FLIGHT MANUAL

for

ULTRAMAGIC HOT AIR BALLOONS

This manual and its approved supplements contain the Instructions for Operation of all Ultramagic Hot Air Balloons included in the Ultramagic Type Certificates EASA BA.014 and BA.517

This copy of the Flight Manual has been customized for the following aircraft:

Registration:			
Model:		Serial Nr.:	
Signed:		Date:	
		Organization:	

ULTRAMAGIC,S.A.
POA ES.21G.007
Aerodrom Igualada-Odena s/n
08700 IGUALADA (SPAIN)
tel +34 93 8042202
e-mail admin@ultramagic.com

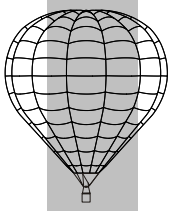
Document name : FM04
Initial Issue date 31 May 2003

LIST OF APPROVED REVISIONS

Rev	Description	Approval	
		Date	Reference
1	Sup. 3, 4, 5 added	17/Sep/03	DGAC - Spain
2	Sup. 6, 7 added	18/Oct/03	DGAC - Spain
3	Sup. 9 added; V-25 model added; Section 8 amended	14/Feb/06	EASA BA.C.01011
4	Sup. 10 added	14/Feb/06	EASA BA.C.01011
5	Sup. 6 amended; Sup. 11 added	14/Feb/06	EASA BA.C.01011
6	Sup. 12 added	31/Jul/06	EASA BA.A.01001
7	Sup. 13, 14 added; Section 5.6 added	31/Jul/06	EASA BA.A.01001
8	Sup. 8 added	03/Mar/08	EASA BA.C.01028
9	Sup. 13 amended; Page 5.8 amended; Sup. 15, 16 added	31/May/07	EASA BA.A.01004
10	FAA requirements added; Section 8 amended; Sup. 19, 20 added	08/Feb/08	EASA BA.A.01010
11	Sup. 17, 18 added	21/Dec/07	EASA BA.C.01067 EASA BA.C.01068
12	Sup. 21 added; Sup.15 amended	18/Apr/08	EASA BA.A.01014
13	Sup. 22 added; Sup. 6, 9, 17, 18, 19 amended; Other minor modifications	29/Apr/08	DOA 21J.0351 PD1-05 002
14	Sup. 25 added; Other minor modifications	23/Jul/08	EASA BA.A.01015
15	Sup. 23, 26 added; ; Other minor modifications	27/Jan/09	DOA 21J.0351 PD1-05 009
16	Section 0, 2, 5, 6, 8, 9 amended; Sup. 8, 19, 26 amended; Sup. 27, 28, 34, 36 added	08/Sep/09	DOA 21J.0351 PD1-05 012
17	Section 0, 4, 9 amended; Sup. 37, 38, 39 added	19/Jul/11	EASA 0010035791
18	Section 0, 1, 2, 5, 8, 9 amended; Appendix A, B amended; Sup. 24, 42 added; Sup. 4, 6, 19, 34, 39 amended	20/Jan/12	EASA 0010038120
19	Section 5 amended	12/Jun/12	EASA 0010016389
20	Sup. 22, 38, 39 amended	08/Mar/13	EASA 0010016416
21	Sup. 8, 38 amended; Other minor modifications	20/May/13	DOA 21J.0351 PD1-05 023
22	Section 0, 2, 4, 5, 8, 9 amended; Appendix C amended; Sup. 47 added; Sup. 4, 6, 12, 13, 24 deleted	29/Nov/13	DOA 21J.0351 PD1-05 024
23	Section 0, 1, 4, 5, 6 amended; Appendix B amended; Sup. 2, 10, 19, 22, 39 amended; Sup. 46, 48, 49 added	21/Jan/15	DOA 21J.0351 PD1-05 028
24	Minor revisions to sections 0, 1, 2, 4, 5, 6, 9, Appendixes B, C and D.	21/Dec/15	DOA 21J.0351 PD1-05 034
25	Minor revisions to sections 0, 1, 2, 3, 4, 5, 6 and 7	29/Apr/20	DOA 21J.0351 PD1-05 062

