

**SKY BALLOONS**

**SKY BALLOONS INTERNATIONAL LTD.**

**MAINTENANCE MANUAL**

**FOR USE WITH ALL SKY HOT AIR BALLOONS**

This manual has been issued for:

Checked for Sky Balloons by:

Name \_\_\_\_\_ Signature \_\_\_\_\_

**SKY BALLOONS INTERNATIONAL LTD.**

**REDWITHER TOWER**

**WREXHAM INDUSTRIAL ESTATE**

**NORTH WALES LL13 - 9XT**

**U.K.**

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# SKY BALLOONS

## Record of Amendments

No.	Date	Affected Pages	Approval
1	March 96	ii, iv, vii, viii updated to show new pages 6.1.1, 6.1.2, 6.1.3, 6.2.1, 6.2.2, 6.3.1, 6.3.2, 6.4.1, 6.4.2, 6.4.3, 6.4.4 added.	
2	January 97	ii, iv, vi, vii, viii, 2.1.1, 2.1.2, 2.2.1, 3.2.5, 4.2.5, 6.2.1, 6.2.2, 7.1.1, app1 page 1, FAA control page, 5.1.2 deleted	
3	December 97	Appendix 3 added	
4	November 98	ii, iv, viii, updated, ix added to show new pages. 5.7.1, 5.7.2, 5.7.3, 5.8.1, 5.8.2, 5.8.3, 5.8.4, 5.9.1	
5	May 1999	All, to reflect new company name.	

# SKY BALLOONS

## MANUAL CONTROL

### Issue number

Each page of this manual carries a two part issue number, eg 1.0. The first part of the number (1, in this example) refers to the status of the manual as a whole. The second part (0) refers to the amendment status of that particular page.

### Page number

Each page in the core of the manual has a three part number, eg 1.2.4. The first part of the number (1) refers to the major section of the manual to which the page belongs. Likewise the second part of the number (2) refers to a sub part of that major section. The final part of the number (4) is the sequential page number within the sub part. The aim of this system is to allow continued logical page numbering when additions/deletions are made to the manual.

### Amendment procedure

The introduction of new balloons or components, or modification action, may require the addition of extra pages and/or amendments to existing pages. The table of page ii records such action. As described above all new/amended pages will show the corresponding issue number. A marginal line, as shown here as an example, will indicate the words affected by the last recorded amendment.

Each manual issued carries a checklist of pages and the signatory of page i will ensure that all listed pages are present at the correct issue/amendment level. This list will be found on page iv, over.

### Supplements

Information common to all balloons is included within this manual. Information that is required on only a limited number of balloons is provided in supplements. These are listed on page v and, if applicable, will be added to the appropriate section at the end of this manual. Again the signatory of page i will ensure this.

### Change of ownership or Certificate of Airworthiness Category

Simply return copies of pages i, iv and v and v to Sky Balloons and any pages requiring updating will be provided.

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3.2.4	1.5	5.6.1	1.5	FIRE EXT.	
3.2.5	1.5	5.7.1	1.5	1	1.0
3.3.1	1.5	5.7.2	1.5	2	1.0
3.3.2	1.5	5.7.3	1.5	3	1.0
3.4.1	1.5	5.8.1	1.5	4	1.0
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3.4.3	1.5	5.8.3	1.5		
3.4.4	1.5	5.8.4	1.5		

Pages indicated \* shall be completed by Sky Balloons before this manual is issued.

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## Checklist of supplements

Supplmnt number	Issue	Title	Tick if required

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# SKY BALLOONS

## 1 - INTRODUCTION

### 1.1 - PURPOSE OF THIS DOCUMENT

#### 1.1.1 - Aims

Hot air balloons are certified aircraft. The aim of this manual is to define the maintenance requirements and techniques necessary to keep the balloon airworthy and safe.

#### 1.1.2 - Qualification

Some countries have very detailed requirements for maintenance whereas others leave much of the maintenance to the pilots discretion. This manual prescribes the recommended materials and techniques required for the maintenance of Sky Hot Air Balloons but it is imperative that the local regulations of any particular country are adhered to. This is particularly important with regard to who carries out maintenance and repairs. This document, whilst detailing the correct procedures and materials, does not override local Airworthiness Authority requirements, and should not be taken as consent to perform the work described herein.

#### 1.1.3 - Replacement parts

Where materials other than those actually used by Sky Balloons are permitted simple minimum specifications are given. In other cases only genuine Sky parts and materials are to be used. The use of incorrectly specified parts on a balloon will invalidate its Certificate of Airworthiness and could have fatal consequences. Where parts/materials not supplied by Sky Balloons are to be used prior permission, in writing, should be obtained from Sky Balloons.

#### 1.1.4 - Unnecessary work

When a new balloon is supplied by Sky balloons it will have been through many stages of inspection and test. Disassembling balloon systems unnecessarily will render all such tests invalid and thus compromise safety. If it isn't broken don't fix it.

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## 1.2 - APPLICABILITY

### 1.2.1 - Range of balloons

This manual is applicable to all Sky Hot Air Balloons up to 14,158cu.m (500,000cu.ft) in size and providing the envelopes are of the natural shape type. In the event of a Sky envelope being used with a basket/burner assembly from another manufacturer this manual will apply only to those parts supplied by Sky Balloons.

### 1.2.2 - Serial numbers

All major components carry their own serial numbers. On the envelope the serial number will be found on a stainless steel plate fixed to the bottom rim tape of the envelope, opposite the ground marker. As this plate carries operating limitations a duplicate of it is fitted to the basket. This is not the basket number however. The basket serial number will be found engraved on one of the nylon rod sockets.

Burners are assembled from individual left and right handed units fitted into a frame. Each individual unit has its own data plate with serial number. The serial number for the fully assembled burner is engraved on the bracket joining the units together. The burner frame has a serial number engraved on one of the nylon rod sockets.

Fuel cylinders have the serial number engraved on the data plate.

Always quote the appropriate serial number when ordering spare parts as this will enable parts to the correct drawing issue to be supplied.

Typical data plates are as shown below:

<i>Sky</i> <b>BALLOONS LTD.</b>		
TYPE	<input type="text"/>	S/N <input type="text"/> DATE <input type="text"/> / <input type="text"/>
<input type="radio"/>	REGISTRATION	<input type="text"/>
MAXIMUM ALL UP WEIGHT <input type="text"/> Kg		
MAX.TEMP 120°C NEVER EXCEED 127°C		
WREXHAM UK +44 (0)1978 664666		

Envelope plate

<i>Sky</i> <b>BALLOONS LTD.</b>		
WORKING PRESSURE 4 - 12 bar		
<input type="radio"/>	SERIAL NO.	<input type="text"/>
	DATE	<input type="text"/>
WREXHAM UK +44 (0)1978 664666		

Burner plate

# SKY BALLOONS

## 2 - OWNER MAINTENANCE

### 2.1 - PREVENTATIVE MAINTENANCE

#### 2.1.1 - General

The owner of the balloon should perform the preventative maintenance, described below, to prevent degradation of equipment and to keep it in a good airworthy condition. The work described below is that which is within the capabilities of the owner/operator.

For US registered balloons the code of federal regulations, part 43.3(g), requires that preventative maintenance may only be performed by the holder of a pilot certificate, issued under part 61, and only on an aircraft owned or operated by that person.

#### 2.1.2 - Basket

The basket should be kept reasonably clean as accumulations of mud can cause dampness. If the basket becomes dull and dry it should be re-varnished. The owner/operator may also perform repair work to the suede trim on the top of the basket and the hide trim at the bottom.

#### 2.1.3 - Fuel cylinders

Only those parts which can be replaced without breaking the pressure integrity of the cylinder may be replaced by the owner. These items are:

- 1) Seals on Acme type connectors.
- 2) Jackets - for drying or cleaning.

Fuel connectors should be lubricated. In areas where dust contamination is possible it is best to use a dry lubricant like graphite powder. Otherwise silicone grease is best.

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### 2.1.4 - Burners

Again owner replacement is limited to those items which can be removed without breaking the pressure integrity of the system. These are:

- 1) Seals on Tema type connectors.
- 2) The pilot light head and stem may be removed for jet access for cleaning purposes.

### 2.1.5 - Fuel manifolds

Only connector seals which can be replaced without disassembly of the manifold may be fitted by the owner.

### 2.1.6 - Envelopes

Minor damage occurring below the first horizontal load tape above the nomex may be repaired using adhesive and patches or self adhesive patches/tape (see later). In addition any parts which can be replaced without the necessity for sewing can be replaced. These are:

- 1) Control lines.
- 2) Carabiners.
- 3) Instrument signal cables.
- 4) The pulley on the parachute.
- 5) Scoop.

### 2.1.7 - Instruments

Owner maintenance is limited to battery replacement only.

# SKY BALLOONS

## 2.2 - INSPECTION REQUIREMENTS

### 2.2.1 - Pre flight

The required pre flight checks are given in the Flight Manual, reference SKYFM, section 2.3. It is the responsibility of the pilot to perform these checks.

### 2.2.2 - Annual/100hour

To maintain a valid C of A the balloon shall be inspected on an annual or 100 hour basis (whichever occurs first) in accordance with the schedule given as appendix 1 to this manual. It is the responsibility of the owner/operator to ensure that this inspection is performed by a person/organisation approved by the appropriate Airworthiness Authority.

### 2.2.3 - US requirements for 100 hour / annual inspections.

Part 91.409 of the code of federal regulations defines the requirements for annual and 100 hour inspections. The 100 hour inspection may be performed by an appropriately rated FAA certified mechanic. For the annual inspection the mechanic must also hold an "Inspection Authorization". Some certificated repair stations also have the necessary authorizations. An annual inspection can be counted as a 100 hour inspection but a 100 hour inspection does not preclude the requirement for an annual inspection.

The technical content of both inspections, as defined in appendix 1 of this manual, are identical.

# SKY BALLOONS

## 3 - ENVELOPE REPAIRS

### 3.1 - DESIGNATION

#### 3.1.1 - Envelope types

All Sky balloon envelopes are constructed of 24 gores, the gores being the basic vertical slices from which the balloon is constructed. The gores meet at a vertical seam with a load tape. The gores themselves are constructed from panels laid horizontally.

All Sky balloons use a parachute type deflation valve. The base panels and scoop are always nomex and turn vents are standard.

#### 3.1.2 - Nomenclature

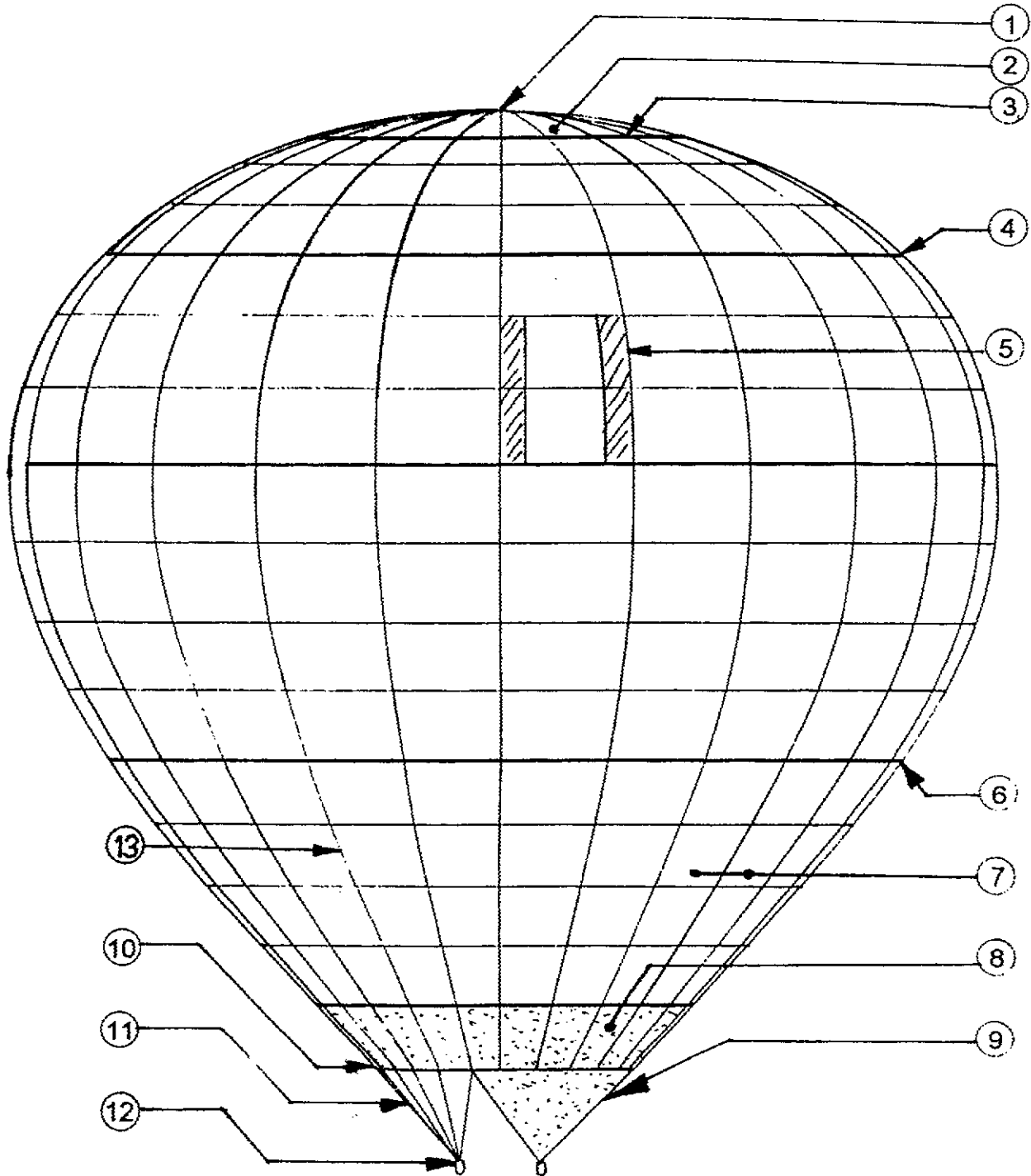
With reference to the diagram (over) the standard parts are:

- 1) Apex ring
- 2) Parachute valve
- 3) Top rim
- 4) Horizontal tape
- 5) Turn vents
- 6) Lowest horizontal tape
- 7) Nylon panels
- 8) Nomex base panels
- 9) Nomex scoop
- 10) Bottom rim
- 11) Flying wires
- 12) Carabiners
- 13) Vertical tape.

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## 3.1.2 - Envelope nomenclature (cont.)

### Typical Sky envelope





# SKY BALLOONS

## 3.2 - ENVELOPE MATERIALS

### 3.2.2 - Sewing thread

The thread used in original manufacture is polyester, metric 40 size, 3 strand continuous filament. Nylon to the same general specification is an acceptable alternative but natural fibres and natural/synthetic mixes must not be used.

Nomex thread is preferred for stitching nomex accessories but must never be used on seams on the envelope or for tape jointing.

### 3.2.3 - Fabrics

There are three fabrics used on Sky envelopes. The parachute valve and some upper panels are made from a high strength, silicon coated fabric. It is easily identified by its plain weave and slippery finish. Its specification is N2369. Only this fabric should be used for repairs in this area.

The main bulk of the balloon is made of a lighter, polyurethane coated nylon fabric, specification N1053. This is easily identified by the square pattern seen in the weave. It should not be used as a substitute for N2369. N2369 may, however, be used as a substitute for N1053, but never below the lowest horizontal tape (reference diagram on page 3.1.2).

The base panels and scoop of the balloon are made from a fire resistant fabric with the trade name Nomex. It is recognisable by being thicker and coarser than the nylon fabrics and it is totally porous even when new. It is permissible to make repairs in this area with N1053 but the proximity to the burner flame will probably render such repairs temporary.

In addition to the woven fabrics parachutes have clear panels made of a film material. These panels are not repairable and must be replaced in their entirety if damaged. Only Sky panels are to be used.

If the fabrics described are not immediately available other balloon fabrics may be acceptable but can only be used with the written consent of Sky Balloons.

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### 3.2.4 - Load tapes

All Sky load tapes are polyester but nylon tape may be used for repair providing the strengths quoted below are met or exceeded.

#### Top rim tape

This is always 25mm (1") wide, specification GW59036. The minimum strength requirement is 2000Kg (4400lbs).

#### Horizontal tapes

These are always 19mm (3/4") wide, specification GW58402. The minimum strength requirement is 600Kg (1320lbs).

#### Bottom rim tape

This is always 50mm (2") wide, specification 50mm CSB. The minimum strength requirement is 1500Kg (3300lbs).

#### Vertical tapes

For balloons up to, and including, the 77,000cu.ft the tape is 19mm wide GW58402, as above.

For balloons 90-105,000cu.ft the tape is 19mm wide, specification GW59055. The minimum strength is 820Kg (1800lbs).

For balloons 120-160,000cu.ft the tape is 19mm wide, specification GW59056. The minimum strength is 1200Kg (2650lbs).

For balloons 180-200,000cu.ft the tape is 25mm wide GW59036, as above.

#### Loops

Loops may be made from any of the 19mm tapes listed above.

## SKY BALLOONS

### 3.2.5 - Flying wires

Balloons up to, and including, 120,000cu.ft use flying wires to the following specification:

Wire - 3mm diameter, 7 x 19 construction, AISI316 stainless steel  
To BS MA29, minimum strength 588Kg (1296lbs)

Balloons 140,000cu.ft and above use flying wires to the following specification:

Wire - 4mm diameter, 7 x 19 construction, AISI 316 stainless steel  
To BS MA29, minimum strength 1040Kg (2293lbs)

Splicing as performed by Sky Balloons is by the Cabco Talurit process but the Nico-press system is an acceptable alternative. If more than 5 wires are replaced at any one time a sample shall be tested to destruction to show the integrity of the jointing process. The joint must remain intact after the wire itself has failed. If the specified cable is not available the following requirements must be met:

- 1) Strength to match or exceed the figures given above.
- 2) Wire must be stainless steel.
- 3) Ferrules must be copper
- 4) Thimbles must be stainless steel, size 5mm/3/16", such that the carabiner will fit easily.
- 5) Wire and fittings shall be to a recognised national standard and be delivered with a certificate of conformity proving strength.

