FLIGHT MANUAL

for

ULTRAMAGIC HOT AIR BALLOONS

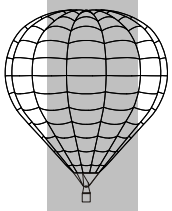
H 31 42 56 65 77
V 25 56 65 77 90 105
S 50 70 90 105 130 160
T 150 180 210
F Special Shapes

M 42 56 56C 65 65C 77 77C 90 105 120 130 145 160
N 180 210 250 300 355 425 500
Z 90

Serial number	_____
Approval	**Rev.20 under EASA Approval 0010016416-001**
Date	_____

ULTRAMAGIC,S.A.
Aerodrom Igualada-Odena s/n
08700 IGUALADA (SPAIN)
tel +34 93 8042202
fax +34 93 8035604
e-mail admin@ultramagic.com

Document name : FM04
Initial Issue date 31 May 2003



ULTRAMAGIC S.A

This Flight Manual has been prepared for the following balloon

Registration: …… ……

Type: ……..……

Serial Number: ……..……

Volume: ……m3……

Build Standard ……See page 0.2……

I hereby certify that this Flight manual, as prepared for the above balloon and incorporating the amendments listed, conforms to the build standard of the above balloon at the time of the issue of the Certificate of Airworthiness.

Signed: …….. Date: ……..

Applicability

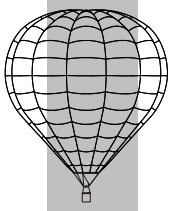
This Flight Manual applies to all Ultramagic S.A. balloons listed in section 6.3. For non-standard shaped balloons or balloons not listed in 6.3 see relevant Flight Manual Supplement in section 9.

FAA approved or pendent of approval for U.S. registered aircraft in accordance with FAR 21.29.

Flight Manual Supplement 25 to be used only with U.S. registered aircrafts.
V-25 configuration not U.S. approved.

Build Standard

See page 0.2 for build standard.



BUILD STANDARD

REGISTRATION _____

ENVELOPE

TYPE _____ VOLUME _____ m3

SERIAL NO. _____ WEIGHT _____ kg

BASKET

MAKE _____ MODEL _____

SERIAL NO. _____ WEIGHT _____ 76 kg

BURNER

MAKE _____ MODEL _____

SERIAL NO. _____ WEIGHT _____ kg

I hereby certify that the above build standard meets the requirements stated in this Flight Manual at the time of issue of the Certificate of Airworthiness .

Signed: …… Date ……

Alternative Equipment.

Alternative baskets or burners to those listed above may only be substituted subject to meeting the following requirements.

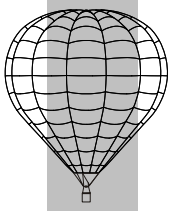
1. Basket and Burner must meet the requirements of 5.4 (Table of compatibility) and/or requirements listed and stated in Supplements concerning other Manufacturers Equipment.
2. All equipment must be inspected as airworthy by the appropriate designated National Inspector Authority.
3. All equipment must be listed in the front of the Balloon logbook noting all serial numbers.
4. Weights of all equipment must be listed in the front of the balloon logbook.

WARNING

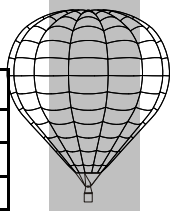
- Any changes to the equipment listed on this Build Standard sheet without meeting the above requirements, will invalidate the Certificate of Airworthiness.
- Latest editions and revisions of the Flight Manual are published in the web www.ultramagic.com
- To subscribe/unsubscribe to receive automatically information on the approved updates of the Flight Manual, contact engin@ultramagic.com

LIST OF APPROVED REVISIONS

Revision Nº	Modifications (Brief description)	Approval Nº Approval Date
1	Supplement 3 UK Passenger Transport Category	DGAC -SPAIN 17-Sept-03
	Supplement 4 Kubicek Bottom Ends	
	Supplement 5 MK-21 Electric Burner	
2	Supplement 6 Schroeder Fire Bottom Ends	DGAC-SPAIN 18-Oct-03
	Supplement 7 Special Shape F-25 “Futbol”	
3	Supplement 9 Solo / Duo	BA.C.01011 14-Feb-06
	Envelope Model V-25	
	Cameron and Thunder & Colt Worthington Cyl.	
4	Supplement 10 Disabled Passenger Basket	BA.C.01011 14-Feb-06
5	Supplement 6 Modification	BA.C.01011 14-Feb-06
	Supplement 11 Dropping Parachutist	
6	Supplement 12 Fantasy Balloons	BA.A.01001 31-Jul-06
7	Supplement 13 Raven – Aerostar Bottom Ends	BA.A.01001 31-Jul-06
	Supplement 14 MK-21 Cruise Control Valve	
	Reduced Maximum TO Mass Operations	
8	Supplement 8 Special Shape “Corazon” F-26	BA.C.01028 3-Mar-08
	Correction Table 5.2	
9	Supplement 13 Modification	BA.A.01004 31-May-07
	Correction page 5.8	
	Supplement 15 MK-21 Burner Butane Fuel	
	Supplement 16 Central Gimbal Burner Frame	
10	FAA of USA requirements	BA.A.01010 8-Feb-08
	Modif. of Section 8 to be included as Supplement 19	
	Supplement 20 “Units Conversion Chart”	
11	Supplement 17 BMK-008 Bonanno Burner	BA.C.01068 BA.C.01067 21-Dec-07
	Supplement 18 BMK-050 Bonanno Burner	

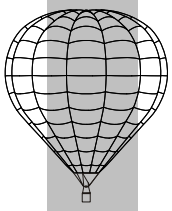


Revision Nº	Modifications (Brief description)	Approval Nº Approval Date
12	Supplement 21 Vapour pilot light Burner MK-21 Supplement 15 modification	BA.A.01014 18-Apr-08
13	Supplement 22 Old Special Shapes Supplements 6, 9, 17, 18, 19 modification Minor corrections to AFM	Approved under Privileges of DOA EASA.21.J.351 29-Apr-08
14	Supplement 25 Special Shapes U.S. certified Minor corrections to AFM	BA.A.01015 23-July-08
15	Supplement 23 (Iss.2) Special Shape F-29 added Supplement 26 Special Shape F-30 added Corrections and documentary changes	Approved under Privileges of DOA EASA.21.J.351 27-Jan-09
16	Amendments on Section 0, 2, 5, 6, 8, 9 Approved supplements 27, 28, 34, 36 added Supplements 8,19, 26 amended	Approved under Privileges of DOA EASA.21.J.351 08-Sep-09
17	Amendments on Section 0, 4, 9 Supplements 37, 38 and 39 added	EASA Approval Nr. 10035791 19-Jul-11
18	Amendments on Section 0, 1, 2, 5, 8, 9, Appx. A, B Supplements 24, 42 added Supplements 4, 6, 19, 34, 39 amended	EASA Approval Nr. 10038120 20-Jan-12
19	Ammendment on Section 5	EASA Approval Nr. 0010016389-001 12-Jun-12
20	Supplement 22, 38 and 39 ammended	EASA Approval Nr. 0010016416-001 08-Mar-13

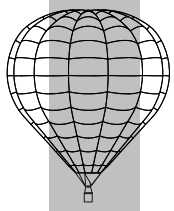


LIST OF EFFECTIVE PAGES

Page	Nº	Date	Page	Nº	Date	Page	Nº	Date
0.0	20	08-Mar-13	6.7	14	23-Jul-08			
0.1	14	23-Jul-08	6.8	14	23-Jul-08			
0.2	16	08-Sep-09	6.9	14	23-Jul-08			
0.3	14	23-Jul-08	6.10	14	23-Jul-08			
0.4	20	08-Mar-13	6.11	14	23-Jul-08			
0.5	20	08-Mar-13	6.12	14	23-Jul-08			
0.6	14	23-Jul-08	6.13	14	23-Jul-08			
0.7	14	23-Jul-08	6.14	14	23-Jul-08			
0.8	14	23-Jul-08	6.15	14	23-Jul-08			
1.1	18	20-Jan-12	6.16	14	23-Jul-08			
1.2	14	23-Jul-08	6.17	14	23-Jul-08			
1.3	14	23-Jul-08	6.18	14	23-Jul-08			
2.1	14	23-Jul-08	6.19	14	23-Jul-08			
2.2	14	23-Jul-08	6.20	14	23-Jul-08			
2.3	14	23-Jul-08	6.21	14	23-Jul-08			
2.4	18	20-Jan-12	6.22	14	23-Jul-08			
3.1	14	23-Jul-08	6.23	14	23-Jul-08			
3.2	14	23-Jul-08	6.24	14	23-Jul-08			
3.3	14	23-Jul-08	6.25	14	23-Jul-08			
3.4	14	23-Jul-08	7.1	14	23-Jul-08			
4.1	14	23-Jul-08	7.2	14	23-Jul-08			
4.2	14	23-Jul-08	7.3	14	23-Jul-08			
4.3	14	23-Jul-08	8.1	18	20-Jan-12			
4.4	14	23-Jul-08	9.1	20	08-Mar-13			
4.5	15	27-Jan-09	A.1	14	23-Jul-08			
4.6	14	23-Jul-08	A.2	14	23-Jul-08			
4.7	14	23-Jul-08	A.3	14	23-Jul-08			
4.8	14	23-Jul-08	A.4	14	23-Jul-08			
4.9	14	23-Jul-08	A.5	14	23-Jul-08			
4.10	14	23-Jul-08	A.6	14	23-Jul-08			
4.11	14	23-Jul-08	A.7	14	23-Jul-08			
4.12	15	27-Jan-09	A.8	14	23-Jul-08			
4.13	14	23-Jul-08	A.9	14	23-Jul-08			
4.14	17	19-Jul-11	A,10	14	23-Jul-08			
4.15	14	23-Jul-08	A.11	18	20-Jan-12			
5.1	19	12-Jun-12	B.1	18	20-Jan-12			
5.2	19	12-Jun-12	C.1	14	23-Jul-08			
5.3	14	23-Jul-08	C.2	14	23-Jul-08			
5.4	14	23-Jul-08	D.1	20	08-Mar-13			
5.5	14	23-Jul-08	D.2	20	08-Mar-13			
5.6	19	12-Jun-12						
5.7	16	08-Sep-09						
5.8	18	20-Jan-12						
5.9	14	23-Jul-08						
6.1	14	23-Jul-08						
6.2	14	23-Jul-08						
6.3	16	08-Sep-09						
6.4	16	08-Sep-09						
6.5	14	23-Jul-08						
6.6	14	23-Jul-08						

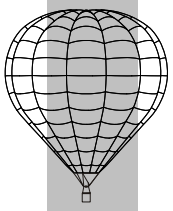


CONTENTS



CONTENTS

CONTENTS



SECTION 1

GENERAL INFORMATION

1.1 Introduction

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

1.2 Certification Basis

All types of balloons for which this manual is applicable have been certified and approved by E.A.S.A.

1.3 Warnings, cautions and notes

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

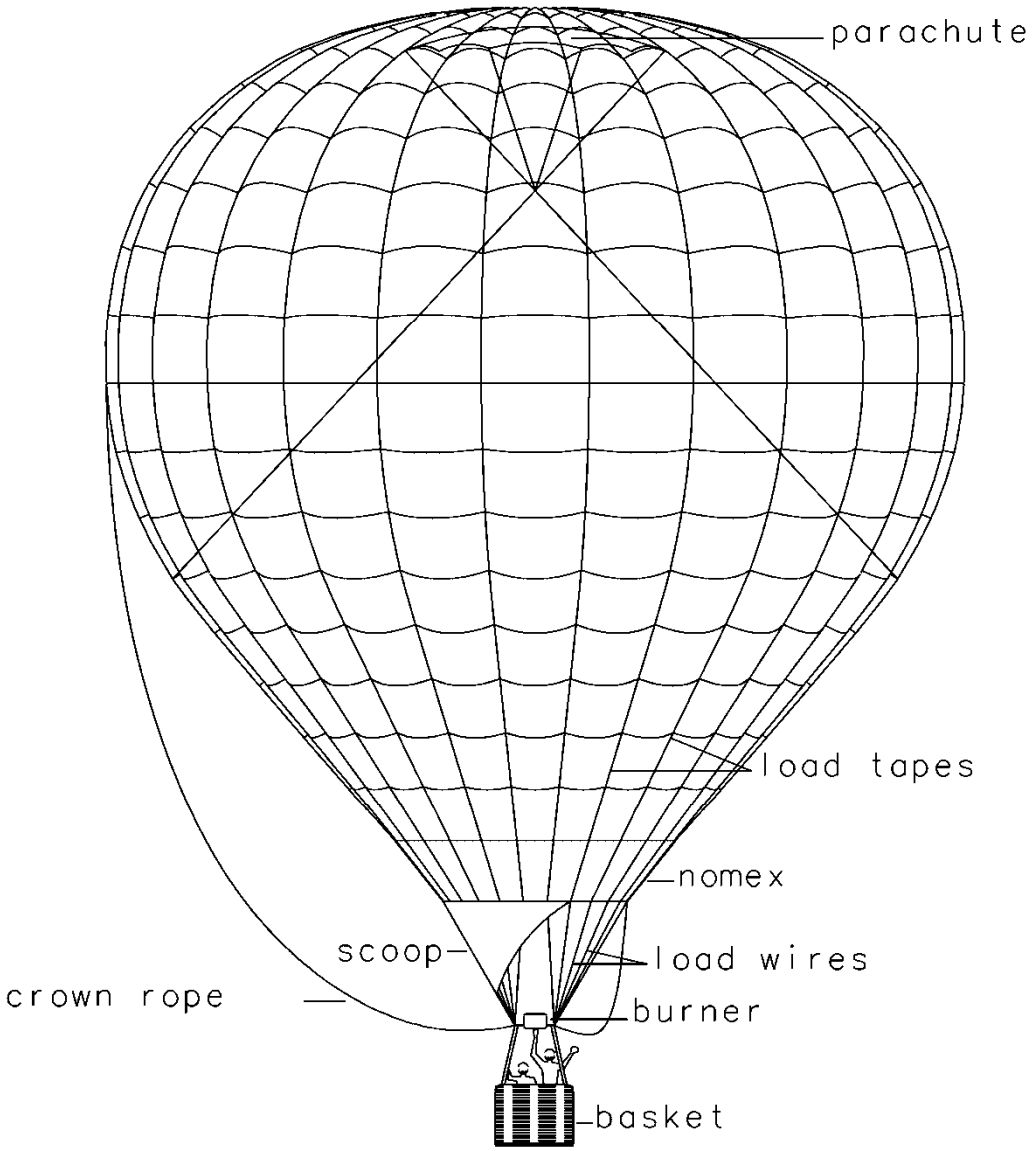
WARNING – means that the non-observation of the corresponding procedures leads to an immediate or important degradation of flight safety.

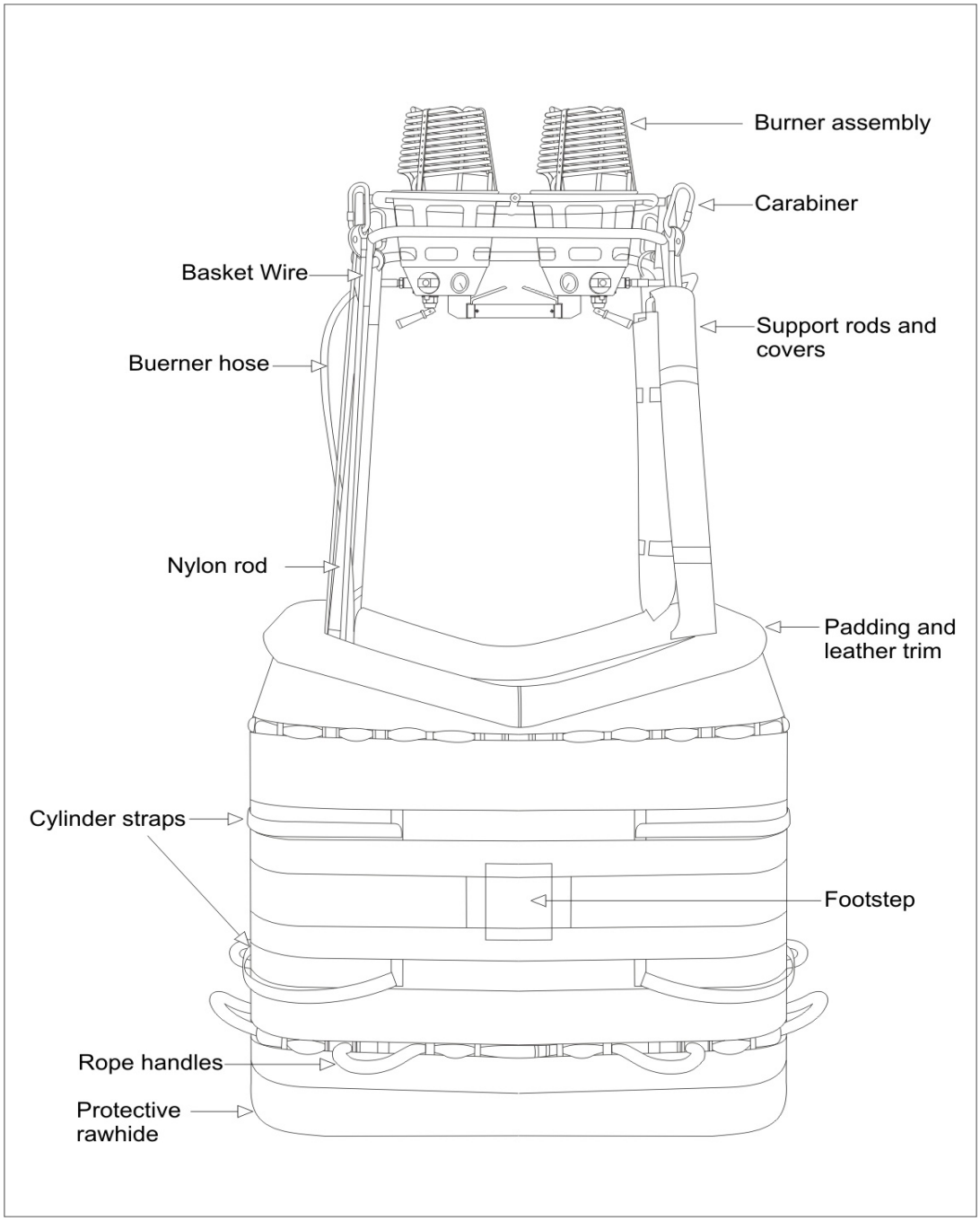
CAUTION – means that the non-observation of the corresponding procedure leads to a minor degradation to flight safety or to a long term degradation of flight safety.

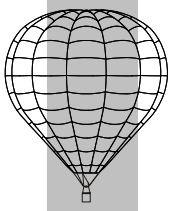
NOTE – draws the attention on any special item not directly related to safety but which is important or unusual.

1.4 General Description

A hot air balloon is a free balloon in which the lifting force consists of hot air produced by means of a propane burner, using this gas in its liquid form. All balloons belong to one of the FAI categories indicated in the tables of Section 6.3.
The aerostat is remarkably simple in its conception and handling. It consists of three main parts: Envelope, fuel system (burner with load frame and fuel cylinders) and finally a basket of woven construction or seat to carry the pilot and passengers.
Envelopes are made of high resistance polyamide fabric reinforced by polyester load tapes. These tapes carry the forces due to loading and transmit the forces to the load frame.
The burner is a high output device for converting the fuel (liquid propane) stored in the fuel cylinders into heat energy.
See section 6 for a detailed description of the balloons and their systems.


parachute
load tapes
nomex
scoop
load wires
crown rope
burner
basket


Burner assembly
Carabiner
Basket Wire
Support rods and covers
Buerner hose
Nylon rod
Padding and leather trim
Cylinder straps
Footstep
Rope handles
Protective rawhide



SECTION 2

LIMITATIONS OF USE

2.1 Introduction

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

The limitations included in this section and in Section 9 have been approved by EASA.

WARNING: Compliance with the approved limitations is mandatory.

2.2 Meteorological Limitations

The surface wind speed must not exceed 7.5 m/s (27 km/h or 15 kts).
There should be no, or only very weak thermal activity.
There should be no sign of storms, either active or building.

2.3 Condition of balloon

WARNING:
The balloon must not take off if it fails any of the pre-flight checks.
The balloon must not take off with any major damage above the lower third of the envelope, or if there is any damage to wires, cables, tapes, load carrying parts below this level, the fuel system, or the burner.
The balloon must not take off if it has not been maintained and inspected in accordance with the manufacturer's maintenance manual.

2.3.1 Acceptable Damage:

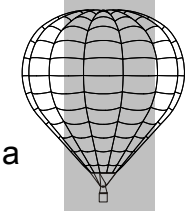
Damage to the fabric in the lower third of the envelope must be limited to an area affecting no more than 3 panels, though they can be completely damaged. These panels may be adjacent.
Holes no greater than 10mm in diameter (e.g. cigarette burn) are permitted elsewhere on the envelope.
These holes must not be within 25mm of a load tape, with no more than 5 in any one panel and be no closer than 50 mm to each other. No more than 3 panels in the upper two thirds of the envelope may have these small holes.

No damage is permitted to any part of the burner, fuel or load suspension system.

2.4 Safety Equipment (Minimum equipment)

All of the following equipment must be in fully working order and must be carried in the balloon basket.

1 One fire extinguisher of 2 kg (or two of 1 kg) conform to EN3 which use dry powder or with an approved equivalent level of safety.



2 Sufficient auxiliary means of ignition (matches, lighter or similar).

3 Protective gloves for the pilot.

4 An envelope temperature indicator, which either gives a warning signal or a continuous reading type instrument.

5 Fuel gauges on each cylinder.

6 A means of measuring fuel consumption (e.g. watch or stop watch) must be carried.

7 Altimeter.

8 Variometer to measure rate of climb and descent.

9 On flights when it is intended to climb higher than 300 m (1000 ft), an ambient temperature thermometer and a load chart provided by the manufacturer must be carried.

2.5 Fuel

A minimum of one cylinder per burner is to be carried for flight except in the case of a single burner where two cylinders must be used. These cylinders must be full at take off. Where vapour pilot lights are fitted to the burner then a vapour supply must be provided for each pilot light.

Aluminium Worthington cylinders may be used as long as the propane fuel is free of caustic soda. In all other cases then stainless steel cylinders must be used.

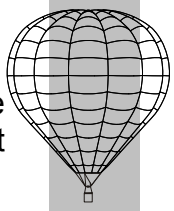
The approved fuel is commercial propane, which can contain some butane.

Butane may also be used as long as the pressure is greater than 3 bar. This pressure can be achieved by pressurising the cylinders with nitrogen.

Fuel tanks pre-pressurized with nitrogen or other inert gas must not be used to provide fuel to “vapour” pilot light.
Gas for refuelling must be completely clean and the use of a fuel filter is strongly recommended.

WARNING:
Minimum dynamic pressure accepted for use with the burner is 3 bar.
Maximum authorised dynamic pressure allowed for use of the burner is 10 bars and the maximum cylinder pressure allowed for use of the burner is12 bars.

CAUTION: extra care should be taken when operating at low burner pressures.



2.6 Loading

The total take off weight must never exceed the upper limit determined with the use of the load chart supplied by the manufacturer in Section 5.2. At no time must the maximum lift (Lmax) listed in Section 5.2 be exceeded.

At the time of landing the actual weight must never be less than that specified in the table supplied by the manufacturer in section 5.5. This applies to all balloons of Volume greater than 90,000 cu ft.

Enough room must always remain in the basket for the pilot to readily access all flight and fuel system controls and for all occupants to prepare for a hard landing. The minimum space requirements for passengers must be maintained in accordance with appendix D.

2.7 Crew

Minimum: 1 pilot

2.8 Vertical velocities

Maximum rate of climb 3 m/sec (600 ft/min), or 5 m/s (1000 ft/min), if an internal envelope temperature indicator is carried and the maximum permitted temperature is not exceeded.
Maximum rate of descent is 5 m/sec (1000 ft/min).
For MV series (M56c,M65c,M77c) the Maximum rate of climb and descent is 7 m/sec if an internal envelope temperature indicator is carried and the maximum permitted temperature is not exceeded.

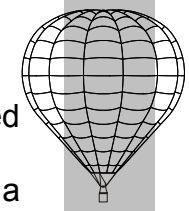
2.9 Internal temperature

In normal use, the maximum continuous internal temperature adjacent to the fabric is 120 °C (250 ºF).
The internal temperature adjacent to the fabric must never exceed 130 ºC (266 ºF).

2.10 Deflation systems

WARNING: It is forbidden to use the red rope of the FDS rapid deflation system at an altitude higher than 10 m (30 feet) above the ground.

CAUTION: In flight use of the parachute vent system should be no longer than 3 seconds at any one time. Re use must not be attempted until the envelope has re-inflated.



2.11 Baskets

2.11.1 Rotation vents must be fitted to envelopes when used with partitioned baskets.
2.11.2 The maximum number of passengers in any one compartment of a basket is six.

2.12 Minimum Burner requirements.

· The Powerplus BMK-008 Single burner may only be used in balloons up to 120.000 ft³ (3.400 m³) –included-. Other single burners may be used only in envelopes up to 105.000 ft³ (3.000 m³).

· The Powerplus Maxi BMK-050 Double burner may only be used in balloons up to 300.000 ft³ (8.500 m³) –included-. Other double burners may be used only in envelopes up to 210.000 ft³ (6.000 m³).

· The Powerplus Maxi BMK-050 Triple burner may only be used in balloons up to 600.000 ft³ (17.140 m³) –included-. Other triple burners may be used only in envelopes up to 300.000 ft³ (8.500 m³).

The quad burner may only be used in balloons greater than 300.000 ft³ (8.500 m³).

2.13 Fuel Cylinders

1. All cylinders must be fitted with a padded jacket.
2. A minimum of two cylinder straps of an approved design must be fitted to each cylinder. These should be fitted so as not to allow any up and down as well as lateral movement.
3. No part of any cylinder must protrude above the top of the basket.

2.14 Tethered Flight

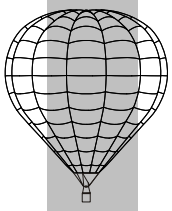
Tethered flight is allowed where the local authorities permit this. Refer to Ultramagic flight manual supplement 1 in section 9 where applicable.

2.15 Other Manufacturers equipment

Baskets and Burners produced by certain other manufacturers may be used with Ultramagic envelopes. (See equipment listed in Supplements 4, 6, 12, 13,19 and 24).

2.16 Night Flying

Night flying is permitted when according with the regulations on equipment, licensing and laws of the country to fly.



SECTION 3

EMERGENCY PROCEDURES

3.1 Introduction

Section 3 provides checklists and amplified procedures for coping with emergencies that may occur.

