MAINTENANCE MANUAL

for

ULTRAMAGIC HOT AIR BALLOONS

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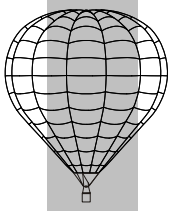

LIST OF APPROVED REVISIONS

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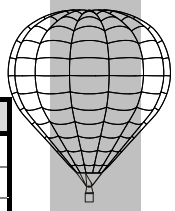
1	Supplements 1, 2 and 3	24-Sep-03
2	Supplement 4	19-Apr-04
3	Supplement 5	01-Sep-04
4	Supplement 6	15-Dec-05
5	Supplement 7 Changes on Inspections and renumbering	26-May-06
6	Supplements 8 and 9	15-Nov-06
7	FAA of USA requirements Section 7 Airworthiness Limitations Supplement 10	17-Apr-07
8	Supplement 4 revision Supplement 11 BMK-008 Single Burner Supplement 12 BMK-008 Double Burner Supplement 13 BMK-050 Burner	01-May-07
9	Supplement 14 MK21 Vapour Pilot Light Supplement 15 MK21 Improved Filtering	15-Feb-08
10	Supplement 13 BMK-050 Burner revision FAA requirements introduced	20-Jun-08
11	Corrections to section 2 and 6 Correction to Appendix 2 Supplement 5 Disabled Pax Basket revision	17-Dec-08
12	Amendment to sections 0, 2, 4, 6, A2 Supplement 17 'Tekno' Envelopes (added) Supplement 18 'Tekno' Baskets (added) Supplement 19 'FuelTek' System (added)	24-Mar-10
13	Amendment to sections 0, 1, 2, 4, 6, A2 Supplement 18 'Tekno' Baskets (revised)	10-Sep-10
14	SUPERSEDED	N/A
15	Supplement 21 "F-35 R4TS" Amendment to sections 0, 1, 2, 3, 4, 6	10-Dec-12
16	Section 7 (EASA Approval 10041973)	10-Dec-12
17	Amendment to sections 2, 7 Supplements 17 and 18 revision	13-Nov-13



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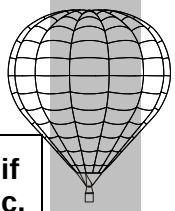

LIST OF APPROVED SUPPLEMENTS

Supplement No.	Description	Issue		Tick if Applic.
		Number	Date	
1	Mk 21 Double burner electric blast valve	2	Sept-03	
2	Mk 10 Burner maintenance, double, triple and quad.	2	Sept-03	
3	Use of “Quick Links” for flying wire replacement.	2	Sept-03	
4	Solo & Duo Maintenance	3	Apr-04	
5	Disabled Passengers Basket	3	Dec-08	
6	Cruise Control	2	Dec-05	
7	Butane Burner	2	May-06	
8	Centre Gimbal Assembly	2	Nov-06	
9	Fastflat Quick Release Coupling	2	Nov-06	
10	U.S. units conversion table to I.S. units	2	Apr-07	
11	BMK-008 Single Burner	2	May-07	
12	BMK-008 Double Burner	2	May-07	
13	BMK-050 Double, Triple & Quad Burner Rev. 10	2	May-08	
14	MK21 Vapour Pilot Light	2	Feb-08	
15	MK21 Improved Filtering	2	Feb-08	
17	‘Tekno’ Envelopes	2	Nov-13	
18	‘Tekno’ Baskets	3	Nov-13	
19	‘FuelTek’ Fuel Control System	1	Mar-10	
21	Special shape F-35 “R4TS”	1	Nov-12	

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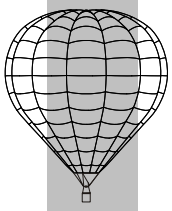

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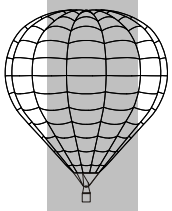

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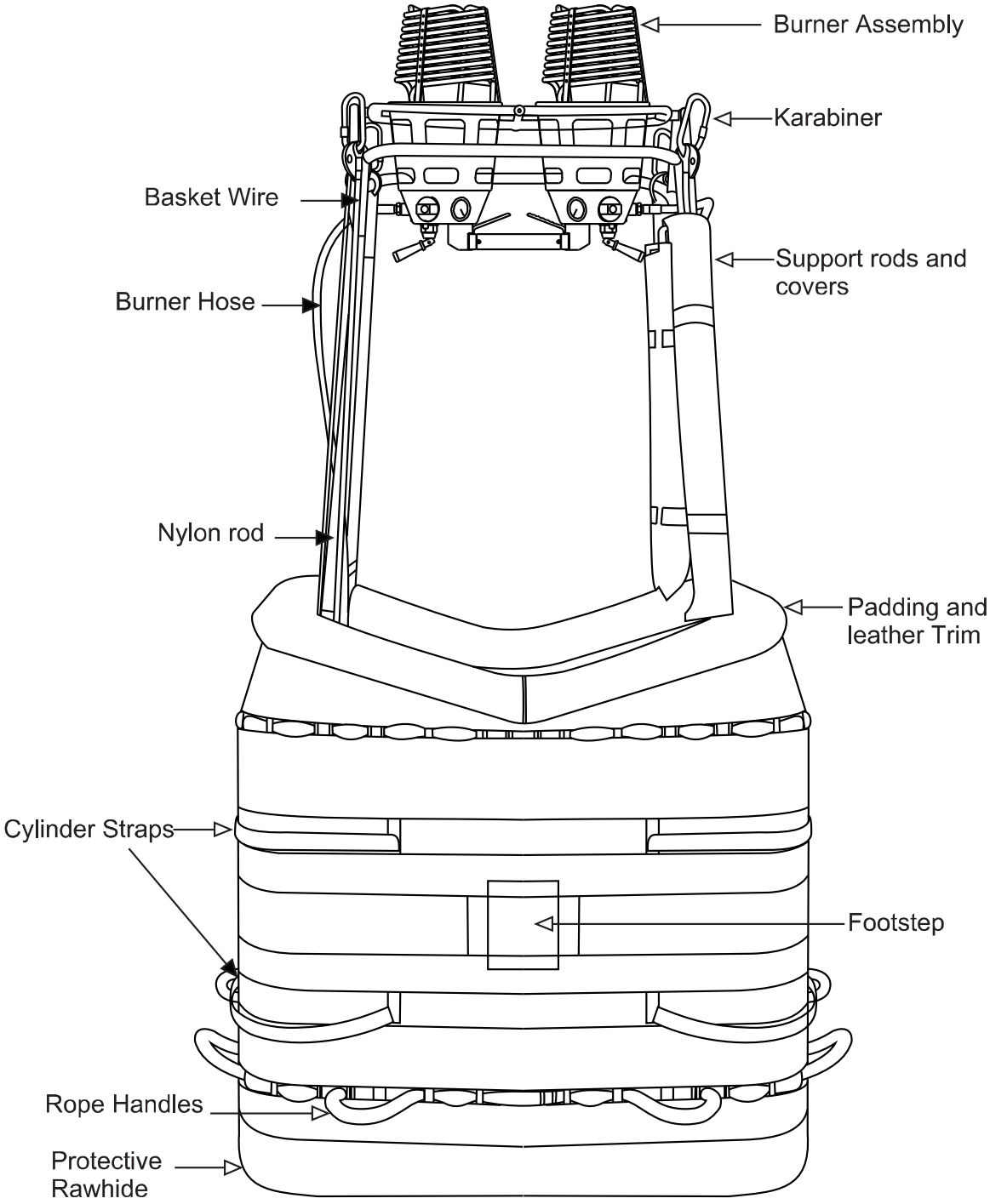
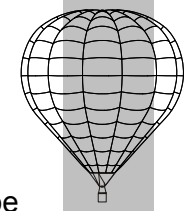
Section 1 - General





Introduction

A hot air balloons is a certified aircraft and as such, maintenance and repairs must be carried out in a controlled manner to keep the balloon airworthy. Whilst maintenance is generally simple it is important that all work is carried out in accordance with the requirements of the manufacturers and the local Airworthiness Authority.

The purpose of this manual is to define the maintenance, repair and inspection requirements and techniques to be used to ensure the continued airworthiness and safety of the balloons manufactured by Ultramagic,S.A..

Prior to supply of the new balloon many rigorous tests and inspections will have been carried out. However as a certified aircraft continual inspections through out its life are necessary.

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Section 6 Inspection Schedules – defines the inspection requirements for the balloon. These inspections are to be carried out by suitably approved and authorised personnel.

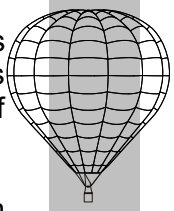
Apart from accidental damage, there are several other factors that can affect the materials used in the manufacture of a balloon. For example, very high temperatures, contact with rough surfaces and ultraviolet rays. This wear and tear may not be clearly evident in some cases and it is therefore imperative that the pilot remains vigilant. It is essential that all parts of the balloon are checked before each flight.

In section 1.1 – Preventative Maintenance – the manual also gives guidelines as to what work can be carried out by the pilot. However the local Airworthiness Authority requirements always takes precedence, as maintenance approval varies from country to country.

It is stated in various sections in this manual where replacement materials approved by Ultramagic or an appropriate aviation authority are required. Where this is written, approved parts and materials must be used. In other cases, simple minimum specifications are given where appropriate.

Special Note: Maintenance or repair work other than that listed as "Owner Maintenance" in section 1.1 must be carried out by Ultramagic S.A or an approved repair station. Any exceptions to this can only be where special permission in writing has been given by either Ultramagic S.A or the local Aviation Authority. Where the maintenance manual instructs that certain repairs may only be made by Ultramagic S.A. then again exceptions may only be made where permission is given in writing by Ultramagic S.A.

Where replacement materials other than those used by Ultramagic are permitted, simple minimum specifications are given. In all other cases only parts and materials supplied by Ultramagic are to be used. Any variance to this is only acceptable with prior written permission from Ultramagic.



Incorrectly used specified parts or materials will invalidate the Certificate of Airworthiness and could be extremely dangerous. Similarly, carrying out work that is not detailed in this manual or not in accordance with this manual will also invalidate the Certificate of Airworthiness.

The manufacturer or their agents are always available to offer advise or to assist with repairs. If there is any doubt or concern then do not hesitate to contact them.

This manual is applicable to all Ultramagic balloons. With older balloons, where the repair or maintenance requirement is not described, then the original manual supplied with the balloon is also applicable.

NOTE: Spare parts. A complete illustrated catalogue of genuine Ultramagic spare parts is available in the Technical Support section of the website www.ultramagic.com

1.1 Preventative Maintenance

1.1.1 General

The following maintenance actions may be carried out by the owner / operator of the balloon providing they hold a current Balloon Pilots licence. Any of this work carried out, should be signed off by them in the balloon logbook.

It is imperative that any other work is carried out or inspected by an approved person and signed off by this approved person in the balloon logbook.

For US registered balloons preventative maintenance may only be performed by the holder of a pilot certificate on the balloon that they own and operate.
Part 43.3 (g) of the code of federal regulations specifies this.

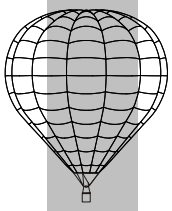
For U.S. operations, only the items listed in 14 CFR Part 43, Appendix A may be accomplished as Preventative Maintenance items.

For U.S. operations, maintenance must be performed in accordance with the requirements of 14 CFR Part 43.3 Persons authorized to Perform Maintenance, Preventative Maintenance, Rebuilding, and Alterations.

For US operations please refer to Unit Conversion Table (Supplement 10), whenever necessary.

1.1.2 Envelope

Replacement of damaged control lines.
(Not allowed on UK Public Transport Certified balloons)
Replacement of karabiners.
Replacement of Temperature flag.
Installation or removal of temperature instrument sensor.
Removal and replacement of Scoop or flight skirt.
Minor fabric damage to the bottom 4m (13 feet) of the envelope. This being above the nomex and at least 25mm (1 inch) away from load tapes.
Sticky patch repair of envelope fabric



1.1.3 Basket

Cleaning
Re varnishing or oiling of wicker
Repair or replacement of suede or leather top trim
Repair or replacement of rawhide bottom trim.
Removal / Replacement of foam floor
Removal / Replacement of side wall padding
Removal / replacement of anti slip floor strips.

1.1.4 Fuel Cylinders

Removal / Repair / replacement of padded jackets
Removal/Replacement of top padding rings.
Any lubrication not requiring disassembly
Replacement of Rego-type seals.
Substitution or addition of fuel cylinders for occasional use: *Cylinders approved for use in the Ultramagic Flight Manual and Supplements may be added or substituted, by the pilot, to the balloon system´s existing cylinders on a flight by flight basis. This action is subject to details of written proof showing current airworthiness of these cylinders and a copy of this document (e.g. Form1, UM RMCY01 card, UK document IR6 or similar) is made available with the cylinders during the flight.*
Pilots are reminded of the requirement of pre-flight checks of all cylinders.

1.1.5 Burner

Overall cleaning using only soap and water
Cleaning of liquid pilot light regulator.
Replacement of pilot light jets and filters
Lubrication not requiring disassembly
Replacement or adjustment of piezzo.
Adjustment of burner gimblal friction.
Removal and refitting of burner in frame.
Replacement of seals in Tema couplings

1.1.6 Burner Frame

Removal and replacement of gimbal bolts, nuts, washers and friction sections.
Removal and replacement of burner frame heat shields.

Section 2 - Envelope Repairs

2.1 Permitted Damage

Damage to the fabric in the lower third of the envelope must be limited to an area affecting no more than 3 panels. These panels may be adjacent.
Holes no greater than 10mm in diameter 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 50mm to each other. No more than 3 panels in the upper two thirds of the envelope may have these small holes.

2.2 General Specifications

All stitching on the structure of Ultramagic envelopes is of the lock stitch type. Chain stitch is not allowed. The stitch length should be between 2.5 and 4 mm. Thread used should be three strand, metric 30 or 40 (210-220 denier) in polyamide or polyester. Needle to be used must be in perfect condition and be of a size no. 110

The end of stitch lines must always be back-tacked or overlapped to ensure the stitch is locked in place. This prevents any possibility of the seam parting.

All panel and gore seams are produced on the balloon with a double fell seam, known as French fell or balloon seam. This is produced by means of a folder on a twin needle sewing machine with a pitch of 8mm (5/16") or 9.5mm (3/8”). The pitch shown on diagram below corresponds to the Ultramagic standard of 8mm. However, pitches above 4mm are also acceptable.

Replacement of any loops or pulleys or similar should always be in identical manner to that originally on the balloon. Gating or back tacking is particularly important to maintain a secure attachment.

Minor simple repairs may be carried out in the lower third of the envelope by applying small patches of fabric or repair tape. Single needle sewing or gluing can be used in this area of the balloon. All other areas must be repaired using a double fell seam.

2.3 The Double Fell Seam (French fell or balloon seam)

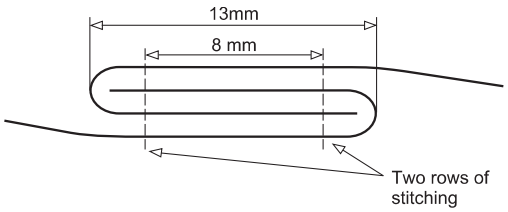


Diagram of fell seam

This seam must always be used when replacing panels and when making patches above the lower third of the envelope. This seam is best produced using a folder with a nominal width of 11 mm (7/16"). The finished seam however will be wider than this. With practise (on scrap fabric, not the balloon) a high level of skill can be attained in producing repairs and replacing panels using this seam. With practise the seam can be produced without

the use of a folder. Never attempt a seam of this kind on a balloon envelope until sufficient skill has been achieved on practise fabric. The continual sewing and un-picking of balloon fabric considerably weakens it and should be avoided.

Where load tapes are present then they should be unpicked first and sewn back separately, once the panel has been replaced. During manufacture vertical load tapes are sewn at the same time as making the vertical seam. This should not be attempted with a panel replacement.

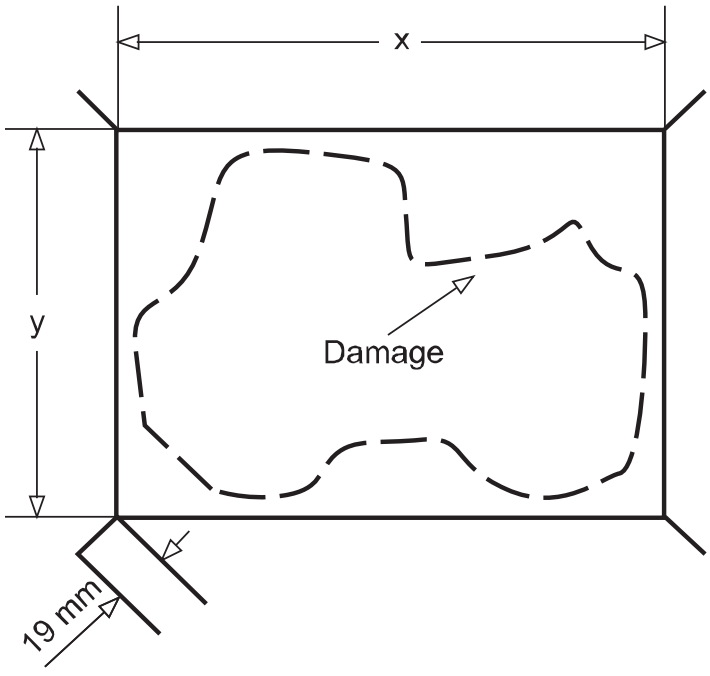
2.4 **Sewn Patches** - (Always the case with Ultralast fabric or above the bottom third.)

This is normally better achieved without a folder in small repairs.

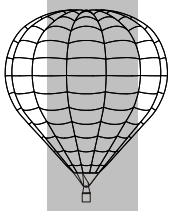
2.4.1 Preferred Method

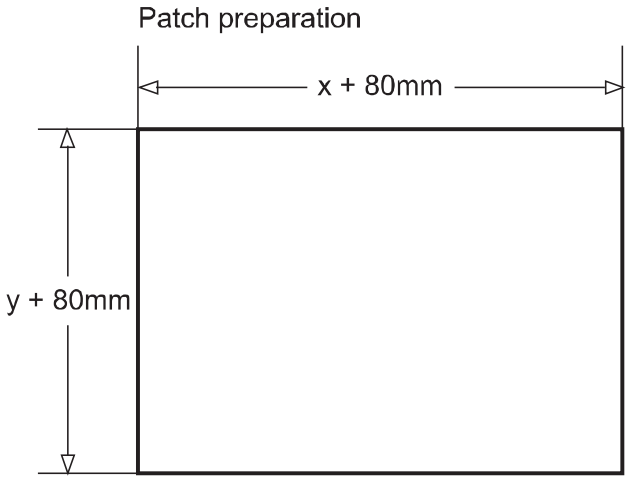
Cut a rectangular hole in line with the weave of the fabric to remove all of the damage. Accurately cut the corners as shown in hole preparation diagram. Cut a patch, again in line with the weave of the fabric, 80mm (3 1/8") larger than the hole in both directions as in patch preparation diagram.

Hole preparation
Double felled patches



Preferred method hole preparation





Preferred method patch preparation

Starting at the centre of one edge fold the fabric to give the required fell seam and carefully stitch round, pin in place if necessary. There should be a minimum overlap/back-tack at the start end point of 25mm (1") This method requires considerable skill and practise. Practise should be carried out on spare fabric first. If needed the patch can only be removed and refitted once after which a larger hole should be prepared with a larger patch.

Where possible, it is preferable to extend the cut of the patch to the original edge of the fabric, replacing existing stitching instead of adding new seam.

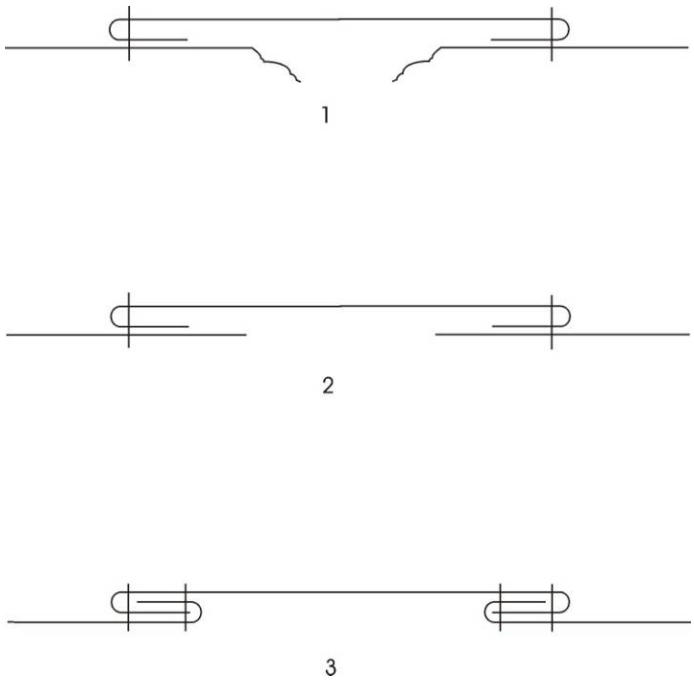
Where difficulty is being encountered in producing the above patch repair the following method may be used. This method below produced well, is preferable to a poorly produced seam shown above.

2.4.2 Alternative patch method

Cut a rectangular patch in line with the weave large enough to overlap the damage with sufficient extra to allow for folding. Fold the edges of the patch over by 13mm (1/2") and sew to the balloon around the outside edges only.
Carefully and accurately cut away the damaged area leaving 10mm (3/8") overlap.

Fold the edges of the original panel under the edges of the patch, cutting at the corners and add the second row of stitching resulting in the finished patch as shown below.

Note: Where the damage comes to within 25mm (1") of an existing balloon seam then that seam should be un-picked with the patch extended to the panel edge. The seam should be re-sewn with a double fell seam (French or balloon seam)



Alternative patch method

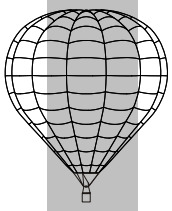
2.5 **Adhesive or repair tape Patches** - (Only in the bottom third.)

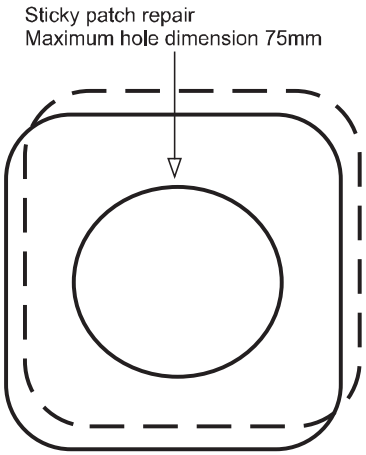
This method may be used for minor damage i.e. in the lower third of the envelope or if above this area, no hole greater than 25mm (1") in any direction or tears no greater than 75mm (3") in any direction.

Cut a circular patch of fabric that overlaps the damage by at least 25mm (1") all round. This should then be fixed to the balloon with a good quality impact adhesive. It is then preferred that the patch be then sewn around to maintain permanency.

An alternative to gluing balloon fabric, where there are simple short tears, is the use of rip stop self-adhesive repair tape. However with this method it is compulsory to sew around the edge where the tear is above the lower third of the balloon envelope.

Note: The adhesive patch or repair tape method should not be used with Ultralast fabric unless it is sewn all around. Similarly the adhesive patch or repair tape method must not be used where damage is closer than 25mm (1") to a load tape. In both cases a sewn repair must be used.





Two patches used, one inside balloon and one outside

2.6 Panel replacement

Where the damage is extensive to a panel then it is better to replace it completely. One may also decide for cosmetic reasons to replace a complete panel. In both cases it is important that the damaged panel is carefully removed by unpicking the stitching. Do not pull or tug at the seam whilst unpicking as the remaining good panels may be damaged at the seam line. Unpicking is best achieved using a seam ripper or very small scissors and then cut every 2nd or third stitch. The thread should then be carefully pulled to open up the seam. Always remove stitching at least 50mm (2") beyond the edge of the removed panel.

Whilst vertical seams have only one set of stitching through the panel and load tapes, horizontal tapes are sewn on separately and require 2 sets of stitching to be unpicked.

The panel to be replaced can be supplied ready cut by Ultramagic or one of its agents. Alternatively a pattern can be prepared from the balloon using an undamaged panel alongside.

The panel must be installed using a full fell seam using the correct thread, needles, and stitch length and seam width. All tapes should be refitted after the panel has been successfully installed. The original stitching in the envelope must be overlapped by the repair stitching by at least 25mm (1") at the beginning and end of every seam.

2.7 Repair and Panel replacement inspection.

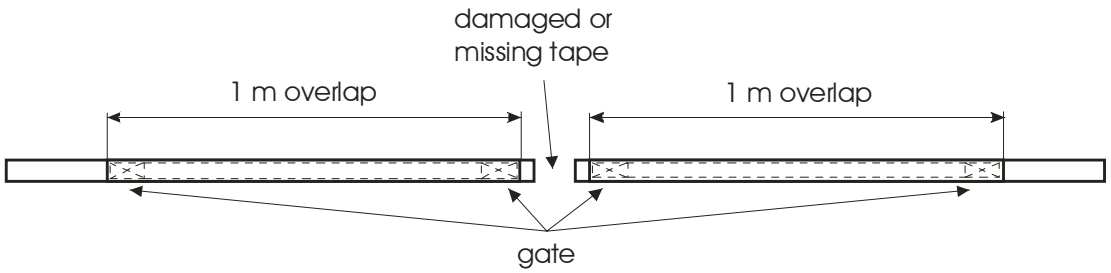
Pull the repaired area flat. There should be no signs of tucks or pulling or wrinkling in the fabric. Any of which could cause undue stresses in the envelope.

Stitch lines and overlaps must be in accordance with the specifications shown with 25mm overlap.

2.8 Load tape repairs

No damage is allowed to load tapes and any damage deems the balloon not airworthy. Great care must be taken repairing load tapes and the repair should be carried out using the identical load tape to that which is damaged. The tape must always be heat sealed when cut to prevent fraying. This can best be achieved by using a hot knife or failing this, it can be sealed using a flame. However in both cases care should be taken to ensure that the resultant edge to the tape is not sharp or this could cause damage to the adjacent fabric areas.

There should be a minimum of one metre overlap away from the damaged position in each direction with 1 gate of 20x50 mm minimum at each end.



If a tape has a minor burn or chafing damage a piece of tape of the same quality can be simply stitched over the top of the damaged section. The length must be enough to cover the damage plus the end joints of 1 metre (39") each end. Tape ends should be heat-sealed with a heated knife or open flame to prevent fraying. Avoid stitching through the heat sealed end of the tape. Also do not allow the stitching to run off the tape onto bare fabric. The tape should be sewn with 2 rows of stitching as specified in fabric repair and the end of each tape should be back tacked a minimum of 25mm (1") and with one gate of 20x25 mm minimum at each end.

Where the load tape is damaged and needs removal from the balloon then it must be unpicked and not cut off. The only exception to this is for the turn-backs at the wire attachments and the crown ring fixing. In these cases it can be easier to carefully separate the 2 sections of tape with a sharp blade, taking extreme care not to damage the section of the tape to remain on the balloon or to damage adjacent fabric.

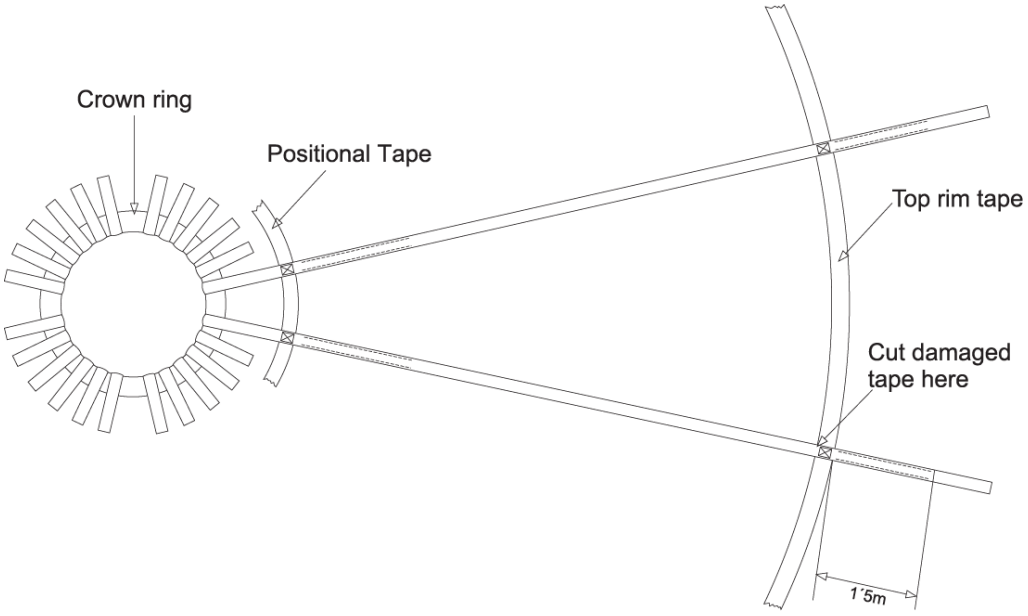
Where a tape is damaged near to one of its ends it may be preferable to replace the complete section from the damage to the end.

In all cases the minimum overlap must be 1 metre with a 25mm back-tack and 1 gate of 20x50 mm minimum a at each end.

2.8.1 Crown (Overlying tape) repair

Where these tapes are damaged then they must be replaced as follows:
First accurately measure the length of the tape to be replaced as well as the adjacent tapes.
Carefully cut and heat-seal the damaged tape at the point where it immediately joins the top rim tape. (See drawing below.) Carefully remove the tape from the crown ring by unpicking and also unpick from the position tape. Using the removed tape for length,

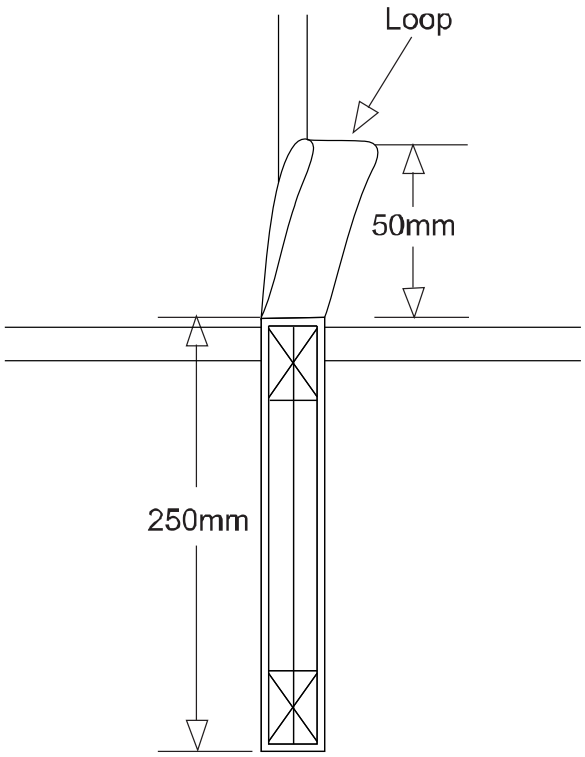
measure and cut a new section of tape adding on an additional 1.5 metres. Stitch these 1.5 metres of tape on the outside on top of the existing tape on the balloon with a heavy back-tack or gate at each end. Re-sew this new tape to the crown ring and position tape using the same stitch pattern as the original. Recheck the finished length and compare with the adjacent tape. It should be identical.



