



LINDSTRAND TECHNOLOGIES LTD

HOT AIR BALLOON MAINTENANCE MANUAL

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RECORD OF AMENDMENTS

No.	Date	Affected Pages	Incorporated By
Issue 1	20 th April 2016	Initial Issue	Lee Barnfield Per Lindstrand
Issue 1.1	12 th July 2016	i, ii, 4	Lee Barnfield Per Lindstrand This revision is approved under the authority of DOA EASA.12J.176

Amendments

This manual is kept up to date by amendments consisting of loose-leaf pages, required to add new information or amend existing information. The pages affected by an amendment and the effective date are shown above. The pages themselves are identified by a change of the issue number at the bottom of each page. The number after the point in the issue number represents the amendment level of that page, eg a page marked Issue 1.1 is at Issue 1 modified by Amendment 1. The Checklist of Pages indicates the issue level of all pages included in this Maintenance Manual.

CHANGE OF OWNERSHIP

If the ownership of this balloon changes, it is important for the new owners to contact Lindstrand Technologies Ltd to ensure that they receive Maintenance Manual Amendments and Supplements, as appropriate.

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MANUAL SUPPLEMENTS

Supplement No.	Title	Tick if Applicable

STATEMENT OF APPROVAL

This manual forms part of the EASA Type Certificate EASA.BA.26, first approved on 20 April 2016.

Future revisions will require approval, signified by an approval number.

USE OF THIS MANUAL

This manual sets out the maintenance procedure and schedule for all Lindstrand Technologies hot air balloons. As each balloon may have specific features for dedicated systems, every balloon has a dedicated manual showing the serial number on the cover. Always make sure before proceeding that you have the correct manual issue.

The Maintenance Manual does not always make a distinction what work can be carried out by the operator and what can only be serviced by factory personnel. If in doubt, always consult the manufacturer on maintenance issues.

It is the responsibility of the balloon owner / operator to ensure that persons engaged in inspection or maintenance of the balloon are trained, competent and authorised to do any work they undertake.

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SECTION 1 **INTRODUCTION**

1.1 PURPOSE OF THIS MANUAL

This Maintenance Manual provides information for the following aspects of a Lindstrand Technologies Ltd. hot air balloon:

Airworthiness Limitations
Technical Description
Preventative Maintenance
Repair and Maintenance Instructions
Inspection Programs

The manual is intended as a guide and if any detailed information cannot be found in this manual, then Lindstrand Technologies should be contacted at the address shown on the front page.

The use of un-approved parts or sub-standard materials will invalidate the Certificate of Airworthiness. Deviation from the repair instructions and material specifications contained in this manual are not permitted without prior written consent from Lindstrand Technologies Ltd.

1.2 APPLICABILITY

The information contained within this manual applies to all hot air balloons manufactured by Lindstrand Technologies Ltd under EASA Approval (see Section 3, Technical Description, for a comprehensive list of models covered).

1.3 IDENTIFICATION OF SYSTEMS

A serial number and a description identify all major components of Lindstrand Technologies hot air balloons. These are located as follows:

Envelope	-	Engraved on an identification plate which is situated on the top side of the envelope mouth.
Burner	-	Engraved onto the stainless steel burner can support bracket.
Basket	-	Engraved onto a plate attached onto the basket sidewall.
Cylinder	-	Engraved on a plate, which is fixed to the bottom foot ring of the cylinder.

1.4 QUALIFICATION

The Maintenance Manual is divided into sections. Only section 4, Preventative Maintenance can be carried out by the owner / operator. All other maintenance and repair, including the annual / 100 hour inspection, must be accomplished by an appropriately approved and qualified person.

SECTION 2 **AIRWORTHINESS LIMITATIONS**

2.1 APPROVAL STATEMENT

This manual provides information for continued airworthiness as required by EASA directive CS-31HB.82

2.2 MODIFICATION

The balloon must not be flown if it has been modified, without the approval of the National Airworthiness Authority in the state of registration.

2.3 MANDATORY REPLACEMENT TIME

Fuel hoses are to be replaced after ten years in service.

No other component in Lindstrand Technologies balloons have a mandatory replacement life.

2.4 INSPECTION INTERVAL

The inspection interval for Lindstrand Technologies hot air balloons is one year or 100 hours of flight time; whichever is sooner.

If the balloon envelope has more than 250 hours of operational use or an overheat event is thought to have occurred, then a fabric strength test should be carried out.

It is at the discretion of the inspector to carry out a grab test below 250 hours of flight if fabric degradation is thought to have occurred.

2.5 INSPECTION PROCEDURE

The Inspection Procedure can be found in Section 6 of the Maintenance Manual.

The Inspection Check List is specified in Appendix A of the Maintenance Manual.

2.6 ACCEPTABLE DAMAGE

The balloon must not be flown if there is any of the following:

ENVELOPE: With any damage to the envelope fabric which is above the first horizontal load tape and is larger than 25 mm in any one direction, or with any damage to load tapes, control lines, or parachute valve rigging.

ENVELOPE CABLES – STAINLESS STEEL: If more than one strand of wire is broken, or if cables have been overheated to the point where they have lost their temper and do not spring back to their original shape when bent, the cable must be replaced before the balloon may be flown.

ENVELOPE CABLES – NON METALLIC: If any cable has been damaged in a way to expose the Kevlar core (yellow braid) or reduce the flexibility of the exterior polyester cover, the cable must be replaced before the balloon may be flown.

FUEL SYSTEM: When any damage exists to fuel hoses, fuel tanks, tank or burner fittings, burner coils, burner frame, or when any fuel leak occurs in any fuel fitting. If any burner, tank valve or pressure gauge is not functional, or experiences a fuel leak, it must be repaired or replaced before the balloon may be flown.

