

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4.1 INTRODUCTION

Section 4 provides checklists and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 8. The procedures included in this Section and in Section 8 have been approved by EASA.

4.2 PREPARATION AND RIGGING

4.2.1 Site Selection

The site should be chosen so that the downwind path that the balloon will take is clear of powerlines or obstructions. The clear area should be large enough that the balloon cannot be damaged should it move during inflation.

The area for laying out the balloon should ideally be a smooth grass surface. Surfaces covered with rocks, sticks or other objects likely to cause fabric damage should be avoided.

4.2.2 Basket rigging

Non-partitioned (open) baskets should be positioned with the step hole on the upwind side.

T-partition baskets should be positioned with the pilot compartment on the right, looking from the basket towards the envelope.

Double T-partition baskets should be positioned with either long side facing towards the envelope.

Strap the cylinders as required into the basket. Check the contents and ensure that the master cylinders (if used) are on the downwind (envelope) side of the basket.

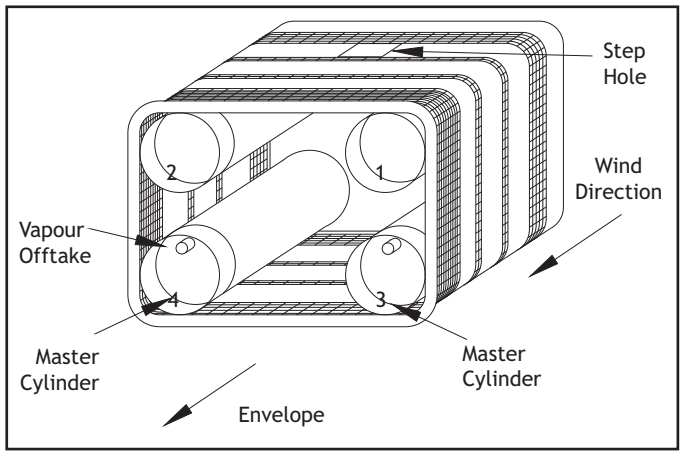
The orientation of the cylinders should ensure that:

1) Cylinders that are required to supply liquid during inflation are positioned so that the liquid valve is in the lower half of the cylinder when the basket is on its side.

2) Cylinders that are required to supply vapour during inflation are positioned so that the vapour valve is uppermost when the cylinder is on its side.

3) All cylinders should be positioned so that the liquid off-takes and hoses can not be struck by the pilot or passengers during landing.

WARNING: Incorrect positioning of cylinders used for vapour offtake can result in pilot light failure.



Correct Positioning Of Master Cylinders

4.2.3 Burner Rigging

The burner frame should be orientated so that the burner pressure gauges are legible when the basket is laid down for inflation. The burner frame is rigged to the basket using karabiners of which there are three standards detailed in Table 1. The 2.5 and 3 tonne karabiners may be regarded as direct alternatives, although the 2.5 tonne is the preferred standard as it causes less flattening of the wires due to its symmetric oval shape.

Table 1: Karabiner Specifications

Part No.	Rating	Identification Markings
CU-9820-0003	2.5 Tonne	STUBAI SYMOVAL2500 UIAA
CU-9820-0001	3 Tonne	STUBAI SYMOVAL3000 UIAA
CU-9825-0001	4 Tonne	STUBAI SYMOVAL4000 UIAA

The 2.5 Tonne karabiners are used in all basket-envelope rigging, not including tethering, except in the following applications where 4 tonne karabiners are recommended;

- where the burner frame has only 4 attachment points and the envelope volume is of 210,000 cu.ft (5947 m^3) and greater;

and,

- where the burner frame has 8 attachment points and the envelope volume is of 340,000 cu.ft (9629 m^3) or larger.

If a launch restraint is to be attached to these karabiners, it is essential that they are orientated so that restraint karabiners must load the solid, not the screwgate side of the envelope karabiners.

4.2.3.1 Flexible Corner Socket Burner Frames

Insert the support rods into the basket sockets, then lift the burner up and locate the burner frame corner sockets onto the top of the support rods.

4.2.3.2 Fixed Corner Socket Burner Frames

Insert the support rods into the burner frame corner sockets, lift up the burner and rods and locate the lower end of the rods into the basket sockets.

4.2.3.3 Adjustable Height Burner Frames

Where an adjustable height burner frame is used, the gas strut must be below the burner during inflation and the burner must be in the upper half of its height range. On larger baskets the gas strut is positioned to the side of the burner, and care must be taken not to overheat the strut.

4.2.3.4 Rigging of Basket Wires to Burner Frame (All Burner Frames)

The correct attachment of the basket wires depends on the number of wires and the burner frame type. The four configurations (A, B, C, D) are shown in the following figures.

Fit the padded support rod covers, enclosing the hoses within them. Start the zips at the top and close downwards. It is important that there is sufficient slack hose at the top to allow the burner to gimbal, but not so much that the hose is affected by radiant heat from the burner.

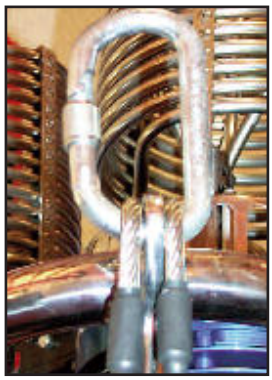
In open baskets the liquid hoses are enclosed in the upwind support rod covers. Vapour hoses (if used) are enclosed in the downwind support rod covers.

In T-partitioned baskets all the hoses fit into the two covers at the pilot's compartment end of the basket.

When double burners are fitted to a double T-partition basket the hoses are arranged identically to the hoses in an open basket. If a triple or quad burner is fitted the hose(s) of each burner follow the adjacent rod. Double T baskets can use two additional padded covers containing only the fuel hoses, suspended from the burner frame and connected inside the pilot compartment.

Check that all burner and cylinder valves are closed and connect the fuel hoses to the cylinders. If cylinder manifolds are used they must be connected as described in Section 4.6.3.1. Fuel hoses should be filled with fuel to check that there are no leaks. The burner test may be performed now or when the balloon is inflated (see Pre-Take-off checklist). Close the cylinder valves and burn the fuel from the hoses.

Manoeuvre the basket onto its side with the burner facing the envelope.



▲ Rigging Of Frame Type 'A'

▲ Rigging Of Frame Type 'B'

▲ Rigging Of Frame Type 'C'

▲ Rigging Of Frame Type 'D'

4.2.3.5 Mini Vapour Cylinder

The mini vapour cylinder should be strapped into a suitable location in the basket. It should be oriented so that it is vertical at all times that vapour is being withdrawn.

If only one vapour hose is to be connected the other vapour outlet may be left bare. If two vapour hoses are to be connected then an extension hose may be required.

Care must be taken to ensure that two independent pilot light fuel supplies remain to keep the redundancy of the fuel and burner system.

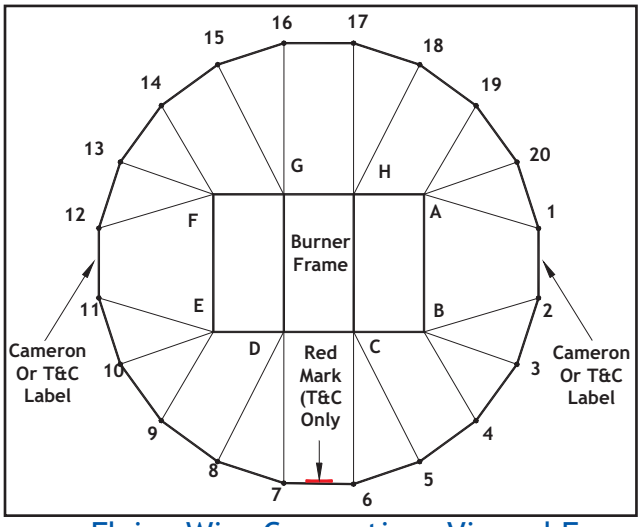
Note: Some mini vapour cylinders incorporate a dip tube which allows vapour to be drawn off with the cylinder in the horizontal position when the outlet is oriented downwards.

4.2.4 Envelope Rigging

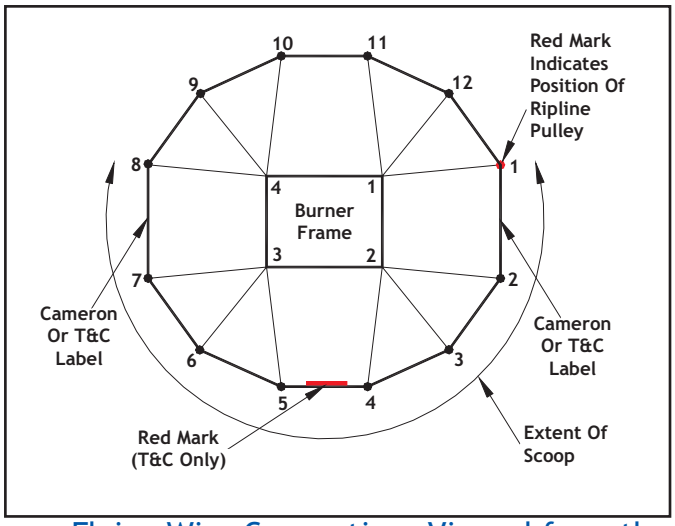
Pull the base of the envelope out of the bag and taking care that wires are not crossed and inside the scoop, connect the appropriate flying wires to each karabiner on the burner frame. Each wire is numbered and the wires are grouped as shown in Table 4.2

Table 4.2 Flying Wire Grouping

4-Rod System	*1*	*2*			*3*	*4*		
8 Wire	8,1	2,3			4,5	6,7		
12 Wire	11,12,1	2-4			5-7	8-10		
16 Wire	14-16,1	2-5			6-9	10-13		
20 Wire	17-1	2-6			7-11	12-16		
24 Wire	20-1	2-7			8-13	14-19		
8-Rod System	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
20 Wire	19,20,1	2-4	5,6	7,8	9-11	12-14	15,16	17,18
24 Wire	23,24,1	2-4	5-7	8-10	11-13	14-16	17-19	20-22
28 Wire	26-28,1	2-5	6-8	9-11	12-15	16-19	20-22	23-25
32 Wire	30-32,1	2-5	6-9	10-13	14-17	18-21	22-25	26-29



▲ Flying Wire Connections Viewed From The Basket (20 Wire, 8 Rod Rigging Shown)



▲ Flying Wire Connections Viewed from the 4 Rod Basket (12 Wire Rigging Shown)

Where a 24 flying wire envelope is rigged to a 4 rod basket, the wires will be collected together either using 'V' wires or forged rings.

Envelope cables may be left permanently attached to a second set of karabiners, which are connected to the burner frame karabiners during rigging. This arrangement causes a 90^0 twist, which can be avoided by connecting a forged tether ring between the karabiners.

Close all karabiner screwgates and connect the control lines to the appropriate points on the burner frame or basket.

Connect the launch restraint.

Pull the envelope from the carrying bag by taking hold of the bag handles and walking away downwind. Stow the envelope bag in the basket or attach it to a support rod taking care not to trap any of the fuel hoses.

4.2.4.1 Parachute/Lock Top Deflation System

The parachute operating line should be attached to either of the karabiners on the pilot's right or inside the pilot compartment of partitioned baskets.

4.2.4.2 RDS Deflation System

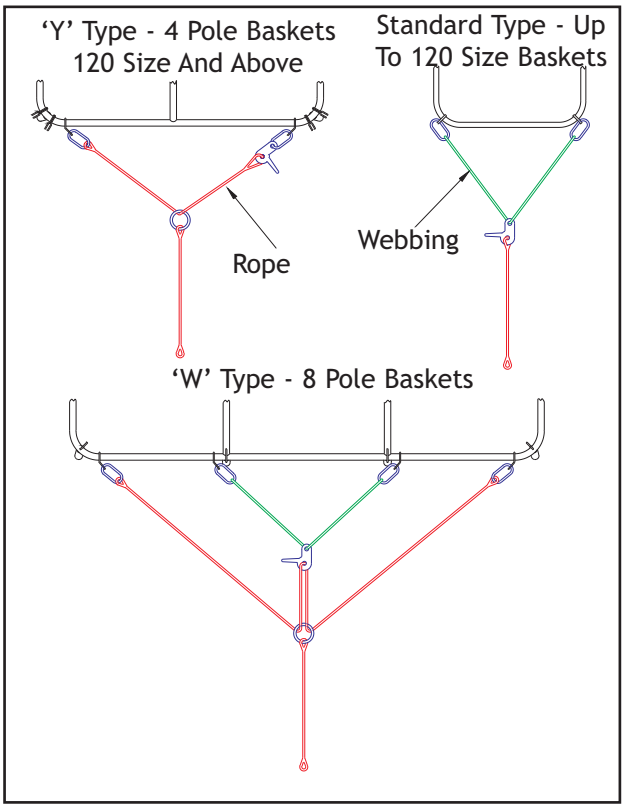
Attach the rip line (red rope) to the burner frame and the venting line (red and white rope) to the ring on the Rapid Deflation System bag installed in the basket.

4.2.4.3 Launch Restraint (Quick Release)

The ends of the webbing yoke should be connected to the restraint lugs on the upwind side of the burner frame. If restraint lugs are not fitted, the yoke should be connected to the two uppermost karabiners during inflation. A short tether line is best for maximum control, and is looped through the jaws of the latch.

If the basket is fitted with strong points (Modification C438), the balloon may be restrained from these points using the quick release in the 'Y' configuration.

Warning: To prevent unintentional entanglement, If the basket is fitted with strong points on both sides it is important that no rigging is left attached to the strong points on the upwind side of the basket when they are not in use.



▲ Quick Release Systems

4.3 INFLATION

Pre-Inflation Checklist

Baskets	Solid floor baskets must have no damage to the rawhide wire protectors sufficient to expose the suspension wires. Check also for wire damage where the wires are visible between the protectors and the skids.
Rigging	Basket and envelope cables correctly attached and checked for damage. Karabiner screwgates closed. Control lines attached.
Fuel	Cylinders securely strapped in the appropriate positions. Contents checked. Hose connections tight. All valves shut
Instruments	Switched on. Set.
Fire Extingusher:	Present, maintained in accordance with manufacturers instructions
Launch Restraint	Connected to fixed point.

4.3.1 Cold Inflation

The crew members should be briefed before the inflation procedure is started. Passengers may be briefed either before inflation begins, or once they are in the basket after inflation. Passengers should be shown how to correctly get into the basket before inflation starts. For Personnel handling information refer to Appendix 5

CAUTION: The most important instruction for all crew members is to let go immediately if they are lifted off the ground.

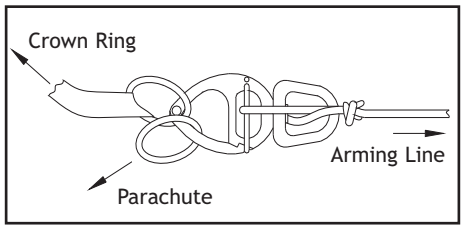
Partially inflate the envelope to introduce enough air into the envelope to free the parachute and parachute operating line.