3.2 Pilot light failure

3.2.1 Single burner unit

If for any reason the pilot light should go out, try to relight it immediately with the piezoelectric ignition system, matches or other igniters.
In case of failure to re-ignite proceed as follows

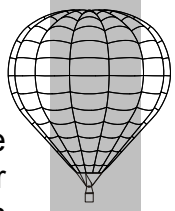
1. Close the vapour and liquid take-off valve(s) on the corresponding cylinder.
2. Open completely the blast valve on the burner.
3. Open slightly the liquid take-off valve on the cylinder on the same side to allow a small flow of propane.
4. Ignite the main burner, and regulate the flame using the liquid valve on the cylinder, taking care not to allow it to extinguish.
5. Land as soon as possible

3.2.2 Burner with additional "quiet" burner

1. Open the valve on the "quiet" burner very slightly and ignite it.
2. Adjust the level of the "quiet" burner to act as an adequate pilot light.
3. Continue to use the main burner as usual, carefully monitoring the "quiet" burner valve for freezing. If freezing occurs, follow 3.2.1.
4. Land as soon as possible.

3.2.3 Double, triple or quadruple burner unit

1. Continue the flight with another burner while trying to re-ignite. If further pilot lights fail, proceed as described in 3.2.1 or 3.2.2, whichever is appropriate.
2. Land as soon as possible.



3.3 Icing of the regulator on systems using a vapour pilot light.

When the fuel cylinders are horizontal during inflation, the regulator on the vapour take off is not fed with gas, but with liquid propane. If the time taken for inflation is too long, ice may form, which could extinguish the pilot light. If this happens, shut down the vapour take-off valve at the cylinder. Wait until all the liquid in the regulator and connections has burned off, and the icing melts, then reopen the valve and re-ignite the pilot light.

3.4 Failure of a burner valve

In case of malfunction of one main valve, transfer control immediately to another burner or with a single burner to the other fuel supply.

- If the blast valve is stuck in the open position or it is leaking, close down the corresponding valve on the cylinder, and burn out the line if necessary, and use the other valve.
- If the blast valve is stuck in the closed position, use the other valve.
- Land as soon as possible.

3.5 Dropping of the temperature flag

If the envelope temperature flag drops during flight then proceed as follows:

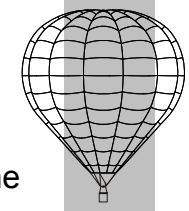
1. Take all precautions to reduce envelope temperature.
2. Descend immediately and land as soon as possible.
3. Inspect the temperature tags to determine if the envelope has been overheated.
4. Carry out a fabric test if the fabric shows to be overheated.
5. Repair or replace fabric as required in accordance with the maintenance manual.
6. Replace the temperature flag.

NOTE: The dropping of the flag does not automatically mean that the envelope has been overheated. In many cases this is just a warning of the potential to overheat.

3.6 Envelope damage

Should the envelope be damaged in flight proceed as follows:

1. Increase the rate of burning to compensate for the loss of heat depending on the size of the hole.
2. Land as soon as possible.



3.7 Emergency landing

If a hard landing or a high wind landing is anticipated, proceed as follows:

1. Brief everyone to brace with knees slightly bent, to hold on firmly to the handles inside the basket, and to watch the progress of the landing.
2. Warn the passengers not to leave the basket until instructed.
3. Take off all glasses and instruct passengers to do so also.
4. Warn everybody of a possible second impact.
5. Throw overboard any unnecessary ballast, taking all possible care not to cause any damage below when doing so.
6. Extinguish the pilot lights.
7. Shut down all cylinder valves and vent the fuel lines before impact.

3.8 Fire in the air

Should a fire occur during flight then follow the instructions below in the order shown:

1. Turn off the propane valve at the cylinder.
2. Use the fire extinguisher on the source of the flame.
3. Once the fire is extinguished, determine the location of the fire and correct it if possible.
4. Use another burner/valve unit if necessary.
5. Maintain control of the height of the balloon all times.
6. Land as soon as possible.

3.9 Fire on the ground

Should a fire occur on the ground, follow the instructions below in the order shown:

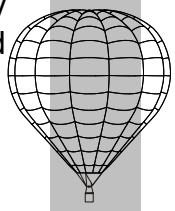
1. Turn off the propane valve at the cylinder.
2. Use the fire extinguisher on the source of the flame.
3. Once the fire is extinguished determine the reason and correct it completely, otherwise abort the flight.

WARNING:
If fire stays more than 20 seconds around a cylinder, abandon the basket making sure not to allow the balloon to lift off when the weight is reduced. The pilot must be the last to exit the basket, if possible with the rip line in his hand.

3.10 Contact with power lines

Any contact with electric power lines is extremely dangerous and should be avoided at all costs. If contact cannot be avoided then steps should be taken to ensure that contact is made only with the envelope above the flying wire level. This may best be achieved by descending which will also mean the basket is closer to the ground to allow escape.

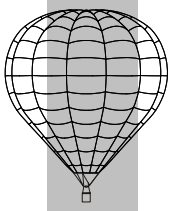
If time permits close all fuel lines and vent off fuel before contact. If safety conditions permit, try to avoid touching the ground until you have been informed that the power line has been switched off.



3.11 Accidental operation of FDS in flight.

Immediately release the vent line and re-close the parachute by pulling on the parachute line and turn on the burner to replace as much lost heat as possible.

WARNING-
The FDS line will not automatically retract when released neither will the panel re-seal unless it is closed by using the parachute line.



SECTION 4

STANDARD PROCEDURES

4.1 Introduction

Section 4 provides checklists and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems and operations can be found in Section 9

4.2 Choosing an inflation site

The selected location must fulfil the following conditions:

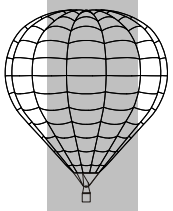
- A flat even surface of sufficient size (50 metres square as a minimum) for safe inflation free of vertical obstructions, sharp stones, thorny bushes or anything else that might cause damage to the envelope, and if possible sheltered from the prevailing wind. There should be sufficient space for positioning of vehicle/s for tethering to.
- The surface should preferably be grass, but without any risk of fire. If there is any risk of setting fire to vegetation, place a Nomex blanket between the burner and the base of the envelope.

4.3 Meteorological Conditions

When planning a flight the limitations set in 2.2 must be adhered to. In addition one should consider the possibility of severe weather approaching, the possible effect of sea breezes and also wind direction. Care should be taken to ensure that the wind direction would not take you into a prohibited area or controlled place. The actual weather conditions should be continually considered during preparation and flight with a view to modifying plans if required. The effect of ambient temperature on fuel pressure must also be considered.

4.4 Load chart

Before each flight it is necessary to calculate the total all up weight and check that it is below the maximum permitted payload. The maximum payload varies with ambient air temperature and altitude, and is found by consulting the load chart supplied by the manufacturer.
Excess weight will result in a high internal temperature, which can damage the envelope fabric. If an ascent to over 300 m (1000 ft) is to be made, it may be necessary to consult the load chart during the flight. The change in temperature and altitude, together with the weight loss due to fuel consumption, may make the pilot change the flight parameters, particularly as far as altitude is concerned. Use of the load chart is explained in Section 5.3.



4.5 Preparing the aerostat for flight

Brief crew as to the roles they are to perform.

4.5.1 Initial Pre-flight checks

Before preparing for every flight, the balloon should be inspected to comply with the following requirements:

4.5.1.1 – Documents

Balloon Flight Manual including AD's and SB's, an airworthiness certificate, a certificate of registration, a certificate of the fuel cylinders and a certificate of burner, basket and/or fuel cylinders in case any part of the bottom end is from another manufacturer.

4.5.1.2 - Envelope and deflation system:

No holes or tears in the fabric above the lower third of the envelope.
All horizontal and vertical load tapes in good condition.
All cords and pulleys well attached and working correctly.
The parachute or FDS lines are free of tangles and operating correctly.
Flying wires are free of kinks or damage

4.5.1.3 - Burner and fuel system:

Check the burner and blast valves, the condition of the hoses, and their connections to the fuel tanks, making sure that there are no leaks. Perform a burner test checking also the pilot lights.

4.5.1.4 - Basket:

General condition, tanks firmly held in, correct attachment of burner frame and wires.

4.5.1.5 – Other Equipment:

Check Altimeter, variometer and thermometer. Also matches, gloves, First Aid kit and Fire Extinguisher all to be in proper condition.

4.5.2 Rigging the basket and burner

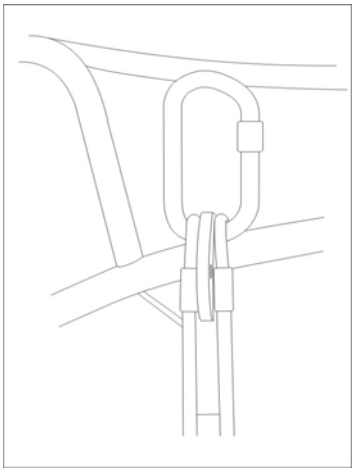
Place the basket upright where the inflation is to take place.
Check the wires of the basket for damage.

- Ensure that the fuel cylinders are firmly strapped into the basket, and that their contents are sufficient for the flight. Check also that the cylinders to be used for

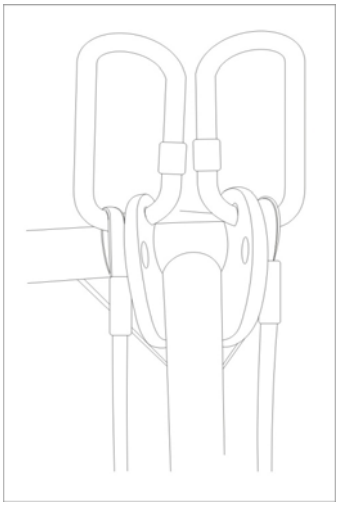
inflation are full and correctly orientated. Cylinders to be used for liquid supply during inflation must be positioned so that the liquid valve is in the lower position when the basket is laid on its side. Where a vapour supply is also required the cylinder should be positioned so that the vapour valve is uppermost when the basket is laid on its side

- Place the support rods to support the burner in their sockets in the basket, then position the upper end of the rods in the sockets on the burner frame. Connect the basket cables to the burner frame using karabiners. On baskets with double corner lugs then each cable fits with its own lug. See following drawings.

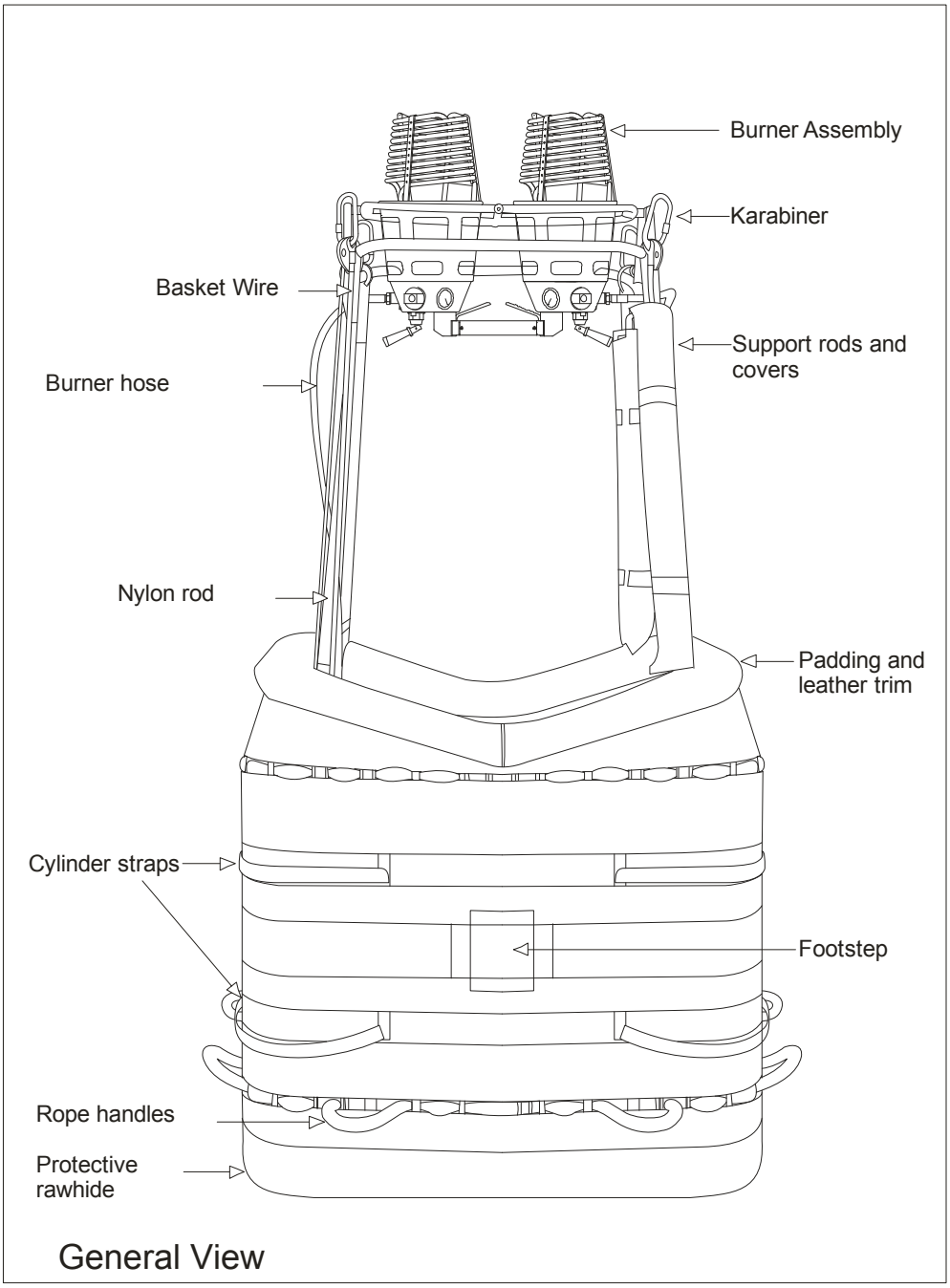
Cameron burner frames are similar to Ultramagic with a single plate corner lug. With Lindstrand, Thunder & Colt and Sky burner frames, the corner lug consists of an inverted U-shaped bracket. With an inverted U-shaped bracket with one wire attachment the eye of the wire is inserted into the U and the karabiner is passed through the hole in the bracket, through the eye of the wire and out the other side of the bracket. With this type of U-shaped bracket on larger baskets where there are two wires at each corner, the eye of the second wire is also threaded on to the same karabiner so that it lies closest to the short side of the basket.



Ultramagic single corner lug attachment 1 karabiner



Ultramagic double corner lug attachment 2 karabiners

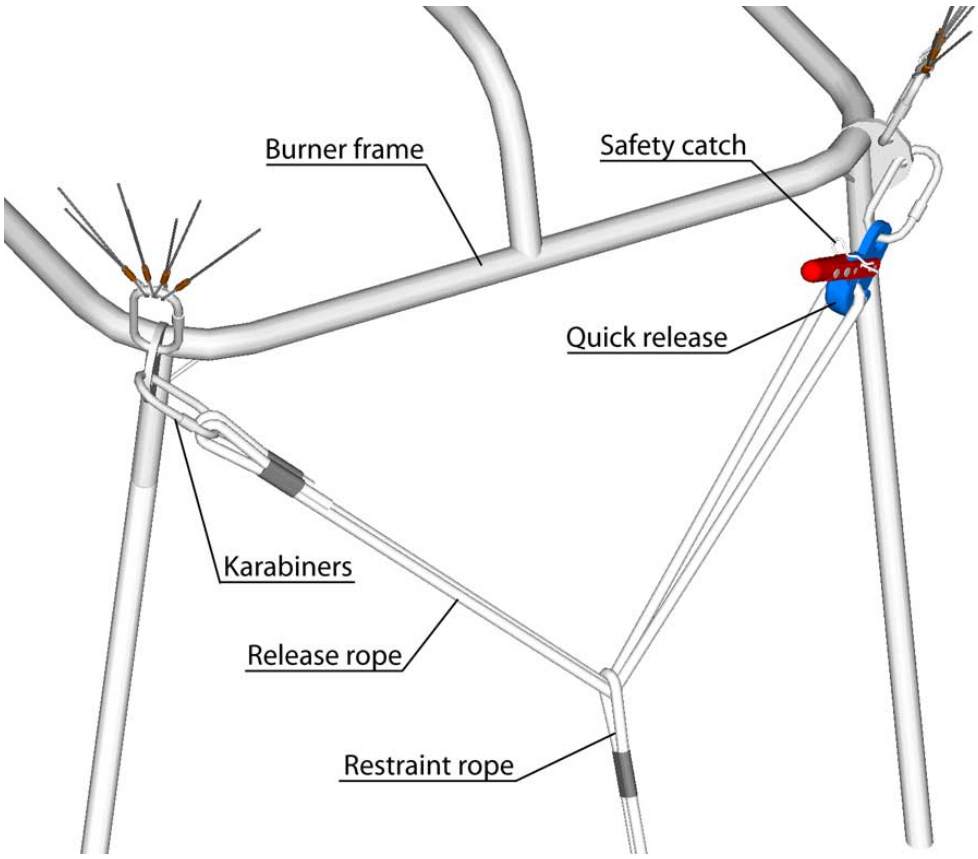


General View

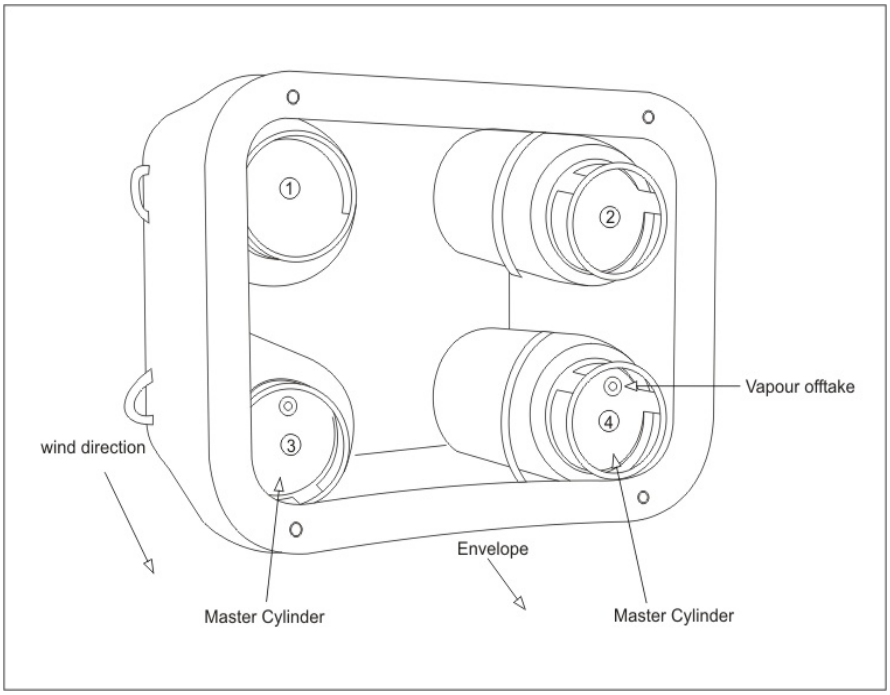
- Check that all fuel lines are in good condition, and then connect them to the cylinders, the vapour feeds (where fitted) to the regulators, and the liquid feeds to the main valves.

- Put the protective covers round the burner supports, making sure that the fuel lines are not pinched by the covers, and that smooth gimballing of the burner is possible. Check that the fuel lines are not kinked in any way that may prevent the free circulation of fuel or cause increased stress to the fuel system.

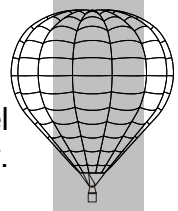
- Using a quick release system, attach one end of a rope to the burner frame on the upwind side, and the other end to a vehicle or solid fixed object.



- Prepare the burner for test as described in Section 4.5.3, then lie the basket down on a long side, with the burner pointing downwind. Note that if vapour outlets are being used; ensure that they are uppermost when the basket is laid over. (See below)



-Note also that for a T-partitioned basket, the pilot compartment should be on the right when looking from the basket into the mouth of the envelope.



4.5.3 Testing the burner

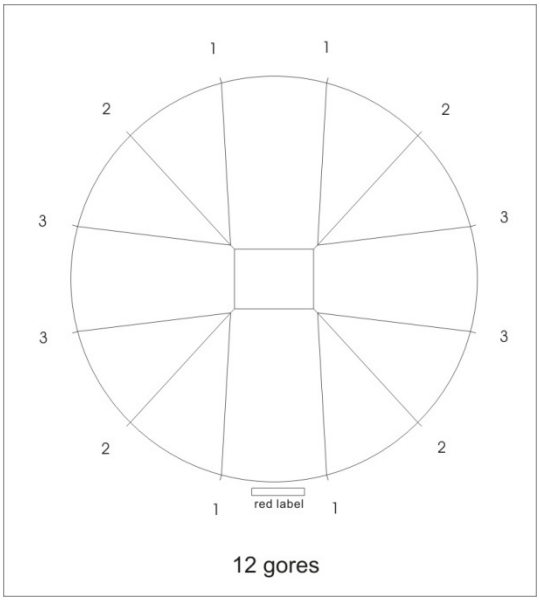
- With all the burner valves closed, turn on first the liquid fuel supply at the fuel cylinder and then (where applicable) the vapour supply valves at the fuel cylinder. Check that there are no leaks by listening and checking for smell.
- Light the pilot light to one burner, and check the flow, and ensure that the flame is strong. Where a vapour pilot light is fitted adjust the setting of the regulator if required.
- Open the main blast valve on the burner, and check that the flame is burning evenly. Check the pressure gauge reading. This should be between a minimum of 3 bars in winter to a maximum of 10 bars in summer.
- Follow the same procedure for each burner in any configuration.
- Check that the cross-flow valve (where fitted) operates correctly (checking 2 or 3 burners that are fuelled from the same fuel cylinder).
- Check that the "quiet" burner operates correctly (where fitted).
- If a hydraulic remote control valve is fitted, this should be connected and tested. The valve on the burner should open fully when the hydraulic handle is depressed.
- Close the liquid valves on the fuel cylinders, burn the remaining gas in the fuel lines, then shut the main blast valve.
- Close the vapour feed valves (where fitted) on the fuel cylinders, wait until the pilot light goes out, then close the pilot light valves.

4.5.4 Envelope

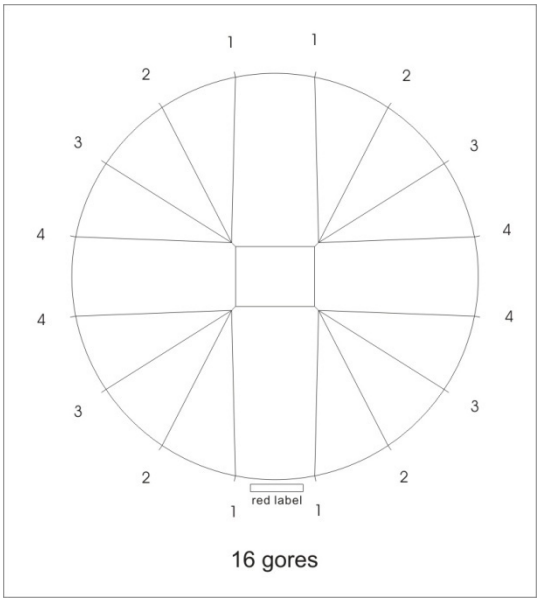
- Open the envelope bag and take out the cables and the lower part of the envelope. Find the coloured tape sewn to the bottom of the Nomex and place it in the centre of the lower part of the envelope. Maintaining this configuration, attach the envelope wires to the load frame with karabiners, making sure they are not twisted at each other. Cables must be attached as shown in Flying wire connection diagrams.

- A basket fitted with double corner lugs will have two karabiners at each corner. Where a basket has eight poles then there will be a karabiner at the top of each pole. The envelope cables may be left connected to a separate set of karabiners. In the case of an eight-pole basket then there should be eight envelope karabiners. Where two adjacent corner lugs are fitted to the load frame then they should not be joined by a single karabiner from the envelope.

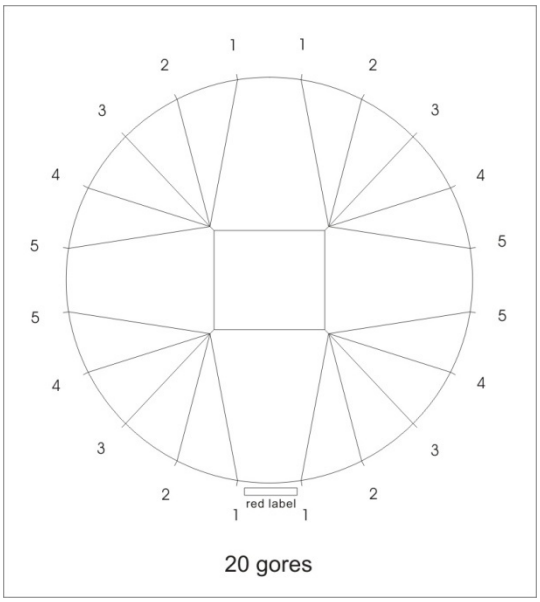
We can find in the following pages different drawings to clarify the position of the red tape of the mouth of the envelope according to the situation of the wires connected to the burner frame.



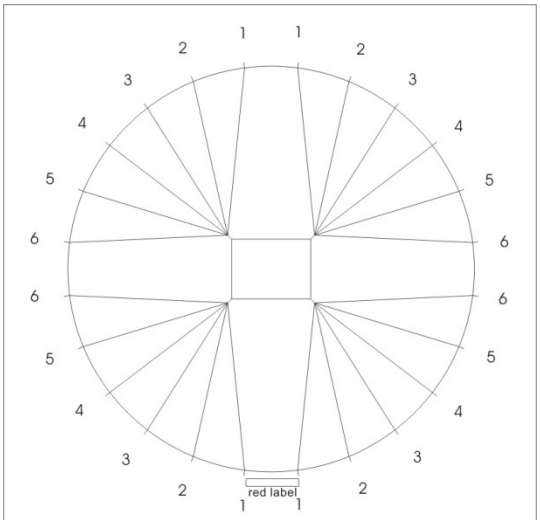
12 gores



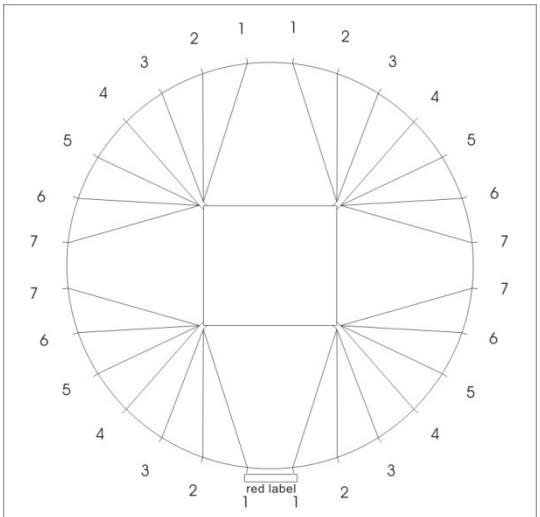
16 gores



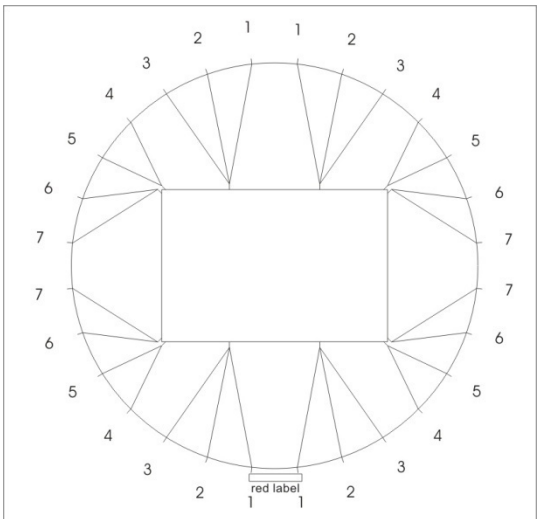
20 gores



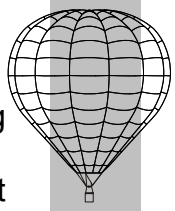
24 gores



28 gores



28 gores 8 poles



- Close all karabiner screw gates.
- Connect the deflation line to the burner frame.
- Once the envelope is correctly attached, take it out of its bag by pulling the bag downwind.
- Spread the envelope out as much as possible, and lay the crown line out downwind.