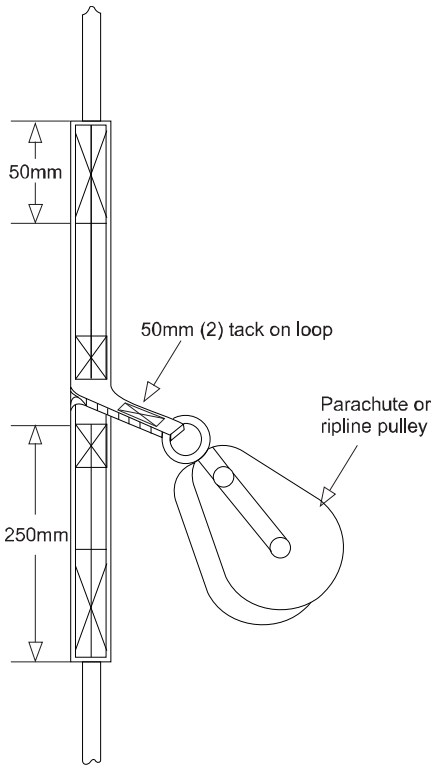
Load tape repair - crown ring

2.8.2 Loop and pulley attachments

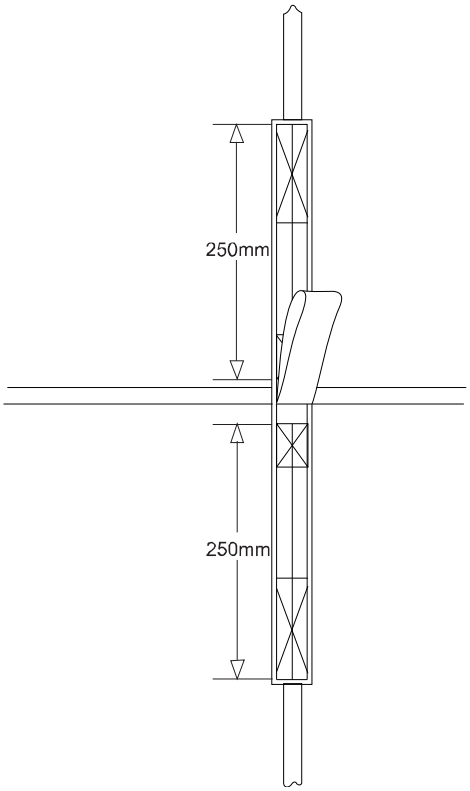
Where these are damaged they should be completely be replaced using identical tape and be sewn exactly as before. See the following 4 drawings for method and measurements.



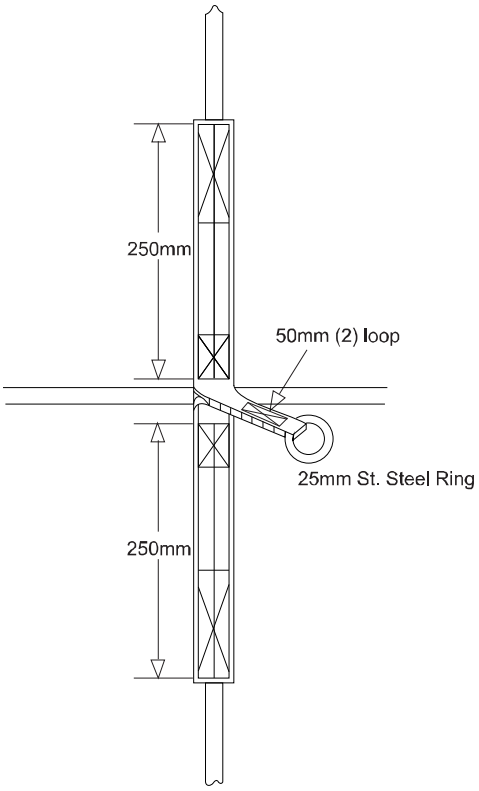
Attachment of parachute loops



Typical pulley attachment



Control line tie off loop



Rotation vent line ring attachment

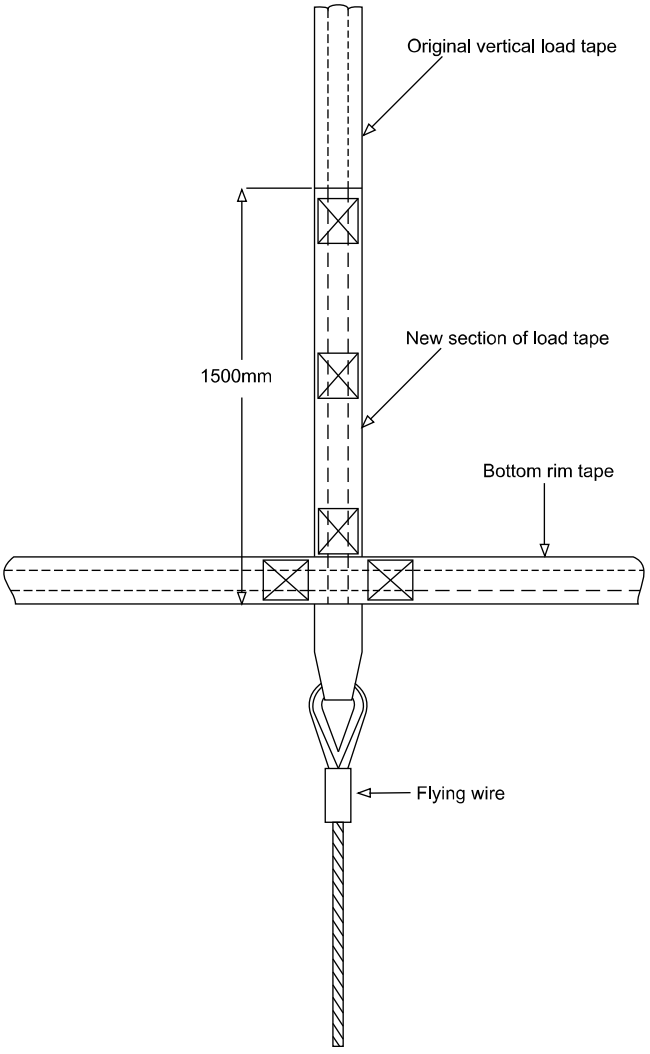
2.9 Flying wire replacement

A cable when damaged must be replaced completely by one identical to that damaged. When ordering the wire, the length is determined by measuring from the inside of the thimble to the inside of the thimble with the cable fully stretched. Where the wire is part of a pair as is the case with 24 gores and some of the wires on 20 and 28 gore envelopes, then both in the pair should be replaced.

The wires are removed as follows. (See drawing below)

1. Unpick and remove the flying wire protector.
2. Unpick and remove the tape turnback.
3. Remove the damaged wire and thread on an identical new one onto the tape turn back making sure that the wire protector is also assembled.
4. Sew back the turnback in its same position, maintaining the 1 metre overlap and 25mm backtrack.
5. Sew back the flying wire protector.

Note: when replacing a pair of wires, care should be taken to ensure that the wires are free from twists, as very often these cannot be removed once the sewing is complete.



Flying wire replacement

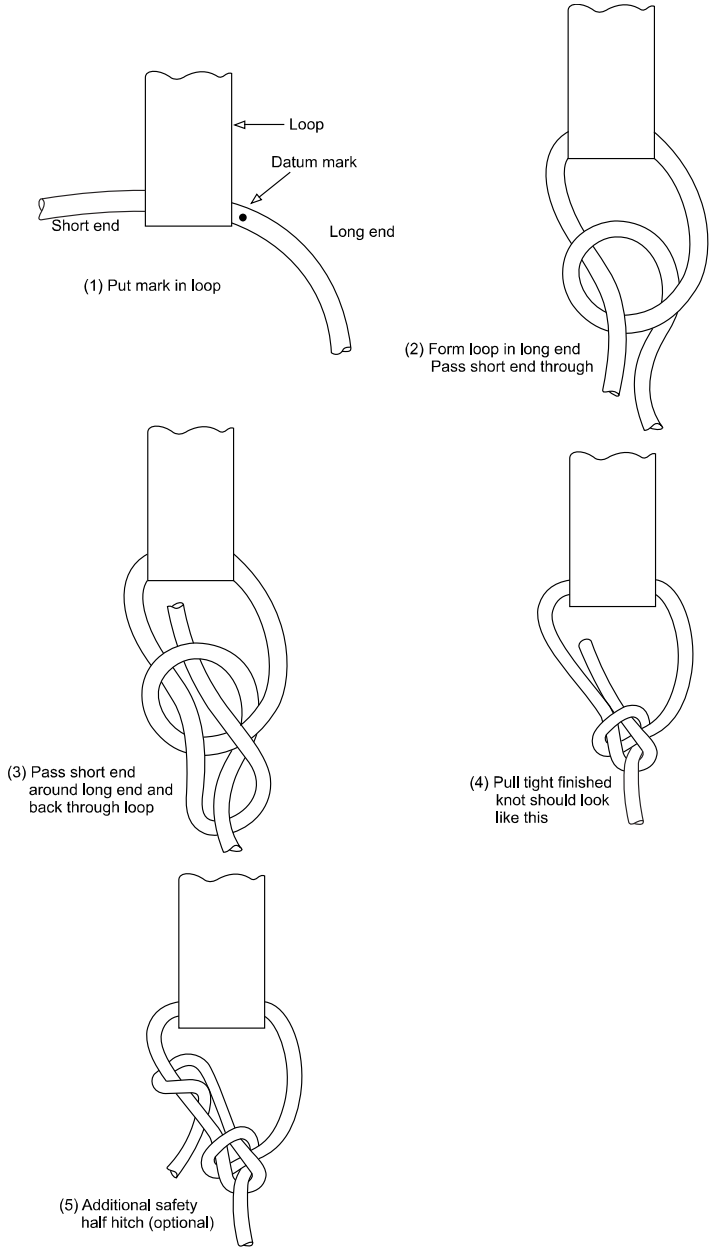
2.10 Control Lines

2.10.1 General

Damage to control lines is not permissible and with the exception of the crown line and turning vent lines, any damaged line must be replaced in its entirety with a line identical to that, which is installed in the balloon.

All control lines are installed using a bowline with the exception of where the parachute release lines are fitted to the parachute pulley.

See the following drawing showing a typical bowline knot, which is used throughout for control line attachment. The drawing shows the use of the knot for a parachute retaining line attachment. However the knot is tied in an identical manner in all cases.

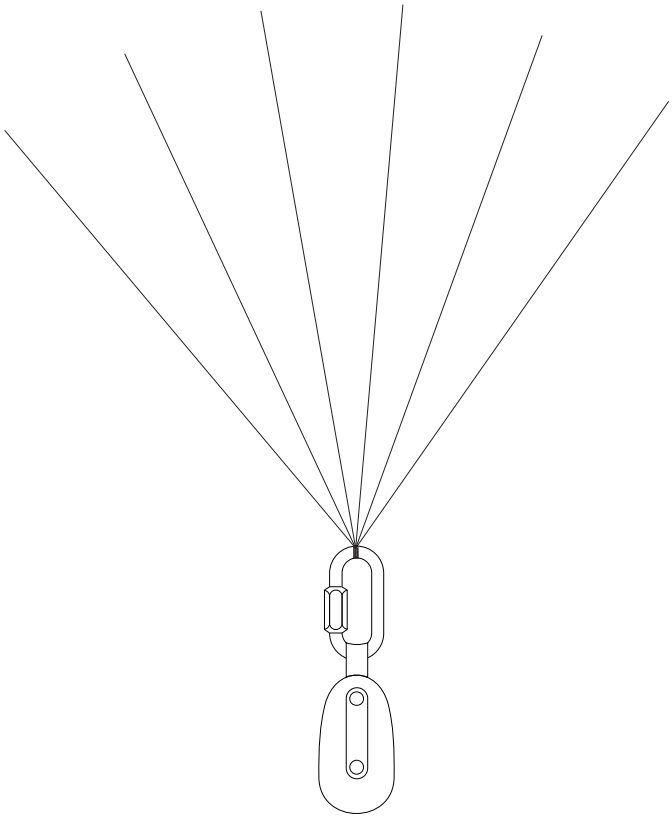


Bowline diagram of parachute retaining line

2.10.2 Parachute release and retaining lines

These are 3mm Kevlar where a standard parachute is fitted. Where an FDS rapid deflation system is installed then these lines are Kevlar core with polyester on the outside and are 2.5mm diameter. The length required should be determined by measuring an existing line. These lines have an additional lock knot as well as a bowline knot.

The overall length of these lines must not be reduced, as this will affect the correct operation of the parachute.



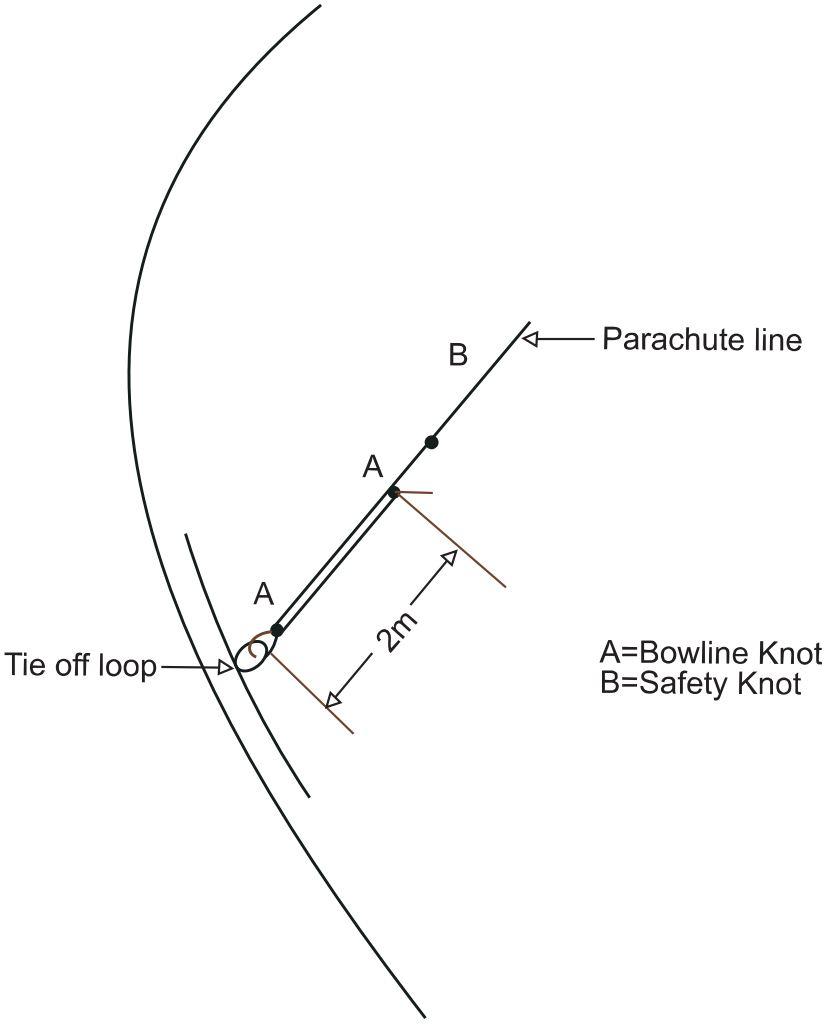
Parachute release line attachment to pulley using a Quick Link fitting.

2.10.3 Crown Line

Crown lines are made of 10mm polyester and are set lengths for each size and type of envelope. If replacement is required then the length should be identical to that already fitted to the envelope. The crown line is attached to the crown ring by means of a bowline knot with a second bowline as a safety knot.

2.10.4 Parachute control line

These are installed with an excess stored in a loop at the fixed end. If burn damage occurs within the first metre close to the free end then the damaged section can be removed and the excess stored rope may be let out to accommodate. Any damage other than this requires careful consideration to ensure no joints from a partial replacement interfere with the operation of the balloon. In doubt, replace the complete line or contact Ultramagic. Parachute lines should be tied with two bowline knots and the safety knot as shown below. The safety knot should be big enough to jam in the parachute pulley in the event of the end-fixing failing.

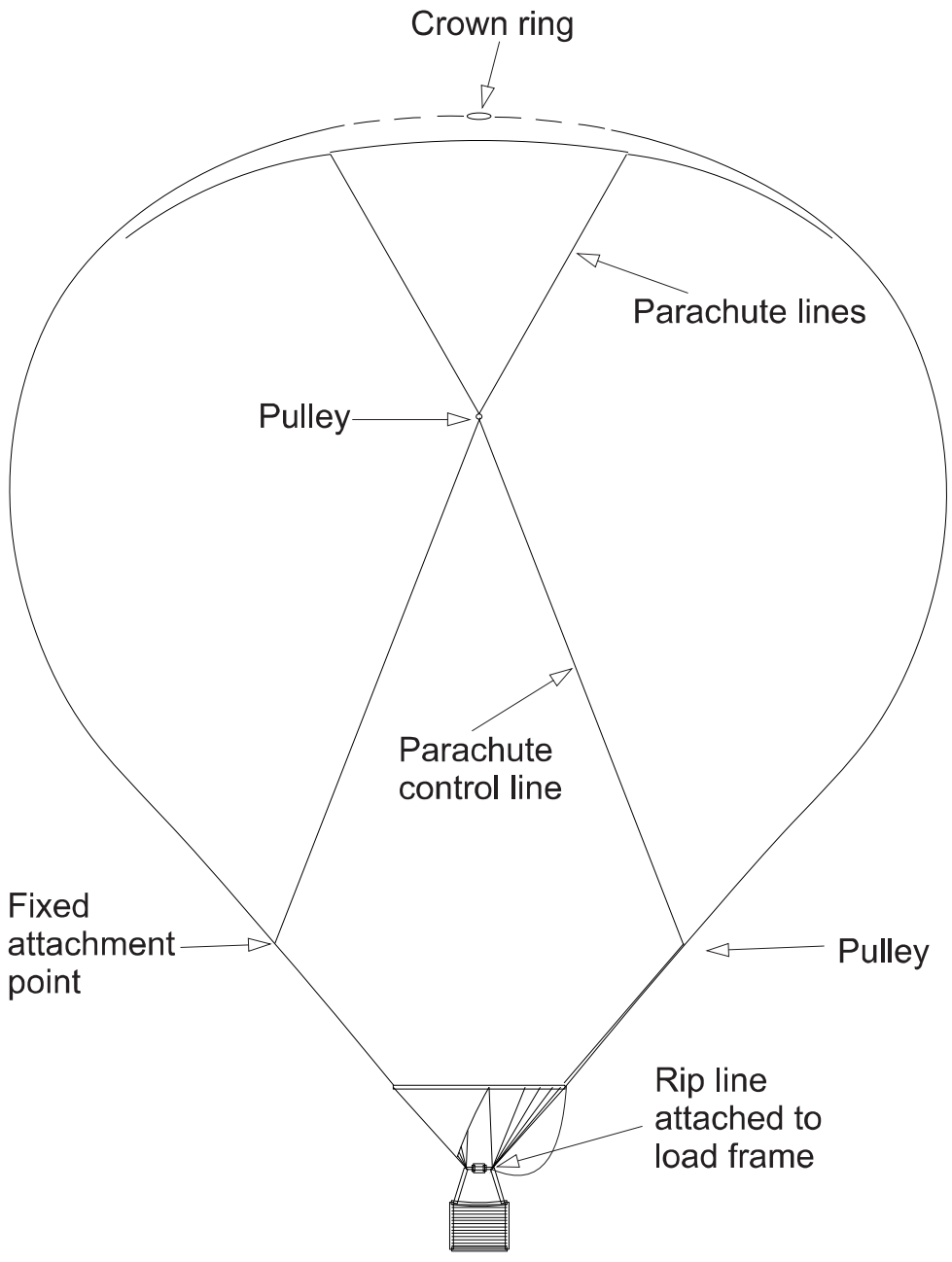


Parachute control line tie off

When fitting new lines then refit as the original with spare at the tie off end. This is best done with the balloon cold inflated and by following the path of the old one with the new one. Care should be taken to avoid crossing or tangling the lines. The balloon should then be fully inflated to set the length of the line. Any slack in the line should be taken out with the balloon fully pressurised and without applying too much tension to the line. The required length can then be marked and cut off and sealed with a hot knife or flame.

Where a FDS system is installed the parachute control line is left long to allow correct operation of the system and to allow movement of the line up into the balloon. Allowance must be made for this.

See diagram below for rigging of parachute lines on a non-FDS system. i.e. parachute only

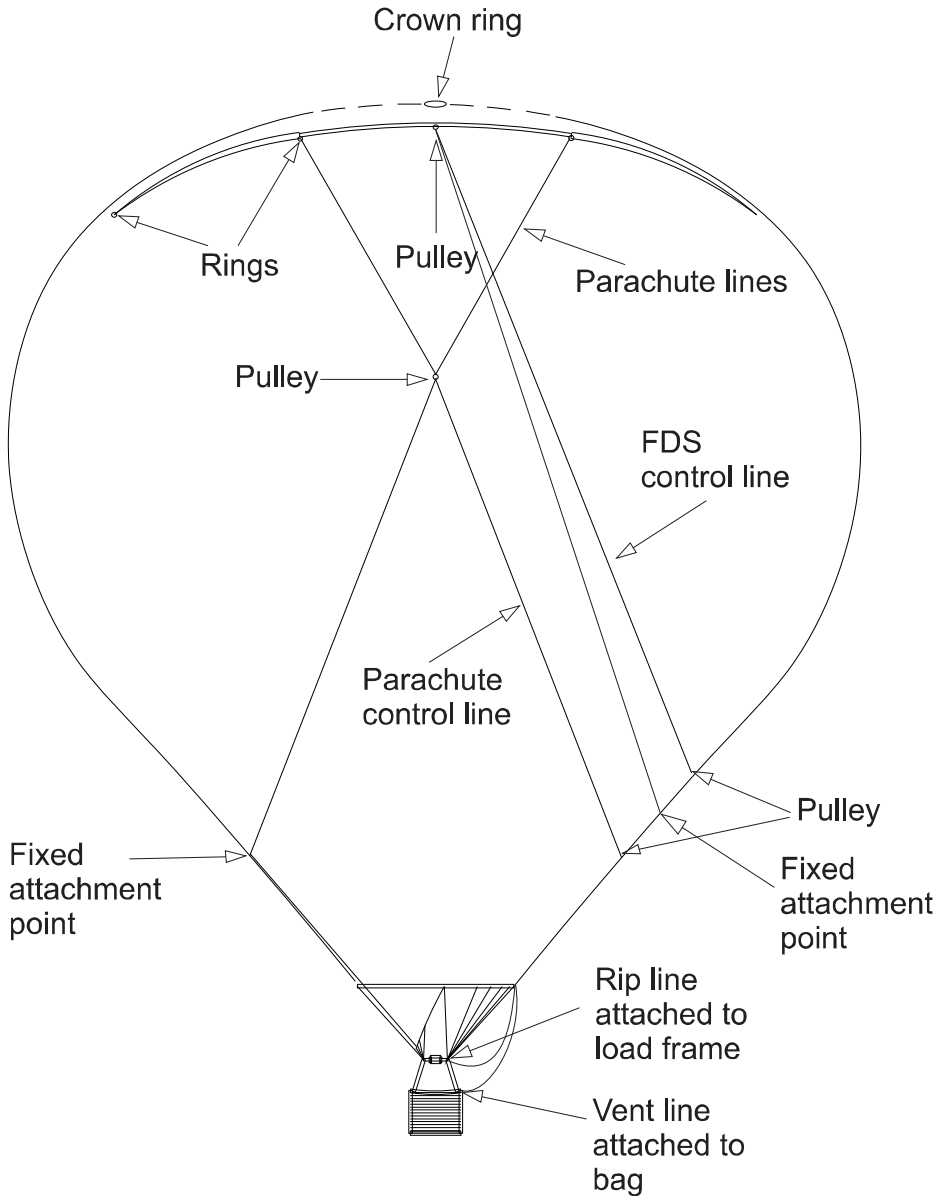


Parachute line rigging 12

2.10.5 FDS control line

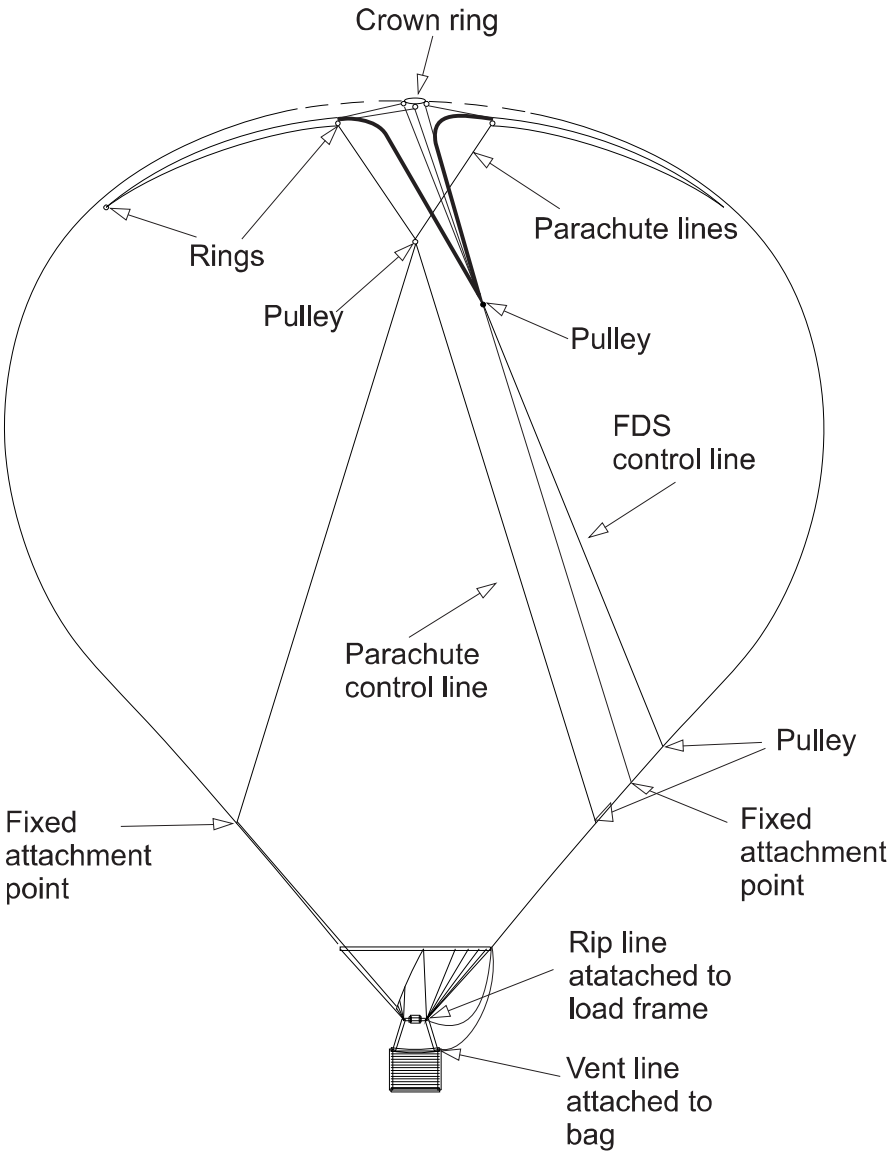
Any damage to the FDS control line means complete replacement is required with an identical line to that which is fitted to the envelope. The line is attached to the centre of the parachute by means of two bowlines. This is best done with the balloon cold inflated and by following the path of the old one with the new one. Care should be taken to avoid crossing or tangling the lines. The balloon should then be fully inflated to set the length of the line. Any slack in the line should be taken out with the balloon fully pressurised and without applying too much tension to the line. The required length can then be marked and cut off and sealed with a hot knife or flame.

See following diagram below for rigging of FDS control line.



FDS rigging closed

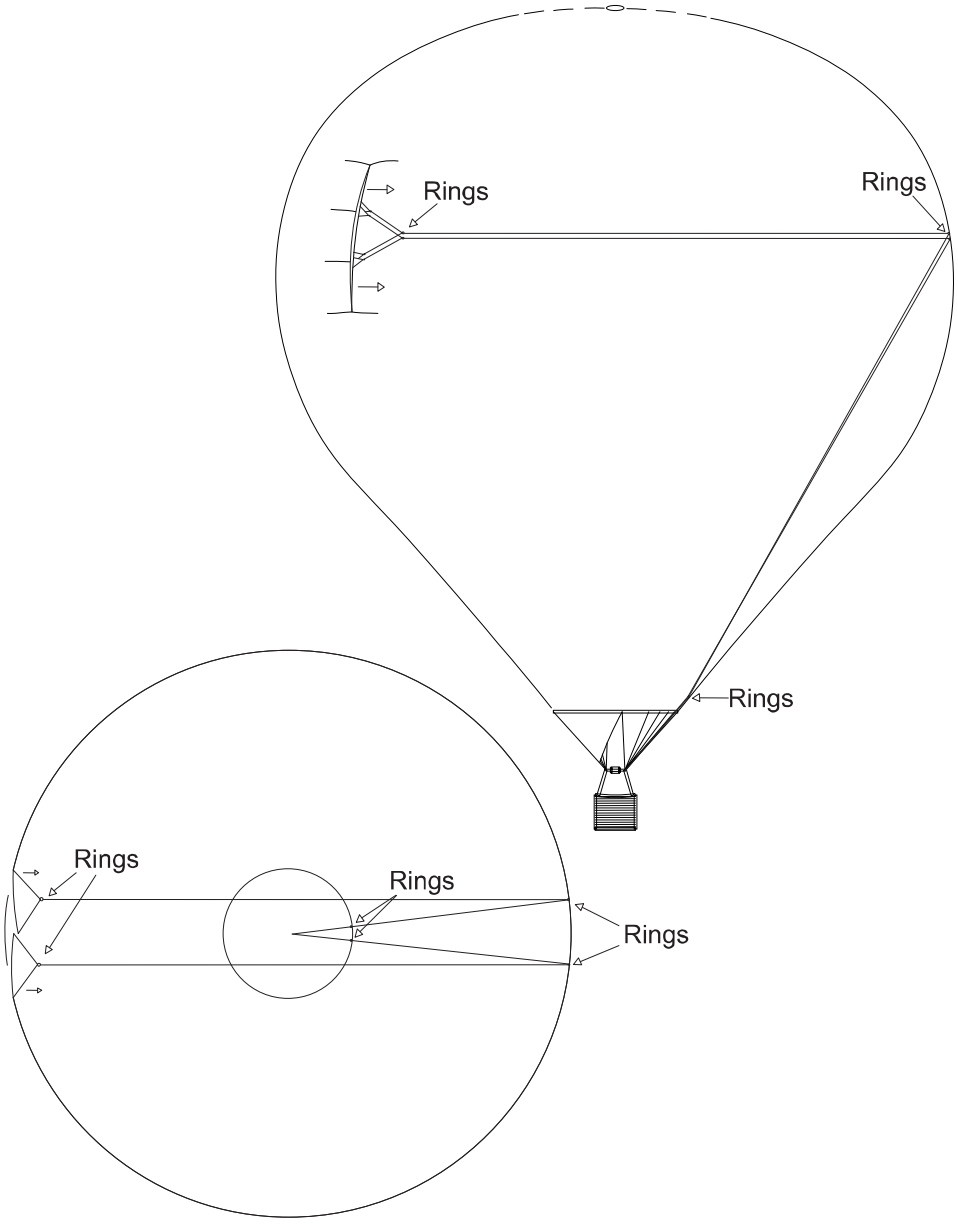
The action of the FDS system should be thoroughly tested to ensure correct resealing of the parachute a number of times prior to the first flight of the balloon after line replacement.



FDS rigging open.

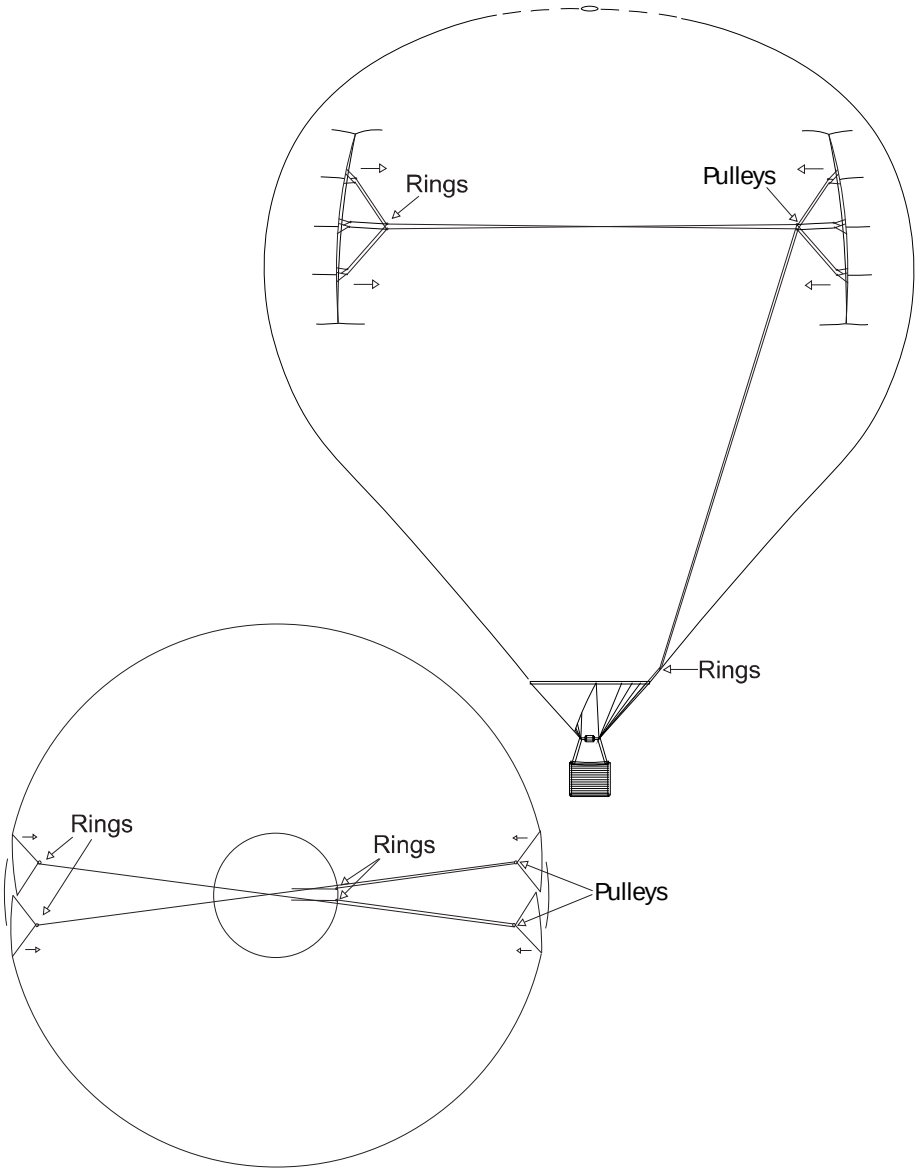
2.10.6 Turning Vent Control Lines

If a turning vent line is damaged or burned near one end, it is permitted to install a new section up to a maximum of 2.5 metres. Damage in excess of this requires that the complete line is replaced to one that is identical to the one installed in the balloon envelope. Installation is similar to that of the parachute line and extreme care should be taken to ensure that the lines are not crossed or twisted.