Untangle the control lines and feed any slack into the mouth of the balloon. Additional control lines should be attached to any suitable karabiner or to the attachment points provided in the pilot compartment of partitioned baskets.
If the parachute has become tangled, follow two adjacent shroud lines from the envelope to the parachute, then work around the edge of the parachute untangling the lines.

Tab the parachute valve into position, matching the numbers or colours near the Velcro tabs on the parachute and envelope. Make sure that there are no folds of fabric lying on the parachute operating line which could open the parachute during the inflation.

4.3.1.1 Lock Top Deflation System

Tab the parachute panel into position. Pull the quick release shackle up to the crown ring (it will be found adjacent to the guide ring 1.5m (5ft) from the crown ring on load tape no.1). Join the stainless steel rings attached to the parachute panel (at the edge of the crown patch) and the crown ring together with the shackle as shown.



Release Shackle Assembly

Attach the end of the arming line (yellow and black spiral) to the burner frame. Follow up the arming line to the lower tie-off point inside the envelope and secure it in position using the Velcro tab.

Note: When the take-off mass of the balloon exceeds half of the standard MTOM, it is no longer necessary to arm the vent prior to use. It is therefore not necessary to rig the arming line after the parachute has been tabbed into place. Great care must be taken however not to stall the parachute when the arming line is not used.

4.3.1.2 RDS Deflation System

Tab the parachute panel into position. Care should be taken to ensure that no lines are wrapped around the Velcro tabs, crown line, or any of the rings or pulleys.

Complete the cold inflation.

4.3.2 Hot Inflation

Check that all the burner valves are closed. Initially, only one burner should be used for inflation and only one liquid fuel supply should be switched on. When vapour pilot lights are fitted, the master cylinders supplying vapour should not be used for inflation.

Open the cylinder valve at the cylinder to be used for inflation, and check that there are no fuel leaks at the cylinder and burner. Turn on the pilot light fuel supply and ignite the pilot light.

Note: Handwheel type cylinder valves supplying liquid propane should be opened by 1½ - 2 turns in order to ensure full fuel flow to the burner. Quick shut off valves should be opened fully. Vapour supply valves need only be opened by half a turn.

Ensure that all the flying cables are out of the way of the flame. Aim the burner at the lower half of the opening and give a short burst of flame. Continue, always with short bursts, and the balloon will slowly fill.

As the balloon rises to the vertical position, step backwards into the basket, and continue heating to fully inflate the balloon.

The passengers should now be loaded (unless they have been loaded prior to hot inflation).

4.4 TAKE-OFF

4.4.1 Pre Take-Off Checks

Pre-Take-Off Checklist

Envelope

General condition:	Damage within Limitations
Temperature Flag:	Visible
Deflation System:	Visual Check, Test operation, Operating lines attached (refer 4.4.1.1 to 4.4.1.3)
Load tapes:	Free of damage without sign of undue strain
Flying Cables:	Correctly connected
Karabiners:	Screwgates closed and karabiners loaded lengthwise
Scoop:	Attached
Crown Line(s):	Attached

Burner

Pilot Lights:	Burning satisfactorily, normal appearance and sound. No freezing at cylinder vapour offtake and vapour valve open (vapour pilot light only).
Test:	Test all systems. Check all valves for leaks (including crossflow valves where fitted).

Cylinders

Fuel Pressure:	Within limitations
Additional Cylinders:	All fuel cylinders should be connected and tested, to ensure adequate fuel pressure and uncontaminated fuel delivery.
Mini Vapour Cylinder:	Valve open (refer to 4.4.1.4)

Equipment

Instruments:	Switched on, set
Alternative source of ignition:	Present, tested.
Pilot Restraint	Belt Worn and strap connected (if used)

4.4.1.1 Parachute

Check the parachute function by pulling on the parachute operating line until the Velcro untabs. Release the line and check the appearance of the panel after it has closed.

4.4.1.2 Lock Top

Check the operation of the parachute valve. Check that the arming line is attached to the load frame, that the tie-off is not broken and that the lock-top indicator flag is not hanging inside the envelope (it can normally be seen sitting on top of the parachute panel).

4.4.1.3 RDS

Test the venting action of the system and ensure that all the Velcro tabs are detached.

Ensure that the balloon is hot and then test the deflation action of the system. Pull on the rip line to collapse the parachute into the centre of the balloon. As soon as a complete ring of sky can be seen around the edge of the parachute, pull on the venting line to fully close the panel. A second operation of the venting line may be needed to obtain a good seal.

The excess venting line should be placed loosely into the top of the Rapid Deflation System bag to prevent any possibility of entanglment.

4.4.1.4 Mini Vapour Cylinder

WARNING: It is important to check that the mini vapour cylinder valve is open before flight as residual vapour in the hose from the burner test may give the impression, for a period of time, that the system is fully functional even when the valve is closed.

4.4.2 Take-Off- Calm Conditions

Take-off by building up lift with intermittent burning, all crew standing clear of the basket. The balloon will lift off and burning can stop a short distance above the ground.

Be ready to burn again at the top of the climb to prevent a descent.

4.4.3 Take-Off- Windy Conditions, Sheltered Site

An apparent loss of lift can occur as the balloon first encounters faster moving air just above the surface during windy conditions. When the balloon is static on the ground, the faster moving air above it creates an area of low pressure which creates lift in the same way as an aeroplane wing.

As the balloon takes-off, this effect diminishes causing the balloon to descend unless more heat is added. The burner flame will also be deflected which may prevent heating to replace the lost lift.

In windy conditions build up excess lift before leaving the ground either by using crew in a 'hands on' and 'hands off' drill, or a restraining device. Burn while ascending and use the angle control on the burner to counteract the deflection of the flame by the wind. The balloon should be launched with the open side of the scoop (if fitted) facing upwind.

4.4.4 Quick Release

When take-off is imminent, the securing pin is withdrawn ready for the final release. The final release should be performed by the pilot. The latch should be held firmly by the handle, and the pilot should be ready to prevent the latch from recoiling or falling towards the occupants of the basket. For this reason, the final release should be made when the quick release is as lightly loaded as possible.

4.5 CONTROL IN FLIGHT

4.5.1 Burner Control

The flight path of the balloon is controlled by the use of the burner, which is either full on or full off. Burner Control layouts are given in Section 6.

4.5.2 Venting in Flight

When venting frequently in flight, always watch the envelope to observe the amount of deflation occurring. Venting should not exceed the limitations in Section 2.

Under very lightly loaded conditions it is possible that the parachute will not reclose automatically, but it will do so if the burner is operated - this requires a visual check.

4.5.2.1 Parachute Valve/RDS

To release hot air during flight the venting line should be pulled.

4.5.2.2 Lock Top

To release hot air during flight the venting line should be pulled. Great care must be taken not to stall the parachute when the arming line is not used.

WARNING: In the unlocked state an extended pull on the parachute operating line beyond the limits in Section 2 may cause the parachute to 'stall'. The parachute will then not re-close.

4.5.2.3 Turning Vents

Where turning vents are fitted it is possible to vent hot air by simultaneous operation of both the turning vents.

4.5.3 Fuel Management

In flight one fuel cylinder is connected to each burner fuel supply. Two cylinders will be connected for a single or a double burner, three cylinders for a triple burner and four cylinders for a quad. These cylinders should be tested immediately before take-off and remain turned on during flight.

Note: Tema 3810 connectors have a latching locking ring below the main release ring. When the locking ring is 'up' (towards the connection), the main release ring cannot be operated to release or make the connection.

One fuel supply should be used preferentially during flight to ensure that two fuel systems are never exhausted simultaneously.

Master cylinders (if a vapour pilot light is fitted) should normally be used last. Occasionally, in very cold conditions, or where a long flight is planned the master cylinders should be used first, as the withdrawal of vapour to fuel the pilot lights reduces cylinder pressure over time. Sufficient fuel should be left in the cylinder to fuel the pilot lights- 3% of cylinder contents per hour of flight is sufficient to fuel a vapour pilot light.

The last cylinder available to each fuel supply must not be used to below 25% full. This ensures that multiple fuel supplies remain at all times and that full burner power is available in an emergency.

CAUTION: The main burners are designed to operate on liquid propane. If they are operated on propane vapour the burner will overheat and may be permanently damaged.

If it is desired to burn as much fuel as possible from a cylinder, then the last 5% of the contents should be burned with the whisper burner, where the liquid fuel can be clearly seen emerging from the whisper jet. Once liquid fuel stops emerging, discontinue the use of that cylinder as the vapour flame will not provide sufficient heat to maintain height.

Cylinder Change Procedure

1. Check function of an alternative burner or fuel supply.
2. Check safe flight path.
3. Shut off the empty cylinder at the cylinder valve.
4. Operate the burner valve to empty the fuel hose.
5. Disconnect the fuel hose from the empty cylinder and reconnect to a full cylinder.
6. Check secure connection.
7. Open the full cylinder, relight the pilot light if necessary.
8. Check function of burner.

4.5.3.1 Use Of cylinder manifolds

WARNING: Only manifolds supplied by Cameron Balloons Ltd. may be used.

The manifold must not be used to connect two or more burner fuel supplies together to reduce the number of independent fuel supplies

A manifold must not be used in such a way as to leave a bare cylinder connector (e.g. only two cylinders on a three-cylinder manifold).

Only one cylinder at a time should be open to each burner.

4.5.4 Climbing

A climb is initiated by burning more than is required for level flight. Care should be taken to not overheat the envelope.

4.5.5 Descending

A descent is initiated by burning less than is required for level flight.

Rapid descents from high altitude may be made without burning (a cold descent). If the mouth of the envelope shows any tendency to close a short burn should be made, sufficient to reopen it. The limitations in Section 2.10 must be respected.

Recovery from cold descents should be initiated at least 2000ft, (600m) above the ground and should be achieved with a number of short burns rather than a single long burn, which could overheat the balloon.

4.5.6 Flight At Higher Altitudes

When flights are being made to a considerable altitude (greater than 3000ft [900m] above take-off level) the weight calculations should be rechecked in the light of the actual temperature encountered at altitude. It is therefore necessary to have a loading chart, an altimeter and a thermometer in the basket.

Alternatively, if an envelope temperature gauge is fitted, it may be used to monitor envelope temperature during the climb.

4.6 LANDING

Pre-Landing Checks

Powerlines	Clear of approach path and overshoot.
Passenger Briefing	Silence during landing. Repeat landing part of passenger briefing.
Pilot Restraint	Belt worn and strap connected (if used).
Fuel	Enough fuel in cylinder(s) in use for landing and overshoot.
Loose Items	Instruments, cameras, radios, etc., securely stowed.
Rip line	Parachute operating line or rip line in hand during approach.
Arming Line	Pulled and indicator flag visible (Lock Top only).
Venting Line	Available and free to pull out of bag (Rapid Deflation System only).
Liquid Fuel Supply	Check contents of cylinders in use.
Pilot Lights	Should be turned off when the pilot is satisfied that no further burner operation will be required.

4.6.1 Approach to Land

For landing, a field must be chosen in the line of flight, containing a sufficiently large clear area in which to land the balloon with no high obstacles in the approach or over-shoot. A larger landing area will be needed in stronger winds.

4.6.1.1 Turning Vents

Where the basket requires turning vents to fitted to the envelope (Section 2.15) the basket should be orientated so that the long side is upwind for landing.

4.6.2 Touchdown

CAUTION: If the wind speed is high, or the landing field poses a fire risk, the pilot lights should be turned off immediately prior to touchdown and the main fuel supply turned off, if time allows.

4.6.2.1 Parachute

The parachute should be opened immediately prior to touchdown. If winds are light and it is intended to keep the balloon upright then the parachute operating line may be released once the balloon is stationary. In stronger winds the parachute operating line should be pulled and held in order to deflate the balloon completely.

4.6.2.2 Lock Top

Landing a balloon with a Lock-top is similar to landing a balloon fitted with a conventional parachute valve, but the system must be armed prior to touchdown. The arming line, which unlocks the parachute from the crown ring, should only be pulled when a final landing is imminent.

The indicator flag becomes visible inside the envelope when the system is armed.

WARNING: In the unlocked state an extended pull on the parachute operating line beyond the limits in Section 2.11 may cause the parachute to 'stall'. The parachute will then not re-close.

4.6.2.3 RDS

The rip line may be pulled immediately before touchdown. For final deflation the panel should be pulled fully open. If the balloon is to be kept inflated, the panel may be opened and then closed by pulling on the venting line once sufficient air has been released.

In light winds it is possible to deflate the balloon by using the venting action, however deflation will be slower than with a conventional parachute.

4.6.3 Action after Landing

Shut off and empty any fuel hoses not already shut down and switch off instruments.

Empty the envelope of air by folding it into a long line and expelling the air towards the crown.

Pack the envelope into the bag starting at the crown. Do not detach the envelope from the burner frame until at least half of it is in the bag.

4.7 PILOT RESTRAINT HARNESS

The pilot restraint harness (if required) should be worn during any period of low level flight and may be worn throughout the flight.

The harness is a simple waist belt fitted with either a parachute buckle or a seat belt type buckle - either of which will allow rapid release in an emergency. A strap of adjustable length is clipped between a metal D-ring on the belt and an anchor point fitted on or near the floor of the basket.

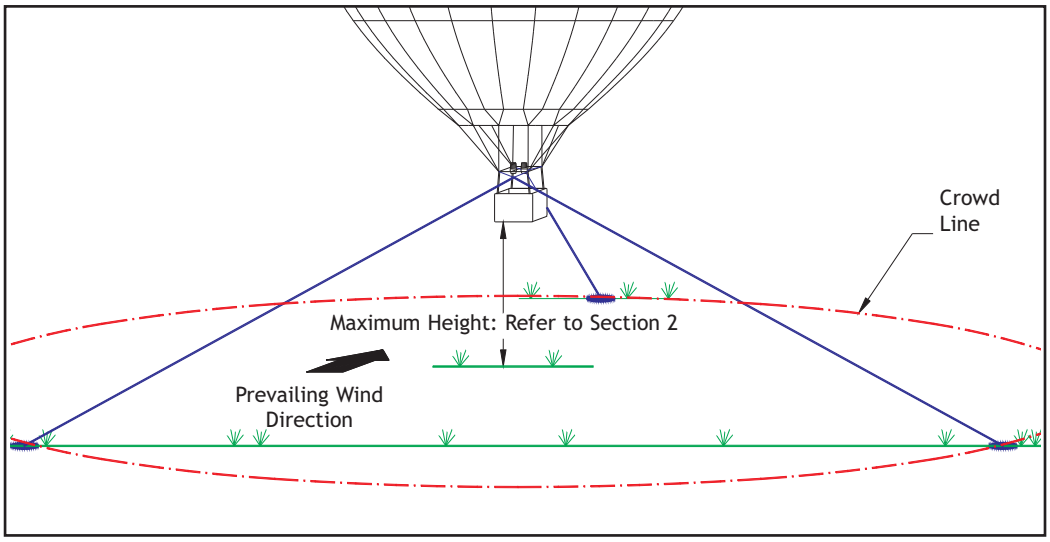
A pouch is fitted to the wall of the basket to store the belt and strap when not in use.