4.6 Deflation system

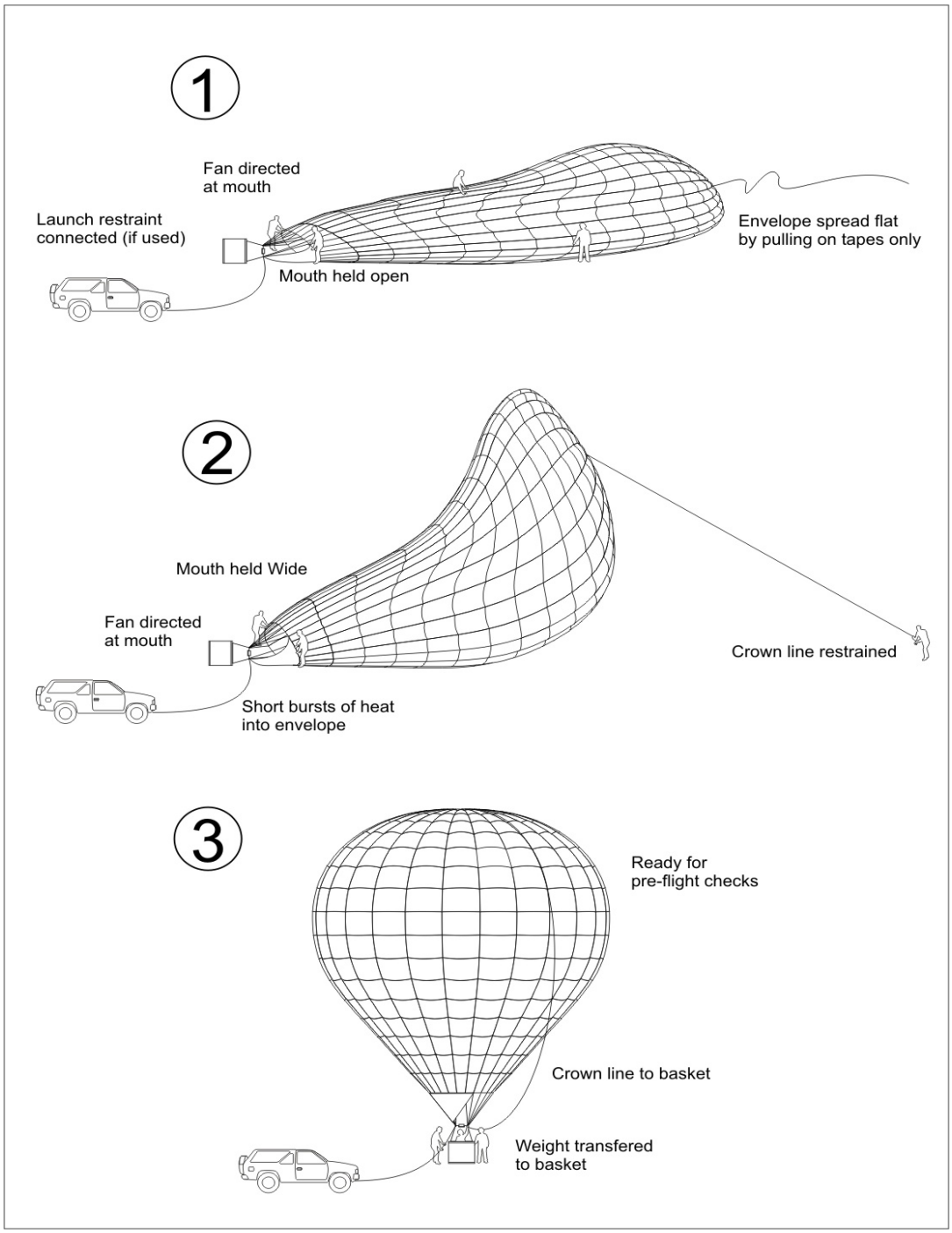
4.6.1 Parachute

It is easier to carry this operation out at the beginning of cold inflation.
- Check that all lines to the parachute are not tangled.
- Pull at the centre of the parachute until it closes against the opening in the balloon.
- Attach the Velcro patches on the edge of the parachute to the corresponding ones on the edge of the balloon opening.

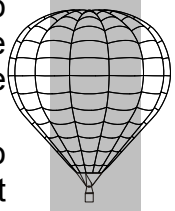
4.6.2 Fast Deflation System (FDS)

- Proceed the same as with a standard parachute system ensuring that all ropes are free from tangles. Check that all lines are free to slide and that no damage can occur.

4.7 Inflation



Fill the envelope with cold air using the fan. During this process the mouth is best held open by two crew, whilst one or a maximum of two, keep the crown rope taut. When the envelope is as full as possible, inflation is completed using the burner. Light the burner using the procedure in Section 4.5.3.
Use the burner only in short bursts, leaving gaps between burns, to allow the air inside the balloon to be heated slowly and evenly.



As the balloon inflates, the crew holding the crown rope allow(s) the crown to rise. The fan should be kept running until the mouth of the balloon leaves the ground. It is useful to have a crewmember to angle the fan to direct air into the balloon.
As the balloon becomes upright, the crew on the mouth of the envelope let go and transfer their weight to the basket as the pilot climbs into the basket whilst the balloon becomes upright.

NOTE: At the pilot's discretion, the crew on the mouth of the balloon may be dispensed with, if the balloon is fully cold inflated.
Also at the pilot's discretion, if the prevailing wind is sufficient to hold the crown down, under the pressure created by the fan, the crown crew may also be dispensed with unless lateral control is necessary.

CAUTION: The crown crew should be made aware of the following instructions.

1. Leather gloves and strong good grip shoes are advisable.
2. Do not take help from onlookers unless instructed by the pilot as this may create too much force to hold down the envelope resulting in too much lift being generated during inflation.
3. Advise the pilot during cold inflation if problems occur at the top of the envelope.
4. Stay at the end of the rope holding secure.
5. Do not wrap the rope about their person or feed out the rope.

WARNING: All crewmembers must be instructed that they must not allow their feet to come off the ground during the inflation and pre-flight period whilst holding either the basket or the crown rope. They must let go immediately.

4.8 Preparation for Take off

Checks –

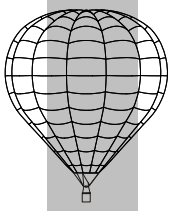
Note: refer also to appendix C.

Once the balloon is upright carry out the following checks:
- Envelope: Check the condition of the fabric, and that there are no tears that would prevent the flight.
- Parachute/Deflating system: Pull the parachute line to release all the Velcro fasteners, making sure it closes properly afterwards and the line works freely.
- Karabiners: Screw gates all closed.
- The passengers may now be loaded. The pilot should ensure that each passenger has a handhold and that they have sufficient room. Once the passengers are aboard then they should be briefed. (See 4.8.2 passenger briefing)

Continue checks.

- Pilot light: Normal function and no freezing.
- Burner: Check again that all fuel lines and valves are operating correctly as in Section 4.4.3.
- Fuel: Check again the contents of the fuel tanks.
- Equipment: Matches or a lighter, compulsory flight instruments.

- Check again for downwind obstacles and obstructions.
- Instruct crew to stand clear



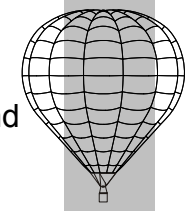
4.8.2 Passenger Briefing

4.8.2.1 Open Baskets

- Always follow the instructions of the pilot, that will prevail over those here, depending on the landing situation.
- Hold on to rope handles or (except when landing) padded uprights.
- Do not at any time hold on to hoses, valves or control lines.
- When instructed to do so, safely stow all cameras, binoculars etc.
- When instructed to do so, take up the landing position as follows.
    - Ensure that long hair is safely kept inside cloths or tied back.
    - Stand at the front of the basket and face the direction of travel.
    - Keep your knees together and bend them slightly. Do not sit or squat.
    - Keep hands inside the basket at all times and hold on to the rope handles.
    - Progress the landing and brace for touchdown.
    - Be aware that the basket may tip over and drag after touch down.
    - Do not leave the basket until the pilot instructs to do so.
    - Wear helmets (when necessary)

4.8.2.2 Partitioned Baskets

- Always follow the instructions of the pilot, that will prevail over those here, depending on the landing situation.
- Hold on to rope handles or (except when landing) padded uprights.
- Do not at any time hold on to hoses, valves or control lines.
- When instructed to do so, safely stow all cameras, binoculars etc.
- When instructed to do so, take up the landing position as follows.
    - Ensure that long hair is safely kept inside cloths or tied back.
    - Stand squarely with your back against the basket facing away from the direction of travel.
    - Keep your knees together and bend them slightly. Do not sit or squat.
    - Press back against the basket wall.
    - Keep hands inside the basket at all times and hold on to the rope handles.
    - Progress the landing and brace for touchdown.
    - Be aware that the basket may tip over and drag after touch down.
    - Do not leave the basket until the pilot instructs to do so.
    - Wear helmets (when necessary)



4.9 Take Off

Take off by increasing the temperature in the envelope with repeated burns, and operate the quick release.
Be ready to use the burner again once the balloon has lifted off and stabilised.

WARNING: In low temperature the propane pressure at the burner will be very low, resulting in less burner power and consequently much slower response from the balloon. This may be alleviated by heating or pressurisation techniques. Please consult the manufacturer for details.

4.10 Control during flight

4.10.1 Manoeuvring in flight

The altitude of the balloon is controlled by the operation of the burner, which is either fully on or fully off. An experienced pilot can judge the length and frequency of burns necessary to control his balloon to within a few centimetres. Remember the maximum ascent rate is 3 m/sec (600 ft/min) if no thermometer is being carried.

When a "quiet" burner is fitted, it is recommended that this be used below 500 ft, and always in the vicinity of livestock. As it is quieter than the main burner it causes less disturbance, as well as allowing fine control of the balloon.

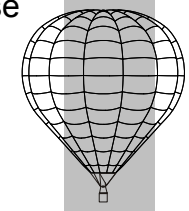
The parachute may be opened briefly for up to 3 seconds at any one time to increase the descent rate, or halt a climb. Always check to ensure that it has resealed after use. In very lightly loaded conditions a small burn may be required where over-venting has occurred.

WARNING:
The FDS rapid deflation system must never be used higher than 10 m. (30 ft) from the ground, as this is to be used for final landing only.

The maximum vertical velocity, the altitude drop required to attain that velocity, and altitude drop required to recover from a descent at that velocity are determined in Appendix A for each balloon size.

4.10.2 Fuel management

The burner has two completely separate fuel supplies as an additional safety factor, however only one should be used at any time under normal conditions. The gauges on the top of the fuel cylinders indicate when they are becoming empty, at the same time the sound of the burner will change and the pressure at the burner will drop. In the case of any of these symptoms, change to the other supply to the burner and continue flying on that side until the source of the problem is clear.
In order to change fuel tanks, carry out the following procedure:
- Shut down the liquid take-off on the empty fuel cylinder.



- Open the burner valve until all liquid in the fuel line has been burned, then close the burner valve.
- Disconnect the fuel line from the empty tank and connect it to a full one.
- Open the liquid feed valve on the full fuel cylinder.
- Check that the burner operates correctly from this new supply.

Continue to fly on the new fuel cylinder. When only two cylinders remain, it is advisable to transfer onto the final one leaving about 25% in reserve, so that there is always fuel in both systems.

If a tank is also supplying a vapour pilot light a reserve of approximately 3% per hour of flight must be left for this purpose, and the pilot must be aware that the pressure available to the burner will reduce with time.

4.10.3 Gusting

The balloon may encounter sudden changes in wind speed or direction. This will cause a slight flattening of one side of the balloon until it stabilises in the new air stream, with a consequent loss of volume and hence lift, together with a sensation of a breeze in the basket. The pilot must compensate for this by burning.

4.10.4 Thermals

WARNING: It is forbidden to intentionally fly in conditions of thermal activity.

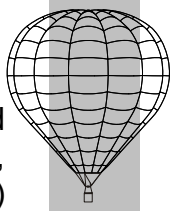
However, if thermals are encountered, the internal temperature of the balloon should be maintained as stable as possible, with the balloon at a safe height of over 3000 ft above ground level until a landing is attempted.

4.11 Landing

Before making any landing carry out the following checks:
- Burner: Connected, if possible, to a fuel cylinder filled to at least 40% of its capacity.
- Handling line: In light winds, conveniently fastened to the load frame, and ready for easy deployment.
- Rip line at hand during approach
- Passengers briefed.
- The selected landing site is free of obstructions, power lines and animals and is large enough to safely land the balloon in the current weather conditions.

4.11.1 Landing without wind, with parachute

The landing should be made with practically no vertical velocity, the parachute being opened immediately after touch down only long enough to stabilise the balloon on the ground.



4.11.2 Landing with wind, parachute

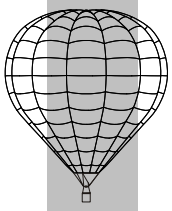
The technique is similar to 4.11.1 but horizontal travel must be minimised to avoid downwind obstacles. To achieve this, a steeper angle of descent is chosen, rounded out by a long burn to achieve straight and level flight at about 20ft (6 m) above the ground. The parachute is then opened fully and kept open until the envelope is fully deflated.
The pilot lights will be extinguished and all cylinder valves should be closed before landing.

4.11.3 Landing with wind, FDS

When approaching the ground, open moderately the parachute and when arriving at the selected landing place, open as fast as possible the FDS with the red rope. The FDS should never be used at a height above 10 m. The FDS system has the advantage that if the rope is released, the opening remains as it was left. In case of aborting the landing, the white-red line must be pulled to reseal the parachute.
The pilot lights will be extinguished and all cylinder valves should be closed before landing.

4.11.4 Landing Large Balloons.

Care should be taken when landing large balloons to ensure that the basket is correctly positioned on the approach to allow touchdown on the long side. This is particularly important with partitioned baskets. The basket is correctly positioned by rotating the balloon using the rotation vents. Be aware that the use of the rotation vents does vent off hot air whilst rotating the balloon, so allowance should be made for this, particularly when close to the ground.



SECTION 5

LOADING

5.1 Introduction

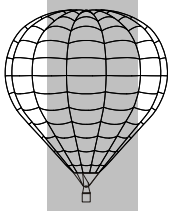
For the given volume, the lift of a balloon is limited by the internal temperature. This is affected by the ambient temperature and the altitude of the proposed flight.
This section shows how the Lift is calculated considering all these parameters, without surpassing the maximum authorised load. Maximum Lift takes account of the basket used because it can be lower than the Maximum Lift permitted for the envelope.

5.2 Table of Empty Weight and Maximum Lift

Model	Basket	Pv	Lmax
H-31	C-0	105	307
	C-2	110	307
H 56	C-2	146	549
Vol=15.9	C-0	141	399
	C-1	152	549
H 65	C-1	154	638
Vol=18.4	C-2	151	638
	C-3	157	638
	C-10	166	638
V-25 (1)	SOLO	61	250
V 65	C-1	158	638
Vol=18.4	C-2	155	638
	C-3	161	638
	C-10	170	638
V 90	C-3	172	878
Vol=25.5	C-1	169	878
	C-2	166	878
	C-4	191	878
	C-10	181	878
S 90	C-3	179	878
Vol=25.5	C-1	167	878
	C-2	164	878
	C-4	189	878
	C-10	179	878
S 130	C-4	215	1365
Vol=36.8	C-1	193	1225
	C-3	196	1365
	C-5	285	1365
	C-6	235	1311
	C-7	262	1365
	C-10	205	1205

Model	Basket	Pv	Lmax
H 42	C-0	115	373
Vol=12.0	C-2	120	416
	C-1	126	416
H 77	C-1	158	756
Vol=21.9	C-2	155	756
	C-3	161	756
	C-10	170	756
	C-4	180	756
V 56	C-2	149	549
Vol=15.9	C-0	144	402
	C-1	155	549
V 77	C-1	162	756
Vol=21.9	C-2	159	756
	C-3	165	756
	C-10	174	756
	C-4	184	756
V 105	C-4	203	1032
Vol=29.5	C-1	181	1032
	C-3	184	1032
	C-10	193	1032
S 105	C-4	198	1032
Vol=29.5	C-1	176	1032
	C-3	179	1032
	C-10	188	1032
S 160	C-5	307	1569
Vol=45.5	C-4	237	1569
	C-6	257	1333
	C-7	284	1569
	C-10	227	1227

(1) V-25 configuration not U.S. approved



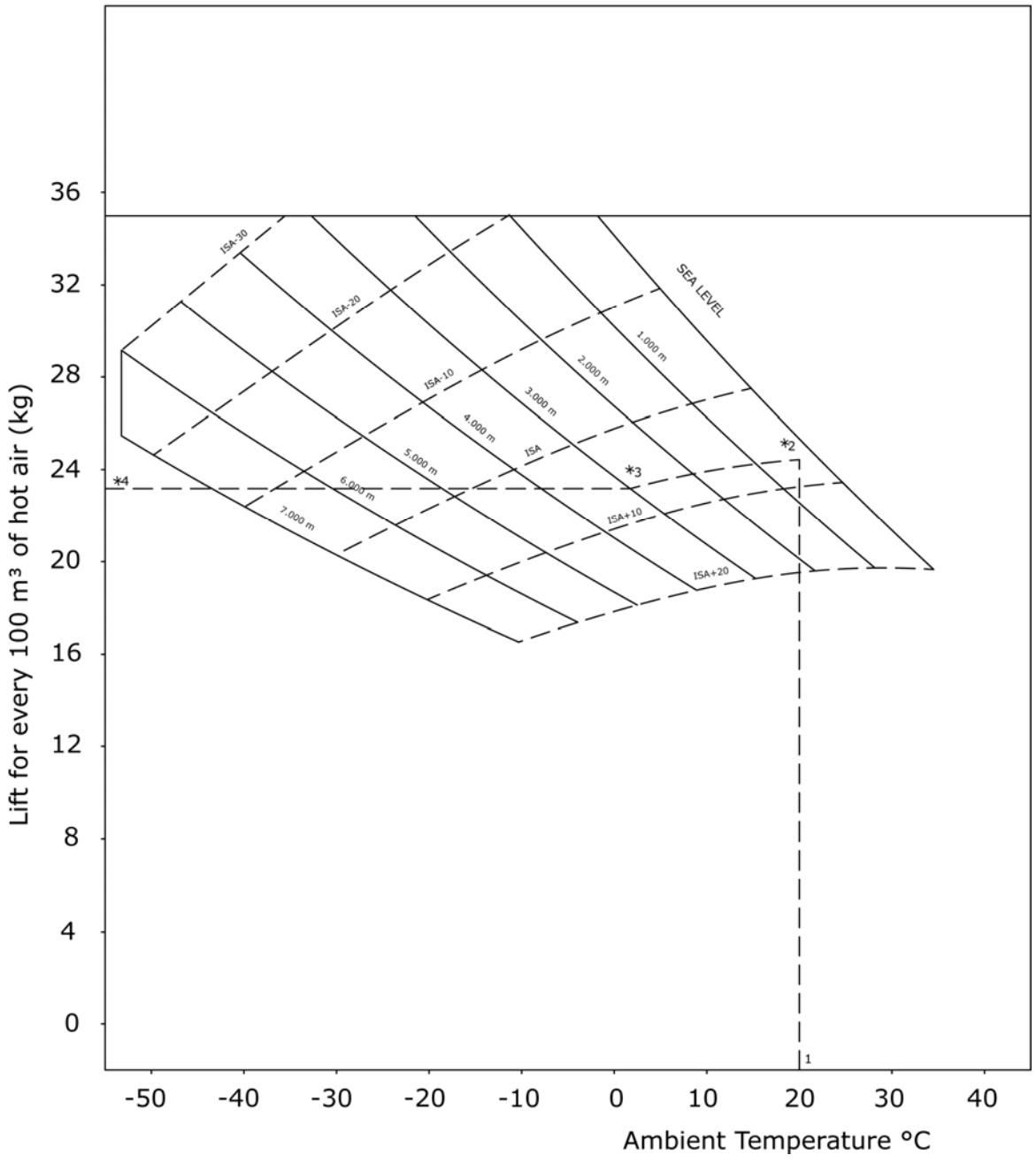
Model	Basket	Pv	Lmax
M-42	C-0	124	382
	C-2	129	414
	C-1	135	414
M 56/M 56c	C-2	146	550
Vol=15.9	C-0	141	399
	C-1	152	550
M 77/M77c	C-1	161	756
Vol=22.0	C-2	158	756
	C-3	164	756
	C-10	173	756
	C-4	183	756
M 105	C-4	205	1032
Vol=29.5	C-1	183	1032
	C-3	186	1032
	C-10	195	1032
M 130	C-4	225	1365
Vol=36.8	C-1	203	1235
	C-3	206	1365
	C-5	295	1365
	C-6	245	1321
	C-7	272	1365
	C-10	215	1205
M 160	C-5	320	1569
Vol=45.5	C-4	250	1569
	C-6	270	1346
	C-7	297	1569
	C-10	240	1240
N 180	C-5	342	1754
Vol=51.0	C-6	292	1368
	C-7	319	1607
	C-8	357	1754
	C-9	447	1754
N 250	C-8	405	2199
Vol=70.0	C-5	390	1959
	C-9	495	2408
	C-11	545	2408
N 355	C-9	546	2704
Vol=100.0	C-5	491	2010
	C-8	456	2250
	C-11	596	3216
	C-12	656	3450
T 150	C-3	231	1465
Vol=42.4	C-10	240	1256
	C-4	250	1465
	C-5	320	1465
	C-6	270	1355
	C-7	297	1465
T 210	C-8	376	2070
Vol=60.0	C-5	361	1930
	C-7	338	1626
	C-9	466	2070
	C-11	516	2070

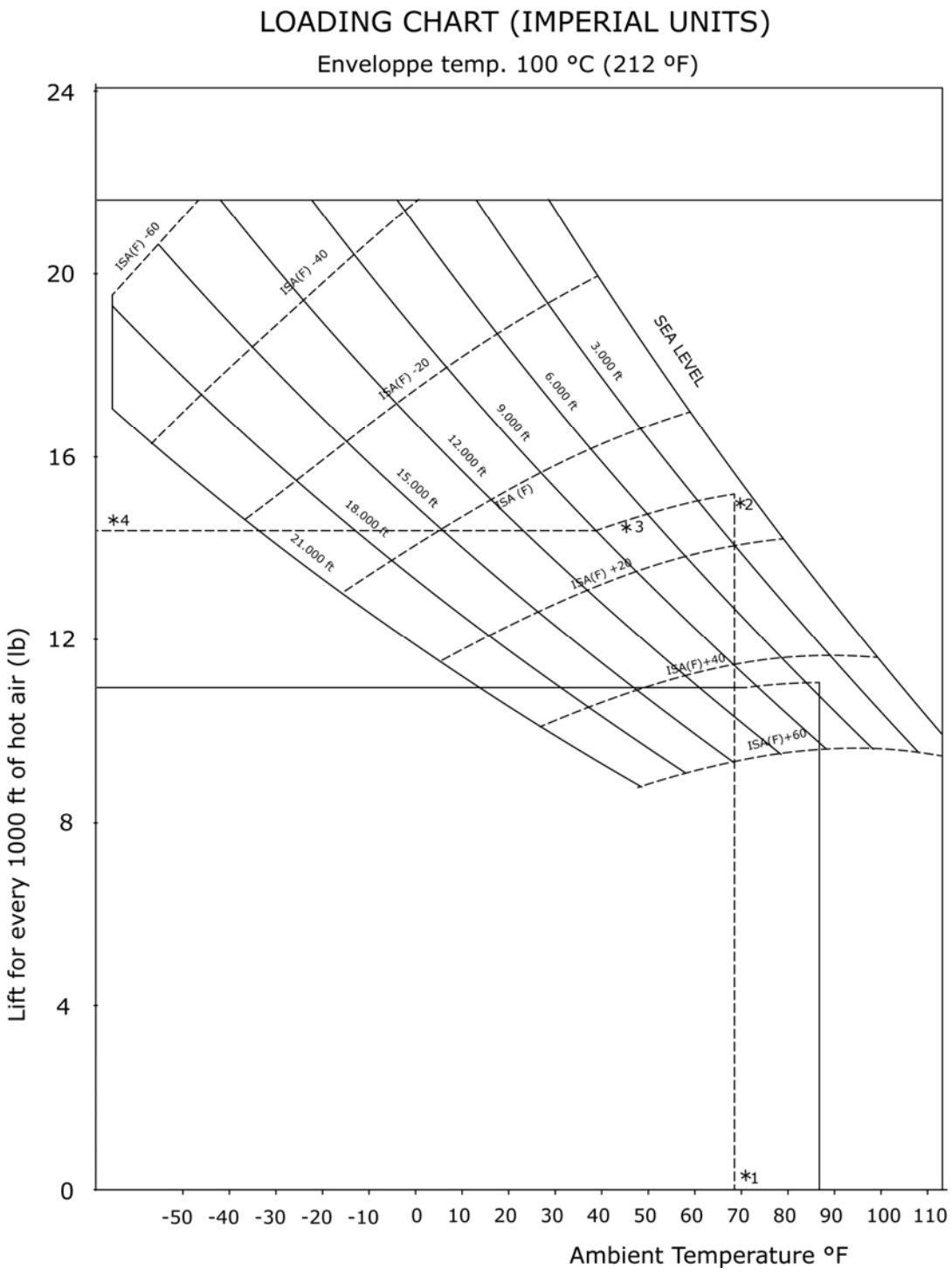
Model	Basket	Pv	Lmax
M 65/M 65c	C-1	159	638
Vol=18.4	C-2	156	638
	C-3	162	638
	C-10	171	638
M 90	C-10	183	878
Vol=25.5	C-1	171	878
	C-2	168	878
	C-3	174	878
	C-4	193	878
M 120	C-4	215	1173
Vol=34.0	C-1	193	1173
	C-3	196	1173
	C-5	285	1173
	C-6	235	1173
	C-7	262	1173
	C-10	205	1173
M 145	C-6	257	1333
Vol=41.0	C-3	218	1436
	C-4	237	1436
	C-5	307	1436
	C-7	284	1436
	C-10	227	1227
N 210	C-8	382	2064
Vol=60.0	C-5	367	1936
	C-7	344	1632
	C-9	472	2064
	C-11	522	2064
N 300	C-9	522	2680
Vol=85.0	C-5	417	1986
	C-8	432	2226
	C-11	572	2924
	C-12	632	2924
N 425	C-12	712	3712
Vol=120.0	C-11	652	3332
	C-9	602	2814
	C-5	497	2010
	C-8	512	2250
T 180	C-5	346	1754
Vol=51.0	C-6	296	1372
	C-7	323	1611
	C-8	361	1754
	C-9	451	1754
Z 90	C-3	170	878
Vol=25.5	C-1	167	878
	C-2	164	878
	C-4	189	878
	C-10	179	878

Vol = Volume in m³x100
Pv = Empty Weight (without any cylinder) (kg)
Lmax = Maximum Lift (Kg) authorised
Note: Pv shall be adapted to the personal configuration of the balloon.