Turning vent line rigging (single)

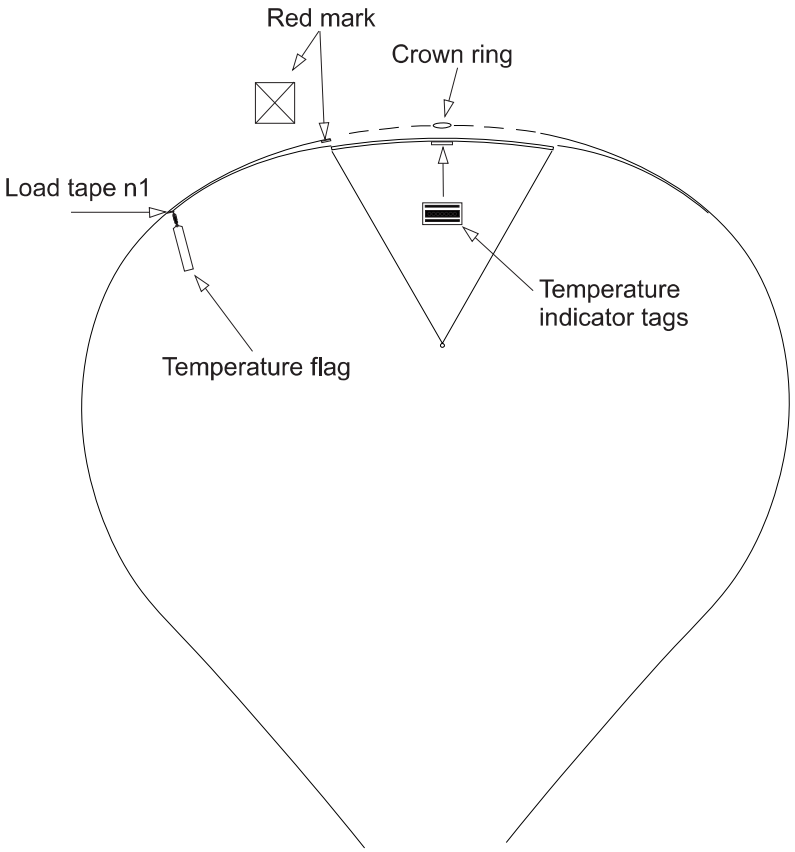
Note that turning vent control cords are routed in a different manner depending whether if the balloon has one set of rotation vents or two. In the first case, blue and black cords are always routed parallel, whilst double sets of rotation vents require the cords to be crossed at the centre axis of the balloon. Note also on the figures the alternative use of rings or pulleys on both arrangements.



Turning vent line rigging (double)

2.11 Temperature Indicators

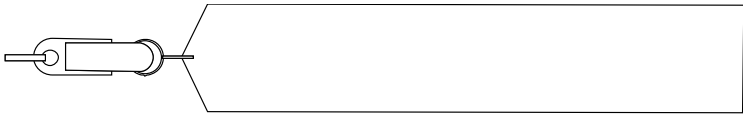
These consist of the 1. Temperature Flag and 2. Temperature Tags
They are installed in the envelope at the positions shown in the diagram below.



Temperature indicator positions 16

2.11.1 Temperature Flag

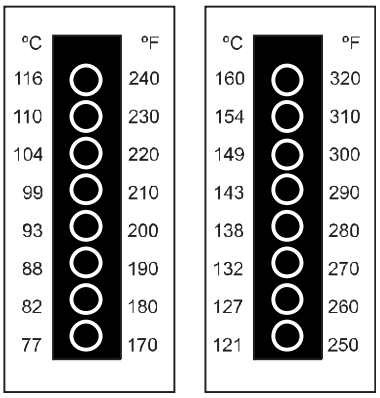
This consists of a flag of balloon fabric attached to the inside if the balloon by means of a specially designed fitment. When the inside of the envelope reaches a temperature beyond the maximum approved then the fitment releases the flag. When the fitment returns to a lower temperature it adjusts to its original position. It is therefore possible to refit the flag by pushing it back into its fitting. Therefore this part should only need replacing if it becomes lost or damaged. A release of the flag indicates that the envelope fabric may have been overheated. This can be confirmed by reading the temperature tags once the envelope has been deflated.



Temperature Flag 17

2.11.2 Temperature Tags

These are indicators which change colour to black once a certain temperature is reached. If they show a temperature above the maximum authorised then a fabric test should be carried out as the fabric may be permanently damaged. Note of this should always be made in the balloon logbook. As long as the fabric is still within test requirements then a new tag may be fitted so that indication of further overheating can be maintained. This is stuck and then sewn in place as the original as shown in the above diagram.



Temperature Tags

2.12 Envelope Materials

2.12.1 Sewing Thread

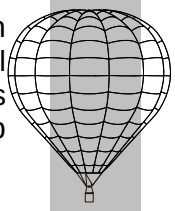
Ultramagic use polyester, metric 40 size, 3-strand continuous filament thread in envelope manufacture. The same specification nylon thread is an acceptable alternative. No other type of thread may be used.

Nomex thread is used where sewing nomex accessories. This thread however must never be used on balloon seams or load tapes.

2.12.2 Fabrics

The following fabrics are used in the manufacture of Ultramagic envelopes. (See also Ultramagic Balloon Fabric Specification sheet Appendix 1.)

High tenacity nylon fabric with polyurethane coating - This has a rip-stop construction. The coating has various additives to reduce the effects of Ultraviolet rays and to prevent fungal growth. This fabric is used generally throughout the envelope with the exception of the parachute and top panel and the mouth panel. This fabric should not be used as a substitute for the following silicon coated fabric.



High strength nylon fabric with a silicon base coating - This is of a plain weave and can also be identified by its slippery finish. This fabric is used in the parachute and top panel as standard but also may be used in other areas of the envelope. Where this fabric is used in the envelope it must be repaired or replaced with the same fabric. The rip-stop polyurethane fabric must not be used.

The mouth or throat panel and scoop/skirt of the balloon are made from fire resistant fabric (Nomex – weight 160 grm/m2 minimum). This is much thicker than the nylon materials and is porous. This area should normally be repaired with the same material.

The fabrics described and specified may be substituted with an equal or higher specification. (See Ultramagic Balloon Fabric Specification sheet Appendix 1)

2.12.3 Load Tapes

Ultramagic load tapes are made from polyester. Similar tapes may be used for repairs providing the strengths quoted on the Load tape Specification table below are exceeded.

Series	Volume	Vertical Load tape size MM.	Load tape strength Kg.
H	31 42	18	1300
	56 65 77	25	1800
S	90 105 130 160	25	1800
T	150 180 210	25	1800
V	56 65 77 90 105	18	1300
M	42 56 56c 65 65c 77 77c 90 105 120 130	*14 18	*900 1300
	145 160	18	1300
N	180 210	18	1300
	250 300 355 425 500	25	1800
Z	90	25	1800

* Where ULTRAMAGIC major modification nr.16 applies
- Horizontal: Flat 17 mm (Strength 650 kg)

2.12.4 Flying Wires

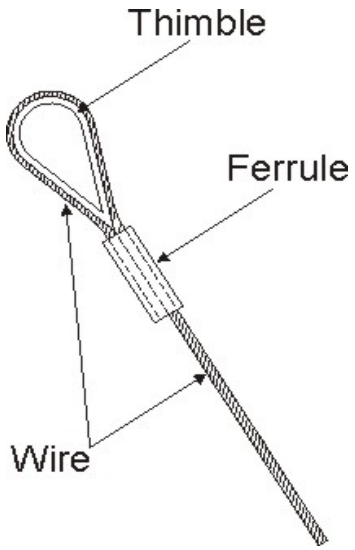
These wires must be made from stainless steel wire.

Type 3mm diameter 7 x 19 construction AISI316 stainless steel to BS MA29
Type 4mm diameter 7 x 19 construction AIS1316 stainless steel to BS MA29

Series	Volume	Wire Diameter MM.	Minimum Wire strength Kg.
H	31 42	3	500
	56 65 77	4	900
S	90 105 130 160	4	900
T	150 180 210	4	900
V	56 65 77 90 105	3	500

M	42 56 56c 65 65c 77 77c 90 105 120 130	*3 4	*500 900
	145 160	4	900
N	180 210	3	500
	250 300 355 425 500	4	900
Z	90	4	900

* Where ULTRAMAGIC major modification nr.16 applies

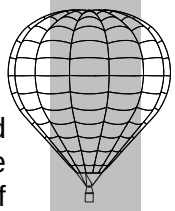


The wire ends are produced by the fitment of a thimble and then by a swaging of a copper ferrule. This is a special process, which requires special tooling controlled to exacting standards. Therefore wires may only be used that are produced and supplied by Ultramagic S.A. Any variation to this rule is only allowed by written authority by Ultramagic S.A.

2.12.5 Ropes and Chords

The ropes and chords used in Ultramagic balloons have been selected and tested to meet their various requirements and are made of synthetic material. The following specifications must be adhered to.

1. Parachute retaining lines are 3mm. diameter Kevlar when a standard parachute is fitted. When a FDS rapid deflation system is installed in the balloon then the Parachute retaining/release lines are Kevlar core with a polyester outside and are 2.5mm diameter.
2. Parachute release lines on a parachute only system are 3mm diameter Kevlar.
3. Parachute control line is Kevlar core with polyester outside and is 8 to 10mm diameter. When a parachute only is installed then this line is red. When a FDS rapid deflation system is fitted to the envelope then the parachute line is white.
4. FDS control line is Kevlar core with polyester on the outside. This line is always red and is 8 to 10mm in diameter.
5. Rotation Vent lines are Kevlar core with polyester on the outside and are of 5mm diameter, or alternatively 4mm for envelopes not above size 210. The right is blue and the left is black
6. Crown Line is 8 to 10 mm polyester in white with a red stripe.



2.12.6 Pulleys

Parachute pulleys are generally made from “Tufnol” which is a fibre reinforced resin. Two types are used, the Becket and non-Becket. When replacing pulleys one should always use an identical type. The Becket type is normally used where a rope has to be tied back to the pulley. In all other cases a non-becket type is used. Alternative supply of pulleys must not be used in lieu of Ultramagic pulleys.

2.12.7 Guide Rings

These are made from 5mm diameter stainless steel wire. The internal diameter is 25mm These are welded and polished. Alternative supply of rings must not be used in lieu of Ultramagic rings.

2.12.8 Karabiners

The only permitted type is Stubai rated to 3000 Kg. For N-500 envelope or C-14 basket it will be used the Stubai 4000 Kg karabiner.

2.12.9 Control Line Hooks

These are vital parts that are required to maintain control of the balloon. No substitution for genuine Ultramagic parts is allowed.

2.12.10 Scoop Fixings

Whilst not vital to safety it is still important to use similar sized items to the factory fitted ones. However material and finish should also be similar.

2.12.11 Quick Links

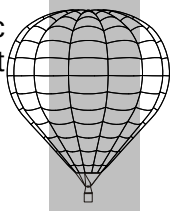
These are used in the parachute release line attachment to the pulley and are vital parts to maintain control of the balloon. Only Ultramagic supplied parts are allowed.

2.13 Envelope Cleaning

2.13.1 Envelope fabric and load tapes.

Cleaning of the envelope should only be undertaken when it is likely that it will be able to dry out.

Only use warm water washing by hand with a gentle soap solution. Do not use any strong or biological detergent or agents, which have a bleach content as this can damage the protective coatings of the fabric. Do not rub the fabric too hard and avoid the use of abrasive materials. Always rinse off the soap with plenty of clean water.



The envelope must not be stored wet or damp as the moisture can cause fabric deteriation 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.

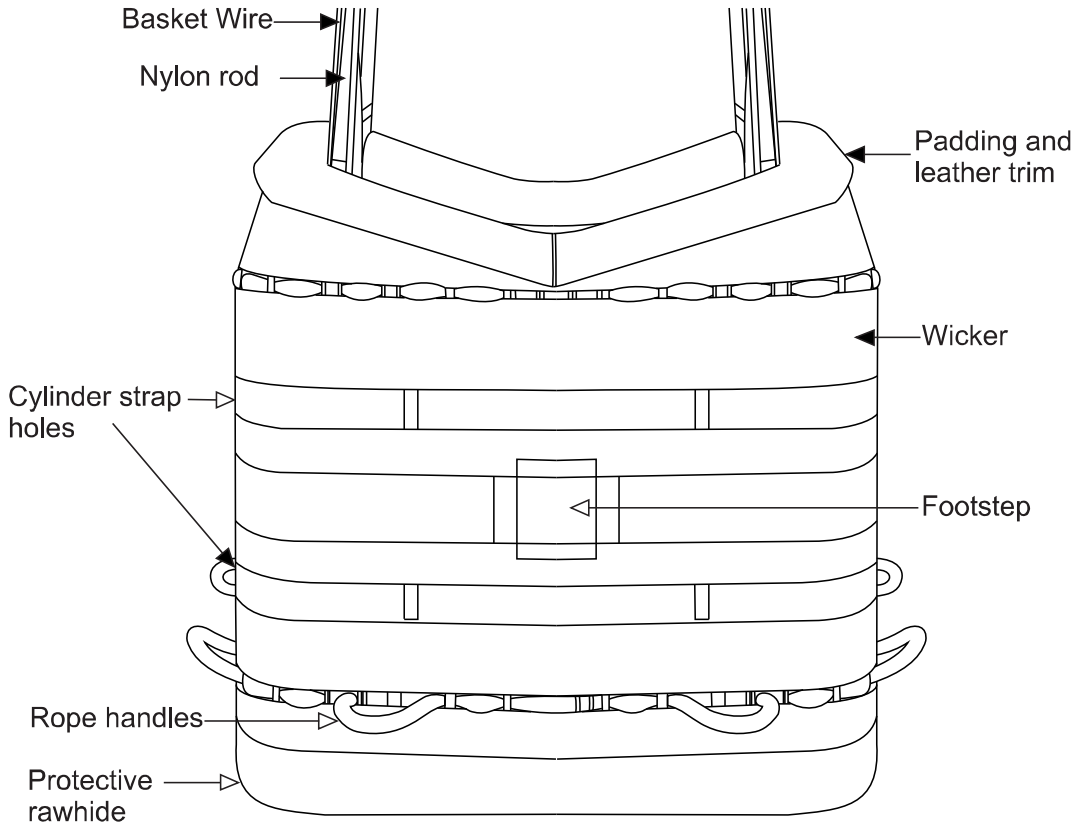
CAUTION: Hot inflating a very wet envelope may cause damage to the fabric.

2.13.2 Velcro

It is very easy for Velcro to have waste material, grass etc. trapped on it because of the nature of the material. This can affect the efficiency of the Velcro. It is therefore recommended that both parts of the velcro are regularly cleaned by carefully removing any trapped material. Do not use water as this can affect the efficiency of the Velcro joint

Section 3 - Basket Repairs

3.1 General Maintenance

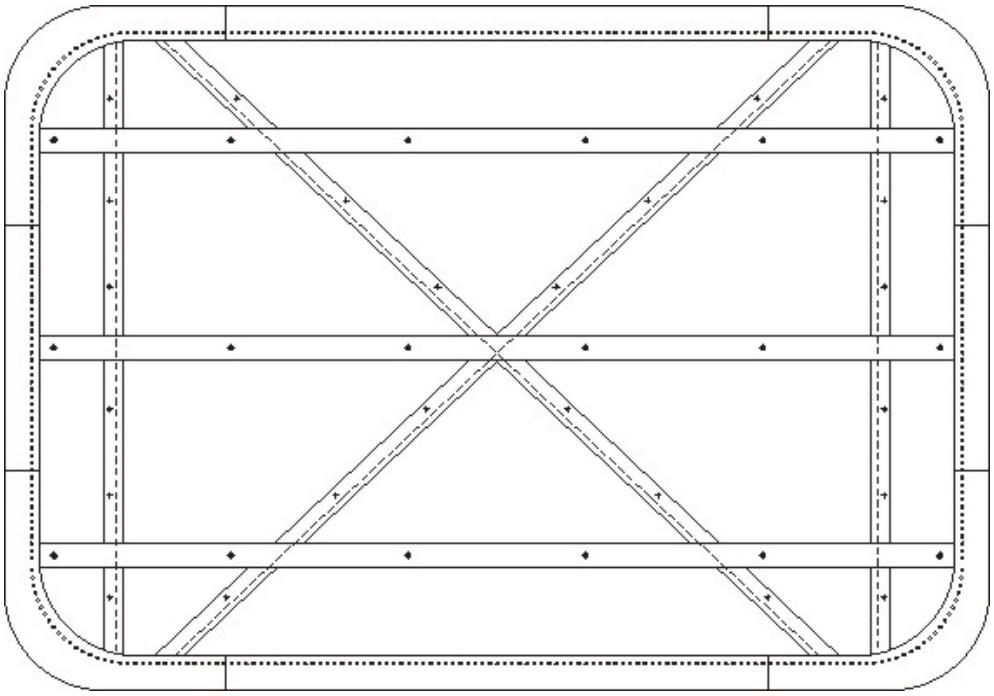


Basket general view

The basket should regularly be cleaned and inspected. The basket may be washed with soapy water (no strong detergents.) It must then be allowed to dry before storing. Internal floor padding / foam (if present) must be removed to enable proper drying.

The basket may be varnished with any good quality varnish. This is best done after washing and before the wicker has totally dried out. This allows the wicker to remain flexible and prevents it from becoming brittle. Alternatively the wicker may be treated with Linseed or Danish oil.

The leather or suede trim may be treated with any proprietary suede or leather cleaner.



Basket floor from the outside

3.2 Basket Frames

Slight bending or distortion of the frames is not a problem as long as no kinks or cracks have been produced. However if there is any doubt then it is important to contact Ultramagic S.A. or one of its agents for advice. Any frame repairs must be carried out in consultation directly with Ultramagic SA.

3.3 Basket Wires

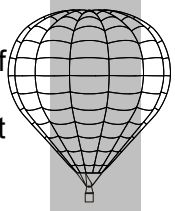
No damage to the suspension cables is allowed. Any damage must be repaired by either replacing the wire completely or by swaging in a new section. This work can only be carried out by Ultramagic SA. Or by a qualified and experienced person or organisation, who is approved by Ultramagic SA or the appropriate aviation authority.
Wire ropes and swages used must be supplied by Ultramagic SA. Or one of its agents.

3.4 Rawhide

This must be kept in good condition to prevent damage to the bottom structure and floor of the basket. Any damaged section of hide should be replaced. The hide is applied in a wet soaked condition first being stapled to the bottom floor and then laced through the wicker. A minimum overlap of 50mm (2") should be allowed due to shrinkage when dry.

3.5 Wicker

Distortion of wicker is not a problem however any damaged canes should be inspected and any sharp ends trimmed off. The damaged are must me monitored on a flight-by-flight basis. Any area of damage larger than 60mm diameter must be repaired prior to flight. This repair must be carried out by Ultramagic or an approved Repair Station. No sharp edges should be left protruding.



Should the wicker damage or the intended repair be affecting the structural integrity of the basket then Ultramagic SA. Or one of its agents must be contacted for advice.
It is permissible to straighten distorted wicker by soaking in water and then by allowing it to dry whilst being supported in its correct position.

3.6 Basket Runners

Reasonable wear and tear to runners is acceptable as they are designed to take abrasion and protect the floor. However they do add considerable strength to the basket and must therefore be replaced if cracked or badly damaged. If there is any doubt contact Ultramagic SA. Or one of its agents.

3.7 Basket Floors

Cracks in the floor visible on both faces less than 75mm (3 ") are acceptable as long as they are monitored on a flight-by-flight basis. Any cracks greater than this must be repaired by gluing and screwing a patch over the damage. This patch must be of marine plywood of the same type and thickness as the floor. The patch must overlap beyond the damaged area by 25mm (1") on the underside of the basket. The patch must not interfere with the suspension cables. The repair must not leave protrusions of a sharp nature inside the basket.

3.8 Basket Poles

Poles must be replaced if broken or cracked. Ultramagic SA or one of its agents must supply these.

3.9 Basket Materials

The basket wicker used is first grade quality palambang, kaboo willow and can.
The Floors are manufactured from 18mm and 20mm varnished marine plywood.

The basket wire cables are made from stainless steel (7 x 7 + 0 or 6 x 7 +1) and are terminated by stainless steel thimbles and copper ferrules.

The basket wire for C0, C1 and C2 baskets is 5 mm with a breaking strain of 1300 kg
The basket wire for all other baskets is 6 mm with a breaking strain of 1700 kg.

3.10 Pilot restraint harness attachement point (where fitted)

The attachment point where fitted is installed as shown (see photo 3.1) Ensure that the attachment fixings are secure and free from damage.
Cracks or damage to the floor in this area could weaken the security of the attachment. Therefore damage is not allowed in this area. Should any damage be noticed then contact Ultramagic S.A or one of its agents for advise and details of repair scheme.

photo 3.1

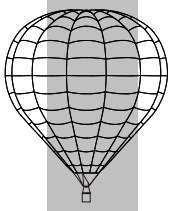
photo 3.2

3.10 Pilot restraint harness (where fitted)

The pilot restraint harness where fitted is attached to the pilot restraint harness attachement point as shown (see photo 3.2).

The harness (see photo 3.3) can be removed and refitted by undoing the quicklink fitting. When in use the quicklink must be secure at all times. All buckles and fittings must be free from damage and must work and secure correctly. No damage is allowed to any of the fittings or webbing. Any damaged parts or webbing must be replaced with new items.

photo 3.3



Section 4 - Fuel Systems

4.1 General Notes

It is very important that all work to fuel systems and burners is carried out in a clean environment. At no time should any of the system be allowed to come in contact with dirt or foreign substances. Ultramagic cylinders are supplied with protective covers to prevent the ingress of dust, oil or dirt. These should be used at all times when the cylinder is not being used. They should only be removed when not in use for inspection or maintenance.

All parts of the system must be totally empty and vented off to atmosphere to ensure that no pressure or propane is present prior to commencing work. Leather or other approved material gloves must always be used when handling propane.

A complete pressure check and functional check of the complete fuel system must be carried out after any work is done and prior to release to service.

Only original Ultramagic spare parts may be used in maintenance and repair work of fuel systems. Substitutions **must not** be made.

At no time should an un-authorised person carry out work on the fuel system as not only is this dangerous, but it will also invalidate the Certificate of Airworthiness. The only work allowed to be carried out by the pilot/operator is that listed in the owner maintenance section. No exceptions can be made unless written approval is gained either from the manufacturer or the appropriate authority.

4.2 Fuel Cylinders

4.2.1 Introduction

Ultramagic fuel cylinders are made in three sizes 20kg/ 40 litre, 30kg/ 60 litre and 40kg/ 80 litre. The size of the tank is indicated on the data plate on the collar of the cylinder. It is important to quote size and serial number of tank when ordering fuel gauges as these differ in each case. All other components are common to all tanks.

The following parts can be removed or changed without emptying the cylinder. All other work can only be carried out once the cylinder is fully empty and has been well vented to atmosphere.

a) 1 ¼ Acme type liquid coupling seals
b) Gauge dial unit. (Face only)
c) Vapour regulator and vapour coupling where fitted.
d) Cylinder jackets.

It is a matter of good practice always to ensure that the liquid coupling is empty of fuel when not being used. It is particularly important that this is done prior to any maintenance work being carried out. Ensuring that the valve is fully closed and then

depressing the self-sealing nipple with a wooden or non-metallic probe best achieve this. This process must be carried out prior to replacing 1 ¼ Acme liquid coupling seals.

Before removing and replacing the vapour regulator or coupling where fitted it is important to ensure that the vapour vale is fully closed by turning the handle fully clockwise.

4.2.2 Emptying cylinders

Where the work to be carried out requires the emptying of cylinders this should be done in a safe manner. If the cylinder is safe for flight then it is best to empty in flight. Where this is not possible then as much fuel as possible should be transferred to another cylinder. The remaining fuel can be either burnt off or vented through the burner in an open space. This should be well away from any buildings with a clear are down wind. The last 5% remaining fuel should not be burned as this could lead to overheating and damage to the burner. Once the cylinder is empty of liquid fuel open the bleed valve and allow the cylinder to vent for at least 30 minutes. At no time should the cylinder be left unattended.

Once venting is complete the fuel gauge unit may be carefully removed to allow internal venting of the cylinder. The cylinder should then be purged with an inert gas to remove any residual fuel vapour. If an inert gas is not available the cylinder may be filled with water. This will remove all traces of water however it is then important that all traces of water are removed before refitting and reusing the cylinder.

4.2.3 Tools

To prevent damage badly fitting tools must not be used. The correct sized open- ended wrenches are required for valve removal. The gauge dial is retained by cross head screws. The actual gauge is fitted with hexagon Allen type screws.

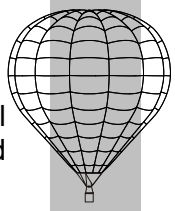
The cylinder should be firmly strapped to a workbench to enable the valves to be removed.

4.2.4 Thread Sealing

The liquid valve has a tapered thread and PTFE tape is used as a securing method. The maxi fill bleed valve and the pressure relief valve (PRV) are secured with Loctite 542 or 572. Tapered threads must achieve at least 3 full turns but must not bottom out to achieve an effective seal. The vapour valve where fitted is fitted in a similar manner.

The liquid valve coupling to valve joint is sealed with a Dowty bonded seal. This should always be replaced if there is any sign of wear. Only Ultramagic approved seals are to be used which are of Nitrile rubber. The coupling threads are assembled with Loctite Screwlock 222e to prevent the joint becoming loose.

The vapour regulator, where fitted is sealed to the vapour valve with a bull-nosed fitting. No sealing method is used other than this. It should be noted that this connection has a left hand thread.



4.2.5 Lubrication

Seal life is increased with the use of lubrication. Silicon grease is recommended in all areas except where sand or dust may collect. A fine graphite powder may then be used as an alternative.

4.2.6 Regular Inspection

The following checks should be made each time a cylinder is used.

1) Check for leaks at liquid connection, couplings and valve
2) Check for leaks at gauge, maxi fill valve and PRV positions.
3) Check for leaks at Vapour valve position (where fitted)
4) Check that all valves work correctly in their on and off position.

In addition to the above inspection requirements, the cylinders must be maintained, inspected and pressure tested at regular intervals according to the manufacturers recommendations. See inspection schedules section 6.

4.2.7 Cleaning

Where an inspection indicates that the cylinder is contaminated or dirty then the cylinder should be emptied as shown in 4.2.2 emptying cylinders.

It then should be cleaned by pouring in some kerosene through the gauge hole and then by moving the cylinder about to dislodge the contamination. One should then pour this out. This can be done a number of times until the cylinder is completely clean.

Important Note – Petrol must not be used at this is very dangerous. Also do not use any water-based cleaners as this could cause corrosion.

A final rinse should be carried out with a small amount of methylated spirit. One can leave a small amount of this in the cylinder, which will help to remove any possible water contamination.

4.2.8 Cylinder jacket.

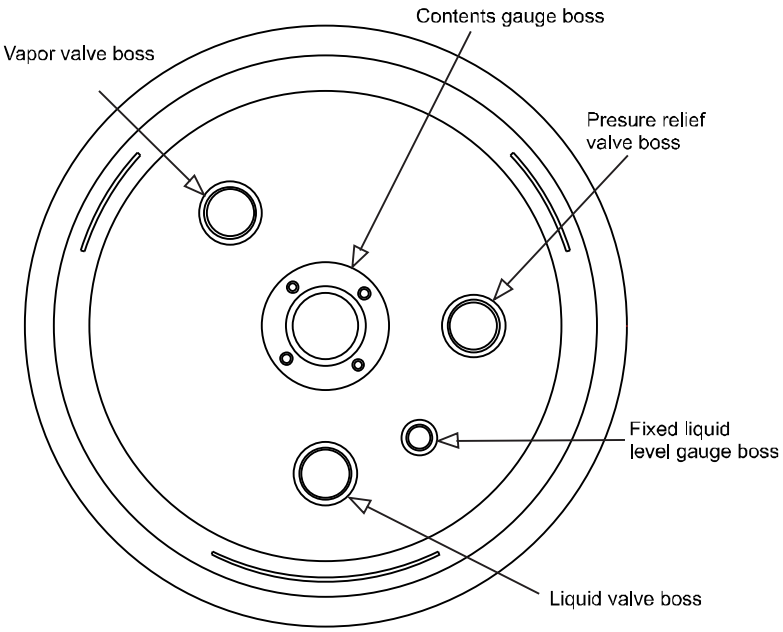
In most cases fuel cylinders are fitted with padded jackets. It is advisable to remove these before carrying out any cleaning work so as to prevent the jackets and foam being contaminated with the cleaning agents.