During the landing approach the pilot should take up a secure landing position in the basket, then tighten the strap by pulling on the sewn handle. It is vital that the strap is pulled sufficiently short to prevent the pilot from falling over the side of the basket.

The pilot restraint harness should be used in addition to, not instead of, good pilot positioning and holding on to handles or cylinder rims during the landing.

4.8 TETHER OPERATION

WARNING: Only approved equipment supplied by the manufacturer may be used



▲ Correct Tethering Site Layout

4.8.1 Site

Tethering requires an open site free from obstruction (including overhead wires or cables). It must be sufficiently large to allow the safe inflation of the balloon and the installation of the tether lines. The area downwind of the site should also be free from obstacles should any of the tether equipment fail.

While tethering it is important to keep spectators away from basket, tether lines and vehicles used as anchors for tether ropes.

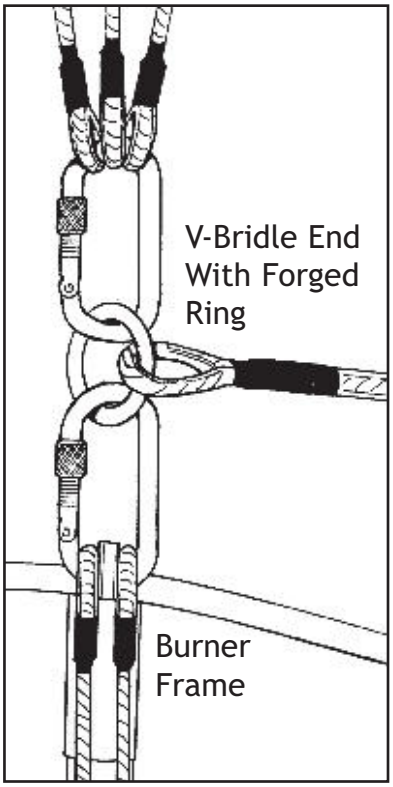
4.8.2 Rigging

The most suitable arrangement of tether lines is a low tripod (less than 45^0) arrangement with the balloon at its apex. If higher tethers are required then the dimensions of the tripod base should be increased in order to keep the angle of the ropes to the ground the same as with a low tether. As the wind speed increases the tripod should be made flatter either by increasing the distances between the tether points or by decreasing the rope length.

Ropes used for tethering should have a minimum strength of 4000kg (8800lb), and should be inspected before each flight. Where karabiners are required in the tether system (not the balloon rigging), 5000kg (11000lb) karabiners must be used.

Anchors for tether points should be capable of withstanding a 4000kg (8800lb) loading.

Two tether ropes should be deployed upwind to provide the main resistance to movement. The angle between them should be between 60° and 120°.



▲ V-Bridle Rigging

Forged tether rings must be used to attach the V-bridles to the balloon. Burner frame restraint lugs must not be used.

The ropes should be attached to a V-bridle connected to two forged tether rings on the side of the load frame opposite the scoop. A third rope should be attached to a V-bridle connected to the two tether rings on the downwind side of the burner frame. This rope should be attached to a third, downwind, anchor point.

While rigging it must be ensured that karabiners are loaded only in their long axis. Transverse loads, especially across the screwgate, can cause the karabiner to fail far below its rated strength.

WARNING: WEBBING V-BRIDLES USED FOR INFLATION RESTRAINTS MUST NOT BE USED FOR TETHERING.

4.8.3 During Tethered Flight

The pilot should monitor the surface wind speed (using a hand held anemometer, wind-sock etc.) and other weather during the tethered flight. If the speed of the wind exceeds the permitted maximum or the prevailing conditions cause the balloon to become unstable, the balloon must be deflated as soon as possible.

In windy conditions the amount of jerking of the balloon on the tether ropes must be minimised. This is usually achieved by adjusting the length of the tether ropes so that all three ropes are taut when the balloon is just above ground level. If a vehicle is used as an anchor point for the downwind tether line it may be moved backwards and forwards in order to vary the maximum height of the balloon.

4.8.4 Tethering Weak Link (Optional)

The weak link is a calibrated ‘fuse piece’, which, if fitted, provides an early warning of excessive loads in the tether system. The link is fitted between two tether rings and bypassed by a steel rope. The weak link is fitted to the apex of the upwind V-bridle. If tether loads exceed 500kg (1100lb) the fuse piece will break, transferring loads into the steel wire. If the link fails the balloon should be deflated immediately.

4.9 REFUELLING

Flight cylinders are refuelled by volume or weight in accordance with standard practices for handling propane.

The fixed liquid level gauge is set to approximately 80% of the water capacity.

Filling by weight should not exceed 0.42 kg/l of the water capacity.

Note: It is important that the refilling and emptying of propane cylinders is carried out with reference to the safety, handling and storage regulations in place for these cylinders.

WARNING: IF A CYLINDER IS TO BE REFUELLED FROM A HIGH PRESSURE PUMP (E.G., AT AN AUTOMOTIVE OR COMMERCIAL FILLING STATION), SUITABLE PRECAUTIONS MUST BE TAKEN TO ENSURE THAT CYLINDER PRESSURE DOES NOT EXCEED THE SAFE WORKING PRESSURE OF 15BAR (218PSI).

Pilots regularly refuelling from commercial LPG cylinders should ensure that a suitable fuel filter (e.g., Bonanno fuel filter) is included in their refuelling hose, especially if a Stealth or Sirocco burner is used.

4.9.1 Use Of Fuel Safe

The Fuel Safe system is an extension fitted to the fixed liquid level gauge to vent propane vapour via a hose away from the vicinity of the cylinder. This enables the safe refuelling of cylinders in a basket or trailer.

The system operates in the same way as a conventional bleed valve. When the cylinder is full, liquid appears in the hose adjacent to the fixed liquid level gauge.

CAUTION: The precautions detailed in this section must still be observed when using the Fuelsafe System.

4.9.2 Emptying Fuel Cylinders

If it is necessary to completely empty a cylinder for transport or maintenance, the remaining fuel should be burnt off by intermittent use of the whisper burner.

4.10 FUEL PRESSURISATION

WARNING: Pressurisation must never be carried out with air or oxygen, as an explosive mix would occur within the cylinder

In order to provide increased fuel pressure during cold conditions fuel cylinders may be pressurised with nitrogen.

The nitrogen used must be from a regulated supply, providing a pressure of between 0 and 10 bar (0 - 145 psi) to the fuel cylinder, and this nitrogen supply must be operated in accordance with the suppliers instructions.

Nitrogen is added to the cylinder through its liquid feed valve until the desired pressure level is reached.

CAUTION: The maximum cylinder pressure must not exceed 10bar (145psi).

CAUTION: The maximum cylinder pressure must not exceed 7bar (100psi) if the cylinder is to be stored in a pressurised state.

If vapour pilot lights are used, sufficient master cylinders must remain nitrogen-free and be easily identifiable for operation.

CAUTION: A cylinder that has been pressurised with nitrogen becomes unusable for vapour withdrawal, as the nitrogen occupies the vapour space at the top of the fuel cylinder.

When fuel cylinders which have been pressurised with nitrogen are warmed, the fuel pressure will rise much more rapidly than that of an unpressurised cylinder. Care must be taken to ensure that the cylinder maximum safe working pressure is never exceeded. This may be achieved either by pressurising cylinders to a maximum of 7 bar(100psi) if they are to be stored, or by pressurising cylinders to 10 bar(145psi) immediately before a flight and venting the nitrogen from any unused or partially used cylinders as soon as is practical after landing.

It is highly recommended that any cylinder which has been pressurised with nitrogen is labelled as such, and extra care is taken with the use and storage of the cylinder.

Nitrogen is vented from a fuel cylinder by opening the fixed liquid level gauge and allowing vapour to vent for a minimum of 10 minutes. This will allow a considerable amount of nitrogen and propane vapour to escape, markedly reducing the internal pressure of the cylinder.

When using this procedure, the same precautions must be taken as when filling the cylinders.

If a master cylinder is to be returned to use supplying a vapour pilot light after having being nitrogen pressurised, empty the cylinder then refill normally. Extra care should be taken during the first pre flight burner test to ensure the pilot light operates correctly and provides a stable flame.

It is important that the use of high pressure nitrogen cylinders is carried out with reference to the safety, handling and storage guidelines in place for these cylinders. Local and national regulations concerning the use of these cylinders must also be complied with. The supplier of the cylinders will be able to provide the necessary information.

4.11 USE OF A MINI VAPOUR CYLINDER

The mini vapour cylinder contains sufficient fuel to supply one pilot light for approximately ten hours or two pilot lights for approximately five hours.

4.11.1 Refuelling a Mini Vapour Cylinder

The vapour regulator and connecting hose should be removed from the cylinder by unscrewing the 'Rego' connector. Once the vapour regulator is removed, the refuelling procedure is identical to a flight cylinder.

If the cylinder is fitted with a fixed liquid level gauge (rather than a fill stop valve), the level gauge is incorporated in the cylinder valve. Care is required not to overfill the mini cylinder if a pump is being used for refuelling, but care must also be taken to ensure the cylinder is full.

The fixed liquid level gauge is in the flow of liquid during refuelling causing a small amount of leakage from the fixed liquid level gauge during filling. The cylinder is not full until there is a constant liquid flow from the fixed liquid level gauge.

5.1 INTRODUCTION

This Section gives the procedure to calculate the weight range within which the balloon may safely be operated.

5.2 LOADING CHART

Before each flight the take-off mass must be calculated, and a check made to ensure that this does not exceed the available lift, otherwise the envelope can easily be overheated.

The load which can be carried safely depends on-

1. The temperature of the surrounding air (ambient temperature).

2. The expected flight altitude.

The available lift may also be calculated using the information given in Appendix 2

5.2.1 Instruction For Use Of The Chart

1. Find the 'Lift (lb) per 1000 cu ft' for the expected flight altitude and temperature, using the chart.

2. Use Section 5, Table 2 or 3 to find total permitted lift for the size of balloon, interpolating if necessary.

3. Disposable lift is the total permitted lift minus the balloon empty weight.

4. Ensure that the combined weight of passengers and fuel cylinders does not exceed the disposable lift.

Notes

1. The dotted lines show typical temperature variations with height (I.S.A. is the International Standard Atmosphere). These are an approximation, and can be used to estimate the ambient temperature (and therefore the lift) at another altitude when the ambient temperature at one altitude is known. For flights to altitudes high above take-off altitude see Section 4.5.6.

2. The loading chart is based on static lift with an 100°C internal temperature, thus allowing for moderate rates of climb within the temperature limitation.

3. The applicable Maximum take-off Mass of the balloon must not be exceeded. (See Section 2, Table 1).

4. Empty weight includes the envelope, carrying bag, burner, karabiners and basket including poles, pole covers and fire extinguisher. (Not included are cylinders, accessories or occupants). The main component weights are listed in Section 5, Table 4 and the balloon's log book.

5. Fuel cylinder weights are given in Section 5, Table 4 or Table 9 in Appendix III.

5.3 INVERSION CONDITIONS

When the temperature of the atmosphere increases with height, loading according to the temperature of the cool ground layer can lead to overheating after the initial climb.

On cool early morning flights, either use the expected midday temperatures for the calculations, or leave a good margin below the calculated maximum permitted weight.

5.4 SAMPLE CALCULATIONS

Dotted lines showing the sample calculations are marked on the chart.

Example 1: Ambient temperature at maximum altitude known.

The balloon is to be flown to a maximum altitude of 3000 ft and the forecast temperature at that altitude is 11ºC.

Start with the ambient temperature at the maximum altitude on the horizontal scale. Follow up vertically to intersect the 3000ft curve. This point will show the lift at 3000ft on the vertical scale (16.7 lb per 1000 cu ft).

Example 2: Ambient temperature at maximum altitude not known

The balloon is to be flown to a maximum altitude of 10,000ft from a take-off altitude of 3000ft The ambient temperature at take-off is 8ºC.

Start with the ambient temperature at take-off on the horizontal scale. Follow up vertically to intersect the 3000 ft curve. This point will show the lift at 3000 ft on the vertical scale (17.4 lb per 1000cu ft).

To allow for the effect of altitude follow parallel to the ISA curves until the 10000 ft curve is reached. This point shows the theoretical ambient temperature at 10,000ft (-7ºC) on the horizontal scale and the lift at 10,000ft (16.3 lb per 1000 cu ft) on the vertical scale.

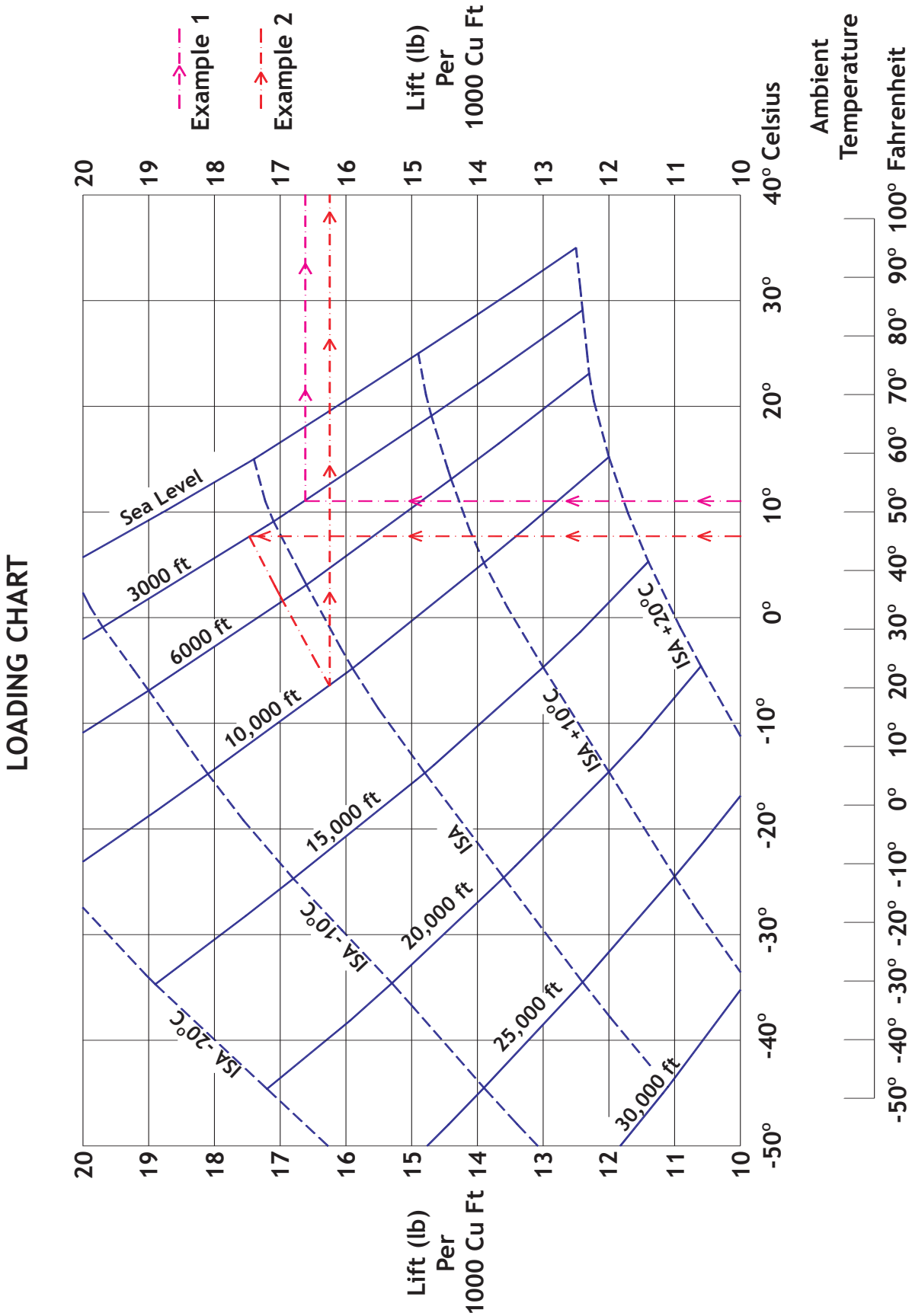

LOADING CHART
Example 1
Example 2
Lift (lb) Per 1000 Cu Ft
Ambient Temperature
40° Celsius
Fahrenheit
Sea Level
3000 ft
6000 ft
10,000 ft
15,000 ft
20,000 ft
25,000 ft
30,000 ft
ISA
ISA +20°C
ISA +10°C
ISA -10°C
ISA -20°C