LOADING CHART (I.S. UNITS)

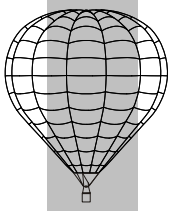
Enveloppe temp. 100 °C





5.3 Load Chart

This graph is used to find the lift available per hundred cubic meters volume at various altitudes and ambient temperature for a temperature of 100° C inside the envelope.
The total payload is the difference between the total lift available and the weight of the various parts of the balloon itself. The empty weight of the balloon does not include empty cylinders or fuel. These should be included in the payload.



See the graphs of pages 5.3 in S.I. (m) and 5.4 U.S. units (ft).

5.3.1 Calculation Example

Flight parameters:

Balloon type H-65
Ambient air temperature: 20° C (68 ºF)
Altitude of launch site: 300 m (984 ft)
Maximum altitude planned: 3000 m (9842 ft)

1. Starting from the ambient air temperature on the base line (1), follow vertically until the intersection of the 300 m (984 ft) curve (2).

2. From this point trace a curve parallel to the I.S.A. curve to intersect with the 3000 m (9842 ft) curve at (3).

3. From (3) trace horizontally across to the vertical axis at (4). Read off 23.2 kg per 100 m3 (14.5 lb/1000 ft3).

4. The Lift Table of Section 5.2 shows that the H-65 has a V = 18.4 (65 in 1000 ft3).

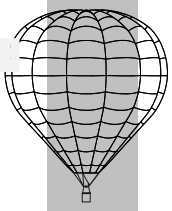
5. Total lift in this case is 23.2 x 18.4 = 427 kg. (65 x 14.5 = 942.5 lb)

6. Payload = Total lift - empty weight with a C-2 basket
= 427 - 151 = 276 kg (= 942.5 – 334 = 608.5 lb ≈ 275 Kg)

These 276 kg (608 lb) have to be distributed between fuel cylinders (minimum 2), fuel, crew, luggage and accessories.

5.4.Table of compatibility

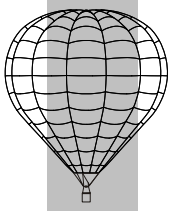
See next pages.



SIZE	25	31	42	56	65	77	90
BURNER MK-2/MK-2 Super MK-10 MK-21 & BMK-008							
SIMPLE	*	*	*	x	x	x	x
DOUBLE				Ø	*	*	*
TRIPLE							
SILENT	x	x	x	x	x	x	x
BASKETS							
C0	*	*	*	x			
C1			x	x	*	*	x
C2	x	x	x	*	x	x	x
C3					x	x	x
C4						x	x
C10					x	x	*
ROT. VENTS	x	x	x	x	x	x	x
FDS	x	x	x	x	x	x	x
MIN.CYL.	1	1	1	2	2	2	2

SIZE	105	120	130	145	150	160
BURNER MK-2/MK-2 Super MK-10 MK-21 & BMK-008						
SIMPLE	☼	⊗				
DOUBLE	*	*	*	*	*	*
TRIPLE	x	x	x	x	x	x
SILENT	x	x	x	x	x	x
BASKETS						
C1	x	x	x			
C2						
C3	x	x	x	x	x	
C4	*	*	*	*	x	x
C5		x	x	x	x	*
C6		x	x	x	x	x
C7		x	x	x	*	x
C10	x	x	x	x	x	x
ROT.VENTS	x	x	x	x	x	*
FDS	x	x	x	x	x	*
MIN.CYL.	2	2	2	2	2	2

- **Standard configuration = ***
- **Compatible configuration = x**
- **Only MK-21 and BMK-008 = ☼**
- **Only BMK-008 = ⊗**
- **BMK-008 Excluded = Ø**



SIZE	180	210	250	300	355	425
BURNER MK-2/MK-2 Super MK-10 and MK-21 BMK-008 & BMK-050						
DOUBLE	x	☼	⊗	⊗		
TRIPLE	*	*	x	☼	⊗	⊗
QUADRUPLE	x	x	*	*	*	*
SILENT	x	x	x	x	x	x
BASKETS						
C5	*	*	x	x	x	x
C6	x					
C7	x	x				
C8	x	x	*	x	x	x
C9	x	x	x	*	x	x
C11		x	x	x	*	x
C12				x	x	*
ROT. VENTS	*	*	*	*	*	*
FDS	x	*	*	*	*	*
MIN.DEP.	2	2	2	2	2	2

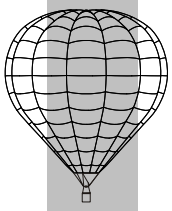
- Standard configuration = *
- Compatible configuration = x
- Only MK-21 BMK-008 and BMK-050 = ☼
- Only BMK-050 = ⊗

5.5.Minimum Take off weight

The total take off weight must never be less than that specified in the following table. This applies to all balloons of Volume greater than 90,000 ft³.

Explanation note : These values provide for an appropriate internal pressure of the envelope which results in less vulnerability to envelope deformation (loss of hot air) by gusts.

See next page.

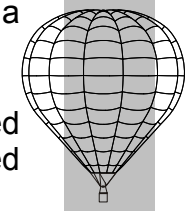


VOL (m3) Volume in m3	VOL (ft3) Volume in ft3 x 1000	Lmax (Kg) Maximum Load in Kg.	Lmin (Kg) Minimum Load in Kg.
3000	105	1032	480
3400	120	1173	544
3700	130	1365	588
4100	145	1436	656
4245	150	1465	679
4550	160	1569	728
5100	180	1754	816
6000	210	2064	960
7000	250	2408	1120
8500	300	2924	1360
10000	355	3454	1600
12000	425	4140	1920

5.6. Reduced Maximum TO Mass Operation

Under certain operational conditions it may be necessary for the balloon operator to select a reduced Maximum Take-Off Mass. Under these circumstances the following limits are advised by Ultramagic S.A.

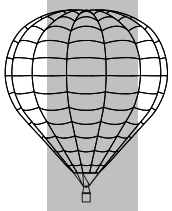
Envelope Size	Maximum Take-off Mass (kg)	Envelope Size	Maximum Take-off Mass (kg)
25	238	145	1378
31	295	150	1425
42	399	160	1506
56	532	180	1710
65	618	210	1995
77	732	250	2375
90	855	300	2993
105	998	355	3373
120	1140	425	3995
130	1235		



Approval of these reduced limits must be recorded in the balloon log book by a qualified balloon inspector.

Operational limitations as specified in section 5.2 and 5.5 and all continued airworthiness requirements must be maintained whilst operating at the reduced Maximum Take-Off Mass.

Normal Maximum Take-Off Mass limitations as section 5.2 and 5.5 can only be restored to the balloon by a qualified inspector making an full inspection of the balloon. This change to the normal MTOM must then be recorded in the balloon logbook by the inspector



SECTION 6

BALLOON AND SYSTEMS DESCRIPTION

6.1 Introduction

Section 6 provides a description and operation of the balloon and its systems. Optional equipment and systems are detailed in section 9 – Supplements.

6.2 Description

The aerostat is remarkably simple in its conception and handling. It consists of three main parts: Envelope, fuel system (burner with load frame and fuel cylinders) and finally a basket.

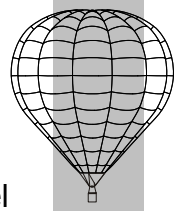
6.2.1 Envelope

The envelope is composed of a certain number of gores as indicated in the tables of Section 6.3. It is made of high resistance polyamide fabric, reinforced by several polyester load tapes. These load tapes bear forces due to loading, and transmit them via stainless steel cables to the load frame. The lowest part of the envelope is made of heat resistant Nomex.

In the top of the envelope is a large hole, where there is no fabric but the mesh of load tapes continues. This hole is covered, from the inside of the balloon by a loose panel of fabric, centred by a system of cords, which makes it resemble a parachute. It is kept closed by the internal pressure of the balloon, so that it seals tightly against the opening and the mesh of load tapes. It is opened from the basket by pulling a cord, a process that is completely reversible, as when the rope is released the parachute reseals.

FDS (Fast Deflation System) is a parachute system but with extra opening capabilities. It's a parachute that can be gathered in the top centre pulling the red line, and therefore allowing a great outflow of hot air for fast deflating; allowing also the recovery in case of necessity by pulling the red/white line. Also pre-flight preparation is similar to a standard parachute system.

The rotation vents are two vertical valves positioned in the equator of the envelope. These may be operated independently to cause rotation of the balloon about its vertical axis in either direction.



6.2.2 Burner and burner frame.

6.2.2.1 Burner General

The burner is a device for converting the fuel (liquid propane) stored in the fuel cylinders into heat energy. This energy is used to heat the air inside the balloon envelope and thus provide the means of inflation and altitude control during flight.

Fuel is supplied to the burner through the flexible hoses. The fuel enters a machined valve block via a fuel inlet post. The fuel is then distributed to the various valves and pressure gauge in readiness for use. Fuel flow is controlled by an on/off valve called the blast or main valve.

Each burner “pot” is fitted with the following major features:

- Burner can.
- Main Burner Vaporising coil
- Fuel hoses
- Main valve assembly (Blast Valve)
- Liquid valve assembly. (Quiet burner or liquid fire burner valve)
- Pilot regulator valve assembly
- Igniter Assembly
- Pressure gauge assembly.
- Liquid fire jet assembly.
- Pilot light assembly.
- Slurper tube assembly.
- Fuel inlet post.

The burner is available in single, double, triple and quad variants.
A minimum of two blast valves and two fuel supplies are always fitted. With a double, triple or quad burner each coil has its own blast valve and fuel supply, while in a single burner both fuel supplies connect to the same burner coil but via separate blast valves.

The main or blast valve allows fuel to pass through the coil to be pre-heated and then burns at the jet or diffuser outlet. This part of the burner gives the maximum power. This valve has a squeeze action
The MK 10 burner has a maximum power of 2,5 million Kcal/h at a pressure of 6 bars, using liquid propane gas.

- 6, 18 or 24 jets or a diffuser to project the vaporised propane.

- The Mark 21 Burner gives 2,8 million Kcal/h at a pressure of 6 bar, using liquid propane gas.

The liquid fire or quiet burner valve feeds fuel directly to a multi hole jet assembly without passing through the coil. This valve has a toggle action on the Mk21 and a twist action on the Mk10. This provides a less powerful but quieter flame for use when flying near animals. This part of the burner is not meant for general use and should not be used to inflate the balloon or when wind shear is present. Excessive use of this burner may cause the inside of the envelope to become black.

Ignition to both heat flames is provided by a pilot light flame. The pilot light is fitted with a shutoff valve and piezoelectric igniter

6.2.2.2 Double, triple and quadruple burners

Double MK-21 Burner

Triple array of the MK-21 Burner

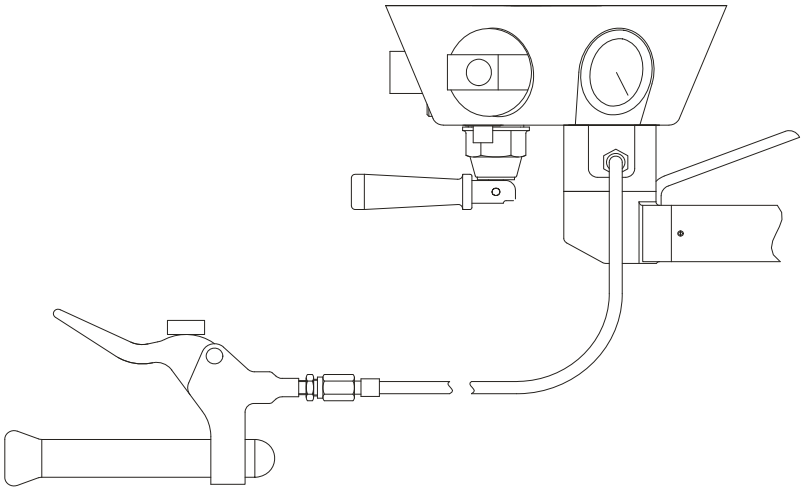
MK-21 Quadruple

6.2.2.3 Load frame

This is a stainless steel frame that establishes the link between the envelope, the burner and the basket. The burner is mounted in the centre of the frame by being swivel mounted on a gimbal. The frame is supported on nylon rods, which are fitted into sockets, which are welded to each of the corners of the load frame. The basket and envelope are attached via the load wires to the corners of the frame with karabiners linked to lugs. These lugs are welded to the frame.

6.2.2.4 Hydraulically actuated remote burner valve

The hydraulically operated main valve is an optional fit on the Mk21 burner. This enables the burner valve to be actuated without toughing the burner. It does not interfere with the normal valve action of the burner.



HYDRAULIC MAIN VALVE ASSEMBLY

6.2.3 Basket

The basket is made from woven willow and cane on a marine plywood base.
Various openings are woven in to accommodate step holes and strap holes for cylinders.
The basket is connected to the load frame by a minimum of four stainless steel cables that pass down the sides and through and under the base. These cables are continuous in pairs. Tube stiffening and tube sockets are woven in various positions depending on the size and type of basket.
The sockets are to accept the nylon rods, which support the burner load frame. These support rods, cables as well as burner hoses are kept inside padded zipped covers when erected.

The floors are reinforced and protected on the outside with hardwood runners, which are bonded and coach bolted to the floor. The bottom edge of the basket, where the wicker joins with the floor, is covered in rawhide for protection from damage.

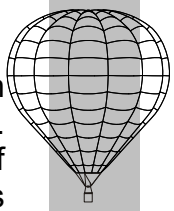
The top edge of the basket is padded with foam and covered in either leather or suede both to enhance appearance and also to offer passenger protection. The sides of the basket can also be padded and covered on the inside in a hardwearing waterproof canvas type material.

A fire extinguisher is fitted to the inside of the basket inside a special padded bag.

6.2.3.1 Sports Basket

Ultramagic sports baskets are available in various sizes capable of carrying between 1 and 6 passengers. They can be either straight top or swept.

6.2.3.2 Partitioned Baskets



Larger baskets for large balloons are supplied in a number of configurations with various partitioned compartments. These can be T, double T or C partitioned. The pilot and fuel are in a separate compartment to the passengers. The sides of the baskets are higher than with the sports basket. The number of support rods and rigging points can also vary depending on the type and size of basket.

As these baskets are considerably longer on one side than the other the balloon should always be landed on the long side. Consequently to achieve this, the envelope should always be fitted with rotation vents with partition baskets.

6.2.4 Fuel Cylinders

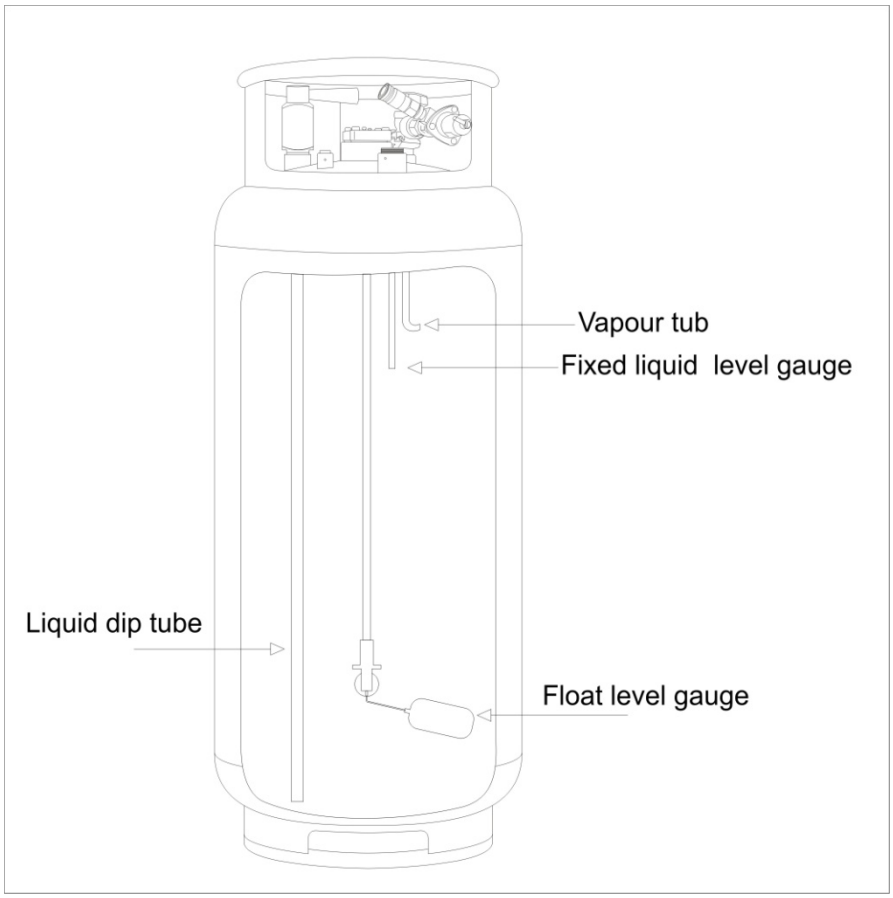
The fuel (liquid propane) is carried under pressure in cylinders, which are made from aluminium (Worthington) or stainless steel especially manufactured for Ultramagic. Worthington cylinders have a nominal volume of 40 litres. Ultramagic cylinders are available in sizes of 40, 60 and 80 litres. These cylinders now generally supply liquid propane only and are commonly called slave cylinders. Earlier model burners required a pressure regulated vapour supply also. These cylinders fitted with this valve and regulator are commonly called masters.

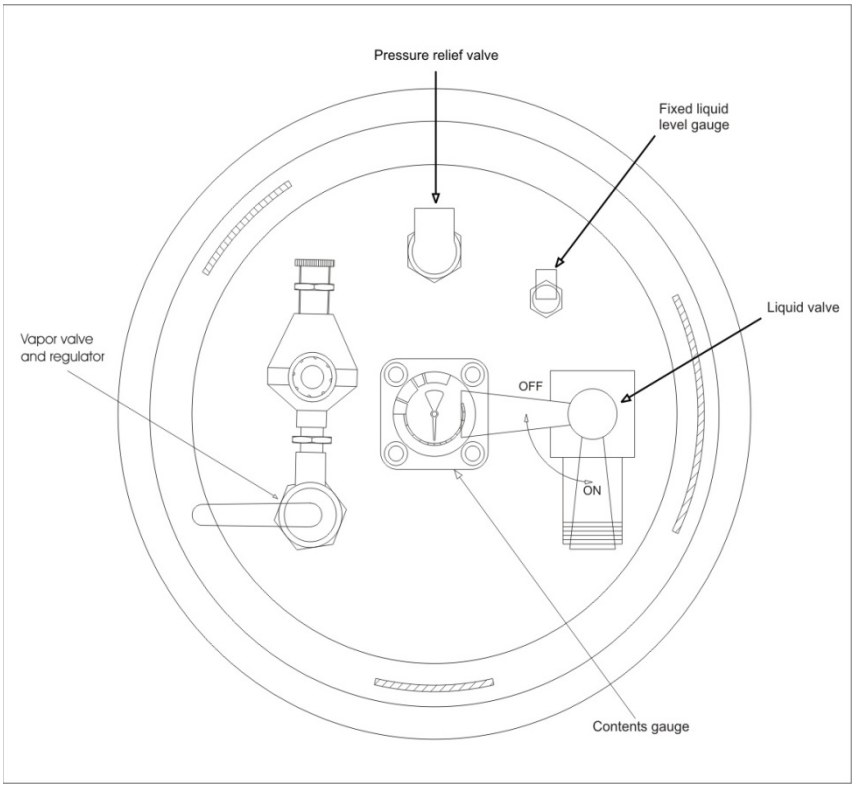
Liquid fuel is delivered via a dip tube from the bottom of the cylinder and is controlled by an on/off quick shut off valve. This valve then has either a Tema push on connector or a Rego screw on connector for connecting to the burner liquid supply hose.

The pressure regulator for vapour supply is fitted to a hand wheel type valve and is opened by turning anti clockwise. The regulator is adjustable and is fitted with a push fit connector for use with burners where a vapour pilot light is fitted.

A contents gauge is fitted to all cylinders, which only start to register when reaching the last 25% of fuel contents. A bleed valve is fitted with a dip tube, which is used for refuelling by volume. A pressure relief valve (PRV) is fitted to prevent the cylinders being over pressurised.

The cylinders must be securely strapped vertically in the basket, taking note of their rotation for cylinders to be used during inflation. Cylinders to be used for liquid supply during inflation must be positioned so that the liquid valve is in the lower position when the basket is laid on its side. Where a vapour supply is also required the cylinder should be positioned so that the vapour valve is uppermost when the basket is laid on its side.


Vapour tub
Fixed liquid level gauge
Liquid dip tube
Float level gauge

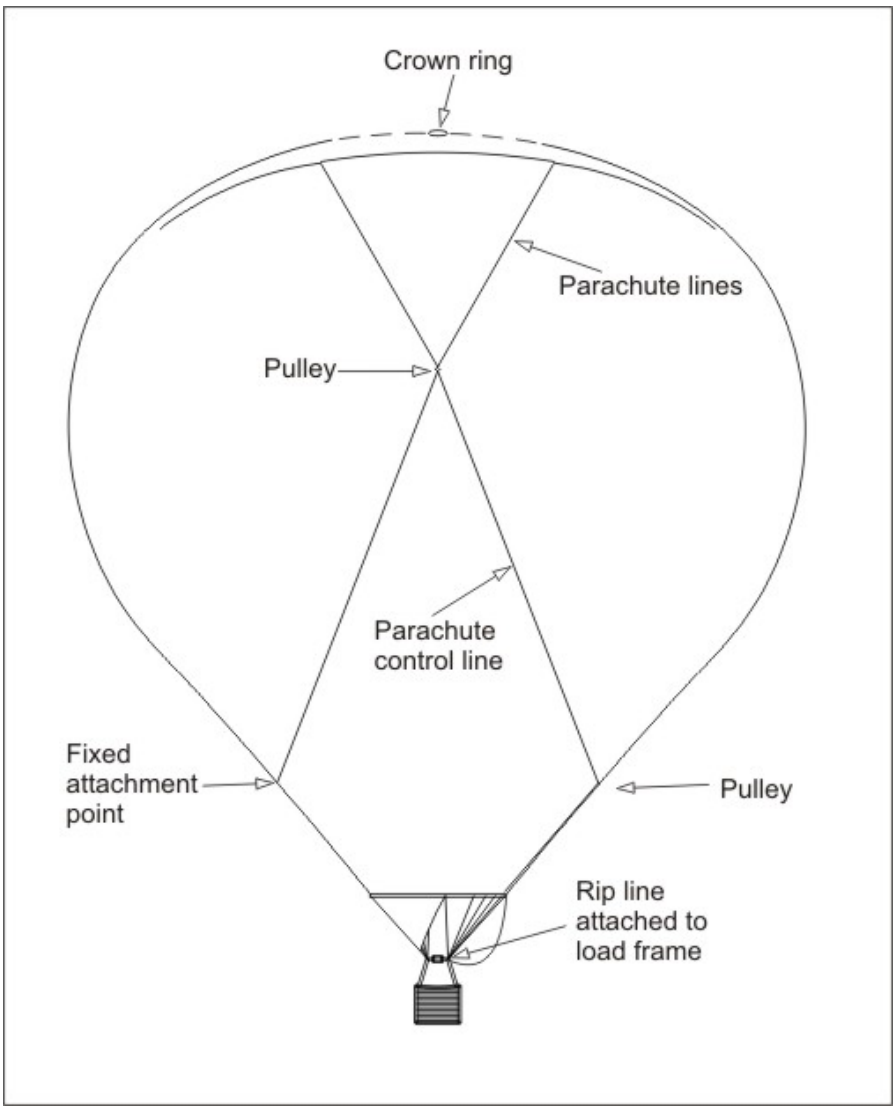

Pressure relief valve
Fixed liquid level gauge
Liquid valve
Vapor valve and regulator
OFF
ON
Contents gauge

6.2.5 Flight controls

6.2.5.1 Burner Controls

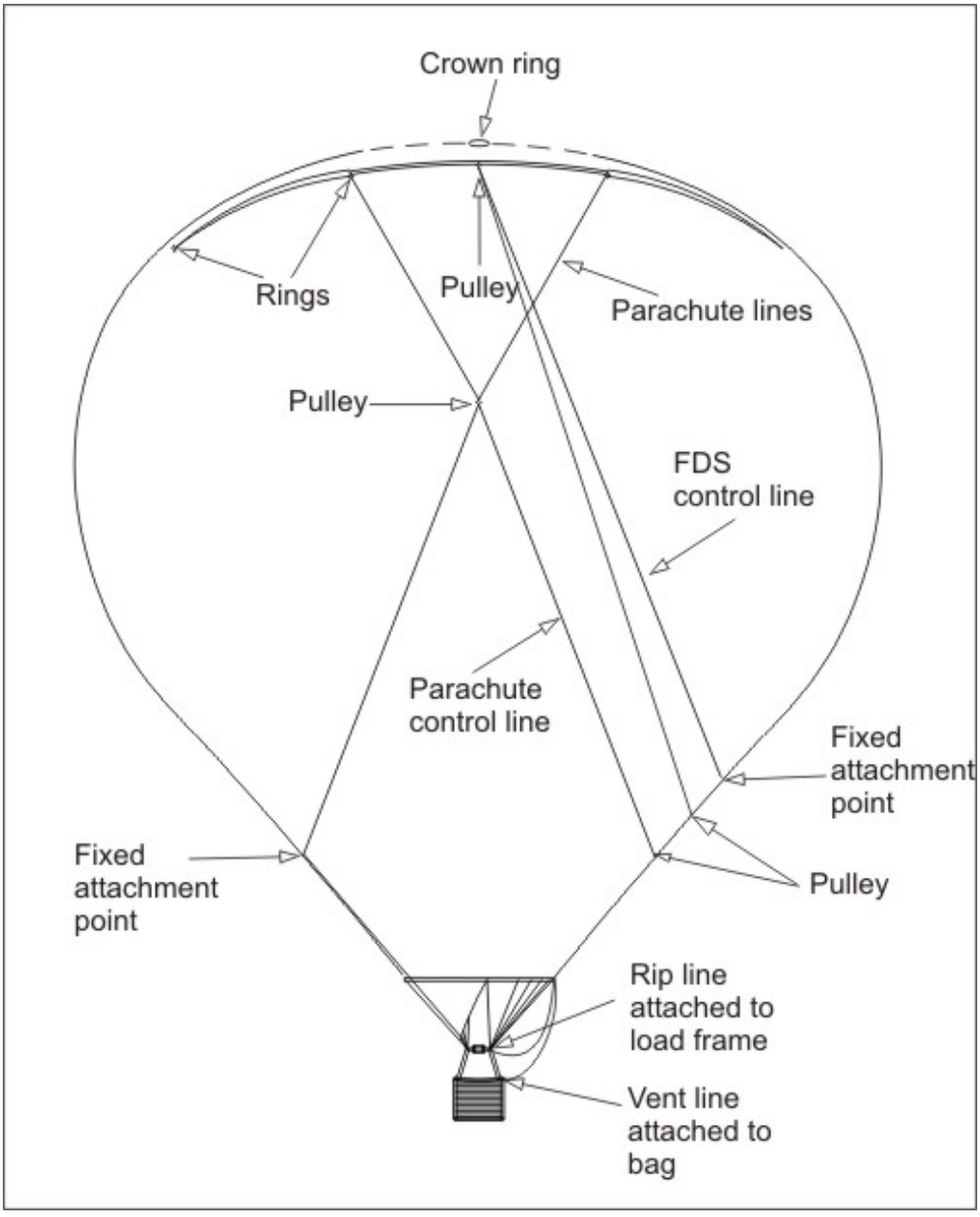
The burner is controlled by an On-Off valve mounted below the burner, and within easy reach of the pilot.