LIST OF EFFECTIVE PAGES

Page	Nº	Date	Page	Nº	Date	Page	Nº	Date
0.0	25	29-Apr-20	6.7	24	21-Dec-15			
0.1	24	21-Dec-15	6.8	23	21-Jan-15			
0.2	24	21-Dec-15	6.9	14	23-Jul-08			
0.3	25	29-Apr-20	6.10	14	23-Jul-08			
0.4	25	29-Apr-20	6.11	14	23-Jul-08			
0.5	24	21-Dec-15	6.12	23	21-Jan-15			
0.6	25	29-Apr-20	6.13	24	21-Dec-15			
0.7	24	21-Dec-15	6.14	24	21-Dec-15			
1.1	18	20-Jan-12	6.15	24	21-Dec-15			
1.2	14	23-Jul-08	6.16	24	21-Dec-15			
1.3	14	23-Jul-08	6.17	24	21-Dec-15			
1.4	25	29-Apr-20	6.18	24	21-Dec-15			
2.1	14	23-Jul-08	6.19	24	21-Dec-15			
2.2	25	29-Apr-20	6.20	25	29-Apr-20			
2.3	25	29-Apr-20	6.21	25	29-Apr-20			
2.4	24	21-Dec-15	6.22	25	29-Apr-20			
3.1	14	23-Jul-08	6.23	24	21-Dec-15			
3.2	23	21-Jan-15	6.24	25	29-Apr-20			
3.3	14	23-Jul-08	6.25	14	23-Jul-08			
3.4	25	29-Apr-20	7.1	14	23-Jul-08			
4.1	24	21-Dec-15	7.2	23	21-Jan-15			
4.2	25	29-Apr-20	7.3	25	29-Apr-20			
4.3	24	21-Dec-15	8.1	23	21-Jan-15			
4.4	24	21-Dec-15	9.1	24	21-Dec-15			
4.5	24	21-Dec-15	A.1	14	23-Jul-08			
4.6	24	21-Dec-15	A.2	14	23-Jul-08			
4.7	23	21-Jan-15	A.3	14	23-Jul-08			
4.8	23	21-Jan-15	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	24	21-Dec-15	A.7	14	23-Jul-08			
4.12	15	27-Jan-09	A.8	14	23-Jul-08			
4.13	25	29-Apr-20	A.9	14	23-Jul-08			
4.14	25	29-Apr-20	A,10	14	23-Jul-08			
4.15	25	29-Apr-20	A.11	18	20-Jan-12			
4.16	25	29-Apr-20	B.1	24	21-Dec-15			
5.1	25	29-Apr-20	C.1	22	29-Nov-13			
5.2	24	21-Dec-15	C.2	24	21-Dec-15			
5.3	23	21-Jan-15	D.1	24	21-Dec-15			
5.4	24	21-Dec-15	D.2	24	21-Dec-15			
5.5	25	29-Apr-20						
5.6	24	21-Dec-15						
5.7	24	21-Dec-15						
5.8	24	21-Dec-15						
5.9	24	21-Dec-15						
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