Table 2: Total Permitted Lift (kg)

Balloon Size	Lift (lb) Per 1000 cu.ft.										
	10	11	12	13	14	15	16	17	18	19	20
25	113	125	136	147	159	170	181	193	204	215	227
31	143	157	171	185	200	214	228	243	257	271	285
35	158	174	190	206	222	238	254	269	285	301	317
42	191	210	229	248	267	286	305	324	343	362	381
50	226	249	272	294	317	340	362	385	408	430	453
56	254	279	305	330	356	381	406	432	457	483	508
60	272	299	327	354	381	408	435	463	490	517	544
65	295	324	354	383	413	442	472	501	531	560	590
69	313	344	376	407	438	469	501	532	563	595	626
70	317	349	381	413	444	476	508	540	571	603	635
77	352	387	422	457	492	527	562	597	633	668	703
80	363	399	435	472	508	544	580	617	653	689	726
84	381	419	457	495	533	572	610	648	686	724	762
90	408	449	490	531	571	612	653	694	735	776	816
100	454	499	544	590	635	680	726	771	816	862	907
105	476	524	572	619	667	714	762	810	857	905	952
120	544	599	653	707	762	816	871	925	980	1034	1088
133	603	663	724	784	844	905	965	1025	1086	1146	1206
140	635	699	762	826	889	953	1016	1080	1143	1207	1270
145	658	723	789	855	921	987	1052	1118	1184	1250	1315
150	680	748	816	884	952	1020	1088	1156	1224	1293	1361
160	726	798	871	943	1016	1088	1161	1234	1306	1379	1451
180	816	898	980	1061	1143	1225	1306	1388	1470	1551	1633
200	907	998	1088	1179	1270	1361	1451	1542	1633	1723	1814
210	952	1047	1143	1238	1334	1429	1524	1619	1715	1810	1905
225	1020	1122	1224	1327	1429	1531	1633	1735	1837	1939	2041
240	1089	1197	1306	1415	1524	1633	1742	1851	1960	2068	2177
250	1134	1247	1361	1474	1588	1701	1814	1928	2041	2155	2268
260	1179	1297	1415	1533	1651	1769	1887	2005	2123	2241	2359
275	1247	1372	1497	1621	1746	1871	1995	2120	2245	2370	2494
300	1361	1497	1633	1679	1905	2041	2177	2313	2449	2585	2721
315	1429	1571	1714	1857	2000	2143	2286	2429	2571	2714	2857
340	1542	1696	1850	2005	2159	2313	2467	2621	2776	2857	2857
340HL	1542	1696	1850	2005	2159	2313	2467	2621	2776	2930	3084
350	1587	1746	1905	2063	2222	2381	2540	2698	2857	3016	3175
375	1701	1871	2041	2211	2381	2551	2722	2892	3062	3232	3401
400	1814	1995	2177	2358	2540	2721	2902	3084	3265	3447	3628
415	1882	2070	2259	2447	2635	2823	3011	3200	3388	3576	3764
425LW	1927	2120	2313	2506	2698	2891	3084	3277	3469	3662	3662
450 LW	2041	2245	2449	2653	2857	3061	3265	3469	3673	3815	3815
450	2041	2245	2449	2653	2857	3061	3265	3469	3673	3878	4082
530	2404	2644	2884	3125	3365	3605	3846	4086	4327	4567	4807
600	2721	2993	3265	3537	3810	4082	4354	4626	4898	5089	5089

Table 3: Total Permitted Lift (lb)

Balloon Size	Lift (lb) Per 1000 cu.ft.										
	10	11	12	13	14	15	16	17	18	19	20
25	250	275	300	325	350	375	400	425	450	475	500
31	315	346	378	409	441	472	504	535	567	598	620
35	350	385	420	455	490	525	560	595	630	665	700
42	420	462	504	546	588	630	672	714	756	798	840
50	500	550	600	650	700	750	800	850	900	950	1000
56	560	616	672	728	784	840	896	952	1008	1064	1120
60	600	660	720	780	840	900	960	1020	1080	1140	1200
65	650	715	780	845	910	975	1040	1105	1170	1235	1300
69	690	759	828	897	966	1035	1104	1173	1242	1311	1380
70	700	770	840	910	980	1050	1120	1190	1260	1330	1400
77	775	852	930	1007	1085	1162	1240	1317	1395	1472	1540
80	800	880	960	1040	1120	1200	1280	1360	1440	1520	1600
84	840	924	1008	1092	1176	1260	1344	1428	1512	1596	1640
90	900	990	1080	1170	1260	1350	1440	1530	1620	1710	1800
100	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
105	1050	1155	1260	1365	1470	1575	1680	1785	1890	1995	2100
120	1200	1320	1440	1560	1680	1800	1920	2040	2160	2280	2400
133	1330	1463	1596	1729	1862	1995	2128	2261	2394	2527	2660
140	1400	1540	1680	1820	1960	2100	2240	2380	2520	2660	2800
145	1450	1595	1740	1885	2030	2175	2320	2465	2610	2755	2900
150	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000
160	1600	1760	1920	2080	2240	2400	2560	2720	2880	3040	3200
180	1800	1980	2160	2340	2520	2700	2880	3060	3240	3420	3600
200	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000
210	2100	2310	2520	2730	2940	3150	3360	3570	3780	3990	4200
225	2250	2475	2700	2925	3150	3375	3600	3825	4050	4275	4500
240	2400	2640	2880	3120	3360	3600	3840	4080	4320	4560	4800
250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000
260	2600	2860	3120	3380	3640	3900	4160	4420	4680	4940	5200
275	2750	3025	3300	3575	3850	4125	4400	4675	4950	5225	5500
300	3000	3300	3600	3900	4200	4500	4800	5100	5400	5700	6000
315	3150	3465	3780	4095	4410	4725	5040	5355	5670	5985	6300
340	3400	3740	4080	4420	4760	5100	5440	5780	6120	6300	6300
340HL	3400	3740	4080	4420	4760	5100	5440	5780	6120	6460	6800
350	3500	3850	4200	4550	4900	5250	5600	5950	6300	6650	7000
375	3750	4125	4500	4875	5250	5625	6000	6375	6750	7125	7500
400	4000	4400	4800	5200	5600	6000	6400	6800	7200	7600	8000
415	4150	4565	4980	5395	5810	6225	6640	7055	7470	7885	8300
425LW	4250	4675	5100	5525	5950	6375	6800	7225	7650	8075	8075
450LW	4500	4950	5400	5850	6300	6750	7200	7650	8100	8410	8410
450	4500	4950	5400	5850	6300	6750	7200	7650	8100	8550	9000
530	5300	5830	6360	6890	7420	7950	8480	9010	9540	10070	10600
600	6000	6600	7200	7800	8400	9000	9600	10200	10800	11215	11215

Table 4: Balloon Component Weight Record

Registration	
Year Of Construction	
Constructors Number	
Balloon Type	

Component	Drawing Number	Serial Number	Weight (kg)
Envelope			
Burner			
Basket			
		Total	

Cylinder	Drawing Number	Serial Number	Weight (kg)	
			Empty	Full
Cylinder 1				
Cylinder 2				
Cylinder 3				
Cylinder 4				
Cylinder 5				
Cylinder 6				
		Total		

Total Fuel Weight _____ kg

6.1 INTRODUCTION

Section 6 provides a description of the standard component parts and assemblies that make up the balloon system.

Optional equipment is described in Section 8.

6.2 ENVELOPE

Envelopes are of sewn construction, and are made of high tenacity nylon fabric. The fabric is coated to make it airtight and to protect it from the effects of sunlight. All the main loads on the envelopes are carried by nylon or polyester load tapes and the designs use high factors of safety.

Horizontal tapes act as rip stoppers so that any damage to the envelope will be limited in extent.

The base panels of the balloon are made from Nomex heat resistant fabric so that the nylon is kept at a sufficient distance from the flame to prevent heat damage. The lower ends of the load tapes are formed into rigging loops to which stainless steel or Kevlar cables, called flying cables, are attached.

Envelopes are fitted as standard with a 'Parachute' deflation system in sizes of up to 150,000 cu.ft (4250m^3) and a 'Lock-Top' deflation system in larger sizes. The Rapid Deflation System is available as an option on most models.

The base of the balloon may be fitted with a Scoop. This improves the performance of the balloon when taking off or tethering in wind, and during flight in turbulent conditions.

There are seven standard types of envelope, all of which are of the conventional 'inverted teardrop' shape. Approved volumes and variants are listed in the Type Certificate Data Sheet EASA.BA.013.

Type	No. of Gores	Suspension Cables	Profile
Cameron 'V' Type (Viva)	8	8	Bulbous
Cameron 'C' Type (Concept)	12-16	12-16	Smooth
Cameron 'O' Type and Thunder Series I	12	12	Semi-Bulbous
Cameron 'A' Type And Thunder Series II	20	20	Semi-Bulbous
Cameron 'N' Type	24-32	12-16	Smooth
Cameron 'Z' Type and Colt 'A' Type	16-32	12-32	Smooth
Cameron 'GP' Type	24	12	Smooth
Cameron 'TR' Type	24	12	Smooth

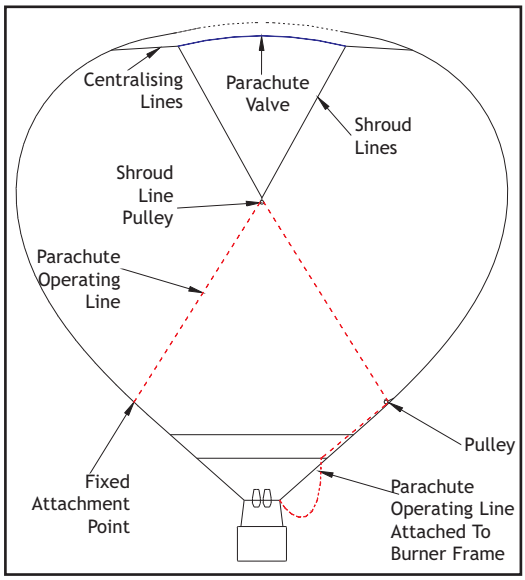
6.2.1-6.2.8 Paragraphs Deleted

6.2.9 Parachute Valve

The parachute valve allows the controlled release of hot air (venting) and the complete deflation of the envelope. It takes the form of a circular parachute-style panel sealing a circular opening in the top of the envelope.

The parachute is held in position by the internal pressure of the hot air and by centralising lines which join its edge to the inside surface of the balloon.

The parachute valve is opened by pulling the red and white operating line attached, via a pulley, to the shroud lines of the parachute. The operating line passes through a second pulley to give a greater mechanical advantage. Larger envelopes may be fitted with a third or fourth pulley to increase the mechanical advantage.



Parachute Internal Arrangement

For in-flight venting the parachute panel is opened for a few seconds, whereas for deflation it is held open until the envelope deflates.

6.2.10 Lock-Top

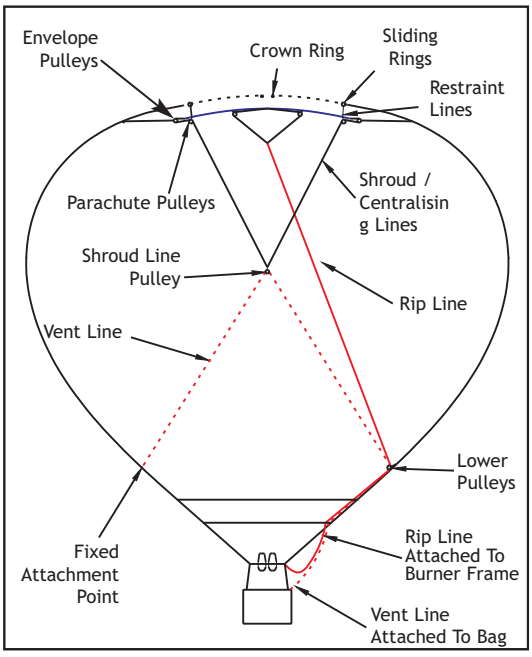
The Lock-Top is a modified form of the parachute valve fitted as standard equipment to larger envelopes. The parachute panel is fitted with longer centralising lines, allowing it to be pulled clear of the circular opening in the top of the envelope. This results in a faster final deflation.

The centre of the parachute is attached to the crown ring by a snap shackle which ensures that the parachute cannot be 'stalled' as a result of over-venting. On the final approach to landing the shackle is opened by pulling the yellow and black arming line. A flag appears inside the envelope once the system has been armed.

6.2.11 Rapid Deflation System (RDS)

The Rapid Deflation System is similar in appearance to a parachute valve. However, the centralising and shroud lines are replaced by a single length of line running through pulleys.

Pulling the red line gathers the parachute panel into a column in the centre of the circular opening for final deflation.