### 3.2.6 - Ropes and cords

The ropes and cords used by Sky Balloons have been carefully selected to minimise shrinkage and the risk of burn damage and to match the accepted UK colour coding system. All ropes and cords are of synthetic material. If replacement is necessary the following specifications must be followed:

- 1) Parachute retaining and pull down cords - These are 2mm diameter braided Kevlar. No other material is to be used but diameter can be increased to a maximum of 3mm (1/8") if the correct size is not available.

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### 3.2.6 - Ropes and cords (cont.)

- 2) The parachute operating line is 8mm (5/16") diameter. It has a Kevlar core covered in a red and white striped polyester sheath. If such rope is not available then the following shall apply:
  - a) Kevlar is preferred but unsheathed Kevlar must not be used.
  - b) Polyester is allowed if it is heat set. Notwithstanding this 3m (9') extra shall be left at the basket end to allow for shrinkage.
  - c) Minimum diameter is 8mm (5/16"), maximum 10mm (3/8").
  - d) Colour should be red.

### Vent lines

Vent lines are 4mm polyester coded green for right rotation and black for left. The material is heat set. Polyester or sheathed Kevlar are permitted alternatives as long as the diameter is between 4mm and 6mm (1/4"). If the correct colours are not available then others may be used provided the two lines are different.

### Crown line

This is not critical to flight safety but choice of the correct material is important for ease of handling. For this reason Sky balloons use a minimum diameter of 10mm (3/8") and again only synthetic fibres are to be used. The minimum acceptable diameter is 8mm (7/16") and the only permitted materials are polyester or nylon.

## **GENERAL SAFETY NOTE ON ROPES**

Polypropylene ropes have the great advantage of being cheaper than any of those specified above. They are strictly forbidden on balloons because of their appalling behaviour at balloon temperatures. Natural fibres are not to be used because of their propensity to rot.

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### 3.2.7 - Envelope hardware

#### Pulleys

Parachute pulleys are made of "Tufnol" (a fibre reinforced thermoset resin) intended for ropes up to 10mm (3/8") diameter. They are all of the "Becket" type.

Vent line pulleys are of the same type and quality but intended for use with ropes up to 6mm (1/4") only.

Only pulleys supplied by Sky Balloons are to be used.

#### Guide rings

These are 5mm (3/16") diameter stainless steel wire. Internal diameter is 25-35mm (1-1 1/4"). The rings are welded and polished to leave a smooth finish. Only rings supplied by Sky Balloons are to be used.

#### Carabiners

This simple component is vital to safety. The only permitted type is "Stubai", rated to 3000Kg.

#### Control line hooks

Failure of these items would render reaching of the control lines, in flight, impossible. Only use genuine Sky parts.

#### Scoop fixings

These are not vital to safety and thus alternatives can be used. Only use stainless steel items otherwise rust stains may occur on the balloon fabric.

## SKY BALLOONS

### 3.3 - ENVELOPE REPAIRS

#### 3.3.1 - General specifications

All stitching on Sky balloons envelopes is of the lock stitch type. Chain stitch is forbidden. General sewing should utilise a needle size of 100-110 (metric) or 16-18 (Singer system). Tape splicing is best achieved with a larger needle but not in excess of 140 (metric), 21 (Singer system).

All panel/panel and gore/gore seams are of the double fell type (see below). This seam is best made on a twin needle machine with the needle pitch being 8mm (5/16"). A seam folder is used with a nominal width of 11mm (7/16") but the finished seam will be wider. These seams can be made on a single needle machine and without a folder but accuracy and speed will suffer and this method should thus be confined to small repairs only. The stitch length of the machine should be set to 2.5-4mm (6-10 stitches per inch). Smaller stitch lengths reduce the strength of the fabric and longer stitches cause weakness simply because not enough stitches are present.

#### 3.3.2 - Damage below the lowest horizontal tape

Damage in this area, provided it is confined to the fabric (ie. no load tape damage) and not excessive in area (not greater in total than the equivalent of two panels) is not dangerous and thus does not require immediate attention. Simple tears and small holes can be repaired with tape or adhesive patches (see below) but it is recommended that such repairs are stitched as soon as convenient. Holes caused by burn damage, with the consequent loss of fabric, cannot easily be repaired by these techniques and the better methods described below are recommended.

#### 3.3.3 - Repair of minor damage

Minor damage is defined as that below the first horizontal load tape or, if above this area, no greater than 25mm (1") in any direction for a hole or 75mm (3") in any direction for a tear. Such holes can be repaired by cutting a circular patch of balloon fabric. The patch shall be of such a size that it overlaps the damage by at least 25mm (1") all round. It is fixed with a good quality impact adhesive such as "Evo-stick". The permanence of the repair is improved if it is stitched around the edge.

Simple short tears can be repaired using rip-stop type self adhesive repair tape, as supplied by sailmakers, but in this case stitching around the edge becomes compulsory if the tear is above the lowest horizontal tape.

## SKY BALLOONS

### 3.3.3 - Repair of minor damage (cont.)

NOTE 1 - The use of adhesives and adhesive tapes is confined to N1053 type fabric as nothing will stick to N2369 (see section 3.2.3).

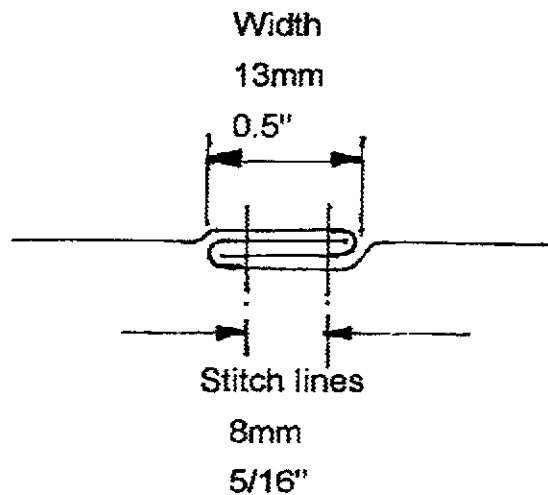
NOTE 2 - The requirement for patches to overlap damage by a minimum of 25mm means that damage closer to a load tape than 25mm must be subject to a sewn repair.

# SKY BALLOONS

## 3.4 - SEWN REPAIRS

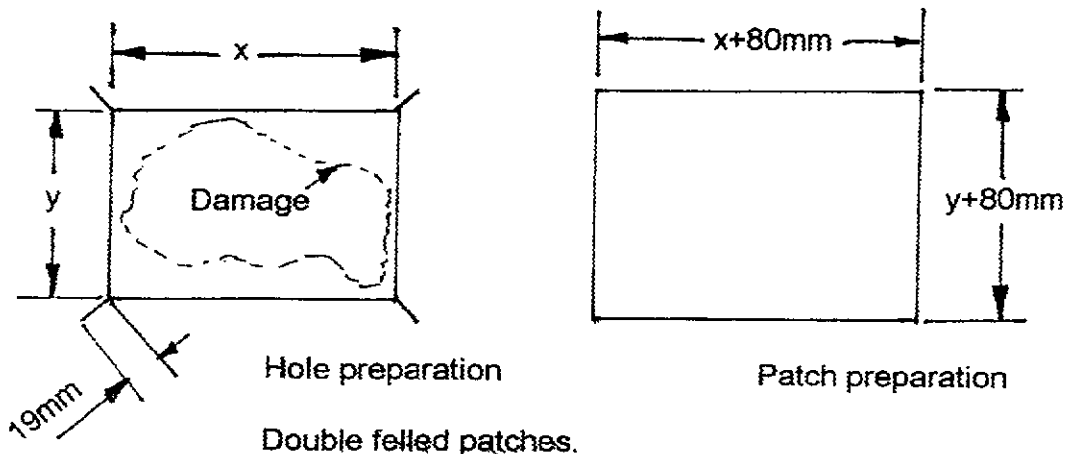
### 3.4.1 - Patches

With the equipment specified in section 3.3.1 and a good level of skill patches can be fitted with true double fell seams, as below.



Note both lines of stitching should pass through all 4 layers of fabric.

First, cut a rectangular hole to remove all damage. The rectangle should be aligned with the weave of the fabric. Cut the corners as shown. Cut a patch 80mm (3 1/8") bigger than the hole in both directions. Starting in the centre of one edge fold the fabric to give the required seam and stitch carefully round. The stitching should overlap a minimum of 25mm (1") at the start/end point. This method requires skill. Practice on a sample first. If the patch needs to be removed it can only be removed and refitted once. If this fails recut the hole and a larger patch and start again, or try the easier method on the next page.



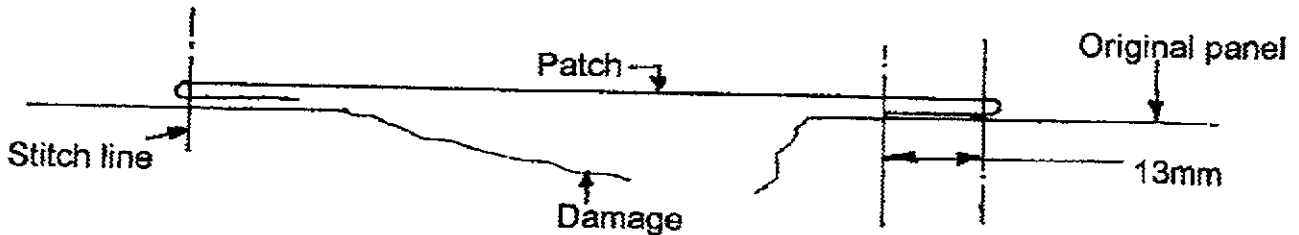


## SKY BALLOONS

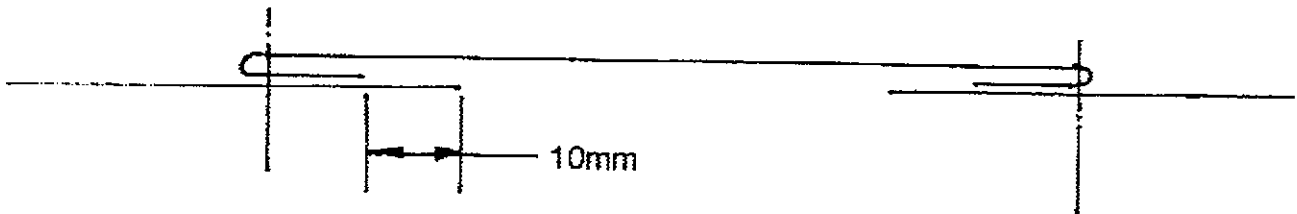
### 3.4.1 - Patches (cont.)

#### Simple method

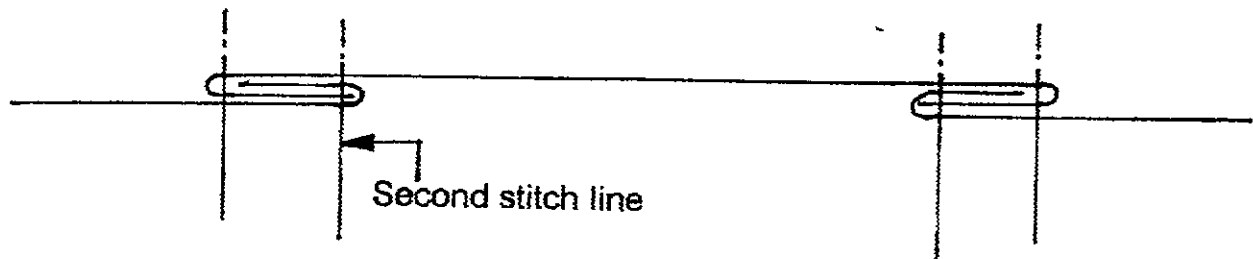
Cut a rectangular patch large enough to overlap all damage with sufficient extra to allow for folding. Fold the edges of the patch over by 13mm (1/2") and sew to the balloon, around the outside edges.



Cut away the damaged area leaving 10mm (3/8") overlap.



Fold the edges of the original panel under the edges of the patch, cutting at the corners, and add a second row of stitching. The finished result looks like this:



It is not quite the full balloon seam as described earlier but it is an approved repair technique. It is better to perform this simplified process well than make a full balloon seam badly.

#### Inspection of patches

Pull the repaired panel flat. The fitted patch should show no signs of pulling or wrinkling which could cause excessive local stresses. All stitch lines should be in accordance with the specifications given above and properly overlapped at the ends.

## SKY BALLOONS

### 3.4.2 - Panel replacement

Full panel replacement may be called for for simple cosmetic reasons, because the original panel is too extensively damaged to repair, or because minor damage is too close to a tape to allow repair by the patching techniques described above. To replace a whole panel it first needs to be carefully unstitched. Removing stitches is best achieved using the correct tool, available from any good sewing shop at modest cost, or fine scissors. Cut every third or fourth stitch and carefully pull the panels apart. Do not use force. Stitches should be removed to an extent of 50mm (2") beyond the edge of the panel being removed.

Note that on vertical seams the tapes, in original manufacture, are added simultaneously with the seam being made but horizontal tapes are added on to an existing seam thus requiring two sets of stitches to be removed.

Copy the removed panel. If this is not possible (due to the extent of damage) contact Sky Balloons for the required dimensions or remove a second healthy panel to copy. The replacement panel must be fitted using the seam construction shown on page 3.4.1. Regardless of the original method of manufacture all tapes should be re-fitted only after the new panel is in place. Repair stitching should overlap original stitching by a minimum of 25mm (1").

Inspection procedures are as described in section 3.4.1.

## SKY BALLOONS

### 3.4.3 - Load tape repairs

Vertical load tapes are the structural core of the balloon and damage to any of them will mean that the balloon is not airworthy. Horizontal load tapes carry no load but are present to contain fabric damage, should it occur, and are thus equally important. The bottom rim tape alone can be left with unrepaired damage as long as this does not affect more than 20mm (3/4") of the width. This tape is the most likely to sustain burn damage and is wider than the rest for this reason.

Load tape joints on Sky Balloons are largely made with a three step zig-zag machine (as diagram (a), over. Only industrial quality machines are suitable for this type of joint and so method (b), over, which requires a heavy duty single needle machine, is offered as an alternative. Machines with reverse make achieving the required pattern easier.

The joints shown are used for all tape overlaps, the flying wire and apex ring fixings and also for the attachment of loops.

If a tape has minor burn or chafing damage a piece of tape, of the same quality (reference section 3.2.4), can simply be stitched over the top of the damaged section. The length shall be enough to cover the damage plus the end joints of 250mm (10") each. Tape ends should be heat sealed with a heated knife or open flame to prevent fraying. Do not allow stitching to run off the tape onto bare fabric as this will cause local weakness in the fabric. Avoid stitching through the heat sealed end of the tape as this can break needles. As with fabric repairs it is best to practice on spare tape before tackling the balloon as repeated unstitching/restitching will weaken the surrounding fabric.

Flying wire loop damage will require the protective sleeve to be removed and the flying wire loop unstitched. Splitting spliced loops of this type is best achieved with a very sharp knife and requires two people. First cut enough stitches from the end of the joint, from the outside, to allow the two tapes of the joint to be pulled apart. Place the knife in the gap thus obtained and gently cut the stitches as the joint is further pulled apart. Note, however, that this technique is only to be used on tape joints, not removing tapes from fabric.

The tape should be further unstitched up the height of the balloon to a point 600mm (24") above the bottom rim and cut off at this point. Restitch the balloon seam. Cut a piece of tape, identical to the original, 1400mm (55") long. Splice this to the tape on the balloon with the standard joint and stitch it with 2 rows of stitching down, and onto the bottom rim tape. Mark the new tape 100mm (4") below the lower edge of the rim tape and again 250mm (10") below this. Cut off any excess.

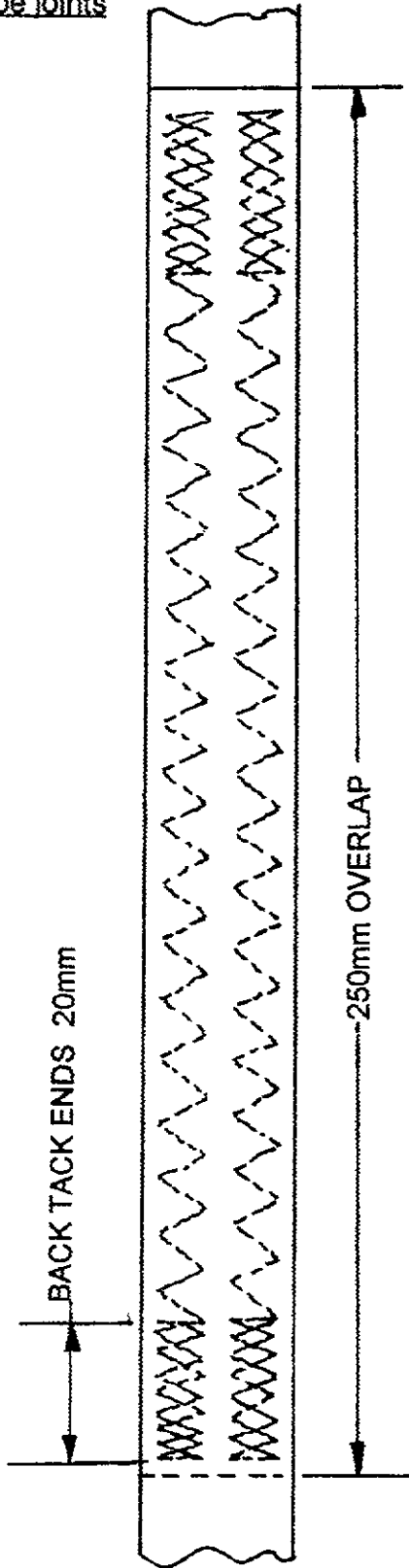
(Continued on page 3.4.6)

# SKY BALLOONS

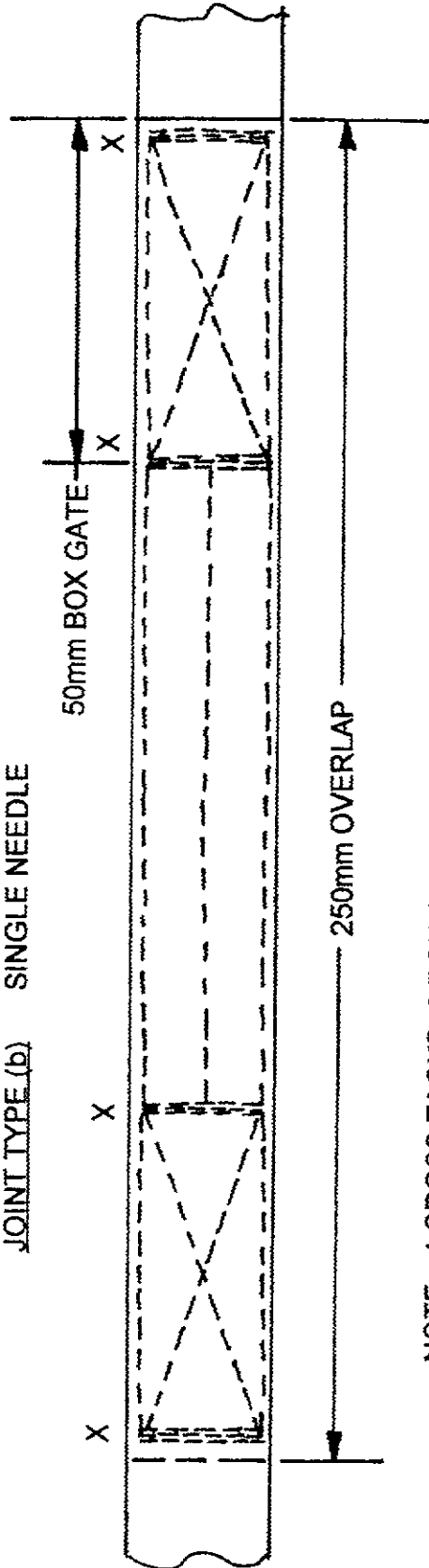
## 3.4.3 - Load tape repairs (cont.)