BASKET: When there are more than five strands of a basket wire broken, it must be repaired or replaced before the balloon may be flown.

BASKET – PLYWOOD FLOOR: If the plywood floor has separated from the lower stainless frame or if the floor is damaged so that a 250 mm crack is visible on both sides of the floor, the basket must be repaired or the damaged part replaced before the balloon may be flown.

Any damage must be repaired in accordance with the instructions contained in the Section 5 of this manual. All repairs must be noted in the balloon log book and approved by a designate of the appropriate authority.

SECTION 3

BALLOON AND SYSTEM DESCRIPTION

A hot air balloon consists of three main components: envelope, basket and burners. In addition, flight instruments, fuel tanks and other support equipment are needed for safe balloon operation.

3.1 ENVELOPE

The envelope is made of a coated nylon or polyester. The material is cut into panels which are sewn together in vertical rows called gores. The gores are reinforced with horizontal and vertical structural load tapes which are continuous to the top centre of the balloon where they are sewn into a load ring. Stainless steel or Kevlar® cables transfer basket loads to load tapes which in turn support the load. The base of the envelope and scoop are comprised of a fire resistant Nomex® material.

A parachute is located at the top of the envelope and allows for the controlled release of hot air. Partial opening of the parachute valve can be used to cool the balloon. Some Lindstrand Technologies balloons are also equipped with turning vents which allow for the pilot to turn the balloon on its vertical axis while in flight.

Lindstrand Technologies produce the following envelopes:

Balloon Type	Volume		FAI Class
	cu.m.	cu.ft.	
Series 1 70	1,982	70,000	AX7
Series 1 80	2,266	80,000	AX8
Series 1 90	2,550	90,000	AX8
Series 1 105	2,970	105,000	AX8
Series 1 120	3,400	120,000	AX9
Series 1 150	4,250	150,000	AX10
Series 1 180	5,100	180,000	AX10
Racer 56	1,590	56,000	AX6
Racer 65	1,840	65,000	AX7

The Series 1 and Racer range are smooth 24 gore envelopes. There are several models in the Series 1 range from 70,000 cubic ft (1,982 cu.m) to 180,000 cubic ft (5,100 cu.m). See Figure 1 (Appendix C) for a typical Series 1 envelope.

3.2 BASKET

Wicker is the preferred material for the passenger compartment basket of a hot air balloon because it is sturdy, flexible and relatively lightweight. The flexibility of wicker helps with balloon landings and cushions some of the impact force at landing. The basket contains the fuel tanks, instruments, pilot, and passengers.

Flexible nylon poles, in conjunction with stainless steel cables, located on the upper portion of the structure transfer the basket load to the envelope attachment points and support the burner assembly. Basket skids affixed to the floor add rigidity and provide a point of abrasive resistance to the floor. Sidewalls surround and protect the passengers, equipment and fuel tanks. Single-T baskets have padded basket dividers or partitions to form passenger compartments. For more details on basket occupancy see Flight Manual Section 2.1.8.

3.3 BURNER

The Lindstrand Vortech burner is effectively the engine of the hot air balloon. The burner system consists of burners (two), and fuel lines that carry LPG from the fuel tanks to the burners. The burners convert ambient air into hot air, which in turn provides the lift required for flight.

The fuel is supplied to the burner assembly through the fuel hoses that connect the fuel tanks to the burner assembly. The fuel system also provides fuel to the pilot light. The LPG fuel is diverted from the main supply line at the burner via a pilot shut-off valve. The fuel goes through a vapour converter and regulator and is distributed through a pilot head. A piezo-electric system ignites the vapour.

The burner coil is manufactured from stainless steel tubing. The fluid rises to the top of the coil and then descends into the jet ring. The jet ring is equipped with a combination of removable jets and machined holes.

The main liquid tank valve controls the flow of LPG fuel to the burner, while the main squeeze trigger valve controls fuel flow at the burner. With the liquid tank valve open, opening the burner blast valve permits LPG to enter the heat exchange coil where it is vaporised. After exiting the heat exchange coil through the jet ring in the lower portion of the coil, the propane is ignited by the pilot light.

In addition to the main coil and jet ring, it is possible through the use of the liquid fire valve to ignite un-vaporised propane. This produces a softer flame, that has a lower audible level, but a burn efficiency less than the main coil. The use of liquid fire is particularly useful when flying over livestock.

For description see Figure 2, Appendix C.

3.4 FUEL CYLINDERS

Fuel cylinders are equipped with a main liquid valve, a float gauge, pressure relief valve and ullage valve. The main liquid valve regulates the flow of the liquid propane to the burner. The float gauge provides a reading of the remaining capacity of the tank in a percentage. The pressure relief valve allows for the release of propane from the tank should the tank exceed the maximum design pressure. The pressure relief valve normally releases at 375 pounds per square inch (psi).

SECTION 4 **PREVENTATIVE MAINTENANCE**

WARNING!

Installation of any non-approved parts or materials, the modification of any aircraft part, or the utilisation of a non-approved repair method, could result in a hazardous condition which could result in death or injury.

4.1 PAPERWORK DOCUMENTATION

Only preventative maintenance as permitted by this section may be carried out by the balloon owner without sign-off by an appropriately qualified airworthiness inspector.

All preventative maintenance work carried out by the balloon owner or operator, in accordance with the instructions contained within this section of the Maintenance Manual must be documented with an entry in the balloon log book, which includes the following information:

- a. A description of the work performed
- b. The date of completion of the work performed
- c. The name of the person who made the repair or approved it
- d. The total number of hours on the balloon when the work was performed

4.2 ENVELOPES

4.2.1 Cleaning and Storage

Envelopes may be cleaned by gently applying a mild, non-detergent soap diluted with water onto the fabric using a sponge or cloth.