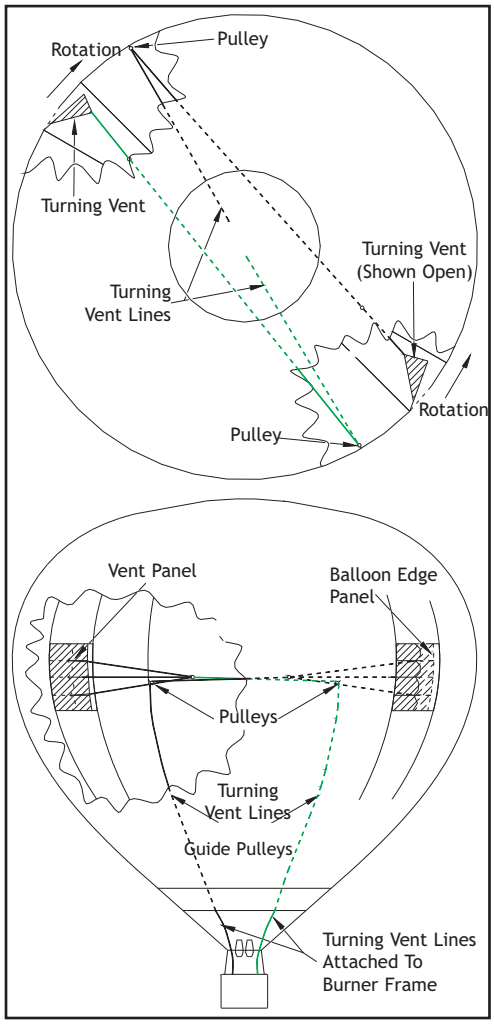


Rapid Deflation System Internal Arrangement

The action of the red line can be reversed by pulling the red and white venting line.

Pulling the red and white venting line opens the parachute in a similar way to a parachute valve for in-flight venting of hot air.

6.2.12 Paragraph Deleted



Turning Vent Internal Arrangement

6.2.13 Paragraph Deleted

6.2.14 Turning Vent

Turning vents may be fitted, which allow the balloon to be rotated about its vertical axis while airborne. These can be used to align the basket into the safest position for landing and can assist the effective display of advertising. The black line will rotate the balloon to the pilot's left, the green line to the pilot's right.

6.2.15 Temperature Streamer

A melting link attached to a streamer is fitted to all envelopes, usually near the top of load tape no. 2. If the envelope is overheated the streamer will fall through the mouth of the envelope warning the pilot. The streamer will fall out at 127°C (261°F) and may be of any colour contrasting with the envelope.

6.2.16 Tempilabel

A tempilabel is sewn into all envelopes near the top of load tape 3. This label has temperature sensitive areas which permanently change colour at different temperatures between 90° to 150°C (200° to 300°F). This provides a permanent record of the maximum temperature the fabric has reached.

6.3 BURNER

6.3.1 General

The main heat source for balloon flight is a high-output burner fuelled with liquid propane.

Burners are available in single, double, triple and quad configurations.

The burner valve controls are colour coded to aid recognition.

6.3.2 Main Burner

The fuel passes through a vaporising coil (burner coil) and jet system prior to combustion. Fuel flow is controlled by an on/off valve referred to as the blast valve. The blast valve control is coloured red.

6.3.3 Whisper Burner

The Whisper burner ('Liquid Fire' or 'Cow Burner') feeds liquid fuel directly to a multi-hole jet producing a quieter and less powerful flame. Fuel flow is controlled by a rotary valve or toggle valve which can vary the output of the burner. The whisper burner control is coloured blue.

The Whisper burner is designed for occasional use. Excessive use may cause discolouration of the envelope.

The Whisper burner should not be operated continuously with the valve partially open as this may lead to droplets of propane being produced at the nozzle. Liquid fuel may then collect in the base of the burner and present a fire risk.

6.3.4 Pilot Light

Burner ignition is provided by a pilot light. Pilot lights may be fuelled by liquid propane taken from the main fuel supply or from a separate regulated vapour supply. The pilot light is controlled by a rotary action shut off valve. Each pilot light has its own piezo igniter (except the Shadow Single burner which shares one igniter between two pilot lights). The pilot light control obscures the igniter push button when in the closed position. The pilot light control is coloured gold.

Note: During initial use, some 'bedding down' of the pilot light and whisper burner valves may occur necessitating a simple adjustment to ensure the valves shut off correctly (Maintenance Manual Sections 4.5.1 and 4.6.1).

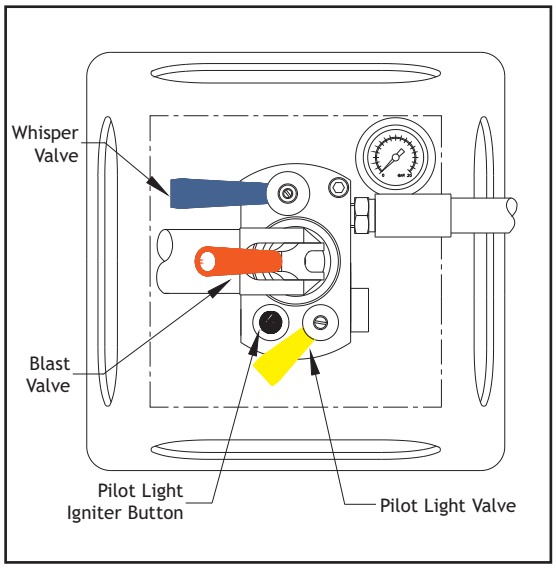
6.3.5 Pressure Gauge

A pressure gauge is fitted to each liquid fuel supply. The pressure gauge displays the fuel pressure at the burner.

6.3.6 Fuel Supplies

A minimum of two separate fuel supplies is always fitted. In a single burner these both feed, via independent valves, to the same burner coil. In double, triple or quad burners, each burner unit has its own independent fuel supply.

The fuel hoses on triple and quad burners are marked with a coloured band at each end so that the hose couplings can be matched with their burner unit.



Shadow / Stealth Control Layout

6.3.7 Simultaneous Multiple Burner Operation

In multiple burners, pairs of burners are linked by either 'dual action handles' or by a crossflow valve. The dual action handle allows the operation of two main blast valves, via separate fuel supplies, with one hand. The crossflow valve allows the routing of single fuel supply from one blast valve to two burner coils. Maximum power will not be achieved using the crossflow as both the burners are being fed from one fuel hose.

6.3.8 Shadow and Stealth Burners

The Shadow burner uses a jet ring incorporating multi-hole jets producing a powerful slim high speed flame.

Shadow Single Burner

The Stealth burner uses a sophisticated foil jet ring system to achieve a considerable reduction in noise output. The Stealth has a 'soft start - soft finish' burn, with a gradual build up and decay of burner noise.

The lower flame speed produced results in a 'softer' flame which is more easily deflected by wind or turbulence. Radiant heat is also slightly increased.

Cleaning of the Stealth jet ring may be required after using dirty propane (Maintenance Manual Section 4.5.6). If dirty propane is suspected a fuel filter should be incorporated into the refuelling hose.

Shadow and Stealth burners are fitted with a liquid pilot light. A vapour pilot light is available as an option. Both types of pilot lights are fitted with filters which require periodic cleaning (Maintenance Manual Section 4.5.2).

6.3.8.1 Shadow Single Burner

The Shadow single burner consists of a single burner coil with a dual feed manifold block. The manifold block has two independent fuel supplies each with its own blast valve, whisper valve and pilot light.

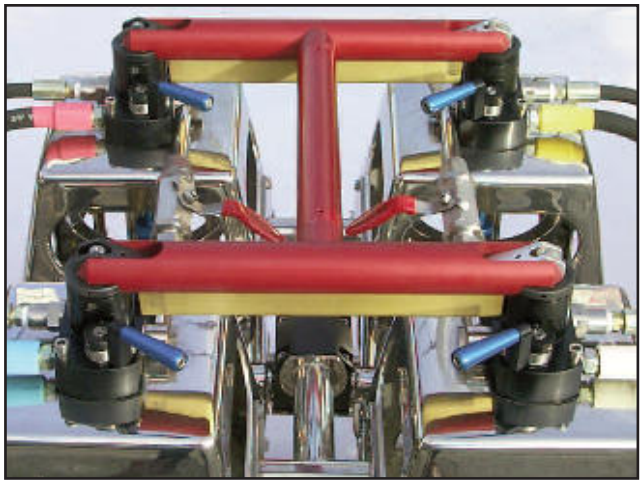
6.3.8.2 Shadow And Shadow / Stealth Combination Burners

Shadow and Shadow/Stealth combination burners are available as double, triple and quad burners.

The Shadow and Stealth burners share the same manifold block and control layout, and differ only in the main burner jet ring and coil arrangement.

The Stealth burner is only fitted in combination with Shadow units to create double, triple or quad combination burners.

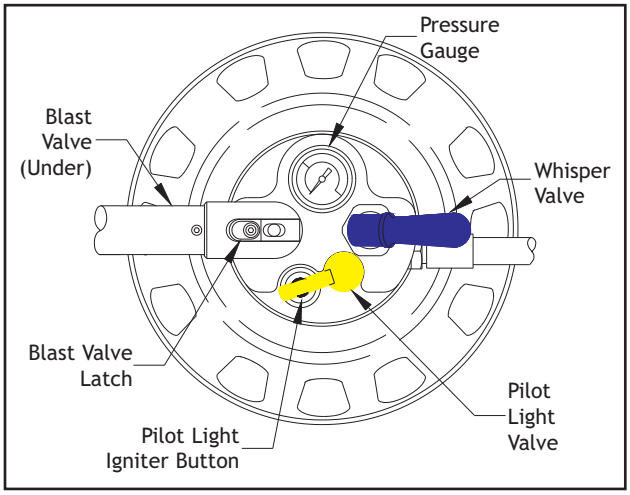
Double burners are fitted with crossflow valves. Triple and quad burners can be fitted with crossflow valves or dual action handles (“squeeze bar action”) between paired burner units.



Stealth / Shadow Quad Burner

6.3.9 Stratus Burner

The Stratus Burner is available as a single, double, triple or quad burner.



Stratus Control Layout

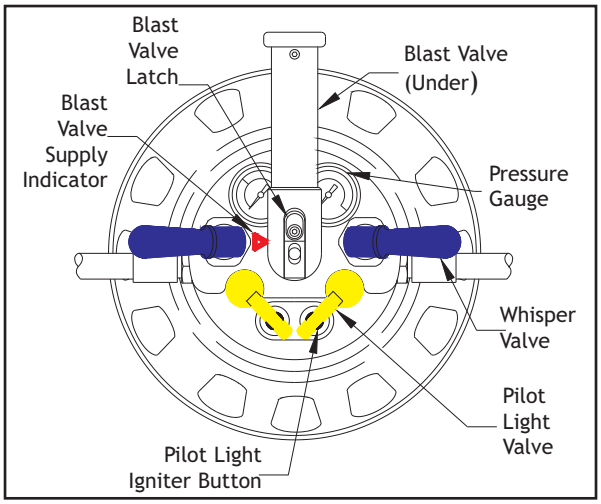
The main burners are fitted with squeeze action blast valves which are operated by squeezing the control lever towards the hand grip. Each handle has a latch fitted on its underside to allow the valve to be locked on in an emergency (Section 3.11). The blast valve handles are arranged so that pairs of burners be operated simultaneously with one hand.

The Whisper burner is operated by a toggle valve, which may be rotated to give a convenient operating position.

The Stratus burner is fitted with a liquid pilot light. A vapour pilot light is available as an option. Both types of pilot lights are fitted with filters which require periodic cleaning (Maintenance Manual Section 4.7.2).

6.3.9.1 Stratus Single Burner

The Stratus single burner has two independent fuel supplies. Each fuel supply feeds a pilot and whisper burners. One main blast valve is fitted and its fuel supply is denoted by a red arrow on the block. The Stratus single burner has two igniters.



Stratus Single Control Layout

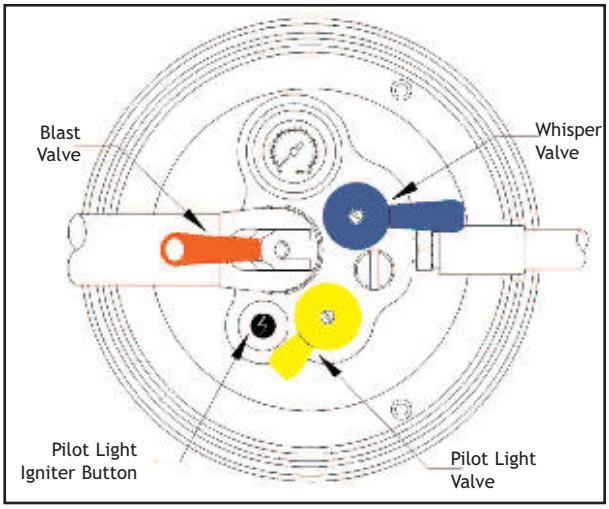
6.3.9.2 Stratus Double, Triple And Quad Burners

Triple and quad burners can be fitted with crossflow valves between adjacent burners. When a crossflow valve is open, two burners can be operated from one burner valve. This enables all the burners to be operated with one hand.

6.3.10 Sirocco Burner

The Sirocco burner is available as a double, triple or quad burner.

The Sirocco burner has the ability to perform over a wide range of fuel pressures without the use of nitrogen (N_2) pressurisation, and gives a slim, powerful flame with low radiant heat output.



Sirocco Control Layout

The burner coil operates at a relatively low temperature which reduces thermic cycling extending burner life.

A dual action handle is fitted to allow the operation of a pair of burner units simultaneously with one hand.

The Whisper valve and pilot valve are operated by rotary action handles which are marked to show their sense of operation.

The Sirocco manifold block enables quick disassembly for ease of maintenance.

The Sirocco is only available with a regulated liquid pilot light system.

Sirocco burners are not fitted with crossflow valves.

6.3.11 Sirocco E.P. Remote Control Burner

The Sirocco burner is available with a solenoid actuated remote control system. The burner may be operated normally or from a hand held remote control. The remote control system actuates either burner of a double burner or both burners simultaneously. The System can also be fitted to one pair of burners in a triple burner system or one pair of burners in a quad burner system.

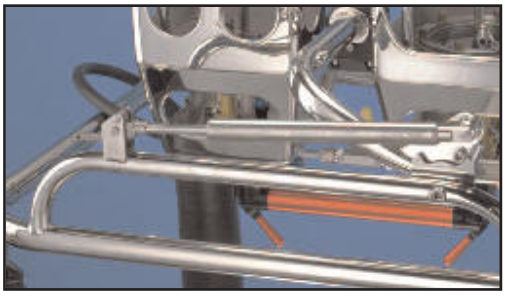
Sirocco Manifold Block

6.3.12 Fixed Height Burner Frame

The burner assembly is mounted on a gimbal in the burner frame.
The burner frame has a socket in each corner to accept a nylon support rod. In addition, there are rigging points at each corner through which karabiners are hooked to join the basket wires to the envelope flying cables. Larger frames are fitted with four additional sockets and rigging points. Heat shields may be fitted to larger burner frames to reduce radiant heat.

6.3.13 Adjustable Height Burner Frame

The adjustable height burner frame allows the burner to be raised and lowered relative to the basket floor. This adjustment can be safely carried out in flight. The adjustable burner frame is only available for use with single and double burners.