### Standard tape joints

JOINT TYPE (a) 2 ROWS THREE STEP ZIG-ZAG



JOINT TYPE (b) SINGLE NEEDLE



NOTE - 4 CROSS TACKS, 3 ROWS STITCHING (MIN), 4 POINTS (X)  
STITCH LENGTH 2-3mm (8-12 stitches/inch)

## SKY BALLOONS

### 3.4.3 - Load tape repairs (cont.)

Slide the protective sleeve onto the flying wire and pass the new tape through the flying wire eye ensuring the wires are not twisted. Turn the new tape end over itself on the outside of the balloon and place the 100mm mark on the lower edge of the rim tape. Stitch the 250mm end down to form the new loop. Restitch the protective sleeve. This last operation only is best done with nomex thread but this is not essential.

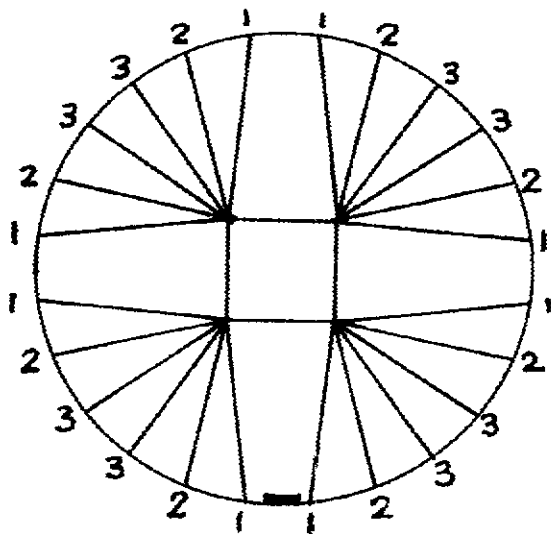
### 3.4.4 - Internal loops

It is unlikely that internal loops will become damaged but they may have to be removed in the process of fabric repair. Make a careful note of their position (Sky Balloons will provide a suitable diagram for this, on request) and, if necessary, a sketch of the feature which has been removed. Always complete all other work before re-fitting loops. Stitch patterns are as the diagram of page 3.4.5.

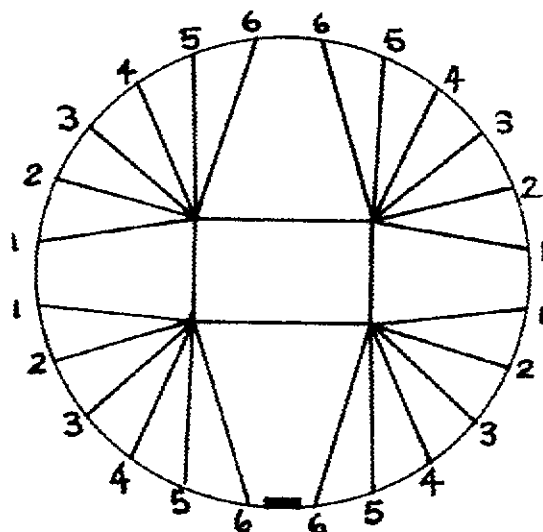
### 3.4.5 - Flying wire replacement

Flying wires are fitted, on new balloons, in pairs. If one half of such a pair becomes damaged it can be simply cut off and one wire only replaced. Do not repeat this technique more than once on any carabiner though as there will be too many wire eyes to fit on the carabiner.

To estimate the length of a replacement wire measure an identical wire on the balloon. The diagrams below show how to identify such wires.



Balloons with square burner frame



Balloons with rectangular burner frame

## SKY BALLOONS

### 3.4.5 - Flying wire replacement (cont.)

If the correct tools are available the easiest method of repair is to assemble the new wire around the existing envelope loop. If a pre-made wire is used it will be necessary to remove the protective sleeve, unstitch the loop and re-assemble, as previously described. Replacement of the flying wire loop, as described in section 3.4.3 is not necessary unless it too is damaged.

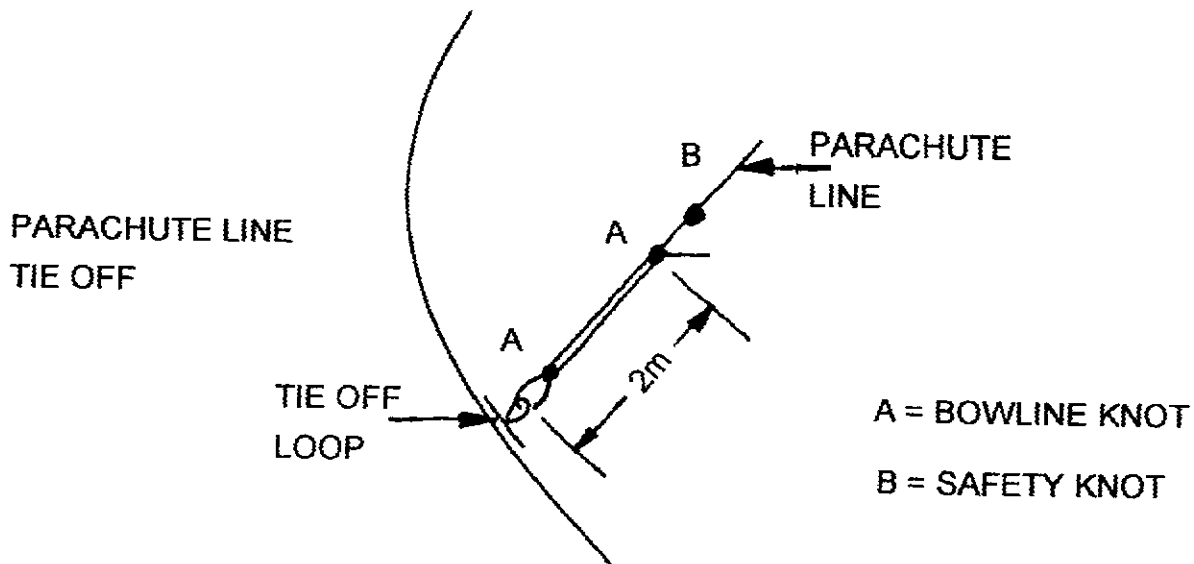
### 3.4.6 - Control and rigging lines

Parachute and vent lines are fitted with a spare length at their termination inside the balloon. If the line becomes too short simply undo the knots, let out the spare length and re-tie. Parachute lines should be tied with two bowline knots and the safety knot, as shown below. The safety knot must be big enough to ensure that it will jam in the parachute pulley in the event of the end fixing failing. Vent lines should also be fitted with two bowline knots.

When fitting new lines re-fit as the original with 2m (78") spare at the tie off end. With the balloon fully inflated pull all slack out of the new line, but without applying further tension, cut off any excess at the basket floor level.

To fit control lines it is best to cold inflate the balloon and follow the path of the old line with the new one. This will avoid lines becoming crossed or tangled.

To fit new parachute retaining or pull down lines copy the length of an original and refit using bowline knots at both ends. The cut ends of Kevlar cords should always be taped to prevent fraying. Kevlar cannot be heat sealed. Tape for this can be the repair tape as described in section 3.3.3.



# SKY BALLOONS

## 4 - BASKETS

### 4.1 - INTRODUCTION

#### 4.1.1 Construction of Sky baskets

All Sky baskets have traditional wicker work sides with stainless steel reinforcing frames top and bottom. The floor is a reinforced plywood assembly. The top edge of the basket is lined with a high density foam (to prevent passenger injury) and finished with suede or leather. The bottom joint of the wicker to the floor is covered with hide to minimise landing damage. Likewise the suspension cables, which form a continuous structural sling around the basket, are covered with hide where they pass under the floor. Sky baskets are designed for long life and also for ease of repair, when required.

#### 4.1.2 - Damage limits

There must be no damage to the suspension cables. Distorted frames are not a problem as long as the distortion has not kinked or cracked the frame tubing. Cracks in the floor visible on both faces but less than 100mm (4") long can safely be left unrepaired but flight by flight monitoring is recommended. Cylinders should be removed from time to time to allow full inspection of the floor. The underside can be inspected at inflation. Distortion of wicker is not a problem. If there are broken canes they should be inspected and any sharp ends cut off. The damaged area shall be monitored on a flight by flight basis. Any area of damage large enough to permit a hand or foot to pass through must be repaired before the next flight.

## SKY BALLOONS

### 4.2 - BASKET REPAIR

#### 4.2.1 - Basket suspension cables

Sky balloon envelopes have 24 cables. Replacement of one or two of these, whilst important, would not be catastrophic if subsequent failure, due to non-compliance with manual, were to occur. Baskets do not have this level of redundancy. On a small basket, for instance, there are just two cables. These are fitted in such a way that failure of one end, or impact damage under the floor, would not release the other end. Loss of both ends simultaneously would render further use of the burner impossible and could possibly eject passengers. **Thus repair or replacement of basket cables must only be trusted to the original balloon manufacturer or Airworthiness Authority approved repair facility.** Each time a basket is finished at Sky Balloons a spare length of cable is swaged from the same parts and materials as the basket cables and tested to destruction to prove the integrity of the jointing process. It is mandatory that repaired or replaced cables are subject to the same test. This can be carried out by Sky balloons on request. The following materials are used:

Cable - 6mm diameter, 6x19 or 7x19 construction, AISI 316 stainless steel, to BS MA29.

Minimum tensile strength - 1770Kg (3900lbs).

Swaging - Cabco - Talurit process using copper ferrules to BS 5281.

End thimbles - 6mm size, stainless steel AISI316, to BS SP67

Imperial size wires (1/4" only) of the same construction may be used providing the material is stainless steel and providing the minimum strength requirement is met. The Nico-press system of swaging may be used instead of the Talurit process but note that only copper ferrules are permitted on stainless steel cables. All cables and fittings shall be to a recognised national standard and be delivered with a certificate of conformity proving strength.

#### Total replacement of a cable

Remove all staples holding the protective hide over the cables. The edge hide will need to be soaked, to soften it, so that it can be peeled away. Cut the cable eyes off. Pull the cable ends downwards through the floor and frame. Pull the bottom centre of the cable to release it from the floor. Measure the distance between the location ferrules carefully and copy this on the new cable noting that the cable should have a small amount of float between the stop plates, ie the distance between the ferrules is 5mm less than the distance between the stop plates. Note that when fitting location ferrules a second short length of cable is fitted inside the ferrule to ensure a full strength swage. To re-thread the cable it helps to merge the strands together by welding. This end will be trimmed off later.



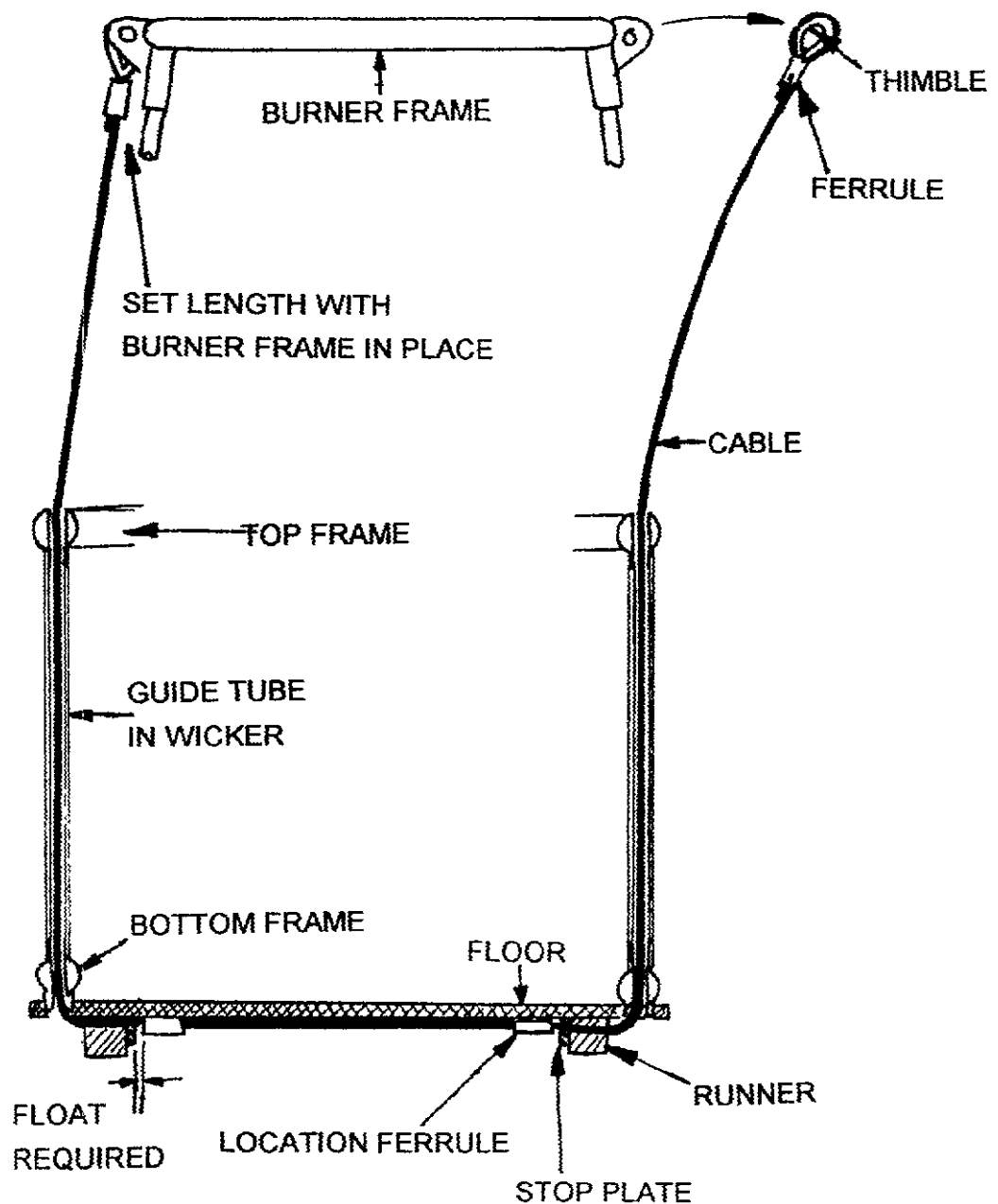
## SKY BALLOONS

### 4.2.1 - Basket suspension cables

#### Total replacement of cable (cont.)

Thread the cable through the floor, frame and guide tubes through the wicker. Refit the hide covering using rust proof staples. Stand the basket upright and fit the burner frame in the normal way. Set the cable length with the carabiner in place. Refit the cable covering tube, trim the cable to length and reswage. The finished result is shown below:

#### TYPICAL CABLE ROUTING



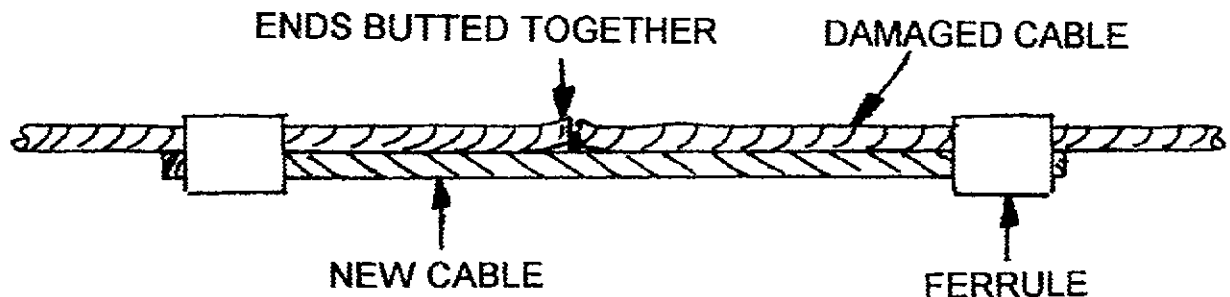
## SKY BALLOONS

### 4.2.1 - Basket suspension cables (cont.)

#### Partial replacement

Partial replacement can be used if the centre section of cable, under the floor, or the length above the top frame has been damaged, so long as the damage is far enough away from the basket runners, or frame (as appropriate) to allow access to the swaging tool.

