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Maintenance Manual Supplement

UltraMagic Baskets and Burners

Type: .....

Model: .....

Serial No.: .....

Registration: .....

This balloon Maintenance Manual Supplement is initially approved by EASA under major change approval number 10070614, dated 26 July 2019.

Subsequent revisions are approved either by EASA or by authority of DOA, no. EASA.21J.277 as detailed on page USBEU-3.

This balloon Maintenance Manual Supplement is approved in accordance with 14 CFR Section 21.29 for U.S. registered aircraft and is approved by the Federal Aviation Administration. Initial date of approval: 31 July 2019.

This balloon is to be preserved in an airworthy condition in compliance with instructions and information contained herein.

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0.1 Record of revisions

Any revision of this Manual must be recorded in the following table.

Revision Number	Affected Section	Affected Pages	Date of Issue

Revisions to this Manual are published on the Kubicek balloons web site at www.kubicekballoons.eu.

The new or amended text in the revised page is indicated by a black vertical line in the outer margin, and the revision number and the date is shown on the bottom of the page.

CAUTION	Mandatory revisions are introduced by a Service Bulletin published on the Kubicek Balloons web site www.kubicekballoons.eu.

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SECTION 1 – GENERAL

1.1 INTRODUCTION

This is a Maintenance Manual Supplement for the use for balloons combining UltraMagic bottom-end with Kubicek Balloons envelope.

This supplement was created by adopting applicable pages of the original Maintenance Manual by UltraMagic, document name MM04, Revision 18, initial issue date September 24, 2003 and its supplements. The original Maintenance Manual is available from www.ultramagic.com.

This supplement also gives guidelines as to what work can be carried out by pilot (those are the procedures included in Sections 4, 5 and 6, NOT in the Appendices).

NOTE	Maintenance or repair work other than that listed as "Owner Maintenance" in Sections 4, 5 and 6 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 specific 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.

WARNING	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.

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

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; pages 1.1 and 1.2, Section 1, chapter 1.1 Introduction)

1.2 APPLICABILITY

All balloons combining UltraMagic bottom-ends with Kubicek Balloons envelopes.

1.3 MAINTENANCE CATEGORIES

DOCUMENTATION OF WORK

Whenever the local CAA regulations allow it, the maintenance actions described in Sections 4, 5 and 6 (NOT the Appendices) of this supplement may be carried out by the owner/operator of the balloon providing they hold a current Balloon Pilots license. Any of this work carried out, should be signed off by them in the balloon logbook. Any other work MUST be carried out or inspected by an approved person and signed off by this approved person in the balloon logbook.

LOG BOOK

Logbook 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. 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.

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 6.9, Section 6, chapter 6.6 Inspection Requirements)

1.6 Definitions and Abbreviations

UM	UltraMagic S.A
MM	Maintenance Manual
MMS	Maintenance Manual Supplement

1.7 Balloon Technical Description

A complete description of the balloon, its systems, controls and equipment is provided in the Kubicek Balloons Flight Manual Supplement (document no. B.3105-FMS_USBEU), section 6.

SECTION 2 - AIRWORTHINESS LIMITATIONS

2.5 Life Limited Items

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	Limit
Fuel Cylinder pressure relief valve (PRV)	10 years from date of supply of the valve (if not marked, refer to “D-Type” inspection details described in point 6.6.5.5 of Appendix 6– Inspection Criteria / Techniques)

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 6.18, Section 6, chapter 6.8 Service Life Limitations)

SECTION 3 - ENVELOPE REPAIRS AND MAINTENANCE

No change.

SECTION 4 - BASKET REPAIR AND MAINTENANCE

For US registered balloons preventative maintenance (procedures specified in this section) only may be performed by the holder of a pilot certificate on the balloon that they own and operate.

Basket general view (source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 3.1, Section 3, chapter 3.1General Maintenance)

BASKETS

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
Replacement of nylon poles

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 1.3, Section 1, chapter 1.2. Preventative Maintenance)

The basket should regularly be cleaned and inspected. Debris, dust and mud should not be allowed to accumulate. The basket may be washed with plain or soapy water (no strong detergents). It must then be allowed to dry before storing. Internal floor padding/foam (if present) should be removed to enable proper drying.
It is recommended to treat the wicker with oil from time to time, particularly when the balloon is operated in dry locations. 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. The preferred products are drying oils such as Linseed or Danish oil because of their rapid cure rate. Varnish is possible but it

is recommended to use only a Lasur type.
The leather or suede trim may be treated with any proprietary suede or leather cleaner.

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 3.1, Section 3, chapter 3.1 General Maintenance)

For maintenance and repair instructions, see Appendix 3 and 6 of this MMS.

SECTION 5 - BURNER REPAIRS AND MAINTENANCE

For US registered balloons preventative maintenance (procedures specified in this section) only may be performed by the holder of a pilot certificate on the balloon that they own and operate.
It is very important that all work on 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.

BURNERS

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 piezo
Adjustment of burner gimbal friction
Removal and refitting of burner in frame
Replacement of seals in Tema couplings

BURNER FRAME

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

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 1.3, Section 1, chapter 1.2. Preventative Maintenance)

For maintenance and repair instructions, see Appendix 4 and 6 of this MMS.

SECTION 6– FUEL SYSTEM AND FUEL CYLINDERS REPAIRS AND MAINTENANCE

For US registered balloons preventative maintenance (procedures specified in this section) only may be performed by the holder of a pilot certificate on the balloon that they own and operate.
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 this section. No exceptions can be made unless written approval is gained either from the manufacturer or the appropriate authority.
It is very important that all work to fuel systems is carried out in a clean environment. At no time should any part of the fuel 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.

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.

(source: Maintenance Manual MM04, Revision 18, September 24, 2003 – UltraMagic S.A; page 1.3, Section 1, chapter 1.2. Preventative Maintenance)

Cylinders require inspection before each flight in accordance with the applicable Flight Manual. However, whenever the cylinder has other uses (e.g. burner test, etc.) the following checks are still required:

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 manufacturer's recommendations. See inspection schedules Section 8.

For maintenance and repair instructions, see Appendix 5 and 6 of this MMS.

SECTION 7 – INSTRUMENT REPAIRS AND MAINTENANCE

No change.

SECTION 8 – INSPECTION SCHEDULE

8.1 General

This section describes inspection schedule for all balloons combining Kubicek Balloons envelopes with UM bottom-ends (basket, burner, burner frame and fuel system).

Pre-flight inspection ("A type") must be carried out before every flight. To proceed with this inspection, pre-flight checklist is defined by the applicable Flight Manual or Supplement. Information on permitted damage must also be considered at inspection.

8.2 Scheduled Inspections

1. Balloons: 100 hour/annual inspection ("B type")
2. Fuel tanks: 10- year inspection ("D type")

8.4 100 Hour/Annual Inspection

This inspection is the minimum required for annual/renewal of the Certificate of Airworthiness on all balloons. This interval might be shortened upon decision of the inspector whenever there is a justified reason, or a local regulation requires so.
For the 100 hour/annual inspection of balloon combining KB envelope with UM bottom-end, the same checklist as for inspecting KB balloon must be used (the 100 Hour/Annual Inspection Checklist - see Appendix 2 of the main MM, document number B.3205).

8.15 Inspection Criteria / Techniques

Check that all applicable service bulletins and Ads (KB's for the envelopes and UM's for the bottom-end assembly – these can be part of this MMS, or the later ones are issued separately) have been followed and recorded in the balloon's log book. A list of Service Bulletins which may apply to the balloon can be found on the KB's website. If there is no entry in the logbook of a relevant Service Bulletin being completed, contact KB.

For detailed instructions, see Appendix 6 of this MMS.

8.15.3 Baskets

For inspecting of the basket, see Section 4 and Appendix 3 of this MMS.

8.15.4 Burner and Frame

For inspecting of the basket, see Section 5 and Appendix 4 of this MMS.

8.16 Fuel Cylinders

8.16.2 Annual / 100 hour inspection

For inspecting of the fuel cylinders, see Section 6 and Appendix 5 of this MMS.

8.19 Non-scheduled Inspections

8.19.3 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 (following the full checklist) 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.

8.20 Life Limited Items

See chapter **2.5 Life Limited Items** of this supplement.

SECTION 9 – APPENDICES

APPENDIX 3 – BASKET REPAIRS

GENERAL (''Section 3'')

Section 3 - Basket Repairs

3.1 General Maintenance

Basket general view

The basket should regularly be cleaned and inspected. Debris, dust and mud should not be allowed to accumulate. The basket may be washed with plain or soapy water (no strong detergents). It must then be allowed to dry before storing. Internal floor padding / foam (if present) should be removed to enable proper drying.

It is recommended to treat the wicker with oil from time to time, particularly when the balloon is operated in dry locations. 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. The preferred products are drying oils such as Linseed or Danish oil because of their rapid cure rate. Varnish is possible but it is recommended to use only a Lasur type.

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

3 BASKET REPAIRS

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 S.A. 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 area must me monitored on a flight-by-flight basis. Any hole 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. It is recommended to coat any hole, deep scratch/crack or large naked area of the plywood board with a suitable phenolic resin to prevent moisture affecting the floor.

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 21mm varnished marine plywood.

The basket wire cables are made from stainless steel (7 x 7 + 0) 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 Occupant restraint harness attachment point (where fitted)

The U-bolt attachment point (where fitted) is installed as shown in picture 3.1a. Ensure that the attachment fixings are secure and free from damage. No cracks are allowed in the plywood adjacent to the attachment. Should any damage be noticed then contact Ultramagic S.A or one of its agents for advise and details of repair scheme.

Whenever it is required to retrofit a U-bolt attachment, drill 2 x Ø12mm holes (spaced 40mm) parallel to the wall, making sure not to interfere with the position(s) of the

cylinder(s) or runners/cables underneath. The recommended gap with the adjacent wall is of 4cm. Remove any splinters and preferably apply a suitable phenolic resin to coat the naked wood before installing the U-bolt. A st steel plate is to be set on each side of the board. Tighten the nuts and cut the protruding male thread. Prevent the rotation of the nuts by adding a welding dot or a mark using a punch and a hammer. It might be needed to remove some protective rawhide in allowance for that assembly. U-bolts must be supplied by Ultramagic.

An alternative welded attachment is available on baskets with bottom steel frames (picture 3.1b). These attachment rings must be inspected for cracks or damage, particularly on the weld. Note that in this case, rings are purposely bent for ease of access.

Picture 3.1a

Picture 3.1b

3.11 Occupant restraint harness (where fitted)

The occupant restraint harness, where fitted, is attached to the occupant restraint harness attachment point by means of the karabiner at the end of the 'leg' tape.

The harness (see two versions in Pictures 3.2a and 3.2b) can be removed and refitted by releasing the karabiner. When in use the quick link 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.

Picture 3.2a

Picture 3.2b

DISABLED PAX BASKETS ("Supplement 5")

S5 DISABLED PAX BASKET

Supplement 5 – Disabled Pax Basket

Section 1

1.0 Introduction

1.1 General

This supplement defines the maintenance and inspection requirements for the Ultramagic Disabled Passenger Carrying Equipment. Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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.

1.2 Equipment Description

The Disabled Passenger Carrying Equipment is designed to enable disabled passengers to be carried in a range of Ultramagic baskets using the passenger's wheelchair or a special removable seat. Baskets are modified to optionally incorporate a passenger access door and/or special floor mounted rails. The rails enable rapid installation and removal of the removable seat and all restraint equipment required when using a wheelchair. The design is such that either system may be used depending upon passenger preference. Baskets fitted with more than one installation may carry any combination of wheelchair and removable seat.

1.3 Applicability

The information contained in this supplement applies to the Ultramagic Disabled Passenger Carrying Equipment as defined by the following drawing numbers:

Removable Chair Assembly:	5003-0000
Wheelchair Installation	5004-0000
Disabled Basket Modifications	5005-0000

1.4 Replacement Parts and Procedures

See Maintenance Manual.

1.5 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.6 Welding and Welders

See Maintenance Manual.

In the event that any repairs are required involving the use of welding, contact Ultramagic for a repair scheme.

1.7 Maintenance Records

See Maintenance Manual

1.8 Technical Support

See Maintenance Manual.

1.9 Safety

See Maintenance Manual.

S5 DISABLED PAX BASKET

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the Ultramagic Disabled Passenger Carrying Equipment, as required by BCAR 31 section 31.82, EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Any additional inspection requirements for the Disabled Passenger Carrying Equipment are defined in Sections 4 and 6 of this Supplement.

S5 DISABLED PAX BASKET

Section 3

3.0 Technical Description

3.1 Removable Seat Assembly

3.1.1 General

The removable seat consists of a car rally seat mounted on a stainless steel frame, which may be fitted to the basket floor mounted rails when required. The equipment is provided with a swivel mechanism allowing the seat to rotate to ease the loading and unloading of the passenger in to the seat. The Removable Seat Assembly may be seen in Figure 3.1.1.

Figure 3.1.1
Removable Seat Assembly

3.1.2 Seat

The removable seat utilises a car rally seat mounted on a welded stainless steel frame. The seat is a proprietary unit designed for rally cars and as such is a very robust construction. Four M8 threaded holes fitted in the underside are used to secure the seat to the remainder of the assembly.

3.1.3 Seat Frame Assembly

A welded stainless steel frame is used to support the seat. Two lockable seat fixtures are fitted on the underside of the frame and these provide the interface to the basket mounted floor rails

3.1.4 Seat Slides

A pair of telescopic seat slides is fitted to the top of the frame. The slides are proprietary item designed specifically for use with the seat. The slides allow the seat to be moved backwards and forwards to enable seat rotation for passenger loading (see below) and to enable the seat back to be supported by the basket wall.

3.1.5 Thrust Bearing

A thrust bearing is fitted between two plywood plates. The lower plate is attached to the slides and the upper plate is attached to the underside of the seat. The thrust bearing allows the seat to rotate for the purposes of easing passenger loading into the seat. A ring spacer is fitted directly above the thrust bearing to provide sufficient space to fit the necessary fixings.

3.1.6 Bearing Assemblies

The thrust bearing is very strong in compression but relatively weak in tension. A series of small bearing assemblies attached to the upper plate are therefore used to "sandwich" the thrust bearing and plywood plates and thus prevent excessive tensile loads being placed upon the thrust bearing.

3.1.7 Plungers

Two spring-loaded plungers are fitted to the upper plywood plate, one each side of the seat. The plungers automatically engage in mating holes in the lower plywood plate when the seat is in the loading and flight positions and prevent further rotation. The plungers may be manually raised to allow seat rotation.

3.1.8 Passenger Harness

A passenger harness is provided. The harness is a four point webbing construction and is provided with a car seat belt style buckle. The shoulder straps have a common anchor karabiner and this is attached to a small strap woven in to the basket wall. The waist straps are secured to the basket mounted floor rails using special quick release castings. The Passenger Harness may be seen in Figure 5.1.9.

3.1.9 Passenger Footrest

A footrest is provided to accommodate different passenger leg lengths. The footrest consists of a horizontal stainless steel tube supported on each side by a stanchion mount. The stanchion mounts are provided with a series of holes to allow the footrest height to be adjusted by inserting shaft-locking pins through the holes. The stanchion mounts are used to secure the footrest assembly to the

basket floor mounted rails and allow for quick and easy attachment and removal as required. The footrest may be seen in Figure 5.1.8.

3.1.10 Access Door

An access door is installed (on request) to allow an easy access of the passengers into the basket. It consists of a steel frame finished in wicker which is joined to the basket structure thanks to a hinge system. A set of two round bars is provided to allow a safe and full locking system between the door and the surrounding structure.

3.2 Wheelchair Equipment

3.2.1 General

The equipment as standard does not include a wheelchair but provides a means of securing the passenger's own wheelchair in to the basket. The following therefore describes the ancillary equipment required to secure the wheelchair to the basket and the additional equipment required to restrain the passenger and ensure his safety and comfort.

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.

Passengers with reduced mobility may be transported using approved seats.

For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

3.2.2 Wheelchair Four Point Webbing Restraint

The [illegible] each corner of the wheelchair and clipped in to the basket mounted floor rails. The front straps are non-adjustable. The rear straps are fully adjustable and are tensioned to hold the wheelchair in place. Attachment of the rear straps is by karabiner. The karabiner attachment has been designed to accommodate the majority of wheelchair designs and this is supplied as standard. However, certain wheelchair designs may require the use of different attachment methods or the use of ancillary equipment. For further information, contact Ultramagic.

The Four Point Webbing Restraint may be seen in Figure 3.2.2.

S5 DISABLED PAX BASKET

S5 DISABLED PAX BASKET

3.2.4 Passenger Headrest

A special headrest is supplied for passenger comfort and safety. The headrest is a universal device designed specifically for wheelchair use. The headrest fits over the wheelchair handles using adjustable pitch tubes and secured using thumbscrews. The headrest may be adjusted to suit the passenger. The headrest may be seen in Figure 3.2.4.

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.

Passengers with reduced mobility may be transported using approved seats.
For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

Figure 3.2.4
Passenger Headrest

3.3 Basket Mounted Equipment

3.3.1 General

Baskets capable of carrying disabled passengers are modified to incorporate a passenger access door and Floor Mounted Rails.

The Floor-Mounted Rails provide a quick, convenient and robust method of attaching and securing the Disabled Passenger Carrying Equipment to the

basket. A universal attachment design enables all the equipment to be secured to the rails whilst allowing a degree of positional flexibility.

3.3.2 Basket Floor Mounted Rails

The Floor Mounted Rails are secured to the basket plywood floor using countersink screws, nuts and washers. The rail is a machined aluminium extrusion, which may be cut to length to accommodate different basket sizes.

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Section 4

4.0 Preventative Maintenance

4.1 Basket Floor Mounted Rails

After each flight, check for any dirt or grit in the floor mounted runners. Remove using a brush or vacuum cleaner as appropriate.

4.2 Wheelchair Four Point Webbing Restraint

Regularly inspect each restraint for wear or malfunction. If any problems are identified, the item must be replaced.

Clean the restraint equipment as for the Passenger Double Inertia Full Harness (see section 4.3).

Take care to prevent dirt or grit contaminating the buckles as this may cause wear.

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.

4.3 Passenger Double Inertia Full Harness

Passengers with reduced mobility may be transported using approved seats.

For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

Regularly inspect each restraint for wear or malfunction. If any problems are identified, the harness must be replaced.

When necessary, clean the harness using soapy water and a clean soft cloth. Rinse with clean water and allow to air dry. Care must be taken to prevent contamination of the webbing with polish, oils and chemicals.

IMPORTANT: When cleaning or disinfecting, do not immerse buckles or reels in disinfectant or water.

Take care to prevent dirt or grit contaminating the mechanisms as this may cause wear.

4.4 Storage

Store all equipment in a clean dry environment. Wrest the Removable Seat Assembly on a soft surface such as a plywood sheet to prevent damage to the lockable seat fixtures.

4.5 Handling

When handled, make sure that the door (if fitted) is properly locked and secured to the surrounding structure.

Section 5

5.0 Repair and Maintenance

5.1 Removable Seat Assembly

5.1.1 Seat

To remove the seat, refer to Figure 5.1.1 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	SEAT OUTLINE SPEC	5003-0015
2	CHAIR SPACER	5003-0013
3	UPPER PLATE	5003-0010
4	LOWER PLATE	5003-0011
5	M8 X 35 ST STL CAP HEAD SCREW	MA-FE-0250
6	M8 ST STL PLAIN WASHER	CR-C-0150

Figure 5.1.1
Seat Removal

- Withdraw the plungers and lock in the retracted position.
- Rotate the seat until the access hole in the lower plate (item 4) is aligned with any of the four seat fixings situated on the underside of the upper plate.
- Using a 6mm across flats Allen key, undo and remove the M8 cap head screw and plain washer.
- Repeat for the remaining three seat fixings.
- Withdraw the seat.
- Using a 19mm AF open-ended spanner, undo and remove the four seat spacers fitted to the seat underside.

Replacement is generally the reverse procedure of removal. Prior to re-fitting the seat, make sure that the seat spacers, item 2, are placed in the counter-bored holes in the upper plate. Apply Loctite 222 to all the screw threads before replacing.

5.1.2 Plungers

To remove the plungers, refer to Figure 5.1.2 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	PLUNGER PARTS KIT TYPE QB20/2/1274	CI-MV-2100

Figure 5.1.2
Plunger Removal

- Raise the plungers and rotate the seat such that plungers rest on the upper surface of the lower plate.
- Using a small hammer, remove the Tommie bar from the plunger stem.
- Rotate the seat until the plungers engage in the lower plate. Withdraw the plunger through the holes in the lower plate.
- Remove the conical spring.
- Undo and remove the threaded bush.
- Remove the upper casting.

Replacement is generally the reverse procedure of removal. Prior to replacing the threaded bush, apply Loctite 222 to the thread.

5.1.3 Bearing Assembly

To remove the Bearing Assemblies, refer to Figure 5.1.3 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	BEARING BLOCK	5003-0018
2	BEARING BLOCK SPACER	5003-0019
3	BEARING TYPE INA688-Z	CI-C-0915
4	M8 X 25 ST STL CAP HEAD BOLT	MA-FE-0230
5	M8 X 30 ST STL C.SINK HEX DRIVE BOLT	MA-FE-0195

Figure 5.1.3
Bearing Assembly Removal

- Using a 5mm AF Allen key, undo and remove the two M8 x 30 countersink screws (item 5) securing the bearing block to the upper plate. Withdraw the bearing assembly.
- Using a 6mm AF Allen key, undo and remove the M8 x 25 cap head screw (item 4) securing the bearing to the bearing block.
- Withdraw the bearing (item 3) and the bearing block spacer (item 2).

Replacement is generally the reverse procedure of removal. Prior to replacing the screws, apply Loctite 222 to the threads. Take care not to allow the Loctite to contaminate the bearing.

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5.1.4 Lockable Seat Fixture

To remove a Lockable Seat Fixture, refer to Figure 5.1.4 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	LOCKABLE SEAT FIXTURE SL/STD	CI-MV-0819
2	M10 X 12 ST STL CAP HEAD SCREW	MA-FE-0310
3	M10 ST STL PLAIN WASHER	CR-C-0160

Figure 5.1.4
Lockable Seat Fixture Removal

- Using an 8mm AF Allen key, undo and remove the two cap head bolts and plain washers (items 2 and 3). Withdraw the Lockable Seat fixture from the frame.

Replacement is generally the reverse procedure to removal. Prior to replacing the bolts, apply Loctite 222 to the threads.

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5.1.5 Support Frame Assembly

To remove the Support Frame Assembly, refer to Figure 5.1.5 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	SUPPORT FRAME ASSY	5003-0002
2	M8 X 12 ST STL CAP HEAD BOLT	MA-FE-0225
3	LOWER PLATE SPACER	5003-0014

Figure 5.1.5
Support Frame Assembly Removal

- Carefully move the seat backwards using the seat slides until the lower fixing securing the slide to the frame is exposed.
- Using a 6mm AF Allen key, undo and remove the two fixings (item 2) securing the front of the slides to the frame.
- Operate the slides and expose the rear fixings. Remove the two rear fixings. Lift the seat away from the frame and place carefully on a soft surface such as plywood.
- Remove the two Lockable Seat Fixtures as described in section 5.1.4.

Replacement is generally the reverse procedure to removal. Prior to replacing the fixings, apply Loctite 222 to the threads.

5.1.6 Seat Slides

To remove the seat slides, refer to Figure 5.1.5 and proceed as follows:

- Remove the Support Frame Assembly as described in section 5.1.5.
- Operate the slides and move the position such as to expose the upper fixings securing the front of the slides to the Lower Plate Spacer (item 3).
- Using a 6mm AF Allen key, undo and remove the two front fixings (item2).
- Operate the slides and move the position such as to expose the upper fixings securing the rear of the slides to the Lower Plate Spacer (item 3). Remove the fixings.

- Withdraw the slides taking care not to bend the wire link between the left and right slides.

Replacement is generally the reverse procedure to removal. Prior to replacing the fixings, apply Loctite 222 to the threads.

5.1.7 Thrust Bearing, Upper and lower Plates, Bearing Spacer

To remove the Thrust Bearing, refer to Figure 5.1.7 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	UPPER PLATE	5003-0010
2	LOWER PLATE	5003-0011
3	THRUST BEARING	5003-0016
4	THRUST BEARING SPACER	5003-0012
5	M6 X 40 ST STL PAN HEAD SCREW	MA-FE-0325
6	M6 X 30 ST STL PAN HEAD SCREW	MA-FE-0315
7	M6 ST STL PLAIN WASHER	CR-C-0140
8	M6 NYLOC NUT	VE-C-0250

Figure 5.1.7
Thrust Bearing Removal

- Remove the Seat as described in section 5.1.1.
- Remove the Support Fame Assembly as described in section 5.1.5.
- Remove the Seat Slides as described in section 5.1.6.
- Remove the Plungers as described in section 5.1.2.
- Remove the Bearing Assemblies as described in section 5.1.3.
- Rotate the Lower Plate until the access hole in the lower plate is aligned with one of the fixings securing the top of the Thrust Bearing to the Upper Plate. Using a flat bladed screwdriver and a 10mm open-ended spanner, undo and remove the fixings (items 5, 7 and 8). Remove the remaining three sets of upper fixings in a similar fashion.
- Remove the Upper Plate and Bearing Spacer.
- Using a flat bladed screwdriver and a 10mm open-ended spanner, undo and remove the four sets of fixings (items 6, 7 and 8) securing the bottom of the Thrust Bearing to the Lower Plate.

Replacement is generally the reverse procedure to removal. When fitting the Thrust Bearing to the Lower Plate, make sure that the access holes in the Lower Plate and Thrust Bearing are aligned.

5.1.8 Footrest Assembly

Replaceable parts associated with the Footrest Assembly are shown in Figure 5.1.8 below.

ITEM	DESCRIPTION	PART NUMBER
1	STANCHION ASSY	5003-0101
2	CROSSBAR ASSY	5003-0102
3	ø8 X 36 SHAFT LOCKING PIN	SL-C-0050

Figure 5.1.8
Footrest Assembly

5.1.9 Passenger Harness

The Passenger Harness used in conjunction with the Removable Seat Assembly is a rally car harness modified to attach to the Basket Floor Mounted Rails. Consequently, the replaceable items are limited to the harness, the Rail Attachment Clips and the Harness Attachment Loop Assembly.

In the event that the Attachment Clips are replaced, all sewing must be carried out in accordance with the requirements of the Ultramagic Maintenance Manual.

The Passenger Harness may be seen in Figure 5.1.9

ITEM	DESCRIPTION	PART NUMBER
1	RALLY HARNESS	CI-C-0900
2	HARNESS ATTACHMENT LOOP ASSY	5003-0201
3	RINGLESS ATF CASTING SUB ASSY	CI-MV-0990
4	12kN ALUMINIUM KARABINER 400/8-3	EM-01-0130

Figure 5.1.9
Passenger Harness (Removable Seat)

5.2 Wheelchair equipment

5.2.1 General

There are no serviceable items contained in the wheelchair related equipment and as such, repair is by replacement only.

Section 6

6.0 Annual / 100 Hour Inspection

6.1 Annual / 100 Hour Inspection

The Disabled Passenger Carrying Equipment must be subjected to an inspection by an inspector approved by the National Airworthiness Authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

6.2 Removable Seat Assembly

6.2.1 Seat

Refer to Figure 5.1.1 and visually check the following:

- The seat padding remains in good condition.
- The seat fixings are secure.

6.2.2 Seat Frame

Refer to Figure 5.1.5 and check the following:

- The frame is in good condition.
- There are no signs of serious distortion to the frame structure.
- The lockable seat fixtures are functioning correctly and the fixings are secure.

6.2.3 Seat Slides

Refer to Figure 5.1.5 and check the following:

- The slides extend, contract and lock in position correctly.
- The wire link between the two slides is in good condition and secure.
- There is adequate lubrication. Apply grease to the slide runners if necessary.
- All slide fixings are secure.

6.2.4 Thrust Bearing

Refer to Figure 5.1.7 and check the following:

- The seat is free to rotate and that the action is smooth.
- All fixings securing the bearing are secure.

6.2.5 Bearing Assemblies

Refer to Figure 5.1.3 and check the following:

- The bearings are free to rotate and that the fixings securing the bearing and the bearing block are secure.

6.2.6 Upper and Lower Plates

Refer to Figure 5.1.7 and check the following:

- Both plates are in good condition and there are no cracks or splinters.

6.2.7 Passenger Harness

Refer to Figure 5.1.9 and check the following:

- All harness webbing is in good condition and all sewn joints are sound.
- The rail clip function is correct.
- The harness buckle function is correct.
- The adjuster buckle function is correct.
- The attachment loop is in good condition.
- The basket wicker where the attachment loop is secured is in good condition and provides a good anchor for the loop.

6.2.8 Footrest Assembly

Refer to Figure 5.1.8 and check the following:

- The stanchion mounts function correctly.
- Both shaft-locking pins are present and function correctly.

6.3 Wheelchair Equipment

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.

Passengers with reduced mobility may be transported using approved seats.

For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

6.3.1 Wheelchair Four Point Webbing Restraint

Refer to Figure 5.2.2 and check the following:

- The webbing and all sewn joints are in good condition.

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- The rear strap adjustment buckles are in good condition and function correctly.
- The front strap buckles function correctly.

6.3.2 Passenger Double Inertia Full Harness

Refer to Figure 3.2.3 and check the following:

- The webbing and all sewn joints are in good condition.
- The waist buckle functions correctly.
- The inertia locking mechanisms lock when the webbing is pulled and when the units are tilted.

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.
Passengers with reduced mobility may be transported using approved seats.
For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

6.3.3 Passenger Headrest

Refer to Figure 3.2.4 and check the following:

- All adjustment joints function correctly and may be made secure.
- The headrest padding is in good condition.
- The fixings securing the headrest to the wheelchair handles are present and function correctly.

6.3.4 Basket Floor Mounted Rails

Check the following:

- All fixings securing the rails to the floor are secure.
- The rails are in good condition with no sharp edges, which could cause injury to passengers.

6.4 Access Door

Refer to Figure 1 and check the following:

- There are no signs of serious distortion to the door and surrounding structure.
- Lock bars can be smoothly inserted and removed, fully locking the action of the door.
- Door movement is correct and always to the outside only.

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APPENDIX 1

Annual / 100 Hour Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Seat			
Padding condition	6.2.1		
Fixings secure	6.2.1		
Seat Frame			
Frame condition	6.2.2		
Distortion	6.2.2		
Seat fixture function	6.2.2		
Seat Slides			
Slide function	6.2.3		
Wire link	6.2.3		
Lubrication	6.2.3		
Fixings secure	6.2.3		
Thrust bearing			
Rotation	6.2.4		
Fixings secure	6.2.4		
Bearing Assemblies			
Bearing rotation	6.2.5		
Fixings secure	6.2.5		
Upper and Lower Plates			
Plate condition	6.2.6		
Passenger Harness			
Webbing condition	6.2.7		
Clip function	6.2.7		
Buckle function	6.2.7		
Adjuster buckle function	6.2.7		
Attachment loop	6.2.7		
Basket wicker	6.2.7		
Footrest Assembly			

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Stanchion function	6.2.8		
Shaft-Locking Pins	6.2.8		
Four Point Webbing Restraint			
Webbing condition	6.3.1		
Rear Buckle	6.3.1		
Front Buckle	6.3.1		
Passenger Double Inertia Full Harness			
Webbing function	6.3.2		
Buckle function	6.3.2		
Lock mechanism function	6.3.2		
Passenger Headrest			
Adjustment function	6.3.3		
Padding	6.3.3		
Fixings secure	6.3.3		
Basket Floor Mounted Rails			
Fixings secure	6.3.4		
Rail condition	6.3.4		
Access Door			
Distortion	6.4		
Lock bars function	6.4		
Door movement	6.4		

Carrying wheelchairs on-board any balloon with KB envelope is NOT ALLOWED.
Passengers with reduced mobility may be transported using approved seats.
For more information see the appropriate KB FMS (B.3105-FMS_USBEU)

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SUPPLEMENT 5, Issue 3
HOT AIR BALLOON MAINTENANCE MANUAL

TEKNO BASKETS ("Supplement 18")

ULTRAMAGIC MAINTENANCE MANUAL SUPPLEMENT Nº18

'TEKNO' BASKETS

S18 - 'TEKNO' BASKETS

Section 1 - General

This supplement defines the particular maintenance and inspection requirements for the CT-01, CT-02 and CT-03 Ultramagic Hot Air Balloon 'Tekno' Baskets.

Sections 1 to 5 detail the specific maintenance procedures and the parts used. Section 6 details the applicable inspection schedules and test requirements.

Due to the innovative materials and concept introduced with the 'Tekno' baskets, some of the generic maintenance instructions for baskets no longer apply. Thus a specific Maintenance Manual Supplement is required where the Maintenance Manual. Indexes are kept in line with the Ultramagic Maintenance Manual to facilitate its use. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

1.1.3 Basket (Preventive maintenance)

Replace with the following:

- Cleaning
- Replacement of wall protection panels
- Replacement of wall cushion padding
- Replacement of handles for the occupants
- Replacement of cross tensor tapes or nylon rods
- Assembling and disassembling of brackets and straps for the external fitting of cylinders (if due)

Section 2 – Envelope Repairs

2.12.8 Karabiners

The following karabiners are allowed when rigging a 'tekno' basket to the envelope.

- 30 kN Steel – Stubai / DMM
- 900 kg St Steel - Quick Link (Maillon Rapid)
- 27 kN Steel - Faders

WARNING: Design Loads of the Basket must be considered in any case.

Section 3 – Basket Repairs

3.1 General Maintenance

The basket should be regularly cleaned and inspected. Basket may be washed with soapy water (no strong detergents) It must then be allowed to dry before storing.

3.4 Rawhide

Special dry rawhide is used on the 'tekno' baskets to allow the "hinge" function. Replacement requires stapling and stitching of the new panels, which must be of the appropriate size.

3.5 Wicker

(Not applicable)

3.7 Basket Floors

Any crack longer than 15 cm and 3 mm depth (two cross-banded veneers) or more in the plywood floor requires work involving its replacement. If this is the case, contact Ultramagic for further information.

3.9 Basket Materials

The Floor of the 'Tekno' basket is manufactured from 9mm varnished marine plywood for CT-01 and CT-03 and from 12mm for CT-02. The basket wire cables are made from Stainless Steel 7x7+0 or 6x7+1 with nominal diameter of 5 mm, and are terminated by Stainless Steel thimbles and Copper ferrules.

3.10 Pilot restraint harness attachment points

The main frame or frame corner eyelets may be used as an attachment point for the restraint harnesses. Being a part of the main Stainless Steel structure, these eyelets must be free from any damage or crack. Should any damage be noticed then contact Ultramagic, S.A. or one of its agents for advice and details.

3.12 Protection walls

Walls provided are secured to the structure and are filled with round foam at the top and special honeycomb panels below. Removal or replacement of this filling is possible thanks to the special Velcro openings at the side. Honeycomb panels must be replaced when a crack or a deep bending line is found through the whole panel. Damages or cuts on the fabric walls are allowed unless the consistency of the walls is jeopardized or passing holes larger than 5 cm diameter are present.

3.13 Cross tensor tapes

Eight cross tensor tapes (4 long, 4 short) are provided with the basket walls. Tape is made of polyester with tubular shape and a minimum strength of 900 daN. Tapes and buckles must be free of damage, corrosion or distortion.

3.14 External fitting for cylinders (optional assembly)

Figure 1
Top view of the external supports

Fitting and removal of the external supports must be carried out in accordance to Figures 1 and 2. A 5mm Allen key and 10mm spanner are required for the locking means. Note that top rings of the support bracket must be fitted into the basket lower frame sockets. When using the second generation of external supports no tools are required for the locking means. Fitting and removal of the second generation external supports must be carried out in accordance to Figure 3.

ITEM	DESCRIPTION	DWG / PART NUMBER
1	EXTERNAL CYLINDER SUPPORT BRACKET	3200-1100
2	M6x40 ST STL HEX DRIVE SCREW TO DIN912	MA-FE-0200
3	M6 ST STL WASHER TO DIN125	CR-C-0140
4	M6 ST STL AEROTITE LOCK NUT	VE-C-0250

Figure 2
Close view (side) of the first generation bracket assembly

Figure 3
Second generation bracket assembly (closed position)

ITEM	DESCRIPTION	DWG / PART NUMBER
1	EXTERNAL CYLINDER SUPPORT BRACKET – Second Generation	3200-1100 (Issue 2)
2	SEAT BOLT QUICK FASTENER – CAM (Shown Closed)	CI-TK-1116 – Cam
3	SEAT BOLT QUICK FASTENER – NUT	CI-TK-1116 – Nut
4	SEAT BOLT QUICK FASTENER - SADDLE	CI-TK-1116 – Saddle

When fitting the second generation brackets ensure that the quick release clamp is firmly secured to the closed position with no less than 12 complete turns. When removing the second generation brackets turn the quick release clamp towards the open position and then untighten the nut. The open and close rotation senses are indicated on the quick release clamp cam. Note that for the purpose of fitting and removing the second generation brackets it is not required to disassemble any other part of the basket.

Figure 4
Second generation bracket detail (left hand)

Section 4 – Fuel Systems

No change.

Section 5 – Instruments

No change.

Section 6 – Inspection Schedules

6.1 Pre-flight Checks ("A" Type)

Replace with the following:

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 karabiner screws are locked.
5. ☐ Make sure that cross-tensor tapes are correctly fitted and tightened.
6. ☐ Check that wall panels are firmly closed and tightened.
7. ☐ If fitted, check that external fuel cylinders are mounted as per 39.4.11.5.

6.3 100 hour / annual inspection ("B" Type)

Basket (replace with the following):

1. ☐ Check the condition of the basket wires, especially at the bottom corners where they enter the runners and on the ferrules.
2. ☐ Check the condition of the nylon rods. Ensure they are not broken, badly bent or twisted.
3. ☐ Ensure that the basket stainless steel frames (top and bottom) have no cracks, corrosion or significant distortion. Any weld suspected of being damaged shall be die-penetrant tested. Special attention to the pole sockets and structural welding must be taken.
4. ☐ Ensure that the floor and wooden runners are free from noticeable cracks or indentation, especially on the screws and fixings to the structure. Check that all bolts and screws are secured.
5. ☐ Check the integrity of the cross tensor tapes and their buckles. Look for any distortion other than normal wear. Check for corrosion and operation of the buckles.
6. ☐ Check that the protective leather on the bottom of the basket is free from excessive damage that would allow the basket itself to become damaged or the wall become loose.
7. ☐ Inspect the condition of the walls and their filling. Remove and check all the honeycomb panels looking for cracks or deep bending lines. Pay attention to the main Velcro joints and sewing.
8. ☐ Check that the handles provided for the occupants are serviceable.
9. ☐ If applicable, visually inspect the optional external fittings for cylinders.

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6.6 Inspection Requirements

6.6.2 Envelope

Karabiners – Check as per Maintenance Manual but considering the components described in section 2.12.8 of this Supplement.

6.6.3 Load Frame

Check as per Maintenance Manual but considering the components described in section 2.12.8 of this Supplement.

6.6.6 Baskets

Section concerning Basket weaving is not applicable. Other sections remain applicable except for those which are amended below. Observe also new paragraphs:

Basket floor – inspect the floor for significant cracks on both faces. Any crack longer than 15 cm and 3 mm depth (two cross-banded veneers) or more is not permitted. Pay particular attention to the area where the floor joins the stainless Steel frame.

Basket wires – Check for damage to the wire structure as no damage is acceptable. Inspect the swage joints as well as where the wire comes out of the floor of the basket and the guidance rings on the top frame.

Nylon Rods – Nylon rods must be inspected to ensure that they are not cracked or seriously bent. Check the lengths of the rods of the basket and the burner against the burner rigged position to ensure that there is no excess on the wires that would allow the rods to pop out.

Cross tensor tapes – This part provides the stiffness and rigidity to the basket, as well as some shock-absorption capability. Cuts or significant fraying other than normal wear are not permitted. Check also the retention capability of the buckle, its operation, and any sign of corrosion on it. Check that the length of the tapes is appropriate to secure each corner eyelet.

Honeycomb panels – Special panels are fitted into the fabric walls to provide additional protection to the occupants in case of side impact against any hard obstacle. These panels are not considered as a structural component but flight cannot be initiated if any of the panels are missing or shows signs of serious damage which may have reduced its shock absorption capacity.

Fabric walls – The fabric panels provide a flexible and lightweight surround which prevents the passenger or equipment from falling or escaping from the basket. Top attachment tapes and Velcro must be in good condition. Side Velcro tapes must fix firmly each corner, and the honeycomb should be properly held. Damages or cuts on the fabric walls are allowed unless the consistency of the walls is jeopardized or passing holes larger than 5 cm diameter are present.

External fitting for cylinders – Check that the suspension straps, their Carbine hooks, rings and sewing are in good condition. Inspect the horizontal straps and their buckles for any sign of damage. Visually check the support brackets and their locking means (screw, nut and washers or quick release clamp) for evident distortion, cracks, oxidation or damage. Check the padded spacer for deformation or cuts. Normal wear is allowed to any of the mentioned parts unless it is suspected that its strength has been reduced.

6.7 Unscheduled Inspections

6.7.3 Hard Landing Inspection

Add the following:

[...] When fuel cylinders are carried externally, a B-Type inspection must be undertaken on those units suspicious of having been affected at the landing, paying special attention to the bottom of the pressure vessel.

Section 7 – Airworthiness Limitations

No change.

Section A2 – Inspection Checklist

Apply the following list specific to the 'Tekno' baskets:

REGISTRATION		BASKET S/N	

CHECK	SECTION	ASPECTS	YES /NO	INSP.
BASKET	Wires	1. Check the condition of the basket wires, especially where they enter the floor and around the ferrules.		
	Nylon Rods	2. Check the general condition of the nylon rods.		
	Frame & Sockets	3. Ensure that the stainless steel structure and its welding does not show signs of evident damage or corrosion.		
	Floor & Runners	4. Ensure that the floor and wooden runners are free from cracks or damage. Check screws and fixings.		
	Cross Tensors	5. Check the condition of the cross tapes and buckles.		
	Rawhide	6. Check that the protective hide on the bottom of the basket is free from excessive damage.		
	Walls	7. Check for important damages or cuts on the walls. Check honeycomb panels, Velcro tapes and sewing.		
	Handles	8. Check that the internal handles are serviceable.		
	External cylinder fittings	9. If applicable, visually inspect the optional external fittings for cylinders.		

VISTA BASKETS ("Supplement 22")

ULTRAMAGIC MAINTENANCE MANUAL SUPPLEMENT Nº22

CV BASKETS

S22 - CV BASKETS

Section 1 - General

This supplement defines the particular maintenance and inspection requirements for the CV Series of Ultramagic Baskets.

Sections 1 to 5 detail the specific maintenance procedures and the parts used. Section 6 details the applicable inspection schedules and test requirements.

Due to the seat arrangement introduced with the CV baskets, a specific Maintenance Manual Supplement is required as a complement to the Maintenance Manual. Indexes are kept in line with the Ultramagic Maintenance Manual to facilitate its use. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

1.1.3 Basket (Preventive maintenance)

Add the following:

- Assembling and removal of waist harnesses
- Assembling and removal of the trays
- Tightening of the seat structure to the plywood

Section 2 – Envelope Repairs

No change.

Section 3 – Basket Repairs

3.1 General Maintenance

To clean the harnesses, wipe the webbing with a sponge soaked in hot soapy water. Do not bleach or dye the belts.

To clean the seats, make a combined use of dry cleaners with gentle brushing.

3.12 Seat assembly

Each seat is mounted on its side plates by means of four M8 screws. The two rear screws include a bushing sleeve to install also the belt brackets (see Fig.2).
Whenever the seat is re-assembled, screws require a torque of 25 N·m (18.5 lb·inch) for proper tightening. The use of screwlock type Loctite 243 on the threads is recommended.

3.13 Seat harnesses

Side attachments are used also to fix the seat, thus refer to Fig. 2 and section 3.12 for their assembly and removal.

Rear attachment consists of a karabiner connected to the basket bottom structure by means of a welded St. Steel ring. Open the karabiner gate to assemble/release the harness.

Whenever the harness is re-assembled, make sure that it is correctly routed through the openings of the seats, checking also for entanglements of the belt with the basket and seat structures.

Any damage to the harnesses or their attachment points must be corrected by replacement, with the exception of damage or wear on the sewn gates, which may be re-sewn or reinforced.

3.14 Tray assembly

Individual trays are installed in front of each seat, supported on the adjacent structure by means of a stainless steel arm. Whenever a tray needs to be removed, Refer to figure 1 and undo the Hex drive Lock Screw holding the plastic gimbal to the steel tube. This will enable releasing the tray assembly from the structure. Four Philips screws connect then the tray to the axial support. Re-assembling is the reverse procedure.

Tray adjustment – Gimbal assemblies are provided with a tilt adjustment in form of a screw. When the tray is not flat and requires adjustment, refer to Figure 1 and loosen or tighten the screw until the inclination of the tray disappears.

Figure 1
Tray assembly – Bottom View

ITEM	DESCRIPTION	DWG / PART NUMBER
1	M8x30 ST STL HEX DRIVE SCREW TO DIN912	MA-FE-0240
2	M8 ST STL WASHER TO DIN9021	MA-FE-0155
3	BUSHING SLEEVE	CI-C-0901
4	M8x40 ST STL HEX DRIVE SCREW TO DIN912	MA-FE-0260
5	ST STL DOUBLE HOLE COUNTERPLATE	CI-C-0177
6	M8 ST STL NUT	VE-C-0270

Figure 2
Seat Support Assembly

Section 4 – Fuel Systems

No change.