6.2.5.2 Parachute control



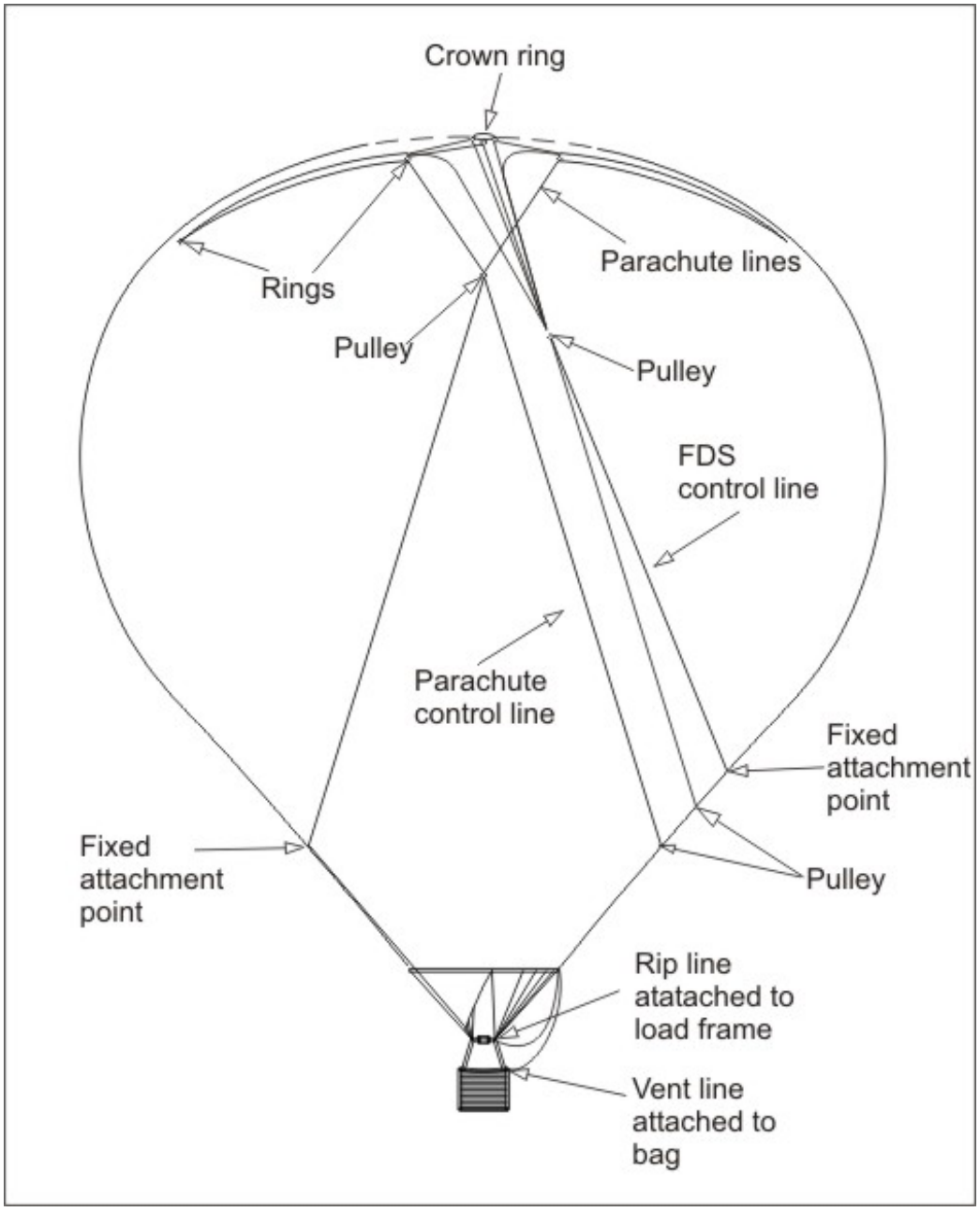
The parachute control line activates the parachute vent or valve. This can either vent off hot air or can totally deflate the envelope. This is the standard method of control on the majority of balloons. The parachute control line which is red (or red/white) polyester on the outside with a Kevlar inside, runs through a pulley inside the envelope to the parachute lines at a pulley and then back to a fixed point on the inside of the envelope. The pulleys reduce the effort required to open the parachute. By pulling the parachute rip line the parachute is opened. The parachute goes back in place when the line is released after a few seconds. Final deflation is achieved by pulling the line completely and holding in this position.

6.2.5.3 FDS Fast Deflating control



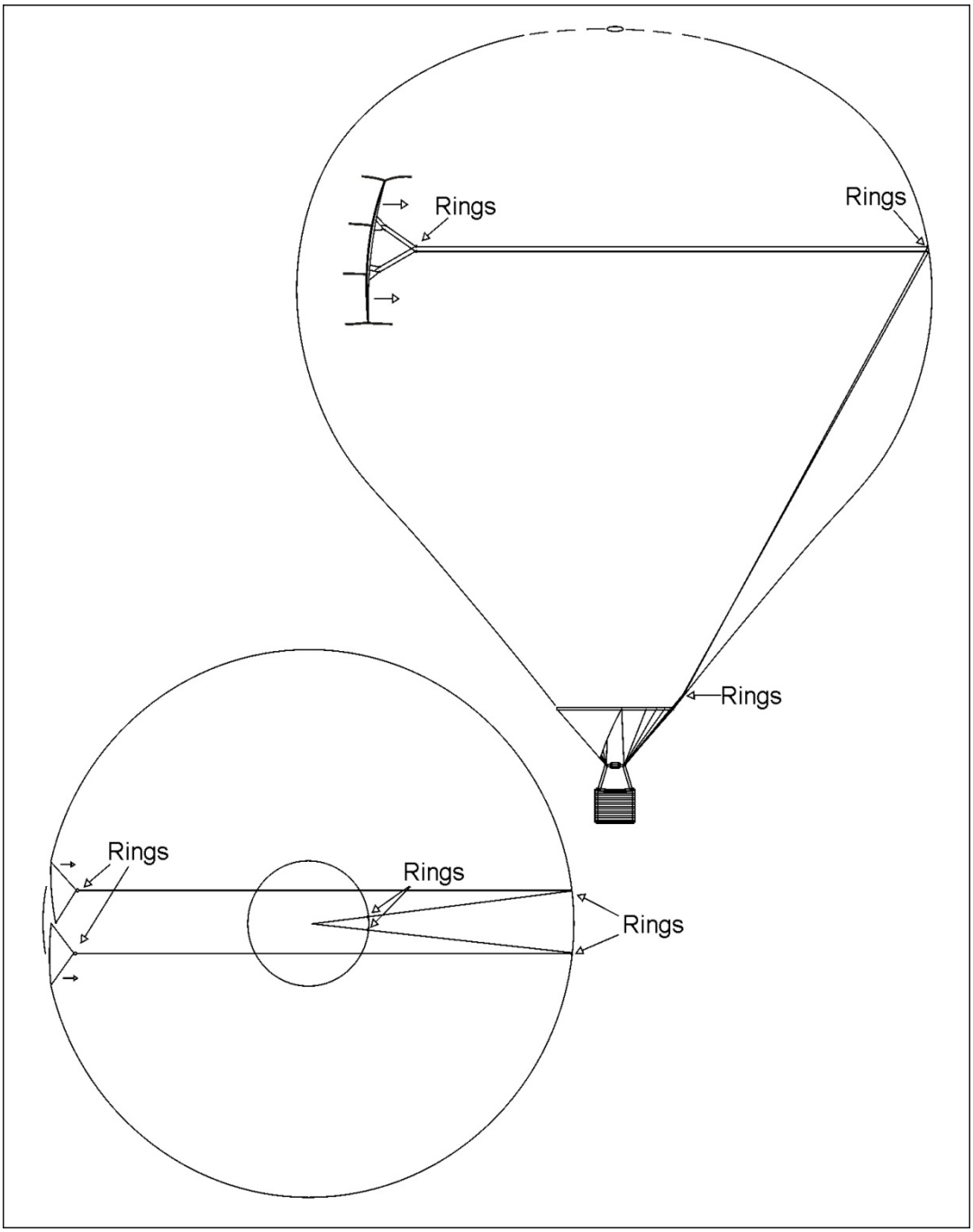
FDS system closed

The FDS system is a rapid deflation system, which incorporates a parachute venting system. The balloon can be vented and deflated as a parachute system by activating the white (or white/red) parachute line. The final rip line, which is red, pulls the centre of the parachute together creating a large opening for final deflation. This line must not be used for venting. The opening action of the red rip line (FDS) can be reversed by pulling on the white (or white/red) parachute (vent) line.



FDS System open

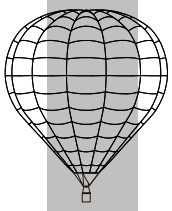
6.2.5.4 Rotation vent control



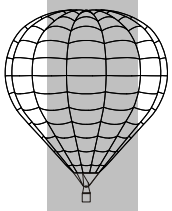
Rotation vents are fitted to balloons when it is necessary to rotate the balloon either to position the long side of the basket for landing or for general positioning of the balloon. This rotation is about the vertical axis. This is achieved by venting air through a panel about the equator of the balloon. Where fitted there are vents to turn either way. The blue line rotates clockwise and the black line anticlockwise. The panel reseals against its overlap panel when the rope is released.

6.3. Dimensions and weights

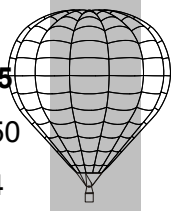
See following tables



	SERIES	H			
Type	**31**	**42**	**56**	**65**	**77**
Vol. (m3)	900	1200	1590	1840	2200
Number of gores	12	12	12	12	12
FAI class	AX4	AX5	AX6	AX7	AX7
Total height (m)	16.2	17.3	19.0	19.9	20.9
Standard basket	C0	C0	C2	C1	C1
Weight in Standard configuration. (Kg)	133	143	174	182	186
Envelope					
Height (m)	12.8	13.6	15.0	16.0	17.0
Diameter at the Equator (m)	12.5	13.8	15.5	16.3	17.3
Diameter at the Mouth (m)	2.1	2.8	3.6	3.6	3.6
Weight (Kg)	51.0	60.0	76.0	85.0	90.0
Parachute					
Diameter (m)	4.0	4.0	5.5	5.5	5.5



	SERIES S			
Type	**90**	**105**	**130**	**160**
Vol. (m3)	2550	2950	3680	4550
Number of gores	16	16	16	16
FAI class	AX8	AX8	AX9	AX10
Total height (m)	21.9	22.9	24.5	26.2
Standard basket	C10	C4	C4	C5
Weight in Standard configuration. (Kg)	207	238	255	347
Envelope				
Height (m)	18	18.9	20.5	22.1
Diameter at the Equator (m)	18.2	19.1	20.5	22.1
Diameter at the Mouth (m)	3.6	3.8	3.9	3.9
Weight (Kg)	94	103	120	142
Parachute				
Diameter (m)	6.0	6.0	6.5	6.5 FDS

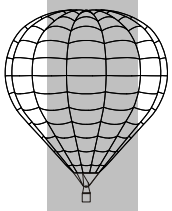


	SERIES V					
Type	**25**	**56**	**65**	**77**	**90**	**105**
Vol. (m3)	729	1590	1840	2180	2550	2950
Number of gores	24	24	24	24	24	24
FAI class	AX4	AX6	AX7	AX7	AX8	AX8
Total height (m)	14.6	19	19.9	20.9	21.9	22.9
Standard basket (1)	SOLO	C2	C1	C1	C10	C4
Weight in Standard configuration. (Kg)	140	177	186	190	209	243
Envelope						
Height (m)	11.5	15	16	17	18	18.9
Diameter at the Equator (m)	11.9	15.5	16	16.6	17.9	18.7
Diameter at the Mouth (m)	3.0	3.6	3.6	3.6	3.6	3.6
Weight (Kg)	40	79	85	89	96	108
Parachute						
Diameter (m)	4.0	5.5	5.5	5.5	6.0	6.0

(1) V-25 configuration not U.S. approved

SERIES M

Type	**42**	**56**	**56c**	**65**	**65c**	**77**	**77c**
Vol. (m3)	1200	1590	1590	1840	1840	2200	2200
Number of gores	24	24	24	24	24	24	24
FAI class	AX5	AX6	AX6	AX7	AX7	AX7	AX7
Total height(m)	17.5	18.8	21.5	20	22.3	21	24.0
Standard basket	C2	C2	C2	C1	C1	C1	C1
Weight in Standard configuration. (Kg)	152	176	176	187	187	189	195
Envelope							
Height (m)	14.4	14.8	17.3	16	18.0	17	19.8
Diameter at the Equator (m)	13.6	14.9	13.8	16	14.7	16.9	15.5
Diameter at the Mouth (m)	2.8	3.7	3.5	3.6	3.6	3.6	3.5
Weight (Kg)	65	76	80	86	90	88	94
Parachute							
Diameter (m)	4.0	5.5	5.5	5.5	5.5	5.5	5.5

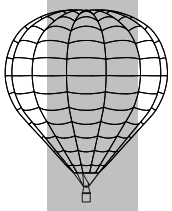


	SERIES M					
Type	**90**	**105**	**120**	**130**	**145**	**160**
Vol. (m3)	2550	2950	3400	3680	4105	4550
Number of gores	24	24	24	24	24	24
FAI class	AX8	AX8	AX9	AX9	AX10	AX10
Total height(m)	21.6	23.1	23.4	24.6	24.7	26.3
Standard basket	C10	C4	C4	C4	C6	C5
Weight in Standard configuration. (Kg)	213	245	255	265	277	360
Envelope						
Height (m)	17.6	19	19.6	20.5	21	22.1
Diameter at the Equator (m)	17.4	18.8	19.2	20.2	19.6	21.6
Diameter at the Mouth (m)	3.7	3.8	3,8	4	4	4
Weight (Kg)	98	110	120	133	142	155
Parachute						
Diameter (m)	6	6.0	6.5	6.5	6.5	6.5 FDS

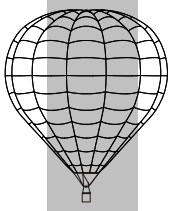
SERIES N

Type	**180**	**210**	**250**	**300**	**355**	**425**
Vol. (m3)	5100	6000	7000	8500	10000	12000
Number of gores	28	28	28	28	28	28
FAI class	AX10	AX10	AX11	AX11	AX12	AX12
Total height(m)	27.3	28.9	30.3	32.4	33.3	35.5
Standard basket	C5	C5	C8	C8	C11	C11
Weight in Standard configuration. (Kg)	382	407	445	472	580	635
Envelope						
Height (m)	23	24.4	25.5	27.2	29.0	31.2
Diameter at the Equator (m)	22.5	23.8	24.9	26.6	27.5	29.5
Diameter at the Mouth (m)	4	4	4	4	4	4
Weight (Kg)	168	186	209	236	260	315
Parachute						
Diameter (m)	6.5 FDS	6.5 FDS	6.5 FDS	7.5 FDS	7.5 FDS	7.5 FDS

SERIES Z



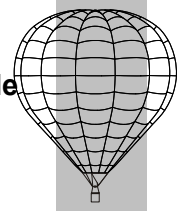
Type	**90**
Vol. (m3)	2550
Number of gores	16
FAI class	AX8
Total height(m)	21.9
Standard basket	C10
Weight in Standard configuration. (Kg)	210
Envelope	
Height (m)	18
Diameter at the Equator (m)	18.2
Diameter at the Mouth (m)	3.6
Weight (Kg)	94
Parachute	
Diameter (m)	6.0



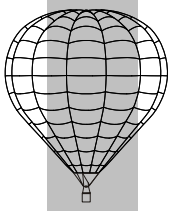
SERIES T

Type	**150**	**180**	**210**
Vol. (m3)	4245	5100	6000
Number of gores	20	20	20
FAI class	AX10	AX10	AX10
Total height(m)	25,0	27.3	28,6
Standard basket	C7	C5	C8
Weight in Standard configuration. (Kg)	350	386	399
Envelope			
Height (m)	21,23	22,7	24,3
Diameter at the Equator (m)	20,95	22,2	24,3
Diameter at the Mouth (m)	4	4	4
Weight (Kg)	155	172	180
Parachute			
Diameter (m)	6.5 FDS	6.5 FDS	6.5 FDS

BURNER AND FRAME



Model MK-2	Simple	Double	Triple	Quadruple
Diameter (m)	0.235	0.235	0.235	
D jets (mm)	2 á 3	2 á 3	2 á 3	
Total Mass (Kg)	14	19	25	
Model MK-2 Super				
Diameter (m)	0.235	0.235	0.235	0.235
D jets(mm)	1.3-1.7	1.3-1.7	1.3-1.7	1.3-1.7
Total Mass (kg)	15	21	28	36
Model MK-10				
Diameter (m)	0.200	0.200	0.200	0.200
Diffuser (mm)	1-1.5	1-1.5	1-1.5	1-1.5
Total Mass (kg)	15	21	28	35
Model MK-21				
Diameter (m)	0.200	0.200	0.200	0.200
Diffuser (mm)	1.0-1.6	1.0-1.6	1.0-1.6	1.0-1.6
Total Mass (kg)	17	24	34	43
Model PowerPlus BMK-008				
Diameter (m)	0.188	0.188		
Diffuser (mm)	1.0	1.0		
Total Mass (kg)	12	21		
Model PowerPlus Maxi BMK-050				
Diameter (m)		0.208	0.208	0.208
Diffuser (mm)		1.0	1.0	1.0
Total Mass (kg)		20	30	41



BASKET

Model	C-0	C-1	C-2	C-3	C-4	C-5	C-6
Length (m)	0.7	1.2	1	1.3	1.6	2.2	1.8
Width (m)	0.8	1	1	1.1	1.2	1.4	1.3
Height (m)	1.06	1.10	1.10	1.10	1.15	1.15	1.15
Mass (Kg)	45	56	50	76	95	160	106

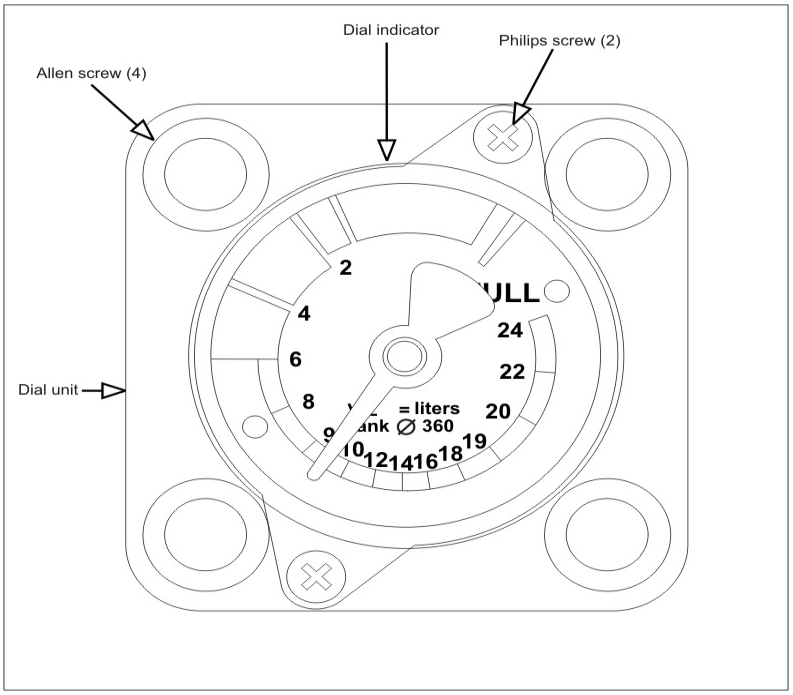
Model	C-7	C-8	C-9	C-10	C-11	C-12
Length (m)	2.0	2.6	3	1.45	3.5	4.25±0.25
Width (m)	1.4	1.5	1.6	1.15	1.7	1.6±0.1
Height (m)	1.15	1.15	1.15	1.15	1.15	1.15
Mass (Kg)	122	175	250	85	340	360

FUEL CYLINDERS

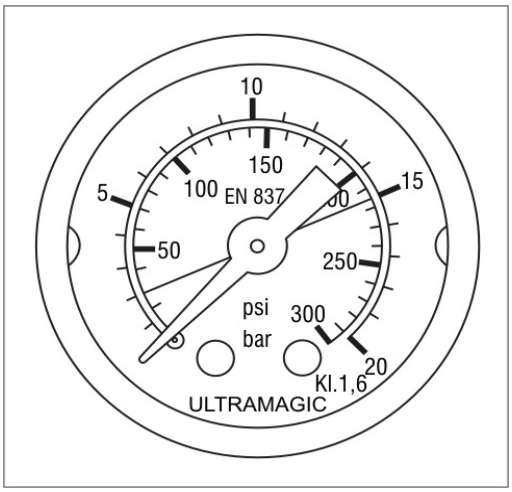
Model	43-U4	M 20 M-20D	M 30 M-30D	M 40 M-40D	T-25
Material	Al	Stainless. Steel	Stainless. Steel	Stainless. Steel	Ti
Height (m)	0.87	0.85	0.92	1.07	0.95
Diameter (m)	0.30	0.30	0.35	0.38	0.33
Empty Mass (Kg)	14	15	20	24	11.5
Full Mass (Kg)	34	35	50	64	36.5

6.4 Monitoring Instruments

6.4.1 Fuel System

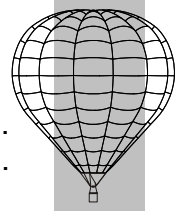


The fuel tanks have gauges in the top showing the percentage of fuel remaining in the tank, below 25%.



Mk21 pressure gauge

A pressure gauge on the burner indicates the input pressure to the burner.



6.4.2 Internal temperature

A soldered link attached to a small flag is located in the upper part of the balloon. Above 125° C the solder melts, releasing the flag, indicating overheating. Alternatively the flag may be held by a bimetallic clamp, which opens at 125° C.

A temperature sensor (optional) can be installed on inside top of the envelope that transmits the signal to the indicator on the basket.

A label is placed inside top of parachute, which colour changes progressively as the temperature increases.

6.4.3 Flight Instruments.

The requirements for the carrying of flight instruments vary from country to country. The carriage of an altimeter and rate of climb indicator is recommended. In some countries a thermister is also required for measuring internal envelope temperature during the flight. See Appendix B for a list of instruments recommended by Ultramagic S.A.

6.5 Bonanno Quick Release

This is a device used to restrain the balloon during inflation and preparation for take off. Its use is recommended during windy conditions to prevent the balloon taking off prematurely or dragging across the ground. However it must not be used to tether the balloon.

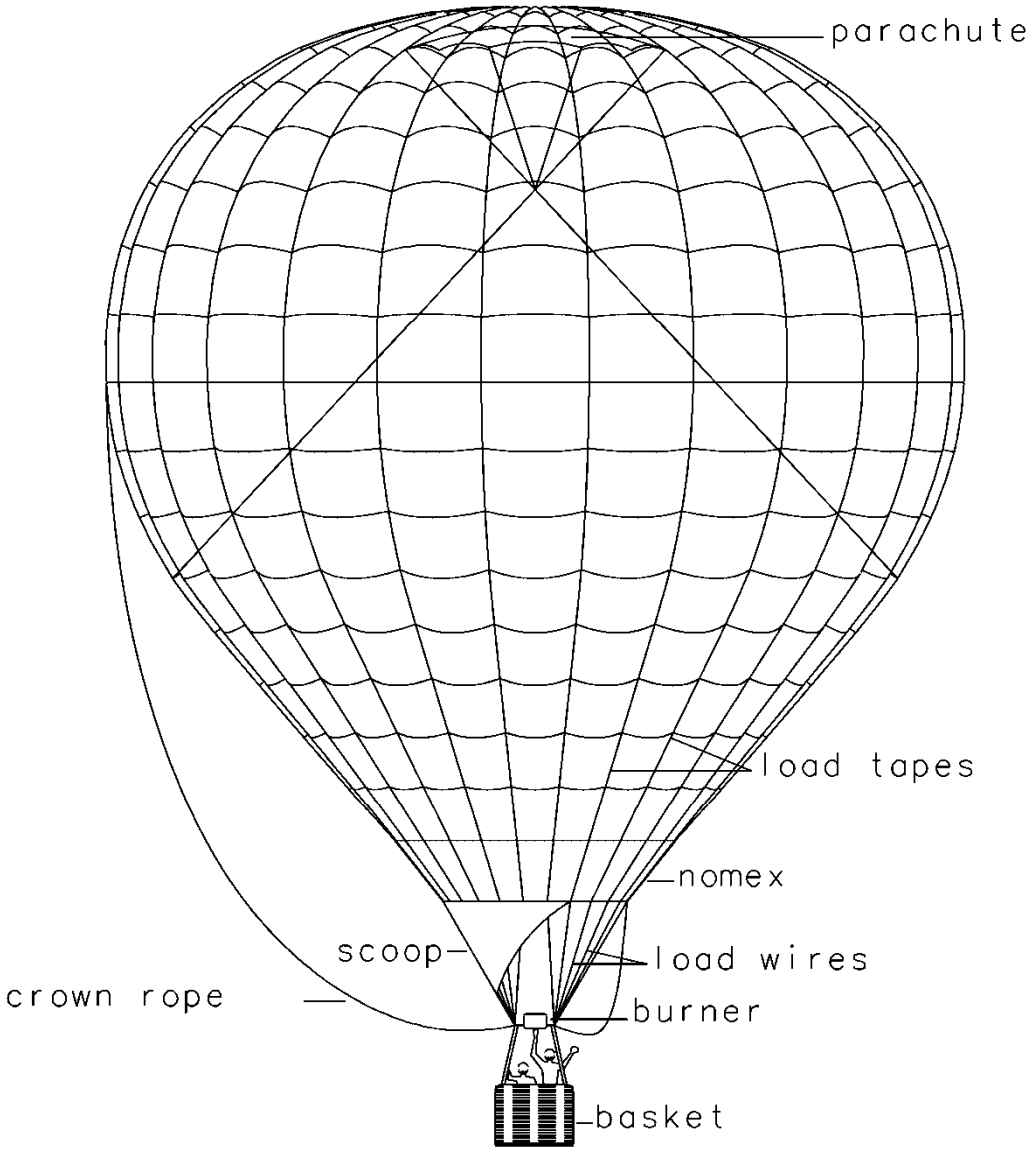
The release mechanism is a form of latch, which is attached to the load frame by means of Karabiners and can also be used with wire, rope or webbing bridles. The restraint rope is fitted into the latch and at the other end to a secure point or braked vehicle.