The envelope (including load tapes, Nomex and ropes) must be dried out completely before being packed and stored. The recommended method of drying out the balloon is to cold air inflate.

CAUTION:

Storing a balloon wet may cause permanent damage to the fabric and / or coating.

4.2.2 Owner / operator Envelope Repairs

Any fabric damage to the lower two panels may be repaired by the owner / operator, provided there is no damage to the vertical or horizontal load tapes or any control mechanism. The repair must be made using approved fabric, thread and technique as outlined in Section 5.

Repairs to load tapes anywhere on the envelope must be undertaken by a qualified repairman or facility.

4.2.3 Nomex Scoop and Nomex

Fabric damage to the Nomex panel may be repaired by the owner / operator, provided there is no damage to the vertical or horizontal load tapes or any control mechanism. The repair must be made using approved fabric, thread and technique. Repairs to load tapes anywhere on the envelope must be undertaken by a qualified facility / person.

4.2.4 Red and White (Candy Stripe) Parachute or Solid Red FDS Deflation Line

There is excess deflation line stored in the large loop at the tied-off end in the envelope which may be let out assuring the existing knot is duplicated. It is not permitted to shorten either line.

4.3 BASKETS

4.3.1 Cleaning, Storage and Re-Varnishing

Baskets should be stored in a cool, dry area.

Mud which has dried onto the basket can be removed using a garden hose. Padding can be cleaned using a suitable suede or leather cleaner as appropriate. The cushion floor foam can be cleaned using detergent and water.

Baskets may be re-varnished to renew the protective layer. Avoid varnishing over the rope handles or suede / leather covering.

NOTE:

Avoid high pressure spray washers as they may damage the natural wicker and possibly strip the natural protective outer layer off. To avoid trapping moisture, do not replace the cushion floor and fuel tanks until the basket is completely dry.

4.3.2 Basket Upholstery

Damage to the suede or leather trim can be repaired by carefully unlacing the cord holding the trim on to the basket and gluing or stitching a patch of replacement leather to the underside of the damaged section. The size of the replacement patch should include a 15 mm ($\frac{5}{8}$ ") overlap around the edges of the damaged section. After repair, replace the leather on the basket by lacing it into place.

4.3.3 Suspension System

Non-certified persons may replace the carabiners with parts provided by Lindstrand Technologies as original equipment replacement parts. Substitution of carabiners, except as specified in the type design, is prohibited. For further information, please contact Lindstrand Technologies Ltd.

Nylon poles must be replaced with Lindstrand Technologies supplied poles only. No other material may be substituted.

4.4 FUEL SYSTEMS

4.4.1 Fuel Cylinders

Flight cylinders require little specific attention throughout their service life. It is however advised that the following instructions are followed.

4.4.2 Handling Cylinders

Although the cylinders are strong, care should be taken when moving them. Ensure that when the cylinders are placed on rough, uneven ground, that the cylinder is resting on the foot ring and not on the dome of the cylinder itself. Be cautious of small stones on the ground when placing the cylinder down, this is often the most common cause of small dents in the base of the cylinder.

CAUTION:

Avoid dropping cylinders on hard surfaces as this may dent or distort the foot ring.

4.4.3 Transportation of Cylinders

Cylinders should be transported standing upright. Transporting cylinders on their sides should be avoided and could cause damage to their internal components. Cylinders should always be securely fastened during transportation.

4.4.4 Cleaning of Cylinders Externally

Cylinders may be washed using detergent and water. Remove tank covers prior to washing.

4.4.5 Protection of Connectors

Dust caps should be fitted over the male half of connectors to prevent the accumulation of dirt in the connectors. It is a good practice to depress the connector nipple on the female half of the connector before the cylinder is stored, in order to prevent liquid from becoming trapped between the valve and the connector seal.

It is a good practice to regularly lubricate the whole connector (both male and female halves) with silicone grease, in either the solid or spray form.

4.5 BURNERS

4.5.1 Storage and Handling of Burners

Although designed to withstand well in excess of typical inflation, flying and landing loads, the burners, as the sole power source for the balloon, are a critical, precision made component and should be treated with care. Burner life and reliability will be shortened significantly through harsh handling. Burners are especially vulnerable during transportation to and from launch and landing sites, especially when this involves crossing roadside curbs or rough terrain. Whenever possible, store the burner inside the basket using straps or carabiniers to secure it to the internal rope handles that will prevent the unit moving and damaging itself or other items in the basket.

Padded transportation bags are available as an option for some burner sizes.

CAUTION:

Traveling with the burner erected on the nylon rods is not advised. It will subject it to repeated jarring and can damage the burner, the burner frame, associated connectors to the burner, and the upper basket frame. If this is unavoidable, a thorough inspection of the burners, all connectors, toggle valve handles, burner-to-frame interface, frame-to-rod interface, and rod-to-basket interface is advised prior to the next flight.

When it is necessary to position the burner on the ground is advisable to place it with the tops of the coils downwards onto a non abrasive surface. Allowing sand, dirt and other foreign matter to enter the fuel line connections increases the risk of burner failure and therefore should be avoided at all times. Keep hoses ends clear of the ground and wherever possible use dust caps to cover the connections when disconnected from the fuel tanks or manifolds.

4.5.2 General Cleaning

Heat discoloration of the coils can be removed using products such as Blue Away and Semi-Chrome designed for cleaning of motorcycle exhaust systems.