For damage to the centre section remove the hide, as above. It will be necessary to cut away some of the tube covering the free ends of the cable, at the top of the basket, so that some slack can be pulled into the cable. To correctly maintain the wire length cut the damaged section in the middle and splice in a new section with the cut ends of the original butted together. Note that the swages should not be fitted on the damaged section itself. See the diagram below. Refit the hide covering.



For damage above the basket edge the same technique for maintaining length can be used or the damaged end can be completely removed and a new end and eye fitted. It will not be possible to refit the plastic cover in this case but this is not important. The new joints should be bound with heavy duty adhesive tape or covered with heavy duty heat shrink tube to mask the sharp wire strand ends.

## SKY BALLOONS

### 4.2.2 - Floor repair

Minor damage can be repaired by patching. The rules for this are that the damage must be covered with an overlap of 25mm (1") on the underside of the basket. If the presence of cables prevents this then the whole floor must be replaced. The patch should be made of high grade (preferably marine) plywood of the same thickness as the original floor. Clean the area where the patch is to be fitted of all varnish, apply the patch using adhesive and coach bolts. Varnish the patch and cleaned area of the floor. Patches are not to be fitted internally as these could cause injury on landing.

To replace the whole floor remove the protective hide. Unscrew the stop plates. The runners should be sawn through to release the cables or, alternatively, remove the bolts and hammer the runners off. Again the plastic sleeves on the upper free ends of the basket cables will have to be cut back to allow the cables to be pulled downwards. Pull some slack into the cables where they pass under the floor. Remove the floor retaining screws and remove the floor.

Replacement floors will be supplied, by Sky Balloons, with the runners loose. Screw on the new floor using the original bolts. Pull the cables back into the correct position and fit the runners using a good quality wood adhesive and the original bolts. Refit the stop plates, these are vital for safety. Varnish the bottom of the floor. Fit the hide using rust proof staples and lacing, as on the original, and varnish this as well.

Runners alone are impossible to replace as it is virtually impossible to remove them without damaging the floor panel. If they are seriously damaged or worn but the floor is intact a new runner can be bolted on next to the original. Runners are made of ash but other hardwoods can be used for this repair.

**SAFETY NOTE** - No repairs to the floor should leave protrusions inside the basket other than the rounded heads of coach bolts. If drain holes are covered by patches then the holes should be continued through the patch.

## SKY BALLOONS

### 4.2.3 - Frame repair

Minor distortion can be removed with the careful application of brute force. Autobody repair type hydraulic jacks are particularly effective. Seriously bent or cracked frames need to be cut, to remove the damage, and have a new section welded in. To achieve this proceed as follows:

Remove the suede covering and foam padding. Soften the wicker around the damage by soaking. This is best achieved by applying wet cloths to the affected area. Unwind the wicker from the frame. Cut away the damaged section and weld in a replacement section. Proceed slowly and carefully so as not to cause a fire or heat damage to the wicker. Only welders with current Airworthiness Authority approval, for welding, are allowed to make such structural repairs and welding will be by the Tungsten Inert Gas (TIG) process (or Heliarc in the US). The tube used must be stainless steel grade AISI 304 to ASTM A269 and match the dimensions of that used in the original frame. The repairs should be carried out in accordance with FAA advisory circular (AC) 43.13-1A.

Re-weave the wicker around the frame copying the original method. Allow it to dry slowly and revarnish it. Refit the padding and suede by copying the original lacing.

### 4.2.4 - Wicker repair

Minor distortion can be removed by soaking followed by the careful application of weight whilst the cane dries again. Revarnish the affected area after performing such operations. Baskets which develop a "lean" can often be cured simply by inflating and landing on the appropriate basket side. Baskets kept clean and well varnished are less likely to suffer either of these problems.

Work requiring weaving should only be submitted to a capable wicker smith. All such work should be inspected for the presence of sharp cane ends which must be trimmed off. Always ensure new cane is varnished.

### 4.2.5 - Top trim

Remove the affected section and repair with a glued patch (inside the original) or a sewn patch.

### 4.2.6 - Bottom hide

This should be kept in good condition to prevent damage to the floor/cane joint. It is applied wet using lacing and staples. Always allow a generous overlap (50mm, 2") when patching or replacing hide as it shrinks on drying. Varnish when dry.

# SKY BALLOONS

## 5 - BURNERS

### 5.1 - INTRODUCTION

#### 5.1.1 - Identification

When ordering parts the burner serial number should be quoted to ensure the correct parts are supplied, see section 1.2.2. Burners assemblies are made of handed units. These are identified by looking at the burner fuel gauge. With this item visible the entry side of the fuel hose defines whether the burner is left or right handed. This, however is only important if the main valve block requires replacing.

#### 5.1.2 - Assembly principles

The burner has been designed with as many common parts as possible. Thus, apart from the main valve block, left and right handed units are identical. All valves use the same parts other than the operating handles.

Acme fuel connectors are fitted to hoses with a tapered thread. This is the only thread on a Sky burner which requires sealant. All other threads are assembled dry with bonded seals.

The valve seals and pilot regulator seals used are to Sky designs and no attempt should be made to source these elsewhere. Connector seals for Acme (commonly known as Rego) or Tema connectors may be obtained from any reputable balloon supplier. All sealing gaskets are of the bonded rubber type in sizes 3/8BSP or 27mm. Only genuine Dowty seals to Sky Balloons specifications are to be used. The pressure gauge is fitted with a special crushable washer to allow correct alignment and this must be renewed if the gauge is removed.

#### 5.1.3 - Tools required

A standard range of open ended spanners, a socket set and flat bladed screwdrivers are required. The only requirement for a "special tool" is a pair of fine circlip pliers if valve handles are to be removed.

A TIG welding set is required if the burner frame, mounting bracket or cans need such repair. See section 4.2.3 for the qualifications required. No attempt should be made to weld damaged coils. If this is required return the damaged unit to Sky Balloons for assessment.

## SKY BALLOONS

### 5.1.4 - Allowable damage

Minor distortion of burner cans or mounting brackets is not a problem as long as the main blast valve operation is not affected. Malfunctioning Piezo igniters can be overlooked providing the requirements of the flight manual are observed with regard to sources of ignition. A malfunctioning pressure gauge is not serious as long as it is not leaking, the fuel cylinders are all known to be delivering the same pressure, and there is a working gauge on another unit.

All pilot lights, blast valves and liquid fire systems must be fully operational. There shall be no leaks. The burner swivel mounting shall be intact with all bolts present and tight and the stop mechanisms functional. The frame shall have no kinks or cracks though lesser distortion is allowed.

## SKY BALLOONS

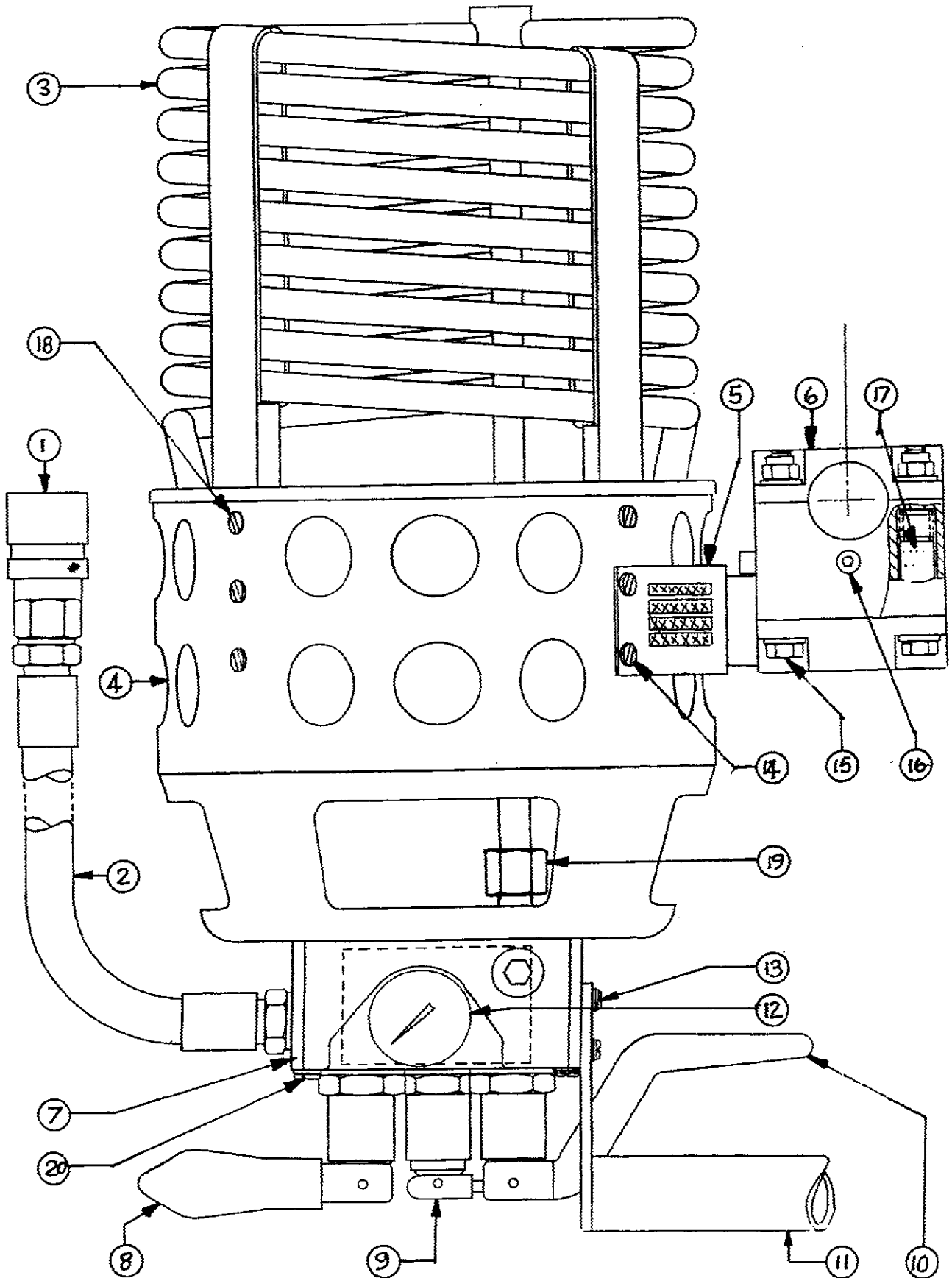
### 5.2 - BURNER PARTS

#### 5.2.1 - Sub assemblies and fuel lines

With reference to burner diagram (a), over:

- 1) Tema 3800 female connector (as shown).  
or Rego 7141F, Note this part must be type with steel mounting boss.
- 2) Fuel hose - 1/2" steel braided to SAE 100R1T 08 with 3/8 BSP male ends (for Tema type connectors).  
or 3/8" steel braided to SAE 100R1T 06 with one 3/8BSP male end and one 1/4NPT male end (for Rego type connectors).
- 3) Coil assembly.
- 4) Can detail assembly.
- 5) Swivel assembly.
- 6) Gimbal block assembly.
- 7) Valve block (left hand shown ( reference section 5.1.1)
- 8) Liquid valve assembly.
- 9) Pilot valve assembly
- 10) Main valve assembly.
- 11) Handle assembly.
- 12) Pressure gauge.
- 13) Handle screws and washers.
- 14) Mounting screws.
- 15) Gimbal bolts and washers.
- 16) Stop bolts.
- 17) Friction bearing.
- 18) Coil fixing screws, washers and nuts.
- 19) Coil coupling.
- 20) Valve block screws and washers.

SKY BALLOONS  
Burner diagram (a)





## SKY BALLOONS

### 5.2.1 - Sub assemblies and fuel lines (cont.)

#### Major disassembly

Unless the gimbal assembly itself (6), or the frame, need repair it is easier to remove the burner units individually from the frame. To achieve this remove the handle screws (13) and handle (11). Next remove the mounting screws (14). The whole burner unit can now be removed.

To remove the valve block undo the coil coupling (19) and remove the screws (20). The whole valve block, with pilot light, piezo unit and liquid fire will now come away.

The coil is now only retained by the screws (18).

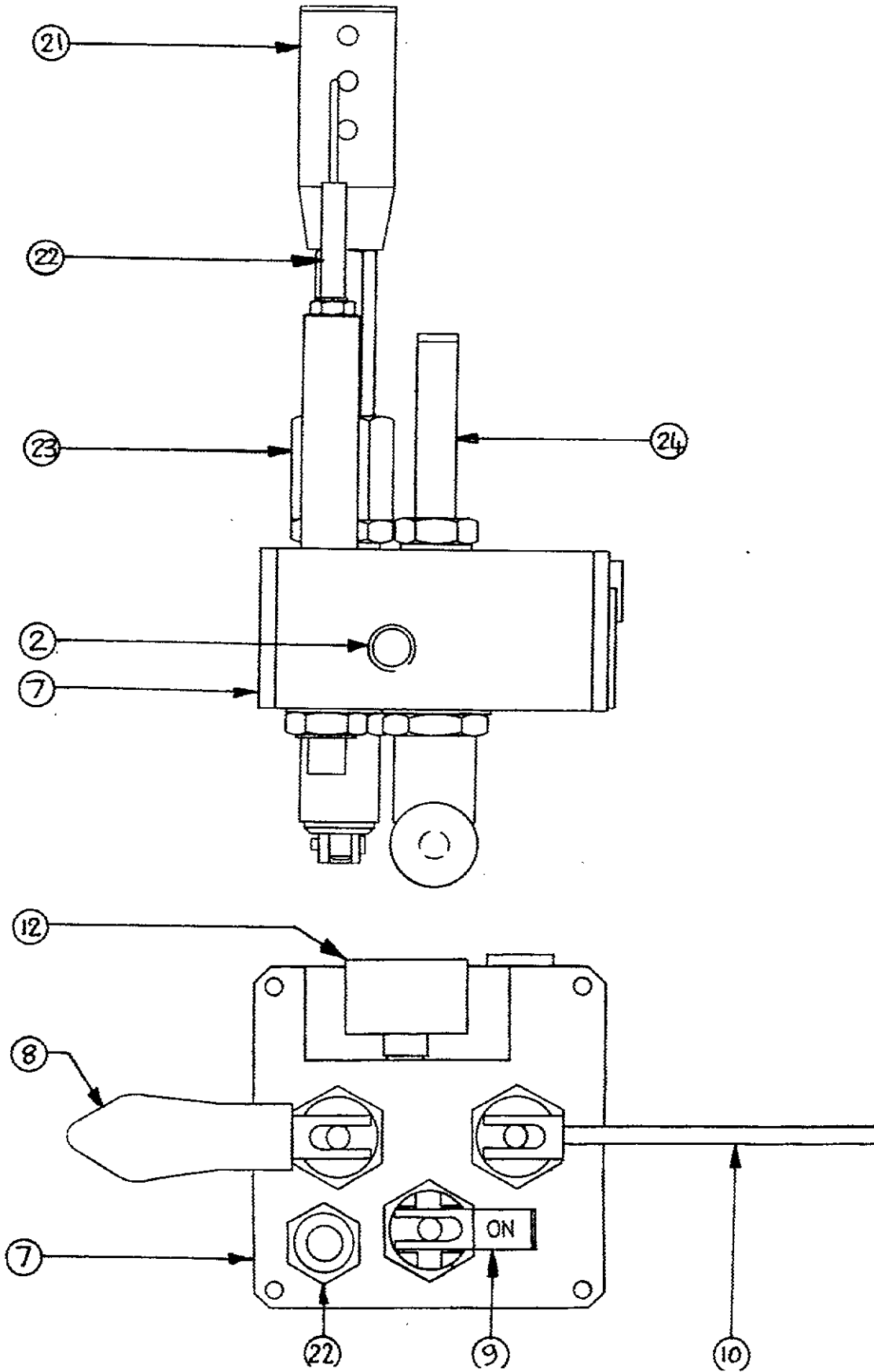
If the gimbal block needs to be removed take out the four hexagonal head bolts (15). Do not remove the allen head bolts (16) unnecessarily as this will release the spring and plunger assembly (17) with great energy.

The working parts of the control system are now exposed, see diagram (b), over. On this diagram the numbers below 20 are as diagram (a). The new numbers are:

- 21) Pilot light assembly.
- 22) Igniter assembly.
- 23) Vaporiser assembly.
- 24) Liquid fire nozzle assembly.

# SKY BALLOONS

## Burner diagram (b)



# SKY BALLOONS

## 5.3 - VALVE REPAIR

### 5.3.1 - Removal and replacement

See burner diagram (c), over.

Regardless of the instructions given in section 5.2, if a single valve needs repair, it can be simply removed by unscrewing from the valve block. In all cases it is recommended that the operating handle is removed first. To remove the handle first remove the circlip (item 25 on diagram c) with the correct tool. Use of incorrect tools may well render the circlip unfit for re-use. Slide out the clevis pin (item 26 on diagram c) and the handle is now released. Note that the difference between the various valves is confined to the handle (item 27 on diagram c) and the nylon pressure pad (item 28 on diagram c), bear this in mind if more than one valve is disassembled at any one time.

The stem assembly (item 29 on diagram c) with its stem and seat seals is not repairable. It must be replaced in its entirety. Sky Balloons alone will repair this item if it is in suitable condition. The stem assembly should be lightly greased with a silicone grease before fitting, items supplied by Sky Balloons will be thus treated on delivery.