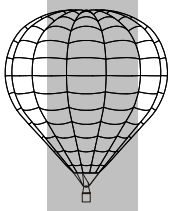
The Bonnano release and all associated restraint equipment must be regularly inspected for damage and deterioration.

6.6 Pilot Restraint Harness

This harness is designed to secure the pilot in position during hard landings. The harness fits around the pilot's waist and is fixed to a restraint harness attachment point on the basket floor. The harness has a special quick release buckle to enable the pilot to remove it in an emergency.

6.7 General illustration





SECTION 7

BALLOON MAINTENANCE HANDLING AND CARE

7.1 Introduction

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

7.2 Inspection periods

Refer to the Ultramagic Maintenance Manual for inspection periods

7.3 Alterations or repairs

No alterations to the balloon may be undertaken without first contacting the appropriate airworthiness authority.

WARNING: Any alterations to the balloon without authority approval will invalidate the Certificate of Airworthiness.

Refer to the Ultramagic Maintenance Manual for all repair procedures.

7.4 Ground Handling and Transportation

When not being used the envelope must always be packed for transportation in its protective bag. This will help prevent the fabric from being damaged by sharp or abrasive objects. The envelope in its bag should be prevented from getting wet.

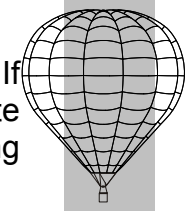
The burner system must be disconnected from the fuel cylinders and all fuel must be vented from the lines.

The basket and burner system must always be de-rigged when being transported. Failure to do so could increase wear on the structure of the support system and load frame.

Whenever possible, fuel cylinders should be transported in a vertical position. Failure to do so may prevent the correct function of the pressure relief valve.

All equipment should be well secured in its means of transport to ensure minimum movement and should also be protected from sharp or abrasive surfaces.

Should the balloon equipment be transported by air, sea or rail it is imperative that the service provider is contacted prior to travel. Each operator has varying requirements relating to the transportation of fuel cylinders, inflation fans and fire extinguishers and these must be planned for and adhered to.



7.5 Storage

The complete balloon system should always be stored in a clean dry place. If stored in an outside utility building e.g. garage or barn, then ensure that adequate protection is in place against possible damage by vermin especially during long periods of storage.

7.5.1 Envelope

The envelope must not be stored wet or damp as the moisture can cause fabric deterioration caused by mould or mildew. Should the envelope have to be packed wet because of weather conditions then the following must be carried out within a few days.

1. Spread the envelope out in a clean dry area.
2. Cold inflate the envelope with an inflation fan and turn the envelope over until completely dry.
3. Ensure that the storage bag is dry before packing the envelope.

CAUTION: Hot inflating a very wet envelope may cause damage to the fabric.

7.5.2 Basket

The basket should always be stored in a clean and dry condition. All mud should be removed as failure to do so may cause damage over a period of time to the wicker, floor and hide. Always use clean water and allow to dry naturally as fast drying may make the wicker brittle and weaken its integrity.

7.5.3 Burner

The burner should always be stored in a clean and dry condition. Ensure that the hose connectors are protected from ingress of dirt. If stored in an outside building it is advisable to cover the burner to prevent foreign matter getting into the jets.

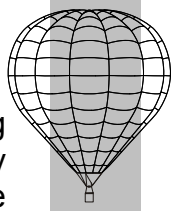
7.5.4 Cylinders

Cylinders should always be stored vertically in a clean and dry condition. This must be a secure place and local regulations must be adhered to.

CAUTION: The valves must always be at the top in their normal operating position. Failure to do so will affect the correct operation of the Pressure Relief Valve (PRV)

CAUTION: Precautions should be taken to ensure that the cylinders do not become over-pressurised. Prevent the cylinders from long periods of direct sunlight or heating.

CAUTION: Do not store cylinders which have been nitrogen pressurised for a long period of time. Vent off the pressure in a safe area if the cylinders are not to be used.



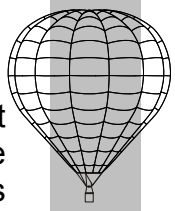
7.6 Cleaning and Care

The envelope should be cleaned using clean water. Avoid the use of strong detergents as these could damage the fabric. A gentle non-detergent soap may be used as long as it is rinsed clean with fresh water. Always ensure that the envelope is dry before packing.

The basket, burner and cylinders may be cleaned using clean water. Always ensure that all systems are dry before storing.

Refer to Ultramagic Maintenance Manual for further cleaning instructions.

SECTION 8: OTHER MANUFACTURERS EQUIPMENT



Ultramagic envelopes are approved for use with other manufacturers equipment as listed in the Supplements below. There is a uniformity of interface between the Ultramagic envelope ranges and the load frames, basket, burners and cylinders listed which allows this use. Ultramagic allow this use based on a number of requirements having been met.

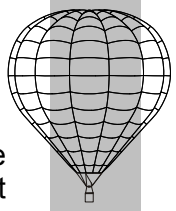
8.1 REQUIREMENTS

To establish compatibility of another basket, burner and tanks from other manufacturers with an Ultramagic envelope, the following conditions must have been met:

1) The equipment must be identifiable as a FAA, BCAR, LBA or other authority accepted by the EASA, type certified vehicle with the applicable Type Certificate Data Sheet.
2) Other manufacturer's equipment must accomplish all requirements and limitations expressed in the Ultramagic Flight Manual including the supplements.
3) The Maintenance Manual for each part remains applicable.
4) Other manufacturer's equipment must be on the lists of the Supplements below.
5) Weight limitations on the complete balloon are based on the ULTRAMAGIC envelope and also on the basket used, if detailed by the manufacturer, and will be limited by the highest restriction.
6) Basket size (length x width = area) must fall within minimum and maximum limits as specified by the manufacturer.
7) Burner Type (Single, Double, Triple or Quadruple) and operation must be accomplished as defined by the manufacturer.
8) All burner frames with 4 rigging points must be attached with 4 karabiners up to size 180, and 8 or 12 karabiners on bigger envelopes (with the exception of some Balloon Works and Lindstrand equipment –see supplement 19-).

8.2 SUPPLEMENTS

Supplement number	Manufacturer	Last update
4	Kubicek Balloons	Rev. 18
6	Schroeder Fire Balloons	Rev. 18
12	Fantasy Balloons	Rev. 14
13	Raven – Aerostar Balloons	Rev. 14
19	Cameron Balloons Thunder & Colt Balloons Lindstrand Balloons Balloon Works Sky Balloons	Rev. 18
24	Ballons Chaize	Rev. 18



SECTION 9: SUPPLEMENTS

9.1 Introduction

This section contains the appropriate supplements necessary to safely operate the balloon when equipped with various optional systems, equipment and operations not included in the Flight Manual.

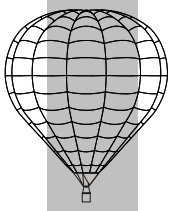
9.2 List of Supplements

The following list indicates the Flight manual supplements applicable to the balloon for which this manual is issued. All supplements issued are listed in the following index. Those applicable are ticked and copies of the applicable supplements are included.
All information given in the applicable supplements must be adhered to in addition to information given in the other sections of the Flight Manual.

Balloon Serial Number	Balloon Type	Balloon Registration

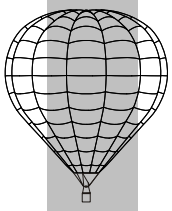
Total number of Flight Manual Supplements applicable …….

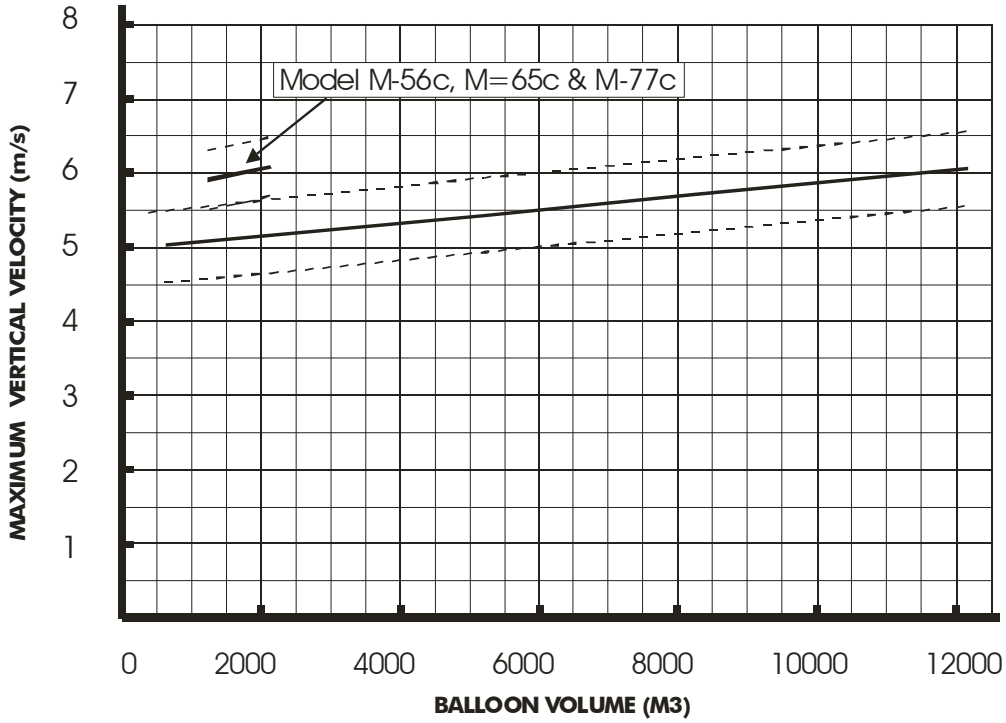
Supplement Number	Description	Issue		Applicable
		Number	Date	
1	Tethered Flying	2	23-Jul-08	
2	Night Flying	2	23-Jul-08	
3	UK Passenger Transport Category	2	23-Jul-08	
4	Kubicek Bottom Ends	3	20-Jan-12	
5	MK-21 Electric Burner	2	23-Jul-08	
6	Schroeder Fire Bottom Ends	5	20-Jan-12	
7	Special Shape F-25 “Futbol”	2	23-Jul-08	
8	Special Shape “Corazon” F-26	3	08-Sep-09	
9	Solo / Duo	2	23-Jul-08	
10	Disabled Passenger Basket	2	23-Jul-08	
11	Dropping Parachutist	2	23-Jul-08	
12	Fantasy Balloons	2	23-Jul-08	
13	Raven – Aerostar Bottom Ends	3	23-Jul-08	
14	MK-21 Cruise Control Valve	2	23-Jul-08	
15	MK-21 Burner Butane Fuel	3	23-Jul-08	
16	Central Gimbal Burner Frame	2	23-Jul-08	
17	Powerplus BMK-008 Burner	3	23-Jul-08	
18	Powerplus Maxi BMK-050 Burner	3	23-Jul-08	
19	Other Manufacturers Equipment	5	20-Jan-12	
20	Units Conversion Chart	2	23-Jul-08	
21	MK-21 Burner Vapour Pilot Light	2	23-Jul-08	
22	Old Special Shapes	3	08-Mar-13	
23	Special Shape F-29 “Movistar”	2	27-Jan-09	
24	Chaize Bottom Ends	1	20-Jan-12	
25	Special Shapes U.S. approved	1	23-Jul-08	
26	Special Shape F-30 “Egg”	2	08-Sep-09	
27	Special Shape F-31 “Mazorcas”	1	08-Sep-09	
28	Special Shape F-32 “Beirao”	1	08-Sep-09	
34	N-500 Envelope / C-14 Basket	2	20-Jan-12	
36	Special Shape F-33 “Pharox”	1	08-Sep-09	
37	FuelTek Fuel Control System	1	19-Jul-11	
38	“Tekno” Envelopes	4	08-Mar-13	
39	“Tekno” Baskets	5	08-Mar-13	
42	Special Shape F-34 “Metten”	1	20-Jan-12	

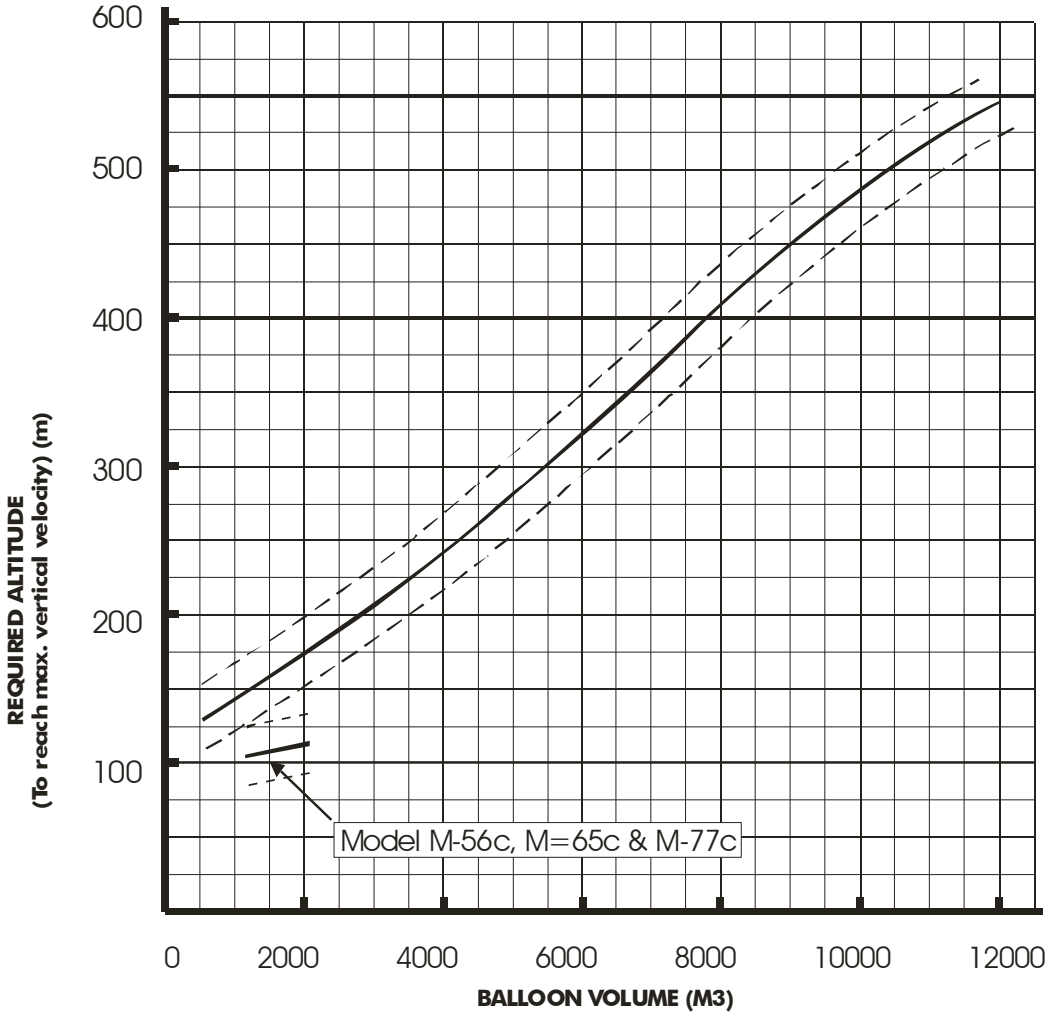


APPENDIX

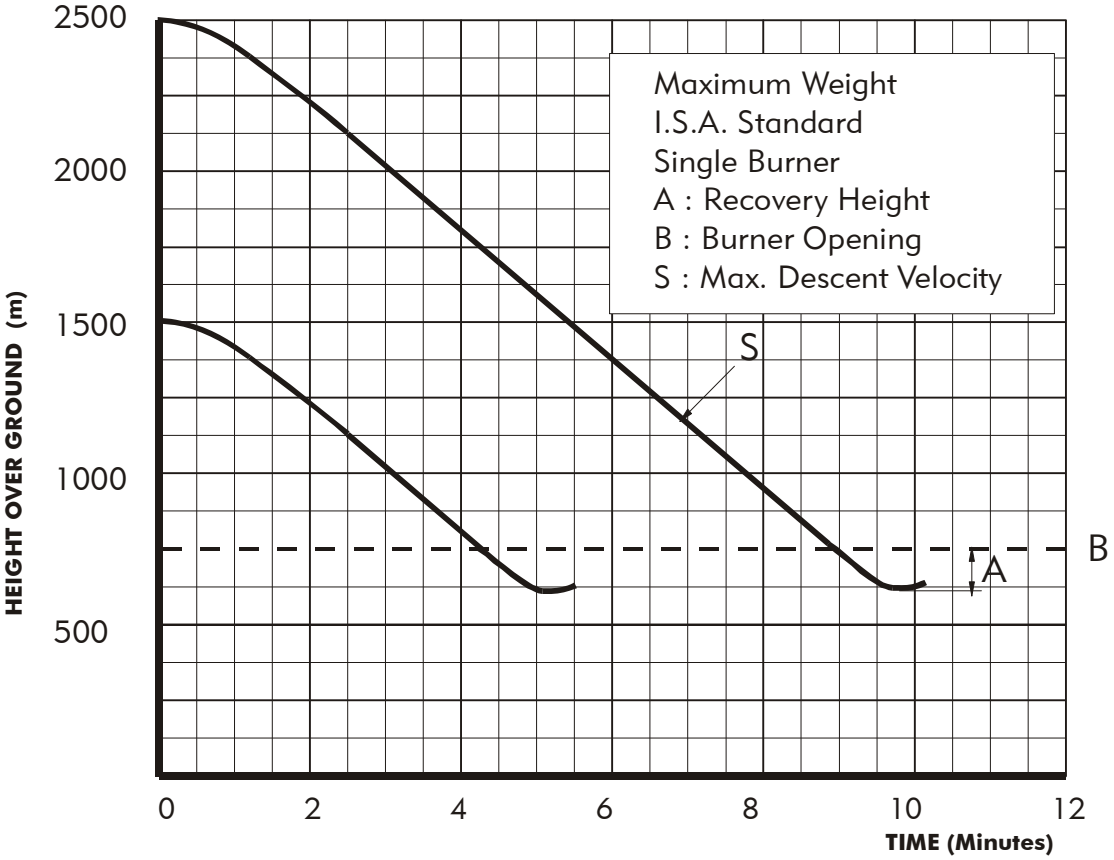
A. Vertical Velocities and Altitude recovery (Metric units)



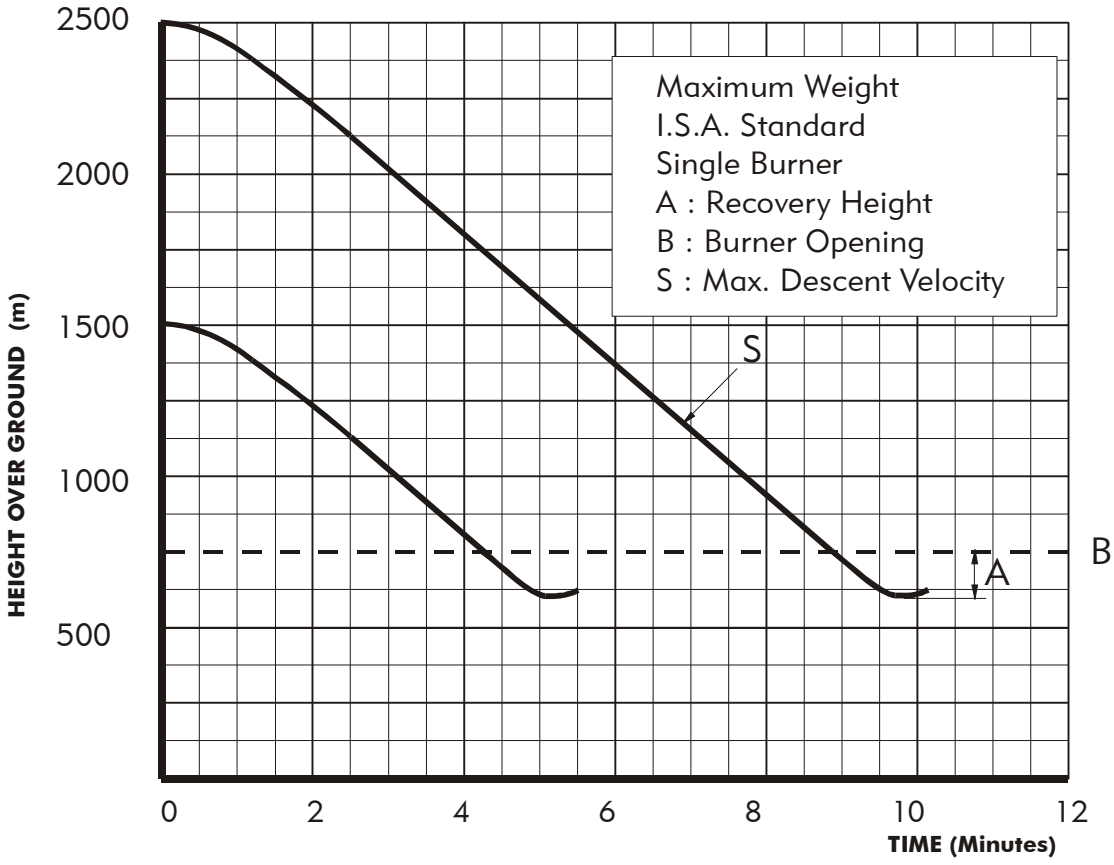

MAXIMUM VERTICAL VELOCITY (m/s)
8
7
6
5
4
3
2
1
Model M-56c, M=65c & M-77c
0
2000
4000
6000
8000
10000
12000
BALLOON VOLUME (M3)


REQUIRED ALTITUDE
(To reach max. vertical velocity) (m)
600
500
400
300
200
100
Model M-56c, M=65c & M-77c
0
2000
4000
6000
8000
10000
12000
BALLOON VOLUME (M3)

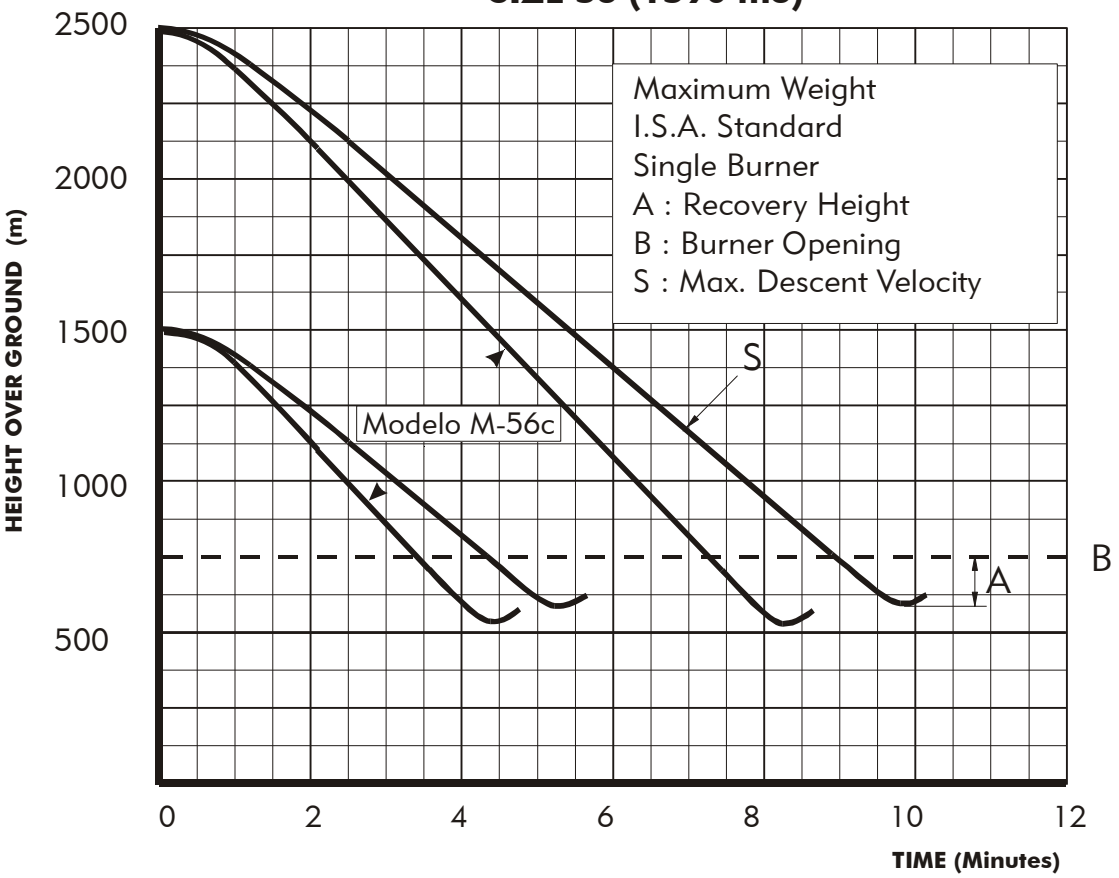
SIZE 31 (900 m3)