SECTION 5
REPAIR AND MAINTENANCE

5.1 ENVELOPES

5.1.1 Envelope Construction Materials

This section describes the materials to be used. In case of doubt, please consult Lindstrand Technologies Ltd. It is important to ensure that any repairs performed on the envelope are achieved by using the material listed below.

CAUTION:

It is critical that all repairs maintain the integrity of the original design of the aircraft. Consequently, the same materials (fabric, thread, load tape) and sewing techniques used during manufacture must be used for repair and maintenance of the aircraft.

Envelope Construction Materials	Colour	Type	Dimensions
Rip Stop Nylon	Multiple Colours	High tenacity woven ripstop nylon with a soft polyurethane fluorocarbon elastomeric coating.	1.5 metre Roll width
Longlife Nylon	Multiple Colours	Taffeta weave heavy nylon base cloth with a silicone elastomeric coating	1.5 metre Roll width
Diamond Weave	Multiple Colours	High tenacity nylon fabric woven in a diamond pattern with a polyurethane coating.	1.5 metre Roll width
Ultra-Light Weight Rip Stop Nylon	Multiple Colours	Lightweight ripstop nylon base cloth with a silicone coating.	1.5 metre Roll width
Nomex	Mutiple Colours	Aramid polymer related to nylon , but has aromatic backbone making it more rigid and more durable. It has excellent thermal, chemical, and radiation resistance for a polymer material.	1.5 metre Roll width

Load Tape (light weight)	White or Black	Polyester or Nylon	20 mm wide
Load Tape (medium weight)	White or Black	Polyester or Nylon	20 mm wide
Load Tape (heavy weight)	White or Black	Polyester or Nylon	20 mm wide
Top Rim Load Tape	White or Black	Polyester or Nylon	25 mm wide
Bottom Rim Load Tape	White or Black	Polyester or Nylon	50 mm wide
Sewing Main Thread	White or Grey	Metric 30 three strand continuous filament polyester of bonded construction. Treated to provide extra resistance to ultra violet exposure.	900d, 450d x2, 300d x3 Denier
Sewing Bobbin Thread	White or Grey	Metric 30 three strand continuous filament polyester of twisted construction. Treated to provide extra resistance to ultra violet exposure.	900d, 450d x2, 300d x3 Denier
Nomex Sewing Thread	White or Grey	Filament thread that has one or more plies that are twisted to make a thread. Made by wrapping Nomex thread with cotton.	
Parachute Centralising Lines	White	Braided Kevlar	2.0 mm
Parachute Pull Down Lines	White	Braided Polyester	2.7 mm
Parachute and FDS Venting Line	White and Red (Candy)	Kevlar core / polyester over braiding	8.0 mm
FDS Combination Lines	White	Kevlar core / polyester over braiding	2.3 mm

Rotation Vent Lines (main)	Green or Black	Kevlar core / polyester over braiding	3.5 mm
Rotation Vent Line (base)	Green or Black	Kevlar core / polyester over braiding	6.0 mm
Centre Pull FDS Line	Red	Kevlar core / polyester over braiding	8.0 mm

5.1.2 Envelope Suspension Cables

Envelope cables are made from stainless steel. For the correct specification for your balloon system please contact Lindstrand Technologies Ltd.

Replacement wires must meet the Lindstrand Technologies specification. It is important that the correct ferrule is used in the swaging process. All ferrules must be copper. It is recommended that any damaged stainless steel cables should be replaced only with pre-assembled cables acquired from Lindstrand Technologies.

5.1.3 Fibre Joint Fabric (Velcro)

The fibre joint fabric used structurally is the 50 mm (2") wide standard strength version. This is used on parachute retaining patches. 25 mm (1") soft pile is used for attaching banners to the envelope.

5.2 ENVELOPE REPAIRS

5.2.1 Sewing Machines

Sewing machines should be of a twin needle variety and for advice and detailed specification on the type of sewing machine and stitching required to repair a Lindstrand Technologies hot air balloon envelope, please contact Lindstrand Technologies.

5.2.2 Fabric Repairs

There are various types of fabric repairs for hot air balloon envelopes, the exact type of repair is often depended on the size of damage or the position of the damage on the envelope. Appendix B provides a quick reference guide for location of damage on the balloon. It is advisable if damage is noted that it is clearly marked on the chart in Appendix B and that the balloon is packed in such a way that damage can be easily found when repairing. This will save considerable time when locating the damage for repair.

5.2.3 Sticky-Backed, Contact Cement or Silicone Patches

Holes or tears of a diameter less than 75 mm can be repaired using sticky-backed fabric, a contact cement patch (Standard Fabric) or a silicone patch (Longlife Fabric).

The patch must include a 25 mm overlap around all sides of the damaged portion of fabric. The recommended method is to place one patch inside the envelope covering the damaged portion and a second patch on the outside of the envelope so that it covers the first patch precisely.

Note that this repair method may not be employed if the damaged section of fabric extends to within 25 mm of any load tape or seam.

a) **Contact Cement Patch (Standard Fabric)**

A contact cement patch should be cut from matching balloon fabric and may be applied on the inside or the outside of the envelope making an effort to align the ripstop fabric pattern. The cement product should be applied to both the patch and the envelope per the adhesive manufacturer's instructions. The same 25 mm overlap beyond the damaged area as specified above applies. Any flexible contact cement intended for use on nylon fabric may be used.

b) **Silicone Patch (Longlife Fabric)**

Adhesive patches for silicone coated fabric should also be cut from matching fabric and applied on the inside or outside of the envelope. Any clear non-hardening silicone based adhesive may be used following the adhesive manufacturer's instructions. Unlike contact cement patches, silicone adhesive patches need to be compressed by weight until fully cured. Depending on the adhesive brand curing could require several hours.