4.2.9 Cylinder body and valve positions

All of the valve and gauge mountings on Ultramagic stainless steel cylinders are welded on the cylinder. (See drawing below.) These consist of:

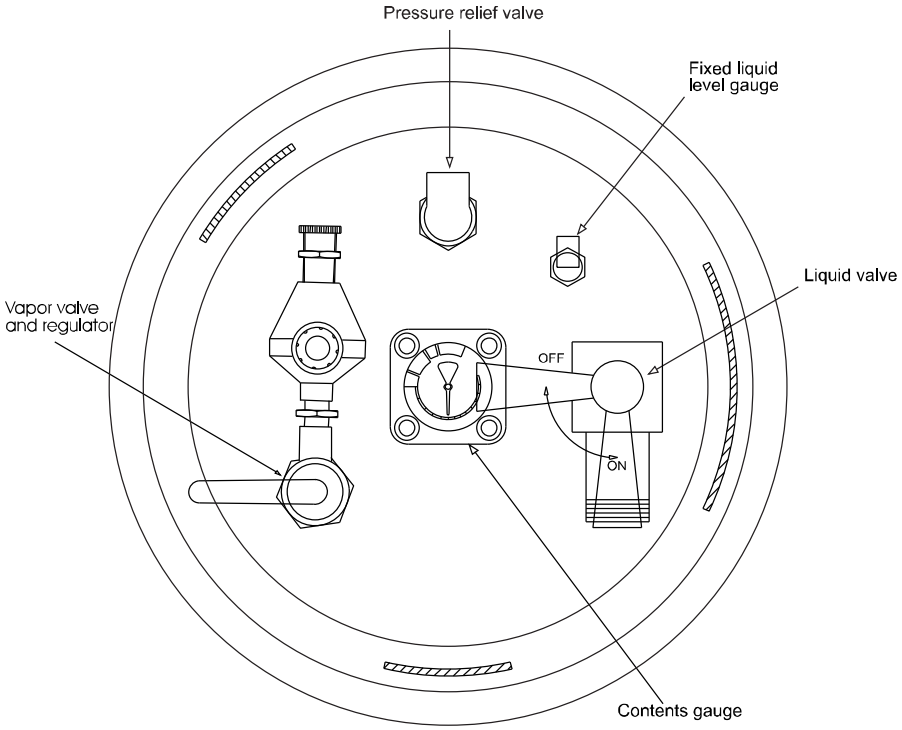
- Contents gauge boss
- Liquid valve boss.
- .3/4 NPT boss for vapour valve and pressure relief valve
- .1/4 NPT boss for fixed liquid level valve (bleed valve)

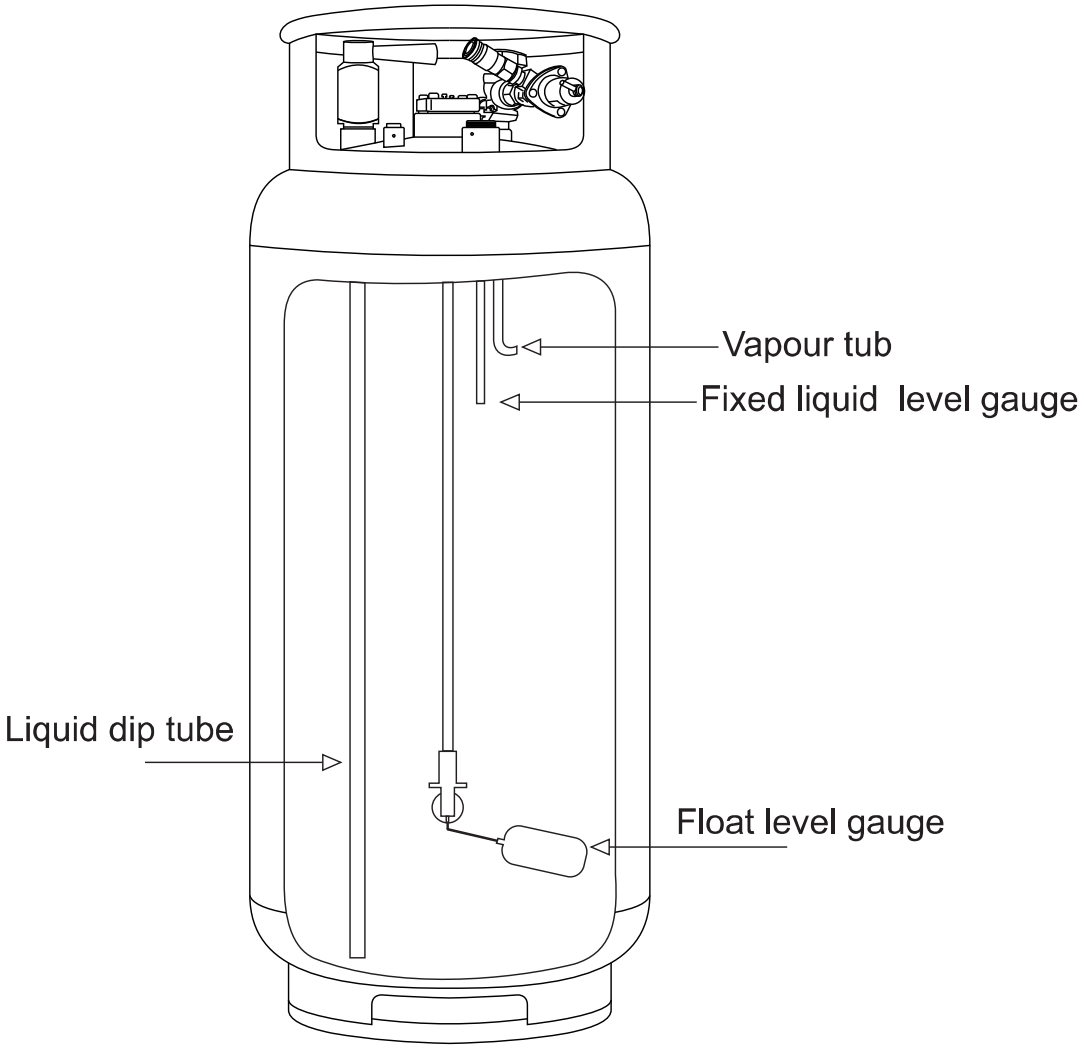
See diagram below for positions



Where a vapour valve is fitted and the cylinder is then classified as a “master”, then all of the valves and fitting are positioned as shown in the drawing below. However on certain master tanks the vapour valve had an integral fixed level liquid valve (bleed valve). In this case a blank is fitted to the tank instead of a bleed valve.

Where no vapour valve is fitted and the cylinder is thus a “slave”, then the pressure relief valve position is blanked and the pressure relief valve is fitted to the vapour valve position.
See diagram below for positions.

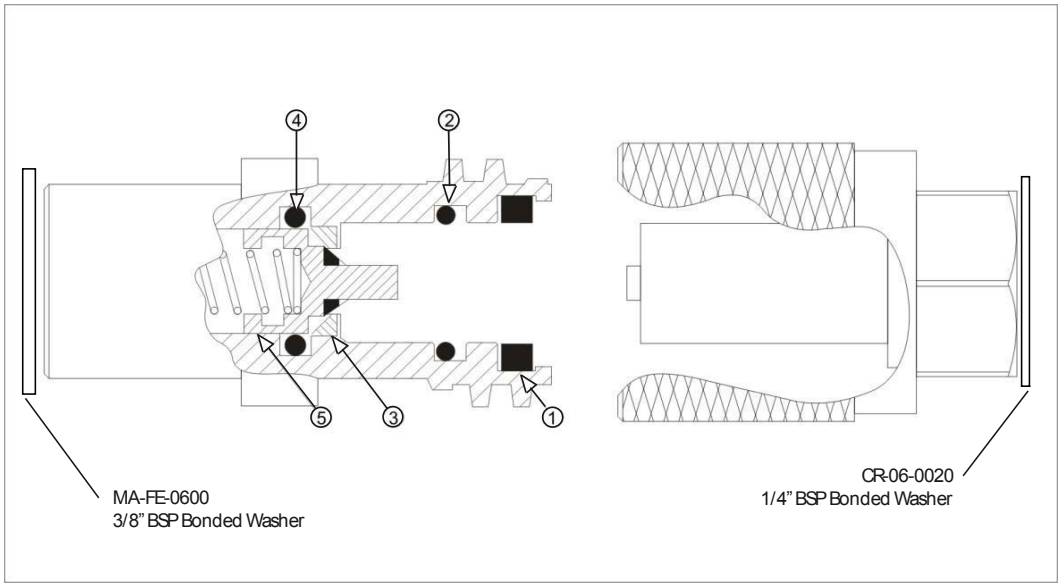




General cutaway view

4.2.10 1 ¼ Acme liquid outlet connecter

This is fitted to the main liquid valve and a dowty seal is fitted between the outlet and the valve. This type of connector is commonly called a rego connector. The square outer O-ring item 1 and the inner O-ring item 2 are replaceable items. Should any of the other parts be found to be faulty then the complete connecter must be replaced.

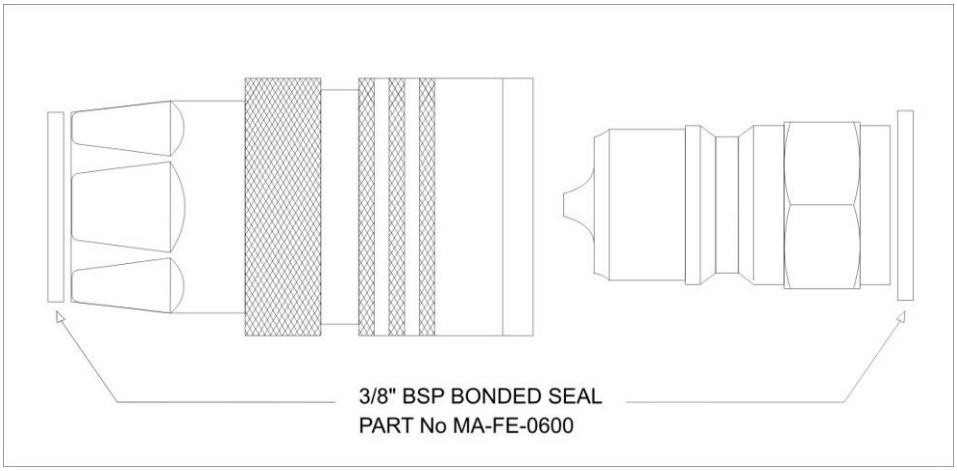


1 ¼ Acme liquid outlet connecter

4.2.11 Tema 3800 outlet connecter

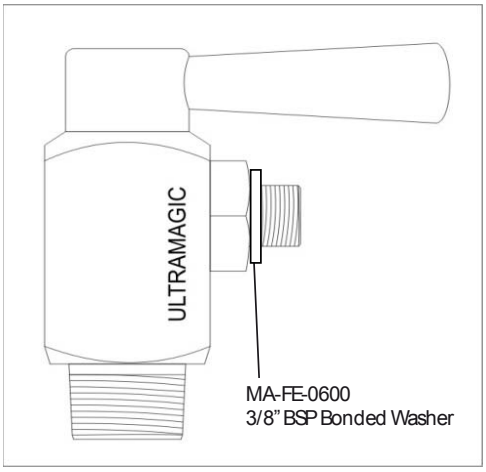
This type of connecter can be fitted to the main liquid valve as an alternative to the 1 ¼ Acme. A dowty seal is also fitted in this case between the valve and the connecter.

Should any part of this connector be found to be faulty then the complete fitting must be changed, as seals are not replaceable.



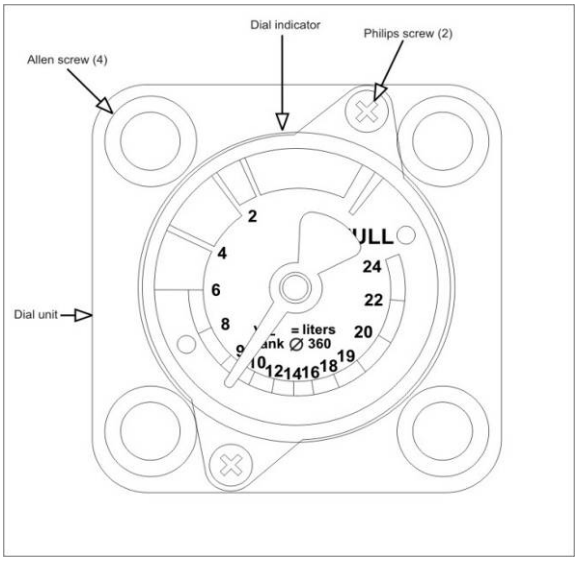
4.2.12 Liquid Take off Valve

The liquid take off valve has been special designed and developed by Ultramagic and is maintenance free. In the unlikelihood of a liquid valve becoming faulty, then the complete valve should be replaced and the original returned to the factory for inspection.

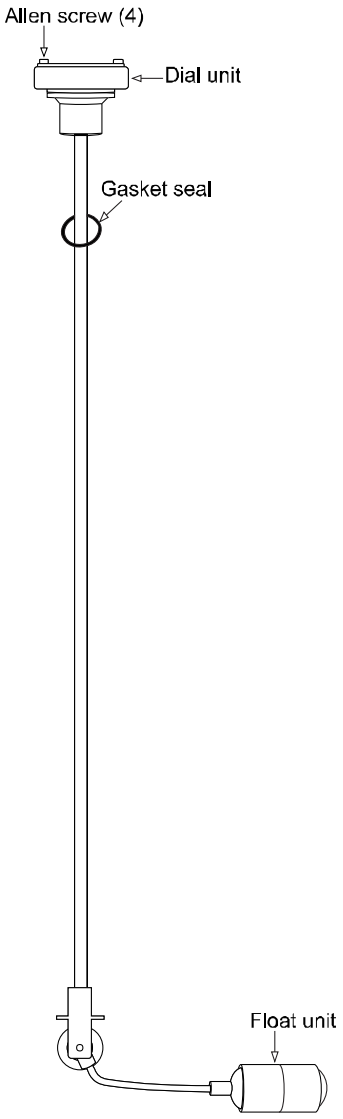


Ultramagic Liquid Take off Valve

4.2.13 Contents Gauge



Top view of gauge

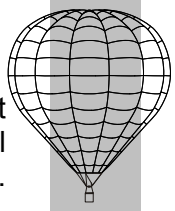


Side view of Gauge

The fuel contents gauge fitted is a Livello float type with magnetically coupled dial indicator. Care should be taken to ensure that the correct length is installed. Each time the gauge is removed the gasket must be inspected and replaced if damaged or worn. New gauges are always supplied with a new gasket.

The gauge action can be tested by rolling the cylinder on the ground. If the float unit is moving but not registering on the gauge then the dial unit is faulty and must be replaced. This can be replaced without emptying the cylinder by removing the 2 screws as shown in gauge top view.

If the float is not moving then the cylinder must be emptied and the gauge removed for inspection by removing the 4 Allen screws. It is possible that the gear action needs cleaning however if this does not solve the problem then the complete gauge assembly must be replaced. Only parts supplied by Ultramagic SA. may be used as replacement.



4.2.14 Pressure Relief Valve (PRV)

This valve is a Tecval and is set to discharge at 375 psi. Only Ultramagic supplied part can be used. Should the valve not be sealing it must be replaced immediately. This will require the emptying of the cylinder. The valve is removed and replaced by using 27mm. wrench.

4.2.15 Maxi Fill valve or "Bleed Valve"

This valve has a dip tube fitted, which sets the liquid fill volume for the cylinder. The type of valve used is a Ceodeux and only parts supplied by Ultramagic may be used. If the bleed valve leaks when closed then the whole valve must be replaced. This will require the cylinder to be emptied. The valve is removed and replaced using a 16mm wrench.

4.2.16 Vapour Regulator (Where fitted)

The outlet of the vapour valve is fitted with a left hand POL thread. The regulator is screwed into this outlet. The pressure setting on the regulator can be adjusted. Where the regulator is found to be faulty it can be replaced without emptying the cylinder. The vapour valve must be fully closed in the clockwise direction before removal and during replacement. The vapour connector is a separate component, which, benefits from occasional lubrication with silicone. Should this be found to be faulty, then the complete connecter should be replaced.

The type of connector used is Legris and only Ultramagic supplied parts may be used.

The type of regulator used is a Calor1476p and only Ultramagic supplied parts may be used.

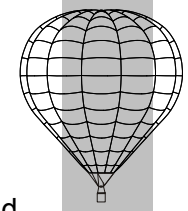
4.2.17 Vapour Valve (Where fitted)

When a vapour valve is fitted then it takes the position where the PRV is normally fitted. The vapour valve has an integral Maxi Fill valve and Pressure Relief valve (PRV). In this case special blanks are fitted in the cylinder in the redundant threaded boss positions in the cylinder.

If the vapour valve is found to be faulty then the complete valve must be replaced. There are no serviceable parts in the valve. The vapour valve is a Rego type and is removed and refitted using a special 30mm. wrench.

4.2.18 Pressure Check and Functional Check

A full pressure check and functional check must be carried out if any of the cylinder valve components have been removed or replaced. This to be carried out in accordance with the Inspection Schedule (see section 6)



4.3 MK 21 DOUBLE, TRIPLE AND QUAD BURNER MAINTENANCE

4.3.1 Replacement Parts and Procedures

The burner has been designed and constructed using carefully selected components and materials. In order to ensure the continued airworthiness of the burner, it is essential that only parts supplied by Ultramagic or by a supplier approved by Ultramagic be used. The use of parts from any other source is strictly forbidden.

Maintenance procedures must be carried out in accordance with the instructions contained in this manual.

4.3.2 Approved Maintenance and Inspection Personnel

In order to ensure the continued airworthiness of the burner, maintenance and formal inspection may only be carried out by Ultramagic, organisations approved by Ultramagic or by organisations approved by the national airworthiness authority in the country of registration.

4.3.3 Welding and Welders

If for any reason a repair requires the use of welding, the following limitations apply:

- All welding must be of the TIG (Tungsten Inert Gas) electric arc type.
- All welding must be carried out by a coded welded approved to the appropriate standard by the national airworthiness authority in the country of registration.

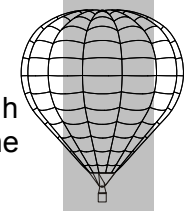
4.3.4 Maintenance Records

Whenever maintenance work of any kind is carried out on the burner, the work must be inspected and approved by a person or organisation approved by the national airworthiness authority in the country of registration. Maintenance work must be recorded by a suitable entry in the equipment maintenance record and must include the following information:

- A description of the work performed.
- The completion date of the work.
- The name of the person (and organisation if applicable) performing the work.
- The name of the inspector approving the work.

4.3.5 Technical Support

If technical assistance is required, contact Ultramagic. Always quote the burner part and serial numbers.



4.3.6 Safety

When connected to a fuel cylinder, the burner is capable of generating a very large, high temperature flame. Exercise care when carrying out maintenance work and observe the following rules.

- Always wear protective eyeglasses.
- Observe the usual rules for the handling of LPG.
- When test firing, wear suitable protective gloves.
- Always make sure that the burner has been completely vented of fuel before removing any components.
- Always make sure that the burner is cool before commencing work.
- Never look down onto the coil when the burner is connected to a fuel cylinder or when pressure remains inside the burner.
- When test firing, never stand down wind of the burner.
- Prior to test firing, make sure that the area is clear of personnel and animals.
- When test firing, make sure that the burner is properly supported and not able to fall or tilt unexpectedly.
- Never smoke or allow naked flames or other sources of ignition near the burner.
- Always use the correct tool for the job

4.3.7 Technical Description

4.3.7.1 General

Fuel is supplied to the burner through the flexible hoses. The fuel is distributed to the various valves and pressure gauge in readiness for use.

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

- Burner can.
- Main Burner Vaporising coil
- Fuel hoses
- Main valve assembly
- Liquid valve assembly.
- Pilot regulator valve assembly
- Igniter Assembly
- Pressure gauge assembly.
- Liquid fire jet assembly.
- Pilot light assembly.
- Slurper tube assembly.
- Fuel inlet post.
- Hydraulically operated main valve (optional fit).

Note that all burner maintenance work must be conducted in a clean environment.

The burner is available in single, double, triple and quad variants. See section 4.4 for single burner.

The burners are constructed on a modular basis and utilise common components and assemblies. For simplicity therefore, the double burner will be described and the differences associated with the triple and quad will be described separately.

The double burner may be seen in figure 1 and the feature and functions detailed above are described in the following paragraphs:

ITEM	DESCRIPTION	PART NUMBER
1	BURNER CAN	2022-0600
2	VAPOURISATION COIL	2022-0500
3	SUPPORT BAR	2022-0012
4	CROSS TUBE ASSEMBLY	2022-0002
5	FUEL HOSE ASSEMBLY	2022-0001
6	FUEL CONNECTOR	REFERENCE
7	HANDLE TUBE	2022-0011
8	MAIN VALVE ASSEMBLY	2022-1200 (LH) 2022-1400 (RH)
9	LIQUID VALVE ASSEMBLY	2022-1100
10	PILOT REGULATOR VALVE ASSEMBLY	2022-0800
11	IGNITER ASSEMBLY	2022-0900
12	PRESSURE GAUGE ASSEMBLY	2022-1300
13	LIQUID FIRE JET ASSEMBLY	2022-1000
14	PILOT LIGHT ASSEMBLY	2022-0700
15	SLURPER TUBE ASSEMBLY	2022-1500
16	FUEL INLET POST	2022-0313
17	LH VALVE BLOCK	2022-0411
18	RH VALVE BLOCK	2022-0311
19	3/8" BSP BONDED SEAL	MA-FE-0600
20	M10 X 55 ST STL CAP HEAD SCREW	MA-FE-0512
21	M6 X 15 ST STL CAP HEAD SCREW	MA-FE-0513
22	M6 ST ST AEROTITE LOCK NUT	MA-FE-0510
23	M6 ST STL PLAIN WASHER	MA-FE-0511
24	M3 X 6 ST STL C.SINK SCREW	MA-FE-0514

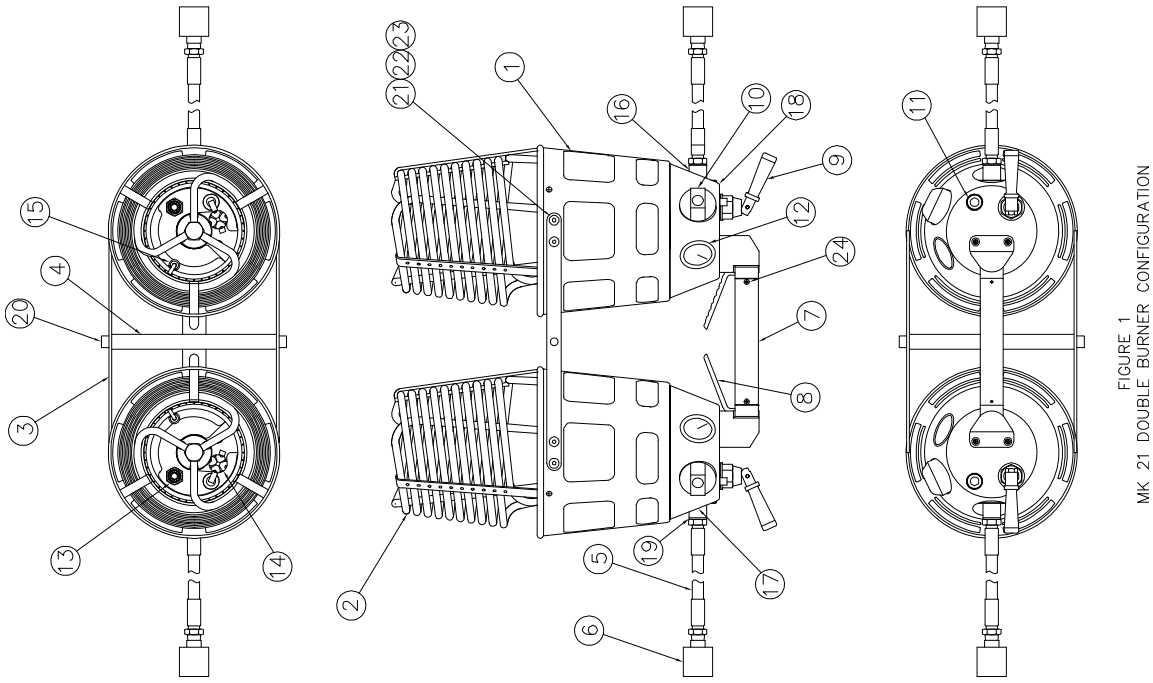
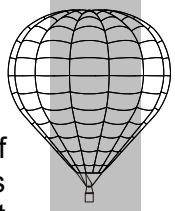


FIGURE 1
MK 21 DOUBLE BURNER CONFIGURATION



4.3.7.2 Burner Can

The burner can is a welded stainless steel construction. It provides a degree of mechanical protection to the components mounted inside the burner. The can is mounted onto the valve block using screw fixings and provides the mechanical support for the vaporisation coil and attachment to the burner frame.

4.3.7.3 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve using a machined coil post. The function of the coil is to preheat the fuel before leaving the jet ring in readiness for combustion. The coil is a three start, welded assembly and is constructed from stainless steel tube, a special jet ring with fixed jets, coil supports and a mounting adapter.

When the main valve is opened, fuel enters the coil at is base. The fuel rises to the top of the coil and then descends through the coil spiral until it exits through the jet ring.

4.3.7.4 Fuel Hoses

The fuel hoses link the burner to the fuel cylinders. They are terminated with a choice of either Rego or Tema self-sealing connectors. The hoses are specially selected to withstand the operational fuel pressures and the wear and tear associated with use and handling. The fuel hose is supplied as a pre-fabricated assembly using armoured hose and swaged end fittings.

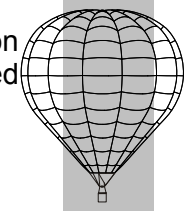
The process of swaging the end fitting onto the hose requires the use of special tooling. The use of any fuel hose other than that supplied by Ultramagic is therefore strictly forbidden.

4.3.7.5 Main Valve Assembly

The main valve is used to control the main burner function of the burner by the activation of a “squeeze” type handle. The valve is of a plunger type and uses a special sprung loaded rubber seal bearing against a machined seat in the valve block to create the seal. The seal is connected to a stem by a rotating joint. When the valve handle is operated, a cam action causes the stem and seal to lift off the seat in the valve block, thus allowing the flow of fuel.

The stem is housed in a machined aluminium valve bonnet. A pressure tight seal is achieved between the stem and bonnet with the use of a primary and secondary “O” seal. The bonnet is sealed to the valve block using a bonded washer.

The valve bonnet is provided with a press fit bush where the stem exits. This bush resists the axial forces imparted to the valve stem when the valve is operated and provides excellent wear resistance.
The stem is secure to the handle by means of a round pin and circlip.



As the valve handle is operated, the cam on the end of the handle bears against a nylon thrust washer. This washer provides a smooth operation and resists the wear associated with the cam action.

4.3.7.6 Liquid Valve Assembly

The liquid valve is identical in construction to the main valve with the following exceptions:

- The valve handle is a “toggle” type action and may be rotated to any convenient position.
- The nylon thrust washer is thinner allowing the handle to rest at an angle.
- The handle is attached to the stem using a pin with a machined flat. Grub screws located on the underside of the handle are used to secure the pin in position.

4.3.7.7 Pilot Regulator Valve Assembly

The pilot regulator valve assembly is an integral construction incorporating the fuel regulation and vaporisation necessary for pilot light operation and the means of switching on and off the flow of fuel. The valve is mounted in a precision-machined bore in the side of the valve block. A pressure tight seal is achieved with the use of two “O” seals, the first mounted in the base of the valve block bore ad the second mounted in a groove on the valve body.

Operation of the valve is through the rotation of a knob. Operating the knob causes a piston inside the valve to move into the valve under spring action thus opening a ball seal positioned in the main fuel feed in the valve block and allowing the flow of fuel.

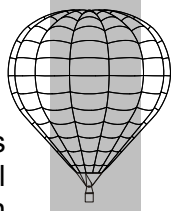
A special filter is mounted inside the valve block and filters the fuel before entering the valve.

4.3.7.8 Igniter Assembly

The Igniter Assembly is a “cartridge” type and is simply inserted into the bore provided in the valve block. The assembly is held in position by a grub screw positioned in the side of the valve block. The assembly is provided with an “O” seal to prevent the seepage of water from the upper surface of the valve block during operation.

The assembly consists of a tube in which are housed a piezzo igniter and an electrode permanently mounted in temperature resistant “spark plug” grade ceramic. When assembled, the piezzo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

Upon operation of the piezzo igniter button, a high voltage spark is produced between the electrode and a tag mounted on the side of the pilot light causing the pilot light to ignite.



4.3.7.9 Pressure Gauge Assembly

The pressure gauge is mounted in the side of the valve block. A pressure tight seal is achieved with the use of primary and secondary “O” seals mounted on a special machined pillar at the gauge rear. The seals interface to a precision machined bore in the valve block. The gauge is retained by means of a threaded ring, which locates over the front rim of the gauge when screwed into the valve block. When in position, the inlet to the gauge is positioned in a tapping from the main fuel feed within the valve block. The gauge therefore provides an indication of the fuel cylinder pressure as soon as the fuel cylinder valve is turned on.

The gauge is prevented from incorrect assembly into the valve block with the use of a polarising pin mounted in the valve block and a mating hole positioned in the rear of the gauge body.

The face of the gauge is provided with a colour coded banding indicating the safe operating pressure range of the burner.

The gauge is fitted with a flow restrictor mounted in the rear. The restrictor is designed to protect the gauge from sudden pressure surges and to limit the fuel flow rate in the unlikely event of a gauge failure.

4.3.7.10 Liquid Fire Jet Assembly

The liquid fire jet assembly is mounted on the upper face of the valve block. The jet controls the flow of fuel when the liquid valve is operated. The assembly consists of a machined body fitted with multiple holes at the outlet and an adapter allowing the jet to be secured to the valve block. The body is sealed to the adapter using a bonded washer and the adapter is sealed to the valve block in a similar fashion.

4.3.7.11 Pilot Light Assembly

The pilot light assembly is mounted on the upper face of the valve block and is supplied with a small flow of vapour fuel from the pilot regulator valve. The assembly consists of a stainless steel element where the fuel is burnt, a body fitted with an air inlet hole and an adapter fitted with a fuel flow regulator jet. The assembly is sealed to the valve block using a bonded washer. The element is secured to the body by a grub screw fitted in the side of the element.

The pilot light element is fitted with a special tag. This tag is aligned with the igniter electrode and adjusted in order to maximise the spark “strength”.

4.3.7.12 Slurper Tube Assembly

The slurper tube is mounted on the upper face of the valve block and is secured using one of the can screw fittings. The function of the slurper tube is to “suck” water formed during the combustion process from the valve block and dispel it into the main burner jet. The outlet of the tube is placed directly in the fuel stream exiting the jet ring. When the main burner is fired, the flow of fuel over the tube causes low pressure to be created in

the tube with the result that any water below the tube is sucked up and vented into the jet stream.

The assembly consists of a small bore tube mounted in a boss. The tube is secured to the boss by a grub screw. Loosening this screw allows the tube to be adjusted in order to achieve optimum performance.

4.3.7.13 Fuel Inlet Post

The fuel inlet post is a machined stainless steel component and is mounted on the side of the burner. The post forms the interface between the valve block and the fuel hose. The post is sealed to the valve block by means of an “O” seal fitted in a groove on the mounting face of the post and it is secured with four screw fittings.

4.3.7.14 Hydraulically Activated Main Valve Assembly

The burner is provided with the option to fit a hydraulically activated main valve. When this option is fitted, the standard valve is replaced by the hydraulic variant. The function of the valve is similar to that of the standard valve but incorporates a hydraulic reservoir and additional piston to enable movement of the valve stem. The valve may be operated in two ways; using the remote hand lever or the “squeeze” action handle.

When the remote hand lever is operated, hydraulic fluid is pumped into a chamber inside the valve bonnet. This forces the piston inside the bonnet to move with the result that the valve is opened and fuel flow is enabled. When the lever is released, the valve closes under spring action.

The hydraulic valve is taller than the standard valve and when it is fitted, a machined spacer is fitted below the valve post to enable the burner handle to be positioned correctly.

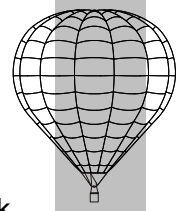
4.3.8 Triple Burner

The MK 21 triple burner utilises identical components and assemblies to the double burner. In the triple configuration, an additional burner “pot” is added to the double thus forming an equilateral triangular configuration.

The triple burner utilises a centrally positioned hanger assembly to secure the three burner pots together. In addition, the burner handle is replaced by a welded aluminium “T” handle, linking all three pots together.

4.3.9 Quad Burner

The quad burner is effectively two double burners placed side by side. The burners are secured using a centrally mounted hanger assembly and the handles are replaced by a single “H” handle linking all four pots together.



4.3.10 Preventative Maintenance

4.3.10.1 General

It is recommended that the burner is subject to periodic preventative maintenance check and preventative maintenance measures implemented if necessary. The recommended period between checks is of 25 hours of operation, although this can be varied based on the experience gained during the operation of each burner. The checks must incorporate the areas detailed below.

4.3.10.2 General Cleaning

Check for the excessive build up of sooty deposits on the vaporisation coil and can. Some accumulation of soot is inevitable and is not detrimental to the burner function. However, excessive deposits are indicative of inefficient fuel combustion. If this is considered to be the case, the burner must be returned to Ultramagic.

Sooty deposits may be removed from the burner can and coil using a suitable cleaning solvent. When using a solvent, follow the manufacturers' safety instructions, particularly with regard to the use of breathing apparatus and ventilation.

4.3.10.3 Vaporisation Coil

4.3.10.3.1 Main Jets

Check the main jets in the coil jet ring for excessive soot deposits and for the presence of foreign bodies within individual jet holes. Blocked jets can cause a reduction in the fuel flow rate and thus lead to an increase in the operating temperature of the coil. This could result in damage to the coil especially when operating at low fuel pressure. In the event that blocked jets are detected, they must be cleaned as specified in section 4.3.11.3.2

4.3.10.3.2 Coil Fixings

Check the fixings in the coil supports. Loose fixings must be tightened as described in section 4.3.11.3.3

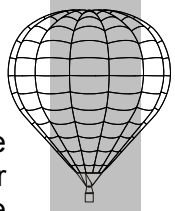
Check the fixings securing the coil supports to the burner can. Loose fixings must be tightened as described in section 4.3.11.3.4

4.3.10.3.3 Coil Tubing

Check the tube used in the construction of the coil for damage including signs of cracking, serious (> 0,3 mm deep) indentation and deterioration of welded joints.