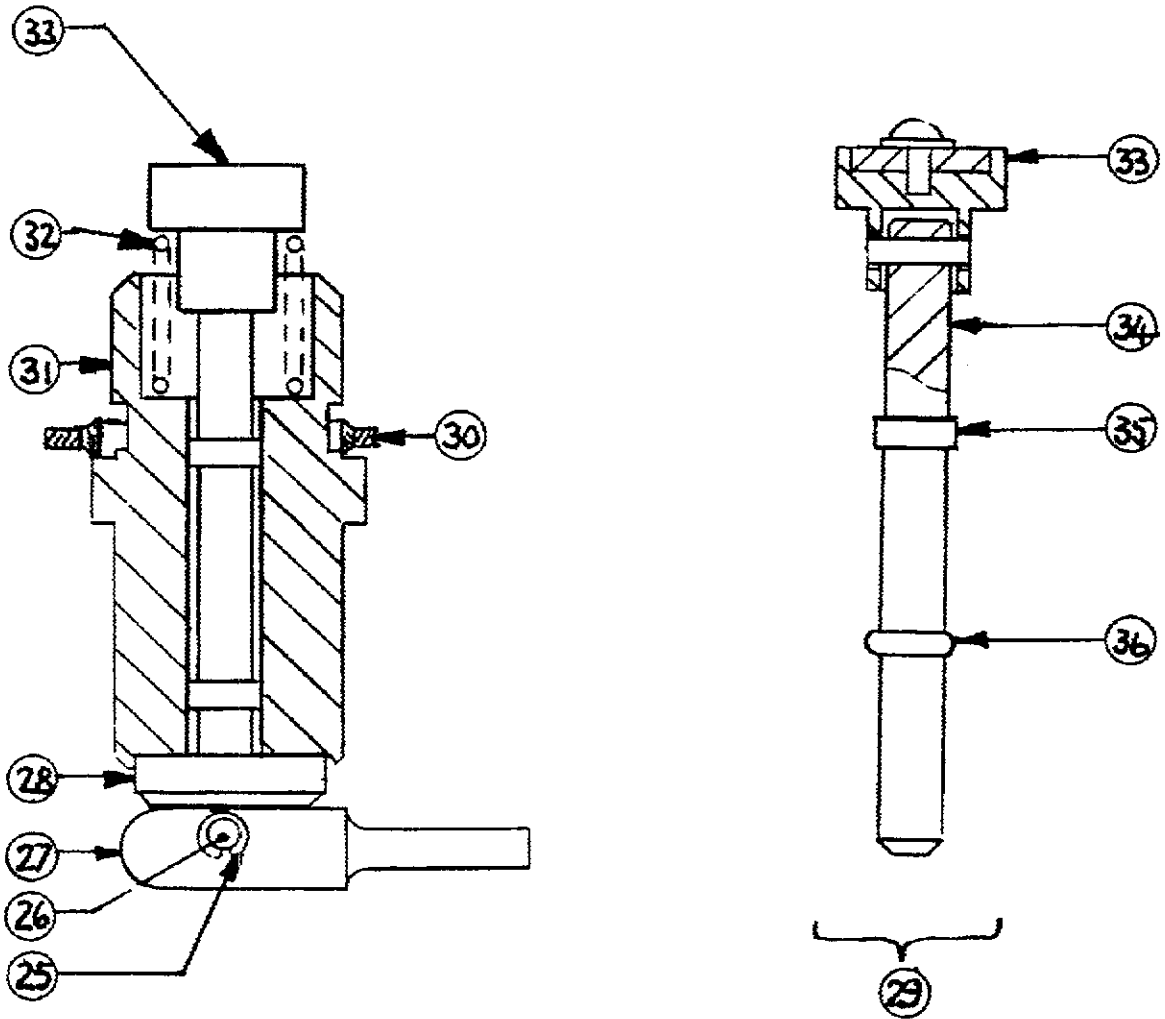
For re-assembly, refit the valve assembly to the block before refitting the handle. Screw the assembly hand tight and check that the sealing gasket (item 30 on diagram c) is properly centred before tightening fully.

### Key to diagram (c)

- |     |  |   |
|-----|--|---|
| 25) | Circlip (4mm stainless steel, external, to DIN 471). |   |
| 26) | Pivot pin.   |   |
| 27) | Handle (pilot light type shown).                     |   |
| 28) | Valve bonnet pad.                                    |   |
| 29) | Valve stem assembly.                                 |   |
| 30) | Bonded seal.   |   |
| 31) | Bonnet.  |   |
| 32) | Spring.  |   |
| 33) | Seat assembly.                                       | Only available as<br>  complete assembly (item 29). |
| 34) | Stem.  |   |
| 35) | Primary stem seal.                                   |   |
| 36) | Back up seal.  |   |

# SKY BALLOONS

Burner diagram (c)



# SKY BALLOONS

## 5.4 - PILOT LIGHT

### 5.4.1 - Common problems

The most common cause of pilot light malfunction is fuel contamination. This can be rectified by cleaning the pilot light components and, thereafter, using cleaner or filtered fuel. The pilot light assembly is shown on diagram (d), over.

To clean the pilot jet (item 37, diagram d), which is an integral part of the regulator unit, it is first necessary to remove the stem (item 38) and pilot light element assembly (item 39) assembly from the vaporiser assembly. The jet can then be cleaned with a fine wire (note the jet is just 0.3mm in diameter). If this does not cure the problem the whole unit should be dis-assembled and cleaned with paraffin. Re-assemble after lubricating the piston seals (items 40 & 41) with silicone grease.

### 5.4.2 - Other problems

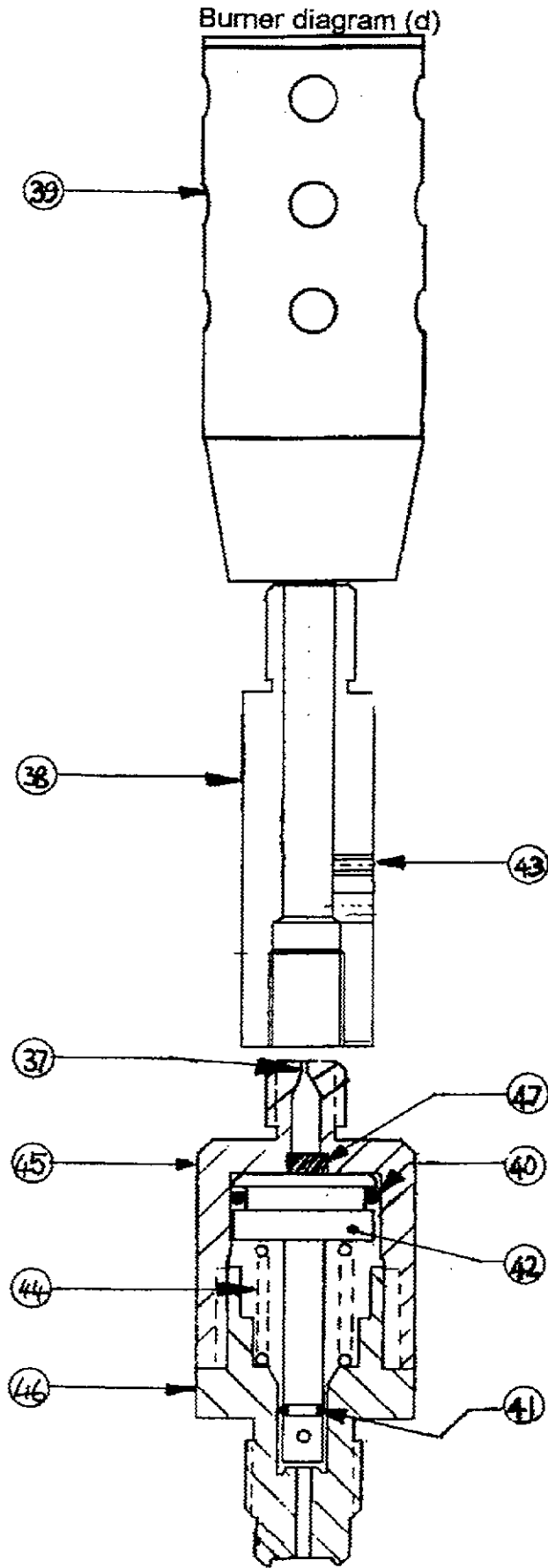
If the pilot light is delivering too little or too much fuel, and cleaning as above does not rectify the problem, then the seals should be replaced. Only use genuine Sky Balloons parts for this. The easiest way of removing old seals is to cut them with a very sharp knife. Avoid damaging the piston (item 42) in this process. New seals should be lubricated with silicone grease to ease the refitting process. If contamination is extreme it may be necessary to replace the filter (item 47).

### 5.4.3 - High altitude flight

The screw hole (item 43) is usually plugged with a screw. For sustained flight above 12,000ft this screw should be removed. Low altitude performance will not be adversely affected by this.

# SKY BALLOONS

Burner diagram (d)



## SKY BALLOONS

### 5.4 (cont.)

#### Key to diagram (d)

- 37) Jet.
- 38) Pilot light stem.
- 39) Pilot light element assembly.
- 40) Seal (large).
- 41) Seal (small).
- 42) Vaporiser piston assembly.
- 43) Screw hole.
- 44) Regulator spring.
- 45) Vaporiser upper body.
- 46) Vaporiser lower body.
- 47) Filter.

# SKY BALLOONS

## 5.5 - PIEZO IGNITER

### 5.5.1 - Problems

The piezo igniter will not function if it is wet. The best answer to this is to light the pilot by another means and use the burner which will then dry everything out.

The gap and position of the electrode is critical to function. See diagram (e), over. If the spark does not touch the edge of the hole the joint between the stem and element assembly can be shimmed with a 1/4 BSP x 18swg copper gasket.

If the piezo does not click when pushed it is broken and should be replaced. If it clicks but no spark appears there is probably a short in the system. Disassemble and replace damaged parts. See diagram (e). When performing disassembly undo the firing tip nut before removing the igniter from the igniter tube. The igniter is locked into the igniter tube with Loctite 222.

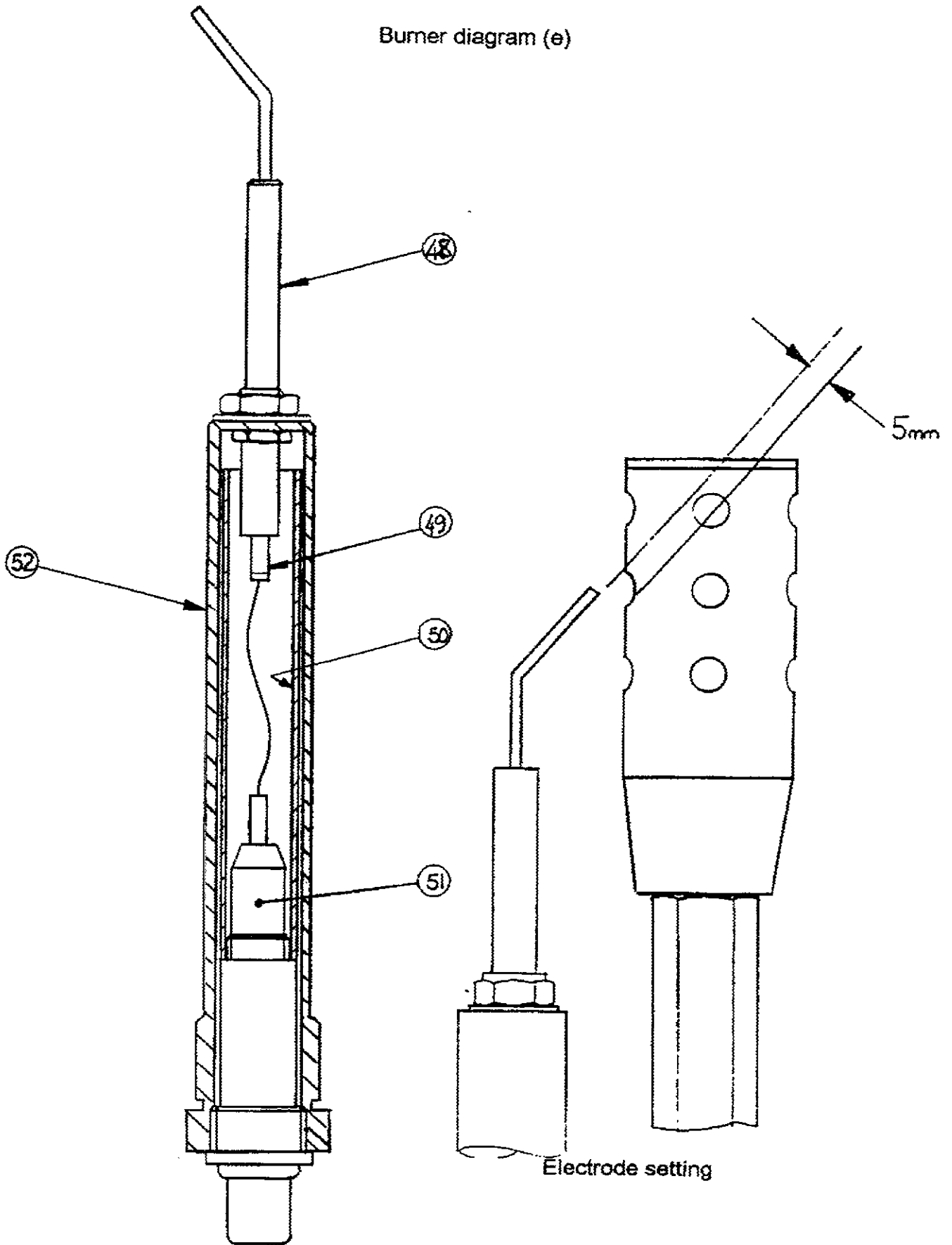
### Key to diagram (e)

- 48) Firing tip.
- 49) Igniter lead assembly.
- 50) PTFE tube.
- 51) Igniter.
- 52) Igniter tube.



# SKY BALLOONS

Burner diagram (e)



# SKY BALLOONS

## 5.6 - COIL

### 5.6.1 - Cleaning

The jet holes in the coil can be cleaned with a fine wire. It is best to remove the coil to achieve this. If this does not cure the problem then the coil should be returned to Sky Balloons for assessment and repair.

### 5.6.2 - Welding

If the coil leaks through a welded joint it must be returned to Sky Balloons for repair. No welding by other persons/organisations is permitted.

### 5.6.3 - Rivets

It is possible that after prolonged use, particularly at low fuel pressures, that the coil rivets may become loose or damaged. The original rivets are stainless steel, 4.8mm (3/16") diameter and 20.3mm (13/16") long. These may be replaced if the appropriate tools are available. If not the rivets may be replaced with nuts and bolts providing:

- a) Only stainless steel must be used.
- b) The bolt/nut size will be 5mm or 3/16". Bolts are 25mm (1") long.
- c) The nut shall be self locking and of all metal construction.
- d) The bolt head will be inside the coil, the nut outside.
- e) The bolt thread shall protrude beyond the nut by 2 full threads minimum.
- f) Nuts, bolts and washers shall be to a recognised national standard.

To remove loose or damaged rivets it is best to drill off the head (which is outside the coil) with an oversized drill and push the remaining stem out, towards the inside of the coil. Drill out the coil strips holes to 5.1mm diameter taking care not to damage the coil tube. (Hole drilling is not required for the 3/16" bolts.)

# SKY BALLOONS

## 5.7 - BR2 BURNERS

### 5.7.1 - INTRODUCTION

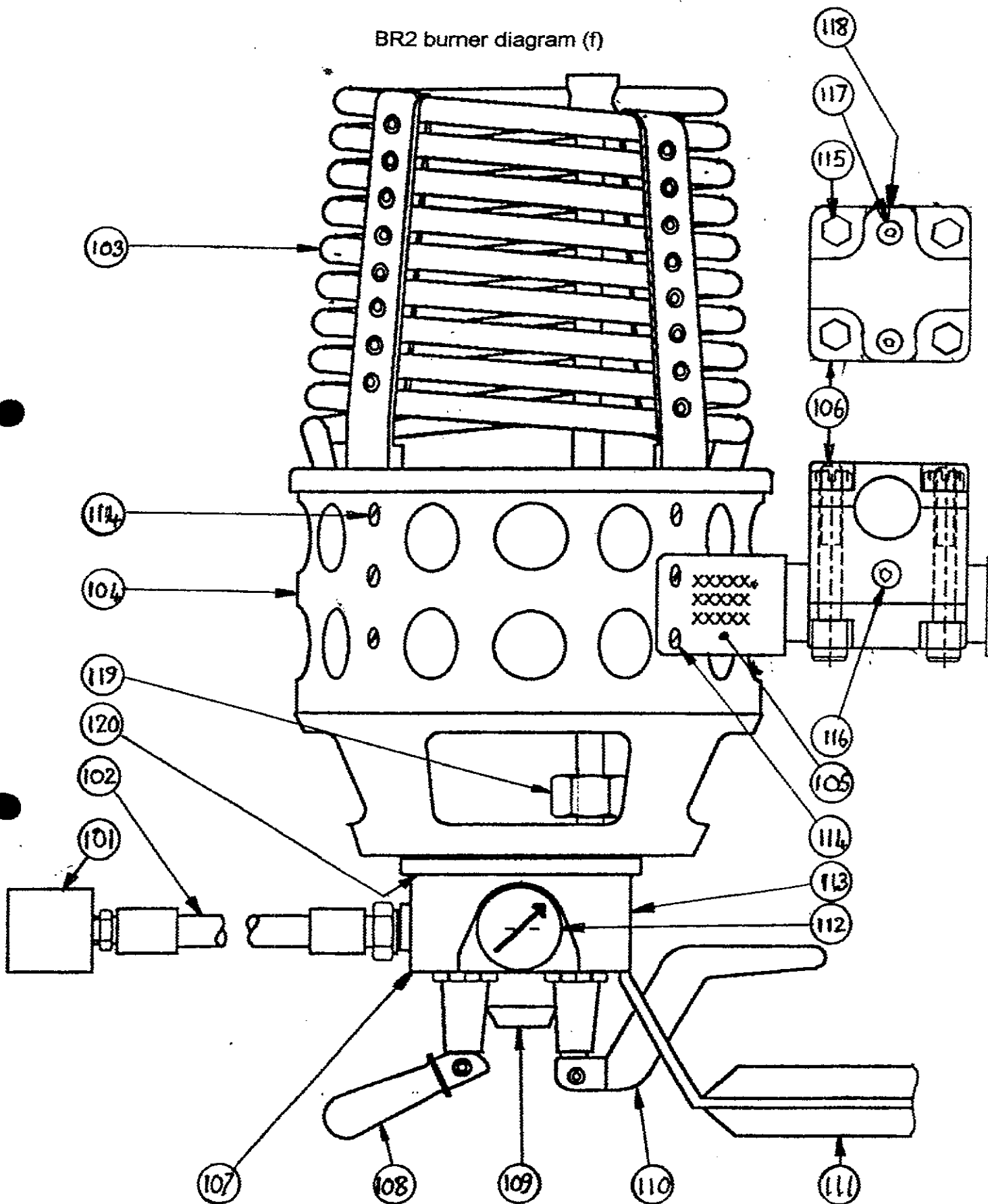
The BR2 "Mistral" burner is a logical progression from the burner described earlier in this section. The same design principles apply and the sections which follow only cover the parts unique to the BR2 burner. Again the serial number will be found on the main swivel assembly and this should be quoted when ordering parts. Assembly principles are as described in 5.1.2 and tool requirements are as described in 5.1.3.