Adjustable Burner Frame

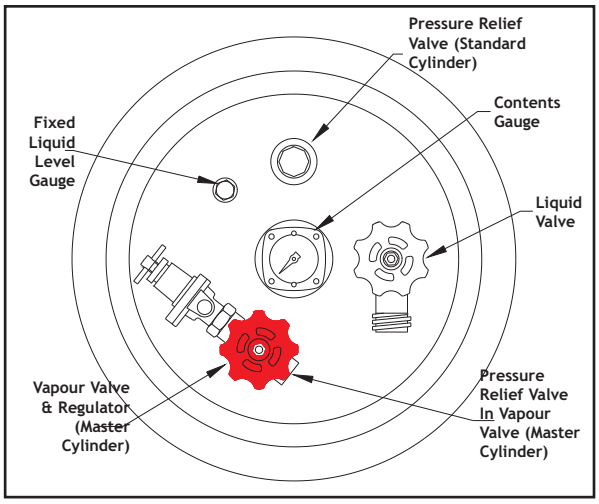
6.4 FUEL CYLINDERS

The fuel cylinders contain the liquid propane fuel under pressure. The cylinders are supplied in two configurations.

'Standard' cylinders: supplying liquid fuel feed only.
'Master' cylinders : supplying liquid fuel feed with an additional pressure regulated vapour supply for vapour pilot lights.

The liquid fuel is drawn from the bottom of the cylinder via an internal dip tube. The liquid supply is controlled by an external valve, either a handwheel type valve with a Rego type (screw-on) hose connector or a 'quick shutoff' lever-operated valve. The quick shutoff valve may be fitted with either a Rego type screw-on connector or a Tema push-on connector.

The regulated vapour pilot light supply (master cylinders only) is taken directly from the top of the cylinder through a handwheel type valve and an adjustable regulator. The vapour hose is connected using a quick release coupling.



Fuel Cylinder Valve Layout - Master Stainless Steel Cylinder Shown

Caution: The Vapour Regulator requires an internal cylinder vapour pressure of 0.5 Bar (7 p.s.i) before it operates correctly. Care must be taken at low ambient temperatures when using fuel which is predominantly butane.

All fuel cylinders are fitted with:

A contents gauge which indicates from approximately 33% of capacity until the cylinder is empty.

A fixed liquid level gauge (bleed valve) which indicates when the cylinder is full.

A pressure relief valve (PRV) which protects the cylinder against excessive internal pressure.

A padded cover with integral map pocket. The padded cover must be used at all times.

The cylinders are strapped vertically inside the basket. Load spreading boards must be fitted to the internal runners of woven floor baskets if cylinders with a useable volume greater than 45 litres are used.

6.4.1 Deleted

6.4.2 Cameron Duplex Stainless Steel Fuel Cylinders

A range of duplex stainless steel cylinders is available. These have usable volumes of between 45 and 72 litres. Cameron duplex stainless steel fuel cylinders have curved dip tubes.

6.4.3 Deleted

6.4.4 Mini Vapour Cylinder

The Mini Vapour Cylinder is a 5 litre Worthington aluminium fuel cylinder, fitted with a vapour outlet, pressure regulator and connections for two pilot light hoses.

Use of a Mini Vapour Cylinder allows the main master cylinders to be pressurised with nitrogen (N_2) or carbon dioxide (CO_2) to increase burner power in cold conditions, or in cases of low gas pressure (e.g. when using butane).

6.4.5 Fuel Manifolds

Approved fuel manifolds may be used to join the outlets of several fuel cylinders to one burner fuel hose.

WARNING: Accidents have been caused by the use of non-approved fuel manifolds. In particular it is important that rigid refuelling adapters are not used to allow the combination of Rego outlet cylinders with Tema connectors or vice-versa.

6.5 BASKET

Baskets are of traditional wickerwork construction. The basket floors are either woven or solid plywood. The structural load is taken by stainless steel wires forming a continuous sling from the burner frame underneath the basket floor.

The baskets are strengthened by aluminium 'U'-tubes or a stainless steel frame.

The top of the basket is padded with foam, which is then trimmed with leather or suede. The bottom edge is covered with rawhide which protects the basket from damage during landings and transit. Openings are woven into the basket for cylinders straps and step holes.

The basket cables, burner support rods and fuel hoses are contained within zip-up padded covers.

Side or end wall cushions and cushion floors may be added inside the basket to increase the levels of passenger comfort.

A fire extinguisher must be fitted inside the basket.

Aristocrat Basket

6.5.1 Concept Basket

The Concept basket is available in two sizes to match the Concept 60 - 70 and 80 - 100 envelopes. The baskets are of lightweight construction and have a flat top.

6.5.2 Aristocrat And Classic Baskets

The Aristocrat and Classic ranges of baskets carry between one and six occupants. The baskets are usually made with the top of the basket upswept at each end but flat top baskets can be specified.

6.5.3 Partitioned Baskets

Larger baskets have internal partitions woven into the walls and floor of the basket. These partitions provide greater structural integrity and separation between groups of passengers The pilot and fuel cylinders occupy a separate compartment from the passengers.

Larger partitioned baskets use two rigging points on each corner of the load frame for increased strength. The largest partitioned baskets have provision for eight burner support rods, each with its own rigging points.

Padded hose covers can be used to bring fuel hoses from the centre of the burner frame to the centre of the pilot compartment.

Turning vents should be fitted to envelopes used with partitioned baskets. This allows the basket to be rotated so that the long side faces the direction of travel during landing.

▲ Double 'T' Partition Basket

6.5.4 Pilot Restraint Harness

The pilot restraint harness prevents the pilot being thrown from the basket during a heavy or fast landing. The harness fastens around the pilot's waist, and is attached securely either to or close to the basket floor. A quick release buckle is fitted to allow the pilot to leave the basket in an emergency.

6.5.5 Bonanno Quick Release

The quick release is designed to restrain the balloon during inflation and heating up for take-off, but must not be used for tethered flight. A locking pin is fitted to prevent accidental release.

Use of the quick release is recommended to ensure that the balloon does not drag during inflation or leave the ground prematurely.

Note: Care should be taken to protect all webbing and rope items from the effects of sunlight. Ultraviolet radiation causes degradation of the rope or webbing, considerably reducing its strength. This applies especially to the launch restraint and equipment for tethered flight. Regular checks should be made to the launch restraint and equipment for tethered flight for wear and loss of strength.

6.6 FLIGHT INSTRUMENTS

Flight instruments used in ballooning are an altimeter (for altitude measurement), a variometer (to display climb and descent rate), a time piece (to record flight times, sunset times etc.) and an envelope temperature gauge (to indicate envelope internal temperature).

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7.1 INTRODUCTION

This Section contains the recommended procedures for proper ground handling and servicing of the balloon.

7.2 INSPECTION PERIODS

Details of the required inspection periods are given in Cameron Balloons Maintenance Manual Issue 10, Section 6.

7.3 ALTERATIONS OR REPAIRS

It is essential that the responsible airworthiness authority is contacted prior to any alterations being made to the balloon to ensure that the airworthiness of the balloon is not compromised.

For repair procedures, reference should be made to Cameron Balloons Maintenance Manual Issue 10.

7.4 TRANSPORTATION

The following Sections apply to road transportation. If the balloon is to be transported by rail, sea or air, the operator of the service should be contacted prior to travel to find out what requirements they have in respect of fans, propane cylinders etc. Extra protection may be required when shipping by these methods.

7.4.1 Envelope

When the balloon is to be transported, the envelope must be carried in its storage bag, and should be protected from weather.

7.4.2 Burners

The burners must be vented of propane, and the fuel hoses disconnected from the cylinders before transport.

The burners should not be rigged to the basket. Transporting a basket and burner in this manner leads to greatly increased wear to the structure, and there is a chance of the burner striking low bridges.

Burners fitted with a crossflow valve should be transported with the crossflow valve in the open position.

Sirocco, Shadow and Stealth burners are fitted with 'squeeze action' valve controls mounted below the hand grip. The burner should be transported and stored with the control lever moved through approximately 150º so that it is parallel with the hand grip.

Burners with liquid pilot lights should be transported and stored with the burner vertical and coils uppermost, to prevent any ‘heavy ends’ in the fuel interfering with the liquid pilot light regulator.

7.4.3 Cylinders

Fuel cylinders must only be transported or stored vertically with the valves uppermost, as the pressure relief valves are designed to vent only vapour.

The cylinders must be firmly secured inside the basket or other form of protection within the transportation unit.

Cylinders which have been pressurised with nitrogen must be checked to ensure the internal vapour pressure is not greater than 7 bar (100 psi) prior to transportation.

If the cylinder pressure exceeds 7bar, the cylinder must be vented (Section 4.14) until the cylinder pressure is below 7bar.

7.4.4 Baskets

WARNING: Great care must be taken when transporting solid floor baskets to ensure that damage is not caused to the wires on the underside of the basket floor. If damage is evident or suspected, the wires must be inspected as per Cameron Balloons Maintenance Manual Issue 10 Section 6.17.4 before flight.

Baskets should be protected from the elements during transportation by use of a suitable cover.

When using ratchet straps to secure baskets to trailers, care must be taken not to over tighten these straps as permanent distortion to the basket can occur (especially when the basket is new or wet).

Baskets can be loaded longitudinally or transversely. Solid floor baskets must not be loaded or unloaded over the side of a vehicle or trailer unless wire protectors (CB 3351) are fitted. This is due to the high risk of wire damage from the edge of the vehicle or trailer. Before loading, check that all these protectors are in place and secure. Woven floor baskets must be protected from areas of the trailer that could cause damage to the wires or wicker. If the basket is to be winched lengthways onto a vehicle or trailer, only approved basket towing plates and bridles should be used. The winch cable must not be attached to the rope handles, or any other part of the basket, or serious damage could be caused to the basket structure.

When unloading baskets from trailers, great care must be taken not to drop the basket onto the ground without cushioning the impact (especially larger baskets with full fuel cylinders) as damage to the structure can occur.

7.5 STORAGE

The balloon should be stored in a clean dry place.

The envelope should not be stored damp or wet for more than a few days, as residual moisture can result in fabric deterioration due to mould or mildew. A wet envelope should be gently dried by keeping it cold inflated with a fan, rolling the envelope over if necessary. Hot inflating a wet envelope may cause damage to the fabric.

The basket should not be stored wet or with a covering of mud, as this will trap moisture next to the hide and wicker, leading to deterioration of the basket. The basket should be cleaned using fresh water and allowed to dry. If the basket is secured to a trailer using ratchet straps during storage, the straps should be loosened to prevent any permanent distortion.

Salt contamination of any part of the balloon and its equipment must be avoided. If any of the balloon's components become contaminated with sea water they should be washed with plenty of fresh water. Salt will cause corrosion in metal components (including stainless steel), accelerate decay in wickerwork, and adversely affect the envelope fabric and tapes.

For full cleaning instructions, reference should be made to Cameron Balloons Maintenance Manual Issue 10.

Cylinders must be stored in a well-ventilated area with no sources of ignition or excessive heat. Cylinders must not be stored near drains or cellars, where any leaked propane could collect.

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8.1 INTRODUCTION

This Section contains the appropriate supplements and additional approved data necessary to safely and efficiently operate the balloon when equipped with various optional systems and equipment not included in the main manual.

The balloon shall be operated in accordance with the applicable supplement and/or additional approved data when appropriate, but the content of the base Flight Manual will also apply.

Where a conflict arises between the information given in a Supplement and/or additional approved data and the information given in the base Flight Manual, the information given in a supplement takes precedence.

A complete list of Supplements is available on the Cameron Balloons Limited website.

Note: Supplements are updated independently of the base flight manual. It is not necessary to update supplements issued with a specific balloon unless notified by Service Bulletin.

8.2 LIST OF SUPPLEMENTS INSERTED

Date of Insertion	Doc. Ref	Description

Signed_____ Name _____ Date _____

Authority _____

8.3 ADDITIONAL DATA

When the envelope detailed in the approval section is being used in conjuction with

.....
(insert details of basket/burner)

the following approved data must be used.

.....
(insert document title, section and paragraph reference)

Signed _____ Name _____ Date _____

Authority _____

9.1 INTRODUCTION

This Section lists the major components which may be combined with each envelope to make a complete balloon.

9.2 EQUIPMENT LIST

Tables 5, 6, 7 and 8 list the envelopes, baskets, fuel cylinders, burners and burner frames which are compatible.

Table 5: Envelopes

Envelope Type	Drawing Number	Applicable Burners	Applicable Baskets
A-105	CB115	B	B, C, D, E, F, G, H, I, J, K
A-120	CB617	B	C, D, E, F, G, H, I, J, K, L
A-140	CB105	B	D, E, F, G, H, I, J, K, L, M
A-160	CB653	B, C	D, E, F, G, H, I, J, K, L, M, N
A-180	CB692	B, C, D	E, F, G, H, I, J, K, L, M, N, O
A-200	CB1199	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
A-210	CB199	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
A-225	CB1618	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
A-250	CB463	C, D	H, I, J, K, L, M, N, O, P, Q
A-275	CB1147	C, D	I, J, K, L, M, N, O, P, Q
A-300	CB603	C, D	K, L, M, N, O, P, Q
A-315	CB1028	C, D	K, L, M, N, O, P, Q
A-340	CB1166	D	L, M, N, O, P, Q
A-340HL	CB1148	D	L, M, N, O, P, Q
A-375	CB761	D	M, N, O, P, Q
A-400	CB1248	D	N, O, P, Q
A-415	CB1311	D	N, O, P, Q
A-450LW	CB1626	D	O, P, Q
A-530	CB197	D	O, P, Q
C-50	CB1611	A, B	A, B, C, D
C-60	CB996	A, B	A, B, C, D, E, F, G
C-70	CB1256	A, B	A, B, C, D, E, F, G, H
C-80	CB1025	A, B	A, B, C, D, E, F, G, H, I
C-90	CB1460	A, B	A, B, C, D, E, F, G, H, I, J
C-100	CB1048	A, B	B, C, D, E, F, G, H, I, J, K
GP-65	CB1397	A, B	A, B, C, D, E, F, G, H
GP-70	CB1498	A, B	A, B, C, D, E, F, G, H

Table 5: Envelopes (continued)