Section 5 – Instruments

No change.

Section 6 – Inspection Schedules

6.1 Pre-flight Checks ("A" Type)

Basket (Add the following)

6. ☐ Check the seat harnesses and their attachments for entanglements, or signs of excessive wear or damage. Check that the buckles remain operative.
7. ☐ Check the waist restraint harnesses and their attachments for entanglements, or signs of excessive wear or damage. Check that the buckles and karabiners remain operative.
8. ☐ Check that trays and accessories are stowed.
9. ☐ Check that the seat structures are firmly secured to the floor and do not present free movement or distortion.

6.3 100 hour / annual inspection ("B" Type)

Basket (add the following):

9. ☐ Check the seat harnesses and their attachments for entanglements, or signs of excessive wear or damage. Check that the buckles remain operative.
10. ☐ Check the waist restraint harnesses and their attachments for entanglements, or signs of excessive wear or damage. Check that the buckles and karabiners remain operative.
11. ☐ Check the condition and movement of the trays. Correct any play and make sure that are firmly attached to the supports.
12. ☐ Check that the seat structures are firmly secured to the floor and do not present free movement or distortion.
13. ☐ Carry out a close inspection to the seats, especially on screwed and welded joints. Make sure that all seats are free from play or relative movement.
14. ☐ Check the partition tubes looking for signs of distortion or cracks.
15. ☐ If present, remove floor padding to check the attachments to the plywood for cracks or damages.
16. ☐ Tilt the basket and check the condition of the bottom face of the floor.

6.6 Inspection Requirements

6.6.6 Baskets

Additionally, observe the following:

Seat Harnesses – Harness must be used in its approved configuration without any modifications or removal of parts. The effectiveness and longevity of the belts are directly related to the manner in which they are installed, used and maintained. The belts must be replaced whenever the webbing is visibly cut, frayed, or weakened due to the actions of chemicals or sunlight. They must also be replaced if metal parts or buckles are bent, deformed or rusted. Any harness which does not function perfectly must be replaced. In the event of finding sewn gates damaged, possible causes should be identified – i.e. entanglements, incorrect installation, hard landing, misuse, etc.

Seats and Seat supports – Carry out a close inspection to the seats, seat supporting structure and the harness attachments, especially on screwed and welded joints. Check for signs of distortion or bending. Make sure that all seats are free from play or relative movement. Check that the screws fixing the seats and the structure are secured. Remove the floor padding to inspect the attachments of the structure to the floor. Tilt the basket and check the condition of the fittings from below, and tighten all screws securing the seat supporting structure to the plywood.

Basket structure – Check the partition tubes looking for signs of distortion, play or cracks. If necessary, remove the padding and leather from the tube for inspection whenever damage is suspected.

Trays – Check the trays in absence of splinters or damage. Check the correct function of the gimbal system. Trays must be firmly secured to the structure. If significant tilt is observed when deployed, adjust them as described in 3.14.

6.7 Unscheduled Inspections

6.7.3 Hard Landing Inspection

Add the following:

Add the checks listed in section 6.3 of this supplement.

Section 7 – Airworthiness Limitations

No change.

Section A2 – Inspection Checklist

Add the following:

CHECK	SECTION	ASPECTS	YES /NO	INSP.
BASKET	Seat Harness	9. Check seat harnesses (entanglements, wear, damage) Buckles operative.		
	Waist Harness	10. Check waist harnesses (entanglements, wear, damage) Buckles operative.		
	Tray	11. Tray condition, movement, attachment.		
	Seat Structure	12. Seat structure firmly secured to the floor, absence of distortion / movement. Tighten screws.		
	Seat	13. Seats and their attachments. Check for play or damages.		
	Partitions	14. Check partition tubes for distortion or cracks		
	Floor attachments	15. Check the condition of the basket floor and their attachments. Remove floor padding if necessary.		
	Bottom	16. Tilt the basket to check the condition of its bottom face.		

APPENDIX 4 – BURNER AND BURNER FRAME REPAIRS

MK-21 BURNER (''Section 4'')

4.3 MK 21 DOUBLE, TRIPLE, 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 annual/100h check is the maximum interval allowed, although this can be shortened 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 light 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 compressed air supply offering an operational pressure. 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-0801
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:

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
10	IGNITER (NEW)	2022-0907
9	ST STL SPRING	MA-FE-0700
8	LOWER IGNITER HOUSING (NEW)	2022-0905
7	UPPER IGNITER HOUSING (NEW)	2022-0906
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. (Only earlier assemblies)

- Undo upper igniter housing from lower igniter housing. (Only new assemblies)
- Withdraw/Unscrew 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.
- Check the condition of the spring between the igniter and the electrode. (Only new assemblies)
- 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, an attempt to clean it can be made by soaking it in petrol or paraffin to remove any oily deposits. If this fails or the jet presents other damages, it must be replaced.
- 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:

ITEM	DESCRIPTION	PART NUMBER
3	3/4" BSP HIGH NITRILE BONDED SEAL TYPE 400-021-5590-41	MA-FE-0603
2	LIQUID FIRE ADAPTOR	2022/1010
1	LIQUID JET BODY	2022/1011

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 V0250	
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	#4 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.

MK-21 BURNER CRUISE CONTROL OPTION ("Supplement 6")

S6 CONTROL CRUISE MK-21

Supplement 6 - MK 21 Burner Cruise Control Option

Section 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the Ultramagic MK 21 burner when fitted with the Cruise Control option. Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The burner when fitted with the Cruise Control option uses many common components to the standard MK21 burner already detailed in the Maintenance Manual. Only those areas, which are different to the standard burner, are therefore described in this supplement. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to the Ultramagic burner when fitted with the Cruise Control as defined by the following drawing numbers:

Single burners are not allowed for combining with KB envelopes

Double Burner:	2022/0000
Triple Burner:	2023/0000
Quad Burner:	2024/0000
Cruise Control Assembly:	2022/2400

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual.

1.5 Maintenance Records

See Maintenance Manual

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

The following safety instructions are additional to those already contained in the Maintenance Manual:

- Before initiating any maintenance work on the burner, ensure that the burner is fully vented of fuel and that it is disconnected from any fuel supply.

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the MK21 burner when fitted with the Cruise Control option, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Additional inspection requirements for the Cruise Control option are defined in Section 6 of this Supplement.

Section 3

3.0 Technical Description

3.1 General

The MK21 burner when fitted with the Cruise Control is very similar in construction to the standard burner. Many common components and assemblies are used and only those areas different to the standard burner are discussed below.

The Cruise Control may be fitted to the Single, Double, Triple and Quad variants of the MK 21 burner. It may replace one or more of the existing Liquid Fire Valve Assemblies. Installation of the Cruise Control does not require any further modification to the burner other than replacing the existing Liquid Fire Valve Assembly with the Cruise Control Assembly.

The Cruise Control incorporates a toggle action handle and a rotary action handle into the same assembly. Use of the toggle handle allows control of the Liquid Fire burner in the normal fashion. Use of the rotary action handle allows the Liquid Burner to be activated with a greater degree of control over the power output and "hands-free" operation.

The control may be fitted in the left and right hand burners. Note however that due to the opposite direction of control rotation, the controls are supplied in left and right-handed variants.

The Cruise Control may be seen in Figure 1.

CONTROL VARIANT	DRAWING NUMBER
LEFT HAND	2024-0000-A
RIGHT HAND	2024-0000-B

Figure 1
Cruise Control Installation

4 Preventative Maintenance

4.1 General

All preventative maintenance is as described for the standard MK 21 Burner in the Maintenance Manual.

Section 5

5 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies and components used within the construction of the Cruise Control.

Maintenance other than that detailed in the Section 4, (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.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

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.

5.2 Cruise Control Assembly

The Cruise Control is fitted directly in the Valve Block Assembly and directly replaces the standard Liquid Fire Valve Assembly. The Cruise Control Assembly may be seen in Figure 2.

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S6 CONTROL CRUISE MK-21

ITEM	DESCRIPTION	PART NUMBER
1	VALVE BONNET (CRUISE CONTROL)	2022-2410
2	VALVE STEM (CRUISE CONTROL)	2022-2411
3	VALVE SEAT ASSY	2022-1102
4	VALVE SEAT SLEEVE	2022-1113
5	LIQUID VALVE HANDLE	2022-1116
6	THRUST WASHER	2022-1114
7	PIVOT PIN	2022-1117
8	STAINLESS STEEL SPRING TYPE D22700	MA-FE-0701
9	M2.5 x 3 ST STL FLAT POINT GRUB SCREW	MA-FE-0503
10	LIQUID VALVE HANDLE (DEAD MAN'S)	2022-1119
11	CAM (LEFT HAND)	2022-2412
12	LOCK NUT	2022-2414
13	CAM FOLLOWER (LEFT HAND)	2022-2413
14	MODIFIED SCREW	2022-2415
15	HANDLE LEVER	2025-0610
16	M6 X 45 ST STL CAP HEAD SCREW	CR-08-0010
17	CAM (RIGHT HAND)	2022-2416
18	4 ID X 2 THICK HIGH NITRILE "O" SEAL TYPE 204-004-5575	MA-FE-0612
19	3/4" BSP HIGH NITRIL BONDED WASHER TYPE 400-027-5590-41	MA-FE-0803
20	CAM FOLLOWER (RIGHT HAND)	2022-2417

Figure 2. Cruise Control Assembly

To remove and strip down the Cruise Control Assembly, refer to Figure 2 and proceed as follows:

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- Before removing the Cruise Control Assembly, make a note of the position of the rotary handle relative to the valve block when the handle is in the off position.
- Using a 28mm AF open-ended spanner, undo and remove the Cruise Control Assembly from the Valve Block.
- Using a 2mm AF Allen key, undo, and remove the two locking Allen screws (Item 9) situated in the underside of the Liquid Valve Handle Item 5. Loosen and retract the next two grub screws. Withdraw the Pivot Pin Item 7.
- Remove the Thrust Washer Item 6.
- Using a 2.5mm AF Allen key, undo and retract (but do not remove) the two Modified Screws, Item 14. Withdraw the Cam Follower Item 13.
- Using a 19mm open-ended spanner and a pair of external circlip pliers, loosen the Lock Nut item 12 from the Cam Item 11. Remove the Lock Nut and the Cam.
- Withdraw the Valve Seat, Valve Seat Sleeve, Spring and Valve Stem as a complete assembly by extracting it form the front of the Valve Bonnet.
- Remove the Spring Item 8.
- Withdraw the Valve Seat Sleeve Item 4.
- Remove the Valve Stem (Item 2) from the Valve Seat Assembly (Item 3).
- 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.
- Check the condition of the Bonded Washer item 19. Replace if necessary.
- Re-assembly of the valve is generally 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. Prior to replacing the Cam Follower, apply graphite grease to the tracks in the Cam.
- Note that the valves are handed. When re-assembling the left hand valve, ensure that the left hand Cam and Cam Follower are used. When re-assembling the right hand valve, ensure that the right hand Cam and Cam Follower are used.
- Note that when replacing the assembly in the valve block it will be necessary to set the position of the cam such that the rotary handle is positioned as shown in Figure 2. The position of the tracks in the Cam side, govern the final handle position. To set the Cam position, screw in the complete assembly excluding the Cam, Cam Follower and Liquid Valve Handle.
- Screw the Cam into position on the Valve Bonnet. Set the position of the tracks so that the Handle Lever will be positioned as in Figure 2. Hold the Cam in position and screw the Lock Nut onto the Valve Bonnet. Using the

19mm open-ended spanner and the circlip pliers, tighten the Cam and Lock Nut together. This will cause the Cam to become locked in position on the Valve Bonnet.

- Replace the Cam Follower and tighten the two Modified Screws Item 14.
- Note that the assembly is designed to operate correctly when the gap between the Liquid Valve Handle and the Thrust Washer is 0.5mm. Set this gap by selecting the required thickness of Thrust Washer. Thrust Washers of different thickness are available 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 Cruise Control Assembly has been re-assembled into the valve block, the valve to block joint and the position where the valve stem exits the valve bonnet 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.

Section 6

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.2 Functional Test

Carry out all functional tests as specified in the Maintenance Manual. In addition, check the following:

- Check the function of the rotary handle. Ensure that the handle is free to rotate fully in both directions and that rotation fires and turns off the Liquid Fire Burner correctly.
- Check the toggle handle function and that it fires and turns off the Liquid Fire Burner Correctly.

APPENDIX 1

Cruise Control

Annual / 100 Hour Burner Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Rotary Handle Function	6.2		
Toggle Handle Function	6.2		

S6 CONTROL CRUISE MK-21

MK-21 BURNER, BUTANE FUEL VARIANT("Supplement 7")

Supplement 7 –MK21 Burner, Butane Fuel Variant

S7 - MK21 BURNER, BUTANE FUEL VARIANT

Section 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the range of Ultramagic MK 21 burners when configured for use with butane fuel.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The burner when configured for use with butane fuel uses many common components to the standard MK21 burner already detailed in the Maintenance Manual. Only those areas which are different to those already detailed in the Maintenance Manual, are described in this supplement. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to the Ultramagic range of MK 21burners, when configured for use with butane fuel, as defined by the following drawing numbers:

Single burners are not allowed for combining with KB envelopes

Double Burner:	2022/0000
Triple Burner:	2023/0000
Quad Burner:	2024/0000

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual.

1.5 Maintenance Records

See Maintenance Manual

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

The following safety instructions are additional to those already contained in the Maintenance Manual:

- Before initiating any maintenance work on the burner, ensure that the burner is fully vented of fuel and that it is disconnected from any fuel supply.

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the MK21 burner when configured for use with butane fuel, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Additional inspection requirements for the MK21 burner when configured for use with butane fuel are defined in Section 6 of this Supplement.

Section 3

3.0 Technical Description

3.1 General

Although similar in calorific content, propane and butane fuels have different characteristics, most noticeably the lower natural vapour pressure of butane when compared to propane at similar temperatures. This combined with certain other differences require that the MK21 burner be configured differently when using butane to the standard propane configuration.

Since the natural vapour pressure of butane is significantly lower than that of propane at similar temperatures, it is normal to pressurise the fuel cylinder when using butane to achieve adequate fuel flow rates and thus burner output power. Pressurisation may be achieved by adding pressurised nitrogen gas to the fuel cylinder or by pre-heating the fuel cylinder with a purpose designed heater jacket. Either method of cylinder pressurisation requires a great degree of care. Procedures covering the methods of cylinder pressurisation are outside the scope of this document.

The differences between the burner in standard (propane) and butane configurations are restricted to two areas. A special Check Valve device is fitted at the burner fuel inlet just behind the Fuel Inlet Post and a different jet configuration is fitted in the Vapourisation Coil. Since propane fuel must not be used with a butane configured burner, one of the burner handle posts is engraved with the word "BUTANE" to act as identification.

The two methods of pressurising the cylinders (nitrogen and cylinder heating) result in different fuel characteristics. To account for this, different Check Valve parts are required. If replacement Check Valve parts are required, consult Ultramagic.

Fig 1 Showing "BUTANE" Identification

4 Preventative Maintenance

4.1 General

See Maintenance Manual.

Section 5

5 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies and components used in the butane configured burner which are different or additional to those used in the standard burner.

Maintenance other than that detailed in Section 4, (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 equipment functions.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

5.2 Coil Assembly

Removal, repair and replacement of the coil are as described in the Maintenance Manual. Note that the coil used in the butane configured burner is different to the standard burner in that it is provided with larger jets. The jet configuration is identified on the underside of the jet ring. Be sure to quote this information if a replacement coil is required. Butane configured coils are identified “40 x 1.8 x 5” thus.

5.3 Check Valve Assembly

The Check Valve is fitted inside the main valve block machining directly behind the Fuel Inlet Post.

It is vitally important that only parts supplied directly by Ultramagic be fitted when carrying out any maintenance work on the Check Valve. The use of any other part may result in a complete loss of burner function!

The Check Valve fitted for heated fuel is different to that fitted for nitrogen pressurised fuel. It is very important to fit the correct part. Fitting the incorrect part may result in a serious reduction in burner power or excessive burner power. When

ordering a replacement Check Valve, consult Ultramagic and state which method of fuel pressurisation is employed.

ITEM	DESCRIPTION	PART NUMBER
1	FUEL INLET POST	2022-0313
2	NITRIL DIAGHRAM	MA-FE-0613
3	ACETAL BUSH	REFER TO ULTRAMAGIC

Figure 2. Check Valve Assembly

To remove and replace the Check Valve, refer to Figure 2 and proceed as follows:

- Remove the fuel inlet post as described in the Maintenance Manual.
- Using a length of hooked wire; remove the nitrile diaphragm item 2.
- Using a length of hooked wire; remove the acetal bush item 3.
- Replacement is the reverse procedure of removal. Make sure that the orientation of the acetal bush and nitrile diaphragm is correct.
- Replace the fuel inlet post as described in the Maintenance Manual.

When replacing the Fuel Inlet Post, make sure that the "O" Seal is in good condition and that it is fitted in the groove machined in the rear face. Apply a thin smear of silicon grease to the seal prior to assembly.

Air pressure test as described in the Maintenance Manual.

Section 6

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.2 Inspection Requirements

Carry out all functional tests as specified in the Maintenance Manual. In addition, check the following:

- Check the condition of the nitrile diaghram. Ensure that the fit of the diaghram inside the valve block bore is good. If the diaghram is a very loose or very tight fit inside the bore, it must be replaced. Consult Ultramagic.
- Check the orientation of the nitrile diaghram inside the valve block. Correct if necessary.
- Check the orientation of the Acetal Bush inside the valve block. Correct if necessary.

APPENDIX 1

Butane Burner

Annual / 100 Hour Burner Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Nitrile Diaghram Condition	6.2		
Nitrile Diaghram Orientation	6.2		
Acetal Bush Orientation	6.2		

MK-21 BURNER, VAPOUR PILOT LIGHT ("Supplement 14")

Supplement 14 - VAPOUR PILOT VALVE OPTION FOR MK 21 BURNERS

Section 1

S14 - VAPOUR PILOT VALVE OPTION

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the range of Ultramagic MK 21 burners when fitted with the optional Vapour Pilot Valve.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The burner when fitted with the Vapour Pilot Valve Assembly uses many common components to the standard MK21 burner already detailed in the Maintenance Manual. Only those areas, which are different to those already detailed in the Maintenance Manual, are described in this supplement. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to the Ultramagic range of MK 21burners, when fitted with the Vapour Pilot Valve Assembly, as defined by the following drawing numbers:

Double Burner:	*2022/0000*
Triple Burner:	*2023/0000*
Quad Burner:	*2024/0000*
Vapour Pilot Valve Assembly:	*2022/2800*

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual.

1.5 Maintenance Records

See Maintenance Manual.

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

The following safety instructions are additional to those already contained in the Maintenance Manual:

- Before initiating any maintenance work on the burner, ensure that the burner is fully vented of fuel and that it is disconnected from any fuel supply.

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the MK21 burner when fitted with the Vapour Pilot Valve Assembly, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Additional inspection requirements for the Vapour Pilot Valve Assembly are defined in Section 6 of this Supplement.

Section 3

3.0 Technical Description

The Vapour Pilot Valve Assembly is an optional fit to the Mk 21 range of burners. When fitted, the valve completely replaces the standard Pilot Regulator Valve fitted in the side of the burner valve block. The valve controls the supply of vapour fuel, taken directly from the fuel cylinder, to the pilot light.

The valve consists of a machined body and a ball valve. The body is provided with "O" seals and these from the seal to the valve block in the same way as the standard Pilot Regulator Valve. The body is secured to the valve block using the same four fixings as used to secure the standard Pilot Regulator Valve. A fuel hose is

connected to the ball valve at one end and to the cylinder vapour regulator at the other. The flow of fuel is enabled or disabled by operating the ball valve.

The Vapour Pilot Valve may be seen in Figure 1.

Figure 1
Vapour Pilot Valve

Section 4

4.0 Preventative Maintenance

4.1 General

All preventative maintenance is as described for the MK 21 Burner in the Maintenance Manual with the following additions:

Check the strength of the pilot light flame. A weak or short flame is indicative of a partial blockage of the pilot light jet or of a blockage of the fuel outlet hole in the valve body. Check the pilot light jet as detailed in the Ultramagic Maintenance Manual. If this fails to improve the pilot light flame, remove the valve from the burner as described in Section 5.2 Clean inside the valve body and remove any solids or oily residue as described in Section 5.2.

Section 5

5.0 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair cleaning and replacement of the components used in the Vapour Pilot Valve Assembly.

Maintenance other than that detailed in Section 4, (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 equipment functions.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

5.2 Vapour Pilot Valve Assembly

When fitted, the Vapour Pilot Valve Assembly is mounted in the side of the burner valve block and directly replaces the standard Pilot Regulator Valve. The Vapour Pilot Valve Assembly may be seen in Figure 2.

Figure 2
Vapour Pilot Valve Assembly

ITEM	DESCRIPTION	DRG / PART NUMBER
1	VALVE BODY	2022-2810
2	*-- RESERVED --*	*-- RESERVED --*

3	22 ID X 2.5 THICK HIGH NITRILE "O" SEAL	MA-FE-0605
4	LEFT HAND BALL VALVE	CR-02-0285
5	LEFT HAND HANDLE ASSEMBLY	2025-0601
6	M4 X 20 ST STL HEX DRIVE, COUNTER SINK SCREW	CR-03-00300
7	RIGHT HAND HANDLE ASSEMBLY	2025-0701
8	RIGHT HAND BALL VALVE	CR-02-0275
9	21 ID X 3 THICK HIGH NITRILE "O" SEAL	MA-FE-0602
10	VAPOUR HOSE	HF-17

To remove and strip down the Vapour Pilot Valve Assembly, refer to Figure 2 and proceed as follows:

- Before commencing work, ensure that the burner is completely vented of fuel and that it is not connected to any fuel supply.
- Using a 14mm open-ended spanner, undo and remove the hose from the ball valve item 4 or 8.
- Using a 25mm open-ended spanner, undo and remove the ball valve (item 4 or 8) from the valve body (item 1).
- Using a 3mm Allen key, undo and remove the four fixings securing the valve body to the burner valve block.
- Withdraw the valve body from the valve block.
- Withdraw the "O" seal (item 9) from inside the valve block bore.
- Clean any solid particles or residue from inside the valve body using a soft cloth.
- Remove any oily deposits from inside the valve body using a soft cloth. A methanol solvent may be used to help remove the oil if necessary.
- Remove the "O" seal (item 3) from the valve body. Check the condition of the seal and replace if any defects are detected. Check the condition of the groove in the valve body where the seal is fitted. If any significant scratches are detected, then the valve body must be replaced. Scratches are considered significant if they are such that they can be felt with a fingernail.
- Check the condition of the "O" seal (item 9) and replace if any defects are detected.
- Check the condition of the bore in the burner valve block. The bore should be smooth and free from defects such as scratches. If any significant scratches are detected, contact Ultramagic for further advice.
- Replacement is generally the reverse procedure to disassembly. Prior to fitting the "O" seals, apply a thin smear of Molycote 111 silicon grease to the seal, the groove in the valve body and to the inside of the bore.
- Note the position of the fuel outlet hole and make sure it is positioned uppermost.
- Prior to replacing the four fixings securing the valve body to the burner valve block, apply Loctite 222 to the screw threads. Fit the valve body inside the valve block before fitting the ball valve.
- Prior to replacing the ball valve in the valve body, remove the PTFE tape from the ball valve thread and replace with new PTFE tape, using a minimum of three turns over all the thread.
- Prior to replacing the hose, remove all PTFE tape from the hose end fitting and replace with new PTFE tape, using a minimum of three turns over all of the thread. Ensure that the valve is correctly orientated so that the handle may be rotated to turn the valve on or off.
- Upon completion of re-assembly, connect the burner to a 6.8 bar (100 psi) compressed air supply. Using leak-detecting fluid, check that there are no leaks from the joint between the valve body and the valve block. If any leaks are detected, the valve body must be removed and the problem rectified before further burner use.
- With the compressed air supply still connected, make sure that there is no air coming out of the pilot light when the ball valve is in the "Off" position. If any air is

detected, then it is likely that there is a problem with the "O" seal (item 9). The problem must be resolved before further burner use.

- Connect the vapour hose to a 2 bar compressed air supply. Open the ball valve. Using leak-detecting fluid, check the joint between the hose and the ball valve, and the joint between the ball valve and the valve body. Close the ball valve and re-check all joints. If any leaks are detected, the problem must be resolved before further burner use. Check that the flow of air to the pilot light is stopped immediately after the ball valve has been closed.

Section 6

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.2 Inspection Requirements

Carry out all functional tests as specified in the Maintenance Manual. In addition, check the following:

- Check the condition of the vapour hose. If the hose shows signs of significant wear, is kinked or has been damaged, then the hose must be replaced.
- Check the condition of the male fitting on the end of the vapour hose. If the fitting shows signs of significant damage, then the hose must be replaced.
- Pressure test the joints between the vapour hose and the ball valve, the ball valve and valve body and the valve body and burner valve block.
- Check the valve function. Ensure that the valve correctly enables and disables the flow of fuel to the pilot light and that the pilot light response is immediate.

Section 7

7.0 Troubleshooting

Symptom	Possible Cause	Corrective Action
Pilot light fails to ignite.	Cylinder valve closed.	Open cylinder valve
	Ball valve closed.	Open ball valve.
	Hose not correctly connected to cylinder vapour regulator connector.	Make sure hose fully connected.
	Vapour regulator on cylinder setting too low.	Adjust vapour regulator setting.
	Fuel outlet hole in valve body blocked.	Clean fuel outlet hole
	Pilot light jet blocked.	Clean pilot light jet (see Maintenance Manual).
	Piezo igniter failure.	Adjust tag or replace the

		igniter (see Maintenance Manual).
Pilot light fails to extinguish.	Ball valve not fully closed.	Fully close ball valve.
	Failure of seal between valve body and burner valve block.	Replace seal. Check for contamination between seal and valve block bore.

APPENDIX I

Vapour Pilot Valve

Annual / 100 Hour Burner Inspection Checklist

Requirement	Reference	Okay	Comments
Vapour Hose Condition	6.2		
Hose End Fitting Condition	6.2		
Pressure Test	6.2		
Valve Function	6.2		

MK-21 BURNER, REGULATOR FUEL FILTERING ("Supplement 15")

Supplement 15 - IMPROVED REGULATOR AND PILOT LIGHT FUEL FILTERING ON THE MK 21 BURNERS

Section 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the range of Ultramagic MK 21 burners when fitted with the improved Regulator Valve and Pilot Light fuel filters.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The burner when fitted with the improved filtering uses many common components to the standard MK21 burner already detailed in the Maintenance Manual. Only those areas, which are different to those already detailed in the Maintenance Manual, are described in this supplement. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to the Ultramagic range of MK 21burners, when fitted with the improved filtering, as defined by the following drawing numbers:

Single burners are not allowed for combining with KB envelopes

Double Burner:	2022/0000
Triple Burner:	2023/0000
Quad Burner:	2024/0000
Solo Burner:	2025/0000
Duo Burner:	2026/0000

Solo/Duo burners are not allowed for combining with KB envelopes

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

S15 - MK21 IMPROVED FUEL FILTERING

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual.

1.5 Maintenance Records

See Maintenance Manual.

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

The following safety instructions are additional to those already contained in the Maintenance Manual:

- Before initiating any maintenance work on the burner, ensure that the burner is fully vented of fuel and that it is disconnected from any fuel supply.

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the MK21 burner when fitted with the improved regulator and pilot light filters, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Additional inspection requirements for the improved filtering are defined in Section 6 of this Supplement.

Section 3

3.0 Technical Description

The improved filtering consists of two filters. The first filter is a sintered bronze construction and is fitted directly in front of the fuel inlet to the Pilot Regulator Valve. The new filter replaces the mesh filter previously used in the same location. The second filter takes the form of two mesh disks fitted in the bulkhead coupling used to secure the Pilot Light Assembly to the burner valve block.

The pilot light filter is now fitted as standard and was introduced on burner serial number 738. The regulator valve filter is now fitted as standard and was introduced on burner serial 766.

The use of the improved filtering is recommended for all burners especially in locations where the fuel quality is known to be poor. To retrofit the filters, refer to Ultramagic Technical Instruction 007.

The regulator and pilot light filters may be seen in Figures 1 and 2 respectively.

Figure 1
Regulator Valve Filter

Figure 2
Pilot Light Filter

Section 4

4.0 Preventative Maintenance

4.1 General

All preventative maintenance is as described for the MK 21 Burner in the Maintenance Manual with the following additions:

4.1.1 Weak Pilot Light Flame

Check the strength of the pilot light flame. A weak or short flame is indicative of one, or a combination of the following problems:

- A partial blockage of the pilot light jet.
- A partial blockage of the fuel outlet hole in the regulator valve body.
- A failure of the regulator piston to move forward under the force of the piston spring.
- A blocked regulator filter.
- A blocked pilot light filter.

In the case of the blocked pilot light jet, the jet will need to be removed and cleaned or replaced. Refer to the Ultramagic Maintenance Manual for instructions.

In the case of the partial blockage of the fuel outlet hole in the regulator valve body and the failure of the regulator piston to move forward under the force of the piston spring, the regulator will need to be removed and stripped down. Refer to the Ultramagic Maintenance Manual for instructions.

If it is determined that the regulator or pilot light filters are blocked then they must be removed and cleaned or replaced. Refer to Section 5 for further instructions.

4.1.2 Large Pilot Light Flame

Check the strength of the Pilot Light flame. If the flame is seen to be very large, or occasionally flares to a large flame and then recovers, or if it is considered that the flame is "spitting", then the cause of the problem may be as a consequence of one or a combination of the following problems:

- Presence of contamination inside the regulator ball housing preventing the small viton ball from sealing correctly.
- Excessive friction preventing the regulator piston from smooth and free movement inside the regulator body.
- Presence of contamination preventing the large "O" seal between the regulator body and the valve block bore from creating a perfect seal.
- Presence of contamination between the regulator body fixing flange and the mating face of the valve block bore, preventing the regulator from seating correctly.
- Damage to the regulator bore fixing flange face preventing the regulator from seating correctly.
- Partial or temporary blockage of the pilot light jet.

In the first two cases, the regulator must be removed, stripped down and the problem resolved. For instructions relating to the removal and strip-down of the regulator, refer to the Ultramagic Maintenance Manual.

Check for any contamination inside the regulator ball housing. If any contamination is found it must be removed.

If excessive friction of the piston is noted, remove the piston and lubricate the piston seal and the inside of the regulator with a **THIN** smear of Molycote 111 silicon grease. If this fails to resolve the problem, contact Ultramagic for further instructions. Do not use excessive quantities of the grease as this can cause jet blockage.

In case three, refer to the Ultramagic Maintenance Manual and remove the regulator. Remove the "O" seal from inside the valve block and clean it carefully. Check for any signs of damage to the seal. Damaged seals must be replaced. Check the inside of the valve block regulator bore. Make sure that all areas of the bore are perfectly clean and free from any contamination such as small particles of swarf etc.

In case four, refer to the Ultramagic Maintenance Manual and remove the regulator. Check for any contamination on the reverse side of the regulator mounting flange which might prevent the regulator from seating fully on the valve block. Check the mating face of the valve block bore for any signs of contamination, which might prevent the regulator from seating fully.

In case five, refer to the Ultramagic Maintenance Manual and remove the regulator. Check the valve block regulator bore mounting face for any signs of damage such as burrs, particularly on the mounting flange edge, which might prevent the regulator from seating fully. If any significant damage is detected, contact Ultramagic for further instructions.

In case six, the pilot light jet must be removed and cleaned or replaced. Refer to the Ultramagic Maintenance Manual for instructions.

Section 5

5.0 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair, cleaning and replacement of the components used in the regulator and pilot light filters.

Maintenance other than that detailed in Section 4, (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 equipment functions.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

5.2 Regulator Valve Filter

The regulator valve filter is fitted inside the burner valve block regulator bore. To remove the filter, refer to Figure 3 and proceed as follows:

S15 - MK21 IMPROVED FUEL FILTERING

ITEM	DESCRIPTION	DRG / PART NUMBER
1	REGULATOR FILTER	2022-0321
2	12 ID x 1.5 THICK HIGH NITRIL "O" SEAL	MA-FE-0625
3	8 ID x 2 THICK HIGH NITRILE "O" SEAL	MA-FE-0607
4	21 ID x 3 THICK HIGH NITRILE "O" SEAL	MA-FE-0622
5	REGULATOR ASSEMBLY	2022-0800
6	M4 X 8 ST STL HEX DRIVE, CAP HEAD SCREW	MA-FE-0505

Figure 3
Regulator Filter

- Before commencing work, ensure that the burner is completely vented of fuel and that it is not connected to any fuel supply.
- Refer to the Ultramagic Maintenance Manual and remove the Regulator Assembly (Item 5) from the burner valve block.
- Withdraw the Regulator Filter (Item 1) from inside the bore using a suitable sharp pointed tool as shown in Figure 4 below.

Figure 4
Regulator Filter Removal

- Remove the "O" seal (Item 2) from the filter and check the seal condition. Damaged seals must be replaced.
- Check the filter for signs of blockage and clean if necessary in a suitable solvent. If the filter is considered to be significantly blocked and cannot be cleaned, then it must be replaced with a new filter.
- Replacement is generally the reverse procedure to removal. Do not apply any grease to the filter seal, filter or inside the regulator filter bore, before re-fitting the seal to the filter and the filter assembly to the valve block. If lubrication is required to assist the replacement of the filter assembly inside the valve block, apply a little saliva to the seal.
- Before replacing the regulator assembly, check that the large seal fitted inside the valve block bore is clean and in good condition. Check also that there is no dirt in the bore, which might come in contact with the seal. Clean the bore if necessary.
- Replace the regulator assembly and pressure test as detailed in the Ultramagic Maintenance Manual.

5.3 Pilot Light Filter Removal

To remove the Pilot Light Filter, refer to Figure 5 and proceed as follows:

ITEM	DESCRIPTION	DRG / PART NUMBER
1	PILOT LIGHT ASSEMBLY	2022-0700
2	MESH FILTER	2022-0718
3	FILTER RETAINING NUT	2022-0717
4	3/8" BSP BONDED SEAL	REFERENCE ONLY

Figure 5
Pilot Light Filter Removal

- Remove the Pilot Light Assembly (Item 1) from the burner as specified in the Ultramagic Maintenance Manual.
- Using a pair of circlip pliers or similar, undo and remove the filter Retaining Nut (Item 3) from the pilot light bulkhead coupling.
- Carefully withdraw the mesh filters from inside the bulkhead coupling.
- Check the condition of the filters and clean if necessary using a suitable solvent. If the filters are considered to be heavily contaminated and cannot be cleaned, they must be replaced.
- Replacement is generally the reverse procedure to removal. Prior to replacing the filter Retaining Nut, apply a small quantity of Loctite 222 to the retaining nut threads.
- Pressure test as specified in the Ultramagic Maintenance Manual.
- Check the Igniter function as specified in the Ultramagic Maintenance Manual.
- Check the Pilot Light function as specified in the Ultramagic Maintenance Manual.

Section 6

S15 - MK21 IMPROVED FUEL FILTERING

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.2 Inspection Requirements

Carry out all functional tests as specified in the Maintenance Manual. In addition, check the following:

- Check the condition of the regulator and pilot light filters. Clean or replace as necessary.

Section 7

7.0 Troubleshooting

Symptom	Possible Cause	Corrective Action
Pilot light fails to ignite or weak flame.	Cylinder valve closed.	Open cylinder valve
	Regulator valve closed.	Open regulator valve.
	Regulator filter blocked.	Clean or replace filter.
	Regulator fuel outlet blocked.	Clean regulator fuel outlet.
	Regulator piston friction too great.	Refer to section 4.1.1
	Pilot light jet blocked.	Clean pilot light jet (see Maintenance Manual).
	Pilot light filter blocked.	Clean or replace filters.
Pilot light flame too large.	Contamination inside regulator ball housing.	Refer to section 4.1.2.
	Regulator piston friction too great.	Refer to section 4.1.2.
	Contamination of main "O" seal at front of regulator.	Refer to section 4.1.2.
	Contamination between regulator and regulator fixing face.	Refer to section 4.1.2.
	Damage to regulator mounting face.	Refer to section 4.1.2.
	Partial or temporary blockage of pilot light jet.	Clean or replace jet.
Pilot light fails to extinguish.	Failure of seal between valve body and burner valve block.	Replace seal. Check for contamination between seal and valve block bore.
	Contamination inside regulator ball housing.	Clean inside ball housing.

APPENDIX I

Vapour Pilot Valve

Annual / 100 Hour Burner Inspection Checklist

Requirement	Reference	Okay	Comments
Regulator and pilot light filter check.	6.2		

BMK-008 POWERPLUS MINI SPORT DOUBLE BURNER ("Supplement 12")

Supplement 12 - POWERPLUS SPORT DOUBLE BURNER BMK-008

SECTION 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the Ultramagic Powerplus (BMK-008) Double burner. Sections 1 to 5 detail the maintenance procedures and the parts used in the burner construction. Section 6 details the annual / 100 hour inspection and test requirements.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to all Ultramagic Powerplus BMK-008 Double burners as defined by drawing 2032-0000.

1.2 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.

Always quote the spare parts reference codes shown in our Parts Catalogue (Issue 5 and on, available on Ultramagic website) to place an order.

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

1.3 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.

1.4 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 welder approved to the appropriate standard by the national airworthiness authority in the country of registration.

1.5 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.

1.6 Technical Support

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

1.7 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.

SECTION 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This manual provides the maintenance information required by EASA CS-31HB .82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

There are no components in the Powerplus BMK-008 Double burner, which must be replaced after a fixed length of time.

2.3 Inspection Interval

The maximum inspection interval for the burner is 100 hours operation or one year; whichever is the sooner. The requirements for this inspection are defined in section 6.

SECTION 3

3.0 Technical Description

3.1 General

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

Fuel is supplied to the burner through the flexible hoses. The fuel enters a machined valve block whereupon the fuel is distributed to the various valves and pressure gauge in readiness for use. The burner is provided with completely independent left and right fuel circuits and thus provides duality of all major functions.

The burner is provided with the following major features:

- Burner gimbal mounting
- Burner cans
- Left and Right Vaporising coils
- 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
- Left and right Safety Buttons

The burner is provided with a two-stage main valve action. Operation of the main valve to the intermediate position activates the main burner. Further operation of the main valve to the fully open position activates both the main and liquid burners enabling approximately double power output through single hand operation.

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

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

ITEM	DESCRIPTION	ASSEMBLY
1	ULTRAMAGIC BURNER FRAME	REF ONLY
2	BURNER GIMBAL MOUNTING	SEE SECTION 3.2
3	BURNER CAN	SEE SECTION 3.3
4	VAPORISATION COIL	SEE SECTION 3.4
5	COIL CONNECTION COLUMN AND BLAST VALVE SLEEVES	SEE SECTION 3.5
6	FUEL HOSES	SEE SECTION 3.6
7	MAIN VALVE ASSEMBLY	SEE SECTION 3.7
8	LIQUID VALVE ASSEMBLY	SEE SECTION 3.8
9	PILOT REGULATOR ASSEMBLY	SEE SECTION 3.9
10	IGNITER ASSEMBLY	SEE SECTION 3.10
11	PRESSURE GAUGE ASSEMBLY	SEE SECTION 3.11
12	LIQUID FIRE JET ASSEMBLY	SEE SECTION 3.12
13	PILOT LIGHT ASSEMBLY	SEE SECTION 3.13
14	PILOT LIGHT FUEL FILTER	SEE SECTION 3.14
15	SAFETY BUTTON	SEE SECTION 3.15

Figure 1

3.2 Burner Gimbal Block Assembly

The burner is provided with a centre gimbal block assembly allowing two-axis movement of the burner. With the exception of the burner gimbal mounting, the gimbal block assembly is standard to the MK21 range of burners and maintenance instructions are provided in a separate maintenance supplement.

The burner gimbal block assembly and mounting configuration may be seen in Figure 1.

3.3 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 via a series of mesh panels using screw fixings. The can provides the mechanical

support for the vaporisation coil and attachment to the gimbal mounting arrangement. The can may be seen in Figure 1.

3.4 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve using a machined coil column and "O" seals fitted to the inlet tube of the coil. The function of the coil is to preheat the fuel before leaving the jet ring in readiness for combustion. The coil is a two start, welded assembly and is constructed from stainless steel tube, a special Coander jet ring with fixed jets and coil supports.

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

The vaporisation coil configuration may be seen in Figure 1.

3.5 Coil Connection Column

The interface to the vaporisation coil is through a machined column screwed in to the upper surface of the valve block and sealed with an "O" seal on the mating face. The column is provided with a precision-machined bore to accept the two "O" seals fitted to the coil inlet tube.

Note that the column is used to create the seal to the main valve and removal of the column will therefore break the pressure integrity of the burner. It is very important therefore to ensure that the burner is completely vented of fuel prior to removal of these components.

The coil connection column and the blast valve sleeve configuration may be seen in Figure 3.

3.6 Fuel Hoses

The fuel hoses link the burner to the fuel cylinders. They are terminated with a choice of REGO®, TEMA® or Fastflat 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.

3.7 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 a plunger type and uses a special sprung loaded rubber seal, bearing against a machined seat in the valve block to create the seal. When the valve handle is operated, the seal lifts off the seat in the valve block and allows the flow of fuel.

The valve stem is housed in a machined brass valve bonnet. A pressure tight seal is achieved between the stem and bonnet with the use of two "O" seals and a primary sprung loaded seal. The bonnet is sealed to the valve block using an "O" seal fitted in a machined groove in the bonnet mating face.

The main valve handle is provided with a special two-stage action. A mechanism links the main valve handle to the liquid valve. When the handle is moved to the first intermediate position, the main valve is opened. Movement of the handle to the second fully open position causes the liquid valve to open simultaneously enabling approximately double burner power from single hand operation.

The main valve configuration may be seen in Figure 10.

3.8 Liquid Valve Assembly

The function of the liquid valve is similar to the main valve described above and the method of sealing is identical. Note however that the liquid valve is only a single action and operation of the liquid valve handle activates the liquid fire function only.

Due to the dual action of the main valve and the associated link mechanism required to enable double action, the design of the liquid valve stem is different to that of the main valve. The stem is longer and has an additional hole to allow connection of the link mechanism. An additional spring loaded thrust assembly is provided underneath the valve handle. The handle is a squeeze action.

The liquid valve configuration may be seen in Figure 10.

3.9 Pilot Regulator Assembly

The pilot regulator may be considered as two sub-assemblies consisting of the regulator itself and the on/off valve mechanism.

The regulator sub-assembly consists of a lower body which screws in to the valve block, a sprung loaded piston and an upper body fitted with a small jet.

The regulator sub-assembly is screwed in to the upper surface of the valve block. An "O" seal fitted in a machined groove on the underside of the lower body forms the seal between the regulator and the valve block. The lower body is provided with a seal seat and this forms the seal to the on/off valve sub-assembly.

When the valve handle is operated, fuel enters the lower body through a small hole. Fuel passes through a small hole in the piston and exits in to the chamber between the piston and the upper body. The sudden increase in volume causes the fuel to vaporise. The fuel pressure in the chamber forces the piston down thus closing off the fuel inlet. Vaporised fuel in the upper chamber is vented off through the jet to the pilot light assembly. As the pressure in the chamber falls, the spring forces the piston to move forward and the cycle is repeated.

The piston is fitted with a small lower seal, which closes off the flow of fuel. A larger "O" seal is fitted inside the upper body and forms the seal between the piston and the body.

The on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat, similar (but not identical) to the main and liquid valves. The stem is sealed to the bonnet using two "O" seals. An "O" seal fitted in a machined groove in the bonnet mating face seals the bonnet to the valve block. Rotation of the knob causes the stem to move backward thus breaking the seal to the regulator lower body.

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

Note that the regulator lower body is used to create the seal to the regulator on/off valve. Removal of the regulator lower body will break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to removal.

The regulator configuration may be seen in Figure 12.

3.10 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 piezo igniter and an electrode permanently mounted in temperature resistant ceramic. The electrode and piezo igniter are electrically connected by a compression spring. When assembled, the piezo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

Upon operation of the piezo 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.

The igniter assembly configuration may be seen in Figure 5.

3.11 Pressure Gauge Assembly

The pressure gauge is mounted inside a machined bore in the valve block. Access to the gauge is from the upper surface of the valve block.

A pressure tight seal is achieved with the use of PTFE tape and a taper thread on the gauge rear. The gauge is screwed in to a special retaining block fitted to the upper surface of the valve block. The retaining block is secured to the valve block by a single screw fixing. The retaining block also functions as a fuel link to the pressure gauge and the interface to the valve block is therefore sealed using an "O" seal. 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 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.

The pressure gauge configuration may be seen in Figure 8.

3.12 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. The body is sealed to the valve block using an "O" seal fitted in a machined groove on the underside of the jet body.

Note that the jet body is used to make the seal to the liquid valve jet and removal of the jet will therefore break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to carrying out any work on the liquid fire jet.

The liquid fire jet configuration may be seen in Figure 3.