Serious indentation cannot be repaired and the coil must be replaced as described in section 4.3.11.3.1. Refer to Ultramagic or one of its representatives if there is any doubt.

If the coil tube has cracked or a welded joint has failed, the coil must be returned to Ultramagic for investigation. Replace the coil as described in section 4.3.11.3.1



4.3.10.4 Pilot Light Strength

Check the strength and height of the pilot light flame. A weak or short flame is indicative of a blockage or partial blockage of the pilot light jet or a fault with the pilot regulator valve. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in section 4.3.11.11. If this fails to improve the pilot light flame, check the function of the pilot regulator valve as described in section 4.3.11.8

4.3.10.5 Igniter spark

Check the strength of the igniter spark. A weak spark will make pilot like ignition difficult or impossible when using the igniter. If it is considered that the igniter spark is weak, adjust the spark gap as described in section 4.3.11.10. If this fails to improve the spark, then refer to igniter maintenance section of 4.3.11.10.

4.3.10.6 Fuel Hoses

Check the condition of the fuel hoses. Look for any signs of abrasion, kinking or other forms of damage. If any of the above are detected, the hose must be replaced in accordance with the instructions in section 4.3.11.4

Fuel hoses must be obtained from Ultramagic.

4.3.10.7 Pressure Gauge

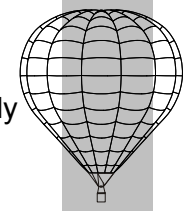
Check the function of the pressure gauge as follows:

- Make sure that the burner is fully vented. Visually inspect the position of the gauge pointer and check that it is indicating zero pressure.
- Connect the burner to a fuel cylinder or a 7 Bar (100 psi) compressed air supply. Visually inspect the position of the gauge pointer and check that it is correctly indicating the pressure.

Upon completion of the test, ensure that the burner is safely vented.

If either of the above tests indicates that the gauge is faulty, the gauge must be replaced in accordance with the instructions in section 4.3.11.9

Note: The pressure gauge is a sealed item with no serviceable parts. No attempt must be made to repair a faulty gauge. Gauge repair is by replacement only.



4.3.10.8 Hydraulic Valve

Before checking the hydraulically activated valve, ensure that the burner has been safely vented.

Check the operation of the hydraulic valve as follows:

- Operate the remote hand lever and check for movement of the valve “squeeze” action handle. A movement of approximately 3mm should be possible with one operation of the remote hand lever.

If the movement of the “squeeze” action handle is insufficient, or several operations of the remote hand lever are required to activate the valve, then the hydraulic system will require bleeding. Bleed the valve as described in section 4.3.11.14

4.3.10.9 Burner Mounting

4.3.10.9.1 Double Burner

Check that all fixings used in the support of the burner and mounting to the load frame are secure. Tighten the fixings if necessary.

4.3.10.9.2 Triple and Quad Burners

Check that all fixings used in the support of the burner and mounting to the load frame are secure. Tighten the fixings if necessary.

Check the condition of the central hanger assembly for signs of damage including serious indentation, distortion, cracking or weld deterioration.

Serious indentation or distortion cannot be repaired and the hanger must be replaced.

Where cracking or weld deterioration is detected, the hanger must be returned to Ultramagic for inspection.

4.3.11 Repair and Maintenance

4.3.11.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies used within the burner. Maintenance other than that detailed in the Section 4.3.10, (Preventative Maintenance) and Section 6, (Annual / 100 Hour Inspection) should not be carried out unless it is clear that there is a fault or there is a noticeable deterioration in the performance of any part of the burner functions. Remember, “If it ain’t broke, don’t fix it”!

Whenever a part or assembly whose removal breaks the pressure integrity of the burner is removed and replaced, the re-assembled joint(s) must be subjected to a pressure test. Connect the burner to a 7Bar (100 psi) compressed air supply and test the joint using soapy water. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

4.3.11.2 Burner Can

The burner can is a welded stainless steel assembly and of a relatively robust construction. Indentation to the can as well as cracks are acceptable provided that the integrity of the fixings supporting the coil, valve block or burner mountings are not compromised and that the gimbal action of the burner is unaffected. Sharp edges as a result of indentations or cracks that could cause injury to the pilot or passengers are not acceptable and must be repaired before flight. Where doubt exists refer to Ultramagic S.A.

Cracks in the can may be repaired by welding (see section 4.3.3).

If it is considered that the can must be replaced, proceed as follows:

- Remove the vaporisation coil as described in section 4.3.11.3
- For Double, Triple and Quadruple burners, undo and remove the fixings securing the burner support bars to the can (see figure 1).
- Undo and remove the six M6 fixings and washers securing the base of the can to the valve block using a 5mm Allen key.
- Remove the can.
- Prior to can re-assembly to the valve block, ensure that the large “O” seal, item 8, figure 2 is fitted within the groove in the upper surface of the valve block. Note that this seal is fitted to prevent water formed in the combustion process from seeping out. Damage to the seal does not affect the airworthiness of the burner.
- Re-assembly is the reverse process of dismantling. Note that the vaporisation coil must be re-assembled in accordance with the instructions contained in section 4.3.11.3
- Pressure test the coil to valve block joints as described in section 4.3.11.1

4.3.11.3 Vaporisation Coil

Since serious indentation in the coil tube cannot be repaired and weld faults must be returned to Ultramagic for inspection, coil maintenance is limited to the following areas:

ITEM	DESCRIPTION	PART NUMBER
1	VALVE BLOCK	2022-0311 (RH) 2022-0411 (LH)
2	BURNER CAN	2022-0600
3	VAPORISATION COIL	2022-0500
4	COIL POST NUT	2022-0319
5	COIL POST	2022-0318
6	3/8" BSP COPPER WASHER	MA-FE-0610
7	M6 X 8 CAP HEAD SCREW	MA-FE-0506
8	169 ID X 1.5 NITRILE "O" SEAL	MA-FE-0601
9	JET RING	REFERENCE
10	M5 X 5 CAP HEAD SCREW	MA-FE-0507
11	M5 COPPER WASHER	MA-FE-0611
12	COIL SUPPORT SCREW	MA-FE-0508
13	COIL POST "O" SEAL	MA-FE-0612
14	M6 X 10 CAP HEAD SCREW	MA-FE-0509

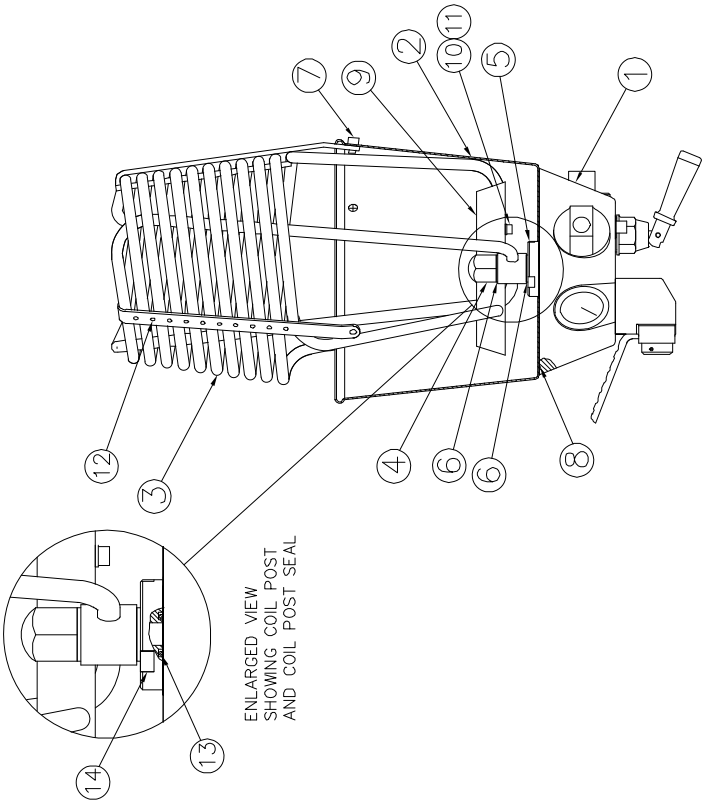
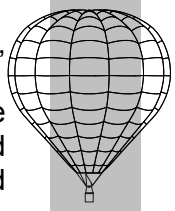


FIGURE 2
COIL MOUNTING ARRANGEMENT

4.3.11.3.1 Coil Removal

Refer to figure 2 and proceed as follows:

- Ensure that the burner is safely vented before commencing.
- Using a socket and extension bar, undo and remove the coil post nut item 4.
- Remove the upper copper washer item 6.
- Undo and remove the three coil support fixings item 7.
- Withdraw the coil.
- Remove the lower copper washer.



- Replacement of the coil is the reverse procedure to removal. When replacing the coil, fit new copper washers item 6.
- The joints between the coil and the coil post must be tested to ensure that there are no leaks. Attach a 7 Bar (100 psi) air line to the burner. Open the main valve and check for leaks using soapy water. If any leaks are detected, they must be corrected before further burner use.

4.3.11.3.2 Main Jet Cleaning

The main jets are drilled directly into the upper surface of the jet ring. Jet cleaning is best accomplished with the coil removed from the burner as described in section 4.3.11.3.1

To clean the jets, refer to figure 2 and proceed as follows:

- Insert a suitable metal pin into the jet hole.
- Remove any debris by undoing and removing the plug and copper washer items 10 and 11 on the under side of the jet ring and blowing out with a blast of air. Always fit a new copper washer item 11.

4.3.11.3.3 Tightening of Coil Support Screws

To tighten the coil support screws, refer to figure 2 and proceed as follows:

- Using an Allen key, tighten the coil support fixings item 12, if necessary.

4.3.11.3.4 Tightening of Coil Mounting Screws

To tighten the coil mounting screws, refer to figure 2 and proceed as follows:

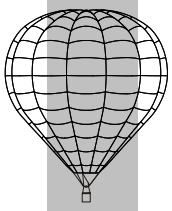
- Using an Allen key, tighten the coil mounting screws item 7, if necessary.

4.3.11.3.5 Removal of Coil Post and Coil Post Seal

The coil post forms the interface between the valve block and the vaporisation coil. The post is secured to the valve block using three cap head fixings and sealed using an “O” seal fitted in a groove in the underside.

To remove the coil post and replace the seal, refer to figure 2 and proceed as follows:

- Remove the coil as described in section 4.3.11.3.1
- Undo and remove the three cap-head screws item 14, securing the coil post to the valve block.
- Withdraw the coil post.
- Carefully remove the “O” seal item 13 from the underside of the coil post. When removing the seal, take care not to damage the groove surface.
- Always fit a new seal before replacing the post. Apply a thin smear of silicone grease to the seal prior to replacing.
- Replacing the coil post is the reverse procedure of removal. Ensure that the coil post fixings item14 are tight.
- Replace the coil as specified in section 4.3.11.3.1.



4.3.11.4 Removal of Fuel Hose

To replace a fuel hose, refer to figure 1 and proceed as follows:

- Using an open-ended spanner, undo the hose item 5 from the fuel inlet post item 16.
- Remove the bonded seal item 19 from the fuel hose end fitting.
- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to figure 3 and specify the length and end fitting required.
- Always fit a new bonded seal item 19 prior to re-assembly.
- Ensure that the hose to coil post joint is tight.
- Pressure test the hose by connecting the fuel connector to a 7 Bar (100 psi) compressed air supply. Check the joint between the fuel connector and the hose and the joint between the hose and the fuel inlet post. The joints may be checked using soapy water and watching for bubbles when the air pressure is applied. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

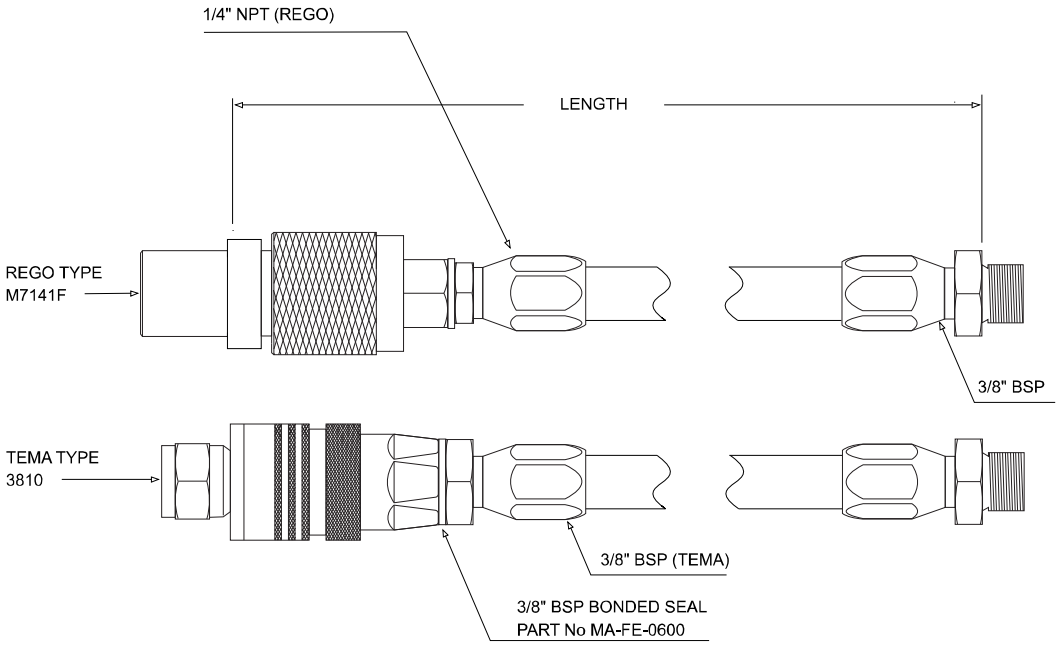
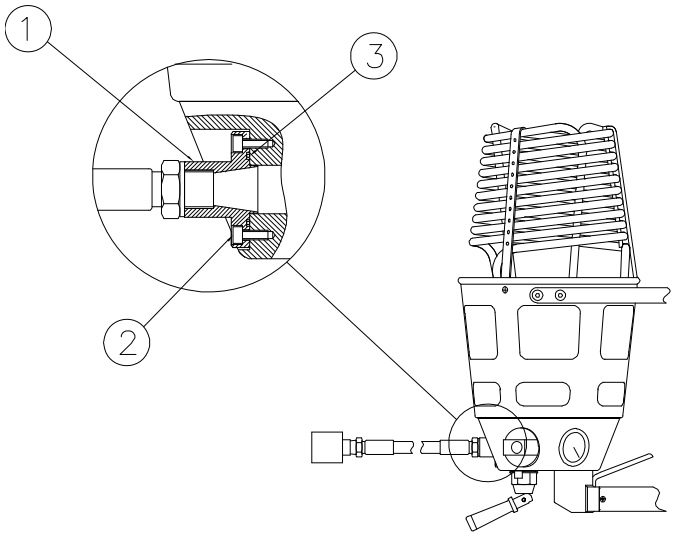


Figure 3 – Fuel Hose

4.3.11.5 Fuel Inlet Post and Fuel Inlet Post Seal

The fuel inlet post is secured to the valve block using four M4 cap head screws and sealed using an “O” seal fitted in a groove in the mounting face. To remove the fuel inlet post and replace the seal., refer to figure 4 and proceed as follows:

- The fuel inlet post item 1 may be removed with the hose connected. However, the hose may be removed first if required as detailed in section 4.3.11.4
- Undo and remove the four cap-head screws item 2, securing the post to the valve block. Ensure that the post is held in position when the last screw is removed.
- Withdraw the fuel inlet post.
- Carefully remove the “O” seal item 3 from the underside of the fuel inlet post. When removing the seal, take care not to damage the groove surface.
- Always fit a new seal before replacing the post. Apply a thin smear of silicone grease to the seal prior to replacing.
- Replacement is the reverse procedure of removal
- Ensure that the coil post fixings item 3, are tight.
- Pressure the re-assembled joint by connecting to a 7 Bar (100 psi) air line and using soapy water to check for leaks. If any bubbles are observed, this indicates that there is a leak and problem must be rectified before further burner use.



ITEM	DESCRIPTION	PART NUMBER
1	FUEL INLET POST	2022–0313
2	M4 CAP HEAD SCREW	MA–FE–0505
3	FUEL INLET POST SEAL	MA–FE–0602

FIGURE 4
FUEL INLET POST CONFIGURATION

4.3.11.6 Main Valve Assembly

To remove and strip down the main valve assembly, refer to figure 6 and proceed as follows:

ITEM	DESCRIPTION	PART No
9	ø4 STANDARD EXTERNAL CIRCLIP TO DIN 471	MA–FE–0530
8	ST STL SPRING TYPE D22700	MA–FE–0701
7	PIVOT PIN (MAIN VALVE)	2022/1211
6	THRUST WASHER	2022/1114 A–C
5	LH MAIN VALVE HANDLE ASSY	2022/1201
4	VALVE SEAT SLEEVE	2022/1113
3	VALVE SEAT ASSY	2022/1102
2	VALVE STEM ASSY	2022/1103
1	VALVE BONNET ASSY	2022/1101

ITEM	DESCRIPTION	PART No
18	NYLON THRUST WASHER	2022–1114 D
17	LIQUID VALVE HANDLE	2022–1116
16	M2.5 X 3 LONG ST STL GRUB SCREW	MA–FE–0503
15	PIVOT PIN (LIQUID VALVE)	2022–1117
14	VALVE POST	2022–0312
13	M6 X 50 ST STL CAP HEAD SCREW	MA–FE–0504
12	3/4" BSP NITRIL BONDED WASHER	MA–FE–0603
11	ST STL SPRING TYPE D20770	MA–FE–0700
10	SPRING CAP	2022/1212

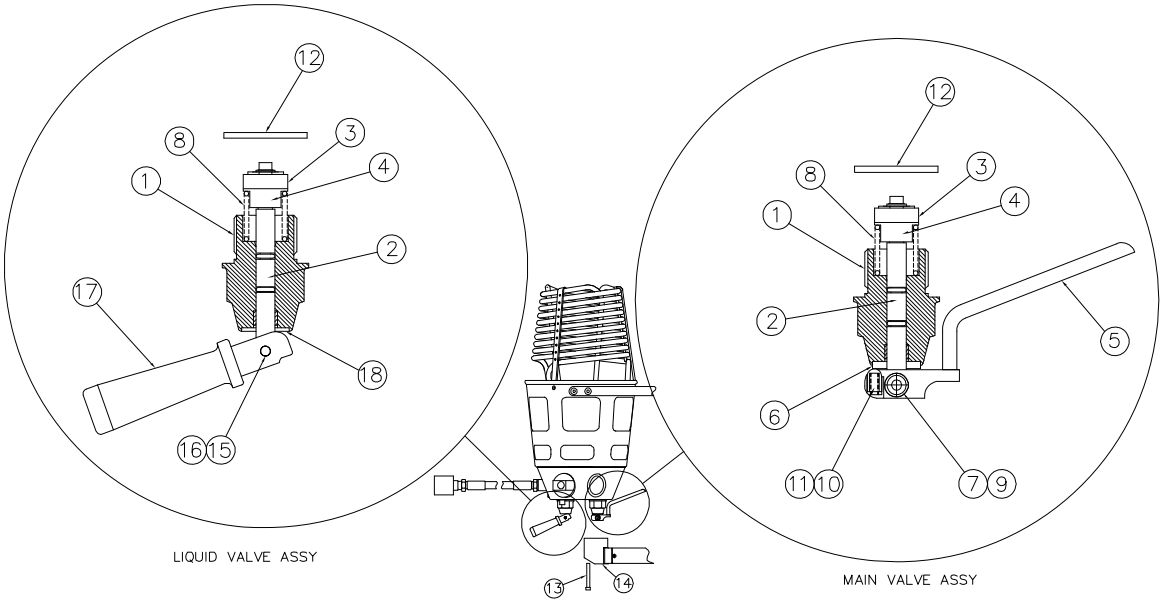
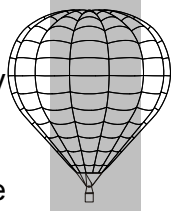


FIGURE 6
MAIN AND LIQUID VALVE ASSEMBLY CONFIGURATIONS

- Undo and remove all the cap head screws item13 securing the valve post and burner handle to the valve block. Withdraw the handle and valve posts as a complete assembly.
- Using a 28 mm open ended spanner, undo and remove the main valve from the valve block. In order to protect the finish on the valve bonnet, apply masking tape to the spanner jaws.
- Remove the bonded washer item 12 from the recess in the valve block.
- The valve may now be stripped down for further maintenance if required. Using a pair of external circlip pliers, remove the circlip item 9 from the pivot pin item 7.
- Withdraw the pivot pin item 7 from the handle assembly item 5. Remove the handle. When removing the handle, take care to ensure that the spring item 11 and spring cap item 10 do not spring out of the recess in the valve handle cam.
- Withdraw the valve seat assembly item 3 and the valve stem assembly item 2 from the valve bonnet item 1.
- Remove the main spring item 8 from the valve stem.



- Remove the valve seat sleeve item 4 from the valve stem and vale seat seal.
- Separate the valve stem assembly from the valve seat assembly by withdrawing the stem sideways from the seat.
- Remove the nylon thrust washer item 6 from the recess in the valve bonnet item 1.
- Check the inside of the valve bonnet bore for signs of scratching. If any scratches are noted, then the valve bonnet must be replaced.
- Check the rubber seal in the valve seat for signs of damage or shrinkage. A small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve block. If the seal is damaged or shows signs of shrinkage, it must be replaced. When only the rubber seal is replaced instead of using a complete shutter assembly, make sure that the socket head screw retaining the assembly is fitted using Loctite 222 screwlock.
- Check the valve stem for signs of scratches or damage. If the stem is scratched or damaged, it must be replaced. Check the condition of the "O" seals fitted to the stem. If either of the seals show signs of deterioration or damage, they must be replaced.
- Re-assembly of the valve is the reverse procedure of disassembly. Prior to re-assembly, apply a thin smear of silicon grease to the valve bore and to the valve stem seals. Always fit a new circlip item 9 and a new bonded washer item 12.
- After re-assembly of the valve into the block, the gap between the nylon thrust washer item 6 and the valve handle must be checked. A gap of between 0.25mm and 0.5 mm must be present. This gap may be achieved by selecting the correct thrust washer thickness. A range of thrust washers in different thicknesses may be obtained from Ultramagic. Failure to set this gap may result in a failure of the valve to switch off the main burner after operation.
- When the valve has been re-assembled into the valve block, the valve to block joint and the position where the valve stem exits the valve body must be pressure tested. To achieve this, connect the burner to a 7 Bar (100 psi) air supply and check the joints using soapy water. If any bubbles are detected, then the problem must be rectified before further burner use.

4.3.11.7 Liquid Valve Assembly

Removal, inspection and maintenance of the liquid valve is identical to the main valve with the a few exceptions. To remove the liquid valve assembly, refer to figure 6 and proceed as follows:

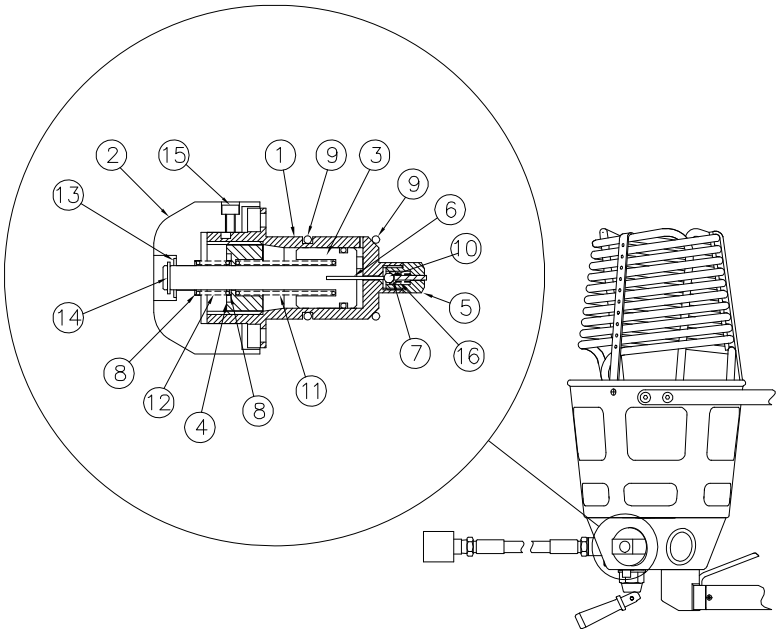
- Using the open ended spanner, remove the valve from the valve block as described in section 4.3.11.6.
- Rotate the valve handle item 17 to the vertical position. Using a 1.3mm Allen key, undo but do not remove the grub-screws item 16 on the underside of the handle cam.
- Remove the pivot pin item 15 connecting the handle to the valve stem item 2 and withdraw the handle.
- Further dismantling, inspection and re-assembly is as for the main valve and is described in section 4.3.11.6. Note that there is only one nylon thrust washer (item 18) used on the liquid valve. The thrust washer is thinner than those used on the main valve (item 6) in order to allow the valve handle to rest in an inclined position.
- When re-fitting the pivot pin item 15, ensure that the grub screws item 16 are tightened against the flat machined along one side of the pin. Grub screws can be secured using a small amount of Loctite 222 screwlock.

4.3.11.8 Pilot Regulator Valve

If the pilot light flame is weak and it is considered to be a fault of the pilot regulator valve, refer to figure 7 and carry out the following test:

- With the pilot light lit, gently press on the spindle which protrudes through the centre of the regulator knob. If when the spindle is pressed the flame improves, then it is likely that the regulator push rod length is too short. The push rod may be replaced by removing the complete assembly from the valve block and stripping it down.
- If the above test fails to improve the pilot light flame strength, then the entire assembly will require stripping down and inspecting.

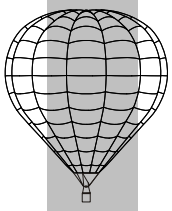
To remove, strip down and inspect the pilot regulator valve, refer to figure 7 and proceed as follows:



ITEM	DESCRIPTION	PART
16	ST STL SPRING TYPE D20520 CLOSED AND GROUND ENDS	MA-F
15	SPECIAL SCREW	2022.
14	ø8 STANDARD EXTERNAL CIRCLIP TO DIN 471	MA-F
13	THRUST WASHER (LARGE)	2022.
12	KNOB SPRING	2022.
11	ST STL SPRING TYPE D22220 CLOSED AND GROUND ENDS	MA-F
10	VITON BALL	MA-F
9	22 ID X 2.5 THICK HIGH NITRIL 'O' SEAL TYPE 206-122-5575	MA-F
8	THRUST WASHER	2022.
7	REGULATOR BALL GUIDE	2022.
6	REGULATOR PUSH ROD	2022.
5	REGULATOR GUIDE HOUSING	2022.
4	REGULATOR SPRING RETAINER	2022.
3	PISTON ASSY	2022.
2	REGULATOR KNOB	2022.
1	REGULATOR BODY	2022.

FIGURE 7
PILOT REGULATOR VALVE ASSEMBLY

- Rotate the regulator knob item 2 such that the holes in the front face line up with the fixing screws securing the regulator body to the valve block. Note that one of the fixings is offset slightly to ensure that the regulator is always positioned in the correct orientation within the valve block.
- Using an Allen key, remove the four fixings securing the regulator body to the valve block.
- Withdraw the complete assembly from the valve block.
- Remove the “O” seal item 9. This will probably have remained inside the valve block bore.
- Carefully remove the filter placed between the regulator and the block bore, and check for signs of blockage. Filter can be cleaned blowing compressed air through, but it must be replaced where there is any hesitation about its condition. Check also the condition of the filter o-ring, and replace if damaged or deteriorated.
- Using a pair of external circlip pliers, remove the circlip item 14 and the large thrust washer item 13.
- Undo and remove the two special screws item 15 securing the knob to the body.

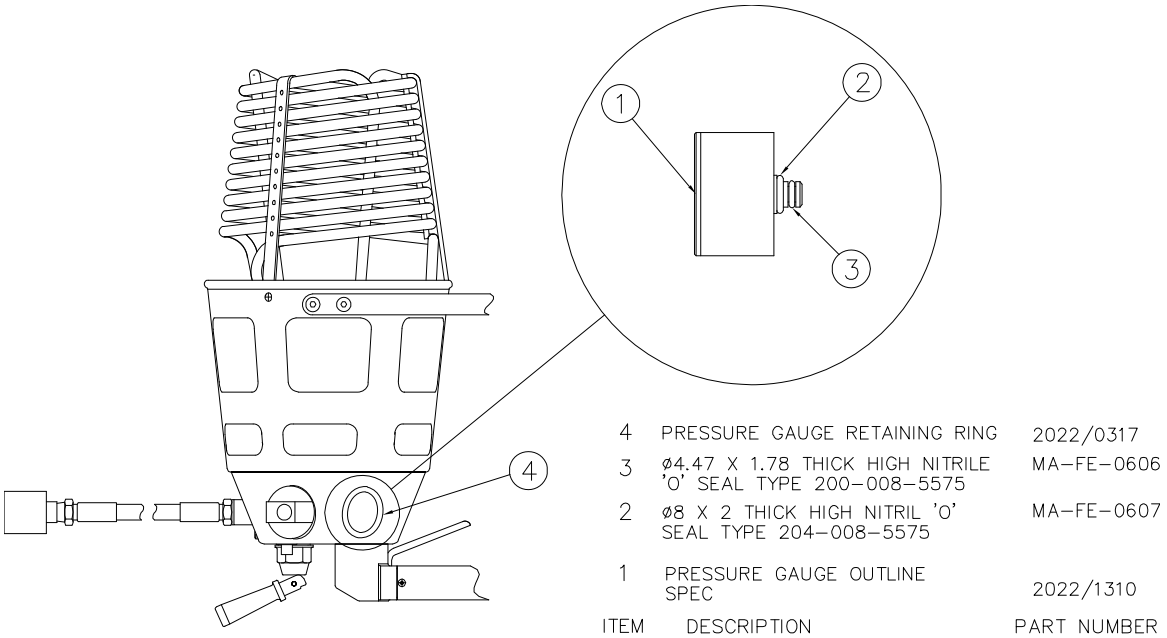


- Withdraw the regulator knob item 2 from the body. Take care not to loose the small thrust washer item 8 from inside the knob.
- Remove the spring item 12.
- Undo and remove the regulator spring retainer item 4 from the regulator body.
- Remove the spring item 11.
- Carefully remove the piston assembly item 3 from the body by gently pulling on the piston shaft. Take care to prevent the regulator push rod item 6 from falling out of the end of the piston.
- Undo and remove the regulator guide-housing item 5 from the end of the body. A small viton ball Item 10, a spring, item 16, and regulator ball guide are located behind the housing. Remove the housing carefully to ensure that these components are not lost.
- Check the internal bore of the regulator body where the piston is housed for signs of damage or scratching. If any damage or scratching is detected, then the body must be replaced.
- Check that the piston movement inside the regulator is smooth and unimpeded.
- Check that the piston spindle is free to move inside the regulator spring retainer item 4.
- Check the condition of the springs. Damaged or broken springs must be replaced.
- Check the piston assembly for signs of damage or scratching on the piston barrel. If signs of damage or scratching are detected, then the piston assembly must be replaced.
- Check the condition of the piston “O” seal. If the seal is damaged or shows signs of deterioration, it must be replaced. The piston and “O” seal are usually supplied as a complete assembly, but when only the o-ring is to be replaced, take care at removal to prevent damage to the seal groove. Do not use hard or sharp objects.
- Check the small bore in the bottom of the regulator body for signs of blockage or accumulation of oily deposits. Remove any blockage with a 1mm diameter wire. Oily deposits must be removed with a suitable solvent. Ensure that all particles are removed with an air blast.
- Check that the regulator ball-guide, item 7, is free to move in the regulator guide-housing, item 5. Remove any blockage or oily deposits as described above.
- Check the condition of the two “O” seals item 9. If the “O” seals are damaged or show signs of deterioration, then they must be replaced. Take care when removing the body seal to prevent damage to the seal groove. Do not use hard or sharp objects to remove the seal.
- Re-assembly of the pilot regulator valve is generally the reverse procedure to disassembly. When replacing the piston, apply a thin smear of silicon grease to the seal and to the internal bore of the regulator body. Apply graphite grease to the cam grooves in the upper section of the body where the special screws, item 15, locate.
- When re-assembling the knob, ensure that when the knob is in the fully extended position, the “zero” engraved on the knob circumference is lowermost when the regulator fixing holes are correctly aligned with the holes in the valve block.
- Prior to re-assembling the complete assembly into the valve block, ensure that the seal item 9 has been placed at the bottom of the valve block bore.
- Having re-assembled the pilot regulator valve into the valve block, the joint between the regulator body and the valve block and the position where the piston spindle protrudes through the knob must be pressure tested. In addition, the annulus created by the circumference of the knob and the valve body must be tested. Do this by connecting the burner to a 7 Bar (100 psi) air supply and checking the joints with soapy water. This test must be carried out with the gauge in the on and off positions. If any bubbles are detected, then the problem must be rectified before further burner use.