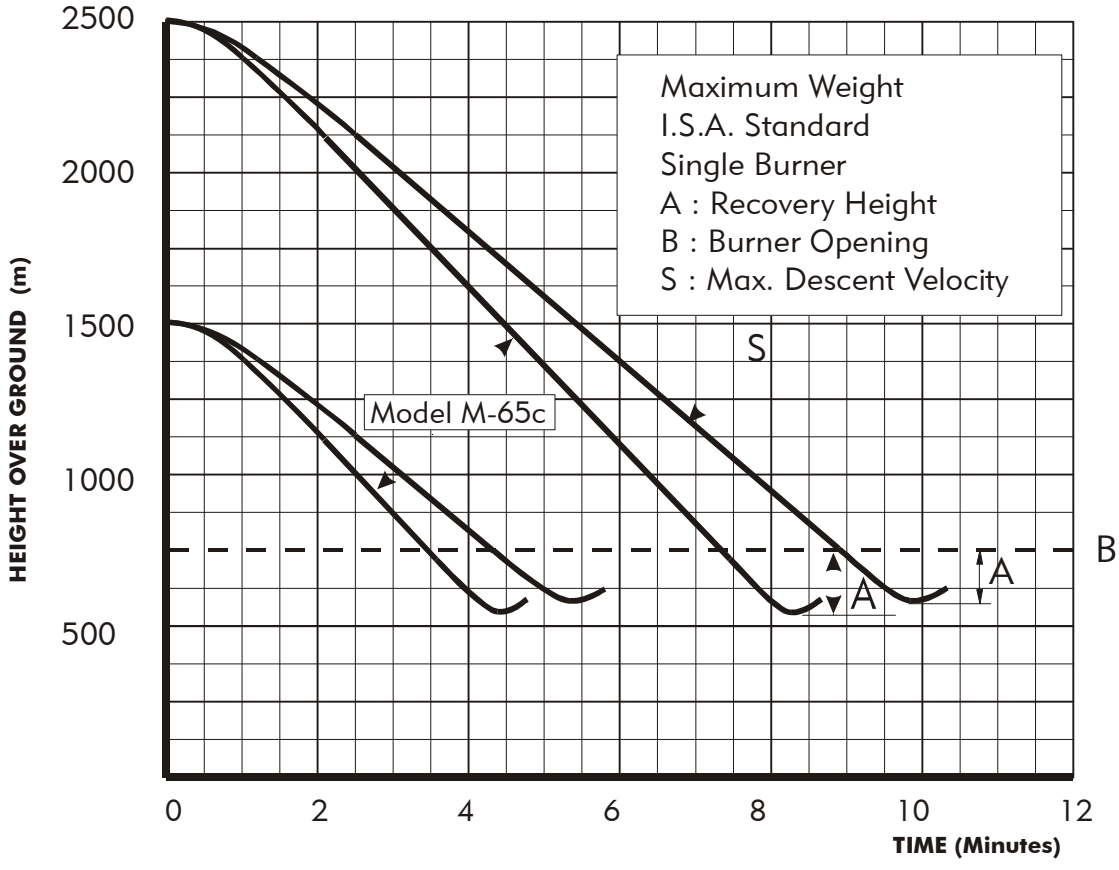
SIZE 42 (1200 m3)



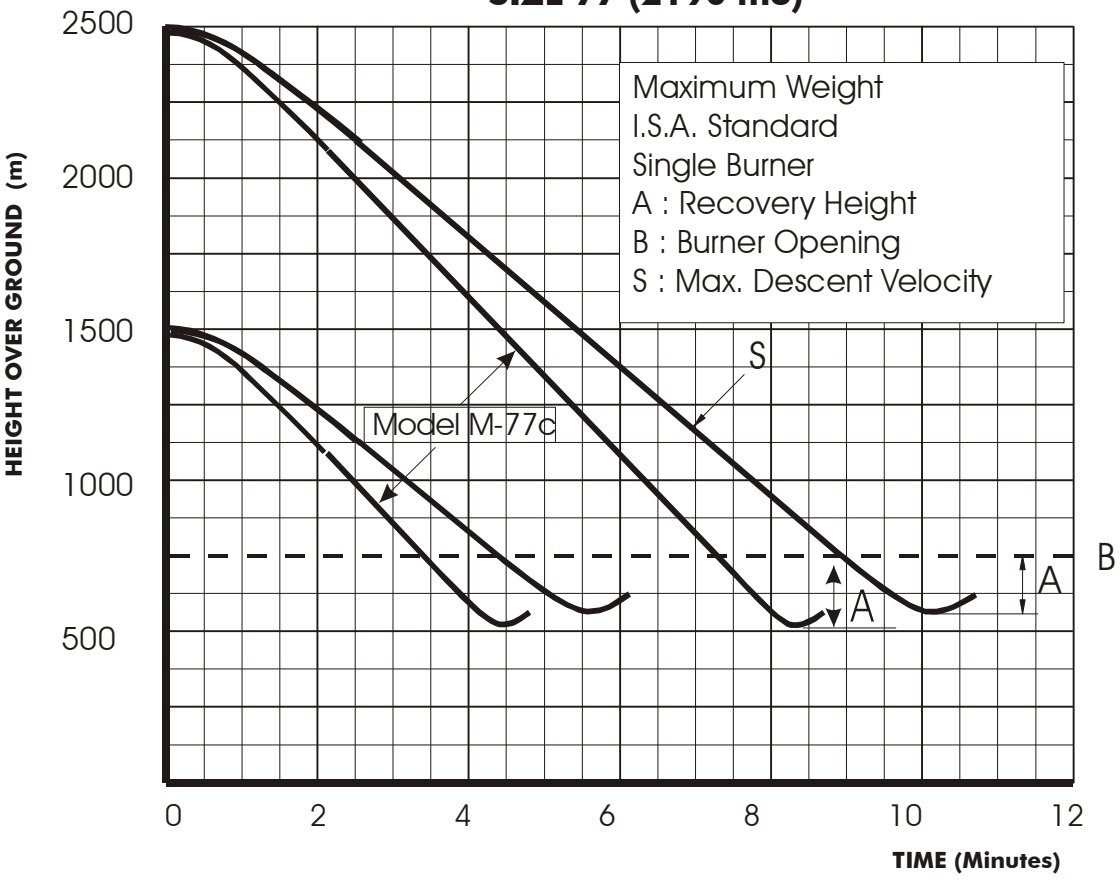
SIZE 56 (1590 m3)



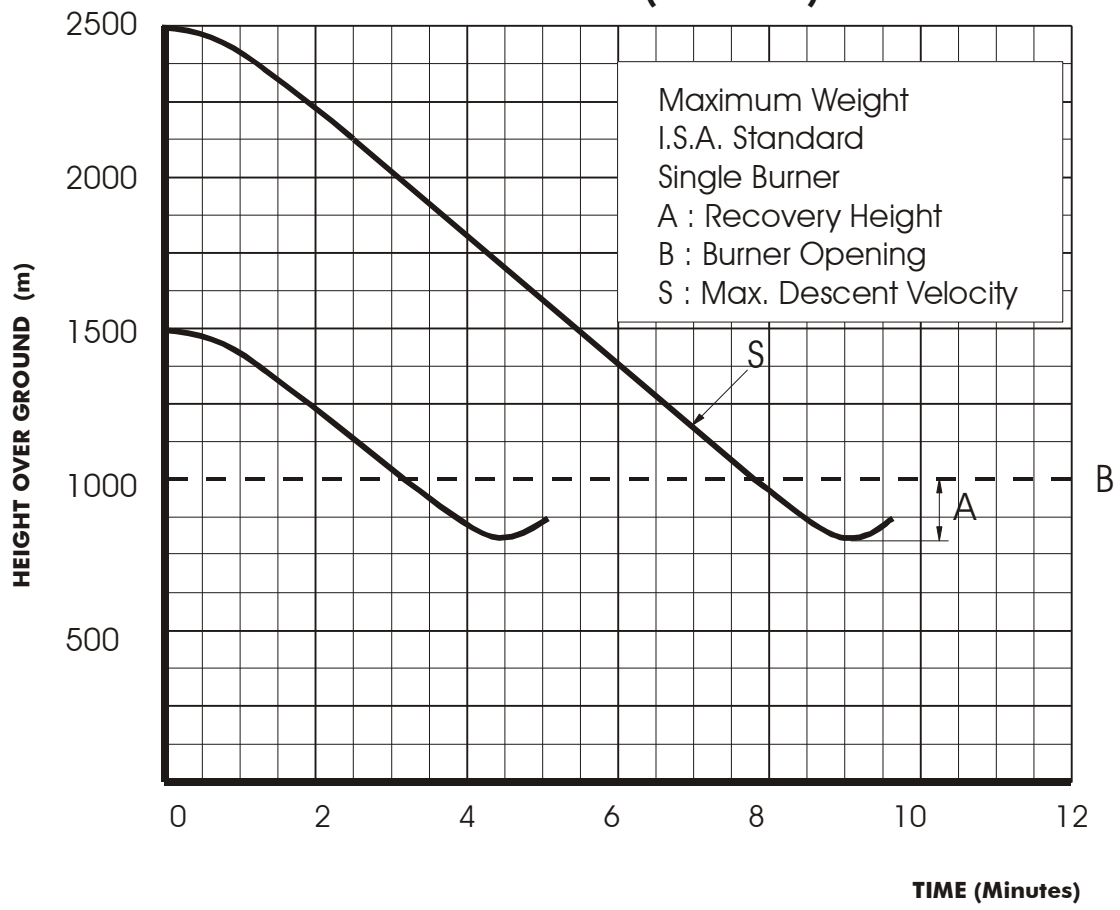
SIZE 65 (1840 m3)

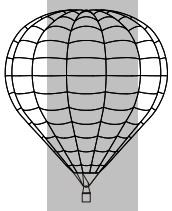


SIZE 77 (2190 m3)



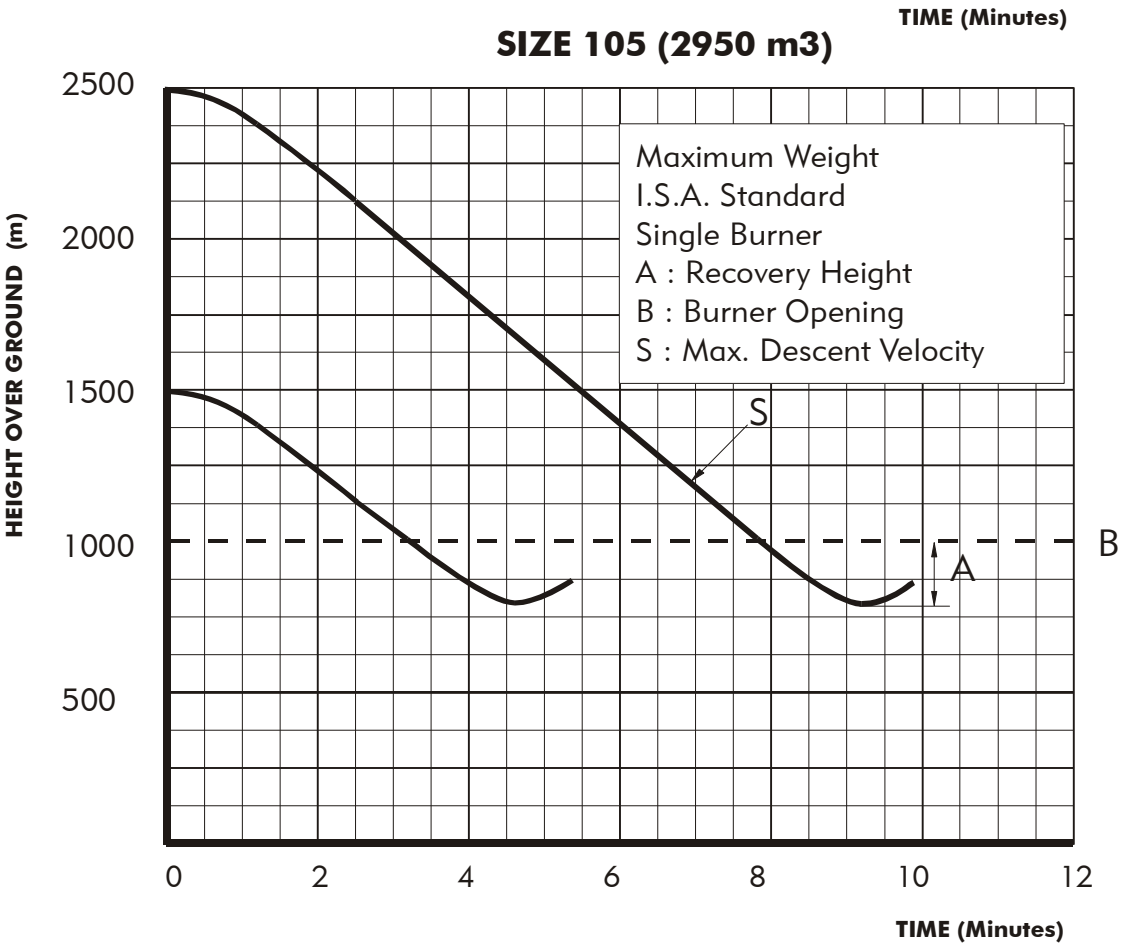
SIZE 90 (2550 m3)



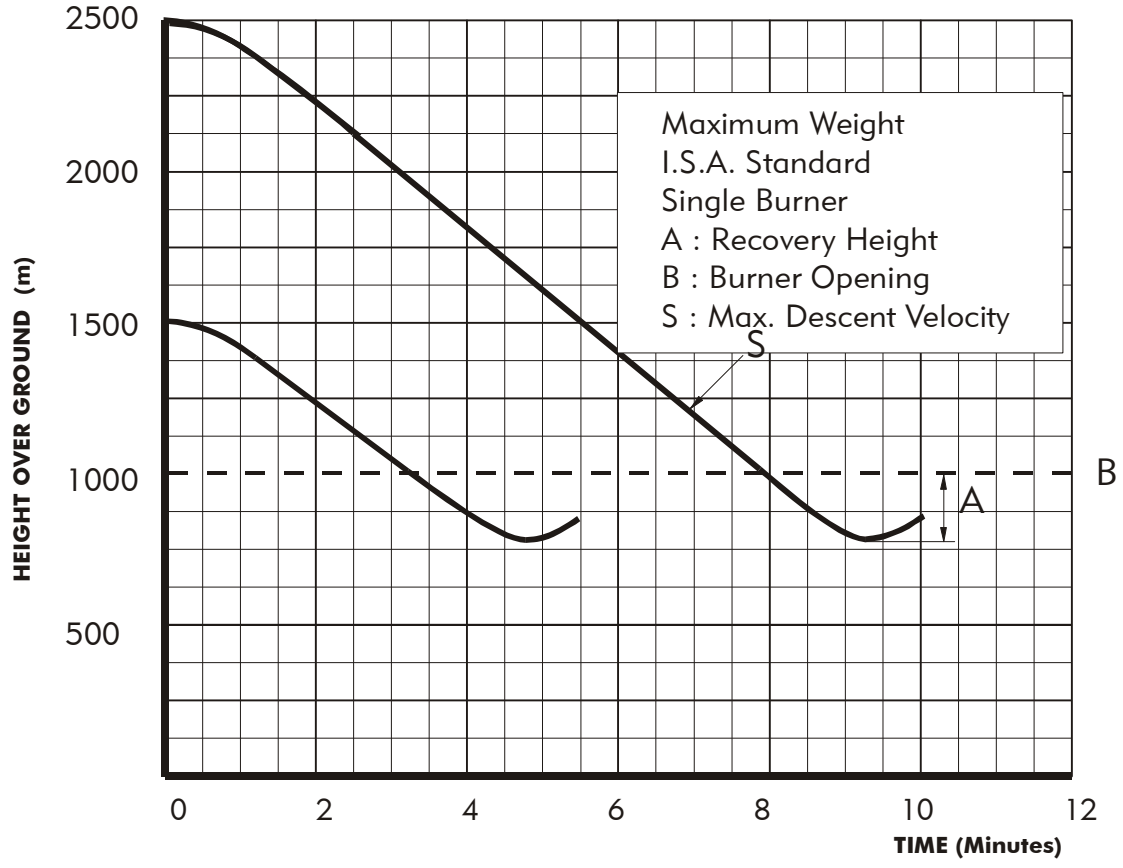


A VERTICAL VELOCITIES

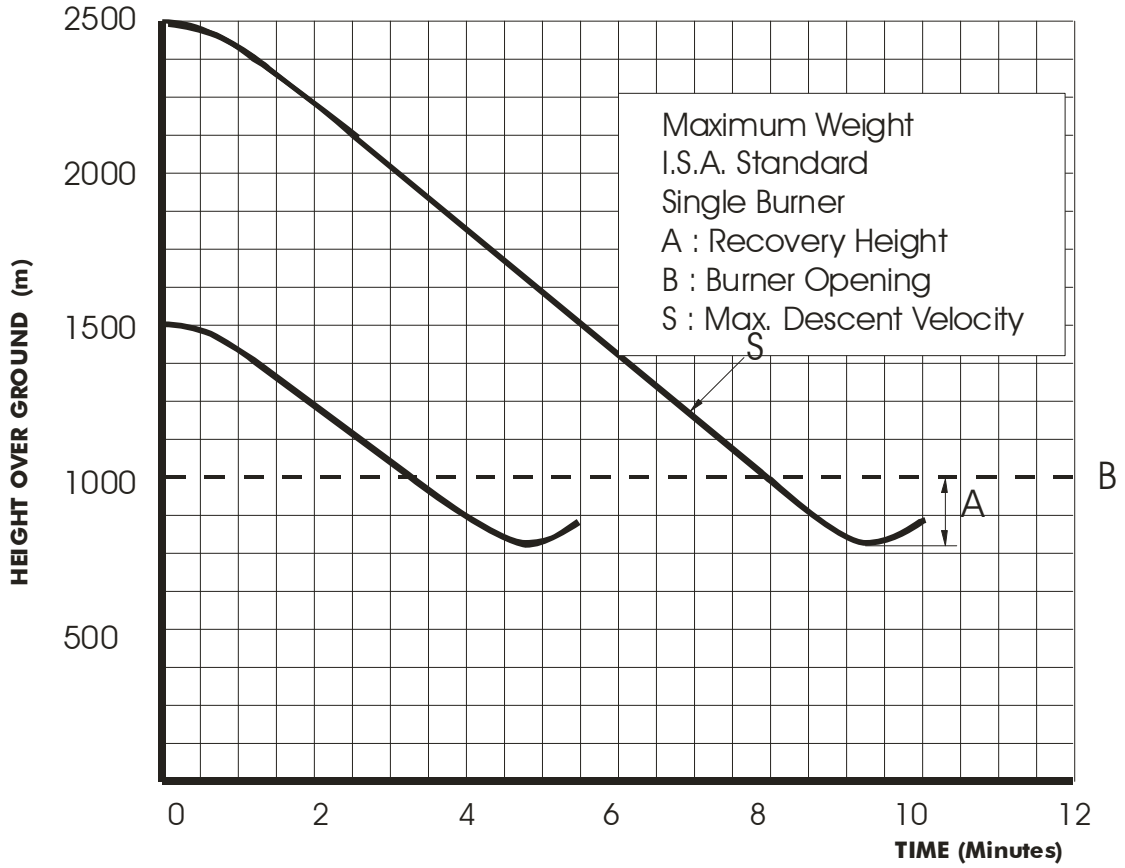
SIZE 105 (2950 m3)



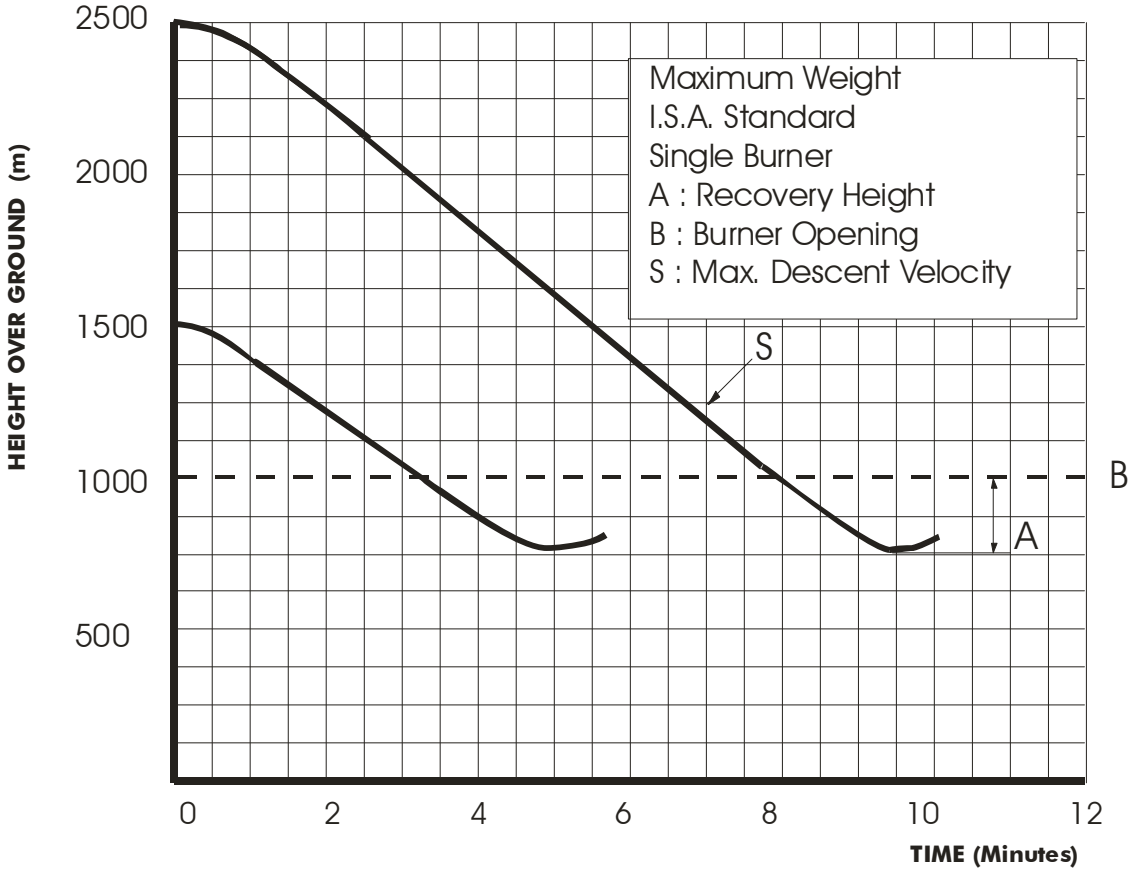
SIZE 120 (3400 m3)



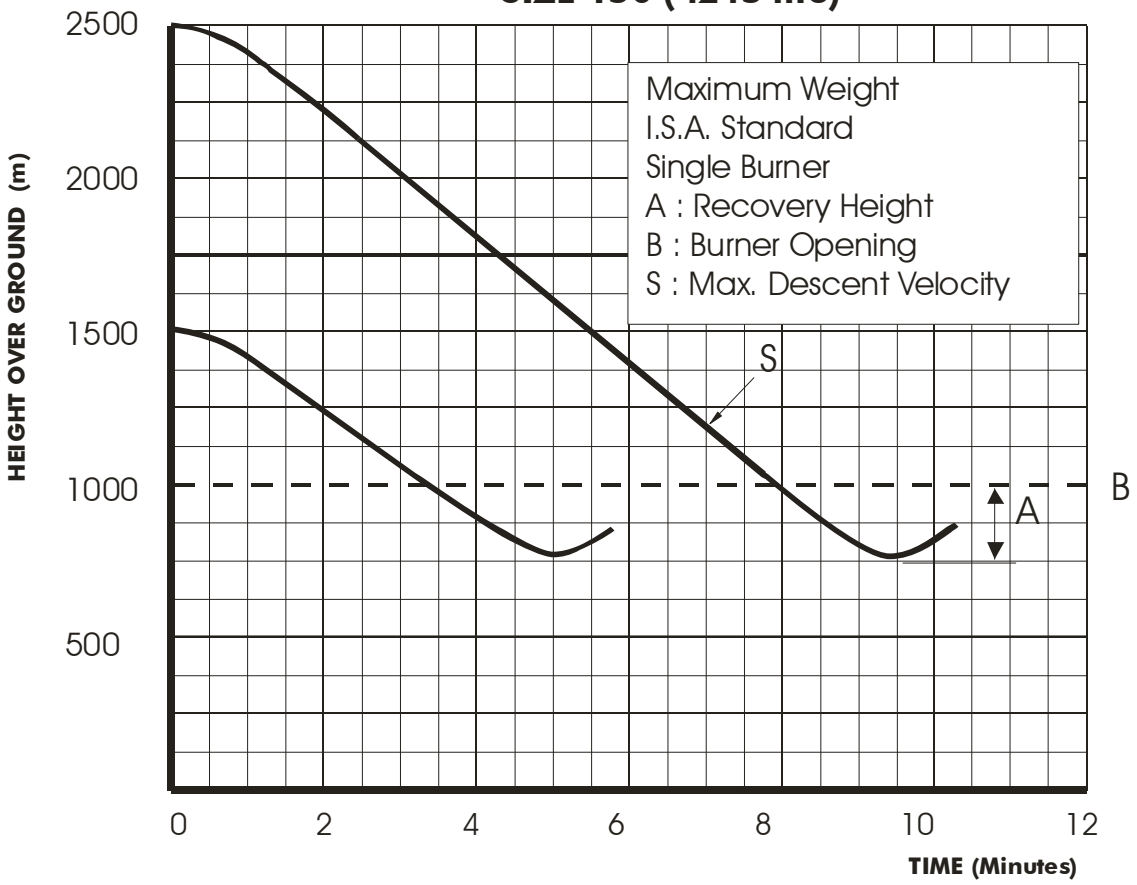
SIZE 130 (3680 m3)



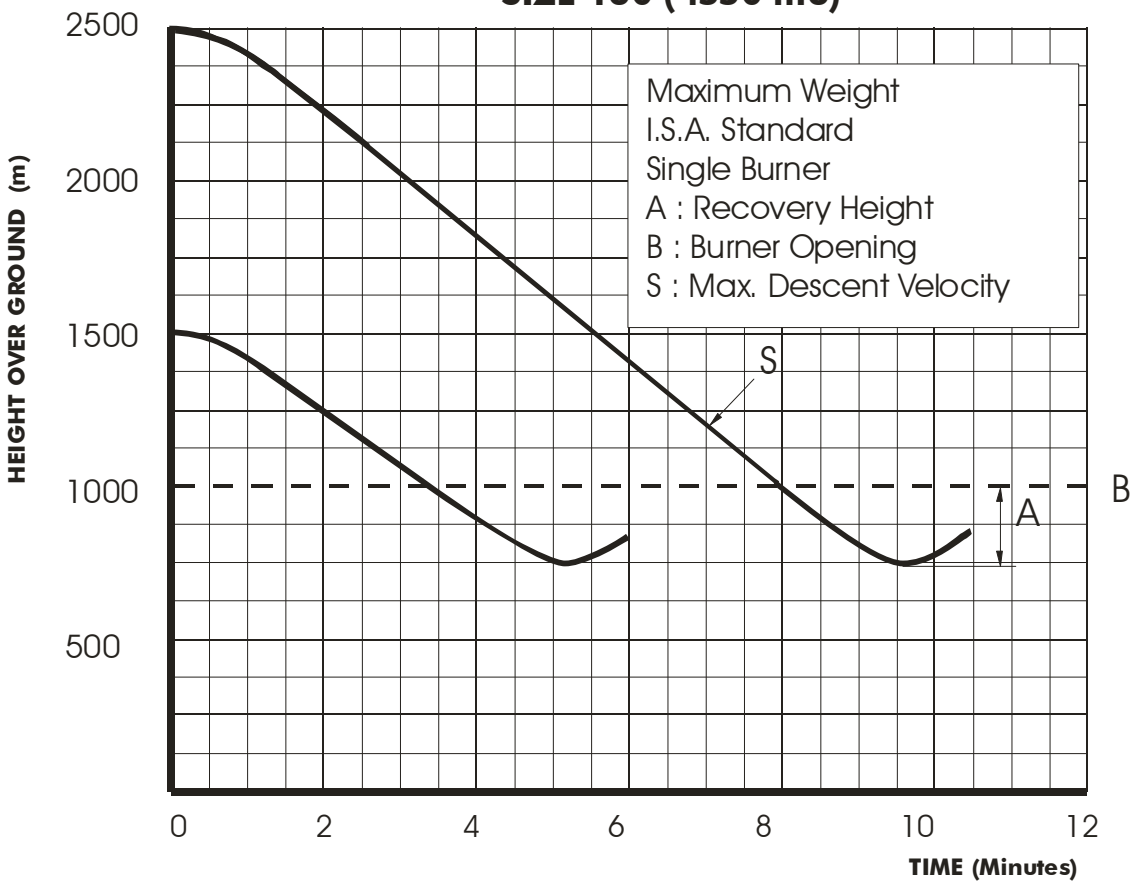
SIZE 145 (4100 m3)