3.13 Pilot Light Assembly

The pilot light assembly is mounted directly above the regulator assembly. It is supplied with a small flow of vapour fuel from the pilot regulator assembly. The assembly consists of a stainless steel filter tube secured to the regulator upper body by a grub screw. The filter tube contains the air inlet to the pilot light and a series of mesh disks secured using split rings near the outlet. A second tube is secured to the filter tube using a small screw. This tube is provided with a series of holes to allow the flame to exit.

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".

The pilot light assembly configuration may be seen in Figure 6.

3.14 Pilot Light Fuel Filter

Fuel to the pilot light regulator is supplied by a dedicated tapping in the valve block. Prior to entering the pilot regulator, the fuel passes through a small filter. The filter is fitted in a special housing allowing it to be removed easily for maintenance. The housing is screwed in to the upper surface of the valve block and is sealed using a small "O" seal fitted in a groove in the housing mating face.

Fuel enters the housing through the filter mounted in the bottom and exits through a small hole near the top of the housing.

The pilot light fuel filter configuration may be seen in Figure 7.

3.15 Safety Button

Each of the main valve mechanisms may be locked in the ON position by operating the safety button fitted on the side of the external valve body. When the main valve handle is held in the open position and the button is simultaneously depressed and held, the main valve will be locked in the open position upon release. The button is spring-loaded and is released by further operation of the main valve handle.

The safety button configuration may be seen in Figure 13.

SECTION 4

4.0 Preventative Maintenance

4.1 General

The burner should be subjected to periodic preventative maintenance checks and preventative maintenance measures implemented if necessary. It is recommended that the period between inspections is once every three months or 25 hours operation, whichever is the sooner. The checks must incorporate the areas detailed below.

4.2 Burner Can Fixings

The four fixings used to secure the valve block to the burner can are very important. Removal of the fixings will allow the valve block to separate completely from the burner. Check therefore, that the four fixings located on the underside of the valve block are secure. If any of the screws are loose, completely remove the screw and apply a small amount of Loctite 243 to the thread. Re-assemble the screw and tighten.

4.3 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, contact Ultramagic for further advice.

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.

4.4 Vaporisation Coil

4.4.1 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 5.3.

4.4.2 Coil Fixings

Check the fixings securing the coil to the can. Loose fixings must be tightened as described in Section 5.3

4.4.3 Coil Tubing

Check the tube used in the construction of the coil for damage including signs of cracking, serious indentation and deterioration of welded joints.

Serious indentation cannot be repaired and the coil must be replaced as described in Section 5.3.

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 5.3.

4.4.4 Coil Support Rivets

Check the condition of the rivets used to fix the two halves of the coil supports together. In particular, check the condition of the rivets on the inside of the coil. All rivets must be in good condition and show no signs of damage due to over-heating.

If damage to any of the rivets is detected, contact Ultramagic for further advice.

4.5 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. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in Section 5.7.

4.6 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 5.6. If this fails to improve the spark, it is possible that there is poor electrical continuity between the igniter and the pilot light. Check that the grub screw used to secure the igniter assembly and fitted in the side of the valve block, is tight (take care not to damage the aluminium thread in the valve block). Check that the pilot light assembly is secure. If it appears to be loose, make sure all fixings are tight.

If the above actions fail to improve the spark, the igniter will need to removed and disassembled to determine the cause of the problem (see Section 5.6).

4.7 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 5.13.

Fuel hoses must be obtained from Ultramagic. For safety reasons, fuel hoses are supplied assembled with the connector and pressure tested.

4.8 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. If a fuel cylinder is used, measure the cylinder pressure first using a calibrated pressure gauge (contact Ultramagic for further details). Visually inspect the position of the gauge pointer and check that it is correctly indicating the pressure. 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 indicate that the gauge is faulty, the gauge must be replaced in accordance with the instructions in section 5.10.

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.

4.9 Burner Mounting

Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight. Tighten if necessary.

SECTION 5

5.0 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies, sub-assemblies and components used within the burner. Maintenance other than that detailed in the Section 4, (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 leak detector fluid. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

Prior to carrying out any maintenance work, ensure that the burner is completely vented of fuel and disconnected from the fuel supply. Remember to check that both left and right fuel circuits are vented.

5.2 Burner Gimbal Mounting

5.2.1 Gimbal Block

The gimbal assembly is identical to that used on the MK21 burners. For maintenance instructions, refer to Ultramagic Maintenance Manual Supplement Number 8.

5.2.2 Burner Gimbal Mounting

To remove the double burner gimbal mounting, refer to Figure 2 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	POWERPLUS DOUBLE MOUNTING BRACKET ASSY	CR-PPD-0135
2	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
3	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
4	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111
5	ULTRAMAGIC GIMBAL BLOCK	2022 / 2500

Figure 2

- Refer to Ultramagic Maintenance Supplement No 8 and remove the burner from the burner frame.
- Ensure both burners are supported and then remove the gimbal block assembly.
- If coil removal is required, use a 4mm Allen key and an 8mm open-ended spanner to undo and remove the eight screws and nuts (items 2, 3 and 4 respectively). Thus the coil will rest free.
- Re-assembly is generally the reverse procedure to disassembly. If necessary, apply Molycote graphite grease to the bearing surfaces of the gimbal block and the mounting bracket. Refer to Ultramagic Maintenance Supplement No 8 for instructions covering the gimbal block assembly process.

5.3 Coil Removal

5.3.1 Removal of Coil from Burner

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 areas detailed below. To remove the vaporisation coil, refer to Figure 3 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	COIL AND COANDA JET RING	CR-PPD-0115
2	POWERPLUS DOUBLE CAN	CR-PPD-0016
3	BURNER CAN PROTECTION NET	CR-PPD-0134
4	POWERPLUS DOUBLE VALVE BLOCK RH	CR-PPD-D031
5	POWERPLUS DOUBLE GIMBAL MOUNTING BRACKET ASSY	CR-PPD-0135
6	M4x12 ST STL PHILLIPS PAN HEAD DIN 7985 SCREW	CR-PP-0041
7	LOWER MULTIHOLE JET RING	CR-PPD-0124
8	M5x30 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0016
9	JET RING BIMETAL STRIP	CR-PPD-0127
10	CENTRE COLUMN FITTING	D116/2
11	NB 3037 NBR 70 SHORE O-R SEAL	CR-PP-0327
12	BLAST VALVE SLEEVE	CR-PPD-0074
13	LIQUID CONNECTION JET	CR-PPD-0075
14	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
15	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
16	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
17	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111
18	LIQUID JET PLATE	D089
19	INNER JET RING	D123/2

Figure 3

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key and a 8mm open-ended spanner, undo and remove the seven fixings securing the coil support legs to the can.
- Carefully withdraw the coil from the burner.

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- Check the condition of the two "O" seals (item 11) fitted near the bottom of the coil inlet tube. The seals must be replaced if they show signs of deterioration such as damage due to over-heating, splits etc.
- Remove the "O" seals using a suitable soft tool to lift the seals out of the grooves. Take care not to damage the surface finish of the grooves. Check the condition of the surface inside the grooves where the "O" seals are fitted for any signs of deterioration. This is best achieved using a suitable magnifying glass. If significant damage to the surface is noted, contact Ultramagic for advice and to determine the most appropriate repair action.
- Replacement of the coil is generally the reverse procedure of removal. Prior to re-assembly, apply a thin smear of Krytox 125 grease to the "O" seals.
- Upon completion of re-assembly, connect the burner to a suitable compressed air supply not exceeding 6.8bar (100psi) pressure. Apply leak detector fluid to the joint between the coil and coil post. Open the main valve and check for signs of leakage. If any leaks are detected, the problem must be resolved before the burner is returned to service.

5.3.2 Disassembly of Jet Ring

The coil is fitted with a special Coander jet ring. The Coander effect is the propensity of a moving fluid to follow the profile of an adjacent boundary and this effect has been used in the design of the jet ring. Consequently the jet ring design is slightly more complex than more traditional designs.

The jet ring is fitted with special stainless steel bi-metal strips, which open and close and thus provide a degree of control of fuel flow rate as the temperature of the fuel in the jet ring varies.

To disassemble the jet ring, refer to Figure 3 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Remove the coil from the burner as described in Section 5.3.1 above.
- Inspection of the jet ring may reveal an accumulation of oily deposits on the outer surface. These deposits are not detrimental to burner performance provided that the deposit does not cause jet blockage.
- To prevent unnecessary work at this stage, check the condition of the jets for blockages etc. This may be done visually and by inserting a suitable piece of stiff wire in to each jet hole. Only proceed with further dismantling if it is considered that the jets require thorough cleaning or if the bi-metal strips require inspection or maintenance.
- The jet ring may be further disassembled if considered necessary. Using a 4mm Allen key, undo and remove the six cap head screws (item 8) from the under side of the jet ring.
- Withdraw the lower jet ring (item 7) from the upper jet ring (item 19).
- Check the condition of the internal jet ring faces. Carefully clean away any oil deposits or other contaminants.
- Check the condition of the bi-metal strips (item 9). These are secured to the underside of the upper jet ring. When the coil is cold, the strips should be in the "closed" position i.e. covering the inlet to the jet hole. Only remove the strips if it is considered necessary.
- Prior to removing the bi-metal strips, use a soft marker pen to mark the position of the strip to indicate which jet holes are covered by the strip.
- To remove the bi-metal strips, use a crosshead Philips screwdriver and remove the screw securing the strip to the upper jet ring.
- Replacement is generally the reverse procedure to removal. Ensure that the bi-metal strips are positioned correctly. Note that the seal between the upper and lower jet rings is formed by the conical fit of the two components. It is very important therefore to ensure that the lower ring is fitted square to the upper ring and that the six fixings are tightened correctly. Fit all six fixings finger-tight. Select any fixing and tighten a quarter turn. Select the diagonally opposite fixing and tighten a quarter turn. Continue to tighten all fixings, always as diagonally opposite pairs, a quarter turn each time, until all fixings are tight. ***Use just an Allen screwdriver to tighten the screws. Over-tightening may result in permanent deformation of the multihole jet ring.***
- Prior to re-assembling the coil to the burner, check the seal between the upper and lower jet rings by connecting the coil inlet to a suitable compressed air supply of maximum

pressure 6.8bar (100psi) and using leak detection fluid around the joint. If leaks are detected, the problem must be resolved before the burner is returned to service.

5.3.3 Tightening of Coil Mounting Screws

To tighten the coil mounting screws, refer to Figure 3 and proceed as follows:

Using a 4mm Allen key and an 8mm open-ended spanner, tighten the eight-coil mounting screws and nuts (items 15, 16 and 17) if necessary.

5.4 Burner Can Removal

The burner can is a welded stainless steel assembly. 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 1.4).

If it is considered that the can must be removed for repair, refer to Figure 4 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
2	BURNER CAN PROTECTION NET	CR-PPD-0134
3	M5 ST STL DIN 127 LOCK WASHER	MA-FE-0072

Figure 4

- Ensure that the burner is completely vented of fuel.
- Remove the burner from the gimbal mounting as described in section 5.2.
- Remove the coil as described in section 5.3.
- Prior to removing the can, mark the relative positions of the can and valve block using a soft felt tip pen at any convenient position on the internal faces where it will not be seen in normal operation.
- Using a 4mm Allen key, undo and remove the four fixings (item 1) located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- The can is now free to be removed. Withdraw the can from the valve block. Withdrawing the can will allow the four mesh panels fitted between the can and the block to be removed.
- Replacement is generally the reverse procedure of removal. Align the markers to ensure that the can is assembled to the block in the correct orientation. Replace the three mesh panels by fitting the lower edge in the groove in the upper side of the valve block and trapping the upper edge behind the retaining strips fitted on the inside of the can. Prior to replacing the three fixings located in the valve block underside, apply a small amount of Loctite 243 to each screw thread. Ensure the three fixings are fully secure.
- Pressure test as described in Section 5.3.

5.5 Mesh Panel Removal

Some damage to the mesh panels such as indentation is acceptable and will not cause deterioration in burner performance. However, if the panels have been damaged in such a way that they may cause cuts or other injury to personnel, they must be replaced.

To remove the mesh panels, refer to Section 5.4.

5.6 Piezo Igniter Assembly Removal

To remove the Piezo Igniter Assembly, refer to Figure 5 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PIEZO IGNITER UNIT	CR-PPD-0061
2	PIEZO IGNITER SUPPORT TUBE	CR-PPD-0057
3	PIEZO IGNITER INSULATOR	CR-PPD-0060
4	PIEZO IGNITER SPRING	CR-PPD-0059

5	PIEZO IGNITER CERAMIC ELECTRODE	CR-PPD-0058
6	NB 2050 NBR 70 SHORE O-R SEAL	CR-PP-0324
7	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
8	M6x8 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-PP-0022

Figure 5

- Ensure that the burner is completely vented of fuel.
- Using a 3mm Allen key, loosen but do not remove the grub screw (item 8).
- Withdraw the igniter assembly from the underside of the valve block.
- Unscrew and remove the piezo igniter (item 1) from the body (item 2). Carefully withdraw the igniter.
- Check the condition of the "O" seal (item 6) fitted on the exterior surface of the igniter body and underneath the piezo flange. Replace the seal if damaged. Note that the seal is fitted to prevent water formed inside the burner from dripping down past the igniter assembly and a damaged seal will not cause deterioration in burner performance.
- Withdraw the insulator, spring and electrode (items 3,4 and 5 respectively) from the body. Check the condition of each of the components. If the electrode ceramic is cracked, it must be replaced.
- Replacement is generally the reverse procedure of removal. Prior to fitting the "O" seal, apply a thin smear of Krytox 125 grease to the seal. Take care not to over-tighten the grub screw (item 8) as this might cause damage to the aluminium thread in the valve block.
- Having re-fitted the igniter, operate the igniter and check for a good spark between the electrode tip and the tag on the pilot light assembly. Adjust the gap if necessary to improve the spark strength. The spark should be "strong" and blue in colour.

5.7 Pilot Light Assembly Removal and Disassembly

The following instructions assume that the burner is already removed from the burner frame but otherwise fully assembled. To remove the pilot light assembly, refer to Figure 6 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER

1	PILOT LIGHT REGULATOR LOWER BODY	CR-PPD-0043
2	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
3	PILOT LIGHT REGULATOR UPPER BODY	CR-PPD-0039
4	PILOT LIGHT REGULATOR PISTON	CR-PPD-0040
5	PILOT LIGHT REGULATOR SPRING	CR-PPD-0091
6	FPM 2015 VITON 75 SHORE O-R SEAL	CR-PP-0311
7	FPM 2081 VITON 75 SHORE O-R SEAL	CR-PP-0312
8	FUEL FILTER	CR-PPD-0038
9	PILOT LIGHT FLAME JET	CR-PPD-0037
10	PILOT LIGHT FLAME LOWER TUBE	CR-PPD-0035
11	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
12	PILOT LIGHT FLAME TUBE GAUZE	CR-PPD-0036
13	M4x5 ST STL FLAT DRIVE DIN 84 SCREW	CR-PP-0031
14	PILOT LIGHT FLAME UPPER TUBE RH	CR-PPD-D032
15	M4 ST STL DIN 125 FLAT WASHER	CR-PP-0201
16	PILOT LIGHT REGULATOR STEM PISTON SEAL	CR-PPD-0041

Figure 6

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the four fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Carefully separate the can and coil, as one assembly, from the valve block.
- Using a 3mm Allen key, undo and remove the screw (item 11) securing the complete assembly to the regulator body.
- Carefully withdraw the pilot light assembly from the regulator.
- To further strip down the pilot light assembly, use a flat blade screwdriver and remove the screw and washer (item 13, 15) securing the upper tube to the lower tube. Carefully separate the upper and lower tubes taking care not to damage the mesh filter (item 12) fitted between the two components.
- Check the condition of the mesh filter. Remove any large contaminants using a blast of air. Oily deposits may be removed by soaking the filter in a suitable solvent.
- Re-assembly is generally the reverse procedure of disassembly. When fitting the filter (item 12), make sure that the small hole in the filter is aligned with the hole in the lower tube. Make sure the filter is flat against the tube and free from wrinkles. Take care to prevent the filter "snagging" between the upper and lower tubes during re-assembly.
- Position the assembly on the regulator so that the igniter electrode aligns with the tag on the side of the upper tube. Adjust the position of the upper tube to obtain the best spark between the electrode and the tag.

5.8 Regulator Removal and Disassembly

To remove the pilot regulator assemblies refer to Figure 6 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Remove the pilot light assembly as described in Section 5.7.
- Remove the igniter assembly as described in Section 5.6.
- Hold the valve block securely, preferably in soft vice jaws.
- Using a 30mm AF open-ended spanner, undo and remove the lower body (item 1) from the valve block. Take care to protect the "O" seal (item2) mounted on the underside of the body.
- Check inside the regulator-mounting hole in the valve block for any dirt. Clean if necessary.
- Carefully place the lower body hexagon in soft vice jaws. Using a 30mm open-ended spanner, undo and remove the upper body (item 3). Take care when removing the upper body, as this will expose the piston, spring and "O" seal.
- Remove the piston, spring and "O" seal (items 4, 5 and 7 respectively).
- Using a suitable soft-ended instrument, remove the "O" seal (item 6) from the piston stem. Take care not to scratch the piston surfaces.

- Remove the "O" seal (item 2) from the underside of the lower body.
- Check the condition of the three "O" seals and replace if necessary.
- Check the condition of the seal fitted in the end of the piston stem. If the seal is damaged or has deteriorated, then the entire piston must be replaced, as the seal cannot be removed independently.
- Using a 6.5mm open-ended spanner, undo and remove the jet (item 9). Remove the filter (item 8).
- Check that the small hole in the jet is clear. Remove any contaminants from inside the jet if necessary.
- Check that the filter is clean. If the filter is considered to be dirty, it must be replaced. Do not attempt to clean the filter as this may result in permanent damage.
- Check the condition of all the surfaces on the regulator bodies and piston where the seals are in contact. If significant scratches are noted, the part must be replaced. As a guide, scratches, which may be felt with a fingernail, are significant.
- Check the condition of the valve block surface where the "O" seal (item 2) makes contact. If the surface is damaged, contact Ultramagic for further instructions.
- Check that the seal sits inside the groove correctly. Poorly fitting seals must be replaced.
- Check the inside of the regulator bodies for the build up of oil. Oily deposits must be removed using a soft cloth and a gentle solvent if necessary. Make sure that the seals are not exposed to the solvent. Ensure that all traces of the solvent are removed before re-assembly.
- Replacement is generally the reverse procedure of removal. Prior to replacing the "O" seals, apply a thin smear of Krytox 125 grease to the seals and to the mating surfaces. Apply a thin smear of the same grease to the seal fitted in the end of the piston stem. Remember to fit the filter before fitting the jet. To aid assembly, fit the lower body and seal to the valve block before assembling the piston and upper body.
- Upon replacement of the regulator assembly, connect the block to a compressed air supply not exceeding 6.8bar (100 psi). Apply leak detector fluid to all the joints and open the pilot valve. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

Note that excessive accumulation of oil inside the regulator can cause the pilot light flame to deteriorate significantly. The rate at which oil accumulates depends greatly upon the quality of the fuel. Over time, if the oil is not removed, a sticky residue can accumulate preventing the piston from moving correctly and blocking the small filter. This may cause pilot light failure. It is important therefore to ensure that the regulator is kept clean.

5.9 Fuel Filter Removal and Disassembly

The filter may be removed in one of two ways. The first requires the use of a very long flat bladed screwdriver and accessing the filter from the top of the coil. However, depending upon the tools available and the conditions at the time it may be considered more practicable to disassemble the valve block from the can first. The following instructions assume the latter method is adopted.

To remove the fuel filter assembly, refer to Figure 7 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PILOT LIGHT INLET FILTER HOUSING	CR-PPD-0065
2	FUEL FILTER	CR-PPD-0038

3	NB 108 NBR 70 SHORE O-R SEAL	CR-PP-0321

Figure 7

- Ensure that the burner is completely vented of fuel prior to removal of the filter assembly.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Carefully separate the can and coil, as one assembly, from the valve block. It was received on
- Using a large flat bladed screwdriver, undo and remove the filter body (item 1) from the valve block. Make sure that the screwdriver is the correct size for the job as use of the incorrect size may cause damage to the slot in the screw head.
- Carefully extract the filter (item 2) from the body (item 1). Check the condition of the filter and replace if considered necessary.
- Check the condition of the "O" seal (item 3) fitted on the underside of the body head. Damaged seals must be replaced.
- Check the condition of the "O" seal groove in the underside of the body head. If significant scratches exist, the body must be replaced.
- Inspect the inside of the body to ensure that there are no blockages. Clean using a blast of air if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the "O" seal, apply a thin smear of Krytox 125 grease to the seal. Take care to ensure that excessive grease is not used and that the small hole adjacent to the seal does not become blocked with grease.
- Upon replacement of the filter assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.10 Pressure Gauge Removal

To remove the pressure gauges, refer to Figure 8 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PRESSURE GAUGE	CR-PPD-0062
2	PRESSURE GAUGE CONNECTION	CR-PPD-0063
3	NB 2010 NBR 70 SHORE O-R SEAL	CR-PP-0322
4	PRESSURE GAUGE BODY SEAL	CR-PPD-0064
5	M5x25 ST STL HEX DRIVE DIN 912 SCREW	FA-FE-0840

Figure 8

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer

supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.

- Using a 4mm Allen key, undo and remove the screw fixing (item 5) securing the pressure gauge connection (item 2) to the valve block.
- Carefully withdraw the pressure gauge connection and pressure gauge as a complete assembly from the valve block. Take care not to loose the small "O" seal (item 3).
- Unscrew the pressure gauge from the gauge connection. Clean off all traces of PTFE tape from the gauge thread
- Remove the small "O" seal (item 3) fitted in the groove between the gauge connection (item 2) and the aluminium block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove and the seal bore in the gauge connection. If there is any damage to the seal mating surfaces, the gauge connection must be replaced.
- Check the condition of the gauge body seal (item 4). The seal is designed to prevent the passage of water from inside the burner through the valve block. Minor deterioration of the seal is therefore not detrimental to burner performance or safety. However, it is recommended that the seal be replaced if damage or deterioration is found.
- Replacement is generally the reverse procedure of removal. Prior to fitting the seals, apply a thin smear of Krytox 125 grease to the seals. Prior to fitting the screw (item 5) apply a small quantity of Loctite 243 to the screw thread. Check for the correct orientation of the gauge inside the valve block.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.11 Liquid Jet Removal

To remove the liquid jets, refer to Figure 3 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the four fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Access to the liquid jets may be improved by first removing the pressure gauge (see section 5.10).
- Using a 27mm AF spanner, undo and remove the liquid jet (item 13).
- Remove the "O" seal (item 14) from the underside of the jet lower flange where it mates with the valve block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove. If there is any damage to the seal mating surfaces, the jet must be replaced.
- Check the condition of the valve block surface where the seal mates. The surface must be free from damage such as significant scratches. As a guide, scratches detectable with a fingernail are considered significant. If significant damage is detected, contact Ultramagic for further advice.
- Check inside the jet-mounting hole in the valve block for any dirt. Clean if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the seal, apply a thin smear of Krytox 125 grease to the seal.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.12 Main Valve Sleeve Removal

To remove the main valve sleeves, refer to Figure 3 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the four fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported

and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.

- Access to the main valve sleeves will be greatly improved by first removing the pressure gauge (section 5.10) and the liquid fire jet (section 5.11).
- Using a 27mm AF open-ended spanner, undo and remove the valve sleeve.
- Remove the "O" seal (item 14) from the underside of the sleeve lower flange where it mates with the valve block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove. If there is any damage to the seal mating surfaces, the sleeve must be replaced.
- Check the condition of the valve block surface where the seal mates. The surface must be free from damage such as significant scratches. As a guide, scratches detectable with a fingernail are considered significant. If significant damage is detected, contact Ultramagic for further advice.
- Check inside the sleeve-mounting hole in the valve block for any dirt. Clean if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the seal, apply a thin smear of Krytox 125 grease to the seal.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.13 Removal of Fuel Hose

To replace a fuel hose, refer to Figures 1 and 9 and proceed as follows:

Figure 9

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Using a 15mm open-ended spanner, undo the hose from the valve block.
- Remove all PTFE tape from the screw thread.
- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to Figure 10 and specify the length and end fitting required. Cover the thread with a minimum of three turns of PTFE tape. Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the valve block. Take care when re-fitting the hose to prevent damage to the thread in the aluminium valve block.
- Ensure that the hose to valve block 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 leak detection fluid 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.

5.14 Liquid Valve Handles

To remove the liquid valve handles, refer to Figure 10 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	BLAST VALVE HANDLE RH (ROUGH)	CR-PPD-D070
2	DOUBLE ACTION VALVE CAM	CR-PPD-0076
3	CAM / STEM CONNECTION	CR-PPD-0077
4	POWERPLUS DOUBLE LIQUID HANDLE BLUE	CR-PPD-B069
5	LIQUID VALVE STEM	CR-PPD-L078
6	BLAST VALVE STEM	CR-PPD-P078
7	BLAST / LIQUID VALVE ANTIFRICTION WASHER	CR-PPD-0080
8	LIQUID HANDLE COMPENSED ANTIFRICTION WASHER	CR-PPD-0083
9	LIQUID HANDLE SPRING	CR-PPD-0094
10	BLAST VALVE CENTRE BODY	CR-PPD-P079
11	LIQUID VALVE CENTRE BODY	CR-PPD-L079
12	APS MAA-000762-01-01-1 ENERGIZED SEAL	CR-PP-0301
13	VALVE PFTE SEAL RETAINING WASHER	CR-PPD-0088
14	BLAST / LIQUID VALVE SPRING	CR-PPD-0090
15	VALVE STEM SHUTTER	CR-PPD-0045
16	VALVE SHUTTER SEAL PAD	CR-PPD-0044

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17	LIQUID CONNECTION JET	CR-PPD-0075
18	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
19	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170
20	BLAST VALVE SLEEVE	CR-PPD-0074
21	POWERPLUS DOUBLE BAR END CAP	CR-PPD-0072
22	M5x30 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0016
23	M3x5 ST STL HEX DRIVE DIN 7991 SCREW	CR-PP-0001
24	CONNECTION STEM MOVEMENT PIN	CR-PPD-0081
25	VALVE EXTERNAL BODY RH	CR-PPD-D071
26	M5x50 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0017
27	NB 2018 NBR 70 SHORE O-R SEAL	CR-PP-0323

Figure 10

- Ensure that the burner is completely vented of fuel.
- Using a 2mm Allen key, undo the two small screws (item 23) located in the side of the handle body (item 4), and remove the locking pin (item 24). Remove the handle.
- Remove the handle washer (item 8) and the compression spring (item 9).
- Re-assembly is generally the reverse procedure to disassembly. In order to prevent the possibility of the valve freezing, all moving parts must be lubricated with plenty of Molycote graphite grease.
- Upon completion, check the function of the liquid valve. Make sure that the valve creates a seal when in the off position and allows the flow of fuel when activated.

5.15 Burner Handle Removal

5.15.1 Bar Handle Removal

To remove the bar handle, refer to Figure 11 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	DOUBLE BURNER BAR HANDLE CONNECTION	CR-PPD-0073
2	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170
3	POWERPLUS DOUBLE BURNER BAR END CAP	CR-PPD-0072
4	M5x30 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0016

Figure 11

- Using a 4mm Allen key, undo and remove the two cap head screws (item 2) (one at each end) securing the bar handle (item 1) to the handle end caps (item 3). Withdraw the bar handle.

- Replacement is generally the reverse procedure to removal. Prior to re-fitting the two screws, apply a small quantity of Loctite 243 to the screw threads.

5.15.2 Handle End Cap Removal

To remove the handle end cap, refer to Figure 11 and proceed as follows:

- Remove the bar handle as described in Section 5.15.1.
- Remove the liquid valve handle as described in section 5.14.
- Using a 4mm Allen key, undo and remove the screw (item 4) securing the end cap (item 3).
- Withdraw the end cap.
- Replacement is generally the reverse procedure to removal. Prior to re-fitting the screw (item 4) apply a small quantity of Loctite 243 to the screw threads.

5.16 Double Action Mechanism Removal

The main and liquid burner valves are linked via a special mechanism. Movement of the main burner valve handle to the first (intermediate) position will open the associated main valve. Further movement of the handle will cause the associated liquid valve to open simultaneously thus enabling approximately double burner power output through single hand activation. Thus the main and liquid valve activation mechanism may be thought of as common to both valves and the mechanism must be disassembled before either of the valves may be removed.

To remove the double action mechanism, refer to Figure 10 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as described in Section 5.15.1.
- Remove the liquid valve handle as described in Section 5.14.
- Remove the handle end cap as described in section 5.15.2.
- Remove the three pivot pins (item 24) securing the blast valve cam (item 2), the connection cam/stem (item 3), the blast valve stem (item 6) and the liquid valve stem (item 5).
- Do not disassemble the handle (item 1) from the cam (item 2) if it is not considered necessary. To disassemble the handle and cam, remove the screw from the underside of the cam using a 4mm Allen key.
- The components used in the mechanism are generally robust and are not subject to significant wear. Component failure or deterioration is therefore unlikely. However, check the components for significant wear or any other problem, which might cause the mechanism to fail in the future. If any significant deterioration is detected, replace the part.
- Re-assembly is generally the reverse procedure of disassembly. Prior to re-assembling the handle (item 1) to the cam (item 2), apply a small quantity of Loctite 243 to the screw thread. ***Note: It is important to ensure that upon re-assembly, all moving joints are well lubricated with Molycote graphite grease. The grease prevents moisture settling on the joints and thus prevents any possibility of the joints freezing together during operation.***

5.17 External Valve Body Removal

The external valve body is fitted on the underside of the main valve block and encloses the main and liquid valve bonnets. In order to gain access to the main and liquid valves, the external valve body must be removed. To remove the external valve body, refer to Figure 10 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Removal of the external valve body will require access to a single fixing screw fitted on the upper side of the main valve block. The screw may be accessed either by using a 4mm Allen key attached to a long extension or by first removing the can and coil. The best approach to screw removal will depend upon the tools available and the conditions

at the time. The following procedure assumes that the valve block is separated from the can and coil.

- Using a 4mm Allen key, undo and remove the four fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Remove the bar handle as detailed in Section 5.15.1
- Remove the liquid valve handle as detailed in Section 5.14
- Remove the handle end cap as detailed in Section 5.15.2.
- Remove the double-action mechanism as detailed in section 5.16.
- Using a 4mm Allen key, undo and remove the single fixing (item 26) situated on the upper side of the valve block.
- Remove the external valve body.
- Replacement is generally the reverse procedure of removal. Prior to replacing the fixing screw (item 26), apply a small quantity of Loctite 243 to the screw threads.

5.18 Pilot Valve Removal and Disassembly

To remove the pilot light valve, refer to Figure 12 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PILOT LIGHT KNOB HANDLE	CR-PPD-V055
2	PILOT LIGHT KNOB BODY	CR-PPD-V054
3	M6x20 ST STL HEX DRIVE DIN 912 SCREW	CR-C-0250
4	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
5	ANTIROTATION PIN	CR-PPD-0082
6	PILOT LIGHT VALVE BONNET	CR-PPD-0049
7	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
8	PILOT LIGHT VALVE STEM	CR-PPD-0046
9	STEM ANTIROTATION PIN	CR-PPD-0082
10	PILOT VALVE OPENING RING	CR-PPD-0050
11	PILOT VALVE STEM STOP WASHER	CR-PPD-0087
12	M4x8 ST STL FLAT DRIVE DIN 84 SCREW	CR-PP-0032
13	PILOT VALVE ANTIFRICTION WASHER	CR-PPD-0084
14	VALVE STEM SHUTTER	CR-PPD-0045
15	VALVE SHUTTER SEAL PAD	CR-PPD-0044
16	PILOT VALVE SPRING	CR-PPD-0090
17	PILOT LIGHT REGULATOR LOWER BODY	CR-PPD-0043
18	PILOT LIGHT REGULATOR UPPER BODY	CR-PPD-0039
19	PILOT LIGHT REGULATOR PISTON	CR-PPD-0040
20	PILOT LIGHT REGULATOR SPRING	CR-PPD-0091
21	FUEL FILTER	CR-PPD-0038
22	PILOT LIGHT FLAME JET	CR-PPD-0037

23	NB 2018 NBR 70 SHORE O-R SEAL	CR-PPD-0323
24	FPM 2015 VITON 75 SHORE O-R SEAL	CR-PP-0311
25	FPM 2081 VITON 75 SHORE O-R SEAL	CR-PP-0312
26	PILOT LIGHT REGULATOR STEM PISTON SEAL	CR-PPD-0041

Figure 12

- Ensure the burner is completely vented of fuel.
- Make sure the valve is in the closed position. Make a note of the position of the knob and knob handle. This will greatly assist when re-assembling.
- Using a 3mm Allen key, undo and loosen the grub screw (item 4) located in the side of the pilot valve knob (item 2). Do not fully remove the screw. Carefully withdraw the knob.
- Using a flat-bladed screwdriver, undo and remove the fixing screw (item 12) located in the end of the valve. Remove the plain washer (item 11) and the anti-friction washer (item 13).
- Unscrew and remove the threaded ring (item 10).
- Using a suitable probe, push out and remove the anti-rotation pin (item 9).
- Using a 26mm AF open-ended spanner, undo and remove the valve bonnet (item 6) from the main valve block.
- Extract the valve stem and shutter assembly (items 8 and 14) and the valve spring (item 16) from the bonnet (item 6).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 15) is permanently fixed in to the shutter. Do not attempt to remove it.
- Using a suitable soft-ended probe, carefully remove the "O" seals (item 23) from the valve stem.
- Remove the large "O" seal (item 7) from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bore inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Remember to fit the anti-rotation pin (item 9). Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals. Apply a small quantity of Loctite 243 to the screw thread (item 12) prior to fitting. In order to prevent the possibility of the valve freezing, all moving parts must be lubricated with plenty of Molycote graphite grease, mainly at the pin (item 9) groove.
- The valve design is such that the position of the ring (item 10) must be set to the correct position. If the ring is not set correctly, the valve may fail to open or close correctly. To set the ring position, fully assemble the valve but do not fit the knob and handle (items 2 and 1 respectively). Carefully unscrew the ring until the anti-friction washer (item 13) just begins to push against the plain washer (item 11). Re-assemble the knob (item 2) and set it in the closed position. Secure the knob by tightening the grub screw (item 4). To assist with the process of correctly setting the knob position, it may be useful to connect the burner to a compressed air supply. Set the knob position by checking for the sound of air exiting from the pilot light as the knob is rotated between the on and off positions.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Check for the correct function of the pilot light valve by operating it normally. Ensure that the valve opens and closes correctly. If it is found that the valve does not function correctly, the problem must be resolved prior to returning the burner to service.

5.19 Liquid Valve Removal and Disassembly

To remove and disassemble the liquid valves, refer to Figure 10 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.
- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.
- Remove antifriction washer (item 7) and spring (item9).
- Using a 27 mm AF open-ended spanner, undo and remove the valve bonnet (item 10) from the main valve block.
- Extract the valve stem and shutter assembly (items 15 and 14) and the valve spring (item 13) from the bonnet (item 11).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 16) is permanently fixed in to the shutter. Do not attempt to remove it.
- Remove the seal-retaining washer (item 13).
- Carefully remove the energised seal (item 12) from the bore inside the valve bonnet.
- Using a suitable soft-ended probe, carefully remove the "O" seals (item 27) from the valve stem (item 5).
- Remove the large "O" seal (item 28) from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of the PTFE energised seal (item 12). If the seal is defective, it must be replaced.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bores inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals and Molycote graphite grease to the antifriction washer (item 7).
- Prior to fitting the external valve body, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints of all valves removed. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Upon completion, check for the correct function of all valves which have been removed. Ensure that the valves turn on and off correctly. If it is found that any of the valves do not function correctly, the problem must be resolved prior to returning the burner to service

5.20 Main Valve Removal and Disassembly

To remove and disassemble the main valve, refer to Figure 10 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.

- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.
- Remove the antifriction washer (item 7).
- Access to the main valve may be improved by first removing the pilot valve. If it is considered necessary, remove the pilot valve as detailed in section 5.18.
- Using a 27 mm AF open-ended spanner, undo and remove the valve bonnet (item 10) from the main valve block.
- Extract the valve stem and shutter assembly (items 6 and 14) and the valve spring (item 13) from the bonnet (item 9).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 16) is permanently fixed in to the shutter. Do not attempt to remove it.
- Remove the seal-retaining washer (item 13).
- Carefully remove the energised seal (item 12) from the bore inside the valve bonnet.
- Using a suitable soft-ended probe, carefully remove the "O" seals (item 27) from the valve stem (item 6).
- Remove the large "O" seal (item 28) from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of the PTFE energised seal (item 12). If the seal is defective, it must be replaced.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bores inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals and Molycote graphite grease to the antifriction washer (item 7).
- Prior to fitting the external valve body, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints of all valves removed. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Upon completion, check for the correct function of all valves which have been removed. Ensure that the valves turn on and off correctly. If it is found that any of the valves do not function correctly, the problem must be resolved prior to returning the burner to service.

5.21 Safety Button Removal and Disassembly

To remove the safety button, refer to Figure 13 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	SAFETY BUTTON	CR-PPD-0066
2	BLAST VALVE HANDLE RH (ROUGH)	CR-PPD-D070
3	M5x50 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0017
4	VALVE EXTERNAL BODY RH	CR-PPD-D071
5	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
6	SAFETY BUTTON SUPPORT	CR-PPD-0068
7	SAFETY BUTTON STEM	CR-PPD-0067
8	SAFETY BUTTON SPRING	CR-PPD-0093
9	POWERPLUS DOUBLE BURNER BAR END CAP	CR-PPD-0072
10	DOUBLE ACTION VALVE CAM	CR-PPD-0076

Figure 13

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.
- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.
- Using a soft felt tip pen, put a small mark at the junction of the button assembly with the external valve body to keep the position of the plunger.
- Using a 3mm Allen key, loosen but do not remove the small grub screw (item 4).
- Withdraw the safety button assembly.
- Only if full disassembly is required, carefully unscrew the button (item 1). Remove the compression spring (item 7) located directly behind the button.
- Remove the plunger (item 6).
- Replacement is generally the reverse procedure to removal. Prior to assembly, apply a small quantity of Loctite 243 to the plunger thread. Note that the hole in the safety button support (item 5) is offset. When re-fitting the assembly back in to the external valve body, it will be necessary to set the position of the hole relative to the valve body. Set the position by rotating the assembly and aligning it with the marker. Having set the correct position, lock the assembly in position by tightening the grub screw (item 4).
- When the burner is fully assembled, check for correct function of the button by ensuring it locks out the main burner valve handle and releases when the handle is subsequently operated.

SECTION 6

SUPPLEMENT 12, Issue 3
HOT AIR BALLOON MAINTENANCE MANUAL

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner. The inspection requirements are detailed below.

6.2 Pre-functional Checks

Carry out all non-functional checks detailed in Section 4 (Preventative Maintenance).

6.3 Functional Test

6.3.1 Left and Right Main Burner Function (First Position)

Connect the burner to a suitable fuel supply. Operate the left and right main burner valves to the first (intermediate) position. Check for a good flame. Check that the ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.2 Left and Right Double Action Function

Operate the left and right main valve handles to the fully open position. Check for a good main and liquid combination flame. Check that the ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.3 Left and Right Liquid Valve Function

Connect the burner to a suitable fuel supply. Operate the left and right liquid burner valves. Check for a good flame. Check that flame ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.4 Left and Right Pilot Regulator Valves

During operation it is possible that an oily residue will accumulate inside the bore of the pilot regulator valve. This is quite normal. ***However, if the residue is not removed, it may cause problems in time as the residue changes consistency and begins to block the pilot light and pilot regulator jets and holes. This can cause a pilot light failure.***

The regulator must therefore be checked every 100 hours or 12 months (whichever is the sooner) and the residue removed as follows:

- Remove and strip down the regulator as described in section 5.8.
- Using a soft cloth, wipe the inside of the regulator housing and the regulator piston and remove all traces of the residue.
- If the residue proves difficult to remove, a cloth soaked with a small amount of methanol solvent should be used.
- Check the condition of the fuel filter. Clean or replace if necessary.
- Check the inside of the jet and make sure it is clean. Remove any oil accumulation and any other dirt or contamination.
- Re-assemble the regulator as specified in section 5.8.

Having re-assembled the pilot regulator, its function must be tested as described below:

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.

6.3.5 Fuel Filter

Remove the left and right fuel filter assemblies as detailed in Section 5.9. Check the condition of the filter. Replace the filter if necessary. Make sure that all holes in the filter body are clear.

6.3.6 Emergency Pilot Light Safety Button

Check for the correct function of the left and right emergency pilot light buttons. Ensure that the buttons maintain the main valve handles in the open position when operated.

6.3.7 Burner Rotation Stops

Check that the burner rotation stops are fully functional and that they prevent burner inversion in ***both*** axes.

6.4 Pressure Test

Connect the burner to a 7Bar (100 psi) air supply. Using soapy water, check the following areas for leaks:

6.4.1 All main valve-to-valve block joints
6.4.2 All main valve stems in open and closed position.
6.4.3 All liquid valve-to-valve block joints.
6.4.4 All liquid valve stems in open and closed position
6.4.5 All fuel hose joints.
6.4.6 All pressure Gauge to Valve block joints.
6.4.7 All pilot regulator valve to valve block joints.
6.4.8 All liquid fire jet assembly to valve block joints (liquid valve open).
6.4.9 All pilot light to valve block joints (pilot regulator valve open).
6.4.10 All coil post to valve block joints (main valve open).

SECTION 7

7.0 Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Main burner failure.	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Liquid burner failure.	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Persistent smell of fuel.	Fuel leak from burner or hose.	Air pressure test to determine location of leak. Repair as necessary.
Reduction in main burner power.	Jets in jet ring blocked.	Clean and unblock jets.
Main and / or liquid valves fail to close.	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Valve double-action mechanism frozen.	Grease mechanism (see section 5.19 and 5.20).
	Safety button activated.	Release button.
Pilot light fails to ignite.	Fuel cylinder valve off.	Turn valve on.
	Pilot valve off.	Turn valve on.
	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly
	Regulator filter blocked.	Clean filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Failure of piezo igniter.	Repair igniter.
	Gap between igniter electrode and tag incorrect.	Re-set gap.
	Burner placed in excessive crosswind.	Move burner away from crosswind.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Pilot light flame weak.	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly
	Regulator filter blocked.	Replace filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
	Piston lower seal detached from piston.	Replace piston assembly.
	Inlet and outlet hole in piston blocked.	Clean hole.
	Air inlet to pilot light blocked.	Clean mesh filter.
	Piston "O" seal failure.	Replace seal.
Pilot light flame very large.	Regulator jet not fitted.	Fit jet.
	Piston seals not fitted or failed.	Repair seals.
Pilot light fails to extinguish.	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Burner gimbal action too tight or too loose.	Friction setting on gimbal mechanism incorrectly set.	Adjust friction setting.
Burner excessively hot.	Fuel pressure too low.	Run burner within recommended fuel pressure range.
	Fuel cylinder empty, burner running on vapour only.	Connect burner to a full cylinder.
Safety button fails to operate correctly.	Offset hole in button assembly incorrectly set.	Adjust assembly position in external valve body.

S12 - POWERPLUS DOUBLE

APPENDIX I

SUPPLEMENT 12, Issue 3
HOT AIR BALLOON MAINTENANCE MANUAL

Annual / 100 Hours Burner Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Burner Can Fixings	4.2		
General Cleaning	4.3		
Main jets	4.4.1		
Coil Fixings	4.4.2		
Coil Tubing	4.4.3		
Coil Support Rivets	4.4.4		
Pilot Light Strength	4.5		
Igniter Spark	4.6		
Fuel Hoses	4.7		
Pressure Gauge	4.8		
Burner Mounting	4.9		
Main Burner Function	6.3.1		
Double Action Function	6.3.2		
Liquid Valve Function	6.3.3		
Pilot Regulator Valve Clean and Function	6.3.4		
Fuel Filter	6.3.5		
Emergency Pilot Light Button	6.3.6		
Burner Rotation Stops	6.3.7		
Main Valve Pressure Test	6.4.1 6.4.2		
Liquid Valve Pressure Test	6.4.3 6.4.4		
Fuel Hose Pressure Test	6.4.5		
Pressure Gauge Pressure Test	6.4.6		
Pilot Regulator Valve Pressure Test	6.4.7		
Liquid Fire Jet Pressure Test	6.4.8		
Pilot Light Pressure Test	6.4.9		
Coil Post Pressure Test	6.4.10		

S12 - POWERPLUS DOUBLE

BMK-050 POWERPLUS MAXI BURNERS ("Supplement 13")

Supplement 13 - POWERPLUS MAXI BMK-050 BURNERS

S13 - POWERPLUS MAXI

SECTION 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the Ultramagic Powerplus Maxi BMK-050 burner. Sections 1 to 5 detail the maintenance procedures and the parts used in the burner construction. Section 6 details the annual / 100 hour inspection and test requirements.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to all Ultramagic Powerplus Maxi BMK-050 burners as defined by the following drawings:

Double Burner: 2052-0000
Triple Burner: 2053-0000
Quad Burner: 2054-0000

1.2 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.

Always quote the spare parts reference codes shown in our Parts Catalogue (Issue 5 and on, available on Ultramagic website) to place an order.

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

1.3 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.

1.4 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 welder approved to the appropriate standard by the national airworthiness authority in the country of registration.

1.5 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.

1.6 Technical Support

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

1.7 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.