Envelope Type	Drawing Number	Applicable Burners	Applicable Baskets
N-31	CB476	A	A, B, C, D
N-42	CB476	A	A, B, C, D, E
N-56	CB476	A, B	A, B, C, D, E, F, G
N-65	CB476	A, B	A, B, C, D, E, F, G, H
N-70	CB476	A, B	A, B, C, D, E, F, G, H
N-77	CB476	A, B	A, B, C, D, E, F, G, H, I
N-90	CB476	A, B	A, B, C, D, E, F, G, H, I, J
N-100	CB476	A, B	B, C, D, E, F, G, H, I, J, K
N-105	CB476	B	B, C, D, E, F, G, H, I, J, K
N-120	CB476	B	C, D, E, F, G, H, I, J, K, L
N-133	CB476	B	C, D, E, F, G, H, I, J, K, L
N-145	CB476	B, C	D, E, F, G, H, I, J, K, L, M
N-160	CB476	B, C	E, F, G, H, I, J, K, L, M, N
N-180	CB476	B, C, D	E, F, G, H, I, J, K, L, M, N, O
N-210	CB476	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
O-31	CB110	A	A, B, C, D
O-42	CB101	A	A, B, C, D, E
O-56	CB45	A, B	A, B, C, D, E, F, G
O-65	CB54	A, B	A, B, C, D, E, F, G, H
O-77	CB112	A, B	A, B, C, D, E, F, G, H, I
O-84	CB49	A, B	A, B, C, D, E, F, G, H, I
O-90	CB658	A, B	A, B, C, D, E, F, G, H, I, J
O-105	CB167	B	B, C, D, E, F, G, H, I, J, K
O-120	CB505	B	C, D, E, F, G, H, I, J, K, L
O-140	CB772	B, C	D, E, F, G, H, I, J, K, L, M
O-160	CB368	B, C	D, E, F, G, H, I, J, K, L, M, N
TR-60	CB1520	A, B	A, B, C, D, E, F, G
TR-70	CB1519	A, B	A, B, C, D, E, F, G
TR-77	CB1591	A,B	A, B, C, D, E, F, G
TR-84	CB1612	A,B	A, B, C, D, E, F, G
V-31	CB149	A	A, B, C, D
V-42	CB369	A	A, B, C, D, E
V-56	CB134	A, B	A, B, C, D, E, F, G
V-65	CB166	A, B	A, B, C, D, E, F, G, H
V-77	CB170	A, B	A, B, C, D, E, F, G, H, I
V-90	CB817	A, B	A, B, C, D, E, F, G, H, I, J
Z-25	CB1461	A	A, B, C
Z-31	CB1462	A	A, B, C, D
Z-35	CB-1619	A	A, B, C, D
Z-42	CB1463	A	A, B, C, D, E
Z-56	CB1464	A, B	A, B, C, D, E, F, G
Z-65	CB1346	A, B	A, B, C, D, E, F, G, H
Z-69	CB1465	A, B	A, B, C, D, E, F, G, H

Table 5: Envelopes (continued)

Envelope Type	Drawing Number	Applicable Burners	Applicable Baskets
Z-77	CB1342	A, B	A, B, C, D, E, F, G, H, I
Z-90	CB1340	A, B	A, B, C, D, E, F, G, H, I, J
Z-105	CB1345	B	B, C, D, E, F, G, H, I, J, K
Z-120	CB1348	B	C, D, E, F, G, H, I, J, K, L
Z-133	CB1349	B	C, D, E, F, G, H, I, J, K, L
Z-140	CB1477	B, C	D, E, F, G, H, I, J, K, L, M
Z-145	CB1350	B, C	D, E, F, G, H, I, J, K, L, M
Z-150	CB1473	B, C	D, E, F, G, H, I, J, K, L, M
Z-160	CB1351	B, C	D, E, F, G, H, I, J, K, L, M, N
Z-180	CB1352	B, C, D	E, F, G, H, I, J, K, L, M, N, O
Z-210	CB1353	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
Z-225	CB1466	C, D	G, H, I, J, K, L, M, N, O, P, Q
Z-250	CB1459	C, D	H, I, J, K, L, M, N, O, P, Q
Z-275	CB1467	C, D	I, J, K, L, M, N, O, P, Q
Z-315	CB1468	C, D	K, L, M, N, O, P, Q
Z-350	CB1469	D	L, M, N, O, P, Q
Z-375	CB1470	D	M, N, O, P, Q
Z-400	CB1471	D	N, O, P, Q, R
Z-425LW	CB1502	D	N, O, P, Q, R
Z-450	CB1472	D	N, O, P, Q, R
Z-600	CB1565	D	N, O, P, Q, R
Thunder 65 S1	CB1136	A, B	A, B, C, D, E, F, G, H
Thunder 77 S1	CB1080	A, B	A, B, C, D, E, F, G, H, I
Thunder 90 S1	CB1113	A, B	A, B, C, D, E, F, G, H, I, J
Thunder 105 S1	CB1107	B	B, C, D, E, F, G, H, I, J, K
Thunder 120 S1	CB1137	B	C, D, E, F, G, H, I, J, K, L
Thunder 140 S1	CB1214	B, C	D, E, F, G, H, I, J, K, L, M
Thunder 160 S1	CB1138	B, C	D, E, F, G, H, I, J, K, L, M, N
Thunder 180 S1	CB1139	B, C, D	E, F, G, H, I, J, K, L, M, N, O
Thunder 90 S2	CB1082	A, B	A, B, C, D, E, F, G, H, I, J
Thunder 105 S2	CB1089	B	B, C, D, E, F, G, H, I, J, K
Thunder 120 S2	CB1105	B	C, D, E, F, G, H, I, J, K, L
Thunder 140 S2	CB1079	B, C	D, E, F, G, H, I, J, K, L, M
Thunder 150 S2	CB1334	B, C	D, E, F, G, H, I, J, K, L, M
Thunder 160 S2	CB1140	B, C	D, E, F, G, H, I, J, K, L, M, N
Thunder 180 S2	CB1141	B, C, D	E, F, G, H, I, J, K, L, M, N, O
Thunder 210 S2	CB1142	B, C, D	G, H, I, J, K, L, M, N, O, P, Q
Thunder 225 S2	CB1200	C, D	G, H, I, J, K, L, M, N, O, P, Q
Thunder 250 S2	CB1194	C, D	H, I, J, K, L, M, N, O, P, Q

Table 5: Envelopes (continued)

Envelope Type	Drawing Number	Applicable Burners	Applicable Baskets
Colt 25A	CB1461	A	A, B, C
Colt 31A	CB1462	A	A, B, C, D
Colt 42A	CB1463	A	A, B, C, D, E
Colt 56A	CB1464	A, B	A, B, C, D, E, F, G
Colt 65A	CB1346	A, B	A, B, C, D, E, F, G, H
Colt 69A	CB1465	A, B	A, B, C, D, E, F, G, H
Colt 77A	CB1342	A, B	A, B, C, D, E, F, G, H, I
Colt 90A	CB1340	A, B	A, B, C, D, E, F, G, H, I, J
Colt 105A	CB1345	B	B, C, D, E, F, G, H, I, J, K
Colt 120A	CB1348	B	C, D, E, F, G, H, I, J, K, L
Colt 133A	CB1349	B	C, D, E, F, G, H, I, J, K, L
Colt 140A	CB1477	B, C	D, E, F, G, H, I, J, K, L, M
Colt 150A	CB1473	B, C	D, E, F, G, H, I, J, K, L, M
Colt 160A	CB1351	B, C	D, E, F, G, H, I, J, K, L, M
Colt 180A	CB1352	B, C, D	D, E, F, G, H, I, J, K, L, M, N
Colt 210A	CB1353	B, C, D	E, F, G, H, I, J, K, L, M, N, O
Colt 225A	CB1466	C, D	G, H, I, J, K, L, M, N, O, P, Q
Colt 240A	CB1128	C, D	G, H, I, J, K, L, M, N, O, P, Q
Colt 250A	CB1459	C, D	H, I, J, K, L, M, N, O, P, Q
Colt 260A	CB1129	C, D	I, J, K, L, M, N, O, P, Q
Colt 275A	CB1467	C, D	K, L, M, N, O, P, Q
Colt 315A	CB1468	C, D	L, M, N, O, P, Q
Colt 350A	CB1469	D	M, N, O, P, Q
Colt 375A	CB1470	D	N, O, P, Q
Colt 400A	CB1471	D	N, O, P, Q
Colt 450A	CB1472	D	O, P, Q

Table 5A: Tether Equipment

Item	Part Number	Description
1	CB-6043-1000	V-Bridle
2	CU-3000-0001	Tether Ring, Large
3	CU-9780-0001	Karabiner, 5 Tonne
4	CB-6043-3000	V-Bridle complete with Tether Rings

Note: Item 4 is alternative to items 1 to 3

Table 6: Baskets

Basket Cat.	Drawing Number	Basket Description*	Applicable Cylinders	Applicable Burner Frames
B	CB3037	LITE	1a, 1, 2	CB2118, CB2355, CB2356
B	CB310-1A	31-42 O	1a, 1, 2	CB855, CB871, CB925, CB2203(Fl), CB2224(Fl), CB2231(Fl), CB2598, CB2874
C	CB300-2A	56-65 O	1a, 1, 2, 3	CB855, CB871, CB925, CB2203(Fl), CB2224(Fl), CB2231(Fl), CB2598, CB2665, CB2860(Fl), CB2863(Fl), CB2874
C	CB310-2A			
C	CB3050-2			
C	CB3115-2			
C	CB3011-2A	56-65 OH		
C	CB3023-2			
C	CB3011-2B			
C	CB3051	C60/70 O	1a, 1, 2, 3	CB855, CB871, CB925, CB2203, CB2224, CB2231, CB2598, CB2665, CB2860, CB2863, CB2874
D	CB300-3A	77-84 O	1a, 1, 2, 3	
D	CB310-3A			
D	CB3050-3			
D	CB3115-3			
D	CB3011-3A	77-84 OH	1a, 1, 2, 3	
D	CB3023-3			
D	CB3011-3B			
D	CB3052	C80/90 O	1a, 1, 2, 3	
D	CB8001	65-77 O	1a, 1, 2, 3	CB855, CB871, CB925, CB8810, CB8811, CB8820, CB8821, CB8894, CB8902, CB8903, CB8905, CB8912
D	CB8012			
D	CB8006	65-77 OH	1a, 1, 2, 3	
D	CB8017			
D	CB8002	77-90 O	1a, 1, 2, 3	
D	CB8013			
D	CB8007	77-90 OH	1a, 1, 2, 3	
D	CB8018			
E	CB300-4A	90-105 O	1a, 1, 2, 3	CB855, CB871, CB925, CB2203, CB2224, CB2231, CB2598, CB2665, CB2874
E	CB310-4A			
E	CB3050-4			
E	CB3115-4			
E	CB3011-4A	90-105 OH	1a, 1, 2, 3	
E	CB3023-4			
E	CB3011-4B			
E	CB8003	90-105 O	1a, 1, 2, 3	CB8810, CB8811, CB8820, CB8821, CB8894, CB8902, CB8903, CB8905, CB8912
E	CB8014			
E	CB8008	90-105 OH	1a, 1, 2, 3	
E	CB8019			
F	CB8004	105-120 O	1a, 1, 2, 3	CB8822, CB8823, CB8824, CB8825, CB8830, CB8831, CB8846
F	CB8013			
F	CB8009	105-120 OH	1a, 1, 2, 3	
F	CB8020			
F	CB8200	105-120T	1a, 1, 2, 3	

* For key see page 9-6

Table 6: Baskets (continued)

Basket Category	Drawing Number	Basket Description*	Applicable Cylinders	Applicable Burner Frames
G	CB303	120 - 133 O	1a, 1, 2, 3	CB2309, CB2312
G	CB3238	120 - 133 P	1a, 1, 2, 3	CB2470, CB2468
G	CB3233	120 - 133 T	1a, 1, 2, 3	CB2470, CB2468
H	CB991	140 T	1a, 1, 2, 3	CB2264, CB2263
H	CB3060	140 T W	1a, 1, 2, 3	CB2266, CB2265
H	CB3376	140 T	1a, 1, 2, 3	CB2264, CB2263
H	CB8266	120 - 160 T	1a, 1, 2, 3	CB8900, CB8901
I	CB3310	160 - 180 T	1a, 1, 2, 3	CB2590, CB2591
I	CB8206	180 - 210T	1a, 1, 2, 3	CB8826 CB8832, CB8840
J	CB754	180 - 210 TT	1a, 1, 2, 3	CB750, CB2420, CB2411, CB2261, CB2371
K	CB3164	210 TT Os	1a, 1, 2, 3	CB2250, CB2303
L	CB3314	210 - 250 T	1a, 1, 2, 3	CB2505, CB2592
L	CB3081	210 - 250 TT W	1a, 1, 2, 3	CB2260, CB2304
M	CB3004	250 TT	1a, 1, 2, 3	CB2250, CB2303
M	CB971	250 TT D	1a, 1, 2, 3	CB2260, CB2304
M	CB3387	250TT	1a, 1, 2, 3	CB2613, CB2614
N	CB3200	275 TT Os	1a, 1, 2, 3	CB2427, CB2447
O	CB3042	300 TT	1a, 1, 2, 3	CB2270, CB2258
O	CB3040	300 TT D	1a, 1, 2, 3	CB2271, CB2259
O	CB3049	300 TT S	1a, 1, 2, 3	CB2272, CB2269
O	CB3235	300 TT	1a, 1, 2, 3	CB2390
O	CB3223	300 TT S	1a, 1, 2, 3	CB2427, CB2447
O	CB8250	350 TT	1a, 1, 2, 3	CB8842, CB8843
O	CB3360	350 TT	1a, 1, 2, 3	CB2192, CB2418
P	CB3205	400 TT S	1a, 1, 2, 3	CB2418
Q	CB3288	400 - 410 TT S	1a, 1, 2, 3	CB2418
R	CB3370	600 TT S	1a, 1, 2, 3	CB2376

*** Key:** H= Hi-Spec; L=Asymmetric pilot compartment; O = Open; P= single partition; T = T partition; TT = double T partition; Os = offset; D = designed for use in Germany; S = Safari (tough terrain); W = wheelchair access; Fl = Flexi-corner burner frame only.

Table 7: Fuel Cylinders

Cylinder Category	Drawing Number	Cylinder Material	Cylinder Description
1a	CB901	ALUMINIUM	MINI WORTHINGTON
2	CB2900	DUPLEX STAINLESS STEEL	45
2	CB2901	DUPLEX STAINLESS STEEL	60
3	CB2902	DUPLEX STAINLESS STEEL	54
3	CB2903	DUPLEX STAINLESS STEEL	72

Table 8: Burners

Shadow, Stealth and Stratus burners have their pilot light configuration denoted, with the following drawing numbers being appended with -1 for vapour, -2 for liquid or -3 for mixed vapour and liquid.