5.2.4 Stitched Patch

A hole or damage in a panel of any size can be repaired using a single stitched patch, providing that the damage is not present on two adjoining panels and does not cross a seam.

The fabric patch must be of the same type of fabric as the panel which is being repaired.

Appropriate thread as detailed in 5.1.1 must be used. The use of non-approved thread and fabrics are not allowed.

5.2.5 Panel Replacement

Often for large areas of damage and for overall aesthetic appearance, it is often advisable to replace an entire panel.

For complete panel replacements the seams of the damaged panel should be unpicked with care taken when unpicking any vertical or horizontal tapes.

The damaged panel can be used as a template for the replacement panel, or alternatively pre-cut replacement panels are available from Lindstrand Technologies.

The new panel should be stitched in using a French fell seam. Any tapes should be sewn back on and a careful inspection of the repaired area.

The repaired area can be held up to a bright light source to ensure that the seams are correct. Any errors, the panel should be unpicked and restitched.

CAUTION:

Never trim a factory replacement panel or cut the load tapes to make the fabric edges and load tapes fit together.

5.2.6 Modified French Fell Seam

A modified French fell seam is allowed for the perimeter of partial and full panel replacement. The damaged panel may be cut away as close as possible to the original folded seam. The replacement panel is folded as it would be in a true French fell, but the panels do not actually interlock.

The replacement panel will overlay the original panels which surround it and no raw fabric edge may be exposed. The stitching thread must comply with Section 5.1.1 and must penetrate two layers of the replacement panel as it would in a true French fell seam. This repair method may introduce only two additional layers at the seam area. For a subsequent replacement of the same panel, the fabric must be removed back to the original layers.

5.2.7 Load Tape Repairs

There must be no damage to load tapes.

If load tape is damaged it should be repaired by splicing a new section of load tape to replace the damaged section. The load tapes should be unpicked to approximately 300 mm beyond each end of the damaged section. A new section totally 500 mm longer than the damaged section should then be stitched with a 250 mm overlap of each of the damaged end. The load tape should be spliced before reattached to the envelope. For diagram see Figure 3, Appendix C.

5.2.8 Overlying Tape Repairs

Tapes overlying the parachute can be replaced as follows:

The damaged tape can be cut at the point where it joins the top rim tape. The tape should be carefully unpicked and removed from the locating tape. The damaged tape should be measured and a new section of tape measured. There should be a 250 mm longer than the damaged tape to allow for the splicing of the load tapes as in 5.2.7.

As an additional guide, all tapes from the top rim to the crown ring are of equal length, so measurement of adjacent tapes will provide further indication of correct tape length.

For diagram see Figure 4, Appendix C.

5.2.9 Envelope Cable Attachment Loops

Replacement envelope cables can be attached as follows:

- a. Unpick and remove the Nomex pocket over the affected tape.
- b. If there is any damage to the tape itself, then this must be unpicked 250 mm (10") beyond the damaged area.
- c. Cut a new length of correct tape 250 mm (10") longer than the length removed.
- d. Stitch the new section of tape onto the existing tape, as shown in Section 5.1.2.3.
- e. Pass the new tape through the Nomex pocket.
- f. Turn the tape inside the envelope and stitch through both layers of tape and the sandwiched fabric with the stitch patterns.

For diagram see Figure 5, Appendix C.

5.2.10 Envelope Cables (Stainless)

Stainless steel cables that are slightly discoloured due to overheating are safe provided they have not become too flexible. Localised excessive flexibility in a flying wire indicates a weakening due to loss of strength and wire temper. Wires affected in this way should be replaced. Wires that are badly kinked or frayed should be replaced. If the wire doesn't spring back, it must be replaced. If only one strand of an envelope cable has broken, the broken section can be covered with heat resistant tape to prevent the ends of the wire causing damage to other parts of the balloon.

Contact Lindstrand Technologies for further advice with regards to envelope suspension cables.

5.2.11 Parachute Centralising Lines

Before removing any damaged cords, measure the length of the relevant cord, or if it is broken, measure the length of the cord adjacent to it. Mark each end of the cord with five marks spaced 50 mm apart. The marks are used as a reference when re-tying lines.

Cut the Kevlar cords and tie an overhand knot at the end to prevent fraying. When refitting the cords, note which mark is aligned with the loop on the parachute and on the envelope. Hold the correct mark in place and secure the line by tying an overhand loop knot as shown in Figure 6, in Appendix C. Once complete, check the parachute positioning by pulling the vertical tape very tight between the parachute opening and the centralising line attachment point. While the vertical tape is held tightly, pull the parachute toward the crown ring until all slack is out of the centralising line. Do not stretch the line. There should be 25 cm of overlap of parachute inside the envelope. The envelope should be test inflated and position of parachute checked for correct fitting and operation.

5.2.12 Parachute Pull Down Lines

Parachute pull down lines rarely require repair, however if required remove the damaged line from the edge of the parachute. Each length of cord runs from a loop on the edge of the parachute down to the pulley and then back up to the adjacent loop on the parachute edge. Once the line has been removed, the overall length of the line should be measured. A replacement length of polyester cord (see Section 5.1.1) should be cut. The replacement line should be folded into two equal lengths and tied in a loop at the mid point. Re-tie the resulting ends of the pull down lines to the loops on the edge of the parachute and re-attach the loop to the quick link. The quick link screw gate should be fastened tightly and secured using loctite glue.

5.2.13 Parachute, FDS Deflation Line

For damage near the basket end, an additional loop of line is provided at the termination side in the envelope. This loop can be let out to compensate for damage in approximately the lower 1-2 metre of line. If the parachute or FDS deflation line becomes excessively frayed or burnt, then it should be replaced.