SECTION 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This manual provides the maintenance information required by EASA CS-31HB .82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

There are no components in the Powerplus Maxi BMK-050 burner, which must be replaced after a fixed length of time.

2.3 Inspection Interval

The maximum inspection interval for the burner is 100 hours operation or one year; whichever is the sooner. The requirements for this inspection are defined in section 6.

SECTION 3

3.0 Technical Description

3.1 General

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

Fuel is supplied to the burner through the flexible hoses. The fuel enters a machined valve block whereupon the fuel is distributed to the various valves and pressure gauge in readiness for use. The burner is provided with completely independent left and right fuel circuits and thus provides duality of all major functions.

The burner is provided with the following major features:

- Burner gimbal mounting.
- Burner can
- Main Burner Vaporising coil
- 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
- Left and right Safety Buttons

The burner is provided with a two-stage main valve action. Operation of the main valve to the intermediate position activates the main burner. Further operation of the main valve to the fully open position activates both the main and liquid burners enabling approximately double power output through single hand operation.

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

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 burner in double configuration may be seen in Figure 1 and the features and functions detailed above are described in the following paragraphs:

ITEM	DESCRIPTION	ASSY
1	FRAME	REF ONLY
2	ULTRAMAGIC GIMBAL BLOCK	SEE SECTION 3.2
3	BURNER CAN	SEE SECTION 3.3
4	VAPORISATION COIL	SEE SECTION 3.4
5	COIL CONNECTION COLUMN	SEE SECTION 3.5
6	FUEL HOSES	SEE SECTION 3.6
7	MAIN VALVE ASSEMBLY	SEE SECTION 3.7
8	LIQUID VALVE ASSEMBLY	SEE SECTION 3.8
9	PILOT REGULATOR ASSEMBLY	SEE SECTION 3.9
10	IGNITER ASSEMBLY	SEE SECTION 3.10
11	PRESSURE GAUGE ASSEMBLY	SEE SECTION 3.11
12	LIQUID FIRE JET ASSEMBLY	SEE SECTION 3.12
13	PILOT LIGHT ASSEMBLY	SEE SECTION 3.13
14	PILOT LIGHT FUEL FILTER	SEE SECTION 3.14
15	SAFETY BUTTON	SEE SECTION 3.15

Figure 1

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3.2 Burner Gimbal Block Assembly

The burner is provided with a centre gimbal block assembly allowing two-axis movement of the burner. With the exception of the burner gimbal mounting, the gimbal block assembly is standard to the MK21 range of burners and maintenance instructions are provided in a separate maintenance supplement.

The burner gimbal block assembly and mounting configuration may be seen in Figure 1.

3.3 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 via a series of mesh panels using screw fixings. The can provides the mechanical support for the vaporisation coil and attachment to the gimbal mounting arrangement. The can may be seen in Figure 1.

3.4 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve using a machined coil column and "O" seals fitted to the inlet tube of the coil. 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 Coander jet ring with fixed jets and coil supports.

When the main valve is opened, fuel enters the coil through the inlet tube. The fuel rises through the inner coil to the top of the burner and then descends through the outer coil spiral until it exits through the jet ring.

The vaporisation coil configuration may be seen in Figure 1.

3.5 Coil Connection Column

The interface to the vaporisation coil is through a machined column, which is screwed in to the upper surface of the valve block. The column is provided with a precision-machined bore to accept the three "O" seals fitted to the coil inlet tube.

Note that the coil connection column is used to create the seal to the main valve and removal of the column will therefore break the pressure integrity of the burner. It is very important therefore to ensure that the burner is completely vented of fuel prior to removal of these components.

The coil connection column may be seen in Figure 5.

3.6 Fuel Hoses

The fuel hoses link the burner to the fuel cylinders. They are terminated with a choice of REGO®, TEMA® or Fastflat 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.

3.7 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 a plunger type and uses a special sprung loaded rubber seal, bearing against a machined seat in the valve block to create the seal. When the valve handle is operated, the seal lifts off the seat in the valve block and allows the flow of fuel.

The valve stem is housed in a machined brass valve bonnet. A pressure tight seal is achieved between the stem and bonnet with the use of two "O" seals and a primary sprung loaded seal. The bonnet is sealed to the valve block using an "O" seal fitted in a machined groove in the bonnet mating face.

The main valve handle is provided with a special two-stage action. A mechanism links the main valve handle to the liquid valve. When the handle is moved to the first intermediate position, the main valve is opened. Movement of the handle to the second fully open position causes the liquid valve to open simultaneously enabling approximately double burner power from single hand operation.

The main valve configuration may be seen in Figure 11.

3.8 Liquid Valve Assembly

The function of the liquid valve is similar to the main valve described above and the method of sealing is identical. Note however that the liquid valve is only a single action and operation of the liquid valve handle activates the liquid fire function only.

Due to the dual action of the main valve and the associated link mechanism required to enable double action, the design of the liquid valve stem is different to that of the main valve. The stem is longer and has an additional hole to allow connection of the link mechanism. An additional spring loaded thrust assembly is provided underneath the valve handle. The handle is a rotary action.

The liquid valve configuration may be seen in Figure 11.

3.9 Pilot Regulator Assembly

The pilot regulator may be considered as two sub-assemblies consisting of the regulator itself and the on/off valve mechanism.

The regulator sub-assembly consists of a lower body which screws in to the valve block, a sprung loaded piston and an upper body fitted with a small jet.

The regulator sub-assembly is screwed in to the upper surface of the valve block. An "O" seal fitted in a machined groove on the underside of the lower body forms the seal between the regulator and the valve block. The lower body is provided with a seal seat and this forms the seal between the on/off valve sub-assemblies.

When the valve handle is operated, fuel enters the lower body through a small hole. Fuel passes through a small hole in the piston and exits in to the chamber between the piston and the upper body. The sudden increase in volume causes the fuel to vaporise. The fuel pressure in the chamber forces the piston down thus closing off the fuel inlet. Vaporised fuel in the upper chamber is vented off through the jet to the pilot light assembly. As the pressure in the chamber falls, the spring forces the piston to move forward and the cycle is repeated.

The piston is fitted with a small lower seal, which closes off the flow of fuel. A larger "O" seal is fitted inside the upper body and forms the seal between the piston and the body.

The on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat, similar (but not identical) to the main and liquid valves. The stem is sealed to the bonnet using two "O" seals. An "O" seal fitted in a machined groove in the bonnet mating face seals the bonnet to the valve block. Rotation of the knob causes the stem to move backward thus breaking the seal to the regulator lower body.

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

Note that the regulator lower body is used to create the seal to the regulator on/off valve. Removal of the regulator lower body will break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to removal.

The regulator configuration may be seen in Figure 8.

3.10 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 piezo igniter and an electrode permanently mounted in temperature resistant ceramic. The electrode and piezo igniter are electrically connected by a compression spring. When assembled, the piezo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

Upon operation of the piezo 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.

The igniter assembly configuration may be seen in Figure 7.

3.11 Pressure Gauge Assembly

The pressure gauge is mounted inside a machined bore in the valve block. Access to the gauge is from the upper surface of the valve block.

A pressure tight seal is achieved with the use of PTFE tape and a taper thread on the gauge rear. The gauge is screwed in to a special retaining block fitted to the upper surface of the valve block. The retaining block is secured to the valve block by a single screw fixing. The retaining block also functions as a fuel link to the pressure gauge and the interface to the valve block is therefore sealed using an "O" seal. 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 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.

The pressure gauge configuration may be seen in Figure 9.

3.12 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 a duct with multiple holes at the outlet. The body is sealed to the valve block using an "O" seal fitted in a machined groove on the underside of the jet body.

Note that the jet body is used to make the seal to the liquid valve jet and removal of the jet will therefore break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to carrying out any work on the liquid fire jet.

The liquid fire jet configuration may be seen in Figure 11.

3.13 Pilot Light Assembly

The pilot light assembly is mounted directly above the regulator assembly. It is supplied with a small flow of vapour fuel from the pilot regulator assembly. The assembly consists of a stainless steel filter tube secured to the regulator upper body by a grub screw. The filter tube contains the air inlet to the pilot light and a series of mesh disks secured using split rings near the outlet. A second tube is secured to the filter tube using a small screw. This tube is provided with a series of holes to allow the flame to exit.

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".

The pilot light assembly configuration may be seen in Figure 8.

3.14 Pilot Light Fuel Filter

Fuel to the pilot light regulator is supplied by a dedicated tapping in the valve block. Prior to entering the pilot regulator, the fuel passes through a small filter. The filter is fitted in a special housing allowing it to be removed easily for maintenance. The housing is screwed in to the upper surface of the valve block and is sealed using a small "O" seal fitted in a groove in the housing mating face.

Fuel enters the housing through the filter mounted in the bottom and exits through a small hole near the top of the housing.

The pilot light fuel filter configuration may be seen in Figure 8.

3.15 Safety Button

Each of the main valve mechanisms may be locked in the ON position by operating the safety button fitted on the side of the external valve body. When the main valve handle is held in the open position and the button is simultaneously depressed and held, the main valve will be locked in the open position upon release. The button is spring-loaded and is released by further operation of the main valve handle.

3.16 Triple Burner

The Powerplus Maxi 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 a triangular configuration.

The triple burner utilises a centrally positioned hanger assembly to secure the three burner pots together. In addition, an aluminium "T" handle, linking all three pots together replaces the burner handle.

3.17 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 a single "H" handle linking all four pots together, replaces the existing handles.

SECTION 4

4.0 Preventative Maintenance

4.1 General

The burner should be subjected to periodic preventative maintenance checks and preventative maintenance measures implemented if necessary. It is recommended that the period between inspections is once every three months or 25 hours operation, whichever is the sooner. The checks must incorporate the areas detailed below.

4.2 Burner Can Fixings

The three fixings used to secure the valve block to the burner can are very important. Removal of the three fixings will allow the valve block to separate completely from the burner. Check therefore, that the three fixings located on the underside of the valve block are secure. If any of the screws are loose, completely remove the screw and apply a small amount of Loctite 243 to the thread. Re-assemble the screw and tighten.

4.3 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, contact Ultramagic for further advice.

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.

4.4 Vaporisation Coil

4.4.1 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 5.3.

4.4.2 Coil Fixings

Check the fixings securing the coil to the can. Loose fixings must be tightened as described in Section 5.3

4.4.3 Coil Tubing

Check the tube used in the construction of the coil for damage including signs of cracking, serious indentation and deterioration of welded joints.

Serious indentation cannot be repaired and the coil must be replaced as described in Section 5.3.

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 5.3.

4.4.4 Coil Support Rivets

Check the condition of the rivets used to fix the two halves of the coil supports together. In particular, check the condition of the rivets on the inside of the coil. All rivets must be in good condition and show no signs of damage due to over-heating.

If damage to any of the rivets is detected, contact Ultramagic for further advice.

4.5 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. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in Section 5.7.

4.6 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 5.6. If this fails to improve the spark, it is possible that there is poor electrical continuity between the igniter and the pilot light. Check that the grub screw used to secure the igniter assembly and fitted in the side of the valve block, is tight (take care not to damage the aluminium thread in the valve block). Check that the pilot light assembly is secure. If it appears to be loose, make sure all fixings are tight.

If the above actions fail to improve the spark, the igniter will need to removed and disassembled to determine the cause of the problem (see Section 5.6). Note that Small cracks or damage to the Igniter Ceramic as well as sooty deposits on the electrode or spark surfaces may cause ignition problems. Replace the electrode if necessary.

4.7 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 5.13.

Fuel hoses must be obtained from Ultramagic. For safety reasons, fuel hoses are supplied assembled with the connector and pressure tested.

4.8 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. If a fuel cylinder is used, measure the cylinder pressure first using a calibrated pressure gauge (contact Ultramagic for further details). 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 indicate that the gauge is faulty, the gauge must be replaced in accordance with the instructions in section 5.10.

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.

4.9 Burner Mounting

4.9.1 Double Burner

Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight.

4.9.2 Triple and Quad Burners

Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight.

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.

SECTION 5

5.0 Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies, sub-assemblies and components used within the burner. Maintenance other than that detailed in the Section 4, (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 leak detector fluid. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

Prior to carrying out any maintenance work, ensure that the burner is completely vented of fuel and disconnected from the fuel supply. Remember to check that both left and right fuel circuits are vented.

5.2 Burner Gimbal Mounting

5.2.1 Gimbal Block

The gimbal assembly is identical to that used on the MK21 burners. For maintenance instructions, refer to Ultramagic Maintenance Manual Supplement Number 8.

5.2.2 Double Burner Gimbal Mounting

To remove the double burner gimbal mounting, refer to Figure 2 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	DOUBLE GIMBAL MOUNTING BRACKET ASSY	CR-PPM-0135
2	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
3	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
4	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111

Figure 2

- Refer to Ultramagic Maintenance Supplement No 8 and remove the burner from the burner frame.
- Ensure both burners are supported and then remove the gimbal block assembly.
- To remove the coil, use a 4mm Allen key and an 8mm open-ended spanner to undo and remove the eight screws and lock nuts (items 2, 3 and 4 respectively).
- Re-assembly is generally the reverse procedure to disassembly. If necessary, apply Molycote graphite grease to the bearing surfaces of the gimbal block and the mounting bracket. Refer to Ultramagic Maintenance Supplement No 8 for instructions covering the gimbal block assembly process.

5.2.3 Triple Burner Gimbal Mounting

To remove the triple burner gimbal mounting, refer to Figure 3 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	TRIPLE GIMBAL MOUNTING BRACKET ASSY	CR-PPT-0136
2	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
3	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
4	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111
5	GIMBAL BLOCK ASSY	2022-2500
6	M5x35 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0019
7	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170
8	TRIPLE BURNER BAR HANDLE CONNECTION SHORT	CR-PPT-C073
9	TRIPLE BURNER BAR HANDLE CONNECTION LONG	CR-PPT-L073

Figure 3

- Refer to Ultramagic Maintenance Supplement No 8 and remove the burner from the burner frame.
- Ensure both burners are supported and then remove the gimbal block assembly.
- To remove the coil, use a 4mm Allen key and an 8mm open-ended spanner undo and remove the twelve screws and lock nuts (items 2, 3 and 4 respectively).
- Re-assembly is generally the reverse procedure to disassembly. If necessary, apply Molycote graphite grease to the bearing surfaces of the gimbal block and the mounting bracket. Refer to Ultramagic Maintenance Supplement No 8 for instructions covering the gimbal block assembly process.

5.2.4 Quad Burner Gimbal Mounting

To remove the triple burner gimbal mounting, refer to Figure 4 and proceed as follows:

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ITEM	DESCRIPTION	DWG / PART NUMBER
1	QUAD MOUNTING BRACKET ASSY	CR-PPQ-0137
2	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
3	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
4	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111
5	GIMBAL BLOCK ASSY	2022-2500
6	M5x35 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0019
7	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170
8	QUAD BURNER BAR HANDLE CONNECTION SHORT	CR-PPQ-C073
9	QUAD BURNER BAR HANDLE CONNECTION LONG	CR-PPQ-L073

Figure 4

- Refer to Ultramagic Maintenance Supplement No 8 and remove the burner from the burner frame.
- Ensure both burners are supported and then remove the gimbal block assembly.
- To remove the coil, use a 4mm Allen key and a 8mm open-ended spanner to undo and remove the sixteen screws and lock nuts (items 2, 3 and 4 respectively).
- Re-assembly is generally the reverse procedure to disassembly. If necessary, apply Molycote graphite grease to the bearing surfaces of the gimbal block and the mounting bracket. Refer to Ultramagic Maintenance Supplement No 8 for instructions covering the gimbal block assembly process.

5.3 Coil Removal

5.3.1 Removal of Coil from Burner

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 areas detailed below. To remove the vaporisation coil, refer to Figure 5 and proceed as follows:

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ITEM	DESCRIPTION	DWG / PART NUMBER
1	VAPORISATION COIL RH	CR-PPM-D115
2	BURNER CAN	CR-PPM-0016
3	NETTING	CR-PPM-0134
4	VALVE BLOCK RH	CR-PPM-D031

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5	ULTRAMAGIC GIMBAL BLOCK ASSY	2022-2500
6	UPPER JET RING	P123/1
7	LOWER JET RING	CR-PPM-0124
8	M5x25 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0840
9	BI-METAL STRIP	CR-PPD-0127
10	CENTRE COLUMN FITTING	P116/1
11	NB 3037 NBR 70 SHORE O-R SEAL	CR-PP-0327
12	MAIN VALVE SLEEVE	CR-PPM-0074
13	LIQUID CONNECTION JET SLEEVE	CR-PPM-0075
14	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
15	M5 ST STL DIN 985 LOCK NUT	CR-PP-0111
16	M5x12 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0011
17	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
18	M4x12 ST STL PHILLIPS PAN HEAD DIN 7985 SCREW	CR-PP-0041
19	WATER SLURPER	CR-PPM-0030
20	SLURPER SPECIAL SCREW	CR-PPM-0083

Figure 5

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key and an 8mm open-ended spanner undo and remove the three fixings securing the coil support legs to the burner block.
- Carefully withdraw the coil from the burner.
- Check the condition of the three "O" seals (item 11) fitted near the bottom of the coil inlet tube. The seals must be replaced if they show signs of deterioration such as damage due to over-heating, splits etc.
- Remove the "O" seals using a suitable soft tool to lift the seals out of the grooves. Take care not to damage the surface finish of the grooves. Check the condition of the surface inside the grooves where the "O" seals are fitted for any signs of deterioration. This is best achieved using a suitable magnifying glass. If significant damage to the surface is noted, contact Ultramagic for advice and to determine the most appropriate repair action.
- Replacement of the coil is generally the reverse procedure of removal. Prior to re-assembly, apply a thin smear of Krytox 125 grease to the "O" seals.
- Upon completion of re-assembly, connect the burner to a suitable compressed air line not exceeding 6.8bar (100psi) pressure. Apply leak detector fluid to the joint between the coil and coil post. Open the main valve and check for signs of leakage. If any leaks are detected, the problem must be resolved before the burner is returned to service.

5.3.2 Disassembly of Jet Ring

The coil is fitted with a special Coander jet ring. The Coander effect is the propensity of a moving fluid to follow the profile of an adjacent boundary and this effect has been used in the design of the jet ring. Consequently the jet ring design is slightly more complex than more traditional designs.

The jet ring is fitted with special stainless steel bi-metal strips, which open and close and thus provide a degree of control of fuel flow rate as the temperature of the fuel in the jet ring varies.

To disassemble the jet ring, refer to Figure 5 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Remove the coil from the burner as described in Section 5.3.1 above.
- Inspection of the jet ring may reveal an accumulation of oily deposits on the outer surface. These deposits are not detrimental to burner performance provided that the deposit does not cause jet blockage.
- To prevent unnecessary work at this stage, check the condition of the jets for blockages etc. This may be done visually and by inserting a suitable piece of stiff wire in to each jet hole. Only proceed with further dismantling if it is considered that the jets require thorough cleaning or if the bi-metal strips require inspection or maintenance.
- The jet ring may be further disassembled if considered necessary. Using a 4mm Allen key, undo and remove the four cap head screws (item 8) and the two slurpers and special screws (items 19, 20) from the under side of the jet ring.
- Withdraw the lower jet ring (item 7) from the upper jet ring (item 6).

- Check the condition of the internal jet ring faces. Carefully clean away any oil deposits or other contaminants.
- Check the condition of the bi-metal strips (item 9). These are secured to the underside of the upper jet ring. When the coil is cold, the strips should be in the "closed" position i.e. covering the inlet to the jet hole. Only remove the strips if it is considered necessary.
- Prior to removing the bi-metal strips, use a soft marker pen to mark the position of the strip to indicate which jet holes are covered by the strip.
- To remove the bi-metal strips, use a crosshead Philips screwdriver and remove each screw (item 18) securing the strip to the upper jet ring.
- Replacement is generally the reverse procedure to removal. Ensure that the bi-metal strips and slurpers are positioned correctly. Note that the seal between the upper and lower jet rings is formed by the conical fit of the two components. It is very important therefore to ensure that the lower ring is fitted square to the upper ring and that the six fixings are tightened correctly. Fit all six fixings finger-tight (including slurper fixing screws). Select any fixing and tighten a quarter turn. Select the diagonally opposite fixing and tighten a quarter turn. Continue to tighten all fixings, always as diagonally opposite pairs, a quarter turn each time, until all fixings are tight. ***Use just an Allen screwdriver to tighten the screws. Over-tightening may result in permanent deformation of the multihole jet ring.***
- Prior to re-assembling the coil to the burner, check the seal between the upper and lower jet rings by connecting the coil inlet to a suitable compressed air supply of maximum pressure 6.8bar (100psi) and using leak detection fluid around the joint. If leaks are detected, the problem must be resolved before the burner is returned to service.

5.3.3 Tightening of Coil Mounting Screws

To tighten the coil mounting screws, refer to Figure 5, and using a 4mm Allen key and an 8mm open-ended spanner, tighten the six-coil mounting screws if necessary.

5.4 Burner Can Removal

The burner can is a welded stainless steel assembly. 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 1.4).

If it is considered that the can must be removed for repair, refer to Figure 6 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	BURNER CAN PROTECTION NET	CR-PPM-0134
2	M5x16 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0013
3	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170

Figure 6

- Ensure that the burner is completely vented of fuel.
- Remove the burner from the gimbal mounting as described in section 5.2.
- Remove the coil as described in section 5.3.
- Prior to removing the can, mark the relative positions of the can and valve block using a soft felt tip pen at any convenient position on the internal faces.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- The can is now free to be removed. Withdraw the can from the valve block. Withdrawing the can will allow the three mesh panels fitted between the can and the block to be removed.
- Replacement is generally the reverse procedure of removal. Align the markers to ensure that the can is assembled to the block in the correct orientation. Replace the three mesh panels by fitting the lower edge in the groove in the upper side of the valve block and trapping the upper edge behind the retaining strips fitted on the inside of the can. Prior to

replacing the three fixings located in the valve block underside, apply a small amount of Loctite 243 to each screw thread. Ensure the three fixings are fully secure.

- Pressure test as described in Section 5.3.

5.5 Mesh Panel Removal

Some damage to the mesh panels such as indentation is acceptable and will not cause deterioration in burner performance. However, if the panels have been damaged in such a way that they may cause cuts or other injury to personnel, they must be replaced.

To remove the mesh panels, refer to Section 5.4.

5.6 Piezo Igniter Assembly Removal

To remove the Piezo Igniter Assembly, refer to Figure 7 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PIEZO IGNITOR UNIT	CR-PPD-0061
2	PIEZO IGNITOR SUPPORT TUBE	CR-PPD-0057
3	PIEZO IGNITOR INSULATOR	CR-PPD-0060
4	PIEZO IGNITOR SPRING	CR-PPD-0059
5	PIEZO IGNITOR CERAMIC	CR-PPD-0058
6	NB 2050 NBR 70 SHORE O-R SEAL	CR-PP-0324
7	M6x8 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-PP-0022
8	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040

Figure 7

- Ensure that the burner is completely vented of fuel.
- Using a 3mm Allen key, loosen but do not remove the grub screw (item 7).
- Withdraw the igniter assembly from the underside of the valve block.
- Unscrew and remove the piezo igniter (item 1) from the body (item 2). Carefully withdraw the igniter.
- Check the condition of the "O" seal (item 6) fitted on the exterior surface of the igniter body and underneath the piezo flange. Replace the seal if damaged. Note that the seal is fitted to prevent water formed inside the burner from dripping down past the igniter assembly and a damaged seal will not cause deterioration in burner performance.
- Withdraw the insulator, spring and electrode (items 3,4 and 5 respectively) from the body. Check the condition of each of the components. If the electrode ceramic is cracked, it must be replaced.
- Replacement is generally the reverse procedure of removal. Prior to fitting the "O" seal, apply a thin smear of Krytox 125 grease to the seal. Take care not to over-tighten the grub screw as this might cause damage to the aluminium thread in the valve block.
- Having re-fitted the igniter, operate the igniter and check for a good spark between the electrode tip and the tag on the pilot light assembly. Adjust the gap if necessary to improve the spark strength. The spark should be "strong" and blue in colour.

5.7 Pilot Light Assembly Removal and Disassembly

The following instructions assume that the burner is already removed from the burner frame but otherwise fully assembled. To remove the pilot light assemblies, refer to Figure 5 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PILOT LIGHT REGULATOR LOWER BODY	CR-PPD-0043
2	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
3	PILOT LIGHT REGULATOR UPPER BODY	CR-PPD-0039
4	PILOT LIGHT REGULATOR PISTON	CR-PPD-0040
5	PILOT LIGHT REGULATOR SPRING	CR-PPD-0091
6	FPM 2015 VITON 75 SHORE O-R SEAL	CR-PP-0311
7	FPM 2081 VITON 75 SHORE O-R SEAL	CR-PP-0312
8	VAPOUR JET FILTER	CR-PPD-0038
9	PILOT FLAME JET	CR-PPD-0037
10	PILOT FLAME LOWER TUBE	CR-PPD-0035
11	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
12	PILOT FLAME FRICTION NET	P034

13	PILOT FLAME TUBE SPLIT RING	P033
14	PILOT FLAME TUBE GAUZE	CR-PPD-0036
15	M4x5 ST STL FLAT DRIVE DIN 84 SCREW	CR-PP-0031
16	TORCH (UPPER TUBE) RH	CR-PPM-D032
17	TAG - FLAME DEFLECTOR FOR PIEZO SPARK	C032/1
18	PILOT LIGHT INLET FILTER HOUSING	CR-PPD-0065
19	NB 108 NBR 70 SHORE O-R SEAL	CR-PP-0321
20	PILOT LIGHT FUEL FILTER	CR-PPD-0038
21	M4 ST STL DIN 125 FLAT WASHER	CR-PP-0201

Figure 8

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Carefully separate the can and coil, as one assembly, from the valve block.
- Using a 3mm Allen key, undo and remove the screw (item 11) securing the complete assembly to the regulator body.
- Carefully withdraw the pilot light assembly from the regulator.
- To further strip down the pilot light assembly, use a flat blade screwdriver and remove the screw and washer (items 15, 21) securing the upper tube to the lower tube. Carefully separate the upper and lower tubes taking care not to damage the mesh filter (item 14) fitted between the two components.
- Check the condition of the mesh filter. Remove any large contaminants using a blast of air. Oily deposits may be removed by soaking the filter in a suitable solvent.
- Re-assembly is generally the reverse procedure of disassembly. When fitting the filter (item 14), make sure that the small hole in the filter is aligned with the hole in the lower tube. Make sure the filter is flat against the tube and free from wrinkles. Take care to prevent the filter "snagging" between the upper and lower tubes during re-assembly.
- Position the assembly on the regulator so that the igniter electrode aligns with the tag on the side of the upper tube. Adjust the position of the upper tube to obtain the best spark between the electrode and the tag.

5.8 Regulator Removal and Disassembly

To remove the pilot regulator assemblies refer to Figure 8 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Remove the pilot light assembly as described in Section 5.7.
- Remove the igniter assembly as described in Section 5.6.
- Hold the valve block securely, preferably in soft vice jaws.
- Using a 30mm AF open-ended spanner, undo and remove the lower body (item 1) from the valve block.
- Check inside the regulator-mounting hole in the valve block for any dirt. Clean if necessary.
- Carefully place the lower body hexagon in soft vice jaws. Using a 30mm open-ended spanner, undo and remove the upper body. Take care when removing the upper body, as this will expose the piston, spring and "O" seal.
- Remove the piston, spring and "O" seal (items 4, 5 and 7 respectively).
- Using a suitable soft-ended instrument, remove the "O" seal (item 6) from the piston stem. Take care not to scratch the piston surfaces.
- Remove the "O" seal (item 2) from the underside of the lower body.
- Check the condition of the three "O" seals and replace if necessary.
- Check the condition of the seal fitted in the end of the piston stem. If the seal is damaged or has deteriorated, then the entire piston must be replaced, as the seal cannot be removed independently.

- Using a 6.5mm open-ended spanner, undo and remove the jet (item 9). Remove the filter (item 8).
- Check that the small hole in the jet is clear. Remove any contaminants from inside the jet if necessary.
- Check that the filter is clean. If the filter is considered to be dirty, it must be replaced. Do not attempt to clean the filter as this may result in permanent damage..
- Check the condition of all the surfaces on the regulator bodies and piston where the seals are in contact. If significant scratches are noted, the part must be replaced. As a guide, scratches, which may be felt with a fingernail, are significant.
- Check the condition of the valve block surface where the "O" seal (item 2) makes contact. If the surface is damaged, contact Ultramagic for further instructions.
- Check that the seal sits inside the groove correctly. Poorly fitting seals must be replaced.
- Check the inside of the regulator bodies for the build up of oil. Oily deposits must be removed using a soft cloth and a gentle solvent if necessary. Make sure that the seals are not exposed to the solvent. Ensure that all traces of the solvent are removed before re-assembly.
- Replacement is generally the reverse procedure of removal. Prior to replacing the "O" seals, apply a thin smear of Krytox 125 grease to the seals and to the mating surfaces. Apply a thin smear of the same grease to the seal fitted in the end of the piston stem. Remember to fit the filter before fitting the jet. To aid assembly, fit the lower body and seal to the valve block before assembling the piston and upper body.
- Upon replacement of the regulator assembly, connect the block to a compressed air supply not exceeding 6.8bar (100 psi). Apply leak detector fluid to all the joints and open the pilot valve. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

Note that excessive accumulation of oil inside the regulator can cause the pilot light flame to deteriorate significantly. The rate at which oil accumulates depends greatly upon the quality of the fuel. Over time, if the oil is not removed, a sticky residue can accumulate preventing the piston from moving correctly and blocking the small filter. This may cause pilot light failure. It is important therefore to ensure that the regulator is kept clean.

5.9 Fuel Filter Assembly Removal and Disassembly

The filter may be removed in one of two ways. The first requires the use of a very long flat bladed screwdriver and accesses the filter from the top of the coil. However, depending upon the tools available and the conditions at the time it may be considered more practicable to disassemble the valve block from the can first. The following instructions assume the latter method is adopted.

To remove the fuel filter assembly, refer to Figure 8 and proceed as follows:

- Ensure that the burner is completely vented of fuel prior to removal of the filter assembly.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Carefully separate the can and coil, as one assembly, from the valve block.
- Using a large flat bladed screwdriver, undo and remove the filter body (item 18) from the valve block. Make sure that the screwdriver is the correct size for the job as use of the incorrect size may cause damage to the slot in the screw head.
- Carefully extract the filter (item 20) from the body (item 18). Check the condition of the filter and replace if considered necessary.
- Check the condition of the "O" seal fitted on the underside of the body head. Damaged seals must be replaced.
- Check the condition of the "O" seal groove in the underside of the body head. If significant scratches exist, the body must be replaced.
- Inspect the inside of the body to ensure that there are no blockages. Clean using a blast of air if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the "O" seal, apply a thin smear of Krytox 125 grease to the seal. Take care to ensure that

excessive grease is not used and that the small hole adjacent to the seal does not become blocked with grease.

- Upon replacement of the filter assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.10 Pressure Gauge Removal

To remove the pressure gauges, refer to Figure 9 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PRESSURE GAUGE	CR-PPD-0062
2	PRESSURE GAUGE CONNECTION	CR-PPD-0063
3	NB 2010 NBR 70 SHORE O-R SEAL	CR-PP-0322
4	PRESSURE GAUGE BODY SEAL	CR-PPD-0064
5	M5x25 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0840

Figure 9

- Ensure that the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Using a 4mm Allen key, undo and remove the screw fixing (item 5) securing the pressure gauge connection (item 2) to the valve block.
- Carefully withdraw the pressure gauge connection and pressure gauge as a complete assembly from the valve block. Take care not to loose the small "O" seal (item 3).
- Unscrew the pressure gauge from the gauge connection. Clean off all traces of PTFE tape from the gauge thread
- Remove the small "O" seal fitted in the groove between the gauge connection and the aluminium block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove and the seal bore in the gauge connection. If there is any damage to the seal mating surfaces, the gauge connection must be replaced.
- Check the condition of the gauge body seal (item 4). The seal is designed to prevent the passage of water from inside the burner through the valve block. Minor deterioration of the seal is therefore not detrimental to burner performance or safety. However, it is recommended that the seal be replaced if damage or deterioration is found.
- Replacement is generally the reverse procedure of removal. Prior to fitting the seals, apply a thin smear of Krytox 125 grease to the seals. Prior to fitting the screw (item 5) apply a small quantity of Loctite 243 to the screw thread. Check for the correct orientation of the gauge inside the valve block.

- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.11 Liquid Jet Removal

To remove the liquid jets, refer to Figure 5 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Access to the liquid jets may be improved by first removing the pressure gauge (see section 5.10).
- Using a 27mm AF spanner, undo and remove the liquid jet (item 13).
- Remove the "O" seal (item 14) from the underside of the jet lower flange where it mates with the valve block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove. If there is any damage to the seal mating surfaces, the jet must be replaced.
- Check the condition of the valve block surface where the seal mates. The surface must be free from damage such as significant scratches. As a guide, scratches detectable with a fingernail are considered significant. If significant damage is detected, contact Ultramagic for further advice.
- Check inside the jet-mounting hole in the valve block for any dirt. Clean if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the seal, apply a thin smear of Krytox 125 grease to the seal.
- Make sure that the jet is not aligned with any coil duct. If this happens, tilt the jet gently with the hand (the minimum possible) to avoid a direct contact among blast and coil.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8 bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.12 Main Valve Sleeve Removal

To remove the main valve sleeves, refer to Figure 5 and proceed as follows:

- Ensure the burner is completely vented of fuel.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Access to the main valve sleeves will be greatly improved by first removing the pressure gauge (section 5.10) and the liquid fire jet (section 5.11).
- Using a 27mm AF open-ended spanner, undo and remove the valve sleeve.
- Remove the "O" seal (item 14) from the underside of the sleeve lower flange where it mates with the valve block. Check the condition of the seal. If any deterioration of the seal is detected, it must be replaced.
- Check the condition of the "O" seal groove. If there is any damage to the seal mating surfaces, the sleeve must be replaced.
- Check the condition of the valve block surface where the seal mates. The surface must be free from damage such as significant scratches. As a guide, scratches detectable with a fingernail are considered significant. If significant damage is detected, contact Ultramagic for further advice.
- Check inside the sleeve-mounting hole in the valve block for any dirt. Clean if necessary.
- Replacement is generally the reverse procedure of removal. Prior to replacing the seal, apply a thin smear of Krytox 125 grease to the seal.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.

5.13 Removal of Fuel Hose

To replace a fuel hose, refer to Figures 1 and 10 and proceed as follows:

Figure 10

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Using a 19mm open-ended spanner, undo the hose from the valve block.
- Remove all PTFE tape from the screw thread.
- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to Figure 10 and specify the length and end fitting required. Cover the thread with a minimum of three turns of PTFE tape. Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the valve block. Take care when re-fitting the hose to prevent damage to the thread in the aluminium valve block.
- Ensure that the hose to valve block 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 leak detection fluid 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.

5.14 Liquid Valve Handles

To remove the liquid valve handles, refer to Figure 11 and proceed as follows:

SECTION DOUBLE ACTION VALVE ASSY

ITEM	DESCRIPTION	DWG / PART NUMBER
1	BLAST VALVE HANDLE RH	CR-PPD-D070
2	BLAST VALVE CAM	CR-PPD-0076
3	CONNECTION CAM / STEM	CR-PPD-0077
4	DOUBLE ACTION HANDLE PIN	CR-PPD-0082
5	LIQUID VALVE STEM	CR-PPM-L078
6	BLAST VALVE STEM	CR-PPD-P078
7	NB 2018 NBR 70 SHORE O-R SEAL	CR-PP-0323
8	BLAST / LIQUID ANTIFRICTION WASHER	CR-PPD-0080
9	BLAST VALVE CENTRE BODY	CR-PPD-P079
10	LIQUID VALVE CENTRE BODY	CR-PPD-L079
11	APS MAA-000762-01-01-1 ENERGISED SEAL	CR-PP-0301
12	WASHER STOP PTFE SEAL	CR-PPD-0088
13	BLAST / PILOT / LIQUID VALVE SPRING	CR-PPD-0090
14	BLAST / PILOT / LIQUID VALVE SHUTTER	CR-PPD-0045
15	BLAST / PILOT / LIQUID VALVE SEAL PAD	CR-PPD-0044

16	LIQUID CONNECTION JET	CR-PPM-0075
17	M5x20 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0170
18	BLAST VALVE SLEEVE	CR-PPM-0074
19	LIQUID VALVE EXTERNAL BODY	CR-PPM-0053
20	LIQUID VALVE HANDLE	CR-PPM-0056
21	M6x30 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0449
22	ROTATION STOP PIN	CR-PPD-0082
23	LIQUID VALVE BONNET	CR-PPM-0048
24	RING TO OPEN VALVE	CR-PPD-0050
25	LIQUID ANTIFRICTION WASHER	CR-PPD-0084
26	LIQUID SPRING SUPPORT	CR-PPM-0085
27	LIQUID VALVE STOP STEM	CR-PPM-0086
28	M4x8 ST STL FLAT DRIVE DIN 84 SCREW	CR-PP-0032
29	SPRING COMPENSATION	CR-PPM-0092
30	ANTIROTATION STEM PIN	CR-PPD-0082
31	BAR END CAP	CR-PPM-0072
32	M5x25 ST STL HEX DRIVE DIN 912 SCREW	MA-FE-0840
33	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
34	EXTERNAL BODY RH	CR-PPD-D071
35	M5x50 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0017
36	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326

Figure 11

- Ensure that the burner is completely vented of fuel.
- Using a 3mm Allen key, undo but do not fully remove, the small grub screw located in the side of the handle body (item 33).
- Using a flat-bladed screwdriver, undo and remove the fixing screw (item 28) located in the end of the valve. Remove the valve stop (item 27), the compression spring (item 29), the spring support (item 26) and the anti-friction washer (item 25).
- Unscrew and remove the threaded ring (item 24).
- Using a suitable probe, push out and remove the anti-rotation pin (item 30).
- Withdraw the bonnet (item 23).
- Re-assembly is generally the reverse procedure to disassembly. Remember to fit the anti-rotation pin (item 30). Apply a small quantity of Loctite 243 to the screw thread (item 28) prior to fitting. In order to prevent the possibility of the valve freezing, all moving parts must be lubricated with plenty of Molycote graphite grease.
- The valve design is such that the position of the threaded ring (item 24) must be set to the correct position. If the ring is not set correctly, the valve may fail to open or close correctly. To set the ring position, fully assemble the valve but do not fit the knob (item 19). Carefully unscrew the ring until the gap between the spring support (item 26) and the valve stop (item 27) is between 0.1mm and 0.2mm. Check the gap using feeler gauges. Re-assemble the knob (item 19) and set it in the fully closed position. Secure the knob by tightening the grub screw. To assist with the process of correctly setting the knob position, it may be useful to connect the burner to a compressed air supply. Set the knob position by checking for the sound of air exiting from the liquid fire jet as the knob is rotated between the on and off positions.
- Upon completion, check the function of the liquid valve. Make sure that the valve creates a seal when in the off position and allows the flow of fuel when activated.

5.15 Burner Handle Removal

5.15.1 Double Burner Bar Handle Removal

To remove the bar handle, refer to Figure 12 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	BAR END CAP LH	CR-PPM-E072
2	BAR END CAP	CR-PPM-0072
3	DOUBLE BURNER BAR HANDLE CONNECTION	CR-PPD-0073

Figure 12

- Using a 4mm Allen key, undo and remove the two cap head screws (one at each end) securing the bar handle to the handle end caps. Withdraw the bar handle.
- Replacement is generally the reverse procedure to removal. Prior to re-fitting the two screws, apply a small quantity of Loctite 243 to the screw threads.

5.15.2 Handle End Cap Removal

To remove the handle end cap, refer to Figures 11 and 12 and proceed as follows:

- Remove the bar handle as described in Section 5.15.1.
- Remove the liquid valve handle as described in section 5.14.

- Using a 4mm Allen key, undo and remove the two screws (item 32, Figure 11) securing the end cap.
- Withdraw the end cap.
- Replacement is generally the reverse procedure to removal. Prior to re-fitting the two screws (item 32, Figure 11) apply a small quantity of Loctite 243 to the screw threads.

5.15.3 Triple Burner Bar Handles Removal

To remove the triple burner bar handles, refer to Figure 3 and proceed as follows:

- Using a 4mm Allen key, undo and remove the three cap head screws (two at the ends of the short bar handle, one at the end of the long bar handle –item 7–) securing the bar handles to the handle end caps. Withdraw the T-shape bar handle assy.
- Using a 4mm Allen key, undo and remove the cap screw (item 6) securing the long bar (item 9) to the short bar handle (item 8).
- Replacement is generally the reverse procedure to removal. Prior to re-fitting the four screws, apply a small quantity of Loctite 243 to the screw threads.

5.15.4 Quad Burner Bar Handles Removal

To remove the quad burner bar handles, refer to Figure 4 and proceed as follows:

- Using a 4mm Allen key, undo and remove the four cap head screws (one at each end of each short bar –item 7–) securing the bar handles to the handle end caps. Withdraw the H-shape bar handle assy.
- Using a 4mm Allen key, undo and remove the two cap screws (item 6) securing the two short bars (item 9) to the long bar handle (item 8).
- Replacement is generally the reverse procedure to removal. Prior to re-fitting the six screws, apply a small quantity of Loctite 243 to the screw threads.

5.16 Double Action Mechanism Removal

The main and liquid burner valves are linked via a special mechanism. Movement of the main burner valve handle to the first (intermediate) position will open the associated main valve. Further movement of the handle will cause the associated liquid valve to open simultaneously thus enabling approximately double burner power output through single hand activation. Thus the main and liquid valve activation mechanism may be thought of as common to both valves and the mechanism must be disassembled before either of the valves may be removed.

To remove the double action mechanism, refer to Figure 11 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as described in Section 5.15.1.
- Remove the liquid valve handle as described in Section 5.14.
- Remove the handle end cap as described in section 5.15.2.
- Remove the three pivot pins (item 4) securing the blast valve cam (item 2), the connection cam/stem (item 3), the blast valve stem (item 6) and the liquid valve stem (item 5).
- Do not disassemble the handle (item 1) from the cam (item 2) if it is not considered necessary. To disassemble the handle and cam, remove the screw from the underside of the cam using a 4mm Allen key.
- The components used in the mechanism are generally robust and are not subject to significant wear. Component failure or deterioration is therefore unlikely. However, check the components for significant wear or any other problem, which might cause the mechanism to fail in the future. If any significant deterioration is detected, replace the part.
- Re-assembly is generally the reverse procedure of disassembly. Prior to re-assembling the handle (item 1) to the cam (item 2), apply a small quantity of Loctite 243 to the screw thread. ***Note: It is important to ensure that upon re-assembly, all moving joints are well lubricated with Molycote graphite grease. The grease prevents moisture settling on the joints and thus prevents any possibility of the joints freezing together during operation.***

5.17 External Valve Body Removal

The external valve body is fitted on the underside of the main valve block and encloses the main and liquid valve bonnets. In order to gain access to the main and liquid valves, the external valve body must be removed. To remove the external valve body, refer to Figure 11 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Removal of the external valve body will require access to a single fixing screw fitted on the upper side of the main valve block. The screws may be accessed either by using an Allen key attached to a long extension or by first removing the can and coil. The best approach to screw removal will depend upon the tools available and the conditions at the time. The following procedure assumes that the valve block is separated from the can and coil.
- Using a 4mm Allen key, undo and remove the three fixings located in the underside of the valve block. Note that upon removal of the four fixings, the valve block is no longer supported and is free to be withdrawn. Make sure therefore that the valve block is supported before removing the fixings.
- Remove the bar handle as detailed in Section 5.15.1
- Remove the liquid valve handle as detailed in Section 5.14
- Remove the handle end cap as detailed in Section 5.15.2.
- Remove the double-action mechanism as detailed in section 5.16.
- Using a 4mm Allen key, undo and remove the single fixing (item 35) situated on the upper side of the valve block.
- Remove the external valve body.
- Replacement is generally the reverse procedure of removal. Prior to replacing the fixing screw (item 35), apply a small quantity of Loctite 243 to the screw threads.