Table 8: Burners (continued)

Burner Category	Drawing Number	Burner Description
A	CB2245	Single Shadow, Fixed Frame
A	CB2246	Single Shadow, Adjustable Height Frame
A	CB2233	Single Shadow Mini, Fixed Frame
A	CB8710	Single Stratus, Liquid Pilot Light
A	CB8712	Single Stratus, Vapour Pilot Light
B	CB2222	Double Shadow, Fixed Frame
B	CB2215	Double Shadow, Adjustable Height Frame
B	CB2243	Double Shadow / Stealth, Fixed Frame
B	CB2244	Double Shadow / Stealth, Adjustable Height Frame
B	CB2694	Double Sirocco, Fixed Frame
B	CB2695	Double Sirocco, Adjustable Height Frame
B	CB8720	Double Stratus, Liquid Pilot Light
B	CB8721	Double Stratus, Vapour Pilot Light
C	CB2255	Triple Shadow
C	CB2424	Triple Shadow, Crossflow to Single Burner
C	CB2520	Triple Shadow, Squeeze Bar Action, with Crossflow
C	CB2301	Triple Stealth (double) / Shadow (single)
C	CB2289	Triple Shadow (double) / Stealth (single)
C	CB2446	Triple Shadow / Stealth (double) ‘ Shadow (single)
C	CB2459	Triple Stealth (double) / Shadow (single), Squeeze bar Action
C	CB2467	Triple Shadow (double) / Stealth (single), Squeeze bar Action
C	CB2469	Triple Shadow / Stealth (double) / Shadow (single), Squeeze bar Action
C	CB2941	Triple Shadow (double) / Stealth (single), Squeeze bar Action
C	CB2696	Triple Sirocco
C	CB8730	Triple Stratus, Liquid Pilot Light.
C	CB8731	Triple Stratus, Liquid Pilot Light, ‘T’ Baskets
C	CB8732	Triple Stratus, Liquid Pilot Light, ‘TT’ Baskets
C	CB8733	Triple Stratus, Vapour Pilot Light
C	CB8734	Triple Stratus, Vapour Pilot Light, ‘T’ Baskets
C	CB8735	Triple Stratus, Vapour Pilot Light, ‘TT’ Baskets
D	CB2256	Quad Shadow
D	CB2351	Quad Shadow, Dual Squeeze Bar
D	CB2305	Quad Shadow (double) / Stealth (double)
D	CB2342	Quad Shadow (double) / Stealth (double), Dual Squeeze Bar
D	CB2395	Quad Shadow / Stealth (double) / Shadow / Stealth (double)
D	CB2697	Quad Sirocco
D	CB8740	Quad Stratus, Liquid Pilot Light
D	CB8741	Quad Stratus, Liquid Pilot Light, Crossflow
D	CB8742	Quad Stratus, Vapour Pilot Light
D	CB8743	Quad Stratus, Vapour Pilot Light, Crossflow

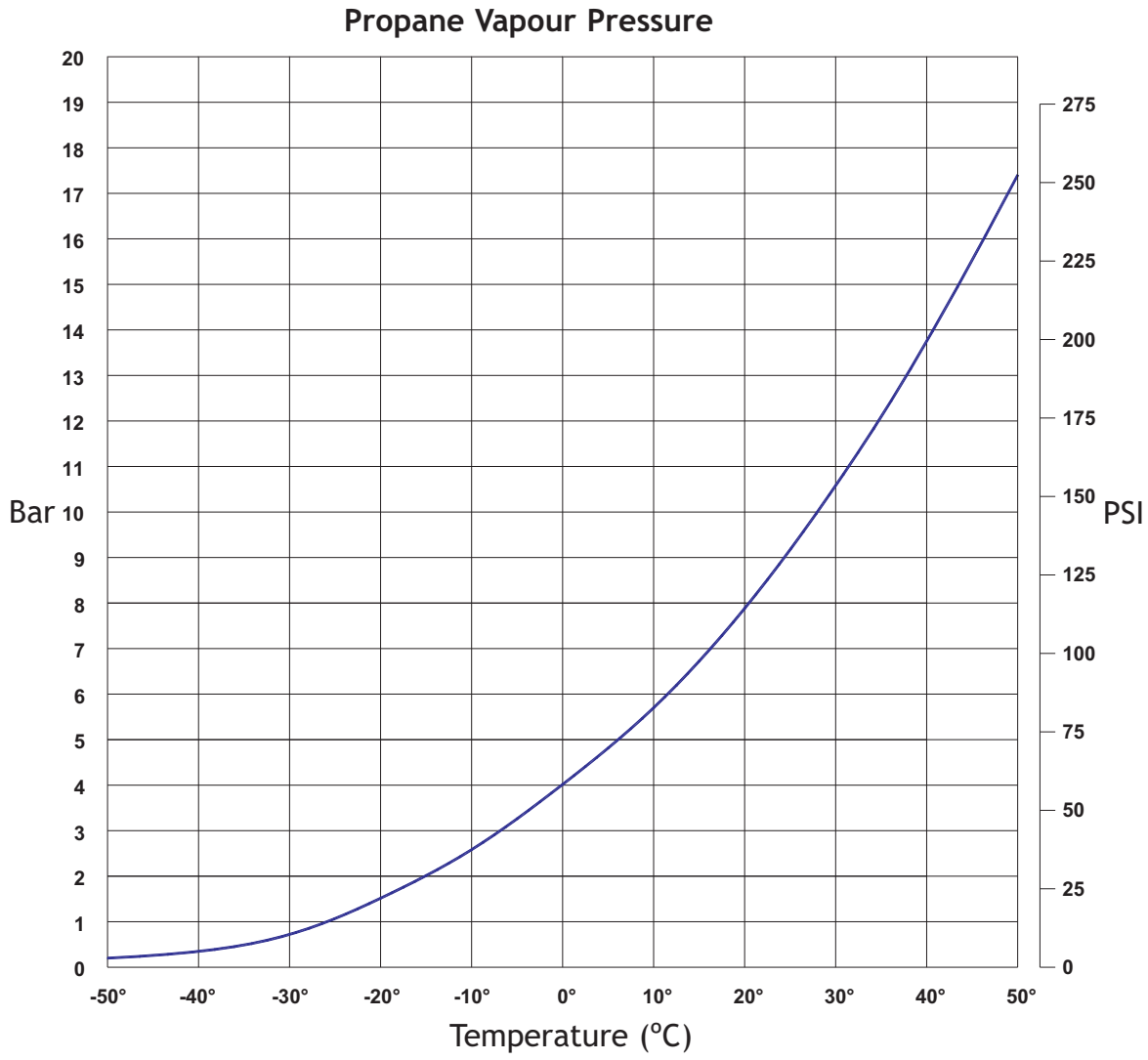
Appendix 1: Notes On Propane Fuel

Propane is a petroleum hydrocarbon, chemical formula C3H8. At normal temperatures and pressures it is a vapour, but it is stored as a liquid under pressure.

Propane is in its pure state colourless and odourless, and is heavier than air (1.5 times as dense). To reduce the risk of a propane leak going undetected a sulphur compound is added to give it a noticeable smell.

The requirements for commercial propane vary from country to country. Propane may contain 'heavy ends' which are long-chain hydrocarbons (oils and greases) or water. Special care is required when using commercial cylinders for the supply of propane as these are generally used for vapour supply, allowing heavy ends and water to collect in the bottom of the cylinder. Heavy ends may contaminate the fuel system (especially the vapour side) necessitating stripping and cleaning. Water may freeze in the cylinders and obstruct the liquid fuel flow.

Commercial propane will also contain some amount of butane (C4H10). Butane is also deliberately added to propane, particularly in hot countries, in order to reduce the vapour pressure. Butane has similar properties to propane, differing mainly in its vapour pressure which is substantially lower.



A small proportion of butane in the fuel is acceptable, provided that the fuel pressure does not drop below the minimum required for flight.

The storage of the fuel under pressure is an advantage as it allows the operation of a very high output burner without a pump, but since burner power is directly related to the fuel pressure, lower burner power is obtained in winter.

Liquid propane expands rapidly with increasing temperature, making it essential to never completely fill a storage cylinder. The fixed liquid level gauge (bleed valve) is set to release liquid when the cylinder is approximately 80% full leaving sufficient vapour space to allow for normal levels of fuel expansion.

Further protection from high temperatures and overfilling is provided by a pressure relief valve in the cylinder. This valve is set to open at approximately 26bar (375psi).

Large amounts of heat are required to change propane from a liquid to a gas. This is the reason the burner uses liquid fuel, drawn from the bottom of a cylinder via a dip tube. If vapour were drawn off at the high rates required then the cylinder would rapidly cool and lose pressure.

A vapour pilot light draws propane vapour from the top of the cylinder via a pressure regulator. Occasionally when the cylinder is on its side during inflation liquid propane will enter the regulator. The evaporation of propane inside the regulator will cause frost to form on the outside and the regulator may perform erratically or leak slightly.

The lift of a hot air balloon at a given flight altitude may be calculated as follows:

$$T_a = T_g - \left[0.0065 \times \left(A - E_g\right)\right]$$

$$P = 1013.25 \times \left[1 - \frac{(0.0065 \times A)}{288.16}\right]^{5.256}$$

$$L = 0.3484 \times V \times P \times \left[\frac{1}{T_a + 273.16} - \frac{1}{T_i + 273.16}\right]$$

where

A = maximum planned flight altitude in m
E_g = elevation of take-off site above sea level in m
L = total lift of the balloon in kg
P = air pressure at maximum planned flight altitude in hPa / mB
T_a = ambient temperature at flight altitude in °C
T_g = ambient temperature at take-off site elevation in °C
T_i = average internal envelope temperature in °C (Maximum of 100 °C)
V = envelope volume in m^3

ISA environmental lapse rate is assumed.

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Table 9: Fuel Cylinder Weights And Volumes

Cylinder Material	Cylinder Type	Volume (Litres)		Configuration	(Including Cover & Straps)			
					Empty Weight		Full Weight	
		Total	Usable		kg	lb	kg	lb
Duplex Stainless Steel	CB2900 '45'	56	45	Master	21	46	44	97
				Standard	20	44	43	95
	CB2901 '60'	75	60	Master	23	51	53	117
				Standard	22	49	52	115
	CB2902 'T60'	68	54	Master	24	53	51	112
				Standard	23	51	50	110
	CB2903 '72'	90	72	Master	27	60	63	139
				Standard	26	57	62	137

Table 10: Burner Weights

Burner (Including Karabiners)		kg	lb
[1] Single	(Shadow / Stratus)	17	37
[1] Double	(Shadow / Stealth / Sirocco / Stratus)	24	53
[2] Triple	(Shadow / Stealth / Sirocco / Stratus)	44	97
[2] Quad	(Shadow / Stealth / Sirocco / Stratus)	52	115

[1] In adjustable height frame add 3kg / 7lb

[2] If metal heat shields are fitted add 7kg / 15lb

Note: The component weights given in Tables 9 and 10 are approximate and for guidance purposes only. For pre-flight weight calculations, the actual component weights given in Table 4 and the aircraft log book should be used.

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Introduction

In addition to the limitations in Section 2 and Section 5, the following factors should be considered when determining how many occupants a particular basket can carry for a particular flight. The guidance below assumes that a standard occupant is an adult of 77kg mass.

The pilot should also take into account the relative masses and sizes of the passengers when loading partitioned baskets to evenly distribute the payload.

Maximum Occupancy

For all baskets, a minimum 0.25m^2, floor area should be allowed for each standard occupant.

When calculating the number of occupants, the area used by items of other equipment (e.g. fuel cylinders) must be subtracted from the total area.

For the purposes of these calculations the floor area taken up by single fuel cylinders can be taken as 0.1m^2 for "large" diameter cylinders (e.g. CB2901) and 0.09 m^2 small diameter cylinders (e.g. CB2900).

Example

If we consider the following example;

Envelope; Z-140,

Basket; CB303,

Double Burner; CB2694,

Fuel for 1 hour flight with reserve; CB2901x2 and CB2900 x1

Limitation on occupancy by floor area;

Floor area of basket (to frame tube centre-lines) = 1.1x1.78 = 1.96 m^2

Floor area of equipment = [0.1x2] +0.09 = 0.29 m^2

Available floor area for occupants = 1.96 – 0.29 m^2 = 1.67 m^2

Total maximum number of occupants = 1.67 / 0.25 = 6.68 = 6 standard occupants

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A5.1 INTRODUCTION

This appendix provides guidance on handling and brief crew and passengers. It describes practices that have been shown to be safe and effective in practice but is not compulsory.

A5.2 CREW BRIEFINGS

A5.2.1. General

Strong gloves (leather or fire resistant), footwear and clothing of natural or heat resisting fibre should be worn. Clothing for the mouth crew should cover the arms.

The crew members should be briefed before the inflation procedure is started.

CAUTION: The most important instruction for all crew members is to let go immediately if they are lifted off the ground.

Crown Crew Briefing

The object is to prevent the envelope from swaying excessively, and to prevent it rising until it is full and sufficiently buoyant. Apply only moderate tension on the crown line until the parachute panel is seen to be pressing against the crown tapes, then apply maximum force until the balloon is upright. Do not try to fight the wind, but keep the envelope downwind wherever possible.

1. Hold the very end of the line; do not attempt to feed it out through the hands.

2. Do not loop or tie the crown line around your body, your arm or any object

3 Refuse all offers of help pulling on the crown line from onlookers.

4. Hold the line slack during cold inflation.

5. Hold the line taut when the burner noise is heard.

6. Continue to pull the line until the balloon is upright

7. On the pilot's instruction walk up to the basket and clip the end of the line to a karabiner on the burner frame.

Mouth Crew Briefing

The aim of the mouth crew should be to hold the mouth of the envelope as open and round as possible. During cold inflation this means simply supporting the weight of the fabric. When hot inflation (i.e. the burner is turned on) commences the crew should be prepared to shield themselves to the side and slightly behind the Nomex which will provide protection from the heat. As the balloon rises the crew should work their way down the side to the base of the mouth, without holding on to the scoop.

As the envelope finally rises catch the scoop attachment hooks and clip them onto the karabiners. The crew member on the pilot's right hand side may need to hold the control lines to prevent them hanging in the burner flame.

1. Keep feet off and outside of the flying wires.

2. If you feel uncomfortable or in danger, let go and move away.

3. Watch the pilot.

4. Do not hold on by the scoop.

5. When the basket is upright, move to it and apply your weight to the upper padding.

Inflator fan briefing

The aim of the fan crew should be to control the operation of the fan and direct the air stream into the centre of the mouth thus avoiding deflecting the burner flame into the side fabric.

If a single fan is used it should be positioned to the left of the basket, so that the on/off switch is nearest to the pilot, and so that the fan does not blow the deflation line which is positioned on the right side into the burner flame.

1. Hold the fan at the top.

2. Point the fan into the centre of the mouth.

3. Do not re-position the fan with the engine running

4. Turn fan off at a pre-agreed signal from the pilot.

5. Wheel the fan well away from the basket.

6. Return and apply weight to basket

The fan crew may also be responsible for manning a fire extinguisher during hot inflation should a fire occur.

A5.3 PASSENGER BRIEFINGS

Passengers may be briefed either before inflation begins, or once they are in the basket after inflation. Passengers should be shown how to safely get into the basket before inflation starts highlighting the step holes and internal handles.

The passenger’s landing position may be rehearsed before take-off to ensure that they are taking up the correct position. It is important that the passenger’s knees are only slightly bent, and that they are not squatting or sitting on their heels.

Passenger Briefing: Open Baskets

1. Do not hold on to hoses, valves or control lines.

2. Hold on to rope handles, cylinder rims or (except when landing) burner support rods.

3. Before landing, stow all loose items, cameras etc.

4. On landing stand sideways to the direction of travel, at the front edge of the basket (where practicable). Knees should be together and slightly bent. Hands must remain inside the basket. Hold on to rope handles or cylinder rims. Watch the progress of the landing and brace for the touchdown. After touchdown the basket may fall on its side and drag along the ground.

5. After landing do not leave the basket without the pilot's permission.

Passenger Briefing: Partitioned Baskets

1. Do not hold on to hoses, valves or control lines.

2. Hold on to rope handles or (except when landing) burner support rods.

3. Before landing, stow all loose items, cameras etc.

4. On landing face away from the direction of travel. Knees should be together and slightly bent. Push backwards against the leading edge of the passenger compartment. Hold on to the rope handles in front of you with both hands. Continue to hold on until the basket comes to rest.

5. After landing do not leave the basket without the pilot's permission.

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