5.3 BASKETS

Baskets are a robust design, incorporating many natural materials. Therefore, basket repairs are relatively simple and materials readily available in most areas of the world.

5.3.1 Basket Wires

If the wires are badly kinked or more than ten strands of a basket wire are broken, then a new section of wire must be spliced into the structure.

Contact Lindstrand Technologies for further advice.

5.3.5 Basket Floor

All Lindstrand Technologies baskets have a plywood floor. If the floor has cracked through both sides of the floor, then it either must be patched or replaced totally. To patch the floor, remove any protective varnish from the damaged area by sanding prior to bonding the patch in place. Cut a piece of similar thickness plywood which covers the cracked area and bond it over the crack from the underside, using wood glue. Small tacks can be used to hold the patch in place while the glue is drying.

Wooden runners are bonded to basket floors for greater damage resistance. If a runner is damaged to the extent where it is no longer providing strength, then another runner may be placed alongside and attached to the floor in a similar manner as the original.

If the damage to the floor is unrepairable by patching method described above, then the entire floor can be replaced. Replacement of the floor is achieved by the following procedure:

1. Remove all rawhide or bottom scuff leather from the basket cables across the underside of the floor.

2. The basket cables should be pulled through the floor allowing 100 mm of slack in each wire.
3. The cord that holds the base/floor to the bottom frame should be unlaced.
4. Slots should be cut in both the plywood floor and the runners to remove the wires, runners can also be removed.
5. The old floor can now be removed by sliding out the floor from under the wires.
6. The new floor can now be slid into place and laced to the lower frame.
7. The frame should now be laced onto the lower frame and the hide and runners installed. It is advisable to soak hide for up to 24 hours in water, to allow the hide to become soft and supple. This will ease the installation. After the hide has been installed the hide should be allowed to dry causing it to harden.

Note: Replacement floors are available from Lindstrand Technologies. Alternatively the old floor can be used as a pattern. Holes will need to be cut similar to the removed floor to allow access for the wires. Care should be taken to ensure the same thickness and material type is used for both the new floor and the replacement runners. For further information contact Lindstrand Technologies.

5.3.6 Wicker Repairs

Baskets have tremendous give and flexibility and over time distortion can occur. This does not affect the airworthiness of the basket. Typical problems can be storage of the envelope in the basket over extended periods of time ie shipping.

Distortion can be rectified by soaking the wicker in water for two days and then placing a weight on the distorted area. The wicker should be allowed to dry for another two days with the weight.

Sometimes wickerwork will crack or break leaving sharp ends or edges which could cause injury. Inspect the interior and exterior of the basket for any damage to the wicker. If more than four vertical strands of wicker out of twelve consecutive vertical strands are broken, they must be repaired. If more than twelve horizontal strands in a 600 mm by 600 mm area are broken, they must be repaired. If a hole in the wicker exists larger than 100 mm at the widest dimension, it must be repaired.

For advice on damage and repair of basket wicker work contact Lindstrand Technologies.

5.4 FUEL SYSTEMS

For detailed cylinder maintenance guidance please see relevant cylinder manufacturer's Maintenance Manual. For Lindstrand Balloons USA fuel cylinders maintenance guidance see Lindstrand Balloons USA Manual for Continued Airworthiness, Section 5.3.

5.5 BURNERS

The Vortech burner has been designed for ease of operation and for ease of maintenance. Most components are complete units so that burners can be returned to service in a short period of time, while the problem component can be maintained in a work shop environment.

When any work is performed on the burners, it is very important to ensure that a high standard of cleanliness is achieved. Components should be cleaned and dried with soft lint-free cloth, or left to dry naturally.

Once any type of service work has been performed on the burner, a functional test must be conducted to ensure there are no fuel leaks within the burner.

Each burner function is tested to ensure correct operation. A soap solution or commercial leak detector may be applied to all threaded connections to detect very small leaks.

All hoses and manifold, must be replaced after ten years in service.

For detailed service instructions contact Lindstrand Technologies Ltd.

SECTION 6 **BALLOON INSPECTION**

6.1 100 HOUR / ANNUAL INSPECTION

This inspection is to be carried out annually or after a 100 hours of flight whichever is sooner.

For balloons used in commercial operations, it is quite likely that 100 hours of operation or more will be achieved within a twelve month period.

There is no difference in the parts inspected during an annual or a 100 hour inspection. Completion of an annual or 100 hour inspection must be completed by an appropriately rated person.

6.1.1 Applicability

The Maintenance Schedule applies to all Lindstrand Technologies balloons certificated in any category.

6.1.2 Qualification

Inspection must be carried out by a properly certified and rated inspector under National Authority of the country of registration.

6.1.3 Documentation

The aircraft log book must be present for all annual inspections. All maintenance, preventative maintenance and any alterations must be properly recorded in the aircraft log book. The entries identifying components of the balloon should be checked and verified to ensure agreement with the components actually installed in the balloon presented for inspection.

On successful completion of the inspection, the return to service must be documented with the following or similar entry: "I have inspected this aircraft using procedures approved by the manufacturer for the completion of a (Annual / 100 hour) inspection and find the aircraft is in an airworthy condition. This aircraft is approved for return to service in accordance with a (Annual / 100 hour) inspection". The entry must include the aircraft total time, the date of the inspection, the maximum temperature indicated on the temperature label, any airworthiness directives that have been complied with during the inspection and any repairs, installations or replacements made, along with the name and qualification of the person making the entry, as well as the work order number which provides traceability to the pertinent inspection documents on file.

If the aircraft is found to be in an unairworthy condition, the inspector must make note of the discrepancies in the aircraft log book and make a statement in the log book of the unairworthy conditions.