### 5.7.2 - BURNER PARTS - With reference to diagram (f), over:

- 101) Tema 3800 female coupling or Rego 7141F. **Note** - this part must be type with steel mounting boss.
- 102) Fuel hoses. 3/8" steel braided to SAE 100 RT 06. Both ends are 3/8"BSP parallel male for Tema couplings. Ends are 3/8"BSP parallel male and 1/4"NPT male for Rego type connectors.
- 103) Coil assembly.
- 104) Can assembly.
- 105) Swivel assembly bracket with serial number shown "XXXX"
- 106) Gimbal block assembly.
- 107) Valve block (left hand shown, note on handing as 5.1.1).
- 108) Liquid valve assembly.
- 109) Pilot valve assembly.
- 110) Main valve assembly.
- 111) Handle assembly.
- 112) Pressure gauge.
- 113) Handle screws (recessed, not visible in this view).
- 114) Mounting screws and coil screws.
- 115) Gimbal bolts.
- 116) Stop bolts.
- 117) Friction adjusting screws.
- 118) Friction springs and plungers (inside, not visible in this view).
- 119) Coil coupling.
- 120) Valve block screws (recessed, not visible in this view).

SKY BALLOONS

BR2 burner diagram (f)



## SKY BALLOONS

### 5.7.3 - MAJOR DISASSEMBLY

#### **Major disassembly**

Unless the gimbal assembly itself (106), or the frame, need repair it is easier to remove the burner units individually from the frame. To achieve this remove the handle screws (113) and handle (111). Next remove the mounting screws (114, right side of diagram f)). The whole burner unit can now be removed.

To remove the valve block undo the coil coupling (119) and remove the screws (120). The whole valve block, with pilot light, piezo unit and liquid fire will now come away.

The coil is now only retained by the remaining screws (114).

If the gimbal block needs to be removed take out the four bolts (115). Do not remove the stop bolts (116) unnecessarily as this will release the spring and plunger assembly (118) with great energy. It is not necessary to remove the friction adjusting screws (117).

The working parts of the control system are now exposed, see diagram (b page 5.2.4). On this diagram the numbers below 20 are as diagram (a). The new numbers are:

- 21) Pilot light assembly.
- 22) Igniter assembly.
- 23) Vaporiser assembly.
- 24) Liquid fire nozzle assembly.

On the BR2 burner items 12, 21, 22 and 23 are identical to those as shown for the earlier burner and are not discussed further. The valves have some common parts and some new parts and these are described below.

# SKY BALLOONS

## 5.8 - VALVES

### 5.8.1 - MAIN AND LIQUID VALVES See diagram (g), over.

Regardless of the instructions given in section 5.7.3, if a single valve needs repair, it can be simply removed by unscrewing from the valve block. In all cases it is recommended that the operating handle is removed first. To remove the handle first remove the circlip (item 127 on diagram g) with the correct tool. Use of incorrect tools may well render the circlip unfit for re-use. Slide out the clevis pin (item 128 on diagram g) and the handle is now released. Note that the difference between the various valves is confined to the handle (items 129 and 130 on diagram g) and the nylon pressure pad (item 126 on diagram g), bear this in mind if more than one valve is disassembled at any one time. Also ensure the spring washer (125) is refitted under the nylon pad.

The stem assembly (item 121 on diagram g) with its stem and seat seals is not repairable. It must be replaced in its entirety. Sky Balloons alone will repair this item if it is in suitable condition. The stem assembly should be lightly greased with a silicone grease before fitting, items supplied by Sky Balloons will be thus treated on delivery.

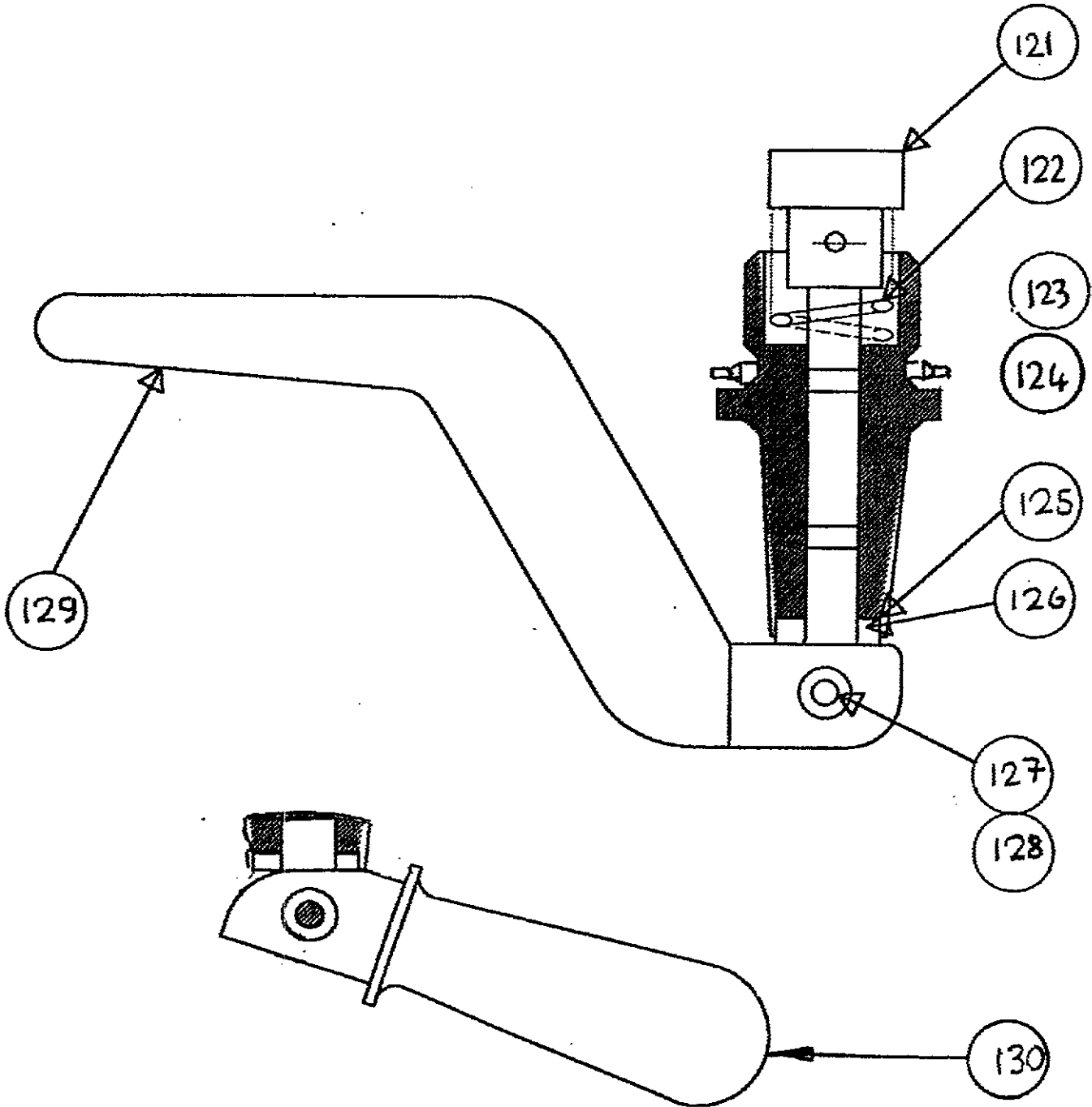
For re-assembly, refit the valve assembly to the block before refitting the handle. Screw the assembly hand tight and check that the sealing gasket (item 124 on diagram g) is properly centred before tightening fully.

#### Key to diagram (g)

- 121) Stem assembly.
- 122) Spring.
- 123) Bonnet.
- 124) Gasket.
- 125) Spring washer (not visible on this diagram).
- 126) Nylon pad.
- 127) Circlip (not visible on this diagram).
- 128) Clevis pin.
- 129) Handle (main).
- 130) Handle (liquid).

# SKY BALLOONS

Diagram (g) - Main/liquid valve



## SKY BALLOONS

### 5.8.2 - PILOT VALVE See diagram (h), over.

To remove the pilot valve the knob (132/139) must first be removed. The circlip (141) and clevis pin (140) are first removed, as for the main valve. Screws (131) are then removed allowing removal of the thrust plate (133). The bonnet (134) can then be removed. There are flats on the upper boss for a spanner. Be aware when performing service or ordering parts that the knob (132) is handed. Again, the stem assembly (137) may only be replaced as a unit.

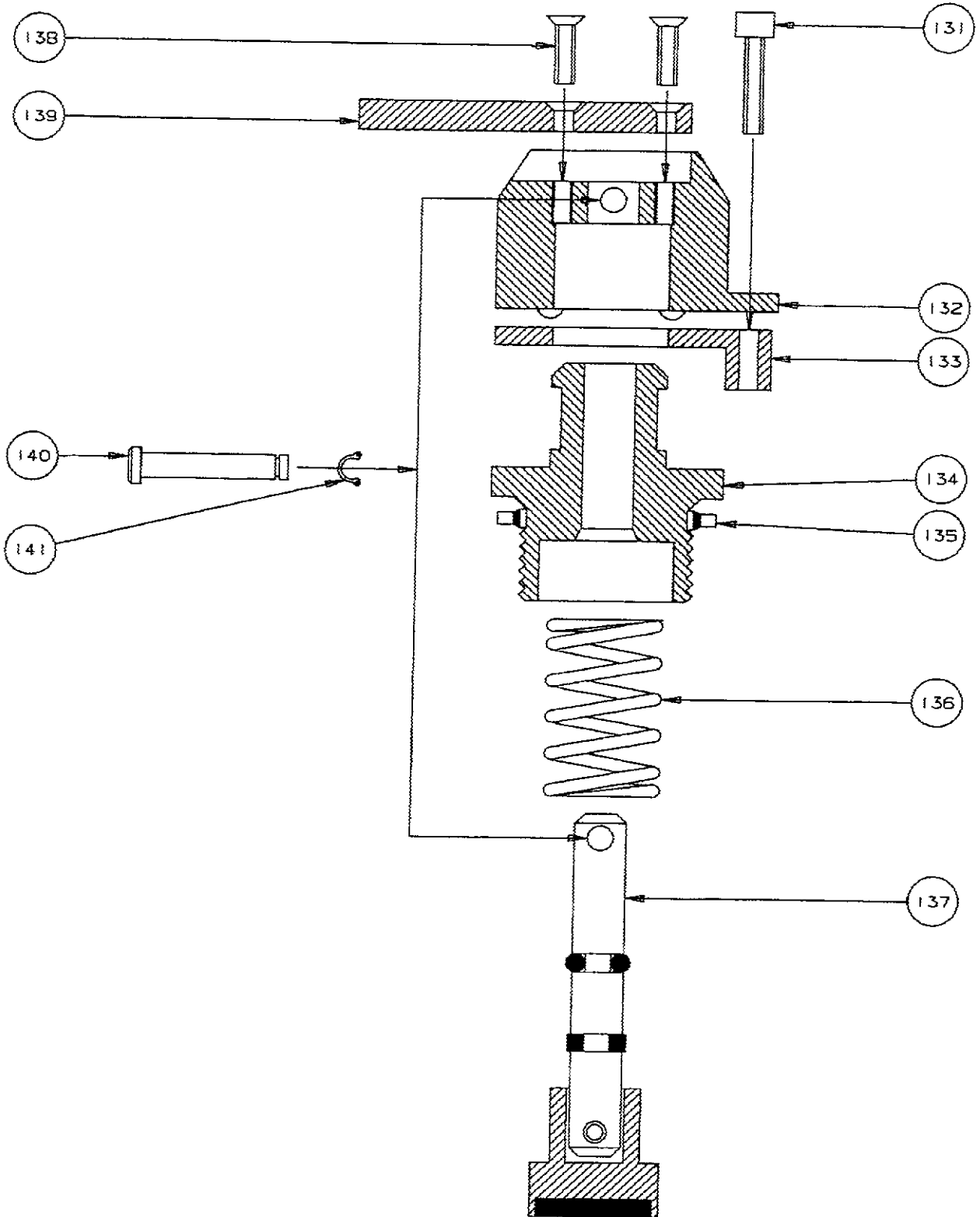
#### Key to diagram (h):

- 131) Thrust plate screws.
- 132) Pilot knob.
- 133) Thrust plate.
- 134) Bonnet.
- 135) Gasket.
- 136) Spring.
- 137) Stem assembly.
- 138) Lever screws.
- 139) Lever.
- 140) Clevis pin.
- 141) Circlip.



# SKY BALLOONS

Diagram (h) - Pilot valve assembly



## SKY BALLOONS

### 5.9 - OTHER ITEMS

#### 5.9.1 - COIL

The rules of section 5.6 apply.

The BR2 coil is equipped with screwed in jets. Removal of these is not recommended unless replacement is required as it is very easy to shear the fine threads. Jets are fitted with Loctite 572.

#### 5.9.2 - LIQUID FIRE JET

The jet holes are easily cleaned with a fine wire, as the main jets. The jet assembly is screwed into its housing without sealant. If the regulator is detached from its control screw (the small Allen screw in the centre) the whole assembly should be replaced, or returned to Sky for repair.

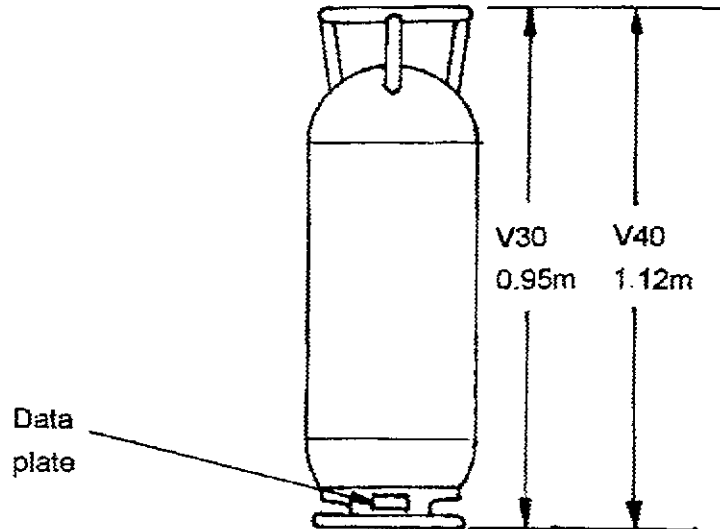
# SKY BALLOONS

## 6 - FUEL CYLINDERS

### 6.1 - INTRODUCTION

#### 6.1.1 - Identification

Sky Balloons fuel cylinders are made in two sizes, V30 holding 60l/30Kg of propane and V40 holding 80l/40Kg of propane. The size of the tank is indicated on the data plate found on the bottom collar of the cylinder. The tanks are identical in diameter but the V30 is 0.95m tall and the V40 1.12m tall. It is very important to quote the size of tank when ordering fuel gauges and gauge dials but all other fittings are common to both tank sizes.



#### 6.1.2 - Safety

The following parts can be removed/changed without the need for the cylinder to be empty:

- 1) Liquid coupling seals (1 1/4 Acme types only)
- 2) Liquid coupling
- 3) Gauge dial unit
- 4) Vapour regulator and vapour coupling (if fitted)

Removal of all other parts will require the cylinder to be empty.

## SKY BALLOONS

### 6.1.2 - Safety (cont.)

Before removing liquid couplings depress the self sealing nipple to ensure the coupling is empty of fuel. Ensure the liquid valve is closed (handle horizontal). Likewise before removing the vapour regulator or coupling (if fitted) ensure the valve is closed by turning the handle fully clockwise.

### 6.1.3 - Emptying cylinders

It may be necessary to empty the cylinder for repair or internal inspection. If the cylinder is in a safe condition to use it is best to empty it in flight. If not transfer as much fuel as possible to another cylinder. The remaining fuel can be vented through the burner in an open space, well away from buildings etc.. Burning fuel from cylinders which are almost empty is not recommended. After the cylinder appears to be empty open the bleed valve and leave the cylinder to vent for 30 minutes after the flow of vapour from the valve appears to have stopped. Do not leave the cylinders unattended. The gauge unit can now be removed to finish the emptying process. Because there will be some residual vapour in the cylinder, even after following the above procedure, the cylinder must be purged with an inert gas before any work is commenced. Alternatively, filling the cylinder with water will remove all traces of propane but then all the water must be removed before the cylinder is re-used.

### 6.1.4 - Tools required

For removal of valves open ended spanners are required. The gauge dial is retained by Philips type screws and the gauge itself by Allen type screws. Pipe wrenches and badly fitting tools should not be used as they can cause permanent damage.

To hold the cylinder, to allow valve removal, it should be firmly strapped to the leg of a sturdy workbench with the strap passing around the legs supporting the top handle of the cylinder. Alternatively a strong assistant will be required.

### 6.1.5 - Thread sealing

The liquid valve is retained by nuts and bolts (see later). These bolts, and those holding the gauge, are locked with "Loctite Screwlock 222e". High strength locking compounds such as "Loctite Studlock" should not be used as future maintenance will be difficult and bolts may be damaged on removal.