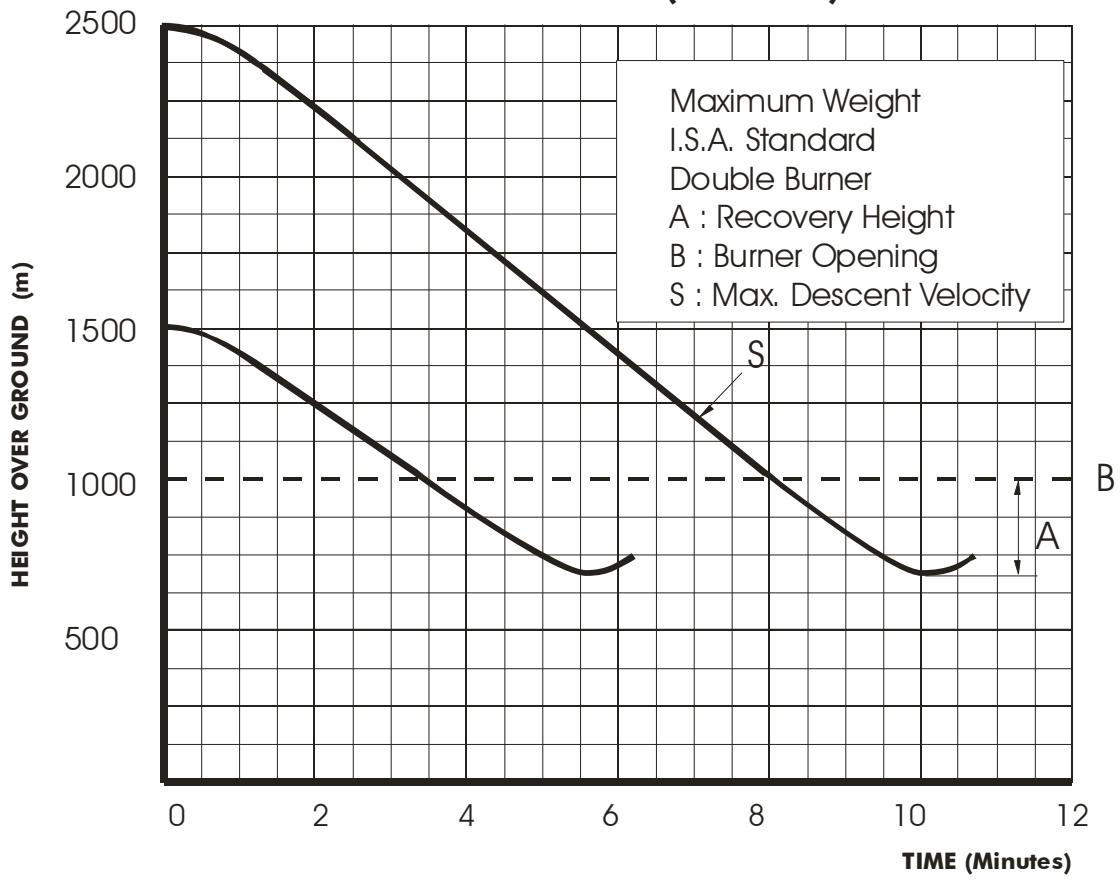
SIZE 150 (4245 m3)



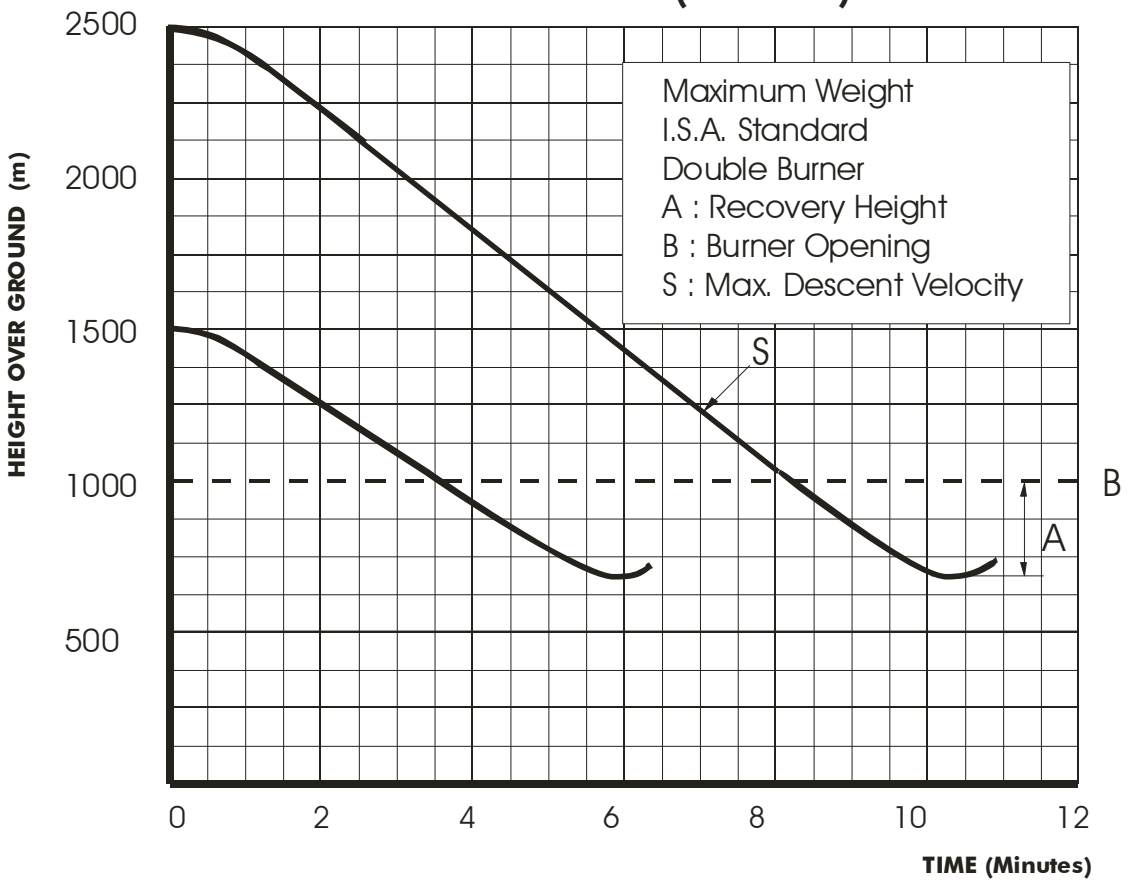
SIZE 160 (4550 m3)



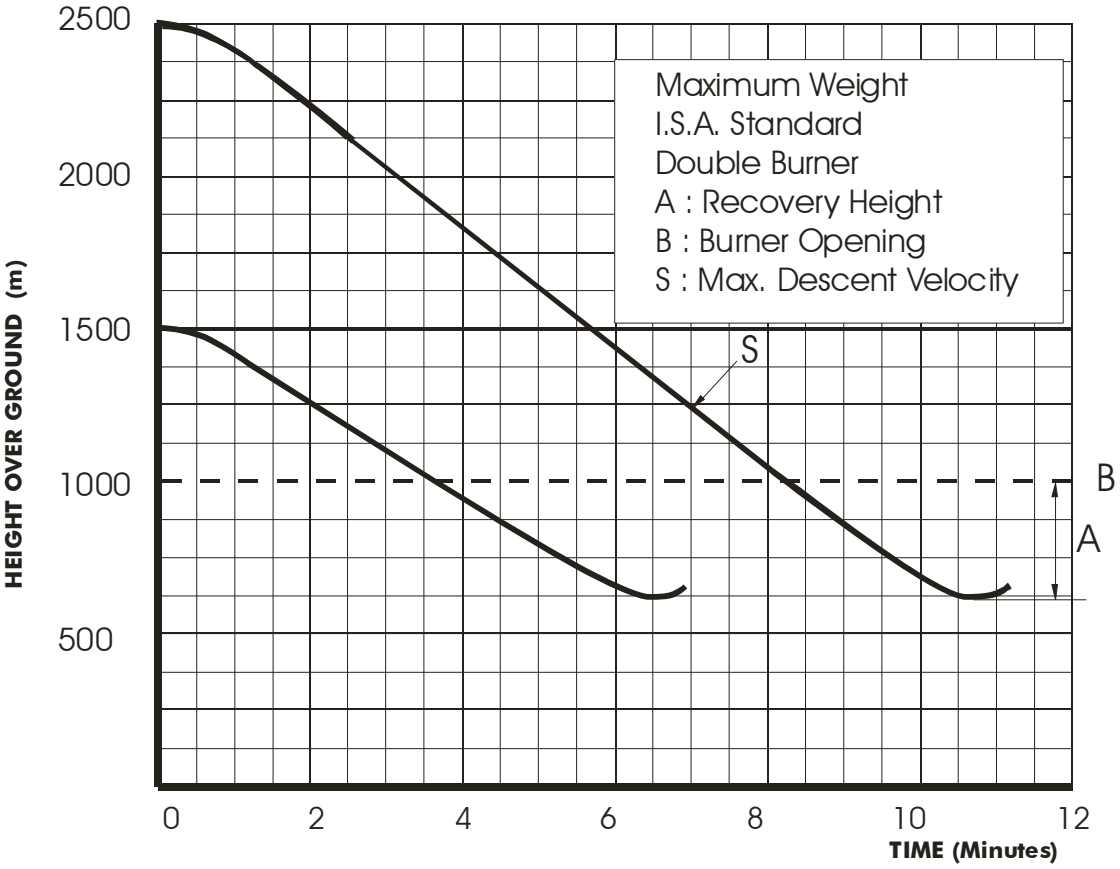
SIZE 180 (5100 m3)



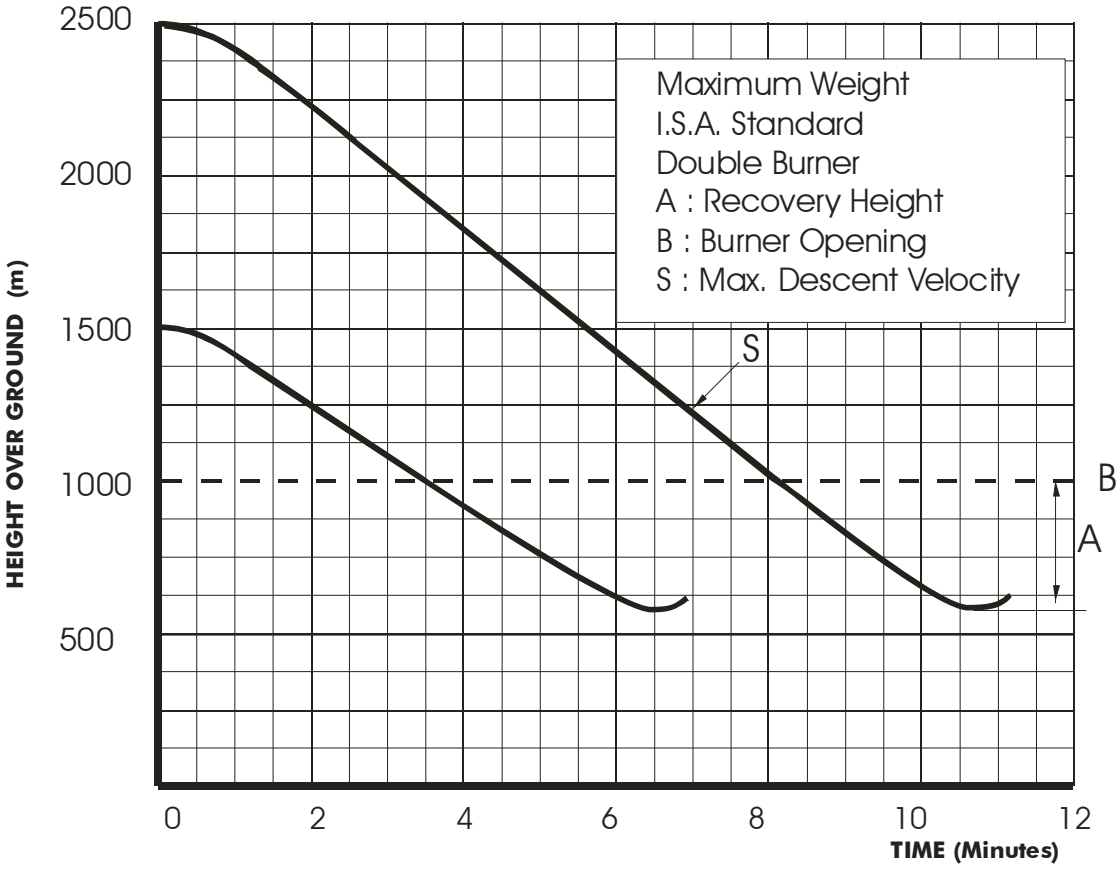
SIZE 210 (6000 m3)



SIZE 250 (7000 m3)

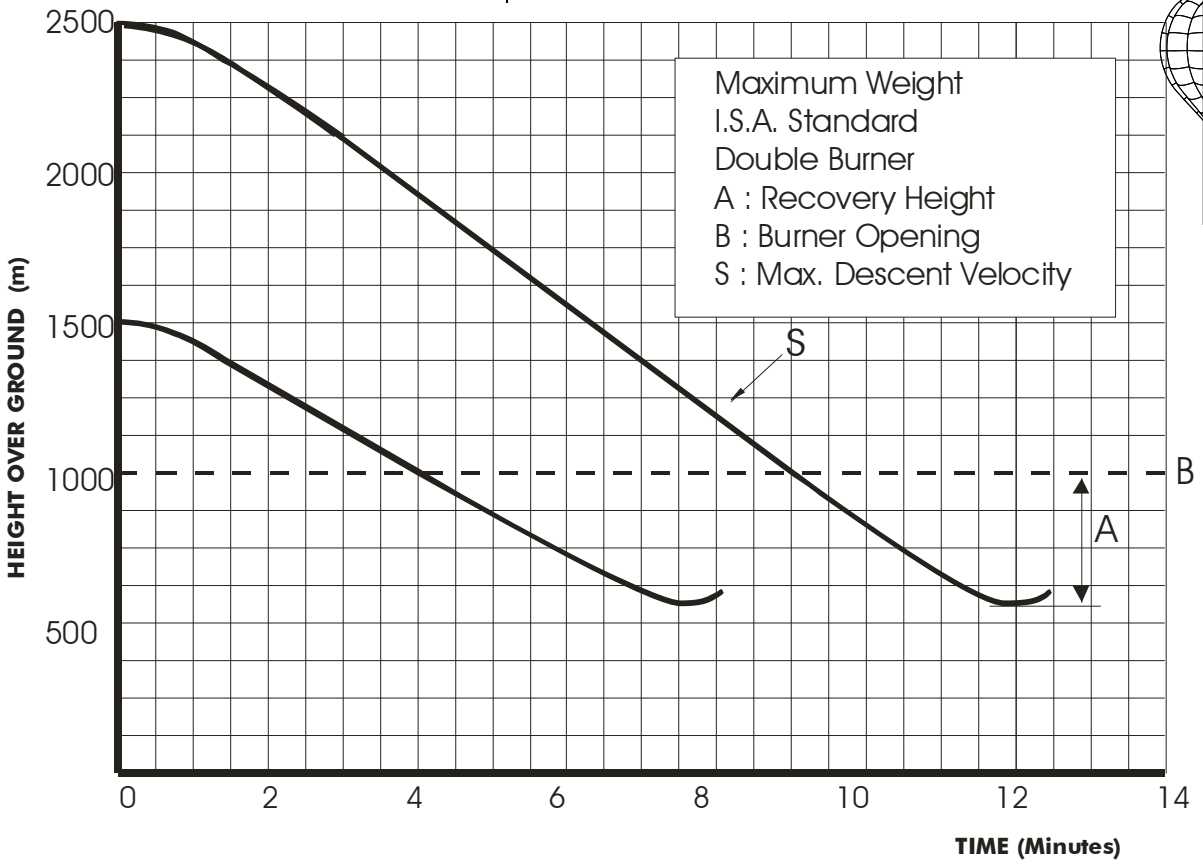


SIZE 300 (8500 m3)

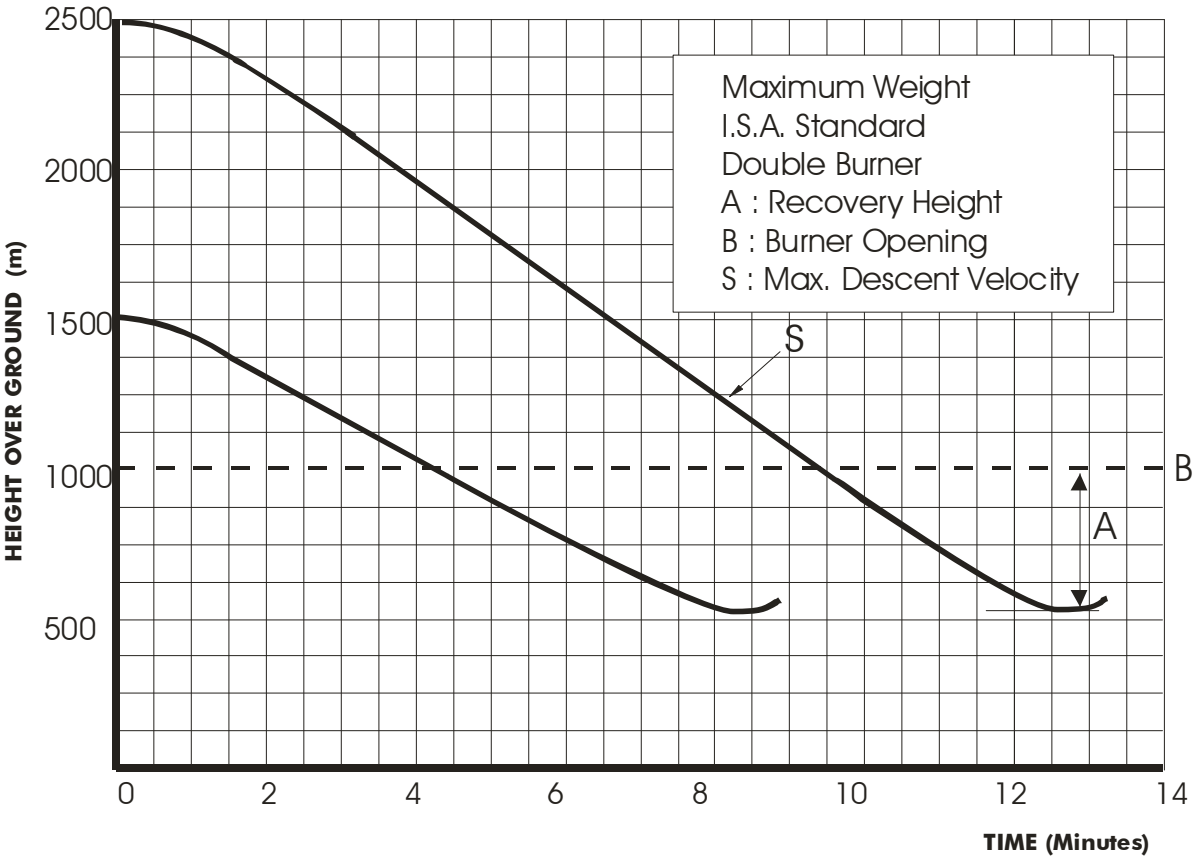


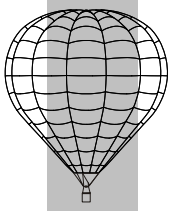
A VERTICAL VELOCITIES

SIZE 355 (10000 m³)



SIZE 425 (12000 m³)



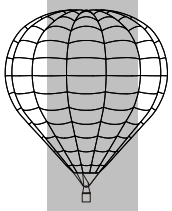


APPENDIX

B – Flight Instruments.

The requirements for the carrying of flight instruments vary from country to country. The carriage of an altimeter and rate of climb indicator is recommended. In some countries a thermister is also required for measuring internal envelope temperature during the flight. The list shown below indicates instruments that Ultramagic recommend and are generally approved for balloon use. This is by no means a list of the only instruments available for use in Hot air balloons. Ultimate approval for use is subject to the instrument being approved by the appropriate national organisation.

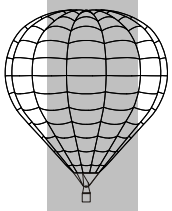
Manufacturer	Instrument Model
Flytec	3040 4005 6005 6040
Aircotec	Piccolo 5000 Piccolo 8000
Ball	655 M55 M57
Blue Sky Avionics	Pegasus HA
Brauniger	IQ IQ Balloon Comfort
Winter	
Digital Balloon Instrument	



APPENDIX

C – Quick reference pre – flight checklist.

This appendix may be copied and used as a quick reference in conjunction with Section 4 - Standard Procedures.



Appendix C - Quick Reference Pre–Flight Checklist.

The following inspections and checks must be carried out before every flight.

Envelope

1. ☐ Ensure that any fabric damage does not exceed the Permitted Damage.
2. ☐ Ensure that there is do damage to any load tapes.
3. ☐ Ensure that there is no damage to the flying wires and that they are free of twists.
4. ☐ Ensure that flying wires are connected correctly and that karabiners are closed, screwed shut and loaded lengthways.
5. ☐ Ensure that all control ropes and chords are free of damage, securely attached, not twisted and work correctly.
6. ☐ Ensure that all pulleys and loops are well attached and are working freely.
7. ☐ Ensure that all controls lines are connected to the load frame.
8. ☐ Carry out a functional check on parachute system.
9. ☐ Carry out a functional check on the FDS rapid deflation system where fitted.

Burner and Fuel System

1. ☐ Check the burner, all valves and hoses for damage and leaks.
2. ☐ Ensure the hoses are connected and secure to the cylinders and that the connections are leak free.
3. ☐ Ensure that the cylinders are securely attached, free of damage and that there are no signs of leaks.
4. ☐ Check fuel pressure is in accordance with stated requirements.
5. ☐ Carry out burner functional check on all burners ensuring all valves open and close correctly.
6. ☐ Check that pilot light is burning correctly and is strong and not too noisy or too quiet.
7. ☐ Check that all cylinders are functioning correctly.

Basket

1. ☐ Check the general condition of the basket for damage.
2. ☐ Ensure that the basket wires are free of damage and twists.
3. ☐ Ensure that the burner frame and poles fit correctly and are free of damage.
4. ☐ Ensure that the attachment points are secure and that all karabiners are screwed locked.

Fuel

1. ☐ Ensure sufficient fuel is on board for the required duration of the flight.

Equipment

1. ☐ Ensure that the following information and equipment is on board.
   a) ☐ Source of ignition – matches, lighter, striker
   b) ☐ Required maps and airspace and sensitive area information.
   c) ☐ Watch or time piece.
   d) ☐ Instruments – set and working.
   e) ☐ Radio (if used) – set and working.
   f) ☐ Fire extinguisher - in correct condition and at hand.

Passengers.

1. ☐ Ensure that all passengers are on board and have sufficient space,
2. ☐ Ensure that passengers are briefed for take off and that all equipment is stowed securely.

Loading.

1. ☐ Check the load calculations are in accordance with requirements.

Pilot Restraint

1. ☐ Ensure belt is worn and connected (If required)

General Conditions

1. ☐ Ensure downwind area is still free of obstacles.
2. ☐ Ensure weather conditions have not changed to the detriment of the safety of the flight.

APPENDIX

D – Minimum basket space requirements.

For safety and comfort reasons a minimum space in the basket must be available for each occupant. The following tables lists the number of persons that may occupy a basket of a particular size taking into account the number of fuel cylinders being used for the flight.

The basket model number quoted is the Ultramagic number with the size in brackets. Where another manufacturers basket has been approved for use then the equivalent size should be used for reference.

Where the basket has a separate pilot compartment it is permissible to carry a passenger in this compartment dependant on the number of cylinders being used for the flight. This can be seen in the separate column titled “Pilot Compartment”

So for example a C7 basket with 4 cylinders may have 2 persons in the pilot compartment including the pilot as well as 6 persons in the passenger compartment. However with 5 or more cylinders in the pilot compartment then only one person is allowed in the pilot compartment, this being of course, the pilot.

MODEL	N Cyl	N Pers	MODEL	Pilot Compartment		Pax Compartments
				N Cyl	N Pers	
C0 (0.8x0.7m)	2	1	C7 (1.4x2.0 m)	2	2	6
				3	2	6
				4	2	6
				5	1	6
				6	1	6
				7	1	6
				8	-	6
C2 (1.0x1.0 m)	2	2	C5 (1.4x2.2 m)	2	3	8
	3	2		3	2	8
	4	2		4	2	8
	5	1		5	1	8
	6	1		6	1	8
				7	1	8
				8	-	8
C1 (1.2x1.0 m)	2	3	C8 (1.5x2.6 m)	2	2	10
	3	3		3	2	10
	4	2		4	2	10
	5	2		5	1	10
	6	2		6	1	10
				7	1	10
				8	-	10

MODEL	N Cyl	N Pers	MODEL	Pilot Compartment		Pax Compartments
				N Cyl	N Pers	
C3 (1.3x1.1m)	2	4	C9 (1.6x3.0 m)	2	2	12
	3	3		3	2	12
	4	3		4	2	12
	5	3		5	1	12
	6	2		6	1	12
				7	1	12
				8	-	12
C10 (1.45x1.15 m)	2	4	C11 (1.7x3.5 m)	2	3	16
	3	4		3	3	16
	4	4		4	3	16
	5	3		5	2	16
	6	3		6	2	16
	7	3		7	2	16
	8	2		8	1	16
				9	1	16
				10	1	16
C4 (1.6x1.2 m)	2	5	C6 (1.8x1.3 m)	2	1	6
	3	5		3	-	6
	4	5		4	-	6
	5	4		5	-	6
	6	4		6	-	5
	7	4		7	-	5
	8	3		8	-	5

C12 (**)

1.5X4.0 m	P C		Pax	1.7x4.5	Pilot Compartment		Pax Compartments
	N C	N P			N Cyl	N Pers	
	2	2	16		2	3	24
	3	2	16		3	3	24
	4	2	16		4	3	24
	5	1	16		5	2	24
	6	1	16		6	2	24
	7	1	16		7	2	24
	8	-	16		8	1	24
					9	1	24
					10	1	24

· Baskets with Pilot Compartment add the corresponding pax. to the pilot/gas Compartment.
· If the removable partition on C-6 or C-7 is out, the maximum number of pax. is 6.
** If measures of C-12 are different, it will be taken the equivalent.