6.1.4 Envelope

It is recommended that inspection of the envelope be achieved by a gore-by-gore fabric inspection. Inspect the following:

- a) The temperature link (temp flag) will be installed in the balloon crown area. Temperature labels must not be removed by operators.
- b) Check the temperature label for overheating. If the temperature label indicates 127°C or higher, then a new label should be fitted and the maximum temperature reached noted in the log book. A full grab test should be carried out.
- c) Check the fabric for holes or tears. Small holes in the Nomex are acceptable, but any damage above this level must be repaired in the approved manner.
- d) If excessive porosity is suspected, check the fabric for porosity by trying to blow through it. If the porosity of the fabric is high, a flight test should be considered to assess level of porosity.
- e) The fabric at the edge of the parachute should be checked for heat damage. If the fabric is weak or obviously discolored, this can indicate that the parachute is not sealing correctly. The parachute should be repaired / replaced and inspected to ensure that the parachute is correctly adjusted.
- f) Check all load tapes for security of stitching, especially around the crown ring and where the overlying tapes join the top rim tape.
- g) Check the load tape loops that connect the envelope cables to the envelope. There should be no burn damage or fraying of the load tape.

6.1.5 Parachute

- a) Check the parachute deflation line for fraying. If the Kevlar core is visible through the outer coating, this may necessitate complete replacement of the line. Check that the termination knot is secure.
- b) Check that the parachute pulley is running freely and that there is no wear. Check that there are no threads wrapped around the pulley.
- c) Check that the retaining and pulldown cords are in good condition. Stiffness of the cords indicates overheating.
- d) Check the knots and loop stitching to the envelope and parachute.
- e) If there is any doubt about the sealing of the parachute, it should be checked by conducting a hot inflation. The overlap should be equal around the circumference and there should be no daylight visible. There should be no excessive tension in any of the retaining lines or radial stress wrinkles at the parachute edge.

6.1.6 FDS

- a) Check the parachute (Candy Stripe) and FDS (Red) deflation lines for fraying. If the Kevlar core is visible through the outer coating, this may necessitate complete line replacement. Check that the termination knot is secure.
- b) Check that the parachute and FDS deflation line pulleys are running freely and that there is no wear. Check that there are no threads or debris wrapped around the pulleys.
- c) Check that the combination centering / pull down cords are in good condition. Discolouration of the cords indicates overheating.
- d) Check the combination centering / pull down cord rings or pulleys at the edge for wear. Check for abrasion at attachment loop.
- e) Check the knots and loop stitching to the envelope and parachute.
- f) If there is any doubt about the sealing of the parachute, it should be checked by conducting a hot inflation. The overlap should be equal around the circumference and there should be no daylight visible. There should not be excessive tension in any of the retaining lines or radial stress wrinkles at the parachute edge.

6.2 LOAD BEARING ATTACHMENTS

6.2.1 Envelope Cables

All envelope cables on Lindstrand Technologies balloons are manufactured from stainless steel. Replacement with galvanised mild steel is not acceptable.

For stainless steel envelope cables, check that there are no broken wires or severe kinks. Slight discolouration due to burning is permissible provided that the flexibility is not reduced. Excessive localised flexibility should not be present as this indicates severe overheating. Cable must spring back to original shape after bending.

Check the thimbles and ferrules for distortion. Check that the quick link is tight and in good condition.

6.2.2 Carabiners

Carabiners should be free of distortion and the screw gate should operate freely.

6.2.3 Basket Wires

These should be checked for damage and that the thimble and ferrule are intact. A slight distortion of the thimble is not critical provided that the wire is not frayed beyond the specified limits.

6.2.4 Load Frame

Check for distortion of the load frame and all the welds.

Check the security of the burner attachment to the inner frame and the inner frame into the outer. The pivot of the burner should be slightly stiff but not to the extent that movement is prevented.

On a centre gimbal burner, check tightness of centre block bolts and tension adjusting bolts.

Ensure that the nylon rods are free from fractures and the steel stubs on basket and burner frame are intact.

6.3 BURNER

Inspect all fuel connectors, pressure gauge, pilot, main and liquid controls.

Check condition of fuel hoses, including any manifolds that are fitted and perform functional burner test.

Check the age of fuel hoses, fuel hoses must be replaced after ten years of service.

WARNING!

Only approved Lindstrand Technologies fuel hoses may be used! Installation of any other hoses or manifolds is dangerous and is specifically not approved. If unapproved hoses are found connected to the aircraft fuel system, they must be replaced with approved parts.

6.4 FUEL CYLINDERS

Check for external damage to the pressure vessel. Damage to the protective top and bottom rings is not critical, provided there is no damage to cylinder body at points where these rings are attached.

Check the operation of the contents gauge.

Check that when no hoses are connected, the self-sealing function of the liquid connectors is leak-tight by opening the valve. After testing, release the pressure. Check cylinder manufacturer's maintenance guidance for any further checks regarding internal inspections and timed intervals.

6.5 BASKETS

Inspect the interior and exterior of the basket for any damage to the wicker. If more than four vertical strands of wicker out of twelve consecutive vertical strands are broken they must be repaired. If more than twelve horizontal strands in a 600 mm by 600 mm area are broken they must be repaired. If a hole in the wicker exists larger than 100 mm at the widest dimension, it must be repaired.

Check the condition of the plywood floor, cracks through both sides of the floor are not permitted.

Damage to the runners is not critical provided that they are not broken in two.

Check the condition of the rawhide and scuff leather. This is a protective layer so not critical to structural strength, but if it is damaged, should be repaired at earliest convenience.