5.18 Pilot Valve Removal and Disassembly

To remove the pilot light valve, refer to Figure 13 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	PILOT VALVE HANDLE RED	CR-PPD-V055
2	PILOT VALVE KNOB BODY	CR-PPD-V054
3	M6x20 ST STL HEX DRIVE DIN 912 SCREW	CR-C-0250
4	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
5	ROTATION STOP PIN	CR-PPD-0082
6	PILOT VALVE BONNET	CR-PPD-0049
7	NB 2087 NBR 70 SHORE O-R SEAL	CR-PP-0326
8	PILOT VALVE STEM	CR-PPD-0046
9	ANTIROTATION PIN	CR-PPD-0082
10	RING TO OPEN PILOT VALVE	CR-PPD-0050
11	STOP STEM WASHER	CR-PPD-0087
12	M4x8 ST STL FLAT DRIVE DIN 84 SCREW	CR-PP-0032
13	ANTIFRICTION WASHER	CR-PPD-0084
14	PILOT VALVE SHUTTER	CR-PPD-0045
15	SHUTTER SEAL PAD	CR-PPD-0044
16	PILOT VALVE SPRING	CR-PPD-0090
17	PILOT LIGHT REGULATOR LOWER BODY	CR-PPD-0043
18	PILOT LIGHT REGULATOR UPPER BODY	CR-PPD-0039
19	PILOT LIGHT REGULATOR PISTON	CR-PPD-0040
20	PILOT LIGHT REGULATOR SPRING	CR-PPD-0091

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21	PILOT LIGHT JET FILTER	CR-PPD-0038
22	PILOT LIGHT REGULATOR JET	CR-PPD-0037
23	NB 2018 NBR 70 SHORE O-R SEAL	CR-PP-0323

Figure 13

- Ensure the burner is completely vented of fuel.
- Make sure the valve is in the closed position. Make a note of the position of the knob and knob handle. This will greatly assist when re-assembling.
- Using a 3mm Allen key, undo and loosen the grub screw (item 4) located in the side of the pilot valve knob (item 2). Do not fully remove the screw. Carefully withdraw the knob.
- Using a flat-bladed screwdriver, undo and remove the fixing screw (item 12) located in the end of the valve. Remove the plain washer (item 11) and the anti-friction washer (item 13).
- Unscrew and remove the threaded ring (item 10).
- Using a suitable probe, push out and remove the anti-rotation pin (item 9).
- Using a 26mm AF open-ended spanner, undo and remove the valve bonnet (item 6) from the main valve block.
- Extract the valve stem and shutter assembly (items 8 and 14) and the valve spring (item 16) from the bonnet (item 6).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 15) is permanently fixed in to the shutter. Do not attempt to remove it.
- Using a suitable soft-ended probe, carefully remove the "O" seals from the valve stem.
- Remove the large "O" seal (item 7) from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bore inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Remember to fit the anti-rotation pin (item 9). Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals. Apply a small quantity of Loctite 243 to the screw thread (item 12) prior to fitting. In order to prevent the possibility of the valve freezing, all moving parts must be lubricated with plenty of Molycote graphite grease.
- The valve design is such that the position of the ring (item 10) must be set to the correct position. If the ring is not set correctly, the valve may fail to open or close correctly. To set the ring position, fully assemble the valve but do not fit the knob and handle (items 2 and 1 respectively). Carefully unscrew the ring until the anti-friction washer (item 13) just begins to push against the plain washer (item 11). Re-assemble the knob (item 2) and set it in the closed position. Secure the knob by tightening the grub screw (item 4). To assist with the process of correctly setting the knob position, it may be useful to connect the burner to a compressed air supply. Set the knob position by checking for the sound of air exiting from the pilot light as the knob is rotated between the on and off positions.
- Upon re-assembly, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Check for the correct function of the pilot light valve by operating it normally. Ensure that the valve opens and closes correctly. If it is found that the valve does not function correctly, the problem must be resolved prior to returning the burner to service.

5.19 Liquid Valve Removal and Disassembly

To remove and disassemble the liquid valves, refer to Figure 11 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.
- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.
- Remove antifriction washer (item 8) and spring.
- Using a 27 mm AF open-ended spanner, undo and remove the valve bonnet (item 10) from the main valve block.
- Extract the valve stem and shutter assembly (items 5 and 14) and the valve spring (item 13) from the bonnet (item 10).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 15) is permanently fixed in to the shutter. Do not attempt to remove it.
- Remove the seal-retaining washer (item 12).
- Carefully remove the energised seal (item 11) from the bore inside the valve bonnet.
- Using a suitable soft-ended probe, carefully remove the "O" seals from the valve stem.
- Remove the large "O" seal from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of the PTFE energised seal (item 11). If the seal is defective, it must be replaced.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bores inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals and Molycote graphite grease to the antifriction washer (item 8). Prior to inserting the pin, use a small screwdriver or similar and carefully rotate the hole in the stem so that it is aligned correctly.
- Prior to fitting the external valve body, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints of all valves removed. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Upon completion, check for the correct function of all valves which have been removed. Ensure that the valves turn on and off correctly. If it is found that any of the valves do not function correctly, the problem must be resolved prior to returning the burner to service

5.20 Main Valve Removal and Disassembly

To remove and disassemble the main valve, refer to Figure 11 and proceed as follows:

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.
- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.

- Remove the antifriction washer (item 8).
- Access to the main valve may be improved by first removing the pilot valve. If it is considered necessary, remove the pilot valve as detailed in section 5.18.
- Using a 27 mm AF open-ended spanner, undo and remove the valve bonnet (item 9) from the main valve block.
- Extract the valve stem and shutter assembly (items 6 and 14) and the valve spring (item 13) from the bonnet (item 9).
- The valve stem is screwed in to the shutter and locked with a screw thread adhesive. It is recommended therefore that no attempt be made to separate the shutter from the stem, as it is likely that surfaces will be damaged in the process.
- The seal (item 15) is permanently fixed in to the shutter. Do not attempt to remove it.
- Remove the seal-retaining washer (item 12).
- Carefully remove the energised seal (item 11) from the bore inside the valve bonnet.
- Using a suitable soft-ended probe, carefully remove the "O" seals from the valve stem.
- Remove the large "O" seal from the underside of the valve bonnet collar where it mates with the valve block.
- Check the condition of all "O" seals. Damaged seals must be replaced.
- Check the condition of the shutter seal. The surface should be smooth and free from any damage. If the seal is considered to be defective, replace the complete shutter and stem assembly.
- Check the condition of the PTFE energised seal (item 11). If the seal is defective, it must be replaced.
- Check the condition of all the "O" seal grooves. If any significant damage such as scratching to the groove surfaces is detected, then the component must be replaced. As a guide, scratches detectable with a fingernail are considered significant.
- Check the condition of the bores inside the valve bonnet. If any significant scratches (particularly scratches running along the length of the bore) are detected, the bonnet must be replaced.
- Check the condition of the valve block lower surface where it mates with the large "O" seal on the underside of the bonnet collar. If any significant damage or deterioration is detected, contact Ultramagic for further advice.
- Re-assembly is generally the reverse procedure to disassembly. Prior to re-assembly, apply a thin smear of Krytox 125 grease to all the "O" seals and Molycote graphite grease oto the antifriction washer (item 8)..
- Prior to fitting the external valve body, connect the block to a compressed air supply not exceeding 6,8bar (100 psi). Apply leak detector fluid to all the joints of all valves removed. Check for any leaks. If any leaks are detected they must be corrected prior to return to service.
- Upon completion, check for the correct function of all valves which have been removed. Ensure that the valves turn on and off correctly. If it is found that any of the valves do not function correctly, the problem must be resolved prior to returning the burner to service.

5.21 Safety Button Removal and Disassembly

To remove the safety button, refer to Figure 14 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	SAFETY BUTTON	CR-PPD-0066
2	BLAST VALVE HANDLE RH	CR-PPD-D070
3	M5x50 ST STL HEX DRIVE DIN 912 SCREW	CR-PP-0017
4	EXTERNAL VALVE BODY RH	CR-PPD-D071
5	M6x6 ST STL HEX DRIVE DIN 914 GRUB SCREW	CR-N-0040
6	SAFETY BUTTON SUPPORT	CR-PPD-0068
7	STEM FOR SAFETY BUTTON	CR-PPD-0067
8	SPRING FOR SAFETY BUTTON	CR-PPD-0093
9	BAR END CAP	CR-PPM-0072
10	VALVE CAM	CR-PPD-0076

Figure 14

- Ensure that the burner is completely vented of fuel.
- Remove the bar handle as detailed in section 5.15.1.
- Remove the liquid valve handle as detailed in section 5.14.
- Remove handle end cap as detailed in section 5.15.2
- Remove the double action mechanism as detailed in section 5.16.
- Remove the external valve body as detailed in section 5.17.
- Using a soft felt tip pen, put a mark at the junction of the button assembly with the external valve body to keep the position of the plunger.
- Using a 3mm Allen key, loosen but do not remove the small grub screw (item 5).
- Withdraw the safety button assembly.
- Carefully unscrew the button (item 1). Remove the compression spring (item 8) located directly behind the button.
- Remove the plunger (item 7).
- Replacement is generally the reverse procedure to removal. Prior to assembly, apply a small quantity of Loctite 243 to the plunger thread. Note that the hole in the safety button support (item 6) is offset. When re-fitting the assembly back in to the external valve body,

it will be necessary to set the position of the hole relative to the valve body. Set the position by rotating the assembly and aligning it with the marker. Having set the correct position, lock the assembly in position by tightening the grub screw (item 5).

- When the burner is fully assembled, check for correct function of the button by ensuring it locks out the main burner valve handle and releases when the handle is subsequently operated.

SECTION 6

6.0 Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner. The inspection requirements are detailed below.

6.2 Pre-Functional Checks

Carry out all non-functional checks detailed in Section 4 (Preventative Maintenance).

6.3 Functional Test

6.3.1 Left and Right Main Burner Function (First Position)

Connect the burner to a suitable fuel supply. Operate the left and right main burner valves to the first (intermediate) position. Check for a good flame. Check that the ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.2 Left and Right Double Action Function

Operate the left and right main valve handles to the fully open position. Check for a good main and liquid combination flame. Check that the ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.3 Left and Right Liquid Valve Function

Connect the burner to a suitable fuel supply. Operate the left and right liquid burner valves. Check for a good flame. Check that flame ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.4 Left and Right Pilot Regulator Valves

During operation it is possible that an oily residue will accumulate inside the bore of the pilot regulator valve. This is quite normal. ***However, if the residue is not removed, it may cause problems in time as the residue changes consistency and begins to block the pilot light and pilot regulator jets and holes. This can cause a pilot light failure.***

The regulator must therefore be checked every 100 hours or 12 months (whichever is the sooner) and the residue removed as follows:

- Remove and strip down the regulator as described in section 5.8.
- Using a soft cloth, wipe the inside of the regulator housing and the regulator piston and remove all traces of the residue.
- If the residue proves difficult to remove, a cloth soaked with a small amount of solvent should be used.

- Check the condition of the fuel filter. Clean or replace if necessary.
- Check the inside of the jet and make sure it is clean. Remove any oil accumulation and any other dirt or contamination.
- Re-assemble the regulator as specified in section 5.8.

Having re-assembled the pilot regulator, its function must be tested as described below:

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.

6.3.5 Fuel Filter

Remove the left and right fuel filter assemblies as detailed in Section 5.9. Check the condition of the filter. Clean or replace if necessary. Make sure that all holes in the filter body are clear. Clean if necessary.

6.3.6 Emergency Pilot Light Safety Button

Check for the correct function of the left and right emergency pilot light buttons. Ensure that the buttons maintain the main valve handles in the open position when operated.

6.3.7 Burner Rotation Stops

Check that the burner rotation stops are fully functional and that they prevent burner inversion in ***both*** axes.

6.4 Pressure Test

Connect the burner to a 7Bar (100 psi) air supply. Using soapy water, check the following areas for leaks:

6.4.1 All main valve-to-valve block joints.
6.4.2 All main valve stems in open and closed position.
6.4.3 All liquid valve-to-valve block joints.
6.4.4 All liquid valve stems in open and closed position.
6.4.5 All fuel hose joints.
6.4.6 All pressure Gauge to Valve block joints.
6.4.7 All pilot regulator valve to valve block joints.
6.4.8 All liquid fire jet assembly to valve block joints (liquid valve open).
6.4.9 All pilot light to valve block joints (pilot regulator valve open).
6.4.10 All coil post to valve block joints (main valve open).

SECTION 7

7.0 Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Main burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Liquid burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Persistent smell of fuel	Fuel leak from burner or hose.	Air pressure test to determine location of leak. Repair as necessary.
Reduction in main burner power	Jets in jet ring blocked.	Clean and unblock jets.
Main and / or liquid valves fail to close.	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Valve double-action mechanism frozen.	Grease mechanism (see section 5.19 and 5.20).
	Safety button activated.	Release button.
Pilot light fails to ignite	Fuel cylinder valve off.	Turn valve on.
	Pilot valve off.	Turn valve on.
	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly
	Regulator filter blocked.	Clean filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Failure of piezo igniter.	Repair igniter.
	Dirty igniter electrode or tag	Clean electrode and tag
	Gap between igniter electrode and tag incorrect.	Re-set gap.
	Burner placed in excessive crosswind.	Move burner away from crosswind.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Pilot light flame weak	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly
	Regulator filter blocked.	Clean filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
	Piston lower seal detached from piston.	Replace piston assembly.
	Inlet and outlet hole in piston blocked.	Clean hole.
	Air inlet to pilot light blocked.	Clean mesh filter.
	Piston "O" seal failure.	Replace seal.
Pilot light flame very large	Regulator jet not fitted.	Fit jet.
	Piston seals not fitted or failed.	Repair seals.
Pilot light fails to extinguish	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Burner gimbal action too tight or too loose	Friction setting on gimbal mechanism incorrectly set.	Adjust friction setting.
Burner excessively hot	Fuel pressure too low.	Run burner within recommended fuel pressure range.
	Fuel cylinder empty, burner running on vapour only.	Connect burner to a full cylinder.
Safety button fails to operate correctly	Offset hole in button assembly incorrectly set.	Adjust assembly position in external valve body.

APPENDIX I

Annual / 100 Hours Burner Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Burner Can Fixings	4.2		
General Cleaning	4.3		
Main jets	4.4.1		
Coil Fixings	4.4.2		
Coil Tubing	4.4.3		
Coil Support Rivets	4.4.4		
Pilot Light Strength	4.5		
Igniter Spark	4.6		
Fuel Hoses	4.7		
Pressure Gauge	4.8		
Burner Mounting	4.9		
Main Burner Function	6.3.1		
Double Action Function	6.3.2		
Liquid Valve Function	6.3.3		
Pilot Regulator Valve Clean and Function	6.3.4		
Fuel Filter	6.3.5		
Emergency Pilot Light Button	6.3.6		
Burner Rotation Stops	6.3.7		
Main Valve Pressure Test	6.4.1 6.4.2		
Liquid Valve Pressure Test	6.4.3 6.4.4		
Fuel Hose Pressure Test	6.4.5		
Pressure Gauge Pressure Test	6.4.6		
Pilot Regulator Valve Pressure Test	6.4.7		
Liquid Fire Jet Pressure Test	6.4.8		
Pilot Light Pressure Test	6.4.9		
Coil Post Pressure Test	6.4.10		

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MK-32 BURNER SERIES ("Supplement 23")

Supplement 23

MK-32 BURNER SERIES

SECTION 1. Introduction

This supplement defines the maintenance and inspection requirements for the ULTRAMAGIC MK-32 burner series. Sections 1 to 5 detail the maintenance procedures and the parts used in the burner construction. Section 6 details the annual / 100 hour inspection and test requirements.

Refer to Unit Conversion Table (Supplement 10), whenever IS units are necessary.

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under 14 CFR 42.16 and 91.403 of the Federal Aviation Regulations.

1.1 Applicability

The information contained in this supplement applies to all ULTRAMAGIC MK-32 burners as defined by the following drawings:

Double Burner: 2062-0000
Triple Burner: 2063-0000
Quad Burner: 2064-0000

1.2 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.

Always quote the spare parts reference codes shown in our Parts Catalogue (available in the ULTRAMAGIC website) to place an order.

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

1.3 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 maintenance organisations approved by the national airworthiness authority in the country of registration of the aircraft.

1.4 Welding and Welders

The burner is designed so that almost all the parts are replaceable without requiring welding. In accordance with that, this supplement does not define the procedures involving welding. However, 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.
- Always contact ULTRAMAGIC in order to provide advice on the setup, materials and techniques to be applied.
- All welding must be carried out by a welder approved to the appropriate standard by ULTRAMAGIC or the national airworthiness authority in the country of registration.

1.5 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.
- Traceability with the origin of any spares or parts used.

1.6 Technical Support

If technical assistance is required, contact ULTRAMAGIC. Always quote the burner serial numbers involved.

1.7 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.
- Whenever the burner is to be leak / operationally tested using fuel, place it outdoors in a clear and well ventilated area. Check that the fuel pressure falls within the operational range.
- 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.

1.8 Tools and Consumables

The MK-32 Burner is to be maintained using the appropriate tool for each job. The burner has been designed not to require special tooling for normal maintenance, thus it is not mandatory to use tools supplied by ULTRAMAGIC. However, always use the appropriate tool for its intended function.

Observe the general use of consumables such as Loctite Screwlock 222, Graphite grease, and Krytox grease (this last one only to be supplied by ULTRAMAGIC).

1.9 Torque

The following table provides recommended torque values for most of the threaded assemblies present in the MK-32. These values are provided for guidance only; the use of dynamometric equipment is not mandatory, unless otherwise specified.
Beware that certain specific fittings may require a special torque, which will be detailed in the appropriate section of this Manual.

Thread	Male Material	Female Material	Recommended Torque [N·m]	Joint / Component
M5	St Stl	Alu	4.3	Valve block to block cover

				Handle bar support Pressure gauge connector to valve block Coil centre column to Valve block
M5	St Stl	St Stl	4.4	Liquid valve handle
M6	St Stl	Copper	4.3	Can to Hanger
M6	St Stl	St Stl	7.4	Can to Coil strip Can to Valve block
M6	St Stl	Brass	7.4	Main/Liquid Valve seat to Valve stem
M6	Brass	Brass	2.3	Pilot light Jet
M6	St Stl	Alu	2.5	Coanda type jet ring Piezo support grub screw
M8	St Stl	St Stl	15	Pressure gauge felt compressor Cap
M20	St Stl	Alu	20	Liquid jet
M20	St Stl	St Stl	35	Blank nut to Coil centre column
M27	St Stl	Brass	20	Liquid pilot light regulator body
M27.5	St Stl	St Stl	20	Liquid pilot light regulator body

SECTION 2. Airworthiness Limitations

2.1 Approval Statement

This manual provides the maintenance information required by EASA CS-31HB .82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

There are no components in the MK-32 Burner Series which must be replaced after a fixed length of time.

2.3 Inspection Interval

The maximum inspection interval for the burner is 100 hours operation or one year; whichever is the sooner. The requirements for this inspection are defined in section 6.

SECTION 3. Technical Description

3.1 General

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

Fuel is supplied to the burner through the flexible hoses. The fuel enters a machined valve block whereupon the fuel is distributed to the various valves and pressure gauge in readiness for use. The burner assembly is to be fed from at least two independent supplies.

The burner pot is provided with the following major features/functions:

- Burner can
- Main Burner Vaporising coil
- Liquid Fuel hose
- Main valve assembly
- Liquid valve assembly
- Pilot Light assembly
- Igniter assembly
- Pressure gauge assembly
- Liquid fire jet assembly

Burner pots are mechanically connected by the handle bar and hanger assemblies. The complete burner is then mounted onto the supporting frame by means of a gimbal block fitted to the hanger bracket.

The burner Main and Liquid valve handles are designed to enable their independent use, but also their simultaneous activation. This last feature implies approximately double power output through single hand operation.

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

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

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

Figure 1 - General Assembly Identification

ITEM	DESCRIPTION	SECTION
1	ULTRAMAGIC GIMBAL BLOCK	3.2
2	BURNER CAN	3.3
3	VAPORISATION COIL	3.4
4	FUEL HOSES	3.6
5	LIQUID FUEL INLET POST	N/A
6	HANDLE BAR ASSEMBLY	N/A
7	BLOCK MAIN ASSEMBLY	N/A
8	VALVE BLOCK ASSEMBLY	N/A
9	LIQUID/WHISPER FIRE VALVE ASSEMBLY	3.8
10	CENTRE COLUMN ASSEMBLY	3.5
11	PRESSURE GAUGE ASSEMBLY	3.10

12	IGNITER ASSEMBLY	3.9
13	PREHEATER ASSEMBLY	3.13
14	PILOT LIGHT ASSEMBLY	3.12
15	FILLER BLOCK / HYDRAULIC ACTUATOR ASSEMBLY	3.16

3.2 Burner Gimbal Block Assembly

The burner is provided with a centre gimbal block assembly allowing two-axis movement of the burner. With the exception of the burner gimbal mounting, the gimbal block assembly is standard to the ULTRAMAGIC range of burners and maintenance instructions are provided in a separate maintenance supplement. The burner gimbal block assembly and mounting configuration may be seen in Figure 1.

3.3 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 an interface gasket providing water sealing. The can provides the mechanical support for the vaporisation coil and attachment to the gimbal mounting arrangement. The can may be seen in Figure 1.

3.4 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve using a machined coil column and bonded washers fitted on top and below the coil inlet fitting. 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, with riveted coil supports, ended by a special jet ring with machined jet holes. This jet ring is used at the same time as the support for the water slurper tube assembly. 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 consist of a small bore tube mounted in a boss. The tube is secured to the boss by means of an Allen screw. Loosening this screw allows the tube to be adjusted in order to achieve optimum performance. The boss assembly can be either welded or screwed to the jet ring.

The three vertical riveted strips are connected to the can edge using screws. One of the strips is mechanically connected also to the burner hanger assembly.

When the main valve is opened, fuel enters the coil through the inlet tube. The fuel rises through the inner coil to the top of the burner and then descends through the outer coil spiral until it exits through the jet ring. The vaporisation coil configuration may be seen in Figure 1.

3.5 Coil Connection Column

The interface to the vaporisation coil is through a machined column, which is hold against the valve block bore by means of three screws. The column is provided with a precision-machined neck to accommodate the coil inlet fitting, which is mechanically fixed to the column using a blind nut above. The coil connection column may be seen in Figure 5.

Note that the coil connection column is used to create the seal to the main valve and removal of the column will therefore break the pressure integrity of the burner. It is very important therefore to ensure that the burner is completely vented of fuel prior to removal of these components.

3.6 Fuel Hoses

The fuel hoses link the burner to the fuel cylinders. They are constructed with a multilayer tubular structure which combines nitrile rubbers and steel meshes, being terminated with a choice

of REGO®, TEMA® or Fastflat 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 date of manufacture is engraved on the hose end fittings for traceability purposes.

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.

3.7 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 main valve is a single action and operation of the valve handle activates the main fire function only. The valve is a plunger type and uses a special sprung loaded rubber seal, bearing against a machined seat beneath the Coil connection column to create the seal. When the valve handle is operated, the rubber seal splits from the seat and allows the flow of fuel.

The valve stem is housed in a machined brass valve bonnet. A pressure tight seal is achieved between the stem and bonnet with the use of two "O" seals and a primary sprung loaded seal. The bonnet is sealed to the valve block using an "O" seal fitted in a machined groove in the bonnet mating face. The main valve configuration may be seen in Figure 6.

3.8 Liquid Valve Assembly

The function of the liquid valve is similar to the main valve described above and the method of sealing is identical. The liquid valve is a single action and operation of the liquid valve handle activates the liquid fire function only.

The design of the rubber seal, its seat and the valve stem is identical to that of the main valve. It differs only on the handle mechanism, which is, however, of squeeze action as well.

The liquid valve configuration may be seen in Figure 6.

3.9 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 piezo igniter and an electrode permanently mounted in temperature resistant ceramic. The electrode and piezo igniter are electrically connected by a compression spring. When assembled, the piezo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

Upon operation of the piezo 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.

The igniter assembly configuration may be seen in Figure 10.

3.10 Pressure Gauge Assembly

The pressure gauge is mounted inside a machined bore in the valve block. Access to the gauge is from the upper surface of the valve block.

A pressure tight seal is achieved with the use of PTFE tape and a taper thread on the gauge rear. The gauge is screwed in to a special retaining block fitted to the upper surface of the valve block. The retaining block is secured to the valve block by a single screw fixing. The retaining block also functions as a fuel link to the pressure gauge and the interface to the valve block is therefore sealed using an "O" seal. 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 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.

The pressure gauge configuration may be seen in Figure 9.

3.11 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 a duct with multiple holes at the outlet. The body is sealed to the valve block using an "O" seal fitted in a machined groove on the underside of the jet body. The liquid fire jet configuration may be seen in Figure 1.

Note that the jet body is used to make the seal to the liquid valve jet and removal of the jet will therefore break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to carrying out any work on the liquid fire jet.

3.12 Pilot Light Assembly

The MK-32 Burner introduces a single-assembly pilot light concept, which enhances its access for maintenance as well as its changeability.

The pilot light assembly is offered with a choice of variants, depending on the needs of the customer. All variants are designed to fit onto the same bore in the main block. Its seal is provided with a couple of o-rings, and is hold in place by a set of screws. All the assemblies provide a pilot light torch and an on/off valve function to control the feed of fuel to the pilot light. Each of the variants and its particularities is described next.

3.12.1 Liquid Pilot Light Assembly

The Liquid Pilot Light is the standard choice of the MK-32 burner. Its name is given by the use of liquid fuel as source. This feature involves the presence of a regulator, which vaporizes the fuel needed and provides a constant output flow of fuel vapour, regardless of the pressure of the sourced fuel.

The liquid pilot light consists of three main subassemblies, named from top to bottom: Torch, Regulator and Valve.

The torch is meant to protect the stability of the pilot light flame against turbulences and wind gusts, ensure a proper mixing of fuel / air and allow the ignition of the flame as a result of the spark from the piezo.

The regulator subassembly consists of a lower body which screws in to the valve block, a sprung loaded piston and an upper body fitted with a small jet.

The regulator sub-assembly is screwed in to the upper surface of the valve block. An "O" seal fitted in a machined groove on the underside of the lower body forms the seal between the regulator and the valve block. The lower body is provided with a seal seat and this forms the seal between the on/off valve sub-assemblies.

When the valve handle is operated, fuel enters the lower body through a small hole. Fuel passes through a small hole in the piston and exits in to the chamber between the piston and the

upper body. The sudden increase in volume causes the fuel to vaporise. The fuel pressure in the chamber forces the piston down thus closing off the fuel inlet. Vaporised fuel in the upper chamber is vented off through the jet to the pilot light assembly. As the pressure in the chamber falls, the spring forces the piston to move forward and the cycle is repeated.

The piston is fitted with a small lower seal, which closes off the flow of fuel. A larger "O" seal is fitted inside the upper body and forms the seal between the piston and the body.

The on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat, similar (but not identical) to the main and liquid valves. The stem is sealed to the bonnet using two "O" seals. An "O" seal fitted in a machined groove in the bonnet mating face seals the bonnet to the valve block. Rotation of the knob causes the stem to move backward thus breaking the seal to the regulator lower body.

Note that the regulator lower body is used to create the seal to the regulator on/off valve. Removal of the regulator lower body will break the pressure integrity of the burner. It is therefore very important to ensure that the burner is completely vented of fuel prior to removal.

3.12.2 Vapour Pilot Light Assembly

When fitted, the Vapour Pilot Light completely replaces the standard Liquid Pilot Light fitted in the burner valve block. Its valve controls the supply of vapour fuel, taken directly from a master-type fuel cylinder and supplied with a dedicated hose, to the pilot light.
Similarly to the liquid version, the on/off valve sub-assembly consists of rotary action knob acting about a valve bonnet. The bonnet is fitted with a stem and a valve seat. The stem is sealed to the bonnet using two O-Rings. Rotation of the knob causes the stem to move backward thus breaking the seal to the pilot light upper body. Note that the regulator is omitted in this version as the fuel is already available in vapour phase.
The body is secured to the valve block using the same four fixings as used to secure the standard Pilot Regulator Valve.

3.12.3 Oxygen assisted Pilot Light Assembly

The so called Oxygen Assisted Pilot Light consists of a Vapour Pilot Light design derived from the assembly described above, which has been added with a second independent circuit intended for an auxiliary supply of Oxygen to the pilot light flame. This is of particular interest to enhance the performance and stability of the flame in atmospheres with a poor content of Oxygen (high altitude flights).

The pilot light on/off valve in the burner allows the control of the flow of vapour fuel, whist oxygen is controlled from the valve in the source.

3.13 Pre-heater and Filter Assembly

On the Liquid Pilot Light assembly, fuel to the pilot light regulator is supplied by a dedicated tapping in the valve block. Prior to entering the pilot regulator, the fuel passes through a preheater tube assembly and a filter. The filter is fitted underneath the preheater base allowing it to be removed easily for maintenance. The assembly is screwed in to the upper surface of the valve block and is sealed using two Viton O-Rings fitted in two grooves in the mating face.

Burners equipped with a Vapour or Oxygen Pilot Light may continue to mount the preheater (although not used) or fit a blanking plate, as its presence is not required.

3.14 Triple Burner

The MK-32 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 a triangular configuration.

The triple burner utilises a centrally positioned hanger assembly to secure the three burner pots together. In addition, an aluminium "T" handle, linking all three pots together replaces the burner handle.

3.15 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 a single "H" handle linking all four pots together, replaces the existing handles.

3.16 Hydraulic Kit (optional)

The burner is provided with the option to fit a hydraulically activated main valve, which consists of a remote hydraulic handle with reservoir and an actuator block, both connected using a hydraulic tube. The function of the valve is similar to that of the standard valve.

The actuator block is inserted in a valve block slot (replacing a filler block), allowing its piston to move the main valve mechanism when the remote hand lever is squeezed. When this occurs, hydraulic fluid is pumped into a chamber inside the actuator block. This forces the piston to move, with the result that the main valve stem is pulled down, the valve is opened and the fuel flow to the coil is enabled. When the lever is released, the valve closes under spring action.

The main valve may be operated anytime in two ways: using the remote hand lever or the standard "squeeze" action handle.

3.17 Crossflow Kit (optional)

The burner is provided with the option to fit a set of additional valves and connections allowing the simultaneous use of two burner vaporisation coils. This feature allows the pilot to use all the power of a triple or a quadruple burner with just one hand.

The system consists of an interconnection tube between the two burner pot's vaporisation coil inlet. The interconnection tube is provided with a manual shutoff valve allowing the pilot to enable or disable the flow of fuel from one coil to the other. When the valve is closed the coils are completely independent from each other and the burner behaves as if it was a standard burner. On the other side, when the valve is opened the two vaporisation coils become connected and when one of the two main valves is activated the fuel flows along the two vaporisation coils.

SECTION 4. Preventative Maintenance

4.1 General

It is recommended that the burner is subject to periodic preventative maintenance checks 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 operational conditions and experience gained during the operation of each burner. The checks are detailed below.

4.2 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 may be indicative of inefficient fuel combustion. If this is considered to be the case, contact ULTRAMAGIC for further advice.

Sooty deposits may be removed from the burner can and coil using a suitable cleaning solvent. It is recommended to apply the product in small quantities using a cloth.

Avoid the use of high-pressure water cleaners and products not compatible with brass, anodised aluminium, steel or rubber. When using a solvent, follow the manufacturers' safety instructions, particularly with regard to the use of breathing protection and ventilation.

4.3 Valve Block Fixings

The six fixings used to secure the valve block to the burner can provide structural stability. Therefore check that the 6 screws on the underside of the valve block perimeter are secure. If any of the screws are loose, completely remove the screw and apply a small amount of Loctite 222 to the thread (one at a time). Re-assemble the screw and tighten.

The same check applies to the four hex socket cap fixings around the pilot light handle, which hold the pilot light assembly in place. Beware that the removal of the screws releases the assembly, breaking the pressure integrity of the burner.

4.4 Vaporisation Coil

4.4.1 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. A small number of blocked jets (≤10%) does not have significant effects, but if a larger amount is detected, these must be cleaned as specified in Section 5.13.

4.4.2 Coil Tubing

Check the tube used in the construction of the coil for damage including signs of cracking, serious indentation and deterioration of welded joints. Serious indentation cannot be repaired and the coil must be replaced as described in Section 5.12.

4.4.3 Coil Support Rivets

Check the condition of the rivets used to fix the two halves of the coil supports together, as well as the riveted nuts at their inferior ends. In particular, check the condition of the rivets on the inside of the coil. All rivets must be in good condition and show no signs of damage due to over-heating. If damage to any of the rivets is detected, contact ULTRAMAGIC for further advice.

4.4.4 Water Slurper Tube Assembly

Check that the water slurper tube is firmly secured to its correct position. If some adjustment is required loosen the screw that holds the tube, make the adjustment and tight the screw again. For the removable version of the slurper assembly check also that the screw holding the boss to the coil jet ring is firmly secured. Check if the slurper tube is blocked and clean or replace it accordingly.

4.5 Pilot Light

4.5.1 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 (if applicable) or pilot light valve. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in Section 5.20.

4.5.2 Pilot Light Shut-off

Check that the pilot light flame extinguishes correctly:

- Turn on and light the pilot light for a minimum of 5 seconds.

- Switch off the pilot light valve.
- Await a few seconds (< 5 sec) and reopen the valve handle. Check that the gas exhausts the jet but it does not ignite. If a flame is detected, the pilot light must be cleaned or fixed.

4.5.3 Pilot Light Handle Movement

The pilot light handle is designed to enable its setup and adjustment. Its rotary action of 180° must allow sufficient margin to ensure the complete closing / opening of the valve. Therefore connect the burner to a suitable fuel supply and check that a flow of gas can be heard exiting the pilot light jet at approx. half of the handle run (90°). If a significant deviation is found, adjust the handle as described in Section 5.20.6.

4.5.4 Pilot Light Conversion

Since the MK-32 is offered with different pilot light types (Liquid, Vapour or Vapour with Oxygen Assistance), these can be swapped from one to another as per 5.20.4. Carry out a full operational and leak check after any conversion and make sure to carry on board the appropriate supply of fuel (and oxygen, if due) as per the Flight Manual and Supplements.

4.6 Igniter Spark

Check the strength of the igniter spark. If it is considered that the igniter spark is weak, adjust the spark gap as described in section 5.16. If this fails to improve the spark, it is possible that there is poor electrical continuity between the igniter and the pilot light. Check that the grub screw used to secure the igniter assembly and fitted in the side of the valve block is tight (take care not to damage the aluminium thread in the valve block). Check that the pilot light assembly is secure. If it appears to be loose, make sure all fixings are tight.

If the above actions fail to improve the spark, the igniter will need to removed and disassembled to determine the cause of the problem (see Section 5.16). Note that Small cracks or damage to the Igniter Ceramic as well as sooty deposits on the electrode or spark surfaces may cause ignition problems. Replace the electrode if necessary.

4.7 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 5.6.

Fuel hoses must be obtained from ULTRAMAGIC. For safety reasons, fuel hoses are supplied assembled with the connector and pressure tested.

4.8 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 at normal operational pressure (5 to 10 bar). Turn on the liquid supply and visually inspect the position of the gauge pointer. Shut off the valve and repeat the process with the other burner units using the same cylinder. All manometers must provide the same reading ± 1 bar.

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

If either of the above tests indicate that the gauge is faulty, the gauge must be replaced in accordance with the instructions in section 5.15.

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.

4.9 Burner Mounting

4.9.1 Double Burner

Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight.

4.9.2 Triple and Quad Burners

Check that all fixings used to secure the gimbal support to the burner cans are secure. Tighten the fixings if necessary. Ensure that the eight fixings securing the gimbal block are tight. Visually check the condition of the central hanger assembly for signs of damage including serious indentation, distortion, cracking or weld deterioration.

4.10 Hydraulic Kit (if applicable)

Fit the actuator in the slot (section 5.22) and make sure that it stays in position: pull gently the hose and confirm that risk of inadvertent removal of the actuator is not possible. Check for the correct function of the hydraulic assembly and that there are no hydraulic fluid leaks.

4.11 Crossflow Kit (if applicable)

Check the condition of the interconnection tube and valve. Look for any sign of damage or abuse loads. Check there is no leaks in any of the interconnection joints and that the valve works correctly. Check that the antirotation plate placed on the central gimal assembly is in good condition.

SECTION 5. Repair and Maintenance

5.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies, sub-assemblies and components used within the burner. Maintenance other than that detailed in the Section 4, (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 compressed air supply (7 Bar/100 psi recommended) and test the joint using leak detector fluid. If bubbles are detected during the test, there is a leak, which must be rectified before further burner use.

Prior to carrying out any maintenance work, ensure that the burner is completely vented of fuel and disconnected from the fuel supply.

5.2 Gimbal Block Removal

The gimbal assembly is identical to that used on the MK21 burners. For maintenance instructions, refer to ULTRAMAGIC Maintenance Manual Supplement Number 8.

5.3 Gimbal Mounting Bracket Removal

- Remove the Handle Bar Assembly (Section 5.5)
- Remove the Gimbal Block (Section 5.2)
- Bracket and Can Withdrawal

5.4 Can Removal

If it is considered that the can must be replaced, refer to Figures 2 and 3 and proceed as follows:

Figure 2 - Can & Coil Fixings

ID	P/N	DESCRIPTION
1	CR-22-2500	Centre Gimbal Block Assembly
2	CR-C-0250	Bracket-Can-Coil Securing Screw
3	CR-09-0080	Bracket-Can Securing Screw
4	MA-FE-0090	Washer
5	CR-03-0170	Locking Nut
6	MA-FE-0090	Washer

ID	P/N	DESCRIPTION
7	CR-C-0250	Coil-Can Securing Screw
8	2062-0600	Burner Can
9	2062-1500	Double Burner Centre Bracket
10	2062-0612	Doubler Plate
N/A	2063-1500	Triple Burner Centre Bracket
N/A	2064-1500	Quad Burner Centre Bracket

Figure 3 - Can Bottom Fixings

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ID	P/N	DESCRIPTION
1	CR-C-0250	Can-Block Securing Screw
2	2062-0600	Burner Can Assembly
3	2062-0300	Main Burner Block
4	3D-06-1302	Can Rubber Gasket (not shown)

- Remove the Handle Bar Assembly (Section 5.5).
- Using a 5 mm Allen key, undo and remove the three screws (Figure 2, items 2, 6 and 7) securing the coil strips to the can. Note that the screw on the bracket (Figure 2, item 2) is longer and does not use washer.
- Using a 5mm Allen key, undo and remove the four fixings (Figure 2, item 3) securing the can to the supporting bracket. Note that the screws are fitted with nuts (Figure 2, item 5) and washers (item 4). When reassembling the can later, fit new copper nuts.
- Using a 5mm Allen key, undo and remove the six M6 fixings (Figure 3, item 1) securing the base of the can (Figure 3, Item 2) to the valve block (Figure 3, Item 3).
- Check the condition of the gasket (Figure 3, Item 4) and replace if damaged.
- Remove the Coil (Section 5.13).
- Re-assembly is the reverse process of dismantling. Note that the vaporisation coil must be reassembled in accordance with the instructions contained in section 5.13.
- Beware that the can is fitted with an internal steel doubler on the top collar which adds mechanical strength to the can. It is hold by the screws which secure the coil strips and the centre support bracket. Beware that the doubler can be assembled only in one position, thus check for the correct alignment of the holes.

5.5 Handle Bar Assembly Removal and Disassembly

The procedure is common to all burner assemblies (Double/Triple/Quad). Refer to figure 4a and proceed as follows:

Figure 4a - Handle Bar and Liquid Fire Handle Assemblies

ID	P/N	DESCRIPTION
1	2062-0312	Valve Block Handle Connection
2	2062-0110	Double Burner Handle Tube
3	CR-PP-0011	Liquid Handle Securing Screw

ID	P/N	DESCRIPTION
4	2062-1122	Liquid Handle (Red)
5	CR-PP-0011	Handle Connection Securing Screw
6	CR-09-0080	Handle Tube Securing Screw

- Remove all Filler Blocks and/or the Hydraulic Actuators (Section 5.22)
- Using a 4mm Allen key, undo and remove the screws (Figure 4a, item 3) securing the liquid handles (Figure 4a, item 4). Release the handles.

- Using a 4mm Allen key, undo and remove the four screws (Figure 4a, item 5) holding each handle bar end (Figure 4a, item 1).

Once removed from the burner, the Handle Bar Assembly can be disassembled loosening the screws (Figure 4a, item 6) which hold the tube(s) (Figure 4a, item 2) with the ends (Figure 4a, item 1). These screws can be accessed from the holes in the handle bar. On the triple and quadruple burner assemblies, the tube arrangement may be dismantled as shown in Figure 4b:

Figure 4b - Triple/Quad Handle Bar Subassembly

ID	P/N	DESCRIPTION
1	3T-01-1101	Triple Burner Handle Tube (Long)
2	3Q-01-1101	Quad Burner Central Handle Tube
3	CR-09-0080	Handle Tube Securing Screw

ID	P/N	DESCRIPTION
4	3T-01-1302	Handle Tube T-connection Inner Saddle
5	3T-01-1201	Handle Tube T-connection Outer Saddle
6	3T-01-1001	Triple/Quad Burner Handle Tube (Short)

Re-assembly is generally the reverse procedure to disassembly. Insert the ends to the bar(s) but do not tighten the screws (item 6) until the Handle Bar Assembly is connected to the burners (by doing this, the correct alignment of the ends is warranted).

5.6 Fuel Hose (Liquid) Removal and Replacement

To replace a fuel hose, refer to Figures 1 and 5 and proceed as follows:

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Using an adequate open-ended spanner, undo the hose from the valve block.
- Inspect the condition of the thread in the Fuel Intake socket. Replace if necessary (Section 5.8).
- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to the ULTRAMAGIC Parts Catalog and specify the length and end fitting required.
- In parallel (cylindrical, BSP) threaded fittings, inspect the condition of the Bonded washer, looking for signs of corrosion or damages to the rubber lip. Replace if damaged or if in doubt about its condition.
- In conical (NPT, BSPT) threaded fittings, remove all PTFE tape from the female screw thread. Cover the new male thread with a minimum of three turns of PTFE tape (it can be combined with the use of Loctite 572). Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the valve block.
- Refit the connector to the hose end. Ensure that the joint is tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. 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 leak

detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

5.7 Fuel Hose End Connector Removal

The following instructions describe the removal and replacement process of all approved connector types (Rego, Tema, FastFlat):

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.
- Hold the hose end fitting securely, preferably in soft vice jaws.
- Using a suitable open-ended spanner, undo and remove the connector from the hose.
- Replace the hose or the connector, as required. When ordering a replacement part, refer to the ULTRAMAGIC Parts Catalog.
- In parallel (cylindrical, BSP) threaded fittings, inspect the condition of the Bonded washer, looking for signs of corrosion or damages to the rubber lip. Replace if damaged or if in doubt about its condition.
- In conical (NPT, BSPT) threaded fittings, remove all PTFE tape from the female screw thread. Cover the male thread with a minimum of three turns of PTFE tape (it can be combined with the use of Loctite 572). Wind the tape on to the thread in the correct direction so that it does not tend to undo whilst it is being screwed in to the connector.
- Inspect the condition of the threaded bore in the connector.
- Ensure that the hose to valve block joint is tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. 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 leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

5.8 Fuel Intake Post Removal

The Fuel Intake Posts allow the burner to accommodate various types of hose and prevent the damage of the aluminium block in the event of a hose replacement. These also offer a proper orientation of the hoses, as posts can be of two types: straight and in 90° elbow. Note that the recess in the block which accommodates the posts is common, enabling the replacement of the post for another of a different type. To remove the post, refer to Figure 5 and proceed as follows:

Straight Fuel Inlet Post Elbow Fuel Inlet Post

Figure 5 - Fuel Inlet Posts

5.8.1 Straight connection

- The straight fuel inlet post may be removed with the hose connected. However, the hose may be removed first if required as detailed in section 5.6.
- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder.

- Using a 4mm Allen key, undo and remove the four cap head screws securing the post to the valve block recess. Ensure that the post is held in position when the last screw is removed.
- Withdraw the fuel inlet post.
- Carefully remove the o-ring from the underside of the inlet post. When removing the seal, take care not to damage the groove surface.
- It is recommended to always replace the o-ring before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Reassembly is the reverse procedure of removal. A drop of Loctite 222 can optionally be applied to the four cap head screws.
- Ensure that the coil post fixings are tight.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the hose. Check the joint between the fuel inlet post and the burner block. The joints may be checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use.

5.8.2 Elbow connection

The 90° elbow fuel intake post can be removed following the same steps of the straight post (Section 5.8.1). Note, however, that the previous removal of the fuel hose (Section 5.6) is mandatory in this case.

NOTE: The elbow type fuel inlet post is symmetrical and can be assembled in two different directions. Prior to refitting it, make sure that the alignment of the hose is the appropriate.

5.9 Valve Block Assembly Removal

To remove the valve block assembly, refer to figure 6 and proceed as follows:

Figure 6 - Main and Liquid Valve Assemblies

ID	P/N	DESCRIPTION
1	2062-1203	Main Valve Handle (Slotted)
2	2062-1220	Main Valve Antifriction Spacer
3	2062-1121	Liquid Valve Lever
4	2062-1120	Liquid Valve Antifriction Spacer
5	MA-FE-0840	Valve Body Securing Screw
6	2062-1114	Main/Liquid Handle Play Spring
7	2062-0311	Valve Block Cover
8	2062-1130	Liquid Valve Body
9	2062-1230	Main Valve Body
10	3D-99-0135	Valve Body O-Ring
11	CR-PP-0301	Energized PTFE Stem Guidance Ring
12	2062-1113	Guidance Ring Retention Washer

ID	P/N	DESCRIPTION
13	2062-0828	Valve Spring
14	2062-1123	Stem-Handle Connection Pin
15	2062-1110	Valve Stem
16	3D-99-0085	Valve Stem O-Ring
17	2062-1111	Valve Seat
18	2022-1115	Valve Seat Shutter Rubber
19	CR-22-1118	Valve Seat Shutter Retention Flat Washer
20	MA-FE-0520	Valve Seat Shutter Serrated Washer
21	MA-FE-0517	Valve Seat Shutter Retention Screw
22	N/A	Liquid Valve Bore (Main Block)
23	N/A	Main Valve Bore (Main Block)
24	2062-1202	Main Valve Handle (Smooth)

- Remove the Handle Bar Assembly (refer to Section 5.5). This enables the access to the liquid lever and main valve handle.
- Remove the pin (item 14) which connects the main valve handle (item 1 or 24) to its stem (item 15).