Section 4 – Standard Procedures

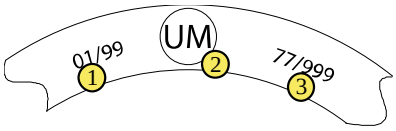
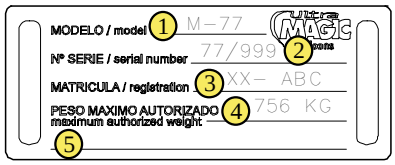
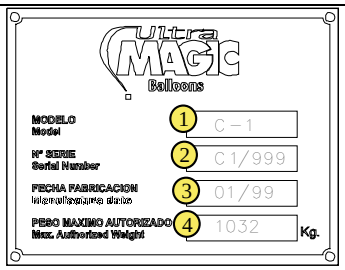
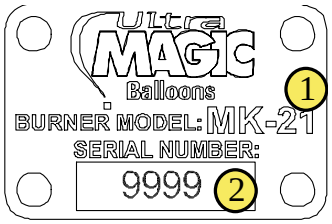
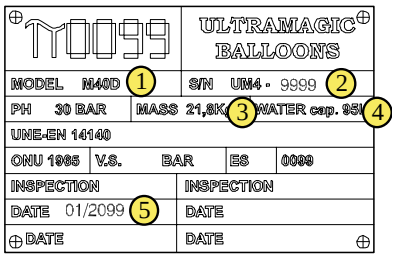
4.1 Introduction
4.2 Choosing an inflation site
4.3 Meteorological conditions
4.4 Load chart
4.5 Preparation for flight
4.5.1 Initial pre-flight checks
4.5.2 Rigging the basket/burner
4.5.3 Testing the burner
4.5.4 Envelope
4.6 Deflation systems
4.6.1 Parachute
4.6.2 Fast deflation system
4.7 Inflation
4.8 Preparation for take off
4.8.1 Checks
4.8.2 Passenger briefings
4.9 Take off
4.9.1 Windy Conditions, Sheltered Site
4.10 Control during flight
4.10.1 Manoeuvring in flight
4.10.2 Fuel management
4.10.3 Gusting
4.10.4 Thermals
4.11 Landing
4.11.1 Landing without wind (parachute)
4.11.2 Landing with wind (parachute)
4.11.3 Landing with wind (FDS)
4.11.4 Landing large balloons
4.12 Cylinders - N_2 or other inert gases (CO_2) pressurisation

Section 5 - Loading

5.1 Introduction
5.2 Table of empty weights
5.3 Load chart
5.3.1 Calculation example
5.3.2 Calculation example
5.4 Table of compatibility
5.5 Minimum Take off Mass
5.6 Reduced Maximum TO Mass Operations
5.7 Basket loading

1.5 Identification of parts

Ultramagic parts and components are identified as follows[1][3]:

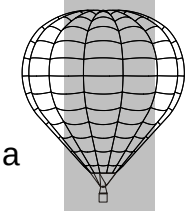
	PICTURE	POSITION	DESCRIPTION
ENVELOPE		Crown Ring[2]	Data engraved over Aluminium or Steel: 1) Manuf. Date [MM/YY] 2) Ultramagic acronym 3) Serial Number
		Nomex mouth (1 to 3 posns.)	Model painted over PVC support.
		Nomex mouth (Load tape #9 usually)	Data engraved over Steel plate on a leather support: 1) Model 2) Serial Number 3) Registration 4) Maximum Authorized Weight 5) Others (if due)
BASKET		Basket wall, inside, pilot partition	Data engraved over Steel plate on a leather support: 1) Basket model 2) Serial Number 3) Manufacture Date 4) Maximum Authorized Weight
BURNER		MK-21: valve block bottom face MK-32: Valve block Side BMK-008: Valve block Side	Model (#1) and Serial Number (#2) engraved on a Steel plate riveted to the block
	N/A	BMK-008 & BMK-050, valve block, bottom face[4]	Information engraved on the Aluminium block: 1) Model and Serial number (valve) 2) Serial number (coil)
CYLINDER		Top protection ring, outside	Data engraved on a Steel plate riveted to the collar: 1) Model 2) Serial number 3) Empty Mass (kg) 4) Water Capacity (L) 5) Initial inspection [MM/YYYY]

[1] *For older identification means, contact Ultramagic. Specific requirements from certain National CAAs may also introduce changes to the identification means.*

[2] *S-50, S-70, B-70 envelopes may not have crown ring identification.*

[3] *Envelope Registration marks not described (depend on local requirements).*

[4] *Only older BMK-008 burner units uses this identification means.*



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.

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 available at the take-off site.

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 (observe exceptions on Solo or single seater bottom ends). 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.

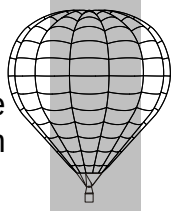
The approved fuel is commercial propane, which can contain some butane.

Butane may also be used as long as the pressure is greater than 3 bar. This pressure can be achieved by warming or by pressurising the cylinders with nitrogen or other inert gas such as CO_2.

Fuel tanks pre-pressurized with nitrogen or other inert gas such as CO_2 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. At no time must the maximum lift (Lmax) listed in the Built Standard (page 0.1) 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.