## SKY BALLOONS

### 6.1.5 - Thread sealing (cont.)

The tapered threads of the relief valve (or vapour valve, if fitted) and the bleed valve are sealed with pipe sealant "Loctite 572". Thread locking compounds must never be used on tapered threads as they may not seal and further maintenance may be impossible. If a tapered thread has been disassembled all traces of the original sealant should be carefully removed. "Loctite 572" is recommended for re-assembly but PTFE tape is an acceptable alternative. Tapered threads must be screwed home at least three full turns to affect a proper seal but they must not bottom out. After re-assembly wipe away any excess sealant.

The joint of the liquid coupling to the liquid valve is made with a "Dowty bonded seal". Replace this, if worn, with a new item. The size is 3/8 BSP and the seal material is Nitrile rubber. The coupling is assembled to the valve with "Loctite Screwlock 222e" to prevent it becoming loose.

If a vapour valve and regulator assembly are fitted the regulator is attached to the valve with a bullnose coupling. This coupling is made without sealant but note that the thread is left hand.

### 6.1.6 - Cleanliness and lubrication

Sky fuel cylinders and burner hoses are supplied with protective covers. These prevent the entrance of dirt and thus help prolong the life of the couplings and seals. It is highly recommended that these covers are used at all times and replaced if lost or damaged.

The life of seals will also be helped by lubrication. Silicone grease is the recommended lubricant except in areas where sand and dust are common. In such areas graphite powder is the preferred lubricant as it will not trap the abrasive dust.

## SKY BALLOONS

### 6.2 - Inspection and cleaning

#### 6.2.1 - Regular Inspection

Each time a cylinder is used the functions should be checked as follows:

- 1) The gauge is working.
- 2) The fuel connector does not leak if the valve is open with the hose disconnected (applies to liquid and vapour). After performing this test the self sealing nipple on the liquid connector must be depressed to release the pressure in it. If this is not done it may be difficult to connect the hose (particularly on Tema couplings) or, if the cylinder is left unused for some time, liquid expansion may permanently damage the self sealing assembly.
- 3) Valves perform their intended on/off function.
- 4) Valves are not leaking through the stem.
- 5) Assembled couplings are not leaking.

#### 6.2.2 - Ten year inspection

In addition to the above inspection requirements the cylinder must be submitted to an approved balloon repair authority after ten years of use. This inspection will also apply if the cylinder body is dented. At this inspection the cylinder will be emptied and purged (as 6.1.3) and an internal inspection performed. This is best done with a car size light bulb suspended through the gauge hole. A dentists type mirror is used to inspect the top of the cylinder, particularly the integrity of the welds and the dip tubes. The long liquid dip tube, the shorter curved vapour tube and the smaller diameter bleed tube must all be present and firmly attached. There should be no signs of corrosion.

## SKY BALLOONS

### 6.2.2 - Ten year inspection (cont.)

If corrosion is visible, or there are dents in the cylinder body, the cylinder shall be subjected to a hydraulic pressure test. To achieve this it will be necessary to replace the relief valve (or vapour valve, if applicable) with a blank plug. The gauge hole must also be closed off. This is best achieved with a gauge that is already damaged, not the working gauge, as the float will not withstand the test pressure of 32 bar. The cylinder must show no signs of leakage during the pressure test. After the test a further internal inspection will be performed to ensure freedom from cracks, particularly in the areas of dents and welding.

The cylinder jacket will be removed at the ten year inspection to further inspect for corrosion and dents.

Under no circumstances must cylinder bodies be re-welded. If this appears to be necessary the cylinder must be returned to Sky balloons for assessment and, if possible, repair by the original manufacturer.

### 6.2.3 - Cleaning

If inspection reveals excessive dirt in the cylinder or if contamination is suspected (pilot light function is usually affected first) then the cylinder should be emptied in accordance with 6.1.3 and cleaned as follows:

- 1) Pour in some kerosene (paraffin) through the gauge hole. Swill this around the cylinder and pour it out. Do not use petrol as it is a great fire hazard and do not use water based cleaners as they can cause corrosion.
- 2) Repeat until the cylinder is clean.
- 3) Perform a final rinse with a small amount of methylated spirit. A small quantity of this left in the cylinder will remove any water contamination.

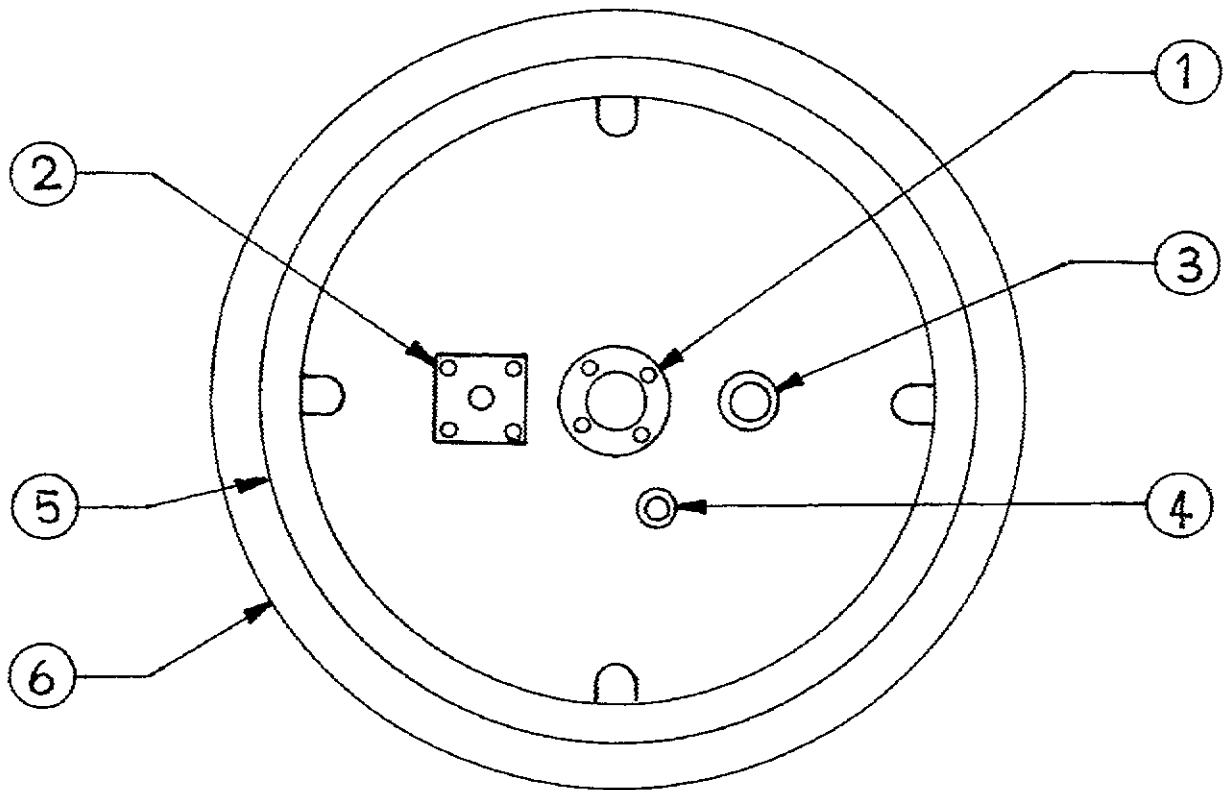
## SKY BALLOONS

### 6.3 - Sky cylinders

#### 6.3.1 - Features on cylinder body

The valve and gauge mountings on Sky cylinders are permanent welded features of the cylinder. On the diagram below:

- 1) Gauge boss.
- 2) Liquid outlet with integral ball valve mounting.
- 3) 3/4 NPT boss for relief valve or vapour valve assembly.
- 4) 1/4 NPT boss for bleed valve.
- 5) Top handle.
- 6) Cylinder body.





## SKY BALLOONS

### 6.3.2 Orientation of components

#### Fuel Gauge

The float arm on the fuel gauge moves from vertically below the centre column (cylinder empty) to vertical and adjacent to the centre column (cylinder full). With the float arm horizontal (90° to the centre column) the float should be in the position marked 'A' on the diagram below. The dial unit should be inserted into the gauge such that the positions of the 5% mark is in the position indicated by 'B'.

#### Liquid valve

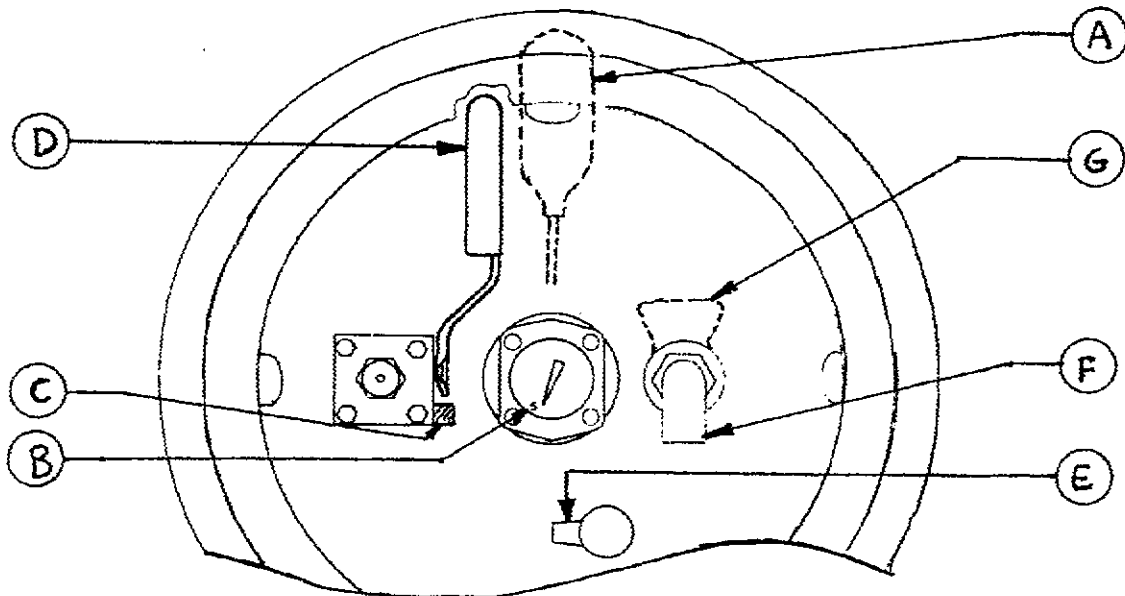
The stop on the body of the liquid valve should be in the position indicated by 'C' and the handle, in the off position, in the position indicated by 'D'.

#### Bleed and relief valves

The position of the bleed valve outlet 'E' is as set by the factory but is not critical unless a safety bleed tube coupling is fitted. Likewise the position of the relief outlet 'F' is as set by the factory but is not critical.

#### Optional vapour outlet

To enable fitting of the regulator the valve should be fitted with the outlet in the position marked 'G'.



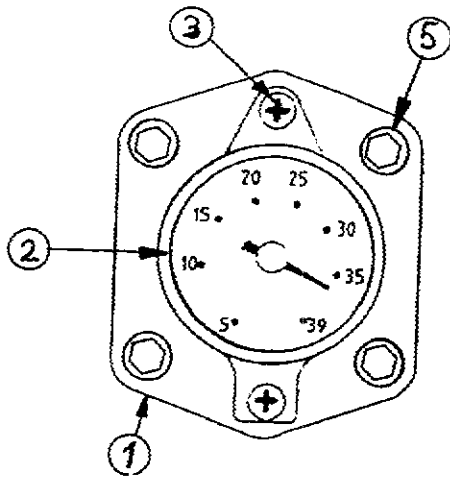
# SKY BALLOONS

## 6.4 - Component specification, faults and repair

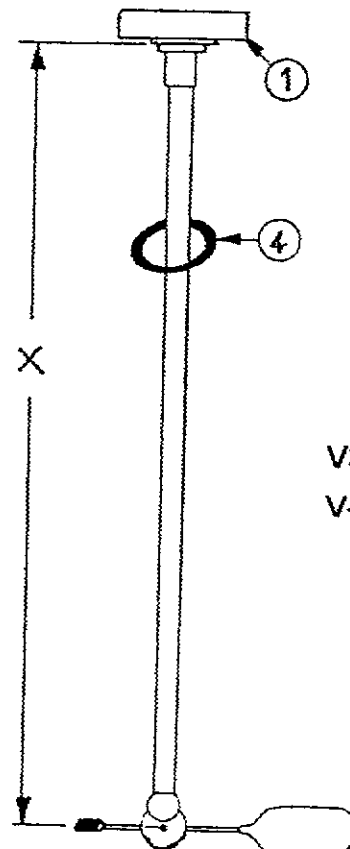
### 6.4.1 - Fuel gauge

The fuel gauge fitted (1) is a Rochester float type with magnetically coupled dial indicator (2). Ensure the correct size gauge is fitted, as on the diagram below. Also ensure the correct dial unit is installed. If the gauge has been removed inspect the gasket (4) for condition and replace if necessary. New gauges are supplied with a gasket.

If the gauge is not reading at all roll the cylinder along the ground. If the float unit can be heard moving then the dial unit is at fault. This can be replaced without emptying the cylinder by removing the 2 Philips screws (3). If the float cannot be heard moving the cylinder must be emptied and the gauge removed for inspection by removing the 4 Allen screws (5). If simply cleaning the gears on the gauge does not effect a cure then it must be replaced in its entirety, it is not repairable.



V30 dial unit (as shown)  
reads from 39%  
V40 dial unit  
reads from 32%



V30 - X = 605mm  
V40 - X = 745mm

## SKY BALLOONS

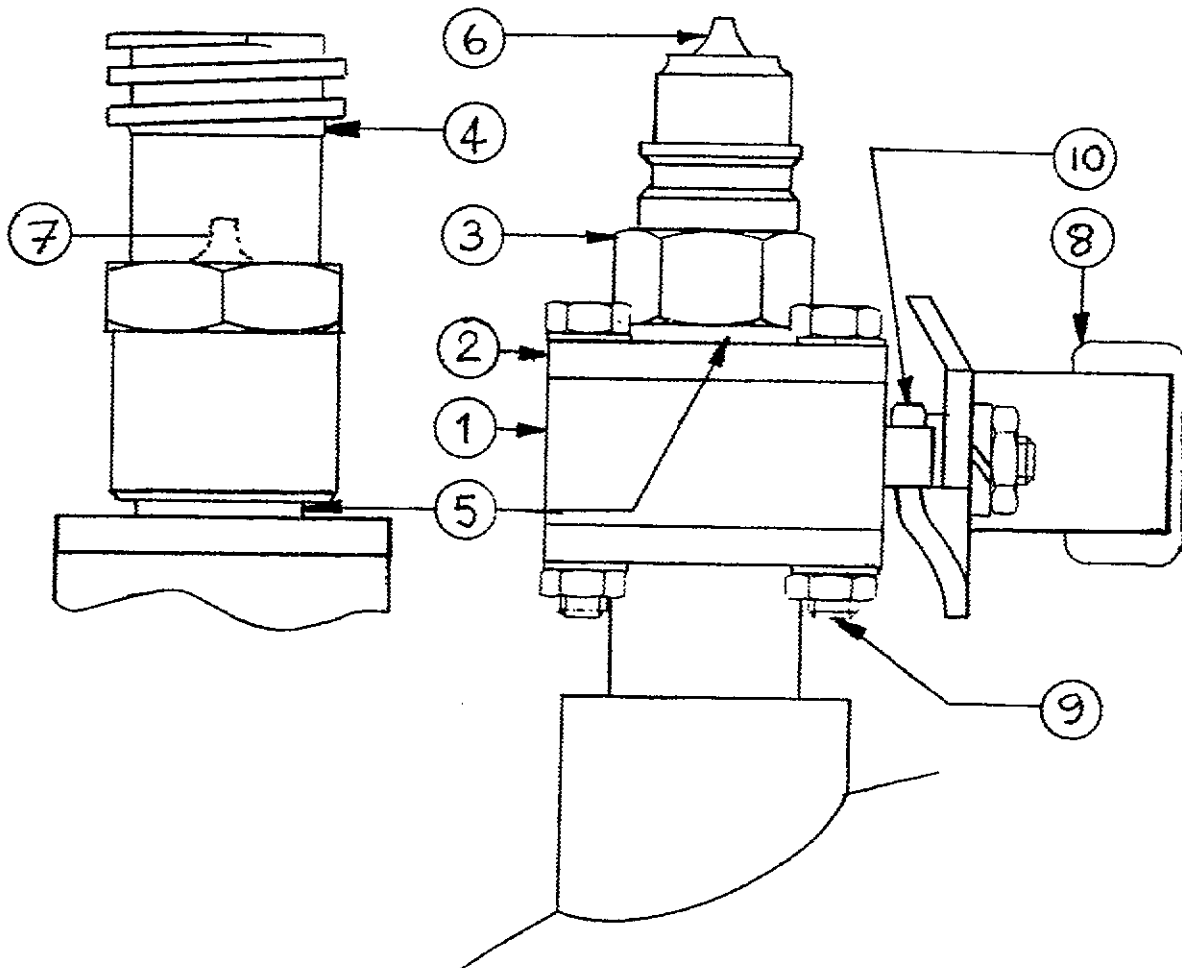
### 6.4.2 - Liquid outlet

The liquid outlet comprises a Worcester W44 ball valve (1), a top adaptor plate (2) and a Tema 3800 male (3) or 1 1/4 acme coupling (4).

If the Tema coupling leaks when assembled to the burner hose then the seals in the hose must be replaced (see burner section). If the self sealing nipple (6) leaks then the whole item will have to be replaced.

If a 1 1/4 Acme coupling leaks when assembled then the seals in the cylinder part need replacing. Only use genuine Rego parts. If the self sealing nipple (7) leaks then the whole item will have to be replaced. Only use genuine Rego 7414M types and ensure the thread is 3/8BSP parallel.

Either type of coupling can be removed without emptying the cylinder so long as the valve is functional and turned off (handle horizontal and adjacent to tank). The sealing gasket (5) should be inspected carefully prior to re-use.