- Remove the main valve handle (item 1 or 24) and the white antifriction spacer (item 2) underneath. Beware that the two handle dumping springs (item 6) are now free. Remove them also.
- Remove the pin (item 14) which connects the liquid valve lever (item 3) to its stem (item 15).
- Remove the liquid valve lever (item 3) and the white antifriction spacer (item 4) underneath. Beware that the two handle dumping springs (item 6) are now free. Remove them also.
- The five M5 Hex Drive screws (item 5) can now be accessed. Using a 4mm Allen key, undo and remove them following the sequence in Figure 7 below. The removal of screws nr.4 and 5 will result in a decompression of the valves and the final release of the entire valve block.

Figure 7 - Valve Body Removal Sequence

- Re-assembly is the reverse procedure of disassembly. Note that the screwing sequence to be applied to the five fixings above is also reverse (from 5 to 1).

5.10 Main / Liquid Valve Removal

The main blast valve and liquid valve assemblies share a unique design of stem, spring, washers and sealing components. Furthermore, both valves are assembled into the same valve block, thus their disassembly and removal instructions are common. Refer to Figure 6 and proceed as follows:

- Remove the Valve Block Assembly as described in section 5.9.
- Withdraw the applicable valve assembly (liquid or main) from the top of the Valve block.
- Carefully remove the NBR O-Ring (item 10) from the groove around the brass valve body (item 8 or 9, as required). When removing the seal, take care not to damage the groove surface.
- It is recommended to replace the O-Ring before refitting the valve. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Ensure that the seal to be used is lubricated with Krytox grease.
- Pull out the stem assembly from the top of the valve. The spring (item 13), brass washer (item 12) and energized PTFE Ring (item 11) are now accessible for inspection or replacement, if required.
- Check the internal surface of the hole in the brass valve body. Look for significant scratches and cleanliness. If the bore is scratched or damaged, it must be replaced.
- Check the rubber seal (item 18) in the valve seat (item 17) 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 hardening or 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 (item 21) retaining the assembly is fitted using Loctite 222 screwlock liquid, together with the appropriate serrated (item 20) and flat (item 19) washers.

- To withdraw the shutter assembly from the stem (item 16), hold the stem preventing its rotation (use the pin hole in combination with a small screwdriver or an equivalent rod) and undo the shutter assembly with a 8mm open ended spanner. The reassembly of a shutter onto the stem requires the use of Loctite 222 over the thread.
- Check the valve stem for signs of scratches or damage. Check also its alignment. If the stem is scratched, bent or damaged, it must be replaced.
- Check the condition of the two O-Rings (item 16) in the stem grooves. No damage is allowed to the O-Rings and if in doubt, these must be replaced. Whenever the O-Rings are removed, clean the grooves from grease and particles and refill with new Krytox grease.
- Re-assembly is the reverse procedure of disassembly. Check the correct greasing of the stem, and carefully insert it into the body through the energised PTFE washer (making sure not to damage or bend its lip).
- Note that the liquid valve body (item 8) is significantly longer than the main blast valve body (item 9). Check that each valve is inserted in the correct bore of the valve block (items 22 for the liquid, item 23 for the main).

5.11 Centre Column Removal

Refer to Figure 8 and proceed as follows:

- Remove the coil as described in Section 5.12.
- Using a 4mm Allen key, undo and remove the three fixings (item 3) which secure the column to the block. Pull out the column.
- Carefully remove the o-ring from the underside of the column. When removing the seal, take care not to damage the groove surface.
- It is recommended to always replace the o-ring before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Check the condition of the hole edge mating with the valve seat at the underside of the jet. It must be clean and free of scratches/damage.

Figure 8 - Centre Column Assembly

ID	P/N	DESCRIPTION
1	CR-22-0319	CENTRE COLUMN BLIND NUT
2	MA-FE-0600	3/8" BONDED WASHER

ID	P/N	DESCRIPTION
3	CR-PP-0011	CENTRE COLUMN SECURING SCREW
4	2062-0500	COIL ASSEMBLY

5.12 Coil Removal

Since serious indentation in the coil tube cannot be repaired and any welding faults must be returned to ULTRAMAGIC for inspection, coil maintenance is limited to the areas detailed below. To remove the coil and jet assembly, refer to figure 8 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 1).
- Remove the upper bonded washer (item 2).
- Undo and remove the three coil support fixings.
- Withdraw the coil (item 4).
- Remove the lower bonded washer.
- Replacement of the coil is the reverse procedure to removal. When replacing the coil, fit new bonded 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.

5.13 Coil Cleaning and Servicing

To disassemble, clean and adjust the jet, firstly identify the type of assembly applicable to the burner and proceed to sections 5.13.1 or 5.13.2, as required:

5.13.1 Fixed Jet Assembly

The fixed jet and coil assembly is fully constructed in selected Stainless Steel alloys. Its assembly is mostly welded or riveted, thus the possible operations on it are limited. Any major damage or deterioration will probably lead to the replacement of the entire coil. For works involving riveting or welding, contact ULTRAMAGIC.
To clean the coil and jet assembly, remove all sealing elements and apply soapy water or a solvent adequate for stainless steel alloys. If necessary, insert a suitable metal pin into any blocked jet holes. Rinse the assembly with clean water at the end of the process, blowing compressed air through the openings afterwards.

5.13.2 Detachable Jet Assembly

The MK-32 coil can alternatively be offered with a detachable jet. This enables the withdrawal of the jet from the coil, enhancing its cleaning and making its partial replacement possible. To remove the jet from the coil (coming from section 5.13), proceed as follows:

- Use a 4mm Allen key to undo and remove the three pairs of M5 screws securing the three coil tube end fittings to the jet perimeter.
- Check the condition of the three O-Rings sealing the jet intakes, and replace if damaged or if in doubt. Apply a smear of Krytox grease on the O-Rings before reassembling.
- Check also the condition of the grooves for the O-Rings and its mating surfaces, looking for scratches or particles. Clean carefully.
- Replacement of the jet is the reverse procedure to removal. Check that the jet ring is installed facing the correct direction (with the holes pointing to the coil).

5.13.2.1 Standard Jet Assembly

The standard jet assembly is constructed in one piece, and is made of Stainless Steel. There are no operations possible on it other than cleaning, following the process described in section 5.14.1.

5.13.2.2 Coanda Jet Assembly

The Coanda jet assembly is constructed in Aluminium, and is composed of a lower ring, an upper ring and the bimetal strips for temperature control. Inspection of the jet ring may reveal an

accumulation of oily deposits on the outer surface. These deposits are not detrimental to burner performance provided that the deposit does not cause jet blockage. To prevent unnecessary work at this stage, check the condition of the jets for blockages etc. This may be done visually and by inserting a suitable piece of stiff wire in to each jet hole. Only proceed with further dismantling if it is considered that the jets require thorough cleaning or if the bi-metal strips require inspection or maintenance.

To rip down the jet completely (coming from section 5.13), proceed as follows:

- Using a 4 mm Allen key, undo and remove the six screws from the upper side of the top jet ring. Carefully withdraw the bottom jet ring from the upper jet ring.
- Check the condition of the internal jet ring faces. Carefully clean away any oil deposits or other contaminants. Make sure not to scratch the surfaces, and use always products compatible for anodised aluminium.
- Check the condition of the bi-metal strips. These are secured to the underside of the upper jet ring. When the coil is cold, the strips should be in the "closed" position i.e. covering the inlet to the jet hole. Only remove the strips if it is considered necessary.
- Prior to removing the bi-metal strips, use a soft marker pen to mark the position of the strip to indicate which jet holes are covered by the strip.
- To remove the bi-metal strips, use a crosshead Philips screwdriver and remove each screw securing the strip to the upper jet ring. Beware that the bimetal strip has two different faces; once assembled, the face shown must have lettering on it.
- Replacement is generally the reverse procedure to removal. Ensure that the bi-metal strips are positioned correctly. Note that the seal between the upper and lower jet rings is formed by the conical fit of the two components. It is very important therefore to ensure that the lower ring is fitted square to the upper ring and that the six fixings are tightened correctly. Fit all six fixings finger-tight. Select any fixing and tighten a quarter turn. Select the diagonally opposite fixing and tighten a quarter turn. Continue to tighten all fixings, always as diagonally opposite pairs, a quarter turn each time, until all fixings are tight. Use just an Allen screwdriver to tighten the screws. Over-tightening may result in permanent deformation of the multihole jet ring.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the jet. Check the joint between the rings, and make sure that gas exhausts only from the jet holes. Check also that no holes are blocked.

5.14 Liquid Jet Removal

To remove and strip down the liquid fire jet assembly, proceed as follows:

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of the Liquid Jet breaks the pressure integrity of the burner.
- Locate the liquid fire jet. Using a long 24mm AF socket tube, undo and remove the entire assembly from the valve block. For ease of access, it is optional to remove the coil (following Section 5.12).
- Carefully remove the o-ring from the underside of the liquid jet assembly. When removing the seal, take care not to damage the groove surface.
- It is recommended to always replace the o-ring before refitting the post. However, the original can continue to be used subject to passing a detailed visual inspection (scratches, damage, flexibility, round section, etc.). Check that the seal to be used is lubricated with Krytox grease.
- Check the condition of the hole edge mating with the valve seat at the underside of the jet. It must be clean and free of scratches/damage.
- No attempt must be made to withdraw the brass diffuser from the exhaust of the jet. It is permanently locked and the whole assembly must be treated as a single item.
- Re-assembly is generally the reverse procedure of removal.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the liquid jet. Check the joint between the jet and the burner block. The joints may be

checked using leak detection fluid and watching for bubbles. If any bubbles are observed, then there is a leak, which must be rectified before further burner use. Make an operational test of the liquid valve.

5.15 Pressure Gauge Removal and Disassembly

Refer to figure 9 and proceed as follows:

Figure 9 - Pressure Gauge Assembly

ID	P/N	DESCRIPTION
1	2062--1301	Connector
2	MA-FE-0170	Block-Connector Securing Screw
3	CR-09-0156	Block-Connector O-ring
4	2062-1312	Compressor Cap
5	3D-99-0115	Cap O-ring

ID	P/N	DESCRIPTION
6	2062-1311	Compressor
7	2062-1313	Dumper
8	2062-1321	Water Gasket
9	2062-1320	Pressure Gauge

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of the Pressure Gauge Assembly breaks the pressure integrity of the burner.
- The assembly is mechanically connected to the block by means of a screw (item 2). Using a 4mm Allen Key, undo and remove the screw.
- Turn the assembly nearly 90° so that the steel connector (item 1) does not interfere with the coil tube.
- Check the condition of the O-ring (item 3) between the connector and the block. Replace if necessary. Check that the small hole in the centre of its bore is clean.
- Pull up the pressure gauge assembly. The black rubber seal for water (item 8) will interfere with the coil tube before the complete withdrawal of the assembly. Bend the rubber seal above the coil tube to enable the release of the gauge. The Pressure Gauge Assembly is now free for access.
- Hold the connector securely, preferably in soft vice jaws.
- Using a 13mm open ended spanner, undo and remove the cap (item 4) of the compressor.
- Check the condition of the sealing O-ring (item 5) under the cap. Replace if necessary.
- Use a flat blade screwdriver to undo and release the compressor (item 6) from the connector.
- Take out the flow dumper (item 7). Replace if damaged or obstructed.
- Using an 14mm open ended spanner on its square neck, unscrew the pressure gauge (item 9) from the gauge connection. Clean off all traces of PTFE tape from the gauge thread.
- Check the condition of the O-Ring groove and the seal bore in the gauge connection. If there is any damage to the seal mating surfaces, the gauge connector must be replaced.
- Using a compressed air supply, make sure the internal holes of the connector remain unobstructed.
- Check the condition of the gauge body seal (item 8). The seal is designed to prevent the passage of water from inside the burner through the valve block. Minor deterioration of

the seal is therefore not detrimental to burner performance or safety. However, it is recommended that the seal be replaced if damage or deterioration is found.

- Prior to fitting the seals, apply a thin smear of Krytox grease to the O-rings.
- Prior to fitting the screw (item 2) and the compressor (item 6) apply a drop of Loctite 222 to their threads.
- Re-assembly is generally the reverse procedure of removal. Check, however, the correct position of the gauge with regard to the connector. When both elements are screwed together, the final position is such that the gauge needle at 0 bar points in the same direction than the connector.
- Once the assembly is finished, check for the correct orientation of the gauge inside the valve block.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the Pressure Gauge Assembly. Check the joints using leak detection fluid and watching for bubbles. If any bubbles are observed, rectify the problem before further burner use. Check the reading before and after pressurizing.

5.16 Piezo Ignitor Removal and Disassembly

To remove the Piezo Igniter Assemblies, refer to Figure 10 and proceed as follows:

Figure 10 - Igniter Assembly and Electrode Adjustment

ID	P/N	DESCRIPTION
1	CR-N-0040	Piezo Retention Grub Screw
2	MA-FE-0606	Friction O-ring
3	2062-0910	Piezo Cover Body
4	2062-0912	Ceramic Electrode
5	2062-0913	Electrode Spacer

ID	P/N	DESCRIPTION
6	2062-0914	Spring
7	2062-0911	Piezoelectric Ignitor
8	CR-PP-0325	Water O-ring

- Ensure that the burner is completely vented of fuel.
- Using a 3mm Allen key, loosen but do not remove the grub screw (item 1).
- Turn the pilot light valve handle enough to allow the withdrawal of the igniter assembly from the underside of the valve block.
- Unscrew and remove the piezo igniter (item 7) from the body (item 3).
- Check the condition of the "O" seal (item 8) fitted on the exterior surface of the igniter body and underneath the piezo flange. Replace the seal if damaged. Note that the seal is fitted to prevent water formed inside the burner from dripping down past the igniter assembly and a damaged seal will not cause deterioration in burner performance.
- Withdraw the insulator, spring and electrode (items 5, 6 and 4 respectively) from the body. Note that the electrode rod is bent; straighten it as required in order to remove it from the body.
- Check for any signs of corrosion or damage on the spring, the pin at the underside of the electrode and contact on top of the igniter. Check also for cracks on the ceramic of the electrode, and the condition of the friction o-ring around its neck (item 2).
- Replacement is generally the reverse procedure of removal. Prior to fitting the "O" seal, apply a thin smear of Krytox or Molycote grease to the seal. Take care not to over-tighten the grub screw (item 1) as this might cause damage to the aluminium thread in the valve block.
- Having re-fitted the igniter, carefully bend the electrode rod as shown in Figure 10, making sure not to damage the ceramic. The end of the rod must be oriented to the large hole of the pilot light torch. Pivot the electrode over the vertical axis as required, and re-tighten the igniter.
- Operate the igniter and check for a good spark between the electrode tip and the tag on the pilot light assembly. Adjust the gap if necessary to improve the spark strength. The spark should be "strong" and blue in colour.

5.17 Preheater Assembly Removal

The preheater assembly is mounted onto the burner block surface, on those units installed with a liquid pilot light.
To disassemble the preheater, refer to figure 11 and proceed as follows:

Figure 11 - Preheater Assembly

ID	P/N	DESCRIPTION
1	2062-0802	Preheater Tube
2	CR-PP-0011	Preheater Securing Screw
3	3D-99-0100	Preheater Inlet O-Ring

ID	P/N	DESCRIPTION
4	3D-99-0105	Preheater Outlet O-ring
5	2062-0832	Preheater Filter

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that the removal of this assembly breaks the pressure integrity of the burner.

- Using a 4mm Allen Key, undo and remove the two screws (item 2) fixing the preheater base to the main block. Release the preheater.
- The sealing o-rings (items 3 and 4) and the filter (item 5) can now be accessed and removed from their bores. To do so, carefully use an adequate sharp tool not to damage the aluminium surfaces.
- Replace the o-rings if damaged or if in doubt. Filter can continue to be used subject to the absence of particles, oil or any substance or body obstructing it (some decolouration to the sintered bronze is normal and acceptable).
- Blow compressed air through the preheater tube from the holes at the bottom plate. Repeat the process in the opposite direction. Beware that particles can exit the tube at high speed; therefore take caution measures. If the flow is significantly restricted, the tube must be replaced.
- Some deposits can accumulate at the cavity below the filter. Clean it with a soft cloth or absorbing paper making sure not to block the hole at the bottom.
- Re-assembly is generally the reverse procedure of removal. Clean the bores with a soft cloth and apply a thin smear of Krytox grease over the o-rings prior to assembling.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals under the preheater using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.

5.18 Preheater Bypass Removal

On burner units fitted with Liquid Pilot Light, a bypass assembly may be installed instead of the preheater tube. Its assembly and disassembly instructions are equivalent to those applicable to the preheater assembly (see section 5.17).

5.19 Preheater Blanking Plate Removal

Burners mounting Vapour or Oxygen Pilot Lights do not require previous filtering or preheating of the fuel. Therefore a Blanking Plate can be mounted instead of the preheater or the bypass. Its assembly and disassembly instructions are equivalent to those applicable to the preheater assembly (see section 5.17), although the filter can be removed from the burner in this case.

5.20 Pilot Light Removal

To remove any of the Pilot Light Assembly variants from the burner, refer to Figure 12 and proceed as follows (Figure 12 corresponds to the Liquid Pilot Light assembly, although the removal/installation procedure is common to all variants):

Figure 12 - Pilot Light Fixings

- Ensure that the burner is completely vented of fuel and that the hose is disconnected from the fuel cylinder. Note that on Liquid Pilot Light assemblies, the removal of the Pilot Light breaks the pressure integrity of the burner.
- Use a 4mm Allen Key to undo and remove the four screws (item 1) securing the Assembly to the block.

- Gently pull out the Pilot Light assembly from the underside of the burner block. Beware that the assembly includes also the pilot light torch, thus make sure not to damage the piezo or the aluminium bore of the block during the operation.
- To disassemble the entire pilot light, proceed as per section 5.20.1, 5.20.2 or 5.20.3, as applicable.
- Re-assembly is the reverse procedure of disassembly. Pay attention to the correct alignment of the torch hole with the ignitor electrode.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.

5.20.1 Liquid Pilot Light Disassembly

To disassemble completely the Liquid Pilot Light, refer to Figure 13 and proceed as follows:

Figure 13 - Liquid Pilot Light Assembly

ID	P/N	DESCRIPTION
1	2062-0803	Pilot Light Torch Assembly
2	CR-N-0040	Torch Assembly Grub Screw
3	2022-0713	Pilot Light Jet
4	2062-0841	Pilot Light Jet Filter
5	2062-0810	Pilot Light Regulator Upper Body
6	3D-99-0090	Regulator Piston Large O-Ring
7	2062-0805	Regulator Piston
8	3D-99-0095	Regulator Piston Small O-Ring
9	2062-0814	Regulator Piston Spring
10	2062-0813	Pilot Light Regulator Lower Body
11	3D-99-0140	Regulator Body External Top O-Ring
12	2062-0825	Liquid Pilot Light Valve Stem
13	3D-99-0085	Liquid Pilot Light Valve Stem O-Ring

ID	P/N	DESCRIPTION
14	2062-0828	Liquid Pilot Light Valve Spring
15	2062-0820	Liquid Pilot Light Valve Body
16	3D-99-0125	Regulator Body External Btm O-ring
17	2062-0822	Pilot Light Valve Rotation Lever
18	2062-0827	Pilot Light Valve Antifriction Washer
19	3D-99-0060	Pilot Light Valve Washer Circlip
20	2062-0821	Pilot Light Valve Handle Rotation Pin
21	2062-0823	Pilot Light Valve Knob
22	CR-N-0040	Pilot Light Valve Knob Grub Screw
23	2062-0824	Pilot Light Valve Handle
24	MA-FE-0200	Pilot Light Valve Handle Screw
25	CR-PP-0011	Liquid Pilot Light Securing Screw

- Withdraw the torch assembly (item 1) from the regulator as per section 5.20.5.
- Check the condition of the two O-rings sealing the assembly (items 11 and 16). Replace if damaged or if in doubt.
- Loosen the grub screw (item 22) and release the handle assembly (items 21/23/24).

- Rotate counter clockwise the brass lever (item 17) with the hand until it contacts with the valve body (item 15).
- Using suitable circlip pliers, remove the circlip (item 19).
- Remove the nylon washer (item 18) and rotate clockwise the brass lever (item 17) to release it.
- Carefully hold the Valve body (item 15) and using a 26mm open ended spanner, undo and withdraw the regulator body (item 10) from the valve body (item 15).
- At this point, the valve can be accessed. Pull up the stem (item 12) and the spring (14).
- Check the condition of the O-rings on the stem (items 13) and replace if damaged or if in doubt.
- Check the condition of the rubber shutter on top of the stem (item 12). Replace the stem if the rubber shows abrasion, shrinkage, hardening, damage or significant distortion. A small circular witness on the seal surface is normal and indicates the position of contact between the seal and the regulator lower body.
- Unscrew and remove the pilot light exhaust jet (item 3) from the regulator upper body (item 5).
- Hold the jet up to the light and check that the hole appears clean and round.
- If the jet is blocked or partially blocked, replace it or carefully attempt to clean it blowing compressed air and/or soaking it in petrol or paraffin. Clean any oil deposits. Any damage of the jet implies its replacement. Avoid the use of sharp wires or tools as these can vary the diameter of the jet.
- Hold the regulator lower body (item 10) and using a 26mm open ended spanner, withdraw the regulator upper body (item 5).
- The regulator piston (item 7/8), its spring (item 9) and its main washer (item 6) are now accessible).
- Check the condition of the O-rings (items 6 and 8) and replace if damaged or if in doubt.
- Invert the upper body (item 5) and release the jet filter (item 4). If it does not fall, use a thin tool or rod (< 2mm Ø) to push it out from the regulator chamber.
- Check the condition of the filter, and replace it if blocked or if in doubt.
- Clean with a soft cloth any oil deposits and particles from the main bodies in the assembly (items 5, 7, 10 and 15) and clean all holes using an adequate compressed air supply.
- Re-assembly is the reverse procedure of disassembly. Apply a smear of Krytox grease on all O-rings.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.
- Adjust the position of the handle as per 5.20.6.

5.20.2 Vapour Pilot Light Disassembly

To disassemble completely the Vapour Pilot Light, refer to Figure 14 and proceed as follows:

Figure 14 - Vapour Pilot Light Assembly

ID	P/N	DESCRIPTION
1	2062-0803	Pilot Light Torch Assembly
2	CR-N-0040	Torch Assembly Grub Screw
3	2022-0713	Pilot Light Jet
4	2062-0841	Pilot Light Jet Filter
5	2062-1810	Vapour Pilot Light Valve Upper Body
6	3D-99-0140	Pilot Light External Top O-Ring
7	3D-99-0125	Pilot Light External Bottom O-Ring
8	CR-PP-0325	Vapour Pilot Light Valve O-Ring
9	2022-1811	Vapour Pilot Light Valve Inlet Body
10	MA-FE-0170	Vapour Pilot Light Securing Screw
11	2062-1813	Vapour Pilot Light Valve Stem
12	3D-99-0085	Vapour Pilot Light Valve Stem O-ring
13	2062-0828	Vapour Pilot Light Valve Stem Spring

ID	P/N	DESCRIPTION
14	CR-22-1120	Vapour Pilot Light Lower Body Seal
15	2062-1812	Vapour Pilot Light Lower Body
16	2062-0821	Pilot Light Valve Handle Rotation Pin
17	MA-FE-0012	Vapour Pilot Light Lower Body Screw
18	2062-0822	Pilot Light Valve Rotation Lever
19	2062-0827	Pilot Light Valve Antifriction Washer
20	3D-99-0060	Pilot Light Valve Washer Circlip
21	CR-N-0040	Pilot Light Valve Knob Grub Screw
22	2062-0823	Pilot Light Valve Knob
23	MA-FE-0200	Pilot Light Valve Handle Screw
24	2062-0824	Pilot Light Valve Handle
25	Ref. IPC	Vapour Hose Assembly

- Withdraw the torch assembly (item 1) from the valve upper body (item 5) as per section 5.21.5.
- Using a 14mm open-ended spanner, undo and remove the vapour hose (item 25) from the aluminium body (item 9). Clean off all traces of PTFE tape from the bore.
- Check the condition of the two O-rings sealing the assembly (items 6 and 7). Replace if damaged or if in doubt.
- Loosen the grub screw (item 21) and release the handle assembly (items 22/23/24).
- Rotate counter clockwise the brass lever (item 18) with the hand until it contacts with the valve lower body (item 15).
- Using suitable circlip pliers, remove the circlip (item 20).
- Remove the nylon washer (item 19) and rotate clockwise the brass lever (item 18) to release it.
- Using a suitable allen key, undo and remove the three c/sunk screws (item 17) securing the valve lower body (item 15).
- Check the condition of the O-Ring (item 14) and replace if damaged or if in doubt. Make sure the groove is not damaged, and remove any grease or particles on it. Refill with Krytox grease prior to reassembly.
- Pull out the stem (item 11) and the spring (item 13). Check the condition of the two stem O-Rings and replace if damaged or if in doubt. Clean any particles in the grooves for the

O-Rings, check for scratches and apply new Krytox grease. Check the condition of the rubber pad on top of the stem; a small circular witness mark on the seal surface is normal and indicates the position of contact between the seal and the valve. If the seal is damaged or shows signs of hardening or shrinkage, it must be replaced.

- Check the bore underneath the valve body (item 9) for scratches, damage and cleanliness, particularly in the contact edge with the seal.
- Unscrew and remove the pilot light exhaust jet (item 3) from the valve body (item 9).
- Hold the jet up to the light and check that the hole appears clean and round.
- If the jet is blocked or partially blocked, replace it or carefully attempt to clean it blowing compressed air and/or soaking it in petrol or paraffin. Clean any oil deposits. Any damage of the jet implies its replacement. Avoid the use of sharp wires or tools as these can vary the diameter of the jet.
- Invert the valve body (item 9) and release the jet filter (item 4). If it does not fall, use a thin tool or rod (< 2mm Ø) to push it out from the valve chamber.
- Check the condition of the filter, and replace it if blocked or if in doubt.
- Re-assembly is the reverse procedure of disassembly. Apply a smear of Krytox grease on all O-rings.
- Connect the hose to a suitable compressed air supply or a fuel cylinder, at normal operational pressure range (5 to 10 bar). Carefully open the supply and pressure test the seals between the pilot light and the block using leak detection fluid and watching for bubbles. If any bubbles are observed, the leak must be rectified before further burner use.
- Adjust the position of the handle as per 5.20.6.

5.20.3 Oxygen Pilot Light Disassembly

To disassemble completely the Oxygen Pilot Light, refer to Figure 15 and proceed as follows:

Figure 15 - Oxygen Pilot Light Assembly

ID	P/N	DESCRIPTION
1	2062-1901	Oxygen Pilot Light Torch
2	3D-99-0160	Oxygen Pilot Light Torch Screw

ID	P/N	DESCRIPTION
16	2062-0821	Pilot Light Valve Handle Rotation Pin
17	MA-FE-0012	Oxygen Pilot Light Lower Body Screw

3	2022-0713	Pilot Light Jet
4	2062-0841	Pilot Light Jet Filter
5	3D-99-0150	Oxygen Needle Jet Grub Screw
6	3D-99-0140	Pilot Light External Top O-Ring
7	3D-99-0125	Pilot Light External Bottom O-Ring
8	3D-99-0145	Oxygen Needle Jet O-Ring
9	2062-1911	Oxygen Pilot Light Valve Body
10	MA-FE-0170	Oxygen Pilot Light Securing Screw
11	2062-1813	Oxygen Pilot Light Valve Stem
12	3D-99-0085	Oxygen Pilot Light Valve Stem O-ring
13	2062-0828	Oxygen Pilot Light Valve Stem Spring
14	CR-22-1120	Oxygen Pilot Light Lower Body Seal
15	2062-1812	Oxygen Pilot Light Lower Body

18	2062-0822	Pilot Light Valve Rotation Lever
19	2062-0827	Pilot Light Valve Antifriction Washer
20	3D-99-0060	Pilot Light Valve Washer Circlip
21	CR-N-0040	Pilot Light Valve Knob Grub Screw
22	2062-0823	Pilot Light Valve Knob
23	MA-FE-0200	Pilot Light Valve Handle Screw
24	2062-0824	Pilot Light Valve Handle
25	Ref. IPC	Vapour Hose Assembly
26	Ref. IPC	Oxygen Hose Assembly
27	2062-1933	Oxygen Needle Jet
28	2062-1932	Oxygen Diffuser Spacer
29	2062-1931	Oxygen Diffuser
30	3D-99-0155	Oxygen Diffuser Screw

- Withdraw the torch assembly (item 1) from the valve body undoing and removing the three screws (item 2) on the base.
- Using a 14mm open-ended spanner, undo and remove the vapour hose from the aluminium body. Clean off all traces of PTFE tape from the bore.
- Repeat the previous step with the Oxygen hose.
- To release the Oxygen Diffuser Assembly from the torch, undo and remove the screw (item 30) with a suitable Allen key. The diffuser (item 29) and its spacer (item 28) can now be removed.
- To release the Oxygen Needle Jet (item 27), undo the grub screw (item 5) with a suitable Allen key. Pull the needle jet removing also the O-Ring (item 8) underneath the torch. Replace the O-Ring if damaged or if in doubt.

CAUTION: Parts in contact with oxygen must be particularly clean due to its high reactivity and the risks derived from it. Pay additional attention to clean all the bores, fittings and seals of the oxygen circuit to avoid presence of oils, greases, dust, cleaning agents or any other unknown fluids or particles. Observe only the possibility to use Krytox grease on the needle o-ring (item 8), if necessary.

5.20.4 Pilot Light Conversion

The MK-32 burner can be fitted with a series of different pilot light types, depending on the operation conditions and the needs of each customer. Note that the combined use of different pilot light types in a burner assembly is permitted.
The installation and removal of each type is described in section 5.20, but the following aspects must be accounted, depending on each case:

5.20.4.1 Liquid Pilot Light to Vapour or Oxygen Pilot Light

When a Vapour or Oxygen Pilot Light is to be installed instead of a Liquid Pilot Light, the preheater assembly (or the bypass filter) must also be replaced by a blanking plate.
Note that in this case, a master cylinder with a suitable vapour fuel supply is required on board.

5.20.4.2 Vapour or Oxygen Pilot Light to Liquid Pilot Light

When a Liquid Pilot Light is to be installed instead of a Vapour or Oxygen Pilot Light, the blanking plate must also be replaced by a preheater assembly (or a bypass filter). Contact Utramagic for further details.

5.20.5 Pilot Light Torch Removal

The Pilot Light Torch assembly can be withdrawn from the burner either with the Pilot Light installed or removed from the burner block. Note that it is mechanically connected to the regulator upper body and consists of 3 main elements: Support tube, Torch and Internal Mesh. Its removal is necessary when the pilot light jet is to be accessed.
Beware that the vapour pilot light variant uses the same torch assembly, whilst the oxygen pilot light mounts a special torch arrangement, the disassembly of which is detailed in 5.20.3.

To remove and disassembly the pilot light torch, refer to figure 16 and proceed as follows:

Figure 16 - Liquid/Vapour Pilot Light Torch Assembly

ID	P/N	DESCRIPTION
1	2062-0842	Torch Support Tube
2	2062-0843	Torch
3	CR-N-0040	Torch-Jet Securing Grub Screw

ID	P/N	DESCRIPTION
4	3D-99-0070	Torch Securing Long Grub Screw
5	3D-99-0020	Torch Mesh Circlip
6	2062-0844	Torch Mesh

- Undo the lateral grub screw (item 3) securing the support tube (item 1) to the regulator upper body.
- Pull up the torch assembly to withdraw it from the regulator. At this point, the jet at the regulator output can be accessed.
- To continue with the complete disassembling of the torch, loosen the screw (item 4) holding the torch (item 2) to the support tube. This screw can be accessed from a lateral hole.
- A set of circlips (item 5) and a mesh (item 6) are now accessible from the underside of the torch. Using suitable circlip pliers, remove the bottom circlip and release the mesh.
- Check the condition of the mesh and the circlips. Replace if damaged, corroded or if in doubt.
- Re-assembly is the reverse procedure of disassembly. Pay attention to the correct alignment of the torch hole with the ignitor electrode.

5.20.6 Pilot Light Valve Handle Adjustment

To adjust the pilot light valve handle, refer to Figure 17 and proceed as follows:

Figure 17 - Pilot Light Handle Knob Adjustment

- Loosen the grub screw (Item 1) at the side of the handle body
- Pull down and release the handle assembly (Item 2).
- The brass rotation lever can now be accessed. Rotate the lever counter clockwise with the hand until it stops.

- Rotate carefully the handle clockwise with the hand until an opposing force is noticed. At this point, the lever starts acting on the valve stem.
- Fit the handle assembly (Item 2) onto the brass lever. Lock it in the OFF position by firmly tightening the grub screw (Item 1).
- Connect the burner to a suitable fuel cylinder at normal operational pressure range (5 to 10 bar). Open slowly the pilot light valve by turning the handle. A gas flow noise should start to be noticed at nearly half of the handle run (90°). Fully open the valve and light the pilot light, and check for a strong flame. Close the valve and confirm that the pilot light extinguishes immediately. If any of these checks fail, repeat the whole adjustment process until the valve functions properly.

5.21 Filler Block / Hydraulic Actuator Removal

To remove the filler block or the hydraulic actuator from the burner block, refer to Figure 18 and proceed as follows:

Figure 18 - Filler Block / Hydraulic Actuator Removal

- Disconnect the burner from the fuel cylinder and vent it completely.
- Squeeze and release the main valve handle once. Beware that fuel will be released if the circuit is connected or filled.
- Gently push the filler block (or the hydraulic actuator) from the pilot light valve side. This movement is marked with an arrow on the Figure. Prevent the fall of the insert with the hand at the opposite side.
- At this point, the internal stem mechanism is partially visible through the slot. Check that no strange bodies, sand or dust are present inside. Prevent the storage or transportation of the burner without the appropriate insert in the slot.

To refit/install a filler block or a hydraulic actuator, proceed as follows:

- Prior to the reassembly, lift the main valve handle (with an opposite movement to its normal squeeze action). This prepares the slot for the insert.
- Reassembly is generally the reverse procedure to dismantling. The filler block (or the hydraulic actuator) must be inserted from the manometer side. Note that the inserts can only be fitted in a single position due to a slot in one edge.
- When fitting the hydraulic actuator, check that the piston is in the fully retracted position before assembling.

NOTE: The burner must have either a filler block or a hydraulic actuator fitted into the slot for the proper function of the main blast valve.

5.22 Hydraulic Kit

To disassemble completely the Hydraulic Kit, remove it from the burner as per 5.21, refer to Figure 19 and proceed as detailed in 5.22.1.
Alternatively, if the system is to be bled or adjusted only, proceed directly with sections 5.22.2 and 5.22.3.

5.22.1 Hydraulic Kit Disassembly

To disassemble a Hydraulic Kit, refer to figures 19 and 20 and proceed as follows:

- Put the handle over a flat surface with the reservoir upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Prepare a can to pour the remaining brake fluid of the circuit. Undo and remove the bleeder (item 2) from the actuator block (item 1). Beware that the brake fluid will escape from the bore: Take the necessary cautions as brake fluids may be irritant or corrosive. Squeeze the handle several times to empty the reservoir and to allow the circuit to drain completely, pouring the fluid in the can. Dispose the old fluid following the local regulations.
- Using a set of suitable circlip pliers or similar, undo and remove the retainer (item 5) from the block. Pull and release carefully the piston (item 3).
- Check the condition of the O-ring on the piston groove. Replace if damaged or if in doubt. Beware that this O-ring does not require greasing of any type.
- Using a set of open-ended spanners, disconnect the hose (item 7) from the connector (item 12) and the block. Note that straight and elbow versions are available and described in depth in Figure 20. Release also the hose from the handle assembly.
- Handle assembly can only be fixed by replacement. No attempt must be made to repair it, as special tooling and components are required. The only item that can be withdrawn is the handle grip tube (item 11), which can be removed by loosening the screw which secures it to the handle.
- Re-assembly is the reverse procedure of disassembly. Check carefully that all circuits and components are clean before re-assembly. If necessary, clean with a suitable brake cleaner.
- Bleed the system and adjust the handle as per sections 5.22.2 and 5.22.3.

Figure 19 - Hydraulic Kit Assembly

ID	P/N	DESCRIPTION
1	2062-2010	Hydraulic Actuator Body
2	3D-99-0030	Bleeder
3	2062-2012	Actuator Piston
4	3D-99-0130	Actuator Piston O-Ring
5	2062-2011	Piston Retainer
6	3D-99-0010	Flat Blade Head Positioning Grub Screw

ID	P/N	DESCRIPTION
7	(KIT)	Hydraulic Flexible Tube
8	(KIT)	Reservoir Cap
9	(KIT)	Cap Securing Screws
10	(KIT)	Cap Gasket
11	(KIT)	Handle Tube
12	(KIT)	Connector

Figure 20 - Hydraulic Kit Assembly

ID	DESCRIPTION
1	M6 Sealing Washer
2	Straight Connector
3	Copper Washer
4	Hose Insert
5	Olive

ID	DESCRIPTION
6	Hose Shroud
7	Hose
8	90º Connector (Banjo) Bolt
9	90º Connector (Banjo)

NOTE: Whenever a seal is removed (particularly items 1 and 3 on Figure 20), it is strongly recommended to replace with a new one.

5.22.2 Hydraulic Kit Bleeding

To bleed the hydraulic kit circuit, refer to figure 19 and proceed as follows:

NOTE: Whenever the hydraulic kit is to be bled, use only DOT5.1 or DOT4 brake fluid from a clean container.

- Put the handle over a flat surface with the reservoir cover flat upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Refill the reservoir to the maximum.
- If the bleeder (item 2) in the actuator has a protective cap, remove it. Clean the nipple from particles or dust.
- Fit a suitable ring spanner onto the bleeder, and connect a suitable transparent bleeding tube onto the nipple.
- Squeeze the handle several times and undo the bleeder approx. a quarter turn whilst the handle is squeezed. Fluid should come out through the bleeding tube. When fluid flow stops, close the bleeder.
- Alternate the action of the handle with the retraction of the piston (item 3), which should pop out on each squeezing of the handle.
- Repeat the two previous steps until the fluid exits the bleeder with no air bubbles at all. Make sure that the reservoir in the handle assembly does not get empty (refill if necessary).
- Check the condition of the reservoir gasket and the cap, looking for cleanliness and any possible distortion or damage. Clean with a soft cloth or replace if necessary.
- Fit the gasket onto the reservoir making sure not to push any air into it. Fit the cap and secure it with the two screws.
- Turn the handle so that the reservoir is right above the hose socket. Squeeze the handle at least ten times.
- Again, put the handle over a flat surface with the reservoir cover flat upwards. Using an Allen key, undo and remove the screws (item 9) securing the cap (item 8). Remove the cap and the gasket underneath (item 10).
- Make sure that the bleeder is closed and retract the piston (item 3).
- Clean the bleeder and cover it with the protective cap, if applicable.
- Refill the reservoir and close it with the gasket and the cap, securing the assembly with the two screws.
- Clean any remains of brake fluid with absorbent paper.
- Install the kit on the burner and check the actuator for a correct function.

5.22.3 Hydraulic Kit Handle Adjustment

If the unit is fitted with an adjustable handle, use an adequate Allen key to tighten or loosen the grub screw located under the handle, as shown in figure 21. By doing this, the handle position can be adjusted enabling a comfortable squeezing movement. Beware that some units may have a wheel instead of a grub screw; in this case, adjustment can be achieved with the fingers.

Figure 21 - Hydraulic Handle Lever Adjustment

5.23 Water Slurper Tube Assembly

Figure 22 - Water Slurper Tube Assembly

ID	P/N	DESCRIPTION
1	2062-2212	Water Slurper Tube
2	MA-FE-0175	Inox Allen Screw M4x6 DIN912
3	CR-09-0060	Inox Allen Screw M4x16 DIN912
4	2062-2210	Water Slurper Top Body
5	2062-2211	Water Slurper Bottom Body

5.24 Crossflow Assembly

SECTION 6. Annual / 100 Hour Inspection Requirements

6.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner. The inspection requirements are detailed below.

6.2 Pre-Functional Checks

Carry out all non-functional checks detailed in Section 4 (Preventative Maintenance).

6.3 Functional Test

6.3.1 Left and Right Main Burner Function

Connect the burner to a suitable fuel supply. Operate the left and right main burner valves. Check for a good flame. Check that the ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.3 Left and Right Liquid Valve Function

Operate the left and right liquid burner valves. Check for a good flame. Check that flame ignition is immediate upon opening the valves. Check that the flame is quickly extinguished upon closing the valves.

6.3.4 Left and Right Pilot Regulator Valves

During operation it is possible that an oily residue will accumulate inside the bore of the pilot regulator valve. This is quite normal. ***However, if the residue is not removed, it may cause problems in time as the residue changes consistency and begins to block the pilot light and pilot regulator jets and holes. This can cause a pilot light failure.***

The regulator must therefore be checked to work properly every 100 hours or 12 months (whichever is the sooner) and in case of malfunction or if the presence of residues is suspected, regulator should be cleaned as follows:

- Remove and strip down the regulator as described in section 5.20.
- Using a soft cloth, wipe the inside of the regulator housing and the regulator piston and remove all traces of the residue.
- If the residue proves difficult to remove, a cloth soaked with a small amount of solvent should be used.
- Check the condition of the fuel filter. Clean or replace if necessary.
- Check the inside of the jet and make sure it is clean. Remove any oil accumulation and any other dirt or contamination.
- Re-assemble the regulator as specified in section 5.20.

Having re-assembled the pilot regulator, its function must be tested as described below:

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.

6.3.5 Burner Rotation Stops

Check that the burner rotation stops in the centre gimbal system are fully functional and that they prevent burner inversion in ***both*** axes (refer to MM supplement 8).

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6.4 Pressure Test

Connect the burner to a suitable fuel cylinder or compressed air supply at normal operational pressure range (5 to 10 bar). Using soapy water, check the following areas for leaks:

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 hose joints.
All pressure Gauge to Valve block joints.
All pilot regulator valve to valve block 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).

SECTION 7. Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Main burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Filler block or hydraulic actuator removed from the block slot.	Fill the slot.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Liquid burner failure	Fuel hose not connected to cylinder.	Connect hose to cylinder.
	Cylinder valve closed.	Open cylinder valve.
	Pilot light failure.	(See pilot light failure below)
Persistent smell of fuel	Fuel leak from burner or hose.	Air pressure test to determine location of leak. Repair as necessary.
Reduction in main burner power	Jets in jet ring blocked.	Clean and unblock jets.
Main and / or liquid valves fail to close.	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Valve rubber shutter hardened	Replace shutter.
	Damages/scratches on the shutter mating bore	Replace centre column or liquid jet (as required)
Pilot light fails to ignite	Fuel cylinder valve off.	Turn valve on.
	Cylinder regulator incorrectly adjusted (Vapour / Oxygen pilot light variants only)	Adjust master cylinder regulator
	Pilot valve off.	Turn valve on.
	Fuel Filter Assembly blocked.	Clean/replace Fuel Filter Assembly
	Regulator jet filter blocked.	Clean/replace filter.
	Regulator jet blocked.	Clean jet.
	Preheater blocked (if installed)	Clean/replace preheater.
	Excessive oil deposits inside regulator.	Clean regulator.
	Failure of piezo igniter.	Repair igniter.
	Dirty or cracked igniter electrode.	Replace electrode.
	Incorrect gap between igniter electrode and torch.	Re-set gap.
	Burner placed in excessive crosswind.	Move burner away from crosswind.
	Pilot valve handle incorrectly adjusted.	Re-set valve knob position.
Pilot light flame weak	Fuel Filter Assembly blocked.	Clean Fuel Filter Assembly

	Cylinder regulator incorrectly adjusted (Vapour / Oxygen pilot light variants only)	Adjust master cylinder regulator
	Regulator filter blocked.	Clean filter.
	Regulator jet blocked.	Clean jet.
	Excessive oil deposits inside regulator.	Clean regulator.
	Preheater blocked (if installed).	Clean/replace preheater.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
	Piston lower seal detached from piston.	Replace piston assembly.
	Inlet and outlet hole in piston blocked.	Clean hole.
	Air inlet to pilot light blocked.	Clean mesh filter.
	Piston O-rings failure.	Replace piston seals.
Pilot light flame very large	Regulator jet not fitted.	Fit jet.
	Incorrect piston spring fitted.	Replace for a suitable spring.
	Regulator piston seals not fitted or failed.	Repair seals.
Pilot light fails to extinguish	Contamination (dirt, swarf etc) between valve shutter and seat.	Remove contamination.
	Pilot valve knob incorrectly adjusted.	Re-set valve knob position.
Pressure gauge fails to display correct pressure	Blockage of the manometer inlet.	Adjust compressor force and/or replace filter.
	Pressure gauge damaged.	Replace pressure gauge.
Burner gimbal action too tight or too loose	Friction setting on gimbal mechanism incorrectly set.	Adjust friction setting.
Burner excessively hot	Fuel pressure too low.	Run burner within recommended fuel pressure range.
	Fuel cylinder disposed incorrectly when horizontal, burner running on vapour only.	Orientate the cylinder to allow the draining of liquid fuel.
	Fuel cylinder empty, burner running on vapour only.	Connect burner to a full cylinder.
Hydraulic actuator fails to open the main valve	Air in the hydraulic circuit.	Bleed the circuit.
Hydraulic handle blocked	Incorrect hydraulic fluid.	Clean the hydraulic system. Replace gaskets and seals and refill with the appropriate fluid.
Hydraulic fluid leak	Damage of a seal	Identify the faulty seal and replace. Refill the circuit and bleed.
Excessive water accumulates in the can.	Water slurper tube assembly working unproperly.	Adjust / Clean / Replace Water Slurper Tube

APPENDIX I. Annual/100 Hours Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Valve Block Fixings	4.3		
General Cleaning	4.2		
Main jets	4.4.1		
Coil Fixings	4.4.3		
Coil Tubing	4.4.2		
Coil Support Rivets	4.4.3		
Water Slurper Assembly	4.4.4		
Pilot Light Strength	4.5.1		
Pilot Light On/Off function	4.5.2, 4.5.3		
Igniter Spark	4.6		
Fuel Hoses	4.7		
Pressure Gauge	4.8		
Burner Mounting	4.9		
Main Burner Function	6.3.1		
Liquid Valve Function	6.3.2		
Pilot Regulator Valve Clean and Function	6.3.3		
Fuel Filter	6.3.5		
Burner Rotation Stops	6.3.6		
Main Valve Pressure Test	6.4		
Liquid Valve Pressure Test	6.4		
Fuel Hose Pressure Test	6.4		
Pressure Gauge Pressure Test	6.4		
Pilot Regulator Valve Pressure Test	6.4		
Liquid Fire Jet Pressure Test	6.4		
Pilot Light Pressure Test	6.4		
Coil Post Pressure Test	6.4		
ACCESSORIES (Complete only if applicable)			
Hydraulic actuator test	4.10		
Vapour Pilot Light Test	4.5.4		
Oxygen Pilot Light Test	4.5.4		

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MK-10 BURNER ("Supplement 2")

Supplement 2 - MK 10 Double, Triple and Quad Burner Maintenance

Section 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the Ultramagic Mk 10 double, triple and quad burners.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to all burners as defined by the following numbers.