4.3.11.9 Pressure Gauge Assembly

There are no user serviceable parts inside the pressure gauge and repair is by replacement only. However, the “O” seals fitted on the base of the gauge may be replaced.

To remove the pressure gauge, refer to figure 8 and proceed as follows:



ITEM	DESCRIPTION	PART NUMBER
4	PRESSURE GAUGE RETAINING RING	2022/0317
3	ø4.47 X 1.78 THICK HIGH NITRILE 'O' SEAL TYPE 200–008–5575	MA–FE–0606
2	ø8 X 2 THICK HIGH NITRIL 'O' SEAL TYPE 204–008–5575	MA–FE–0607
1	PRESSURE GAUGE OUTLINE SPEC	2022/1310

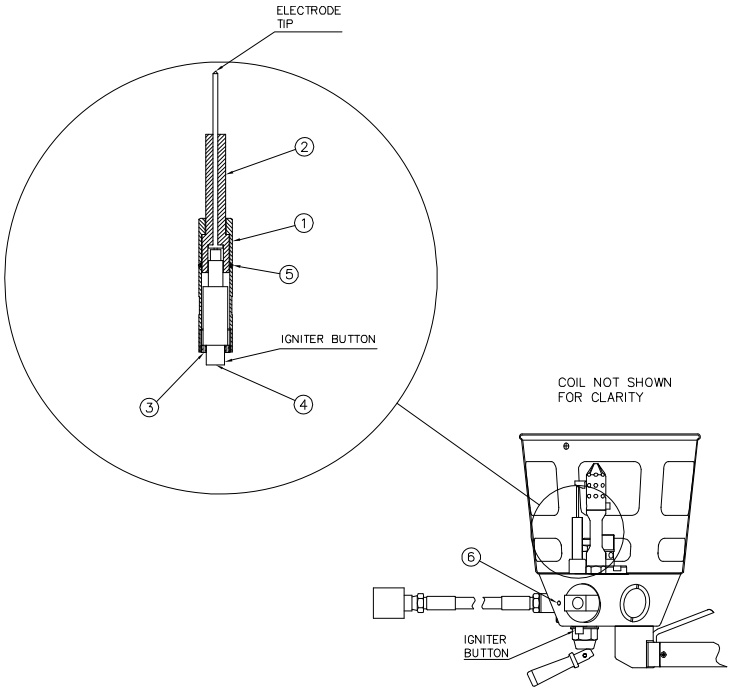
FIGURE 8
PRESSURE GAUGE ASSEMBLY

- Using a suitable flat plate or a length of bar, undo and remove the pressure gauge retaining ring item 4.
- Place two pieces of hooked wire down the sides of the pressure gauge. Place the hooks around the rear of the gauge. Remove the gauge from the bore by carefully pulling on the two wires.
- Check the condition of the two “O” seals items 2 and 3. If the “O” seals are damaged or show signs of deterioration, they must be replaced.
- Check the condition of the post positioned at the gauge rear where the “O” seals are mounted. If the post is damaged or scratched, then the gauge must be replaced. For safety, the gauge is supplied as a complete assembly.
- When re-fitting the “O” seals to the gauge, apply a thin smear of silicon grease to the seals and to the post prior to assembly.
- Re-assembly of the gauge to the valve block is generally the reverse procedure of removal. When inserting the gauge into the bore, ensure that the hole in the rear of the gauge body is aligned with the polarising pin in the bottom of the bore.
- Ensure that the retaining ring item 4 is fully tight.
- Having replaced the gauge, the assembly must be pressure tested. Do this by connecting the burner to a 7 Bar (100 psi) air supply and checking the joints around the retaining ring with soapy water. If any bubbles are detected, then the problem must be rectified before further burner use.

4.3.11.10 Igniter Assembly

Igniter Spark Strength

To check the igniter spark strength, refer to figure 9 and proceed as follows:



ITEM	DESCRIPTION	PART NUMBER
6	M6 X 6 ST STL GRUB SCREW	MA-FE-0502
5	ø19 ID X 1.5 THICK HIGH NITRILE 'O' SEAL TYPE 206-019-5575	MA-FE-0608
4	MODIFIED IGNITER	2022/0914
3	IGNITER END CAP	2022/0912
2	IGNITER CERAMIC	2022/0913
1	IGNITER HOUSING	2022/0910

FIGURE 9
IGNITER ASSEMBLY

- Operate the igniter button and visually check for a good spark. The spark should be approximately 6mm long and bright blue in colour.
- If the spark is weak, adjust the position of the tag on the pilot light element until the gap between the electrode and the lower edge of the tag is approximately 6mm.
- Further adjustment is possible by loosening the grub screw in the side of the valve block and moving the igniter assembly to achieve the required gap. Re-tighten the grub screw.
- Check that the igniter end cap item 3 is tight.
- Check that the grub screw item 6 fitted in the side of the valve block is tight.

Having completed the adjustments, check the spark strength. A good spark should be capable of igniting the pilot light within two attempts.

If the above procedure fails to improve the spark, then it is likely that the piezzo igniter unit item 4 will require replacing.

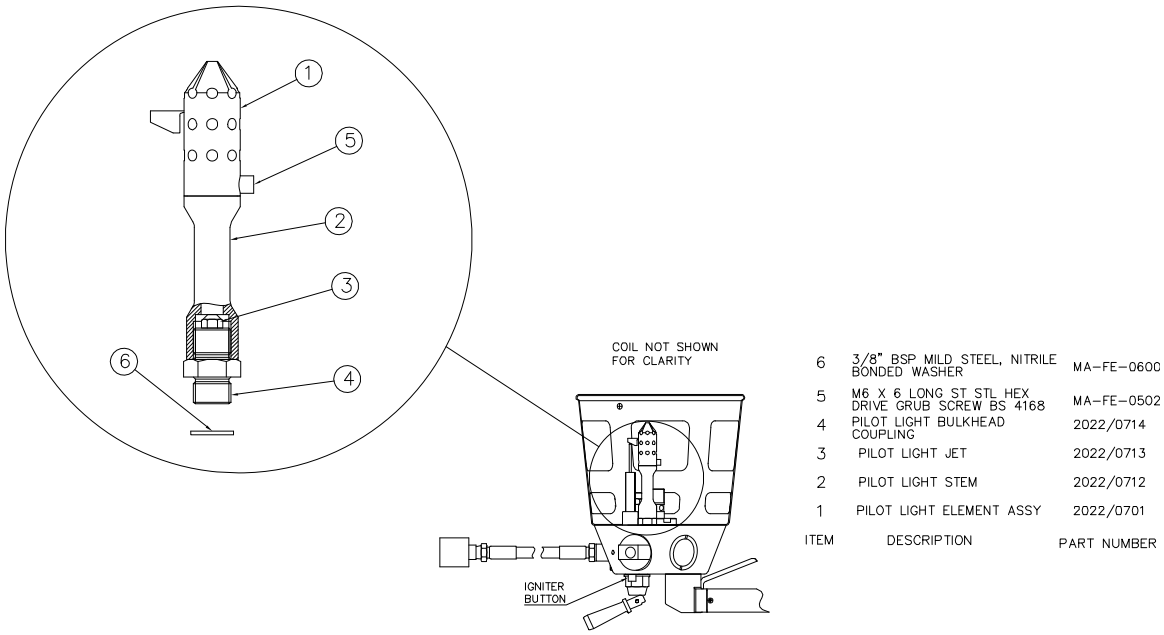
Igniter Maintenance

To remove and strip down the igniter assembly, refer to figure 9 and proceed as follows:

- Undo but do not remove the grub screw, item 6, fitted in the side of the valve block.
- Push the igniter assembly from on top and withdraw it from the underside of the valve block.
- Undo and remove the igniter end cap, item 3.
- Withdraw the piezzo igniter item 4.
- Withdraw the igniter ceramic item 2.
- Check the condition of the “O” seal item 5 fitted to the igniter body and replace if necessary.
- Re-assembly is generally the reverse procedure of disassembly. Prior to fitting the “O” seal item 5, apply a thin smear of silicon grease to the seal. Apply a thin smear of silicon grease to the igniter bore in the valve block prior to re-assembly of the igniter assembly to the valve block.
- Set the position of the electrode tip to ensure a gap of approximately 6mm between the tip point and the lower edge of the tag fitted on the side of the pilot light element assembly.
- Check the operation of the igniter assembly by operating the button.

4.3.11.11 Pilot Light Assembly

To remove and strip down the pilot light assembly, refer to figure 10 and proceed as follows:



ITEM	DESCRIPTION	PART NUMBER
6	3/8" BSP MILD STEEL, NITRILE BONDED WASHER	MA-FE-0600
5	M6 X 6 LONG ST STL HEX DRIVE GRUB SCREW BS 4168	MA-FE-0502
4	PILOT LIGHT BULKHEAD COUPLING	2022/0714
3	PILOT LIGHT JET	2022/0713
2	PILOT LIGHT STEM	2022/0712
1	PILOT LIGHT ELEMENT ASSY	2022/0701

FIGURE 10
PILOT LIGHT ASSEMBLY

- Locate the pilot light bulkhead coupling item 4. Undo and remove the complete pilot light assembly by unscrewing the bulkhead coupling from the valve block.
- Withdraw the pilot light assembly and the bonded washer, item 6.
- Loosen but do not remove the grub screw, item 5, in the side of the pilot light element assembly, item 1. Remove the element.
- Using a small tommie bar, unscrew the pilot light body, item 2, and remove.
- Unscrew and remove the jet item 3.

- Hold the jet up to the light and check that the hole appears round.
- If the jet is blocked or partially blocked, carefully clear the hole using a suitable piece of stiff wire or similar. Ensure that the jet is clear and that no pieces of the cleaning wire remain in the jet. If necessary, soak the jet in petrol or paraffin to remove any oily deposits. Any damage of the jet implies its replacement.
- Where bulkhead is fitted with filter, it is accessible from the bottom face. Using circlip pliers, undo the stainless steel retaining nut and take out the two round meshes inside. These can be cleaned, if necessary, by soaking in petrol or paraffin and blowing through with compressed air. However, where a significant accumulation of deposits is found, it is recommended to replace the meshes.
- Replacement of the pilot light is the reverse procedure of removal. When replacing the pilot light assembly, always fit a new bonded washer item 6. Set the position of the pilot light element assembly to ensure the correct gap setting between the tag and the igniter electrode as specified in section 4.3.11.10
- Having replaced the pilot light, the joint between the bulkhead coupling and the valve block must be pressure tested. Connect a 7 Bar (100 psi) air supply to the burner. Turn the pilot regulator valve on. Check the joint using soapy water. If any bubbles are detected then the leak must be corrected before further burner use.

If the above procedure fails to improve the pilot light flame, then it is likely that a fault exists with the pilot regulator valve. For maintenance procedures on the pilot regulator valve, refer to section 4.3.11.8.

4.3.11.12 Liquid fire Jet Assembly

To remove and strip down the liquid fire jet assembly, refer to figure 11 and proceed as follows:

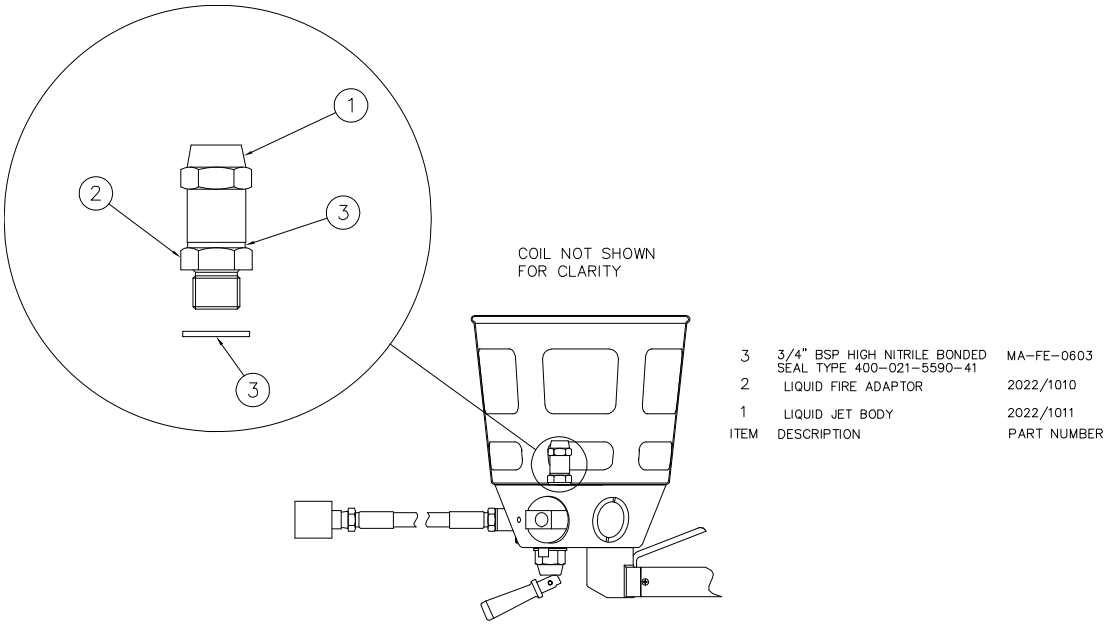
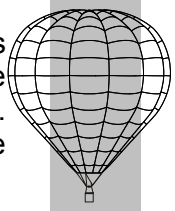


FIGURE 11
LIQUID FIRE JET ASSEMBLY

- Locate the liquid fire adapter item 2. Using a suitable spanner, undo and remove the entire assembly by unscrewing the adapter from the valve block.
- Remove the boded washer, item 3, from the valve block.
- Unscrew the liquid jet body item 1, from the adapter.
- Remove the bonded washer item 3, from the adapter.
- Re-assembly is generally the reverse procedure of removal. Always fit new bonded washers, item 3 when replacing the assembly.



- Having re-assembled the liquid fire jet assembly to the valve block, the joints between the adapter and the valve block and the adapter and body must be pressure tested. Connect a 7 Bar (100 psi) air supply to the burner. Turn on the liquid valve. Check the joints using soapy water. If ant bubbles are detected, the problem must be resolved before further burner use.

4.3.11.13 Slurper Tube Assembly

To adjust the slurper tube to optimise performance, refer to figure 12 and proceed as follows:

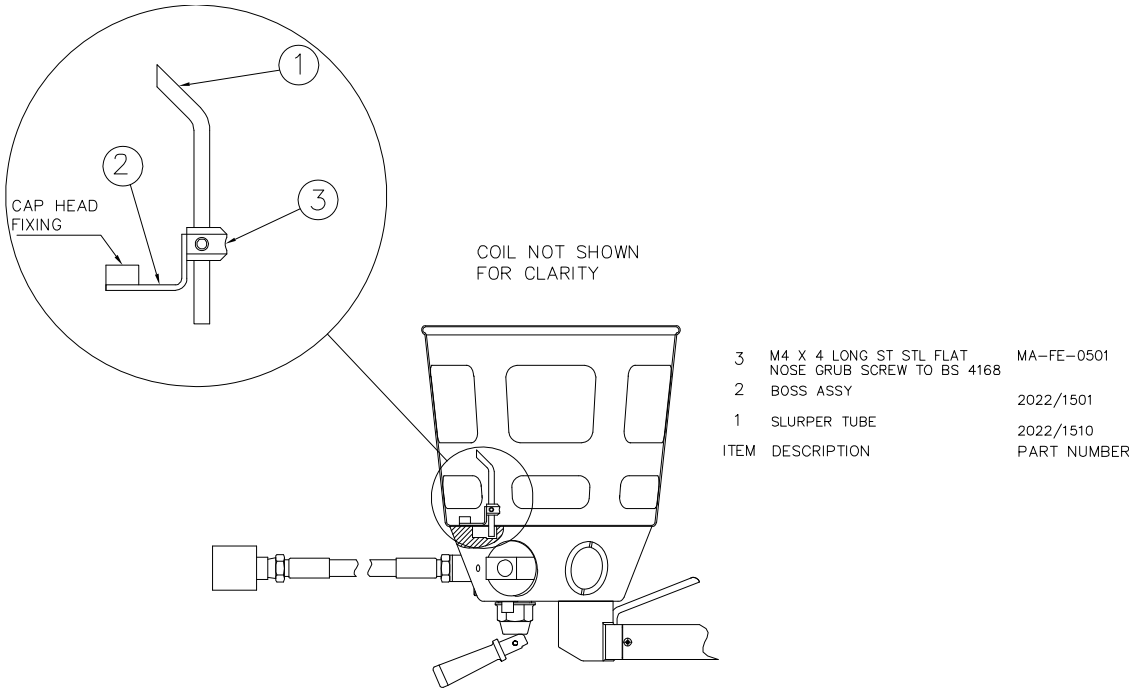


FIGURE 12
SLURPER TUBE ASSEMBLY

- Undo but do not remove the grub screw item 3.
- Adjust the slurper tube, item 1, position such that the bottom of the tube is approximately 1mm above the machined recess in the upper surface of the valve block.
- Re-tighten the grub screw.
- If required, the slurper tube assembly may be completely removed by unscrewing the cap head fixing screw.
- Re-assembly is the reverse process of removal.

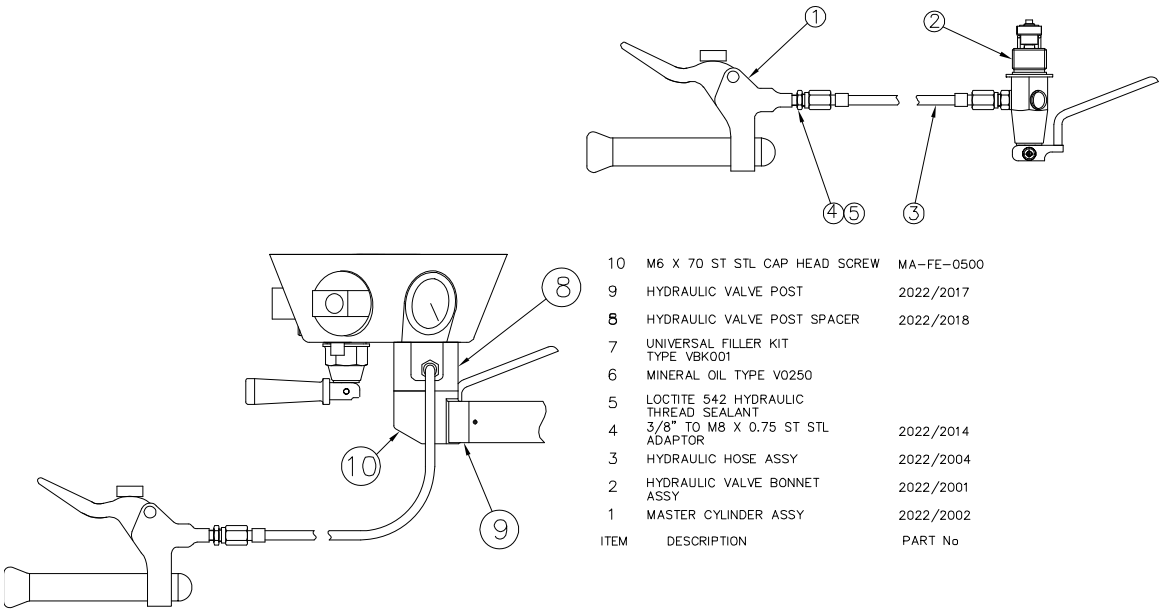
4.3.11.14 Hydraulic Main Valve Assembly

The hydraulically operated main valve is an optional fit. To remove the hydraulic main valve assembly from the valve block, refer to figure 13 and proceed as follows:

- Undo and remove the cap-head fixings item 10 from all positions where the burner handle is attached.
- Withdraw the burner handle as an assembled item.

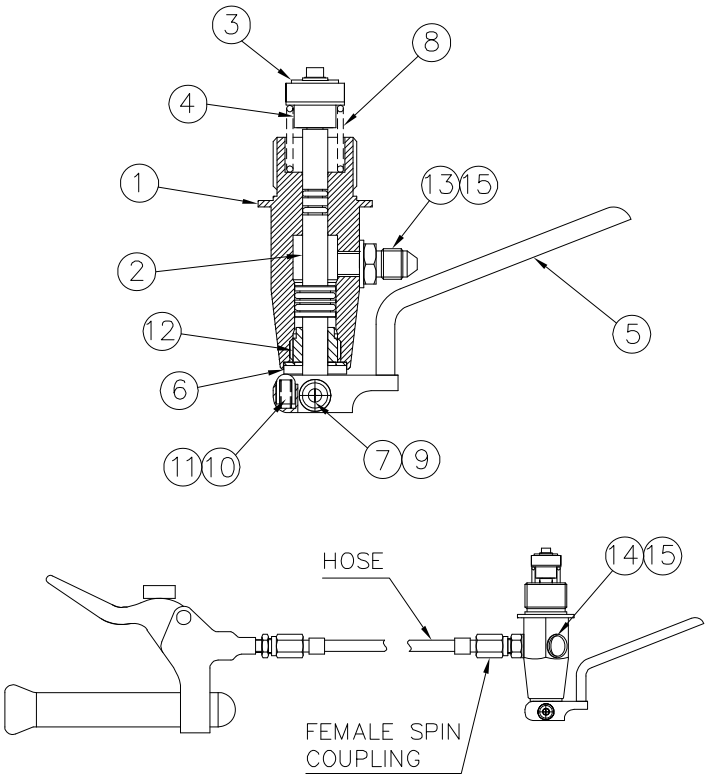
- Remove the valve assembly from the valve block as described for the standard main valve in section 4.3.11.6

For further maintenance work, refer to figure 14 and proceed as follows:



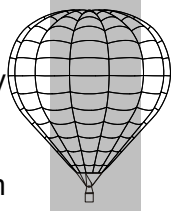
ITEM	DESCRIPTION	PART No
10	M6 X 70 ST STL CAP HEAD SCREW	MA-FE-0500
9	HYDRAULIC VALVE POST	2022/2017
8	HYDRAULIC VALVE POST SPACER	2022/2018
7	UNIVERSAL FILLER KIT TYPE VBK001	
6	MINERAL OIL TYPE VO250	
5	LOCTITE 542 HYDRAULIC THREAD SEALANT	
4	3/8" TO M8 X 0.75 ST STL ADAPTOR	2022/2014
3	HYDRAULIC HOSE ASSY	2022/2004
2	HYDRAULIC VALVE BONNET ASSY	2022/2001
1	MASTER CYLINDER ASSY	2022/2002

FIGURE 13
HYDRAULIC MAIN VALVE ASSEMBLY



ITEM	DESCRIPTION	PART No
15	M8 COPPER CRUSH WASHER	MA-FE-0609
14	BLANKING SCREW	2022/2013
13	3/8" UNF TO M8 ADAPTOR	2022/2014
12	HYDRAULIC VALVE BUSH	2022/2012
11	ST STL SPRING TYPE D20770	MA-FE-0700
10	SPRING CAP	2022/1212
9	ø4 STANDARD EXTERNAL CIRCLIP TO DIN 471	MA-FE-0530
8	ST STL SPRING TYPE D22700	MA-FE-0701
7	PIVOT PIN (MAIN VALVE)	2022/1211
6	THRUST WASHER	2022/1114
5	RH MAIN VALVE HANDLE	2022/1410
4	VALVE SEAT SLEEVE	2022/1113
3	VALVE SEAT ASSY	2022/1102
2	HYDRAULIC VALVE STEM ASSY	2022/2003
1	HYDRAULIC VALVE BONNET	2022/2010

FIGURE 14
HYDRAULIC MAIN VALVE ASSEMBLY



- There are no user serviceable parts in the remote hand lever and repair is by replacement.
- The seals inside the valve may be replaced as follows:
- Using an open ended spanner, undo and detach the hose female spin coupling from the adapter item 13.
- Drain the valve of hydraulic fluid.
- Using a pair of external circlip pliers, remove the circlip item 9 from the pivot pin item 7.
- Withdraw the pivot pin item 7 from the handle assembly item 5. Remove the handle. When removing the handle, take care to ensure that the spring item 11 and spring cap item 10 do not spring out of the recess in the valve handle cam.
- Remove the nylon thrust washer item 6.
- Unscrew and remove the valve bush item 12.
- Carefully push the vale stem assembly forward. Compress the spring item 8. Remove the valve seat sleeve item 4 and the valve seat assembly item 3.
- Remove the main spring item 8 from the valve stem.
- Withdraw the valve stem assembly item 2.
- Check the inside of the valve bonnet bore for signs of scratching. If any scratches are noted, then the valve bonnet must be replaced.
- Check the rubber seal in the valve seat for signs of damage or shrinkage. A small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve block. If the seal is damaged or shows signs of shrinkage, it must be replaced. For safety, the seal is supplied as a complete assembly and no attempt should be made to replace the seal only.
- Check the valve stem for signs of scratches or damage. If the stem is scratched or damaged, it must be replaced. Check the condition of the “O” seals fitted to the stem. If any of the seals show signs of deterioration or damage, they must be replaced. For safety, the valve stem is supplied as an assembly, complete with seals. No attempt should be made to replace the seals or stem independently.
- Re-assembly of the valve is the reverse procedure of disassembly. Prior to re-assembly, apply a thin smear of silicon grease to the valve bore and to the valve stem seals. Always fit a new circlip item 9 and a new bonded washer.
- Re-fill the system with oil ensuring that there are no air bubbles. Only use the oil supplied by Ultramagic. The use of the incorrect fluid may cause damage to the seals and a loss of valve function.
- After re-assembly of the valve into the block, the gap between the nylon thrust washer item 6 and the valve handle must be checked. A gap of between 0.25mm and 0.5 mm must be present. This gap may be achieved by selecting the correct thrust washer thickness. A range of thrust washers in different thicknesses may be obtained from Ultramagic. Failure to set this gap may result in a failure of the valve to switch off the main burner after operation.
- When the valve has been re-assembled into the valve block, the valve to block joint and the position where the valve stem exits the valve body must be pressure tested. To achieve this, connect the burner to a 7 Bar (100 psi) air supply and check the joints using soapy water. If any bubbles are detected, then the problem must be rectified before further burner use.

4.4 MK 21 SINGLE BURNER MAINTENANCE

This section of the Manual provides the specific maintenance instructions applicable to the MK-21 Single burners, whilst most of the content is cross-referenced with the equivalent sections under 4.3.

For information about Replacement Parts and Procedures, Approved Maintenance and Inspection Personnel, Welding and Welders, Maintenance Records, Technical Support or Safety, refer to the appropriate sections from 4.3.1 to 4.3.6.

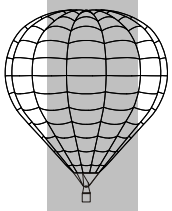
4.4.1 Technical Description

Technical description of the major features for the MK-21 Single burner is common to the Double, Triple and Quadruple models and can be found on section 4.3.7.
However, note that the single burner is fitted with a special block, with many of the assemblies duplicated but split in Left / Right circuits.

This particular distribution is summarized next:

- Single burner can.
- Unique main Burner Vaporising coil
- Left and Right circuit Fuel hoses
- Left and Right Main valve assemblies
- Left and Right Liquid valve assemblies.
- Left and Right Pilot Regulator Valve assemblies
- Left and Right Igniter assemblies
- Left and right Pressure gauge assemblies
- Left and Right Liquid fire jet assemblies
- Left and right Pilot light assemblies
- Single slurper tube assembly.
- Left and right Fuel inlet posts

The MK21 Single burner may be seen in Figure 1 and the features and functions detailed above are described in the following paragraphs:



ITEM	DESCRIPTION	PART NUMBER
1	BURNER CAN	2021-0011
2	VAPOURISATION COIL	2021-0500
3	SWIVEL BOSS	2021-0010
4		
5	FUEL HOSE ASSEMBLY	2022-0001
6	FUEL CONNECTOR	REFERENCE
7	BURNER HANDLE	2021-0313
8	MAIN VALVE ASSEMBLY	2021-1200 (LH) 2021-1400 (RH)
9	LIQUID VALVE ASSEMBLY	2022-1100 (LH) 2021-1600 (RH)
10	PILOT REGULATOR VALVE ASSEMBLY	2022-0800
11	IGNITER ASSEMBLY	2022-0900
12	PRESSURE GAUGE ASSEMBLY	2022-1300
13	LIQUID FIRE JET ASSEMBLY	2022-1000
14	PILOT LIGHT ASSEMBLY	2022-0700
15	SLURPER TUBE ASSEMBLY	2022-1500
16	FUEL INLET POST	2022-0313
17	SINGLE BURNER VALVE BLOCK	2021-0311
18	HANDLE POST	2021-0312
19	3/8" BSP BONDED SEAL	MA-FE-0600
20		
21	M6 X 10 ST STL CAP HEAD SCREW	MA-FE-0509
22	M6 X 70 ST STL CAP HEAD SCREW	MA-FE-0500
23	M6 ST STL PLAIN WASHER	MA-FE-0511
24	M3 X 6 ST STL SLOTTED PAN HD SCREW	MA-FE-0533

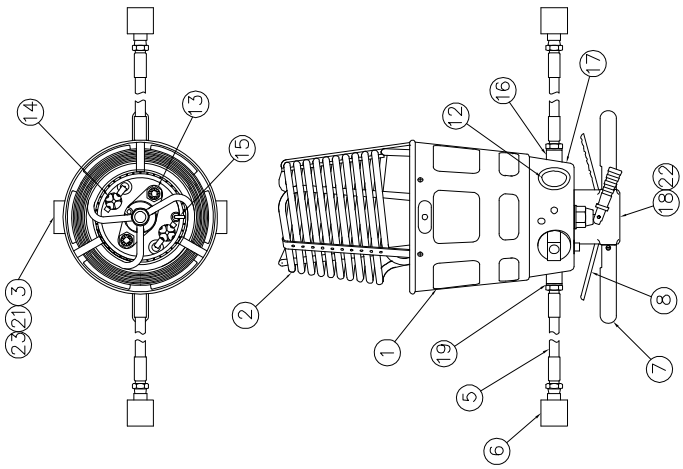
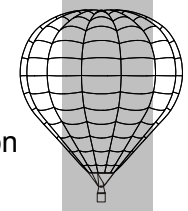


FIGURE 1
MK 21 SINGLE BURNER
ARRANGEMENT



4.4.2 Preventative Maintenance

For information about Preventative Maintenance and General Cleaning, refer to section 4.3.10.

4.4.3 Repair and Maintenance

4.4.3.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies used within the burner. Maintenance other than that detailed in the Section 4.4.2, (Preventative Maintenance) and Section 6, (Annual / 100 Hour Inspection) should not be carried out unless it is clear that there is a fault or there is a noticeable deterioration in the performance of any part of the burner functions. Remember, “If it ain’t broke, don’t fix it”!

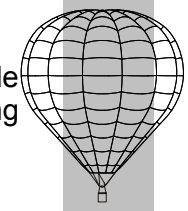
Whenever a part or assembly whose removal breaks the pressure integrity of the burner is removed and replaced, the re-assembled joint(s) must be subjected to a pressure test. Connect the burner to a 7Bar (100-psi) compressed air supply and test the joint using soapy water. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

4.4.3.2 Burner Can

The burner can is a welded stainless steel assembly and of a relatively robust construction. Some indentation to the can is acceptable provided that the integrity of the fixings supporting the coil, valve block or burner mountings are not compromised and that the gimbal action of the burner is unaffected.

Small cracks in the can may be repaired by welding (see section 4.3.3).

If it is considered that the can must be replaced, proceed as follows:



- Using a 6mm Allen key, undo and remove the two M8 cap head screws fitted inside the swivel bosses (item 3, fig 1). **Do not** remove the M6 cap head screws securing the swivel bosses to the can.
- Remove the burner from the burner frame.
- Remove the vaporisation coil as described in section 4.4.3.3
- Undo and remove the six M6 fixings and washers securing the base of the can to the valve block using a 5mm Allen key.
- Remove the can.
- Prior to can re-assembly to the valve block, ensure that the large "O" seal, item 8, figure 2 is fitted within the groove in the upper surface of the valve block. Note that this seal is fitted to prevent water formed in the combustion process from seeping out. Damage to the seal does not affect the airworthiness of the burner.
- Re-assembly is the reverse process of dismantling. Note that any screw fixings not provided with a mechanical locking must be locked using Loctite 222.
- Pressure test the coil to valve block joints as described in section 4.4.3.1

4.4.3.3 Vaporisation Coil

Refer to section 4.3.11.3 for information on repairs and maintenance of the Vaporisation coil.