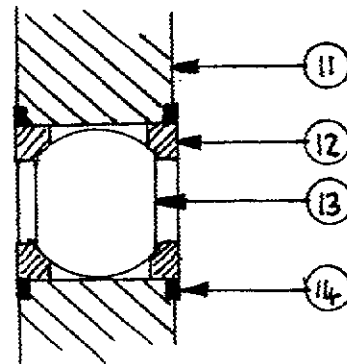
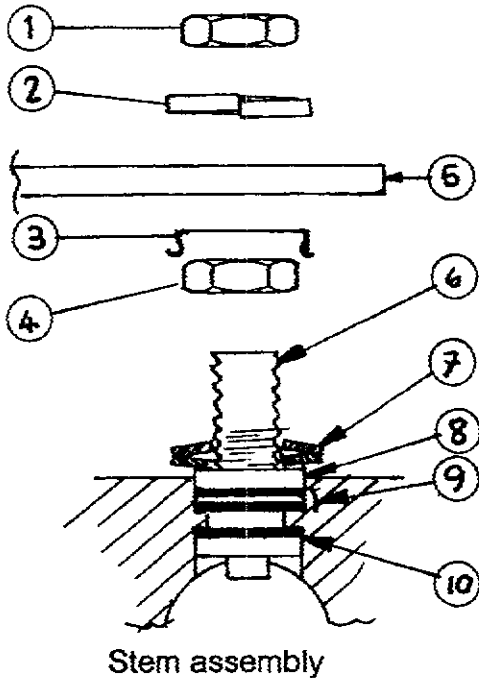
# SKY BALLOONS

## 6.4.2 - Liquid outlet (cont.)

Referring to the diagram on the previous page: If the ball valve is not completely shutting off the fuel supply then the main ball seals will require replacement. Only genuine Worcester parts in PTFE are to be used. To remove the valve the tank must be empty. Remove the handle (8) from the valve before removing the four retaining bolts (9) and the valve itself. If the stem leaks it may be sufficient to remove the valve handle and tighten the nut (10) which is found beneath it. If this does not effect a cure then new stem seals will be required.

## 6.4.3 - Replacing Worcester valve seals

Having removed the valve, as above, remove the lock washer (3) and the stem nut (4) from the valve body (11). The washers (7) and the packing ring (8) will simply slide off. The ball seals (12) and face seals (14) will fall out easily. With the valve in the closed position (hole in ball invisible) the ball can be pushed out. The stem (6) can now be removed from the valve body by carefully pushing it into the ball chamber. Remove all stem seals from the body and stem. When refitting the stem first place **ONE** seal (10) on it before refitting to the body. The remaining **THREE** seals (9) provided in the repair kit are fitted outside the valve body. Replace the packing ring (8) and the conical washers (7). Note that these washers are fitted edge to edge, as shown below. Refit the stem nut (4), the ball (13), ball seals (12) and face seals (14) and refit the valve into the cylinder. Pressurise the cylinder with compressed air or a small amount of propane and check the valve stem with soap solution for leaks. Tighten the stem nut (4) as required and then refit the lock washer (3), the handle (5), the spring washer (2) and the retaining nut (1).



Section through  
ball and body

## SKY BALLOONS

### 6.4.4 - 3/4 NPT outlet

As Sky burners do not require a vapour feed this orifice is fitted, as standard, with a relief valve. The valve type is "Sherwood PV435L" and it is set to discharge at 375 psi. No other type should be used.

If the cylinder is to be used with another manufacturers burner a vapour feed may be required. If so the valve specification is:

Mounting thread - 3/4 NPT.

Screw action valve.

Valve **must** have an integral relief valve set to 375 psi.

Valve must be approved for use in balloons and for burner in use.

This valve will be fitted with a pressure regulator which must also be approved for balloons and for the burner in use.

The vapour hose connector on the cylinder will be of the self sealing type and compatible with the burner in use. Adaptors are not to be used between the cylinder and burner hose.

### 6.4.5 - 1/4 NPT outlet

This outlet is fitted with the liquid level bleed valve. The tube which sets the liquid level is an integral part of the cylinder. The valve fitted as standard, in this orifice is a "Ceodeux, type 71690". If the bleed screw leaks when closed the whole valve must be replaced. The requirements for replacement are:

Valve mounting is 1/4NPT.

Bleed screw is non-removable.

Assembly does not have tube attached.

Assembly is compatible with propane.

The use of any valve other than the one specified above requires prior approval from Sky Balloons .

**Under no circumstances must bleed valves provided by Sky Balloons be used in any other propane cylinder.**

## SKY BALLOONS

### 7 - RECORDING

#### 7.1 - LOG BOOK ENTRIES (excluding USA)

The preflight inspections described in the flight manual and the preventative maintenance described in section 2 of this manual do not need recording. It is mandatory, however, that all faults, damage and repairs are logged in the balloon logbook and signed off by an inspector acceptable to the National Airworthiness Authority with which the balloon is registered.

The requirement for an annual/100 hour (whichever occurs first) inspection is also mandatory for the balloons Certificate of Airworthiness (C of A) to remain valid. The inspection certificate should be fixed into the balloon logbook. Without this certificate the balloon will not have a valid C of A and this may render insurance policies invalid as well.

#### 7.2 - LOG BOOK ENTRIES (USA)

Preventative maintenance shall be recorded in the log-book with the signature of the owner/operator performing the work prior to further operation. Repairs shall also be recorded and signed off by the certificated mechanic performing the work.

100 hour inspections can be performed and recorded by a certificated mechanic but for the annual inspection the mechanic must also have an inspection authorization. See section 2.2.3.

#### 7.3 - MATERIALS RECORDING

The materials used for repair (including batch numbers) shall be recorded in the balloon logbook and in the records of the repair organisation. The aim of this is to be able to trace the destination of materials later found to be faulty and also to identify faulty materials from reported service failures. All materials supplied by Sky Balloons will have batch information on the JAA 1 release certificate.

**SKY BALLOONS**

**MAINTENANCE MANUAL**

**APPENDIX 1**

**100 HOUR / ANNUAL INSPECTION SCHEDULE**

REFERENCE MS/BBAC/1S

# SKY BALLOONS

## ANNUAL / 100 HOUR INSPECTION SCHEDULE

### 1 - INSPECTION REQUIREMENTS

In the UK the inspection shall be performed by a BBAC inspector, category 1, 2 or 3. The inspection shall be performed within 100 flight hours or 1 year of the previous inspection, whichever occurs first, unless the previous inspection report has called for a reduced interval. Satisfactory inspection will be shown by the issue of form IR4, the top layer of which will be retained in the balloon logbook. For failed balloons the IR4 will be held for up to one month pending repair action and re-inspection. The repairs will be logged on the IR4. If the balloon comprises major components from different manufacturers then the appropriate inspection schedules should be used in conjunction with this one.

● Outside of the UK the person performing the inspection must meet the requirements of the licensing Airworthiness Authority.

### 2 - LOGBOOK

<input checked="" type="checkbox"/>	
<input type="checkbox"/>	Present at time of inspection.
<input type="checkbox"/>	Flight hours correct and up to date.
<input type="checkbox"/>	Repairs and modifications recorded.
<input type="checkbox"/>	Equipment serial numbers agree with items submitted for inspection.

### 3 - ENVELOPE

<input type="checkbox"/>	Temperature warning flag present.
<input type="checkbox"/>	Temp tags do not show more than 120°C. If so add new tags next to original and record maximum temperature in logbook.
<input type="checkbox"/>	Apex ring tape stitching secure.
<input type="checkbox"/>	Joint of apex tapes to top rim tape secure.
<input type="checkbox"/>	Parachute loops on parachute secure.
<input type="checkbox"/>	Parachute loops on envelope secure.
<input type="checkbox"/>	Parachute retaining cords secure.
<input type="checkbox"/>	Parachute pull down cords secure.
<input type="checkbox"/>	Parachute fit (check by inflation).
<input type="checkbox"/>	Parachute edge fabric condition.
<input type="checkbox"/>	Parachute pulley running smoothly and free from wear.
<input type="checkbox"/>	Pulley fixing link closed.



## SKY BALLOONS

### 3 - ENVELOPE (CONT.)

If envelope has over 250 flight hours, or if overheating is suspected, a 1" grab test should be performed. This test should apply to all colours at the top of the envelope and the highest rip-stop panels. The test shall be performed at least 100mm away from the nearest tape. Test results:

- Better than 14Kg - balloon is airworthy.
- Between 14Kg and 10Kg - reduce maximum balloon loading to 70% of original and re-test at 50 hours or annually, whichever comes first.
- Less than 10Kg - all weak fabric must be replaced and envelope re-inspected.
- The parachute edge, from the tape to 30cm in remains airworthy so long as the grab strength is above 8kg.

Check the fabric porosity by attempting to blow through it.  
 If high porosity is suspected perform a flight test to ascertain if the balloon can still be controlled without requiring exceptional pilot skill.

- Anchor point of parachute line secure.
- Parachute line pulley secure and in good condition.
- Parachute line in good condition, correct material and length.

- Turn vent stitching secure
- Turn vent lines in good condition, correct material and length.
- Turn vent pulleys and guide rings in good condition and secure.

No un-repaired damage above lowest horizontal tape.  
 Repairs appropriate and correctly performed with correct materials.

- Flying wires stainless steel, free from kinks or damaged strands.
- No burn damage to the extent of taking "spring" from wire.
- Ferrules in good condition.
- Securing loops free from chafing or burn damage.
- Protective sleeves present and secure.
- Carabiners in good working condition. Only Stubai 3000Kg used.

## SKY BALLOONS

### 3 - ENVELOPE (CONT.)

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | All load tapes intact or properly repaired.                   |
| <input type="checkbox"/> | Bottom rim tape not damaged over more than 20mm of its width. |
| <input type="checkbox"/> | Data plate secure on bottom rim tape.                         |

### 4 - BASKET

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | <b>NO DAMAGE TO SUSPENSION CABLES</b>                                     |
| <input type="checkbox"/> | No un-repaired damage to cracks in floor larger than 100mm in length.     |
| <input type="checkbox"/> | Top frame free from cracks, kinks or excessive distortion.                |
| <input type="checkbox"/> | No holes in wicker larger enough to pass a hand or foot through.          |
| <input type="checkbox"/> | No sharp cane ends protruding.  |
| <input type="checkbox"/> | No signs of rot in wood or wicker.  |
| <input type="checkbox"/> | Floor to cane joint intact, hide in good condition.                       |
| <input type="checkbox"/> | Rod stubs in good condition and secure.                                   |
| <input type="checkbox"/> | Nylon rods in good condition.   |
| <input type="checkbox"/> | Fire extinguisher present and charged.                                    |
| <input type="checkbox"/> | Cylinder straps not damaged over more than 25% of width. Buckles working. |
| <input type="checkbox"/> | Carabiners working and in good condition. Stubai 3000Kg type only.        |

### 5 - BURNER

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Frame free from cracks, kinks or excessive distortion.                   |
| <input type="checkbox"/> | Rod stubs and corner lugs secure.  |
| <input type="checkbox"/> | Mounting bolts present and tight.  |
| <input type="checkbox"/> | Stop bolts present and tight.  |
| <input type="checkbox"/> | No external signs of major damage.                                       |
| <input type="checkbox"/> | Coil intact with all rivets in place.                                    |
| <input type="checkbox"/> | Hoses free from kinks or abrasion. SAE100 R1T type only fitted.          |
| <input type="checkbox"/> | Fuel connectors do not leak. Only 1 1/4 Acme (Rego) or Tema 3800 in use. |
| <input type="checkbox"/> | Rego type connectors have steel centre piece (where joined to hose).     |
| <input type="checkbox"/> | Pilot lights strong.   |
| <input type="checkbox"/> | Main blast valves working and free from leaks,                           |
| <input type="checkbox"/> | Liquid fire valves working and free from leaks.                          |
| <input type="checkbox"/> | Pilot valves working and free from leaks.                                |
| <input type="checkbox"/> | Pressure gauges working.   |

## SKY BALLOONS

### 6 - FUEL CYLINDERS

<input type="checkbox"/>	No external damage to cylinder itself.
<input type="checkbox"/>	Connectors not leaking with valves open and hoses disconnected.
<input type="checkbox"/>	Connectors not leaking in use.
<input type="checkbox"/>	Connectors compatible with burner without use of adaptors.
<input type="checkbox"/>	Contents gauge working.
<input type="checkbox"/>	Bleed screw working.
<input type="checkbox"/>	10 year inspection performed (if applicable).
<input type="checkbox"/>	Valves not leaking through stem, or leaking when closed.
<input type="checkbox"/>	Cylinders have approval for balloon use.

### 7 - FUEL MANIFOLDS

<input type="checkbox"/>	Manifolds must have been supplied by a balloon manufacturer.
<input type="checkbox"/>	Connectors not leaking when open ended.
<input type="checkbox"/>	Connectors not leaking in use.
<input type="checkbox"/>	Hoses not kinked or abraded. Must be SAE 100R1T type, 3/8" size minimum.

**SKY BALLOONS**

**MAINTENANCE MANUAL**

**APPENDIX 2**

**NOTES ON FIRE EXTINGUISHERS**

**NOTES ON FIRE EXTINGUISHERS SUPPLIED BY SKY BALLOONS**

**MANUFACTURER**

Several manufacturers have been used by Sky Balloons. Every fire extinguisher supplied, however, has the manufacturer clearly identified on the extinguisher itself. The model number is also indicated.

**CHARGE DATE**

Extinguishers are purchased, as close as possible, to the delivery date of the balloon. Thus annual inspections of the extinguisher should be performed at the same time as the balloon annual inspection is required.

**LAST INSPECTION DATE**

This will coincide with the balloon inspection date and should be recorded in the balloon log book as part of the inspection.

**BOTTLE BUILT DATE**

This, as mentioned above, will coincide with the balloon delivery date.

**STANDARD OF COMPLIANCE**

Whilst different manufacturers have been used the following standards will apply:

- 1) All extinguishers supplied by Sky Balloons will be made to British Standard BS5423 (1987)
- 2) All extinguishers will be of the ABC dry powder type propelled by nitrogen.
- 3) The minimum charge weight will be 1Kg.

**OPERATION INSTRUCTIONS**

These are clearly marked on the extinguisher body.

## Sky Balloons

### **PLACARDS**

All required information is clearly presented on the extinguisher body. If, through wear, this information becomes illegible the extinguisher shall be replaced.

### **WEIGHT**

The charge level of extinguishers provided by Sky Balloons is indicated by a pressure gauge. Thus the weight is not important providing:

- 1) The needle of the pressure gauge is in the green section.
- 2) The safety locking pin and the plastic tie seal are both intact.

### **PRESSURE**

All extinguishers provided by Sky Balloons show the charge pressure on the extinguisher label.

### **TYPE OF CHARGE**

Only dry powder extinguishers (type ABC) are to be used. This is also indicated on the extinguisher label.

### **TIME LIMIT**

There is no time limit so long as the extinguisher has not been used and the pressure gauge shows green (as above).

### **INSPECTION TIME**

The extinguisher shall be inspected, on an annual basis.

### **INSPECTION PROCEDURE**

- 1) Pressure gauge in green section.
- 2) Locking pin and seal intact.
- 3) Labels and instructions legible.
- 4) No visible damage to any part of the cylinder or operating handles.

### **BOTTLE LIFE LIMIT**

There are no limits providing the requirements of the inspection procedure are met at the correct intervals.

### **PROPULSIVE ELEMENT**

The propulsive element is Nitrogen.

### **NOTES ON REPLACEMENT**

Should the fire extinguisher have been used or failed its' annual inspection then the following will apply:

- 1) The cylinder may be submitted to Sky Balloons, or the original manufacturer, for re-charging and/or inspection. The relevant British Standards are:

For inspection - BS 5305, part 3

For re-charging - BS 6643, part 1.

Other extinguishers may be used providing:

- 1) They are of the ABC dry powder type.
- 2) The minimum charge weight is 1Kg (not to be confused with the total weight of the extinguisher, which will be higher).

## Sky Balloons

### **NOTES ON REPLACEMENT (Cont.)**

- 3) The extinguisher has national approval, for propane, in the country in which the balloon is registered.
  
- 4) The specification requirements and the correct inspection/maintenance requirements for the replacement item are met.

### **SPECIAL NOTE ON EARLY EXTINGUISHERS SUPPLIED BY SKY BALLOONS**

Some extinguishers coloured blue and carrying the name "Chubb" had a warning flag which dropped from the operating handle after use and displayed the word "USED". This flag is not to be trusted as it is easy for the owner to replace it with the original safety locking pin. The absence of the safety seal will require further investigation, as described earlier.



# SKY BALLOONS

## MAINTENANCE MANUAL

### AIRWORTHINESS LIMITATIONS

This, the airworthiness limitations section is FAA approved and specifies maintenance required under sections 43.16 and 91.403 of the Federal Aviation Regulations.

This page is part of the "Sky Balloons Maintenance Manual", issue 1 and is required for all manuals issued to the USA.

#### INSPECTION INTERVALS

##### 1 - Routine

The pilot shall perform the pre-flight inspection (reference section 2.2.1) for every flight.

##### 2 - 100 hour/Annual inspection

The following items must be inspected at periods of 1 year or 100 flying hours, whichever occurs first:

Balloon envelope	Basket
Burner	Fuel cylinders
Fuel manifolds	

The inspector is required to verify that the parts submitted for inspection are those listed in the Balloon Log-book. The inspection requirements are given as appendix 1 to the manual.

##### 3 - 250 Hours and every subsequent 50 hours

The 100 hour inspection shall be performed and, in addition, a fabric grab test is required. Requirements as appendix 1 to the manual.

##### 4 - Envelope overheating

An envelope which has, or is suspected of, being overheated shall be subject to the 250 hour test, as above.

##### 5 - Heavy landing

A basket which has been involved in a heavy landing or impact shall be subjected to the inspection of section 4, of appendix 1 to the manual, before it is next flown.

##### 6 - 10 Year Inspection

Fuel cylinders require internal inspection when they become 10 years old. See section 6.2.3 of the manual.

##### 7 - Mandatory replacement times

None.