Double Burner:	CR-A-0050 (liquid pilot light)
	CR-A-0060 (vapour pilot light)
Triple Burner:	CR-A-0070 (vapour pilot light)
	CR-A-0080 (liquid pilot light)
Quad Burner	CR-A-0090 (liquid pilot light)
	CR-A-0100 (vapour pilot light)

1.2 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.

1.3 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.

1.4 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.

1.5 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.

1.6 Technical Support

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

1.7 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

Section 2

2.0 Technical Description

2.1 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.

Note that all burner maintenance work must be conducted in a clean environment.
The burner is available in single, double, triple and quad variants.
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 the general views below and the feature and functions detailed above are described in the following paragraphs:

Mk 10 Burner – General views

2.1.1 Burner Can

The burner can is an aluminium spun and machined 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.

2.1.2 Vaporisation Coil

The vaporisation coil is connected to the outlet of the main valve by means of a screw connector into the valve block. 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.

2.1.3 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.

Tema connection

Rego connection

Mk10 Liquid hose fitting at burner end.

2.1.4 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 brass valve body. A pressure tight seal is achieved between the stem and valve body with the use of a primary and secondary "O" seal. The bonnet is sealed to the valve block using a bonded washer.

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.

2.1.5 Liquid Fire Valve Assembly

The liquid valve is a tecval manufacture.

- The valve handle is a 90 degree on/off type action.
- The handle is attached to the stem using a countersunk hexagon head screw.

2.1.6 Liquid Pilot Regulator Valve Assembly

The liquid pilot regulator valve assembly consists of tecval valve fitted with a brass-bodied regulator. This combined assembly incorporates 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. The regulator is screwed into the valve and sealed using ptfe tape.
Operation of the valve is through the rotation of a handle through 180 degrees. The handle is attached to the stem using a countersunk hexagon head screw. The liquid pilot valve is fitted with a vent tube assembly, which allows the fuel remaining in the valve at shut off to be automatically vented off.

2.1.7 Igniter Assembly

The Igniter Assembly consists of a piezo igniter and an electrode assembly. The electrode assembly is made of 3 main parts. These being an aluminium threaded portion which the piezo screws into, a ceramic closed tube with a hole in one end and an electrode tip which is secured to the ceramic tube. These parts are supplied as a complete assembly. The electrode tip is adjusted by means of it being screwed and is locked with a nut. The distance is set to make firm contact with the piezo when assembled in the burner can.

When assembled, the piezo igniter makes contact with the electrode thus allowing the transmission of the high voltage to the electrode tip.

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

2.1.8 Pressure Gauge Assembly

The pressure gauge is mounted by screwing into the side of the valve block and protrudes through the burner can. A pressure tight seal is achieved with the use of a copper seal and loctite. The seal interfaces to a precision machined bore in 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 face of the gauge is provided with a colour coded banding indicating the safe operating pressure range of the burner.

2.1.9 Liquid Fire Jet Assembly

The liquid fire jet assembly is mounted on the upper face of the liquid fire valve. The jet controls the flow of fuel when the liquid valve is operated. The assembly consists of a machined jet stem body fitted with multiple holes at the outlet with an adapter allowing the jet to be secured to the valve body and brass diffuser fitted with a mesh inside. The parts are sealed together using loctite and the assembly is sealed to the liquid fire valve body in a similar fashion.

2.1.10 Pilot Light Stem

The pilot light assembly is mounted on the upper face of the Liquid regulator and is supplied with a small flow of vapour fuel from the regulator. The assembly consists of a stainless steel stem where the fuel is burnt and a jet installed in the regulator. The stem is sealed to the regulator using a copper washer and ptfe tape.

2.1.11 Slurper Tube Assembly

There are two slurper tubes on a Mk10 burner. One is permanently secured to the coil jet ring and collects from the top of the valve block. The other is mounted on the upper face of the valve block and is secured using one of the screws, which also secures the cover plate. This slurper tube collects from the bottom of the can. 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.

2.1.12 Crossover Valve

The crossover valve assembly consists of a stainless steel valve with union fittings connected to two stainless steel feed tubes. The crossover feed tubes are mounted in a precision-machined bore in the side of each valve block using ptfe tape. The crossover valve union fittings are secured to the feed tubes using stainless steel compression fitting components. When the crossover valve is opened fuel is allowed to pass from one burner to the other allowing both burners to be operated from one main blast valve.

2.1.13 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.

2.1.14 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

Section 3

3.0 Preventative Maintenance

3.1 General

The burner should be subjected to periodic preventative maintenance check and preventative maintenance measures implemented if necessary. It is recommended that the period between inspections is once every three months or 25 hours operation, whichever is the sooner. The checks must incorporate the areas detailed below.

3.1.1 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.

3.1.2 Vaporisation Coil

3.1.2.1 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 4.1.2.2

3.1.2.2 Coil Fixings

Check the fixings in the coil supports. Loose fixings must be tightened as described in section 4.1.2.3

Check the fixings securing the coil supports to the burner can. Loose fixings must be tightened as described in section 4.1.2.4

3.1.2.3 Coil Tubing

Check the tube used in the construction of the coil for damage including signs of cracking, serious indentation and deterioration of welded joints.

Serious indentation cannot be repaired and the coil must be replaced as described in section 4.1.2.1

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 4.1.2.1

3.1.3 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. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in 4.1.7. If this fails to improve the pilot light flame, check the function of the pilot regulator as described in section 4.1.7.

3.1.4 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 4.1.9. If this fails to improve the spark, then refer to igniter maintenance section 4.1.9.

3.1.5 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 is detected, the hose must be replaced in accordance with the instructions in section 4.1.3.

Fuel hoses must be obtained from Ultramagic. For safety reasons, fuel hoses are supplied assembled with the connector and pressure tested.

3.1.6 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 4.1.8.
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.

3.1.7 Burner Mounting

3.1.7.1 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.

3.1.7.2 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.

Section 4

4.0 Repair and Maintenance

4.1 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 3 (Preventative Maintenance) 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.

4.1.1 Burner Can

The burner can is an aluminium spinning with holes machined and is of a relatively robust construction. Some indentation or abrasion 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.

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

- Ensure that the burner is safely vented before commencing.
- Remove the fuel hose as described in section 4.1.3.
- Remove the handle bar assembly as described in section 4.1.5.
- Remove Main valve assembly as described in section 4.1.5.
- Refer to figures 1 & 2, Undo and remove the two burner side strips (-37)

Figure 1

Figure 2

BU10-37 Side strip
BU10-38 Side strip attachment screw
BU10-39 Side strip attachment nut
BU10-40 Side strip attachment washer

- Remove Crossover valve as described in section 4.1.11.
- Remove Crossover feed tube as described in section 4.1.11.
- Remove the igniter assembly as described in section 4.1.9.
- Remove the pilot light handle and valve nut and washer.

BU10-12 liquid pilot valve

BU10-14 pilot light handle

- Remove liquid fire handle item 18.

BU10-18 Liquid fire handle

- Remove pressure gauge as described in section 4.1.8.

- Remove can slurper tube item 48 and cover plate item 46.

BU10-48 Slurper tube BU10-49 Slurper tube screw. BU10-46 Cover plate BU10-47 Screw

- Remove coil to can attachment screws shown in section 4.1.2.4.
- Remove Valve Block lock ring item 35 using either a C wrench or by tapping gently anti clockwise using a soft thin bar. (See figures 3 & 4)

Figure 3

Figure 4

BU10-35 Block lock ring.

- Release and remove the condensate seals item 50 from hose and cross over valve positions on can.

BU10-50 Condensate seal

- Carefully remove the can from the valve block and coil assembly. Take special care not to damage the aluminium threads of the valve block lock ring position. (see figures 5 & 6)

Figure 5

Figure 6

- Clean the areas of the valve block and valves where they have been sealed to prevent passage of water condensate
- Offer up the new can to check for fit. It may be necessary to relive the area where valves, hoses and tubes pas through the can. This should be carried out using a file. Ensure the surface is smooth when finished and that all areas are cleaned and reprotected thoroughly.
- Re-assembly is the reverse process of dismantling. Always use condensate seals and reseal the areas, which were previously sealed to prevent the passage of water condensate using silicon seal compound.
  NOTE - that if the vaporisation coil has been separated from the valve or if any of the valves have been removed from the block, they must be reassembled as described in the relevant sections.
  Where other sections are referred to for dismantling then the same section must be used for reassembly carrying out the appropriate tests.

4.1.2 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:

4.1.2.1 Coil Removal

- Ensure that the burner is safely vented before commencing.
- Remove the can as described in section 4.1.1.
- Remove the liquid pilot light stem as described in section 4.1.7.
- Remove the liquid pilot light regulator as described in section 4.1.7.
- Remove the liquid pilot light valve from the valve block. (this is recommended but not absolutely necessary) see section 4.1.7.
- Remove the liquid fire jet stem and diffuser as described in section 4.1.6.

- Remove the liquid fire valve (this is recommended but not absolutely necessary) see section 4.1.6.
- Mark the existing exact position of the coil relevant to the valve block using a pencil on the block.
- Place the valve block in a vice with the coil upright. Ensure that the jaws of the vice are suitably protected so as not to damage the valve block.
- Unscrew the coil from the valve block. A soft wooden bar may be used to assist by passing through the coil to act as a lever. (See figure 7)
- Clean up the valve faces and check for damage, paying particular attention where the various valves and tubes are fitted.
- Install the new coil in the valve block using loctite and a new copper seal washer. The coil should be tightened into the block to ensure a gas tight seal whilst also maintaining the exact position as that of the coil, which has been removed.

Figure 7 - View showing coil to valve block seat arrangement with copper seal.
(Note - Small bracket is only installed with vapour pilot light systems)

- The joint between the coil and the valve block must be tested to ensure that there are no leaks. Attach a 7 Bar (100 psi) air line to the valve block and check for leaks using soapy water. If any leaks are detected, they must be corrected before further continuing any further.
- (If removed) Refit the liquid pilot and liquid fire valves using new seals and loctite.
- The joints between the valves and the valve block must be tested to ensure that there are no leaks. Attach a 7 Bar (100 psi) air line to the valve block and check for leaks using soapy water. If any leaks are detected, they must be corrected before further continuing any further.
- Reassemble the burner in the reverse order to that dismantled using new seals throughout.
- Carry out a further pressure test. 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.

4.1.2.2 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 4.1.2.1

Figure 8

To clean the jets, refer to figure 8 and proceed as follows:

- Insert a suitable metal pin into the jet hole.
- Refer to figure 9, remove any debris by undoing and removing the plug and copper washer items 65 and 66 on the under side of the jet ring and blowing out with a blast of air. Always fit a new copper washer item 66.

Figure 9
Jet ring clean and drain plug position

BU10-65 Jet ring screw
BU10-66 Jet ring copper seal

4.1.2.3 Tightening of Coil Support Strip Screws

- Referring to figure 10, using an Allen key, tighten the coil support fixings (-51), if necessary.

Figure 10 – BU10-51 Coil strip screw

4.1.2.4 Tightening of Coil to Can Attachment Screws

- Referring to figure 11, using a flat bladed screwdriver, tighten the coil to can attachment screws (-36), if necessary.

Figure 11

BU10-36 Coil to can attachment screws

4.1.3 Removal and replacement of Fuel Hose.

To replace a fuel hose, refer to figures 12, 13 & 14 and proceed as follows:

- Using an open-ended spanner, undo the hose from the valve block. Note: it may be necessary to remove and replace the condensate seal (-50) (see can removal section 4.1.1)

Figure 12
Mk10 Liquid hose fitment

Figure 13
Mk10 Liquid hose fitment (Can removed for clarity)

Figure 14
Mk10 Liquid hose fitting at burner end.

- Replace the hose with a new one if necessary. When ordering a replacement hose, refer to parts catalogue and specify the length and end fitting required.
- Always fit new ptfe tape prior to assembly.
- Ensure that the hose to valve block 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 valve block. 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.

4.1.4 Condensate seal

BU10-50 Condensate seal

The condensate seals are fitted to prevent any condensation in the bottom of the can from dripping on the pilot or passengers. These may be fitted to the hose, crossover tube and liquid fire valve positions. They are installed using silicon seal compound between the seal and the can.

4.1.5 Main Valve Assembly

To remove and strip down the main valve assembly refer to figure 15 & 16 and proceed as follows:

- Remove main valve handle bar assembly (–43) by removing 4 off allen screws (–44) and 2 off screw plates (-45)

Figure 15

BU10-43 Handle bar assembly
BU10-44 Handle bar screw
BU10-45 Handle bar screw plate.

Figure 16 - View showing handle bar removed

- Remove main valve handle circlip (-22) and pivot pin (-22) to enable valve handle assembly (-21) to be removed.

BU10-21 Main valve handle assembly
BU10-22 Main valve handle pivot pin

BU10-19 Main Valve
BU10-20 Main valve screw
BU10-23 Main valve handle circlip

- Remove main valve screw (-20) and carefully lift out valve out of valve block.
- Refer to figure 17 and strip down the valve and check for contamination and signs of wear. Check the inside of the valve body bore for signs of scratching. If any scratches are noted, then the valve body (-25) must be replaced.
- Check the rubber seal in the valve cushion assembly (-32) 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 as the cushion and no attempt should be made to replace the seal only.
- Refer to figure 18 and 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 (-33) fitted to the stem. If either of the seals shows signs of deterioration or damage, they must be replaced. The secondary stem seal (-27) should also be replaced.

Figure 17

BU10-24 Main valve thrust washer
BU10-25 Main valve body
BU10-26 Main valve body seal
BU10-27 Main valve secondary stem seal
BU10-28 Main valve stem washer
BU10-29 Main valve spring
BU10-30 Main valve stem assembly
BU10-32 Main valve cushion assembly

Figure 18
BU10-33 Main Valve stem seal 1

- 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 valve body seal (-26) and circlip (-23)
- After re-assembly of the valve into the block, the gap between the nylon thrust washer (-24) 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 adjusting the screw in the valve handle assembly (-21). 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.

4.1.6 Liquid Fire Valve Assembly

Removal, inspection and maintenance of the liquid valve assembly consists of a number of stages as follows.

Stage 1 - If the valve is not leaking but there are signs of restriction, which is causing a small, flame then one should first check to see if the liquid fire diffuser is blocked. Refer to figure 21 and proceed as follows:

Figure 19

Figure 20

Figure 21 liquid fire assembly

BU10-15 liquid fire diffuser with mesh

BU10-16 liquid fire jet stem.

- Remove the diffuser item 15 and jet stem item 16 from the valve as an assembly.
- Check the valve outlet for contamination.
- Clean through the valve using compressed air.
- Separate the diffuser from the jet stem and again check for contamination
- Clean as required and blow out using compressed air.
- Reassemble using ptfe tape and carry out a burn test.

- If the problem still exists then the liquid fire valve must be replaced.
- Also if the liquid fire valve is found to be faulty by leaking then it should also be replaced as there are no servicable parts.
-

Stage 2 – where the liquid valve is found to be faulty and therefore requires replacing. Refr to figures 19 & 20 and proceed as follows.

- Remove the burner can as described in section 4.1.1 to gain access.
- Remove the diffuser item 15 and jet stem item 16 from the valve as an assembly.
- Remove the liquid valve item 17 and replace with a new valve using ptfe tape.

BU10-17 liquid fire valve

- Reassemble the diffuser and jet stem to the new valve using ptfe tape.
- 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
- Reassemble the burner as described in section 4.1.1
- Carry out a further pressure test. Attach a 7 Bar (100 psi) airline 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.

4.1.7 Liquid Pilot Light Assembly

Liquid pilot light assembly

Removal, inspection and maintenance of the liquid pilot light assembly consists of a number of stages as follows.

Stage 1

If the pilot light flame is weak carry out the following test to determine where the faults lies.

- Ignite the pilot light and check the flame for strength. It should give a consistent flame and be able to withstand being vigorously blown against.
- Carry out this test a number of times checking in each case that the valve shuts off cleanly.
- Check the valve and all assembly joints for signs of leaks.
- Vent off the system and fully purge the burner of all traces of propane.
- Remove the igniter assembly item 2 as described in 4.1.9.
- Remove the top half of the valve vent tube item 13 or loosen and move it to one side to gain access. (see figure 22)

Figure 22

BU10-13 liquid pilot vent tubes

- Using a small "Tommy bar" remove the pilot light stem item 6 to gain access to the pilot jet item 7. It is possible to leave the regulator item 4 in place in the valve. However if they both come out together then this is not a problem.

BU10-4 liquid pilot regulator

BU10-5 Washer

BU10-6 liquid pilot stem

Figure 23

BU10-7 liquid pilot jet

- Refer to figure 23 and remove the pilot jet item 7 and check to ensure that the hole in the jet is clear.

- If the jet is blocked then clear using a very fine wire or blow through with compressed air.
- Replace the jet taking care not to overtighten. And reassemble in the reverse order.
- Carry out the tests on the pilot light as before.
- If the problem still exists then the pilot regulator item 4 will require investigation. This is best achieved at the Ultramagic factory so a complete relacement unit should be installed. Always fit a new copper washer item 5.
- When installing the new regulator care should be taken to ensure that no dirt or debris is allowed to get into the area betwen the valve and the regulator.
- Check the joint between between the regulator and the valve for leaks. Then reassemble as before.
- Should the pilot light valve be leaking or blocked then this will require replacing as there are no servicable parts.
-

Stage 2 – where the liquid valve is found to be faulty and therefore requires replacing. Proceed as follows.

- Vent off the system and fully purge the burner of all traces of propane.
- Remove the igniter assembly item 2 as described in 4.1.9.
- Remove the top half of the valve vent tube item 13 or loosen and move it to one side to gain access.

- Using a small "Tommy bar" remove the pilot light stem item 6 to gain access to the pilot jet item 7. It is possible to leave the regulator item 4 in place in the valve. However if they both come out together then this is not a problem.
- Remove the regulator item 4.
- Remove the can as described in section 4.1.1 to gain access.
- Refer to figure 24 and remove the liquid pilot valve item 12 and replace with a new valve using loctite.

Figure 24

BU10-12 liquid pilot valve

- 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
- Reassemble the burner as described in section 4.1.1
- Reassemble the pilot regulator, jet and stem and test for leaks.
- Reinstall the igniter assembly as described in section 4.1.9.
- Carry out a further pressure test. 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.

4.1.8 Pressure Gauge Assembly

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

To remove the pressure gauge, refer to figures 25 to 28 and proceed as follows:

Figure 25

BU10-3 Pressure gauge and copper seal

Figure 26

Figure 27

Figure 28

- The pressure gauge is screwed into the valve block and sealed with a copper washer. To unscrew the gauge access must be gained to the back of the gauge using a short thin offset wrench passing through the can hole as shown as well as directly inside the can.

Cut down 14mm wrench for removal of pressure gauge

- When replacing the gauge care must be taken to ensure that the gauge is sealed correctly whilst also maintaining the correct rotation.
- 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 joint with the valve block with soapy water. If any bubbles are detected, then the problem must be rectified before further burner use.

4.1.9 Igniter Assembly

Igniter Spark Strength

To check the igniter spark strength, refer to 29 & 30 and proceed as follows:

Figure 29

Figure 30

- 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 distance between the electrode tip and the pilot light stem is approximately 6mm.
- Check that the piezzo igniter is tightly screwed into the electrode assembly
- Check that the electrode tip is tightly secured in the ceramic section of the electrode assembly.

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 1 will require replacing.

Igniter Maintenance

To remove and strip down the igniter assembly, refer to figure 31 and proceed as follows:

- Hold the piezo item 1 by hand or with soft faced grips. And unscrew the electrode assembly item 2 from inside the can.
- Reinstall with a new piezo taking care to ensure that it is secure whilst not over tightening which could result in damage to the piezo or the threads of the electrode assembly.
- Set the position of the electrode tip to ensure a gap of approximately 6mm between the tip point and the edge of the pilot stem.
- Check the operation of the igniter assembly by operating the button.

Figure 31 **BU10-2 Igniter electrode assy.** **BU10-1Piezo**

4.1.10 Slurper Tube Assembly

Very little adjustment or maintenance of the slurper tube assembly item 48 is required as the distance and position is set by its construction. However the tube should be set as shown in figure x so that it lines up correctly with the jet ring to ensure optimum performance.

Should the slurper tube assembly become damaged and require replacing then refer to figure 32 and proceed as follows.

Figure 32

BU10-48 Slurper tube BU10-49 Slurper tube screw

- Remove slurper tube screw item 49 and remove slurper item 48.
- Instal a new slurper in the position as shown in figure x to ensure optimum performance.
- Ensure that the screw item 49 is tight.

4.1.11 Crossover Valve Assembly

The cross over valve requires no maintenance and has no serviceable parts. Therefore if it is found to be faulty then a new valve must be fitted. Refer to figures 33 to 36 and proceed as follows.

- Vent off the system and fully purge the burner of all traces of propane.

Figure 33 Crossover Valve Assembly

Figure 34 Crossover feed tube 1 each side

Figure 35 Crossover Valve Assembly

Figure 36 Crossover Valve Assembly

BU10-52 Cross over valve

BU10-53 Male union fitting - 2

BU10-54 ¼ bsp Dowty seal – 2

BU10-55 Crossover feed tube - 1 each side

- Hold the valve item 52 and the male part of the union item 53 attached to the valve secure and loosen the female part of the union attached to the crossover feed tube. If the Crossover tube is not to be removed then leave the female part of the union attached to the crossover tube.
- Repeat the process for the other side of the valve.
- Remove the valve complete with 2 male unions.
- Inspect the unions to ensure that they are undamaged.
- Remove the male unions from the valve if they are still serviceable.
- Install the unions in the new crossover valve using new seals item 54.
- Reassemble in the reverse order making sure that the unions are tight to ensure there are no leaks.
- 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.

5.0 Vapour Pilot Light Configurations.

5.1 General

The vapour pilot configured Mk10 burners are similar to the liquid pilot light burners described with the exception that they have an additional low pressure hose supplying pre regulated vapour from the master cylinder to a vapour pilot light systems. The pilot light assembly is of a simpler design and construction and requires less maintenance..

The burner cans have an extra hole machined in them to allow the passage of the vapour hose. The can part numbers are the same as those fitted on a liquid pilot system but with the addition on a V added to the end to identify them as vapour system.

The valve blocks have a blank fitted where the liquid supply is given to the vapour valve and a small bracket is secured to the block to mount the vapour pilot valve. Valve block part numbers are the same as those fitted on a liquid pilot system but with the addition on a V added to the end to identify them as vapour system blocks.

Figure 36
General view from underneath a Quad burner fitted with vapour pilot lights showing valve and hose positions.

Figure 37
View showing installation of vapour pilot light valve and assembly

Figure 38
View showing vapour valve mounting bracket

5.2 Technical description - Vapour pilot light assembly

The vapour pilot light valve assembly consists of tecval valve fitted with an adaptor a vapour pilot light jet and a vapour stem assembly. This combined assembly incorporates the means of burning the pre-regulated vapour propane received from the master cylinder and the means of switching on and off the flow of fuel. The valve is mounted in an aluminium bracket secured to the side of the valve block. The adaptor is screwed into the valve and sealed using ptfe tape. The jet is screwed into the adaptor and the pilot light stem assembly is screwed onto the adaptor and sealed using ptfe tape. Operation of the valve is through the rotation of a handle through 180 degrees. The handle is attached to the stem using a countersunk hexagon head screw.

Figure 39

Figure 40

BU10-58 Vapour pilot stem assembly

BU10-59 Vapour pilot jet

BU10-60 Valve adaptor

Figure 41

BU10-56 Vapour pilot valve (left)
BU10-56 Vapour pilot valve (right)

5.3 Preventative maintenance

5.3.1 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 valve. In the event that the pilot light flame is considered to be unacceptable, clean the pilot light jet as described in 5.4 If this fails to improve the pilot light flame, then check the function of the pilot regulator on the master cylinder.

5.4 Repair and maintenance -Vapour Pilot Light Assembly

Removal, inspection and maintenance of the vapour pilot light assembly consists of a number of stages as follows.

Stage 1

If the pilot light flame is weak carry out the following test to determine where the fault lies.

- Ignite the pilot light and check the flame for strength. It should give a consistent flame and be able to withstand being vigorously blown against.
- Carry out this test a number of times checking in each case that the valve shuts off cleanly.
- Check the valve and all assembly joints for signs of leaks.
- Vent off the system and fully purge the burner of all traces of propane.
- Remove the igniter assembly item 2 as described in 4.1.9.
- Using a small "Tommy bar" remove the pilot light stem assembly item 58 to gain access to the pilot jet item 59. It is possible to leave the adaptor item 60 in place in the valve.

- Refer to figure 41 and remove the pilot jet item 59 and check to ensure that the hole in the jet is clear.

- If the jet is blocked then clear using a very fine wire or blow through with compressed air.
- Replace the jet taking care not to over tighten. And reassemble in the reverse order.
- Carry out the tests on the pilot light as before.
- If the problem still exists then the vapour regulator on the cylinder will require investigation.
- Should the pilot light valve be leaking or blocked then this will require replacing as there are no serviceable parts.
-

Stage 2 – where the burner vapour valve is found to be faulty and therefore requires replacing. Procede as follows.

- Vent off the system and fully purge the burner of all traces of propane.
- Remove the vapour hose.
- Remove the igniter assembly item 2 as described in 4.1.9.
- Using a small "Tommy bar" remove the pilot light stem assembly item 58
- Remove the adaptor item60 and jet item 59.
- Remove the can as described in section 4.1.1 to gain access.
- Refer to figure 37 and remove the vapour pilot valve item 56/57 and replace with a new valve using loctite.
- When the valve has been re-assembled into the valve block bracket, 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
- Reassemble the burner as described in section 4.1.1
- Reassemble the valve adaptor, jet and stem and test for leaks.
- Reinstall the igniter assembly as described in section 4.1.9.
- Carry out a further pressure test. Attach a 7 Bar (100 psi) airline 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.

BURNER FRAME MAINTENANCE (''Section 4'')

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

On frames fitted with a Centre Gimbal Block, the instructions provided in Supplement 8 must be adhered to.

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

Thread Form	Max. Torque (NM)
3/8 inch NPT/BSP	20
1/4 inch NPT/BSP	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	M6	3 - 5

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

CENTER GIMBAL BLOCK ASSEMBLY (''Supplement 8'')

Supplement 8 – Center Gimbal Burner Frames

Section 1

1. Introduction

This supplement defines the maintenance and inspection requirements for the range of Ultramagic Burner Frames developed for use with the MK21 burner when fitted with the Centre Gimbal and also for the Mk21 Single Burner. Maintenance and inspection requirements covering the range of Ultramagic MK 21 burners when fitted with the Centre Gimbal Assembly are also provided. Centre gimbal assemblies are also common to the BMK-008 Double, BMK-050 and MK-32 families of burners, being this supplement applicable for this specific subassembly.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

The burner when fitted with the Centre Gimbal Assembly uses many common components to the standard MK21 burner already detailed in the Maintenance Manual. Only those areas which are different to those already detailed in the Maintenance Manual, are described in this supplement. All other limitations, instructions and safety information contained in the Maintenance Manual remain applicable.

A range of burner frames have been designed for use with the Centre Gimbal Assembly, accommodating the various basket styles and burner combinations. The frames use many common components and materials. Consequently, areas of commonality are dealt with on a generic basis.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The information contained in this supplement applies to the Ultramagic range of MK 21burners, when fitted with the Centre Gimbal, as defined by the following drawing numbers:

Double Burner:	2022/0000
Triple Burner:	2023/0000

Quad Burner: 2024/0000
Gimbal Block Assembly: 2022/2500

Note that the Single Burner does not use a Centre Gimbal Assembly.

The range of Burner Frames is as defined in Figure 1 below:

Figure 1
Burner Frame Range

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual.

1.5 Maintenance Records

See Maintenance Manual

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

The following safety instructions are additional to those already contained in the Maintenance Manual:

- Before initiating any maintenance work, ensure that the burner is fully vented of fuel and that it is disconnected from any fuel supply.
- Do not carry out any maintenance work on the burner frames when the frame is assembled to the rest of the balloon equipment.

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the range of Ultramagic burner frames developed for use with the MK21 burner fitted with a Centre Gimbal, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Additional inspection requirements for the Centre Gimbal and the burner frames are defined in Sections 4 and 6 of this Supplement.

Section 3

3.0 Technical Description

3.1 General

3.1.1 Centre Gimbal Assembly

The Centre Gimbal has been introduced to the MK 21 range of double, triple and quad burners and replaces the previous method of achieving burner rotation which used an inner frame.

The Gimbal Block Assembly consists of three machined blocks assembled together using screw fixings. Large diameter holes are bored through the block allowing the block to be attached to a central tube on the burner frame and allowing the burner to be attached with the use of a special hanger assembly. There are three different hanger assemblies depending upon the burner combination.

The Gimbal Block Assembly is provided with a mechanical detent mechanism. This provides a momentary change in the amount of rotational friction and provides an indication to the pilot that the burner is orientated vertically. For the double burner, the mechanical detent is provided in both axes. Due to the different balance requirements, the detent is only present in one axis on the triple and quad burners. However, tension gas springs fitted to the burner frame automatically return the triple and quad burners to the vertical in the other axis.

The Gimbal Block Assembly is fitted with internal friction bearings. These may be adjusted so that the rotational friction can be set to accommodate individual pilot preference.

The Centre Gimbal when fitted in the Double Burner may be seen in Figure 2.

ITEM	DESCRIPTION	PART NUMBER
1	GIMBAL BLOCK ASSY	2022-2500
2	DOUBLE BURNER HANGER ASSY	2022-2600
3	M6 X 15 ST STL CAP HEAD SCREW	QU-C-0035
4	M6 PLAIN ST STL WASHER	MA-FE-0090
5	M6 COPPER LOCK NUT	CR-03-0170

Figure 2
Gimbal Block Installation

The triple and quad burners utilise different hanger assemblies. These may be seen in Figure 3.

ITEM	DESCRIPTION	PART NUMBER
1	TRIPLE BURNER HANGER ASSY	2023-0100
2	QUAD BURNER HABGER ASSY	2024-0100

Figure 3
Gimbal Block Installation (Triple and Quad)

3.1.2 Burner Frames

The burner frames are welded tubular stainless steel assemblies designed to act as the interface between the basket suspension wires and the envelope flying

wires. The frames also provide the mounting for the range of Ultramagic MK21 burners.

For the double, triple and quad burners, provision is made to accommodate the centre gimbal block. In the case of the double burner, a fixed bar spanning the width of the frame provides the mounting for the gimbal block.

In the case of the triple burner, a separate tube with an offset pivot provides the gimbal mount and also the means of achieving burner rotation in one axis. The method of mounting employed for the quad burner is similar to that of the triple with the exception that the pivot is not offset. The triple and quad burner frames are also provided with tension gas springs to assist with the action of burner gimbal.

Although the MK21 Single Burner does not utilise a centre gimbal, a frame has been developed, similar in style, to accommodate its use. Two-axis gimbal is achieved with the use of an inner frame.

Section 4

4.0 Preventative Maintenance

It is recommended that the burner support assemblies are subject to periodic preventative maintenance check and preventative maintenance measures implemented if necessary. The annual/100h check is the maximum interval allowed, although this can be shortened based on the experience gained during the operation.

4.1 Centre Gimbal Assembly

All preventative maintenance is as described for the MK 21 Burner in the Maintenance Manual with the following additions:

Apply a thin smear of temperature resistant silicon grease to the four Detent Blocks (see Figure 2) on the Gimbal Block Assembly.

4.2 Burner Frames

4.2.1 Single Burner Frame

Refer to the safety instructions and:

- Check that the gimbal friction in both axes is satisfactory. Adjust if necessary by tightening the fixing screws and nuts.
- Check that the rotation stop fitted to the end of the inner frame prevents complete burner inversion. If it is found that the rotation stop does not prevent complete rotation, contact Ultramagic for advice.

4.2.2 Double Burner Frames

Refer to the safety instructions and:

- Check that the two Spring Plates fitted to the cross tube are positioned such as to provide a good mechanical indication that the burner is in the vertical position. Adjust if necessary by tapping the Spring Plates gently with a soft hammer.
- Check that the eight fixings securing the Gimbal Block to the Burner Frame and Hanger Assembly are secure. Tighten if necessary.
- Check the gimbal friction in both axes. Adjust the friction if necessary by tightening the two screws positioned in the middle of the upper and lower Gimbal Block Caps (four total).

4.2.3 Triple and Quad Burner Frames

Refer to the safety instructions and:

- Check that the eight fixings securing the Gimbal Block to the Burner Frame and Hanger Assembly are secure. Tighten if necessary.
- Check the gimbal friction about the axis where the Hanger Assembly rotates inside the Gimbal Block. Adjust the friction by tightening the two screws positioned in the middle of the opposite Gimbal Block Cap.
- Check that the attachment of the Gimbal Block to the Cross Tube is secure. The Gimbal Block is locked to the Cross Tube and as such, the attachment should be solid and not loose. If the attachment is loose and cannot be rectified by tightening the Gimbal Block fixings and the friction adjustment screws, then it is likely that the locking pin or mating hole inside the Gimbal Block is worn. In this case, contact Ultramagic for advice.
- Check that the two fixings securing the Cross Tube Assembly to the frame are secure. Do not over-tighten as this will restrict the action of the two gas springs.
- Check the action of the gas springs. Fully operational gas springs should always return the burner to the central position. Faulty or damaged gas springs must be replaced (see Section 5.2.5.2).
- Check all fixings and attachments securing the gas springs. Tighten if necessary.

- Check that the rotation stops fitted at both ends of the Crossbar Assembly prevent complete burner inversion. If it is found that the rotation stops do not prevent complete rotation, contact Ultramagic for advice.

Section 5

5.0 Repair and Maintenance

5.1 Centre Gimbal Assembly

5.1.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies and components used within the construction of the Gimbal Block Assembly and the Burner Hanger Assemblies.

Maintenance other than that detailed in Section 4, (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 equipment functions.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

5.1.2 Gimbal Block Assembly

The Gimbal Block Assembly is used to mount the double, triple and quad burners to the various burner frames. The Gimbal Block Assembly when in double burner configuration may be seen in Figure 4.

ITEM	DESCRIPTION	PART NUMBER
18	M4 X 6 ST STL C.SINK HEX DRIVE SCREW	MA-FE-0865
17	M5 ST STL PLAIN WASHER	MA-FE-0090
16	M6 ST STL CRINKLE WASHER	MA-FE-0860
15	M6 X 25 ST STL CAP HEAD SCREW	CR-C-0260
14	M5 X 10 ST STL C.SINK HEX DRIVE SCREW	MA-FE-0855
13	M6 X 16 ST STL FLAT POINT GRUB SCREW	MA-FE-0850
12	M5 DOUBLE COIL TYPE D SPRING WASHER BS4464	MA-FE-0845
11	M5 X 20 ST STL CAP HEAD SCREW	MA-FE-0170
10	M5 X 25 ST STL CAP HEAD SCREW	MA-FE-0840
9		
8		
7	ROTATION STOP	2022-2516
6	FRICTION BEARING	2022-2515
5		
4	DETENT BLOCK	2022-2517
3	GIMBAL BLOCK BOTTOM CAP	2022-2512
2	GIMBAL BLOCK TOP CAP	2022-2511
1	GIMBAL BLOCK BODY ASSY	2022-2501

Figure 4
Gimbal Block Assembly

To remove and strip down the Gimbal Block Assembly, refer to Figure 4 and proceed as follows:

- Before removing any fixings from the Gimbal Block Assembly, ensure that the burner weight is fully supported and positioned so that it cannot fall. Removal of the Gimbal Block Assembly is best achieved with the burner upside down, on the floor and with the weight supported by the coils.

- Using a 5mm across flats (AF) Allen key, undo and remove the fixings securing the burner handle to the burner valve blocks (refer to Maintenance Manual). Withdraw the handle and store carefully.
- Using a 5mm AF Allen key, undo and remove the four M6 x 25 cap head screws and crinkle washers (items 15 and 16) securing the Gimbal Top Cap (item 2) to the Gimbal Block Body Assembly (item 1). Note these fixings are positioned in the four corners. Remove the Gimbal Block Top Cap.
- Carefully lift off and remove the burner frame and store carefully.
- Using a 5mm AF Allen key, undo and remove the four M6 x 25 cap head screws and crinkle washers (items 15 and 16) securing the Gimbal Bottom Cap (item 3) to the Gimbal Block Body Assembly (item 1). Note these fixings are positioned in the four corners. Remove the Gimbal Block Bottom Cap and Gimbal Block Body Assembly
- Using a 4mm AF Allen key, undo and remove the two M5 x 20 fixings and double coil spring washers (items 11 and 12) from the gimbal Block Bottom Cap.
- Using a 4mm AF Allen key, undo and remove the two M5 x 25 fixings, double coil spring washers and plain washers (items 10, 12 and 17) from the Gimbal Block Top Cap.
- Using a 3mm AF Allen key, undo and remove the six M6 x 16 Grub Screws (item 13) from the Gimbal Block Body Assembly.
- Remove the four Friction Bearings (item 6) from the Gimbal Block Body Assembly.
- Using a 2.5mm AF Allen key, undo and remove the two M4 x 6 countersink screws (item 18) securing the Detent Block (item 4) to the top and bottom caps.
- Using a 3mm AF Allen key, undo and remove the two M5 x 10 countersink fixings (item 14) securing the Rotation Stop (item 7) to the cap. Repeat for the other rotation Stop.
- Replacement is generally the reverse procedure of removal. Prior to replacement, check and lubricate the inside of the circular bores and if necessary, lubricate using temperature resistant silicon grease. Make sure that the correct combination of M5 fixings, double coil spring washers and plain washers are fitted in the Top and Bottom Caps. Use Loctite 222 when replacing any fixings not provided with a mechanical locking method. Note, do not use Loctite on the main fixings securing the top and bottom caps to the Gimbal Block Body Assembly.
- Upon completion of re-assembly, adjust the four M5 screws (items 10 and 11) to achieve the desired level of gimbal friction.

5.1.3 Burner Hanger Assemblies

The Burner Hanger Assemblies secure the individual burner cans to each other and provide the mounting in to the Gimbal Block Assembly. To remove the Burner Hanger Assembly, refer to Figures 2, 3 and 4 and proceed as follows:

- Support the weight of the burner by resting the burner on the burner handle. Take care to make sure that the burner cannot over-balance. Place supports underneath the burner frame to make sure it remains stable and does not fall when the Gimbal Block fixings are removed.
- Using a 5mm AF Allen key, undo and remove the four M6 fixings securing the uppermost Gimbal Cap to the Gimbal Block Body Assembly.
- Take the weight of the burner frame, remove any supports and carefully lower the frame to the floor.
- Using a 5mm AF Allen key and a 10mm open-ended spanner, undo and remove the four M6 Cap Head Screws, plain washers and copper lock nuts (items 3, 4 and 5, Figure 2) securing the hanger brackets to the burner can. Repeat for all can positions.
- Further repair is by replacement only.
- Replacement is generally the reverse procedure of removal. Prior to re-assembly, check and grease the length of tube normally inside the Gimbal Block Assembly if necessary, using temperature resistant silicon grease.
- Upon completion of re-assembly, adjust the four M5 screws (items 10 and 11, Figure 4) to achieve the desired level of gimbal friction.

5.2 Burner Frames

5.2.1 General

This section describes the procedures necessary to enable the removal, repair and replacement of the various assemblies and components used in the burner frames.

Maintenance other than that detailed in Section 4, (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 equipment functions.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

5.2.2 Indentation, bending and cracking (All Frame Types)

The burner frames form the interface between the basket suspension wires and the envelope flying wires. Since the envelope flying wires are at an angle to the vertical, significant mechanical loads are resisted by the burner frame. It is therefore of great importance to ensure that the structural integrity of the frame is not compromised.

In the event that any indentation, deformation or cracking is detected, do not attempt to carry out any repairs without first obtaining repair instructions from the Ultramagic Design Office.

Note that repairs to indentations and deformations may only be carried out by approved Ultramagic personnel, personnel approved by Ultramagic or by personnel approved to the appropriate standard by the Airworthiness Authority in the country of registration. Where welding is required, the limitations detailed in the Ultramagic Maintenance Manual apply.

5.2.3 Single Burner Frame

5.2.3.1 Removal of Single Burner from Burner Frame

To remove the Single Burner from the Burner Frame Assembly, refer to Figure 5 and the Safety Instructions and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	OUTER FRAME ASSY	3321-0001
2	INNER FRAME ASSY	3321-0002
3	BRASS GIMBAL SADDLE (PLAIN)	QUC-140
4	BRASS GIMBAL SADDLE (THREADED)	QUC-150
5	M8 COPPER LOCK NUT	CR-03-0190
6	M8 ST STL PLAIN WASHER	MA-FE-0100
7	M8 X 55 ST STL CAP HEAD BOLT	MA-FE-0270

Figure 5
Single Burner Removal

Before removing any fixings, make sure that the burner weight is supported and that it cannot fall.

- Using a 6mm AF Allen key and a 13mm AF spanner undo and remove the two sets of fixings (items 5, 6 and 7).
- Withdraw the burner from the frame.
- Replacement is generally the reverse procedure of removal. Make sure that the Brass Gimbal Saddles (items 3 and 4) are fitted in the correct positions. Tighten the fixings to provide satisfactory levels of gimbal friction.
- Upon completion, rotate the burner in both directions to check that the rotation stop prevents burner inversion.

5.2.3.2 Removal of Inner Frame Assembly

To remove the Inner Frame Assembly from the Outer Frame Assembly, refer to Figure 6 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	OUTER FRAME ASSY	3321-0001
2	INNER FRAME ASSY	3321-0002
3	BRASS GIMBAL SADDLE (C.SINK)	QUC-130
4	BRASS GIMBAL SADDLE (PLAIN)	QUC-140
5	BRASS GIMBAL SADDLE (THREADED)	QUC-150
6	M8 COPPER LOCK NUT	CR-03-0190
7	M8 ST STL PLAIN WASHER	MA-FE-0100
8	M8 X 80 ST STL C.SINK HEAD HEX DRIVE BOLT	MA-FE-0295

Figure 6
Inner Frame Assembly Removal

- Remove the burner from the Inner Frame Assembly as described in Section 5.2.3.1.
- Using a 6mm AF Allen key and a 13mm AF spanner, undo and remove the copper lock nut (item 6) from both sides.
- Using a 6mm AF Allen key, undo and remove the countersink bolt (item 8) from both sides.
- Withdraw the frame.
- Replacement is generally the reverse procedure of removal. Note the correct orientation of the Brass Gimbal Saddles (items 3, 4 and 5). Tighten the fixings to provide satisfactory levels of gimbal friction.
- Upon completion, rotate the burner in both directions to check that the rotation stop prevents burner inversion.

5.2.4 Double Burner Frame

The double burner frame is a complete welded assembly and as such, there are no removable parts. Repair work is therefore limited to that described in Section 5.2.2.

5.2.5 Triple and Quad Burner Frames

5.2.5.1 Crossbar Assembly Types

The triple and quad burner frames make use of a rotating Crossbar Assembly to achieve burner gimbal in one of the two axes. The Crossbar Assembly rotation is resisted by two tension gas springs. To accommodate the range of frame sizes and configurations, several Crossbar Assemblies are required. These are shown in Figure 7 below.

Figure 7
Burner Frame and Crossbar Assembly Combinations

5.2.5.2 Removal of Tension Gas Springs

Note that in their operational positions, the gas springs are partially extended and therefore exert considerable force. Care must be taken when removing the gas springs to avoid damage or injury. Follow the procedure below.