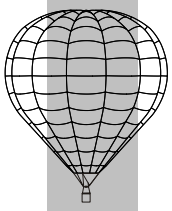
If time permits close all fuel lines and vent off fuel before contact. If safety conditions permit, try to avoid touching the ground until you have been informed that the power line has been switched off.

After having made contact with live electrical power lines the pilot must report the incident and make sure that an unscheduled inspection is carried to the balloon before any further flight according to Section 6.7.2 “Contact with Powerlines” of the UM Maintenance Manual Rev.18.

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.



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 exceed the permitted damage as per Section 2.1 of the UM Maintenance Manual Rev.18.
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:

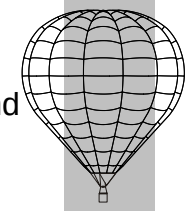
General condition, tanks firmly held in, correct attachment of burner frame and wires.

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



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.

4.9.1 Windy Conditions, Sheltered Site

An apparent loss of lift can occur as the balloon first encounters faster moving air just above the surface during windy conditions. When the balloon is static on the ground, the faster moving air above it creates an area of low pressure which creates lift in the same way as an aeroplane wing. This extra lift or “false lift” adds to the sustentation created by the balloon itself and could let the pilot think that the balloon is hot enough to start the take-off manoeuvre.

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

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

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 refer to section 4.12 of this Manual.

4.10 Control during flight

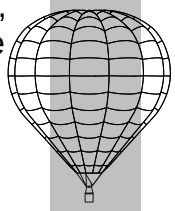
4.10.1 Manoeuvring in flight

The altitude of the balloon is controlled by the operation of the burner, which is either fully on or fully off. Note that the heat output depends on the fuel pressure. The pilot must judge the length and frequency of burns necessary to control his balloon. Remember the limitations on vertical velocities from section 2.8.

When a "quiet" burner (also known as whisper or liquid valve) is fitted, it is recommended that this is used 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.

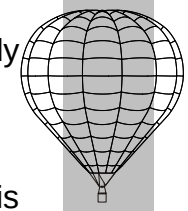
4.10.4 Thermals

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

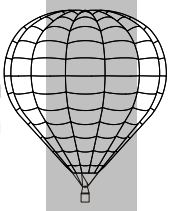
The technique is similar to 4.11.1 but horizontal travel must be minimised to avoid downwind obstacles. To achieve this, a steeper angle of descent is chosen, rounded out by a long burn to achieve straight and level flight at about 20ft (6 m) above the ground. The parachute is then opened fully and kept 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.



4.12 Cylinders - Nitrogen or other inert gases (CO_2) pressurisation

The use of commercial fuels with low natural pressures and/or the operation under cold conditions may lead to the use of cylinders pressurised with Nitrogen or other inert gases such as CO_2, in order to increase the fuel pressure in flight.

The nitrogen or other inert gas (CO_2) source must be adjustable and able to deliver pressures adequate for this purpose. It must be operated as per suppliers instructions.

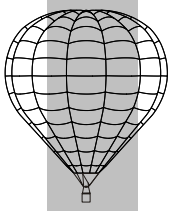
WARNING: Pressurisation must never be carried out with air or oxygen.

CAUTION: Whenever possible, the use of nitrogen or other inert gas pressurisation should be limited to slave fuel cylinders. If a master cylinder is to be pressurised, identify it clearly as cylinders pressurised with nitrogen or other inert gas (CO_2) become unusable as vapour source until the cylinder is emptied and filled again with fuel only. If your burner needs a vapour phase supply, make sure that you have a suitable source for the flight.

CAUTION: Cylinder pressurisation must be carried out immediately before the flight (or the road transportation to the inflation site). Whenever a pressurised cylinder is to be stored, its pressure must be reduced by purging to a maximum of 7 bar (100 psi).

Nitrogen or other inert gas (CO_2) pressurisation of Ultramagic cylinders must be developed as follows:

- Ensure that the Ultramagic cylinder is already filled with fuel.
- Ensure that all valves in the nitrogen or other inert gas supply and the fuel cylinder are closed.
- Connect the nitrogen or other inert gas supply to the liquid coupling of the fuel cylinder.
- Open the main valve of the fuel cylinder.
- Open the feeding valve of the source.
- If applicable, adjust the maximum pressure delivered by the source (refer to section 2.5).
- Await for the pressures to balance (the noise caused by the flow stops).
- Close the valves on the supply and the fuel cylinder. Release the hose.