4.4.3.4 Removal of Fuel Hose

To replace a fuel hose, refer to section 4.3.11.4.

4.4.3.5 Left and Right Fuel Inlet Posts and Fuel Inlet Post Seals

Refer to section 4.3.11.5 for information on repairs and maintenance of the Fuel inlet posts.

4.4.3.6 Left and Right Main Valve Assemblies

To remove and strip down the left or right main valve assembly, refer to figure 6 and proceed as follows:

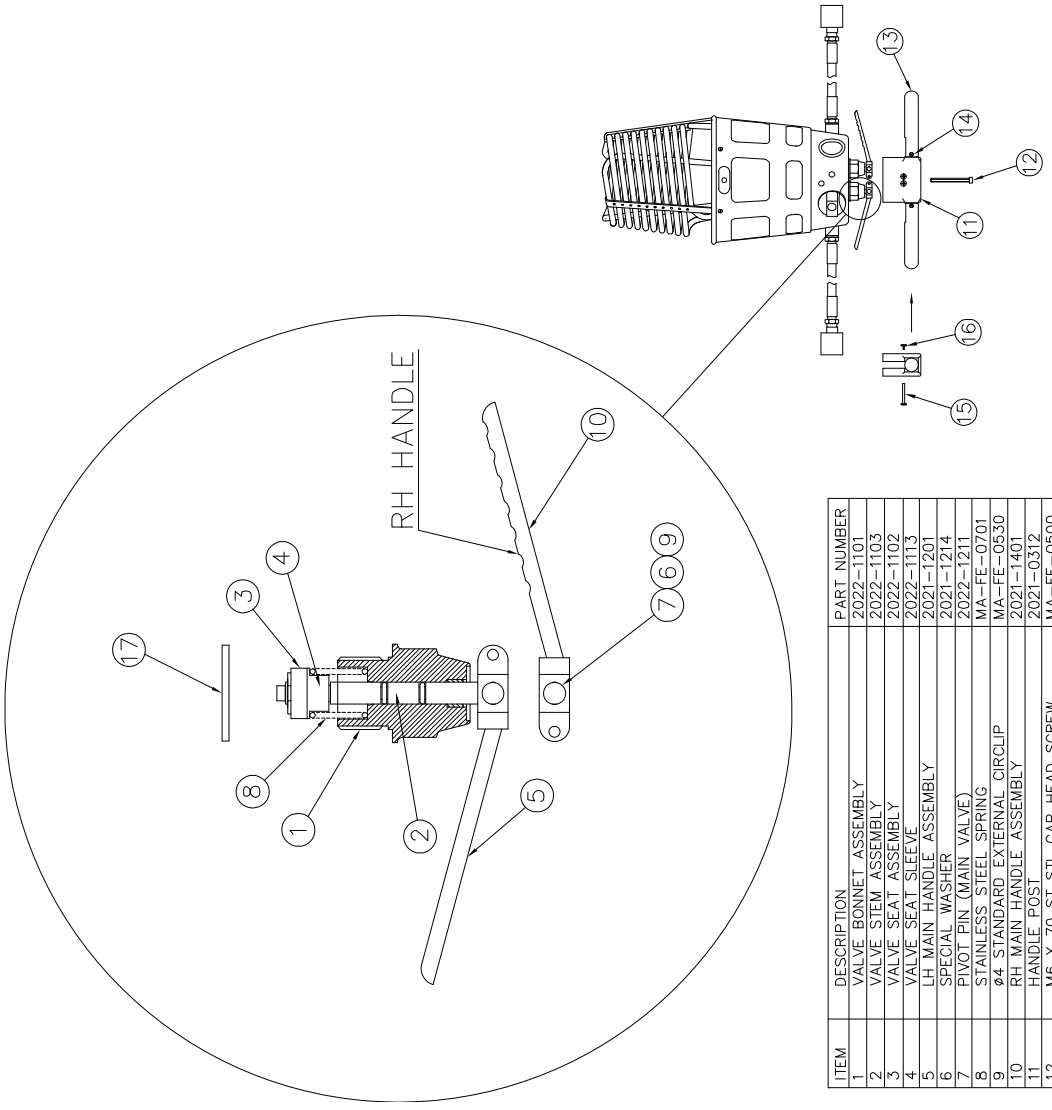
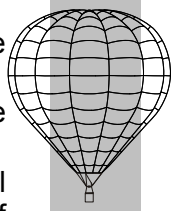


FIGURE 6
MAIN VALVE ASSEMBLY CONFIGURATION

ITEM	DESCRIPTION	PART NUMBER
1	VALVE BONNET ASSEMBLY	2022-1101
2	VALVE STEM ASSEMBLY	2022-1103
3	VALVE SEAT ASSEMBLY	2022-1102
4	VALVE SEAT SLEEVE	2022-1113
5	LH MAIN HANDLE ASSEMBLY	2021-1201
6	SPECIAL WASHER	2021-1214
7	PIVOT PIN (MAIN VALVE)	2022-1211
8	STAINLESS STEEL SPRING	MA-FE-0701
9	ø4 STANDARD EXTERNAL CIRCLIP	MA-FE-0530
10	RH MAIN HANDLE ASSEMBLY	2021-1401
11	HANDLE POST	2021-0312
12	M6 X 70 ST STL CAP HEAD SCREW	MA-FE-0500
13	BURNER HANDLE	2021-0313
14	M3 X 6 ST STL SLOTTED PAN HEAD SCREW	MA-FE-0533
15	VALVE POST PIVOT PIN	2021-0317
16	PIVOT PIN END CAP	2021-0319
17	3/4" BSP NITRILE BONDED WASHER	MA-FE-0603

- Using a pair of flat bladed screw drivers, undo and remove the two valve post pivot pins item 15 and the two pivot pin end caps item 16 from the handle post item 11.
- Using a 5mm Allen key, undo and remove the two, cap head screws item12 securing the handle post item 11 and burner handles item 13 to the valve block. Withdraw the handle post and handles as a complete assembly.
- Using a 28mm open-ended spanner, undo and remove the left or right main valve from the valve block. In order to protect the finish on the valve bonnet, apply masking tape to the spanner jaws.
- Remove the bonded washer item 17 from the recess in the valve block.
- The valve may now be stripped down for further maintenance if required. Using a pair of external circlip pliers, remove the circlip item 9 and the special washer item 6 from the pivot pin item 7.
- Withdraw the pivot pin item 7 from the handle assembly item 5. Remove the handle.
- Withdraw the valve seat assembly item 3 and the valve stem assembly item 2 from the valve bonnet item 1.
- Remove the main spring item 8 from the valve stem.
- Remove the valve seat sleeve item 4 from the valve stem and vale seat seal.



- Separate the valve stem assembly from the valve seat assembly by withdrawing the stem sideways from the seat.
- Check the inside of the valve bonnet bore for signs of scratching. If any scratches are noted, then the valve bonnet must be replaced.
- Check the rubber seal in the valve seat for signs of damage or shrinkage. A small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve block. If the seal is damaged or shows signs of shrinkage, it must be replaced. When only the rubber seal is replaced instead of using a complete shutter assembly, make sure that the socket head screw retaining the assembly is fitted using Loctite 222 screwlock.
- Check the valve stem for signs of scratches or damage. If the stem is scratched or damaged, it must be replaced. Check the condition of the "O" seals fitted to the stem. If either of the seals show signs of deterioration or damage, they must be replaced.
- Re-assembly of the valve is the reverse procedure of disassembly. Prior to re-assembly, apply a thin smear of silicon grease to the valve bore and to the valve stem seals. Always fit a new circlip item 9 and a new bonded washer item 17.
- When the valve has been re-assembled into the valve block, the valve to block joint and the position where the valve stem exits the valve body must be pressure tested. To achieve this, connect the burner to a 7 Bar (100 psi) air supply and check the joints using soapy water. If any bubbles are detected, then the problem must be rectified before further burner use.

4.4.3.7 Liquid Valve Assembly

Removal, inspection and maintenance of the liquid valve are identical to the main valve with the a few exceptions. To remove the liquid valve assembly, refer to figure 7 and proceed as follows:

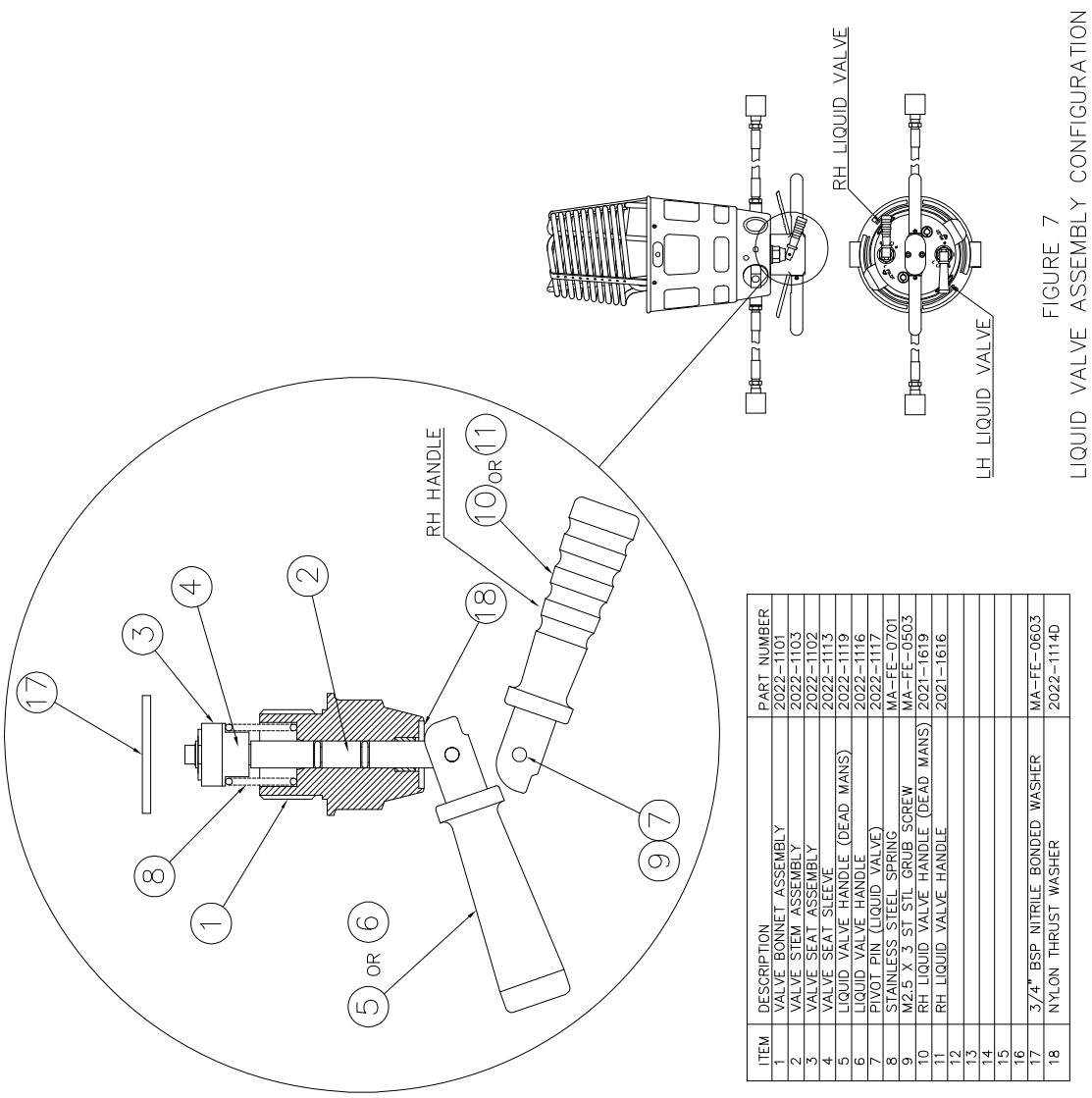
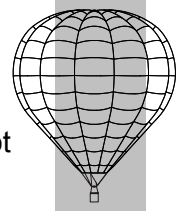


FIGURE 7
LIQUID VALVE ASSEMBLY CONFIGURATION

ITEM	DESCRIPTION	PART NUMBER
1	VALVE BONNET ASSEMBLY	2022-1101
2	VALVE STEM ASSEMBLY	2022-1103
3	VALVE SEAT ASSEMBLY	2022-1102
4	VALVE SEAT SLEEVE	2022-1113
5	LIQUID VALVE HANDLE (DEAD MANS)	2022-1119
6	LIQUID VALVE HANDLE	2022-1116
7	PIVOT PIN (LIQUID VALVE)	2022-1117
8	STAINLESS STEEL SPRING	MA-FE-0701
9	M2.5 X 3 ST STL GRUB SCREW	MA-FE-0503
10	RH LIQUID VALVE HANDLE (DEAD MANS)	2021-1619
11	RH LIQUID VALVE HANDLE	2021-1616
12		
13		
14		
15		
16		
17	3/4" BSP NITRILE BONDED WASHER	MA-FE-0603
18	NYLON THRUST WASHER	2022-1114D

- Using the 28mm open ended spanner, remove the valve from the valve block as described in section 4.4.3.6
- Rotate the valve handle item 5 to the vertical position. Using a 1.3 mm Allen key, undo but do not remove the grub-screws item 9 on the underside of the handle cam.
- Remove the pivot pin item 7 connecting the handle to the valve stem item 2 and withdraw the handle.
- Note that the liquid valve handle type is optional and may be either the standard or “Dead Man’s” version. The “Dead Man’s” handle is designed such that upon release, the valve will always return to the closed position.
- Further dismantling, inspection and re-assembly is as for the main valve and is described in section 4.4.3.6 Note that there is only one nylon thrust washer used on the liquid valve. The thrust washer is thinner than those used on the main valve in order to allow the valve handle to rest in an inclined position.
- When re-fitting the pivot pin item 7, ensure that the grub screws items 16 are tightened against the flat machined along one side of the pin.



4.4.3.8 Pilot Regulator Valve

Refer to section 4.3.11.8 for information on repairs and maintenance of the Pilot regulator valves.

4.4.3.9 Pressure Gauge Assembly

Refer to section 4.3.11.9 for information on repairs and maintenance of the pressure gauge assemblies.

4.4.3.10 Igniter Assembly

Refer to section 4.3.11.10 for information on repairs and maintenance of the igniter assemblies.

4.4.3.11 Pilot Light Assembly

Refer to section 4.3.11.11 for information on repairs and maintenance of the pilot light assemblies.

4.4.3.12 Liquid fire Jet Assembly

Refer to section 4.3.11.12 for information on repairs and maintenance of the pilot light assemblies.

4.4.3.13 Slurper Tube Assembly

Refer to section 4.3.11.13 for information on repairs and maintenance of the pilot light assemblies.

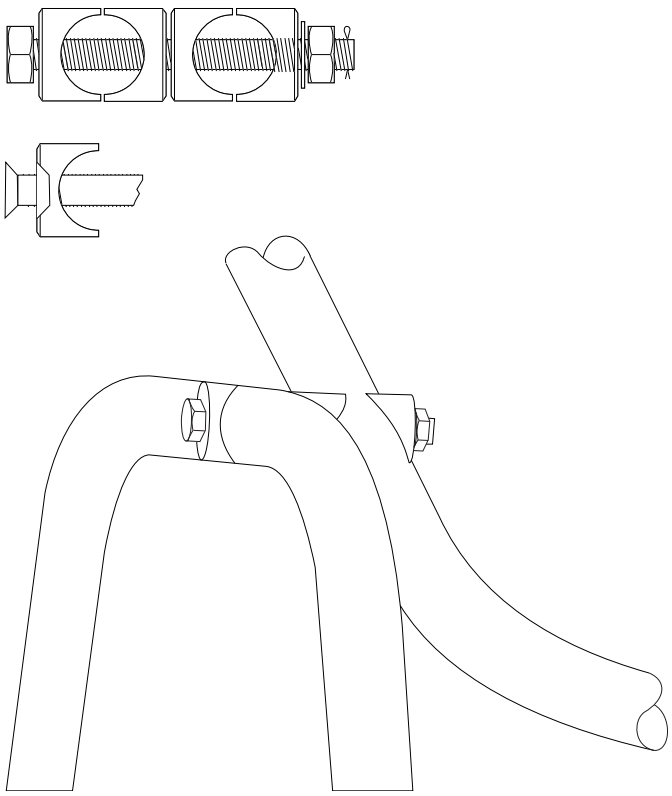
4.5 BURNER FRAME MAINTENANCE

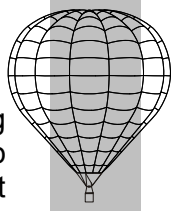
Ultramagic burner frames are require very little maintenance. The Gimbal system may need tightening occasionally. See drawing below which shows the bolts used and the assembly details of the Gimbal joint.

Should the main outer burner frame become damaged then it should be replaced completely with an Ultramagic supplied part. See below for dimensions of appropriate burner frames relating to baskets.

Burner Frame Denomination	Standard Burner Frame Dimensions [cm]	Tube nominal outside Diameter [mm]	Tube nominal inside Diameter [mm]	Bolt Size [M, mm]
QSQ0	65 x 50	25	22	M8 x 70
QSQ2	70 x 53	25	22	M8 x 70
QSQ3	80 x 70	25	22	M8 x 70
QSQ4	118 x 106	30	27	M10 x 100
QSQ6	160 x 135	35	32	M10 x 100
QSQ7	98 x 88	25	22	M10 x 90
QSQ8	200 x 135	35	32	M10 x 100

For details on burner frames fitted with centre gimbal, refer to the applicable supplement.





4.6 STANDARD TORQUE VALUES

The following torque settings are recommended when replacing the following components. However experience and training can take precedence. General workshop practice is applicable for the tightening of all other bolts and screws. Where any doubt exists then consult with Ultramagic S.A. or an approved representative.

Burner Fuel Hoses

Fitting	Thread Form	Max. Torque (NM)
MK21 Liquid Hose	3/8 inch BSP	20
MK21 Liquid Hose	1/4 inch NPT	15-20

Fuel Cylinders

Fitting	Thread Form	Max. Torque (NM)
Fixed Liquid Level Gauge	1/4 inch NPT	28 - 50
Liquid Valve	3/4 inch NPT	110 - 200
Vapour Valve	3/4 inch NPT	110 - 200
Blanking Plug	3/4 inch NPT	110 - 200
Pressure Relief Valve	3/4 inch NPT	135 - 170
Contents Gauge Allen Bolt	M5	3 - 5

Note – 1 N × m = 0.737 lb × ft = 8.85 lb × in.

Section 5 - Instruments

5.1 Flytec Envelope Temperature Sensor

5.1.1 Installation

The Flytec temperature sensor is located on load tape no 1 and this can be identified by a red mark on the overlying tapes. It is positioned 1 metre from the parachute aperture.

The temperature sensor is fitted as follows:

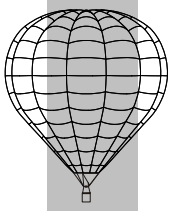
1. Establish the attachment point and peel back the Velcro from the load tape.
2. Pass the Velcro strips over the bars on the unit and pres the velcro firmly back on the load tape.
3. Ensure that the probe and wire are positioned adjacent to the small hole in the envelope fabric and pass the probe through the hole into the envelope.

5.1.2 Replacement of Batteries.

When the main instrument indicates a loss of temperature signal then this means that the batteries in the sender unit need replacing. One should note that the instrument requires a differential of temperature of 10 degrees centigrade between the inside of the envelope and the unit before a signal is transmitted.

The battery is replaced as follows.

1. Remove the sender unit from the envelope in the reverse method to installation.
2. Remove the 2 screws from the underside of the sender unit.
3. Replace the battery with good quality PP3 size battery (9 volt).
4. Reassemble the unit and replace in the envelope exactly as removed.



Section 6 - Inspection Schedules

6.1 Pre – Flight Checks ("A type")

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 as follows.

Damage to the fabric in the lower third of the envelope must be limited to an area affecting no more than 3 panels. These panels may be adjacent.
Holes no greater than 10mm in diameter 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 50mm to each other. No more than 3 panels in the upper two thirds of the envelope may have these small holes.

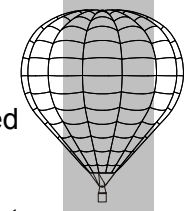
2. ☐ Ensure that there is no damage to any load tapes.
3. ☐ Ensure that there is no damage to the flying wires and that they are free of twists.
4. ☐ Ensure that flying wires are connected correctly and that karabiners are closed, screwed shut and loaded lengthways.
5. ☐ Ensure that all control ropes 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 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.

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.
5. ☐ Check for the presence of a fully charged fire extinguisher.



6.2 Unscheduled Inspections

These consist of inspections other than scheduled inspections, which need to be carried out, as and when required. They consist of.

1. Pre – Flight Inspections.(A Check) (These are covered in the Ultramagic Flight Manual)
2. Envelope Overheat Inspection (See section 6.7.1)
3. Powerline Contact Inspections (See section 6.7.2)
4. Hard Landing (See section 6.7.3)

6.3 100 hour/Annual inspection ("B type")

General Notes

This inspection is the minimum required for annual/renewal of the Certificate of Airworthiness on all Ultramagic balloons.

Validity of the C of A is subject to the log book containing an inspection certificate / certificate of release to service valid according to section 7.3 of this manual.

Additions are required to the schedule in some countries where national requirements dictate this. The appropriate Airworthiness Authority should be contacted for details of these requirements.

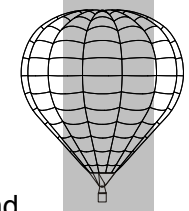
Any parts, which fail an inspection and cannot be repaired, should be dealt with in accordance with the local Airworthiness Authority requirements.

Annual inspections and inspection of overhaul and repair work must be carried out by an inspector approved by the local Airworthiness Authority.

Logbook

- ☐ Present at time of inspection
- ☐ Flight hours correct and up to date
- ☐ All repairs and modifications recorded.
- ☐ Equipment serial numbers agree with items submitted for inspection.
- ☐ For UK Transport Category balloons, the last Technical Log must be presented and remaining hours cross-referenced with hours in the balloon logbook.
- ☐ For UK balloons, satisfactory inspection to be shown by the issue of form IR4, the top layer to be retained in the balloon logbook
- ☐ For UK balloons, which fail inspection, the IR4 will be held for up to one month pending repair action and re-inspection, with repairs logged on the IR4.

Note: Where the balloon comprises of major components from different manufacturers, then the appropriate inspection forms should be used in conjunction with this schedule.



100 hour/Annual inspection ("B type")

Envelope

1. ☐ Check the envelope panel by panel or by inflating for holes and tears and ensure that any fabric damage does not exceed the Permitted Damage as follows. (Special shape envelopes must be inflated)

Damage to the fabric in the lower third of the envelope must be limited to an area affecting no more than 3 panels. These panels may be adjacent.
Holes no greater than 10mm in diameter 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 50mm to each other. No more than 3 panels in the upper two thirds of the envelope may have these small holes.

2. ☐ Ensure that all control ropes and chords are free of damage, securely attached, not twisted and work correctly.

3. ☐ Ensure that all pulleys and loops are well attached and are working freely.

4. ☐ Ensure that all stitching is correct and that no caught or broken threads exist.

5. ☐ Ensure all existing repairs have been carried out in accordance with the maintenance manual and that they have been recorded in the aircraft logbook.

6. ☐ Check the porosity of the fabric by blowing through it. If considerable air passes then carry out a test flight, only after a grab test is carried out to ensure that the balloon is safe to fly.

7. ☐ Ensure that the temperature link is still in place.

8. ☐ Inspect the temperature label. If the temperature label indicates over 127 degrees C then a grab test must be carried out and another temperature label fitted adjacent to the existing one.

9. ☐ Inspect the crown ring for damage.

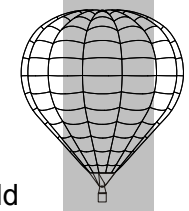
10. ☐ Inspect the load tapes at the crown ring for damage and friction burns. Check the stitching of the overlying tapes on the crown ring.

11. ☐ Inspect the stitching of the joints of the vertical load tapes to the top edge of the envelope.

12. ☐ Inspect the stitching of the joints between the vertical tapes and overlying tapes across the parachute.

13. ☐ Inspect the load tape attachment point with the flying wires for wear or heat damage. Ensure the nomex protectors are in place.

14. ☐ Inspect all vertical and horizontal load tapes for damage and pulled or loose stitching.



100 hour/Annual inspection ("B type")

15. ☐ Ensure that the Velcro tabs are in good condition and are able to hold attached.

16. ☐ Check the condition of the flying wires, especially around the eye and the ferrule.

17. ☐ Check the condition of the fabric at the edge of the parachute panel.

18. ☐ Inspect the parachute attachment and centralising lines especially at the attachment loops and pulley. Check all loop attachments.

19. ☐ Check all knots on the parachute lines.

20. ☐ Ensure that the parachute overlap is correct for giving a good seal. If there is any doubt then, a test inflation must be carried out to check.

21. ☐ Where rotation vents are fitted, check the condition of the turning vent, in particular the inside overlapped area of the envelope and also the pull triangular pieces. If any doubt exists then carry out a grab test in these areas.

22. ☐ Check the stitching around the rotation vents (where fitted) paying special attention to the top and bottom of the vent, the overlying tape attachments and the triangle flag attachment points.

23. ☐ Ensure that the rotation vents are not leaking. If any doubt exists then carry out a test inflation.

24. ☐ Where an FDS system is installed, carry out an additional inspection to the centralising/retaining lines checking for any signs of wear. Check that all rings are securely attached and are not showing signs of wear. Check the loop attachment point at the centre of the parachute. Check the parachute top anti stall strings for security and damage.

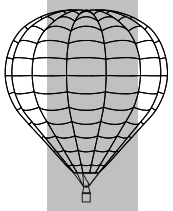
25. ☐ Ensure that the FDS can function correctly. If any doubt exists then carry out a test inflation with a full functional check.

Load Frame

1. ☐ Check that the karabiners are the correct type and work freely, lock and are not damaged or badly corroded.

2. ☐ Check that the burner frame is not bent or twisted.

3. ☐ Check all welds for cracks with a magnifying glass.



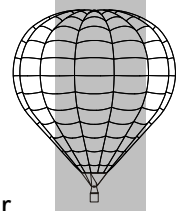
100 hour/Annual inspection ("B type")

Burner

1. ☐ Check the complete burner for signs of wear or damage paying particular attention to the areas subjected to high temperatures.
2. ☐ Check the burner attachment fittings are secure.
3. ☐ Check the burner and all valves for leaks.
4. ☐ Ensure that the pilot lights have a strong and quiet flame. If found to be weak then inspect the pilot light fuel filter and jet for contamination and replace if necessary.
5. ☐ Carry out a full functional check of the burner ensuring all valves open and close correctly.
6. ☐ Check the condition of the hoses and connectors. Ensure there are no cuts or damage.

Fuel Cylinders

1. ☐ Check the date of construction and check that the latest test date is valid
2. ☐ Visually inspect the exterior of the cylinders for dents or damage, especially in the lower part.
3. ☐ Remove the dust cover of the pressure relief valve and inspect for contamination or corrosion. Check the date of the valve and replace if due –refer to section 7.2-.
4. ☐ Check that the valves for signs of damage or corrosion and that they function correctly paying particular attention to the function of the "O" rings and flat faced seal on the Rego type male tank connection.
5. ☐ Inspect all boss fittings and valve attachment points for damage or misuse.
6. ☐ Check the freedom of movement of the contents gauges.
7. ☐ Check all pressure holding joints with leak detector.



100 hour/Annual inspection ("B type")

Basket

1. ☐ Check the condition of the nylon poles. Ensure that they are not badly bent or twisted.
2. ☐ Check the general condition of the wickerwork for excessive damage (holes no larger than 60mm), dryness or damp rot.
3. ☐ Ensure that the frame/ pole sockets are not cracked and that there is no excessive distortion.
4. ☐ Check the condition of the basket wires, especially where they enter the basket and around the ferrules.
5. ☐ Ensure that the floor and wooden runners are free from cracks or damage.
6. ☐ Check that the protective hide on the bottom of the basket is free from excessive damage that would allow the basket itself to become damaged.
7. ☐ Check that the internal handles are serviceable.
8. ☐ Fire Extinguisher – Check the type of Fire Extinguisher. Check that it remains accessible, fixed to the basket, charged and operative.

Ancillary Equipment – where fitted.

☐ Pilot restraint harness – Check function and webbing for signs of wear.

☐ Quick release system – Check function and associated restraint ropes, wire or webbing for wear.

☐ Instruments – Check that instruments are fitted where required and that they are shown to be functioning.

6.4 300 hour/3 year inspection ("C type")

This inspection must be carried out after 3 years or for every 300 hours of flight, whichever is sooner or lesser if deterioration is suspected beforehand. This inspection can be anticipated to meet a 100 hour/Annual check due.

Once this "C" type inspection has been carried out, every subsequent "C" type inspection must be carried out every year or 100 hours, whichever is sooner. However this inspection must be carried out immediately if deterioration is suspected whatever the period or hours.

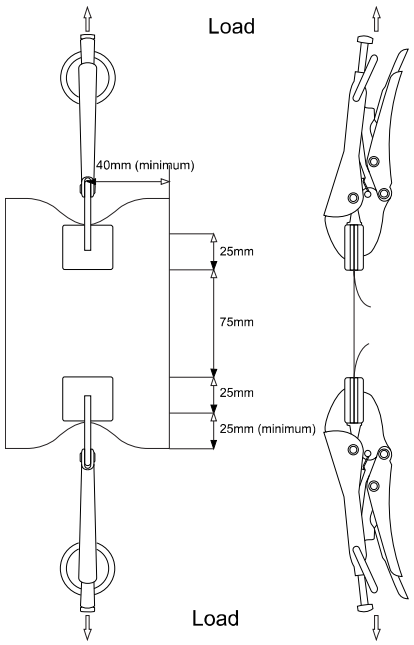
This inspection consists of all checks as indicated under type "B", with the addition of the following:

6.4.1 Envelope fabric "Grab Test"

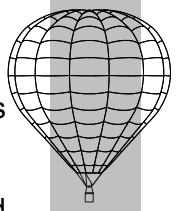
This test must be performed on two different gores and all the different colours above the equator on both the warp and weft directions of the fabric in each area.

Procedure: Select an unrepaired area in the highest panel of each colour between the last horizontal load tape and the opening of the parachute. With a tension of 117N (or 25lbs) applied across a width of 25mm. The fabric should show no signs of weakness or fatigue. This test will be done in two different positions of each colour and in both directions (vertically and horizontally).

This test can be achieved in a number of ways using various purpose made test rigs. However it can be carried out also by using propriety available clamps as shown in the drawing below and a spring balance. The jaws of the clamp should be protected. In all cases when carrying out the test, it is important to maintain the dimensions as shown.



If the fabric fails below 117N (or 25 lbs) then all weak fabric in complete panels must be replaced in accordance with the maintenance manual and the envelope re-inspected.



6.5 Special Inspection of cylinders and fuel hoses after 10 years ("D" type)

This inspection should be carried out 10 years after the original supply of the cylinders and/or the liquid fuel hose lines.

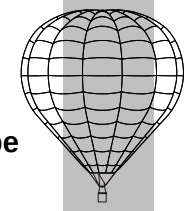
After the first "D" type inspection has been carried out, subsequent inspections should take place thereafter 10 years, unless a shorter period has been determined in a previous inspection.

Fuel Cylinders

1. ☐ Check the date of construction and check that the latest test date is valid.
2. ☐ Visually inspect the exterior of the cylinders for dents or damage, especially in the lower part.
3. ☐ Remove the dust cover of the pressure relief valve and inspect for contamination or corrosion. Check the date of the valve.
4. ☐ Check that the valves for signs of damage or corrosion and that they function correctly paying particular attention to the function of the "O" rings and flat faced seal on the Rego type male tank connection.
5. ☐ Inspect all boss fittings and valve attachment points for damage or misuse.
6. ☐ Check the freedom of movement of the contents gauges.
7. ☐ Check all pressure holding joints with leak detector.
8. ☐ Carry out a hydraulic test of the system to a pressure of 30kg/cm2.
9. ☐ Check the thickness of the walls of cylinders where excessive abrasion has occurred or damage exceeds that allowed in section 6.5.5. of the MM. Original nominal minimum wall thickness is 2.0 ± 0.2 mm. When it is necessary to measure wall thickness please consult Ultramagic S.A.