To remove the gas springs, refer to Figure 8 and proceed as follows:

ITEM	DESCRIPTION	PART NUMBER
1	BURNER FRAME ASSY	SEE FIG 4
2	CROSSBAR ASSY	SEE FIG 4
3	GAS SPRING OUTLINE SPEC	3311-0019
4	M10 X 80 ST STL HEX DRIVE CSK. BOLT	MA-FE-0305
5	M10 ST STL PLAIN WASHER	CR-C-0160
6	M10 COPPER LOCK NUT	CR-03-0180
7	M8 X 20 ST STL CAP HEAD SCREW	BO-C-0080
8	GAS SPRING HORSE SHOE	3311-0017
9	M8 ST STL PLAIN WASHER	MA-FE-0100
10	M8 ST STL NUT	CR-03-0190
11	35MM BRASS SADDLE (OUTER)	3311-0012
12	35MM ANTI-ROTATION SADDLE	3311-0013

Figure 8
Gas Spring and Crossbar Removal

- Remove the Burner Assembly. Instructions covering the safe removal of the burner from the Burner Frame are provided in Section 5.1.2.
- Using a 5mm AF Allen key, carefully loosen the two cap head screws (item 7) securing the Gas Spring Horseshoe (item 8) to the burner frame. Loosen each screw, one turn at a time so that the horseshoe remains level until the Gas Spring has completely retracted. Leave the Horseshoe fixed to the frame.
- Using an 11mm and 13mm AF open-ended spanner, undo and remove the M8 nuts and plain washers at the top and bottom of the Gas Spring securing the ball joints to the Horseshoe and the Crossbar.
- Using an 11mm open-ended spanner, undo the ball joints at the top and bottom of the Gas Spring. Undo each ball joint one turn at a time. Remove the Gas Spring.
- The Gas Spring is a sealed unit containing pressurised gas. **Do not attempt to open the spring.** Repair of the Gas Spring is by replacement only.
- Replacement is generally the reverse procedure to removal. Apply Loctite 222 to the ball joint threads and nuts prior to re-assembly.
- After re-assembly, check that the Anti-Rotation Saddles (item 12) are fitted correctly and that they prevent complete burner inversion.
- Check that the Crossbar Assembly (item 2) is free to rotate smoothly.

5.2.5.3 Removal of Crossbar Assembly

To remove the Crossbar Assembly, refer to Figure 8 and proceed as follows:

- Remove the Burner Assembly. Instructions covering the safe removal of the burner from the Burner Frame are provided in Section 5.1.2.
- Remove the Gas Springs from each end of the Crossbar as described in Section 5.2.5.2.
- Using a 17mm AF open-ended spanner, undo and remove the M10 copper lock nuts and washers (items 6 and 5) from each end of the Crossbar.
- Using a 6mm AF Allen key, undo and remove the two M10 Countersink bolts from each end of the Crossbar.
- Withdraw the Crossbar from the burner frame.
- Replacement is generally the reverse procedure of removal. Note the correct positions of the Brass Saddle and Anti-Rotation Saddle (items 11 and 12 respectively). Anti-Rotation Saddles are fitted at each end of the Crossbar Assembly.
- When re-fitting the Crossbar Assembly, make sure that the Gimbal Block locking-pin located in the middle of the Crossbar is positioned uppermost.
- When replacing the two M10 copper lock nuts (item 6) do not over-tighten. Adjust so that the Crossbar is secure but free to rotate against the action of the Gas Springs.
- Check that the two Anti-Rotation Saddles (item 12) prevent complete burner inversion. Note that both saddles must be functional and that both the stops welded to the Crossbar end plates must engage with the Anti-Rotation Saddles.

5.2.5.4 Brass Saddle and Anti-Rotation Saddle Removal

See section 5.2.5.3.

5.2.6 Gas Spring Horseshoe Removal

The Horseshoe may be replaced as part of the Gas Spring removal process or in isolation. To remove in isolation, refer to Figure 8 and proceed as follows:

- Using a 5mm AF Allen key, carefully loosen the two cap head screws (item 7) securing the Gas Spring Horseshoe (item 8) to the burner frame. Loosen each screw, one turn at a time so that the horseshoe remains level until the

Gas Spring has completely retracted. Continue to undo and remove the screws.

- Using an 11mm and 13mm AF open-ended spanner, undo and remove the M8 nuts and plain washers at the bottom of the Gas Spring securing the ball joint to the Horseshoe.
- Remove the Horseshoe.
- Replacement is generally the reverse procedure to removal. Apply Loctite 222 to the ball joint threads and nuts and to the two Horseshoe fixings (item 7) prior to re-assembly. Tighten the two Horseshoe fixings (item 7) one turn at a time in sequence until fully secure.

Section 6

6.0 Annual / 100 Hour Inspection Requirements

6.1 Centre Gimbal Assembly

6.1.1 General

The burner must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.1.2 Inspection Requirements

Carry out all functional tests as specified in the Maintenance Manual. In addition, check the following:

- Check for the smooth and unrestricted rotation of the burner in both axes. Adjust the friction as necessary.
- Check that the rotation stops are fitted, their fixings are secure and that the stops prevent excessive burner rotation.
- Check for excessive wear on the Detent Blocks. Replace if necessary.
- Check that the eight fixings securing the top and bottom caps to the Gimbal Block Body Assembly are all present and secure.
- Check that the fixings securing the Burner Hanger Assemblies to the burner cans are all present and secure.

- Check the welds securing the Hanger Assembly brackets to the tubing.

6.2 Burner Frames

6.2.1 General

The burner frames must be subjected to an inspection by an inspector approved by the national airworthiness authority in the state of registration. The inspection must be carried out every 12 months or 100 hours use, whichever is the sooner.

The inspection requirements detailed below are additional to those already specified in the Maintenance Manual.

6.2.2 Inspection Requirements

6.2.2.1 Single Burner Frame

Visually inspect the inner and outer frames for indentation, deformation or signs of cracking particularly in the areas of welded joints. If any indentation, deformation or cracking is detected, contact Ultramagic for advice.

Check that the gimbal friction in both axes is satisfactory. Adjust if necessary by tightening the fixing screws and nuts (see section 5.2.3).

Check that the rotation stop fitted to the end of the inner frame prevents complete burner inversion. If it is found that the rotation stop does not prevent complete rotation, contact Ultramagic for advice.

6.2.2.2 Double Burner Frame

- Visually inspect the frame for indentation, deformation or signs of cracking particularly in the areas of welded joints. If any indentation, deformation or cracking is detected, contact Ultramagic for advice.
- Check that the eight fixings securing the Gimbal Block to the Burner Frame and Hanger Assembly are secure. Tighten if necessary.
- Check the gimbal friction in both axes. Adjust the friction if necessary by tightening the two screws positioned in the middle of the upper and lower Gimbal Block Caps (four total).

6.2.2.3 Triple and Quad Burner Frames

- Visually inspect the frame for indentation, deformation or signs of cracking particularly in the areas of welded joints. If any indentation, deformation or cracking is detected, contact Ultramagic for advice.

- Check that the eight fixings securing the Gimbal Block to the Burner Frame and Hanger Assembly are secure. Tighten if necessary.

- Check the gimbal friction about the axis where the Hanger Assembly rotates inside the Gimbal Block. Adjust the friction by tightening the two screws positioned in the middle of the opposite Gimbal Block Cap.

- Check that the attachment of the Gimbal Block to the Cross Tube is secure. The Gimbal Block is locked to the Cross Tube and as such, the attachment should be solid and not loose. If the attachment is loose and cannot be rectified by tightening the Gimbal Block fixings and the friction adjustment screws, then it is likely that the locking pin or mating hole inside the Gimbal Block is worn. In this case, contact Ultramagic for advice.

- Check that the two fixings securing the Cross Tube Assembly to the frame are secure. Do not over-tighten as this will restrict the action of the two gas springs.

- Check the action of the gas springs. Fully operational gas springs should always return the burner to the central position. Faulty or damaged gas springs must be replaced (see Section 5.5.5.2).

- Check all fixings and attachments securing the gas springs. Tighten if necessary.

- Check that the rotation stops fitted at both ends of the Crossbar Assembly prevent complete burner inversion. If it is found that the rotation stops do not prevent complete rotation, contact Ultramagic for advice.

- Remove the Gimbal Block Cap (Ref. 5.1.2) securing the Gimbal block to the Cross Tube of the frame. Visually inspect the tube and its welding, making sure that there are no cracks or signs of damage. Use magnifying lenses if necessary.

Section 7

7.0 Troubleshooting

Symptom	Possible Cause	Corrective Action
Single Burner Frame		
Gimbal Action too loose or too stiff.	Fixings too loose or too tight	*Adjust fixings*
	Inner or Outer Frame bent	*Contact Ultramagic*
Burner capable of turning upside down	Anti-Rotation Stop damaged or broken. Inner or outer frame bent	*Contact Ultramagic*

Double Burner Frame		
Gimbal Action too loose or too stiff.	Gimbal Block friction settings incorrect	*Adjust friction bearing settings.*
	Cross tube bent or deformed	*Contact Ultramagic*
	Hanger Assembly tube bent or deformed	*Contact Ultramagic*
	No grease inside Gimbal Block	*Add grease.*
	Contamination inside Gimbal Block	*Strip down and clean.*
	Spring Plates Incorrectly set	*Adjust and grease Spring Plates*
Burner capable of turning upside down	Anti-Rotation Stops not fitted or broken.	*Fit Anti-Rotation Stops*

Triple and Quad Burner Frames		
Gimbal action too loose or too tight.	Crossbar fixings too tight	*Adjust fixings*
	Gas Spring Faulty	*Replace Gas Spring*
	Hanger Assembly tube bent or deformed	*Contact Ultramagic*
	Crossbar bent	*Replace Crossbar*
	Gimbal Block friction settings incorrect	*Adjust friction bearing settings*
	No grease inside Gimbal Block	*Add grease.*
	Contamination inside Gimbal Block	*Strip down and clean.*
	Spring Plates Incorrectly set	*Adjust and grease Spring Plates*
Burner capable of turning upside down	Anti-Rotation Saddles and stops not fitted or broken	*Fit Anti-Rotation Saddles and Stops*
	Crossbar bent	*Contact Ultramagic*

Section 8

8.0 Post Hard Landing Inspection Requirements

If the equipment has been subjected to a hard landing, inspect the burner frame and check that:

- The frame is not dented, deformed or cracked.
- The burner is incapable of complete inversion.
- All fixings are secure.
- The gimbal action is satisfactory in both axes.
- The Gimbal Block mounting fixings are secure and tight.
- All fixings securing the Burner Hanger Assembly to the burner cans are secure and tight.

APPENDIX 1

Centre Gimbal Assembly and Burner Frames

Annual / 100 Hour Burner Inspection Checklist

REQUIREMENT	REFERENCE	OKAY	COMMENTS
Rotation Action Okay	6.1.2		
Rotation Stops	6.1.2		
Wear on Detent Blocks	6.1.2		
Main Fixings	6.1.2		
Hanger Fixings	6.1.2		
Hanger Assembly Welds	6.1.2		
Indentation, deformation or cracking	6.2.2.1 6.2.2.2 6.2.2.3		
Gimbal Friction Setting	6.2.2.1 6.2.2.2 6.2.2.3		
Burner Inversion	6.2.2.1 6.2.2.2 6.2.2.3		
Gimbal Block Fixings (Double, Triple and Quad only)	6.2.2.2 6.2.2.3		
Cross bar cracks (Triple and Quad only)	6.2.2.3		

FAST FLAT CONNECTORS (''Supplement 9'')

Supplement 9 – Fastflat Connectors

Section 1

1.0 Introduction

This supplement defines the maintenance and inspection requirements for the Fastflat (Stucchi) coupling when fitted to the Ultramagic fuel cylinders and burners.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements.

Connection of the burner to the fuel cylinder is achieved through the use of a special self-sealing coupling. The 3/8" BSP Fastflat connector is offered as an optional fit.

The Airworthiness Limitations section is FAA approved and specifies maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

For US 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 Applicability

The Fastflat coupling may be fitted to all Ultramagic burners and standard fuel cylinders.

1.2 Replacement Parts and Procedures

See Maintenance Manual.

1.3 Approved Maintenance and Inspection Personnel

See Maintenance Manual.

1.4 Welding and Welders

See Maintenance Manual

1.5 Maintenance Reports

See Maintenance Manual.

1.6 Technical Support

See Maintenance Manual.

1.7 Safety

See Maintenance Manual

Section 2

2.0 Airworthiness Limitations

2.1 Approval Statement

This supplement provides the maintenance information for the optional fit Fastflat Coupling as fitted to the Ultramagic burners and fuel cylinders, as required by EASA CS 31 HB.82 and FAR 31 section 31.82.

2.2 Mandatory Replacement Time

See Maintenance Manual.

2.3 Inspection Interval

See Maintenance Manual.

Section 3

3.0 Technical Description

The 3/8" BSP Fastflat connector may be fitted to the fuel cylinder main liquid valve and to the burner fuel hoses as an alternative to the 1 ¼" Acme (Rego) or Tema 3800. Note that all balloon cylinder and burner connectors must be of the same type.

The male connector is fitted to the fuel cylinder main liquid valve and the seal is achieved with the use of a bonded washer. The female connector is fitted to the burner fuel hose and the seal is achieved again with the use of a bonded washer. The coupling is quick-release and self-sealing.

Section 4

4.0 Preventative Maintenance

See Maintenance Manual.

Section 5

5.0 Repair and Maintenance

There are no user serviceable parts in the Fastflat coupling and as such maintenance is limited to replacement only. Removal and replacement of the male and female connectors is generally as described in the relevant sections of the Maintenance Manual. Refer to Figure 1 below for a description of the parts.

ITEM	DESCRIPTION	PART NUMBER
1	3/8" BSP MALE STUCCHI M-A9V 3/8 BSP-A04	CR-06-0250
2	3/8" BSP FEMALE STUCCHI F-A9V 3/8 BSP-A04	CR-06-0255
3	3/8" BSP MALE BONDED WASHER	MA-FE-0600

Figure 1
Fastflat Coupling Attachment to Cylinder and Burner

SUPPLEMENT 9, Issue 2
HOT AIR BALLOON MAINTENANCE MANUAL

Section 6

6.0 Annual / 100 Hour Inspection Requirements

See maintenance manual.

Section 7

7.0 Troubleshooting

Symptom	Possible Cause	Corrective Action
No fuel flow through connector	Cylinder main fuel valve is OFF position	*Turn on main fuel valve*
Mated coupling leaks	Male or female or both couplings damaged	*Replace*
Male connector will not seal	Connector damaged	*Replace*
Female connector will not seal	Connector damaged	*Replace*

Section 8

8.0 Post Hard Landing Inspection Requirements

In the event that the equipment is subject to a hard landing, check the mated coupling for leaks and each half of the connector when disconnected from each other to make sure they continue to maintain perfect seals. In addition, check the joint between the male connector and the cylinder main fuel valve to ensure that there is no damage and that it is secure.

APPENDIX 5– FUEL SYSTEM REPAIRS

FUEL CYLINDERS (''Section 4'')

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.

4 FUEL SYSTEMS

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

All fittings on a cylinder (with the exception of the Contents Gauge - see 4.2.13) have a tapered thread and PTFE tape is used as standard sealing method, allowing alternatively the use of Loctite® 542, 572 or 565. When PTFE tape is used, apply at least 5 turns of tape on the narrow end of the male thread before assembling. Engagement length must achieve a minimum of 3 full turns and the 50% of the thread at least. Refer to the Torque values in section 4.6.

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. The coupling threads are assembled with Loctite® Screwlock 222 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. Krytox® grease is recommended in all areas in contact with fuel. Molykote® 111 grease is accepted as alternative. Friction bearing elements not exposed to fuel may be lubricated with graphite grease, or graphite / PTFE powder in environments where sand or dust is willing to collect.

4.2.6 Regular Inspection

Cylinders require inspection before each flight in accordance with the applicable Flight Manual. However, whenever the cylinder has other uses (e.g. burner test, etc) the following checks are still required:

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
- .3/4 NPT boss with welded dip tube for Liquid valve
- .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.

STANDARD SLAVE CYLINDER STANDARD MASTER CYLINDER

General cutaway view

4.2.10 1¼ ACME (Rego®) liquid outlet connector

This is fitted to the main liquid valve and a dowty seal (bonded washer) 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.

CAUTION: Fisher M220M type connectors are not permitted on Ultramagic cylinders.

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 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 replaced. New gauges are always supplied with a new gasket. When being mounted, make sure that the orientation of the gauge is correct, as shown in section 4.2.9.

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 set to discharge at 26 bar (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. On master cylinders, this valve is built in the vapour valve instead (see 4.2.17).

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 connector should be replaced.

The standard type of connector for vapour hose is Legris, although other types are available from Ultramagic. This connector and the regulator can only be supplied by Ultramagic. Connectors must be set at an angle where access to the valves handles and connection of the hose is possible but connectors do not protrude above the protecting ring.

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 or its PRV is due for replacement, 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 leak check at an operational pressure, as well as a 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)

'FUEL.TEK' FUEL CONTROL SYSTEM („Supplement 19")

ULTRAMAGIC MAINTENANCE MANUAL SUPPLEMENT Nº19

'FUELTek' FUEL CONTROL SYSTEM

S19 FUELTEK FUEL CONTROL SYSTEM

Section 1 - General

This supplement defines the maintenance and inspection requirements for the Ultramagic "FuelTek" Electronic Fuel Gauge, as a response to the requirements established in EASA CS 31HB.82 and FAR 31 Amdt. 31-7 section 31.82.

Sections 1 to 5 detail the maintenance procedures and the parts used. Section 6 details the annual / 100 hour inspection and test requirements. The numbering of sections is kept from the main Ultramagic Maintenance Manual, its content being substituted or appended by the content of this supplement.

The electronic fuel gauge is an optional fit designed for use with the standard range of Ultramagic fuel cylinders. The gauge provides some significant features not available with the mechanical gauge such as zero to 120% fuel monitoring, digital electronic readout and audio warnings at 20% and 10% fuel levels.

The information contained in this supplement applies to the following Ultramagic range of standard fuel cylinders, when fitted with FuelTek sensor:

Ultramagic Cylinder Type	Propane Capacity
M-20 / M-20D	20 kg
M-30 / M-30D	30 kg
M-40 / M-40D	40 kg

1.1.4 Preventative maintenance: Fuel Cylinders

(Add the following)

- External cleaning of the 'FuelTek' readout
- Re-charge / Replacement of the 'FuelTek' readout internal battery
- Removal / Replacement of 'FuelTek' jack lead
- Removal / Replacement of 'FuelTek' readout unit
- When not in use, cover the jack sockets to prevent the ingress of contamination.
- Monitor the functionality of the gauge display for a smooth and continuous change in readout as the cylinder fuel content varies.
- To prevent the further ingress of magnetic particle contamination to the cylinder, use a filter when refuelling.

Section 2 – Envelope Repairs

Not applicable.

Section 3 – Basket Repairs

Not applicable.

Section 4 – Fuel Systems

4.2.13 Contents Gauge: FuelTek system

(Replace with the following)
When fitted, the standard mechanical fuel gauge is completely removed from the fuel cylinder and is replaced with a special Dip Sensor Assembly and float. A small cable fitted with 2.5mm jack plugs at each end links the Dip Sensor Assembly to a special Readout Assembly.

The dip sensor assembly consists of a long stainless steel tube welded to a machined head. The head is attached to the cylinder mounting using the same seal as for the standard gauge. The tube contains a long printed circuit board fitted with electronic sensing devices. A magnetic float is fitted to the outside of the tube and is free to rise and fall with the fuel level.

When the fuel level in the cylinder varies, the float triggers special sensors fitted inside the dip sensor tube. This in turn provides the change in electrical signal which is detected by the electronics in the Readout Assembly. A digital indication of the remaining fuel contents is then provided on the Readout display.

The sensors fitted inside the dip sensor assembly are mounted on a special printed circuit board. In addition, the circuit board is provided with electrical "jumper links", resistors and a 2.5mm jack socket. The circuit board is completely contained within a heat-shrink jacket. The jacket provides a degree of mechanical protection and prevents electrical contact between the circuit board and the dip sensor metalwork.

The dip sensor circuit boards are provided in three lengths. The different lengths are required to accommodate the 20kg, 30kg and 40kg fuel cylinders. Since the printed circuit boards are in all respects identical except for their lengths, they are configured electrically in the factory by setting the "jumper links" so that any Readout Assembly may be used with any cylinder size without the need for re-calibration.

The 'FuelTek' Readout Assembly consists of a bespoke five-part plastic-moulded box. The box contains a rechargeable PP3 battery, and an advanced electronic circuit board fitted with the electronic sensing circuitry, a digital display, a multi-function pushbutton, an audio alarm, an on/off switch, low battery warning indication and a 3.5mm jack socket to allow the connection of a remote power supply.

The 'FuelTek' Readout Assembly is designed to be attached to an existing boss mounted on the top of the standard range of Ultramagic cylinders using a simple thumb-screw arrangement. In this arrangement, one Readout Assembly is dedicated to an individual cylinder. However, a single Readout may be dedicated to more than one cylinder using a simple switching arrangement which may be supplied by Ultramagic.

ITEM	DESCRIPTION	DWG / PART NUMBER
1	20kg FUEL CYLINDER ASSEMBLY	4002-0100
1	30kg FUEL CYLINDER ASSEMBLY	4003-0100
1	40kg FUEL CYLINDER ASSEMBLY	4004-0100
2	20kg FUELTEK DIP SENSOR ASSEMBLY	BO-NE-0200
2	30kg FUELTEK DIP SENSOR ASSEMBLY	BO-NE-0300
2	40kg FUELTEK DIP SENSOR ASSEMBLY	BO-NE-0400
3	2.5mm JACK LEAD ASSEMBLY	BO-NE-0040
4	FUELTEK READOUT ASSEMBLY	BO-NE-0500

Figure 1
Plan View On Fuel Cylinder Showing 'FuelTek' Electronic Gauge Installation

4.2.13.1 General

This section describes the procedures necessary to enable the removal, repair, cleaning and replacement of the components used in the electronic gauge equipment.

Maintenance other than that detailed in Section 1.1.4 (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 equipment function.

Unless otherwise stated, maintenance specified in this section may only be carried out by Ultramagic or by a maintenance organisation approved by the airworthiness authority in the country of registration.

4.2.13.2 Dip Sensor Assembly

The Dip Sensor Assembly is available in three different sizes and is designed to fit the standard Ultramagic 20kg, 30kg and 40kg fuel cylinders. Note that it is important to ensure that the correct assembly is fitted to the cylinder. Use of the incorrect Dip Sensor Assembly will result in erroneous fuel quantity measurement. Note also that the Dip Sensor Assemblies contain a long printed circuit board fitted with the magnetically-activated electronic sensors. There are three different circuit board lengths designed to accommodate the 20kg, 30kg and 40kg cylinders. Fitting the wrong circuit board will result in eventual damage to the circuit board wired connections and incorrect fuel quantity measurement.

The bottom of the Dip Sensor tube is closed off by a welded screw fitting. This welded joint forms part of the cylinder pressure seal. The screw fitting is provided with a nut and washer for the purposes of retaining the magnetic float. The upper end of the tube is welded to the Dip Sensor Head and again, this joint forms part of the cylinder pressure seal. The Dip Sensor Head is secured to the cylinder in the usual fashion using the same gasket seal as for the standard mechanical fuel gauge.

The top of the Dip Sensor Head is provided with a small plate secured using four screws. This plate provides mounting for the jack socket and allows access to the circuit board. Note that the jack connector is provided with "O" seal. This seal maintain the cylinder pressure integrity in the unlikely event that either of the two welded joints on the tube should fail. In addition, the bottom of the jack socket is fitted with a coating of resin to prevent the possibility of fuel flow through the connector body in the unlikely event of a welded joint failure. Therefore the system is fail-safe.

WARNING: Only parts obtained from Ultramagic are to be fitted in these locations

To remove and strip down the Dip Sensor Assembly, refer to Figure 2 and proceed as follows.

LENGTH "L" [mm]	CYLINDER SIZE
696	20 kg
746	30 kg
885	40 kg

ITEM	DESCRIPTION	DWG / PART NUMBER
1	20kg SENSOR TUBE ASSEMBLY	BO-NE-0210
1	30kg SENSOR TUBE ASSEMBLY	BO-NE-0310
1	40kg SENSOR TUBE ASSEMBLY	BO-NE-0410
2	CONNECTOR PLATE	BO-NE-0070
3	20kg PCB SENSOR ASSEMBLY	BO-NE-0250
3	30kg PCB SENSOR ASSEMBLY	BO-NE-0350
3	40kg PCB SENSOR ASSEMBLY	BO-NE-0450
4	GAUGE SEAL GASKET	BO-C-0135
5	MAGNETIC FLOAT	BO-NE-0030
6	ST STEEL DIP TUBE END WASHER	CR-03-0010
7	ST STEEL DIP TUBE END LOCK NUT	VE-C-0250
8	ST STEEL CONNECTOR PLATE SCREW	MA-FE-0544
9	M6 SENSOR TUBE ASSEMBLING SCREW	BO-C-0080
10	CONNECTOR PLATE NBR O-RING	CR-09-0155

Figure 2
'FuelTek' Dip Sensor Assembly

Before removal of any components, switch off and disconnect the Readout Assembly from the Dip Sensor Assembly. Carry out all work in a well ventilated area away from fuel vapour.

The Dip Sensor may be disassembled in two stages. If the electronic Sensor Assembly (item 3) requires replacement, this may be carried out without the need to first empty the cylinder of fuel. However, it should be noted that the joint between the jack socket and connector plate is provided with a seal. This seal is fitted in order to prevent a catastrophic fuel leak in the unlikely event of a failure of the dip tube metalwork inside the cylinder. A failure of the tube will most likely result in a failure of the electronic function of the Sensor Assembly. Thus incorrect electronic function may indicate that there has been a failure of the tube inside the cylinder (albeit very unlikely). Proceed to remove the connector plate and jack socket with caution therefore. If there is any doubt, empty the cylinder of fuel before removing any components.

- To remove the Electronic Sensor Assembly (item 3) undo and remove the four cap head screws (item 8) securing the Connector Plate to the Sensor tube Assembly head using a 3mm AF Allen key.
- Carefully withdraw the Electronic Sensor Assembly from the tube taking care not to damage the three soldered wires between the jack socket and the circuit board.
- Using a pair of suitable pliers, carefully undo the threaded ring securing the jack socket to the Connector Plate.
- Remove the "O" seal (item 10) fitted around the body of the jack socket.
- Replacement is generally the reverse procedure of removal. Prior to fitting the seal, apply a thin smear of Molycote® 111 silicone grease over it.
- Apply a small amount of Loctite® 222 to all cap head screw threads (items 8 and 9) before replacement.

Note that repair of the Electronic Sensor Assembly is by replacement only. However, a repair to a soldered joint on the wires linking the circuit board to the jack socket may be carried out. The process of creating reliable soldered electrical joints requires a high degree of skill on the part of the operator. Consequently, repairs to soldered joints may only be performed by experienced and approved personnel.

If removal of the complete Dip Sensor Assembly is necessary, proceed as follows:

- Completely empty and vent the fuel cylinder as described in the Ultramagic Maintenance Manual. Under no circumstances attempt to remove the Dip Sensor Assembly without having first completely emptied the cylinder.
- Using a 5mm AF Allen key, undo and remove the four M6 cap head screws (item 9) securing the Dip Sensor Head to the fuel cylinder.
- Carefully withdraw the Dip Sensor Assembly from the fuel cylinder.
- Using a 10mm AF open-ended spanner, undo and remove the M6 Aerotite lock nut and plain washer (items 7 and 6) from the lower end of the Dip Sensor Tube.
- Slide the magnetic float off the tube.
- Prior to re-assembly, remove any magnetic particle contamination from the float and tube. In addition, check inside the fuel cylinder for any contamination and clean if necessary.
- Replacement is generally the reverse procedure to removal. Make sure that the float is positioned in the correct orientation. Always fit a new seal (item 4) between the Dip Sensor Head and the cylinder mount. Apply a small quantity of Loctite® 222 to the M6 screw threads securing the head to the cylinder.

- Upon completion, pressure test the cylinder using a compressed air supply not exceeding 7 bar. Check the joint between the head and cylinder using leak detection fluid.

4.2.13.3 Jack Lead

The Jack Lead connects the Dip Sensor Assembly to the Readout Assembly. Due to the nature of its construction, the soldered connections cannot be accessed. Repair is therefore by replacement only. Refer to Figure 1.

4.2.13.3 'FuelTek' Readout Assembly

The Readout Assembly uses a five-part plastic moulding to house the electronic circuit board and the battery. The moulding consists of an upper section, a centre section, a lower section, a slider providing a mechanical link to a switch and a flexible grommet dust cover used to protect the jack sockets.

Due to the nature of the equipment, repair is limited to battery replacement, pushbutton switch replacement, printed circuit board replacement and grommet replacement.

4.2.13.3.1 Battery Replacement

To replace the battery, refer to Figure 3 and proceed as follows:

ITEM	DESCRIPTION	DWG / PART NUMBER
1	BOX UPPER (TRANSLUCENT)	BO-NE-0100
2	BOX MIDDLE	BO-NE-0110
3	BOX BOTTOM	BO-NE-0120
4	READOUT PCB ASSEMBLY	BO-NE-0003
5	SLIDER (BATTERY ISOLATION SWITCH)	BO-NE-0130
6	POSITIONING HANDLE	BO-NE-0050
7	SOCKET COVER	BO-NE-0140
8	PLASTITE SPECIAL SCREW	BO-NE-0080
9	PP3 9V RECHARGEABLE BATTERY PP3	BO-NE-0020

Figure 3
'FuelTek' Readout Assembly

- Using a suitable crosshead screwdriver, undo and remove the three countersink screws (item 8) securing the Box Lower (item 3) to the Box Middle (item 2).
- Disconnect the battery and replace.
- It is strongly recommended that only the battery specified in the table above be used as this battery will provide excellent life and discharge characteristics. The use of other PP3 batteries will result in the premature illumination of the Low Battery Warning LED.
- Replace the cover and re-fit the three screws. When re-fitting the cover, take care not to trap the battery wires.

4.2.13.3.2 Socket Cover Replacement

To replace the Socket Cover, refer to figure 3 and proceed as follows:

- Using a suitable crosshead screwdriver, undo and remove the three countersink screws securing the Box Upper (item 1) to the Box Middle (item 3).
- Remove and replace the Socket Cover (item 7).
- Replace the Box Upper and refit the three screws.

4.2.13.3.3 Readout PCB Assembly

Repair work on the PCB is limited to re-fitting the pushbutton switch and battery wires in the terminal strip and re-soldering the wires to the pushbutton switch terminals. The process of creating reliable soldered electrical joints requires a high degree of skill on the part of the operator. Consequently, repairs to soldered joints may only be performed by experienced and approved personnel.

There are no user-serviceable parts on the PCB itself and repair is by replacement only.

To replace the Readout PCB Assembly, refer to Figure 3 and proceed as follows:

- Using a suitable crosshead screwdriver, undo and remove the three countersink screws securing the Box Lower (item 3) to the Box Middle (item 2).
- Disconnect and remove the battery.
- Using a suitable crosshead screwdriver, undo and remove the three countersink screws securing the Box Upper (item 1) to the Box Middle (item 2). Take care as at this stage, the red Slider (item 5) will become loose. Remove the Slider.
- Using a suitable pair of pliers and a 14mm open-ended spanner, carefully undo and remove the knurled nut ring securing the pushbutton switch to the Box Upper. Withdraw the pushbutton switch from the Box Upper.
- The battery connection leads are looped around a plastic section in the Box Middle. Untie the loop and allow the leads to become free.
- Carefully withdraw the Readout PCB assembly.
- Whilst the circuit board is removed check the terminal block on the rear face of the board. Make sure all wires are securely fitted inside the terminal block. If any wires have become loose or disconnected, replace them and tighten the associated fixings. The wiring arrangement is shown in Figure 4 below.
- Replacement is generally the reverse procedure to removal. When replacing the circuit board, remember to loop the battery leads around the Box Middle cross piece.

Figure 4
Terminal Strip Wiring

4.2.13.3.4 Pushbutton Switch

The Pushbutton Switch is a highly reliable unit and failure of the switch itself is unlikely. The most likely mode of failure will be a broken or dry soldered joint where the wires are attached to the switch terminals. In the event that the wire joints do require re-soldering refer to section 4.2.13.3.3 above.

In the unlikely event that the switch requires replacing, then the easiest way to remove the switch is by disconnecting it from the terminal strip.

- Disassemble the box as described in section 4.2.13.3.3 without removing the battery leads from the Box Middle. Refer to Figure 4 and using a small flat-blade screwdriver, undo the two terminal screws to which the pushbutton switch wires are attached. Withdraw the wires from the terminal strip and remove the switch.
- Replacement is generally the reverse procedure to removal. Make sure all wires are placed back in the terminal strip in accordance with Figure 4 and that the terminal screws are tight.

4.2.13.3.5 Readout Assembly Calibration

The Readout PCB assemblies are calibrated at the factory in order to ensure that the display registers the correct fuel quantity levels in the cylinder. Consequently, further calibration should not be necessary. However, should re-calibration be required refer to Figure 5 and proceed as follows:

Figure 5
Readout Calibration

- Prepare an empty fuel cylinder fitted with the Dip Sensor Assembly. The cylinder may be a 20kg, 30kg or 40kg unit. Ensure the cylinder is standing upright.
- Using a suitable crosshead screwdriver, undo and remove the three screws securing the Box Upper to the Box Middle. Carefully separate and expose the underside of the Readout PCB Assembly.
- Connect the Readout PCB 2.5mm jack socket to the Dip Sensor Assembly jack socket using the Jack Lead and turn on the equipment.
- Using a small flat-bladed screwdriver, adjust potentiometer U2 so that the display reads 0%.
- Switch off the equipment.
- Fill the fuel cylinder in the usual fashion so that it is full as indicated by the bleed valve. Once full, stop re-fuelling and close all cylinder valves. Allow the area to completely clear of fuel vapour.
- Turn on the equipment. Adjust potentiometer U5 so that the display reads 100%.
- Calibration is now complete. Switch off the equipment and re-assemble.

Note that calibration using this method sets the Readout Assembly against the zero and 100% positions for an individual cylinder. Manufacturing tolerances associated with the cylinder and the incremental nature of the Dip Sensor sensors may result in small differences in the maximum contents displayed when the Readout is used with other fuel cylinders.

4.2.13.4 Troubleshooting

Refer to the table below to identify the source of a problem. If none of the actions proposed are effective, or the symptom does not match any entry in the list, contact Ultramagic for advice.

Symptom	Possible Cause	Corrective Action
Digital display reads the same irrespective of the fuel level inside the cylinder	Excessive magnetic particle contamination inside cylinder	Clean cylinder, float and dip tube and remove all magnetic particle contamination
	Sensor failure on Dip Sensor PCB Assembly	Replace Dip Sensor PCB Assembly
	Broken wire connection between Dip Sensor PCB and Jack socket	Repair soldered joint (only by qualified welder) or replace Dip Sensor PCB Assembly
	Jack lead disconnected from Readout Assembly.	Re-connect Jack Lead
Readout displays zero	Fuel cylinder empty	No corrective action necessary
	Jack Lead damaged	Replace Jack Lead
	Broken wire connection between Dip Sensor PCB and Jack socket	Repair soldered joint
	Jack Lead not connected to Dip Tube Assembly	Connect Jack Lead
Red Warning Light Illuminates	Battery Voltage low	Recharge internal battery or connect an auxiliary battery
Battery looses charge quickly	Battery has reached end of working life	Replace battery
	Battery Isolation Switch left connected, (I) position	Turn switch (O) when the readout is not in use
Audio warning sounds when fuel contents not 10% or 20%	Failure of magnetic sensor or sensors on Dip Sensor PCB	Try fitting Readout to another functioning dip sensor. If problem disappears, replace Dip Sensor PCB
	Jack Lead not connected	Connect Jack Lead
	Jack Lead damaged	Replace Jack Lead
	Failure of Readout PCB	Try fitting Readout to another functioning dip sensor. If problem remains, replace Readout PCB.

Equipment will not switch on	Battery exhausted	Recharge / replace battery / connect emergency pack
	Red power switch in off position	Move switch to on position and operate the pushbutton
Battery will not charge	Red power switch in off position	Move switch to on position and charge
	Battery reached end of working life	Replace battery
Readout does not provide accurate display of fuel contents.	Failure of electronic component on Dip Sensor PCB Assembly	Replace Dip Sensor PCB
	Jack Lead not connected	Connect Jack Lead
	Jack Lead damaged	Replace Jack Lead
	Readout requires calibration	Calibrate Readout Assembly
	Incorrect Dip Sensor PCB Assembly fitted	Fit correct Dip Sensor PCB Assembly
	Dip Sensor Assembly PCB "jumper" links incorrectly set	Replace Dip Sensor PCB Assembly

Section 5 – Instruments

No change.

Section 6 – Inspection Schedules

6.1 Pre-flight Checks ("A" Type)

(add the following)

Burner and Fuel System

[...]

7. ☐ Check the gauge battery voltage by removing the 2.5mm jack lead from the side of the gauge box. As reference, the low battery alert (flashing led) appears below 8.2V. It is not allowed to take off if the voltage is below this level. In this case recharge the battery or attach an auxiliary supply.
8. ☐ Check that the 2.5mm jack lead is fully connected to the box. Note that if the lead is not fully connected, the display will provide a reading of battery voltage and the audio warning will sound
9. ☐ Check that the gauge provides a reading commensurate with the fuel contents in the associated cylinder
10. ☐ Check that the gauge is fully secured to the cylinder
11. ☐ Check that at least one auxiliary battery is free, available and fully charged at the moment of the take-off.

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

(add the following)

Fuel Cylinders

[...]

8. ☐ Fully connect the equipment and switch it on. Check that the Readout display corresponds approximately to the quantity of fuel in the cylinder.

9. ☐ Draw off some fuel from the cylinder either by draining the fuel into another cylinder or by connecting to a burner. Check that the Readout displays a corresponding reduction in fuel quantity.
10. ☐ Check the condition of the Jack Lead. Make sure that the connectors and cable are in good condition.
11. ☐ With the equipment switched on, disconnect the Jack Lead from the Readout Assembly. Check that the readout displays a battery voltage greater than 8.5 Volts. Check also that upon disconnection, the audio warning is triggered and that operation of the pushbutton cancels the audio warning. Re-connect the Jack Lead and check that the Readout reverts to a display of fuel contents.
12. ☐ Press the pushbutton and check that the display backlight illuminates.

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

(add the following)

Figure 6
Dip Tube Assembly Weld Inspection Requirements

Fuel Cylinders

[...]

10. ☐ Ensure the fuel cylinder is completely empty of fuel and fully vented so that there is no internal pressure remaining. Remove the Dip Sensor Assembly. Check the condition of the two welds in the positions shown in Figure 6 above. If any deterioration of the weld is detected such as cracking, the Sensor Tube Assembly must be replaced.
11. ☐ Remove the Connector Plate from the Dip Sensor head. Refer to Figure 2 and check that the "O" seals fitted to the Jack Socket are all present and in good condition. Replace if necessary.
12. ☐ Check the underside of the Jack Socket to ensure that the resin coating surrounding the area where the electrical terminals protrude through the connector body is present and in good condition. If any deterioration of the resin is detected, the Jack Socket must be replaced.

Section 7 – Airworthiness Limitations

No change.

S19 FUELTEK FUEL CONTROL SYSTEM

APPENDIX 2 – Inspection Checklist

Add the following items to the 'Cylinders' section:

REGISTRATION		CYLINDER S/N's	

CHECK	SECTION	ASPECTS	YES / NO	INSPECTOR
CYLINDER (B-Type)	6.3	11. Gauge Function Check (I)		
		12. Gauge Function Check (II)		
		13. Jack Lead Condition		
		14. Battery voltage, Audio Warning		
		15. Display Backlight		
CYLINDER (D-Type)	6.5 (If due)	16. Check welds		
		17. Check o-rings		
		18. Check integrity of the resin seal		

APPENDIX 6– INSPECTION CRITERIA / TECHNIQUES (“Section 6”)

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 ferules 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 [illegible] 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 [illegible]

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.

This part is not applicable for balloons combining UM bottom-ends with KB envelopes.

For envelope repairs refer to KB Maintenance Manual.

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, especially around the pole sockets. Beware of undue 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 (observe possible exceptions, 2.12.8) 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 at anytime the hose must be replaced**. Check also the date of manufacture of the hoses; it is strongly recommended to replace hoses 10 years after its manufacture. Local CAA regulations on hose replacement time may apply as well. Date of manufacture is generally engraved on one of the end fittings, showing the 'UM mm/yyyy' format. Hoses with no date are likely to be more than ten years old. Any manifold / interconnection hoses airborne must also be checked following the same criteria. Connectors are not affected by the recommendation.

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 a pressure source or cylinder at an operative 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.

6.6.5.1 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.

6.6.5.2 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 shall take place at every D-Type inspection, although this can be anticipated whenever internal contamination is suspected. 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.

6.6.5.3 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.

6.6.5.4 Fuel Level Gauge – These must be checked for freedom of movement by leaning the cylinder forward and checking movement on the gauge.

6.6.5.5 Proof Pressure Test of Fuel Cylinders (D type inspection)

This inspection must be carried out 10 years after the original supply of the cylinders, and subsequently repeated in intervals of 10 years maximum, unless a shorter period is established by the inspector or the local regulations.
The "D" type inspection consists 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 bar (435 psi) - see specific instructions in next section.
- When significant abrasion is found or suspected on the vessel, the thickness of the walls of the cylinder must be checked: 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 is likely to be more than 10 years old, and it is therefore due for replacement. Otherwise the date engraved on it establishes the life time. Contact Ultramagic for questions regarding to the valve marking.

Hydraulic Test:

1) Cylinder must be emptied completely of fuel and vented.
2) The pressure relief valve and the contents gauge must be removed.
3) The inside of the cylinder must be inspected for cleanliness and corrosion and cleaned out if required.
4) Fill the cylinder with clean water using the open bosses available, and connect the cylinder to the pressure equipment/pump.
5) Blank off all open bosses and the fuel level indicator hole with a banking plug or safety plate, as applicable.
6) Using a clean soft cloth or paper towel, dry out any water remains on the cylinder and its fittings.
7) Pressurise the water inside the cylinder to 30 bar (435 psi) pressure.
8) Inspect all the surfaces and especially the welds for leaks.
9) The pressure must be proved to hold for at least one minute.
10) If all is found to be correct, the cylinder should be emptied and dried.
11) Refit the Pressure Relief Valve and Fuel Level Gauge indicator A test for leaks at an operational pressure using compressed air should be developed, focusing on the previously removed items in particular (PRV, Fuel Level Gauge).
12) Any leaks should be rectified and retested.
13) The cylinder can then be filled with fuel.
14) The complete cylinder with fittings must be checked for leaks with a spray or soapy water.

NOTE: Equivalent proof pressure test conforming to recognized international standards (i.e. EN 1440) is acceptable as alternative to the above described procedure as long as this is carried out and recorded by a properly approved organisation. However, in this case the cylinder may still require a Release to Service in accordance with the CAA regulations, as it is treated as an aircraft component.

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 hole must be no greater than 60mm diameter and no more than one hole 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 Top – Make sure that the socket tubes for nylon poles are not broke loose regarding to the walls. Check the stiffness and integrity of the basket top structure, removing the top leather trim if cracks or damage is suspected.

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 – Inspect looking for cracks in the attachment weld of the vertical tube sockets to the lower basket frame (if present). 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. Excessively worn runners where the cross section of the wood is extensively below the ~70% of the original thickness should be replaced. Bolts/nuts should not protrude from the runner surface.

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.

Occupant Restraint harness point (where fitted) - Inspect the fixing to ensure that it is securely attached to the floor or bottom structure. Check the area around the point for cracks or damage. No damage is acceptable in this area. Screwed-type attachments must not show loose elements.

Cylinder Straps – Check the straps for excessive wear, fraying or discolouration. In areas of doubt the strap must be replaced. Check the buckle locking mechanism to ensure that it hold the tank secure without slipping. Leather straps are not permitted.

6.6.7 Ancillary Equipment

Occupant 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, karabiner, rope or wire that may be used with the release system.

Fire Extinguisher – Check the general condition of the extinguisher and its mechanism. Make sure that it is of the appropriate type and that the pressure gauge is within the operative range. Observe replacement / inspection / validity date as per the manufacturer. Observe other possible local requirements.

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.

This part is not applicable for balloons combining UM bottom-ends with KB envelopes.

For envelope repairs refer to KB Maintenance Manual.

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.

SECTION 10 – SUPPLEMENTS

List of applicable Service Bulletins:

(All service bulletins can be found on www.ultramagic.com)

SB 01/99 (+ assembly instructions)
Fisher Liquid valve connector [EMBODIED]

SB 01/10
Inspection of lower frame of partitioned baskets [EMBODIED]

SB 01/11
Inspection of Burner Frame after road transportation [EMBODIED]

SB 01/13
Inspection of Triple/Quad Burner Frame with Center Gimbal Block

SB 01/15
Fuel Cylinder Plate ID installation

SB 01/17
Vincke Liquid Fuel Hoses

SB 01/17 Iss.2
Vincke Liquid Fuel Hoses

SB 02/17
Tekno Basket FM Supplement Update

LET US HELP YOU!

In case that you have any suggestion, difficulty, problem or comment, please contact our technical department at:

technical@kubicekballoons.cz

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