SECTION 5

LOADING

5.1 Introduction

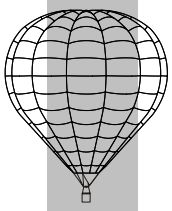
For the given volume, the lift of a balloon is limited by the internal temperature. This is affected by the ambient temperature and the altitude of the proposed flight.
This section shows how the Lift is calculated considering all these parameters, without surpassing the maximum authorised load. Maximum 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

The following table provides **orientative figures** for the **Empty Weight** and **Maximum Lift** available per envelope/basket combination. Actual figures must be calculated with the specific mass of each balloon component (page 0.1).

Model	Basket	Pv	Lmax
H-31	C-0	132	307
	C-2	139	307
H 56	C-2	158	549
Vol=15.9	C-0	151	422
	C-1	163	549
H 65	C-1	183	638
Vol=18.4	C-2	178	638
	C-3	195	638
	C-10	211	638
V-25	SOLO	61	250
V 65	C-1	186	638
Vol=18.4	C-2	181	638
	C-3	198	638
	C-10	214	638
V 90	C-3	224	878
Vol=25.5	C-1	212	878
	C-2	207	878
	C-4	245	878
	C-10	240	878
S 90	C-3	237	878
Vol=25.5	C-1	209	878
	C-2	204	878
	C-4	242	878
	C-10	237	878
S 130	C-4	281	1365
Vol=36.8	C-1	248	1280
	C-3	260	1365
	C-5	373	1365
	C-6	287	1363
	C-7	303	1365
	C-10	276	1276

Model	Basket	Pv	Lmax
H 42	C-0	138	396
Vol=12.0	C-2	145	416
	C-1	150	416
H 77	C-1	190	756
Vol=21.9	C-2	185	756
	C-3	202	756
	C-10	218	756
	C-4	223	756
V 56	C-2	175	549
Vol=15.9	C-0	168	426
	C-1	180	549
V 77	C-1	193	756
Vol=21.9	C-2	188	756
	C-3	205	756
	C-10	221	756
	C-4	226	756
V 105	C-4	269	1032
Vol=29.5	C-1	236	1032
	C-3	248	1032
	C-10	264	1032
S 105	C-4	255	1032
Vol=29.5	C-1	222	1032
	C-3	234	1032
	C-10	250	1032
S 160	C-5	391	1569
Vol=45.5	C-4	299	1569
	C-6	305	1381
	C-7	321	1569
	C-10	294	1294



5.3.1 Calculation Example: Using the graphic load chart

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 6.55 kg per 1000 ft^3 (14.5 lb/1000 ft^3).

4. In our 65,000 ft^3 envelope, the total lift is 6.55 x 65 = 426 kg. (65 x 14.5 = 942 lb)

5. Loading Capacity = Total lift - empty weight with a C-2 basket
= 426 - 178 = 248 kg (= 942 – 392 = 550 lb ≈ 248 Kg)

These 248 kg (~550 lb) have to be distributed between fuel cylinders, fuel, crew, luggage and accessories. This mass must fall within any maximum authorized weight applicable to the bottom end.

If instead, we are planning the same flight in a colder day with an ambient temperature of 10ºC (18ºF), the total lift would be of approximately 488 kg (1075 lb), which results in 62 kg (133 lb) of additional lift capacity when compared to the first scenario.

NOTE: Load chart calculation is a graphic approach method which may lead to negligible deviations when compared with precise mathematical calculations.

5.3.2 Calculation Example: Using the FlightPack App

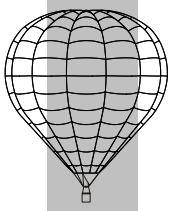
When available, official Ultramagic FlightPack App can be alternatively used to determine the lift available before the flight. The process is as follows:

- Access the application, click on 'Load Calculator' section.
- Adjust the Balloon volume and weight parameters as per the actual values (as listed in the build standard or a valid weight list).
- Establish the flight parameters (take off elevation and temperature, max. altitude, etc).
- Establish the fuel cylinders carried on board. Check that the Total Fuel Weight shown is correct.
- The available lift is calculated in the left column. Add then the masses of the occupants (an estimation is initially provided by the software).
- Software finally shows whether if the configuration is valid or not in terms of lift.