Fuel Hoses

1. ☐Check the condition of the hoses and connectors. Ensure there are no cuts or damage.



6.6 Inspection Requirements

6.6.1 Log book – This must be present at the time of inspection and must be checked prior to commencing the inspection.

Ensure that all of the equipment listed in the logbook is present for inspection. Any change to this equipment must be noted.
(In the case of UK inspection, any changes must be noted on the IR4 form and in the front of the logbook)
Any additional equipment must conform to the items listed in the balloon flight manual for that particular type.

Check that the logbook hours are up to date and request confirmation that all flights have been logged including tethers. Check the record of all previous inspections including the first at manufacture to gain a knowledge of the history of the balloon.

Check for record of maintenance and repairs as these areas of the balloon will require extra attention during the inspection.

6.6.2 Envelope

Fabric - Pay particular attention to the look and the feel and the smell of the fabric. This is best done whilst the balloon is being unpacked and spread out. Check for porosity, discolouration or mould being present. Check the temperature tags for signs of overheating. A poorly looked after envelope will deteriorate must quicker than one that has been kept clean and dry and has not been overheated.

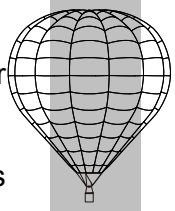
If any doubt exists about the condition of the fabric then a Grab Test should be carried out, even if the age or hours of the balloon are less than the requirement to do so.

Look closely at the areas of the fabric where there is an overlap. These are the parachute and rotation vents (where fitted). These areas can suffer from heat damage much earlier than the rest of the envelope. Again if any doubt exists, carry out a Grab Test at these positions.

Damage to the fabric in the lower third of the envelope must be limited to an area affecting no more than 3 panels. These panels may be adjacent.
Holes no greater than 10mm in diameter 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 50mm to each other. No more than 3 panels in the upper two thirds of the envelope may have these small holes.
On double layer envelopes, internal fabric panels may present any damage or be missing, while only external fabric is subject to the standard criteria

Velcro Tabs – Check the stitching and also that the taps still secure when attached. Check for shrinkage or heat damage, as this is also an indicator of overheating. Look closely at the fabric immediately adjacent to the tabs for possible damage caused by the tabs.

Load Tapes – Pay particular attention to attachment loops and wire and crown ring attachments, as these areas are susceptible to wear. Also look for burn damage where the wires are attached making sure to look underneath the nomex protection



covers. Check to make sure that all load tapes are securely sewn particularly at their ends again looking for burn damage to the thread.

Crown ring – This should be totally free of major damage or distortion. Slight marks can be blended over to prevent the damage to load tapes.

Flying Wires – Check that the flying wires are either original or have been replaced with the same stainless steel specification. The thimbles and ferrules should not be damaged and the wires should not be kinked or badly twisted. No more than two broken strands are allowed. The wires should still be springy which means that when bent, that they return to their original shape ie. straight. When wires have been overheated they can become softened. When this happens then the wires can be bent and stay that way. This softening severely reduces the strength of the wires and they must be replaced.

Control Lines – Ensure that all lines are securely attached with the correct bowline knots. Check the lines for damage. The outside can be slightly stiff with heat, which is acceptable. However it must not be brittle and the outer cover must not be broken. No damage at all is allowed to the inner core.

Pulleys – These must be securely attached and should not be damaged. They must rotate freely but not be overly loose as this indicates excessive wear. Check also for thread or grass which can prevent the pulley from rotating.

Karabiners – These must be steel rated at 2500 kg or 3000 kg (refer to 2.12.8 for exceptions), and no damage or twisting is allowed. Check for wear and corrosion and that they move freely, gates close easily and completely and that they are lubricated. Limited surface corrosion is permitted but not to the hinge area or screw gate.

6.6.3 Load Frame

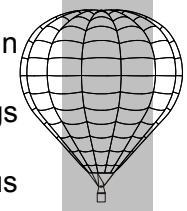
Look closely at the frame to ensure that it is not twisted or damaged.
Check all welds with a magnifying glass for cracks taking note to look for any sign of repairs. Ensure that all attachment bolts are correctly fitted and are secure.
Check basket/load frame Karabiners. These must be steel rated at 2500 kg or 3000 kg and no damage or twisting is allowed. Check for wear and corrosion and that they move freely, gates close easily and completely and that they are lubricated. Limited surface corrosion is permitted but not to the hinge area or screw gate.

6.6.4 Burner

Ensure that the burner has been correctly maintained and checked in accordance with the maintenance manual. The following section is to assist with testing the Mk21 burner. The Mk 10 burner is similar for test purposes with the exception that it does not have a fuel inlet post but the hose attaches directly to the valve block via an adapter.

6.6.4.1 General Burner Inspection –

- Inspect the general condition of the looking for damage, distortion or bending of the can or pipe work. Check to ensure that there are no loose parts or parts missing.
- Check the main jets in the coil jet ring for excessive soot deposits and for the presence of foreign bodies within the jet holes.



- Check the fixings in the coil supports. Loose fixings must be tightened in accordance with the maintenance manual.
- Check the fixings securing the coil supports to the burner can. Loose fixings must be tightened in accordance with the maintenance manual.
- Check the coil tubing for damage including signs of cracking, serious indentations and deterioration of welded joints.
- Check that all fixings used in the support of the burner and mounting and hanger to the load frame are secure. Tighten the fixings if necessary.

6.6.4.2 Fuel Hoses – Check the condition of the fuel hoses. Look for any sign of abrasion, cuts, kinking or other forms of damage. Check condition of end fittings. If any of the above are detected the hose must be replaced.

6.6.4.3 Functional test

Main Burner Function - Connect the burner to a suitable fuel supply. Operate the main burner valve. Check for a good flame. Check that the ignition is immediate upon opening the valve. Check that the flame is quickly extinguished upon closing the valve.

Repeat the test for all main burners.

Liquid Fire Valve Function - Connect the burner to a suitable fuel supply. Operate the liquid burner. Check for a good flame. Check that flame ignition is immediate upon opening the valve. Check that the flame is quickly extinguished upon closing the valve.

Repeat the test for all liquid fire burners.

Pressure Gauge -Check the pressure gauge to ensure that it is reading zero when no pressure is applied to the burner. Connect fuel pressure to the burner and check that the gauge is accurately monitoring the pressure.

Repeat the test for all pressure gauges.

Igniter - Operate the igniter button and visually check for the presence of a good spark. Connect the burner to a suitable fuel supply and switch on the pilot regulator valve. Operate the igniter button and check that the pilot light is easily lit.

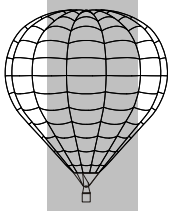
Repeat this test for all igniters.

Pilot Regulator valve - Connect the burner to a suitable fuel supply. Turn on the pilot regulator valve and ignite the pilot light. Check for a strong flame. Turn off the pilot regulator valve and check that the pilot light is quickly extinguished.

Repeat this test for all pilot regulator valves.

6.6.4.4 Leak test – Connect the burner to 7 Bar (100 psi) pressure and check the following areas for leaks. If leaks are suspected prior to making the test then an air supply should be used instead of propane.

- All main valve to valve block joints.



- All main valve stems in open and closed position.
- All liquid valve to valve block joints.
- All liquid valve stems in open and closed position
- All fuel inlet post to valve block joints.
- All pressure Gauge to Valve block joints.
- All pilot regulator valve to valve block joints.
- All pilot regulator valve piston spindle to knob joints.
- All pilot regulator valve knob to body joints.
- All liquid fire jet assembly to valve block joints (liquid valve open).
- All pilot light to valve block joints (pilot regulator valve open).
- All coil post to valve block joints (main valve open).

6.6.4.5 Hydraulic Valve (where fitted) - Before checking the hydraulically activated valve, ensure that the burner has been safely vented. Check the operation of the hydraulic valve as follows:

- Operate the remote hand lever and check for movement of the valve "squeeze" action handle. A movement of approximately 3mm should be possible with one operation of the hand lever.
- If the movement is insufficient or several operations of the handle are required to activate the valve, then the hydraulic system will require bleeding. This should be carried out in accordance with the maintenance manual.

6.6.5 Fuel Cylinders

– Any queries relating to faults or damage found whilst inspecting cylinders must be referred to Ultramagic S.A.

When a cylinder is found unsuitable for use then it must be labelled as such and quarantined. It must no longer be used for the storage of propane.

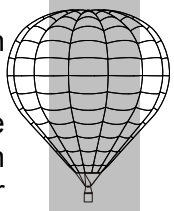
External inspection – A full visual inspection must be carried out on the complete outside of the cylinder to check for damage such as dents, gouges cuts or cracks. The following is meant as a guideline for rejection of cylinders due to damage. However should there be any doubt then the cylinder should be quarantined whilst advice is sought from Ultramagic S.A.

Bulge or Swelling – the cylinder must be rejected where there is any sign of swelling or bulging of the cylinder.

Dent – One small smooth dent may be acceptable as long as they are no deeper than 6% of the width of the dent. Where the width of the dent is greater than 5 cms a proof pressure test must be carried out. However acceptance is also subject to the position of the dent on the cylinder. It must not be close to a boss fitting or weld.
Where the dent also has a cut scratch or gouge then this is not acceptable and the cylinder must be rejected.

Crack – No cracks whatsoever are acceptable and the cylinder must be rejected in all cases.

Cut Scratch or Gouge – This is where a small amount of metal has been removed or displaced leaving a penetration mark in the cylinder. If the depth of this penetration exceeds 20% of the original minimum wall thickness then the cylinder must be rejected. Where the length of the cut is greater than 10% of the circumference of the cylinder then the depth of penetration must be no greater than



10% of the original minimum wall thickness. Where this is not the case then again the cylinder must be rejected.

Internal inspection – This must be carried out initially after ten years after the date of manufacture of the cylinder. The date of manufacture can be found on a plate on the cylinder collar. Subsequent inspections should take place after 5 years. Cylinder should be completely vented and purged prior to internal inspection. A small safety light should be used to illuminate the inside of the cylinder via the gauge aperture. Checks should be made to ensure that no corrosion or damage exists inside. Any dirt or debris found should be cleaned and removed. If further anomalies are found, contact Ultramagic S.A. for advice.

Safety valve or pressure relief valve (PRV) – This should show no sign of corrosion or contamination. The valve must be removed and replaced once the valve is 10 years old.

Contents Gauges – These must be checked for freedom of movement by leaning the cylinder forward and checking movement on the gauge.

Special Inspection of cylinders and fuel hoses (D type inspection after 10 years)

This inspection should be carried out 10 years after the original supply of the cylinders or the liquid fuel hoses.
After the first "D" type inspection, subsequent inspections should take place after 10 years, unless a shorter period has been determined in a previous inspection.
The "D" type inspection is identical to that of the "B" type, with the addition of the following:

- An internal inspection must be carried out.
- A Hydraulic Test of the system must be performed to a pressure of 30 kg/cm².
- The thickness of the walls of the cylinders must be checked when significant damages are found: No damage of the surface to a depth of 0.2 mm or more can be accepted. Denting of the walls containing the fuel is accepted up to 2 mm from its original form.
- Original nominal St. Steel minimum wall thickness is 2.0 ± 0.2 mm. When it is necessary to measure wall thickness please consult Ultramagic.
- If the Safety Valve is not marked with the date of manufacture, it must be replaced at the 10 year inspection. Otherwise replace only if due. Contact Ultramagic for questions regarding to the valve marking.

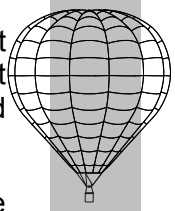
Hydraulic Test:

1) Cylinder must be emptied completely of fuel and vented.
2) The pressure valve must be removed and replaced by an adaptor for connection to the pressure equipment.
3) The fuel level gauge indicator must be removed.
4) The inside of the cylinder must be inspected for cleanthliness and corrosion and cleaned out if required.
5) Fill the cylinder with clean water using the fuel level indicator hole.
6) Blank off the fuel level indicator hole with a safety plate
7) Pressurise the water inside the cylinder to 30 Kg/cm² pressure.
8) Inspect all the surfaces and especially the welds for leaks.
9) The pressure must be proved to hold at the maintained pressure of 30 Kg/cm² for at least one minute.

10) If all is found to be correct, the cylinder should be emptied and dried.
11) A new Safety valve (unless all is in stainless steel) must be installed.
12) The fuel level gauge indicator should be refitted to the cylinder.
13) The cylinder should be pressure tested with compressed air to 7 bar (100 psi.) and checked for leaks at the gauge and PRV attachment points.
14) Any leaks should be rectified and retested.
15) The cylinder should be filled with propane.
16) The complete cylinder with fittings should be checked again for leaks with a spray or soapy water.

6.6.6 Baskets

Basket weaving - Check for damage to the wicker in the way of broken weave or cane uprights. Minor damage is acceptable as long as there are no sharp edges. Any sharp edges should be trimmed back inside the weave. This is particularly important on the inside of the basket where it may cause injury to the occupants. Any damage area must be no greater than 60mm diameter and no



more than one damaged area in any one side. The wicker should be free of rot and should still be flexible. All trapped mud should be removed to prevent rot occurring. Particular attention should be paid to the area around the rawhide and floor to weave intersection.

Basket Floor – inspect the floor for cracks on both faces. A maximum of one minor crack (less than 75mm -3"-) is acceptable as long as it is not seen to be propagating and is not visible on both sides. Pay particular attention to the area where the floor joins the weave.

Basket Stainless Steel Lower Frame (C-6 and larger baskets) – Inspect looking for cracks in the attachment weld of the vertical tube sockets to the lower basket frame. If any cracks or damage is found, Ultramagic S.A must be advised of the nature of the cracks or damage to establish the corrective action required.

Basket Floor Runners – As these are expected to take the wear and tear of the basket then it is expected that they will show some signs of damage. However they should be unbroken and free of major cracks. Gouges and small pieces knocked out are acceptable as long as the overall strength of the runners is not affected. Ensure that the runners are securely fastened and tighten the bolts as required.

Basket Wires – Check for damage to the wire structure as no damage is acceptable. Inspect the swage joint as well as where the wire comes out of the top of the basket. Check also that the steel thimbles at the wire ends are not badly damaged.

Nylon Rods – Although these are non structural, the nylon rod should still be inspected to ensure that they are not cracked or badly twisted as breakage could cause passenger injury during a hard landing. Check the lengths of the rods against the burner rigged position to ensure that there is not excess on the wires that would allow the rods to pop out.

Pilot Restraint harness point (where fitted). - Inspect the fixing to ensure that it is securely attached to the floor. Check the area around the point for cracks or damage. No floor damage is acceptable in this area. The belt shall not show visible wear or abrasion. The buckles, karabiners and attachment points shall work mechanically freely and show no corrosion or mechanical wear.

Cylinder Straps – Check the straps for excessive wear. In areas of doubt the strap must be replaced. Check the buckle locking mechanism to ensure that it hold the tank secure without slipping.

6.6.7 Ancillary Equipment

Pilot restraint harness (where fitted) – Check the condition of the harness webbing and all buckles, adjusters and fittings. Ensure that the harness opens and closes freely and that adjustment is possible. Check the condition of the webbing looking for excessive wear or damage.

Quick Release System – Check the latch mechanism to ensure that it opens and closes correctly. Check for excessive wear of the mechanism which could allow it to open prematurely or prevent it from opening. Check the condition of any webbing, rope or wire that may be used with the release system.

6.7 - Unscheduled Inspections

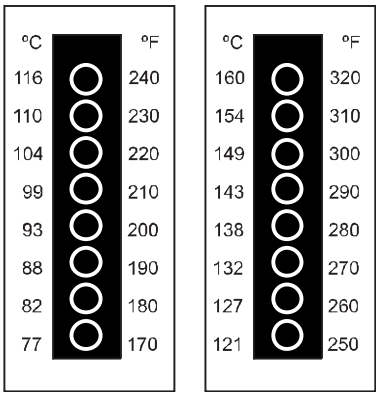
6.7.1 Envelope Overheat Inspection (Refer to section 2.11 for temperature indicator positions)

A temperature indicator flag is installed inside the envelope.

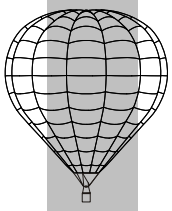
This consists of a flag of balloon fabric attached to the inside if the balloon by means of a specially designed fitment. When the inside of the envelope reaches a temperature beyond the maximum approved then the fitment releases the flag. A release of the flag indicates that the envelope fabric may have been overheated. This can be confirmed by reading the temperature tags once the envelope has been deflated.

Temperature Flag

The temperature tags are indicators which change colour to black once a certain temperature is reached. If they show a temperature above the maximum authorised then a fabric test should be carried out as the fabric may be permanently damaged. Note of this should always be made in the balloon logbook. As long as the fabric is still within test requirements then a new tag may be fitted so that indication of further overheating can be maintained. This is stuck and then sewn in place as the original as shown in the diagram. This must be sewn alongside the existing tag.



Temperature Tags



Inspection procedure.

Check the temperature tags for indication of change of colour to black. No further inspection is required if the temperature indicated is less than 127 degrees Celcius (250 degrees Fahrenheit)

If the temperature indicated is greater than 127 degrees Celcius then proceed as follows.

1. Inspect the top of the envelope,both fabric and tapes for sighs of overheating.
2. Pay special attention to the edge of the parachute where fabric is overlapping.
3. Look for changes of colour or stiffness of the fabric.
4. Carry out a grab test in accordance with section 6.5.3
5. Fit the new temp tag.
6. Record the results of the lest in the balloon log book.

NOTE: If any doubt exists on the state of the balloon envelope during this inspection, then contact should be made with Ultramagic S.A.

6.7.2 Special Inspection after balloon has made contact with powerlines.

It is most important that a full annual/100 hour inspection is carried out if the balloon has made contact with live electrical power lines. Damage may have occurred to the metallic parts of the balloon, which may not be obvious on first inspection.

During this inspection, look closely at wires and fuel cylinders. Look for burn marks, especially on the under-floor of the basket where the basket suspension wires are covered in protective hide.

NOTE: If any doubt exists on the state of the balloon during this inspection, then contact should be made with Ultramagic S.A.

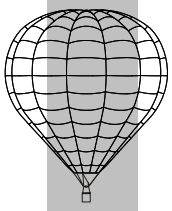
6.7.3 Hard Landing Inspection

Should a hard landing be experienced where there is any possible suspected damage having occurred to the balloon, then carry out a 100 Hr/Annual Inspection in accordance with 6.2 utilising Inspection Requirements 6.4. before the next flight. Any damage found resulting from the hard landing that prevents the balloon passing a 100 Hr/Annual Inspection must be reported to Ultramagic S.A. to determine the appropriate action. The balloon must not be flown until it is capable of passing a 100 Hr/Annual Inspection.

6.8 Service Life Limitations

Any items with a service life limitation must be replaced once the time set is reached. The old item must be labelled and discarded with in accordance with the appropriate authority regulations. Note of the change of parts must be recorded in the balloon logbook.

Component	Service Life Limitation
Fuel Cylinder pressure relief valve (PRV)	10 years from date of supply of the valve (if not marked, refer to D-Type inspection details on page 6.13)



Section 7 – Airworthiness Limitations

7.1 Approval Statement

The Airworthiness Limitations section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulations.

7.2 Mandatory Replacement Time

There is only one component of any Ultramagic Balloon that has to be replaced in a specified length of time. This is as follows.

Fuel cylinder Safety valve or pressure relief valve (PRV) - At intervals not to exceed 120 calendar months from date of manufacture a new pressure relief valve must be installed. - ref. MM page 6.13

7.3 Structural Inspection Interval

Validity of the C of A is subject to the log book containing an inspection certificate / certificate of release to service valid according to the following inspection schedule:

- **Envelopes, Baskets, Burners**: Every 100 flight hours or after one year since the date of last inspection, whichever occurs sooner.
- **Fuel Cylinders**: After one year since the date of last inspection.

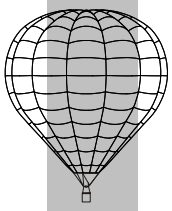
Periods between inspections may be extended out of the limits above only where the following conditions are met:

- The extension is not greater than 30 days and 100 flight hours are not exceeded since the last inspection.
- The provision is not adopted as a regular basis.
- The extension is recorded and signed in the aircraft logbook.
- The extension is justified and approved by the person or organization responsible for the continued airworthiness management of the Balloon, prior to its execution.
- The extension does not concern Components subject to Service life limitations and/or Airworthiness Directives.
- No instructions against the use of the extension have been set beforehand on previous inspections.

For U.S. registered balloons, the tolerance extension listed in this section is not permitted.

7.4 Structural Inspection Procedure

Inspection Procedure is detailed in Section 6 of this manual and with a checklist included in Appendix 2



APPENDIX

Appendix 1.
Ultramagic Balloon Envelope Fabric Specification

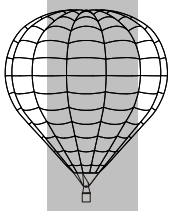
Values quoted are the minimum requirements for new fabric. Fabric of equal or higher specification may be substituted. Narrower widths may also be specified

High Tenacity Nylon, Polyurethane coated Rip Stop fabric – for example Carrington N1107

Named Specification	Units	Value	Typical Standard
Weight	GMS/M2	62 +/-5 Average test 59	BS3424 3 5A
Width	CMS	150 min typical	BS EN 22286
Tensile Warp	N	560 min typical 624	BS3424 4 6
Tensile Weft	N	510 min typical 748	BS3424 4 6
Tear Warp	N	50 min typical 85	BS3424 5 7B
Tear Weft	N	50 min typical 90	BS3424 5 7B
Air Perm Std	CM3/CM2/Sec	< 0.1 typical 0.002	BS5636
Ends	*/CM	42.6 +/-2 typical 42	ISO7211
Picks	*/CM	40.2 +/-2 typical 42	ISO7211
Spry Rate	/	4 min typical 5	BS EN 22286
Skew	CM	4 Max typical 2	

High Tenacity Nylon, silicone based coated fabric – for example Carrington N2369

Named Specification	Units	Value	Typical Standard
Weight	GMS/M2	85 +/-5 Average test 89	BS3424 3 5A
Width	CMS	151 min typical	BS EN 22286
Tensile Warp	N	900 min typical 1118	BS3424 4 6
Tensile Weft	N	850 min typical 1038	BS3424 4 6
Tear Warp	N	390 min typical 394	BS3424 5 7B
Tear Weft	N	390 min typical 394	BS3424 5 7B
Air Perm Std	CM3/CM2/Sec	< 0.1 typical 0.006	BS5636
Ends	*/CM	31 +/-2 typical 34	ISO7211
Picks	*/CM	31 +/-2 typical 32	ISO7211



High Tenacity Nylon, Polyurethane coated Rip Stop fabric – lighter weight

Named Specification	Units	Value	Typical Standard
Weight	GMS/M2	50 +/-5 Average test 59	BS3424 3 5A
Width	CMS	150 min typical	BS EN 22286
Tensile Warp	N	450 min typical 624	BS3424 4 6
Tensile Weft	N	420 min typical 748	BS3424 4 6
Tear Warp	N	100 min typical 85	BS3424 5 7B
Tear Weft	N	100 min typical 90	BS3424 5 7B
Air Perm Std	CM3/CM2/Sec	< 0.1 typical 0.002	BS5636
Ends	*/CM	52 +/-2 typical 52	ISO7211
Picks	*/CM	49 +/-2 typical 49	ISO7211
Spry Rate	/	4 min typical 5	BS EN 22286
Skew	CM	3 Max typical 2	

APPENDIX

Appendix 2.

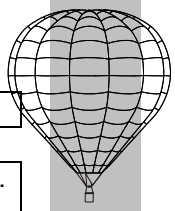
Ultramagic Balloon Inspection checklist.

OWNER			
REGISTRATION		**TYPE**	
SERIAL NO.			
LAST INSPECTION (HOURS)		**TOTAL HOURS RECORDED**	
TYPE OF INSPECTION		**NEXT INSPECTION (HOURS)**	
INSPECTOR		**DATE**	

CHECK	SECTION	ASPECTS	YES NO	INSP.
DOCUMENTATION	Logbook	Present at time of inspection Flight hours correct and up to date All repairs and modifications recorded. Equipment serial numbers agree with items submitted for inspection.		
	Tech. Log (UK only)	For UK Transport Category balloons, the last Technical Log must be presented and remaining hours cross-referenced with hours in the balloon logbook.		
	IR4 (UK only)	For UK balloons, satisfactory inspection to be shown by the issue of form IR4, the top layer to be retained in the balloon logbook		

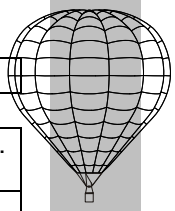
Requirement for special inspections Grab test and Cylinder pressure test to be established in accordance with the maintenance manual and age of balloon and hours logged.

Note: Where the balloon comprises of major components from different manufacturers, then the appropriate inspection forms should be used in conjunction with this schedule.



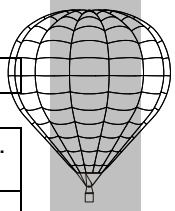
REGISTRATION		ENVELOPE S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
ENVELOPE	Fabric	1. Check the envelope panel by panel or by inflating for holes and tears and ensure that any fabric damage does not exceed the Permitted Damage. (Special shape envelopes must be inflated)		
	Control lines	2. Ensure that all control ropes and chords are free of damage, securely attached, not twisted and work correctly.		
	Pulleys & loops	3. Ensure that all pulleys and loops are well attached and are working freely.		
	Sewing	4. Ensure that all stitching is correct and that no caught or broken threads exist.		
	Repairs	5. Ensure all existing repairs have been carried out in accordance with the maintenance manual and that they have been recorded in the aircraft logbook.		
	Fabric Porosity	6. Check the porosity of the fabric by blowing through it. If considerable air passes then carry out a test flight, only after a grab test is carried out to ensure that the balloon is safe to fly.		
	Temp. link	7. Ensure that the temperature link is still in place.		
	Temp. labels	8. Inspect the temperature label. If the temperature label indicates over 127 degrees C then a grab test must be carried out and another temperature label fitted adjacent to the existing one.		
	Crown ring	9. Inspect the crown ring for damage.		
	Crown tapes	10. Inspect the load tapes at the crown ring for damage and friction burns. Check the stitching of the overlying tapes on the crown ring.		
	Vertical tapes	11. Inspect the stitching of the joints of the vertical load tapes to the top edge of the envelope.		



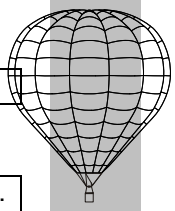
REGISTRATION		ENVELOPE S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
ENVELOPE	Tape stitching	12. Inspect the stitching of the joints between the vertical tapes and overlying tapes across the parachute.		
	Flying wire attachment	13. Inspect the load tape attachment point with the flying wires for wear or heat damage. Ensure the nomex protectors are in place.		
	Load tapes	14. Inspect all vertical and horizontal load tapes for damage and pulled or loose stitching.		
	Velcro tabs	15. Ensure that the Velcro tabs are in good condition and are able to hold attached.		
	Flying wires	16. Check the condition of the flying wires, especially around the eye and the ferrule.		
	Parachute	17. Check the condition of the fabric at the edge of the parachute panel.		
	Parachute attachment	18. Inspect the parachute attachment and centralising lines especially at the attachment loops and pulley. Check all loop attachments.		
	Parachute lines	19. Check all knots on the parachute lines.		
	Parachute	20. Ensure that the parachute overlap is correct for giving a good seal. If there is any doubt then, a test inflation must be carried out to check.		
	Rotation vents	21. Where rotation vents are fitted, check the condition of the turning vent, in particular the inside overlapped area of the envelope and also the pull triangular pieces. If any doubt exists then carry out a grab test in these areas.		



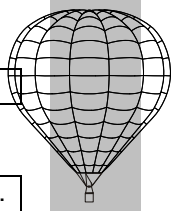
REGISTRATION		ENVELOPE S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
ENVELOPE	Rotation vents	22. Check the stitching around the rotation vents (where fitted) paying special attention to the top and bottom of the vent, the overlying tape attachments and the triangle flag attachment points.		
	Rotation vents	23. Ensure that the rotation vents are not leaking. If any doubt exists then carry out a test inflation.		
	FDS	24. Where an FDS system is installed, carry out an additional inspection to the centralising/retaining lines checking for any signs of wear. Check that all rings are securely attached and are not showing signs of wear. Check the loop attachment point at the centre of the parachute. Check the parachute top anti stall strings for security and damage.		
	FDS	25. Ensure that the FDS can function correctly. If any doubt exists then carry out a test inflation with a full functional check.		
	Fabric	26. Carry out fabric Grab test in accordance with Maintenance Manual section 6.4.1 (If required)		



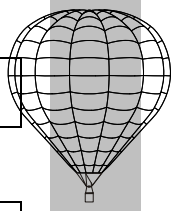
REGISTRATION		BURNER S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
LOAD FRAME	Karabiners	1. Check that the karabiners are the correct type and work freely, lock and are not damaged or badly corroded.		
	Frame	2. Check that the burner frame is not bent or twisted.		
	Frame	3. Check all welds for cracks with a magnifying glass.		
BURNER	Burner	1. Check the complete burner for signs of wear or damage paying particular attention to the areas subjected to high temperatures.		
	Attachment	2. Check the burner attachment fittings are secure.		
	Leaks	3. Check the burner and all valves for leaks.		
	Pilot lights	4. Ensure that the pilot lights have a strong and quiet flame. If found to be weak then inspect the pilot light fuel filter and jet for contamination and replace if necessary.		
	Functional test	5. Carry out a full functional check of the burner ensuring all valves open and close correctly.		
	Hoses & connectors	6. Check the condition of the hoses and connectors. Ensure there are no cuts or damage.		



REGISTRATION		BASKET S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
BASKET	Nylon poles	1. Check the condition of the nylon poles. Ensure that they are not badly bent or twisted.		
	Wicker	2. Check the general condition of the wickerwork for excessive damage (holes no larger than 60mm), dryness or damp rot.		
	Frame & sockets	3. Ensure that the frame/ pole sockets are not cracked and that there is no excessive distortion.		
	Wires	4. Check the condition of the basket wires, especially where they enter the basket and around the ferrules.		
	Floor	5. Ensure that the floor and wooden runners are free from cracks or damage.		
	Rawhide	6. Check that the protective hide on the bottom of the basket is free from excessive damage that would allow the basket itself to become damaged.		
	Internal handles	7. Check that the internal handles are serviceable.		
	Fire Extingui-sher	8. Check the type, attachment and charge condition of the Fire Extinguisher installed.		



REGISTRATION		CYLINDER S/N´S	

CHECK	SECTION	ASPECTS	YES NO	INSP.
CYLINDER	Date and validity	1. Check the date of construction and check that the latest test date is valid		
	Exterior	2. Visually inspect the exterior of the cylinders for dents or damage, especially in the lower part.		
	Pressure relief valve	3. Remove the dust cover of the pressure relief valve and inspect for contamination or corrosion. Check the date of the valve.		
	Valves	4. Check that the valves for signs of damage or corrosion and that they function correctly paying particular attention to the function of the “O” rings and flat faced seal on the Rego type male tank connection.		
	Fittings	5. Inspect all boss fittings and valve attachment points for damage or misuse.		
	Contents gauge	6. Check the freedom of movement of the contents gauges.		
	Leak check	7. Check all pressure holding joints with leak detector.		
CYLINDER	IF DUE	8. Carry out a hydraulic test of the system to a pressure of 30kg/cm2 in accordance with the maintenance manual. (If D type inspection is due or if damage is suspect.)		
	IF DUE	9. Check the thickness of the walls of the cylinders in accordance with the maintenance manual. (If D type inspection is due or if damage is suspect.)		
	IF DUE	10. Replace the pressure relief valve in accordance to 7,2.		

REGISTRATION		ENVELOPE S/N	

CHECK	SECTION	ASPECTS	YES NO	INSP.
ANCILLARY EQUIPMENT (WHERE FITTED)	Pilot Restraint	Pilot restraint harness – Check function and webbing for signs of wear.		
	Quick release system	Quick release system – Check function and associated restraint ropes, wire or webbing for wear.		
	Instruments	Instruments – Check that instruments are fitted (where required) and that they are shown to be functioning		