NOTE: Any further requirements applicable such as compatibility and particular loading limits (restrictions to the bottom ends, etc.) of the equipment are not checked by the software, but must be adhered to.

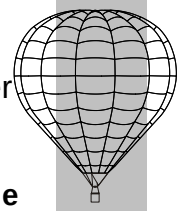
5.4.Table of compatibility

See next pages.



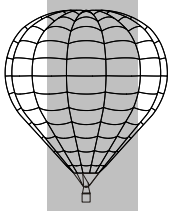
	SERIES T		
Type	**150**	**180**	**210**
Vol. (m3)	4245	5100	6000
Number of gores	20	20	20
FAI class	AX10	AX10	AX10
Total height(m)	25,0	27.3	28,6
Standard basket	C7	C5	C5
Envelope			
Height (m)	21,23	22,7	24,3
Diameter at the Equator (m)	20,95	22,2	24,3
Diameter at the Mouth (m)	4	4	4
Weight (Kg)	177	196	219
Parachute			
Diameter (m)	6.5 FDS	6.5 FDS	6.5 FDS

BURNER AND FRAME



The following table provides orientative figures for the weight of the burner (burner frame not included)

Model MK-2	**Simple**	**Double**	**Triple**	**Quadruple**
Total Mass (Kg)	14	19	25	
Model MK-2 Super				
Total Mass (kg)	15	21	28	36
Model MK-10				
Total Mass (kg)	15	21	28	35
Model MK-21				
Total Mass (kg)	17	24	34	43
Model PowerPlus BMK-008				
Total Mass (kg)	12	21		
Model PowerPlus Maxi BMK-050				
Total Mass (kg)		20	30	41



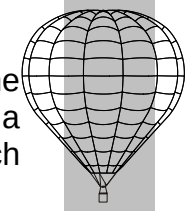
BASKET

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
Typical Empty Mass (Kg)	55	67	62	79	100	192	141

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
Typical Empty Mass (Kg)	174	220	285	95	356	457

FUEL CYLINDERS

Model	Worthington 4100-U4-27	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



6.4.2 Envelope Internal temperature

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

A temperature sensor can optionally be installed on inside top of the envelope, transmitting the signal to the indicator on the basket. To allow the sensor entrance inside the balloon, a small hole with burnt edge is made next to load tape number 9 or 9½, close to envelope's top edge. Adhere to the setup and operation instructions of the transmitter's manufacturer.

A label is placed inside top of parachute, the colour of which changes progressive and irreversibly 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 mandatory. 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.

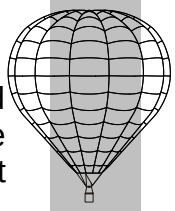
The release mechanism is a form of latch, which is attached to the load frame by means of Karabiners and can also be used with wire, rope or webbing bridles. The restraint rope is fitted into the latch and at the other end to a secure point or braked vehicle.

The device is provided with a safety pin to avoid an inadvertent release of the mechanism.

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

6.6 Occupant Restraint Harness

If fitted, this harness is designed to secure an occupant in position during hard landings (restraint harnesses are not a substitute for adopting a good landing position and using internal handles).
The harness fits around the waist and is fixed to an attachment point on the basket floor, preferably on the long side opposite to the landing direction. The harness has a special quick release buckle to enable the occupant to remove it in an emergency or whenever instructed by the pilot.
Local regulations must be adhered to regarding obligatory requirements of the harnesses.



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 and that the fuel hoses are kept in a natural position avoiding any coiling or bending with small radius of curvature. 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 or other inert gas 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, although is better to dry-wash it whenever is possible. 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. If the basket is fitted with a cushion floor it is recommended to remove it from the basket before cleaning it to avoid moisture problems. Reinstall the cushion floor again when the basket is completely dry.

Refer to Ultramagic Maintenance Manual for further cleaning instructions.