6.6 FABRIC STRENGTH TEST

If the total number of operation hours on the balloon envelope is greater than 250, or the envelope is suspected of having overheated, fabric tests must be performed:

One test warp and one test weft in each colour to 9 kg at the parachute cap edge.

One test warp and one test weft in each colour to 14 kg at the top panel of the balloon.

One test warp and one test weft in each colour to 14 kg at the panel behind each turning vent outer flap.

One test warp and one test weft to 14 kg in balloons built with Longlife fabric, in the first Ripstop panel below the Longlife.

Further fabric tests in different areas of the balloon are at the discretion of the Inspector.

6.7 INSPECTION AFTER OVERHEATING

If the maximum temperature indicated on the temperature label is less than 127°C, then no further action is required. If the indicated temperature of the temperature tags is 127°C or greater, a fabric inspection is required. Pay particular attention to the edges of the parachute fabric and the parachute retaining lines. Excessive heat on fabric tends to cause cracking, due to stiffness.

Discoloration is also another sign of overheating. If any signs are visible, then a fabric strength test should be conducted at various positions, both on the top panels and the parachute panels, as described in Section 6.6.

If no signs of overheating are visible and the fabric strength test indicates sufficient fabric strength, record the maximum temperature reached in the log book and install a new tempil label per 6.1.4 (b) and the inspection checklist.

6.8 INSPECTION AFTER HARD LANDING

Should a hard landing be experienced where damage to the balloon is suspected, an inspection in accordance with the annual inspection guidelines in Section 6 of this manual should be carried out. Any damage found that would prevent the balloon from passing a 100 hour / Annual inspection must be reported to Lindstrand Technologies to determine the appropriate action. The balloon must not be flown until it is capable of passing the 100 hour / Annual inspection.

APPENDIX A

ANNUAL / 100 HOUR AIRWORTHINESS INSPECTION CHECKLIST FOR LTL HOT AIR BALLOONS

REG NO.:
MODEL:
ENVELOPE SERIAL NO.:
TOTAL ENVELOPE TIME:
OWNER:
DATE STARTED:
WORK ORDER NO.:

BASKET

PART NO.:	
SERIAL NO.:	
TOTAL TIME (if different from envelope):	

BURNER

PART NO.:	
SERIAL NO.:	
TOTAL TIME (if different from envelope):	

FUEL CYLINDERS:

1

PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

2

PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

3

PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

4

PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

5
PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

6
PART NO.:
SERIAL NO.:
TOTAL TIME (if different from envelope):

PASS/FAIL

DOCUMENTS AND REQUIRED EQUIPMENT		
Log Book	Record (Temperature) label reading in log book	
	Components match aircraft log book	
	All repairs/alterations correctly entered	
	Airworthiness Directives (A/D's) complied with	
Flight Manual	Present and correct for this model	
Certificate of Airworthiness	Present	
Registration Certificate	Present and current	
Strikers	Present and functional	
Fire Extinguisher	Present and in good condition	
	Maintained in accordance with manufacturer	
ENVELOPE		
ID Plate	Present, numbers match log book	
Fabric Strength (if required, see Section 6.6)	Envelope areas	
	Parachute areas(outer edge of parachute overlap) 9 kg, 25 mm grab test over 75 mm span (1 test, warp and weft in each colour)	
	14 kg, 25 mm grab test over 75 mm span (1 test, warp and weft in each colour) in the top panel of the balloon	
	In balloons built with Longlife fabric, the first panel below the Longlife 14 kg, 25 mm grab test over 75 mm span (1 test, warp and weft in each colour)	

	Turning Vent areas: panel behind the outer flap, in each colour. 14 kg, 25 mm grab test over 75 mm span (1 test, warp and weft in each vent in each colour)	
Recording (Temp.) Label	Latest installed. Reading:	
	If previous indicated temp is 127°C or above, install a new dated label, record temp indicated in aircraft log book.	
Fabric & Load Tape Integrity	Gore-by-gore inspection completed, discrepancies recorded	
	No un-repaired fabric damage	
	No damage to vertical load tapes, and all stitching secure	
	No damage to load tape / envelope cable connection	
Carabiners	Free of distortion	
	No corrosion or rust	
	Locking gates operate freely	
Scoop	Envelope attachments secure and undamaged	
	Lower attachments secure and undamaged	
Envelope cables	No visible heat damage, no reduction of flexibility	
	No abrasion, damage or kinks	
	No more than one broken wire strand	
	No distortion of thimbles or ferrules	
	Cable attachment covers undamaged	
	Cable to envelope attachment links in good condition and tight	
Parachute Deflation (Red and White Stripe) Line	Length correct (must allow envelope to streamer without opening valve)	
	No melt damage (core not visible, line flexible)	
	No abrasion damage (core not visible)	

	Lower termination point secure and intact -pulley attachment on double gear	
	Lower pulley / pulleys undamaged, functional, attachment secure	
FDS Activation Line (Solid Red)	Length correct (must allow envelope to streamer without opening valve)	
	No melt or abrasion damage	
	Lower pulley(s) undamaged, functional and secure	
Turning Vent Rigging (Black Line)	No abrasion or melt damage	
	Condition good	
	Pulley in good, functional condition	
Turning Vent Rigging (Green Line)	No abrasion or melt damage	
	Condition good	
	Pulley in good, functional condition	
Vent Flag Lines and Stainless Ring or Pulley	No twisting or knotting	
	No abrasion damage or fraying	
	All knots in good condition	
Crown Line	Length correct	
	No abrasion damage	
	Attachment clip present and in good condition	
Crown Ring	No abrasion damage or burrs	
Free Load Tapes	No abrasion damage	
	Stitching secure and in good condition	
STANDARD PARACHUTE		
Fabric Integrity	All fabric in good condition	
	No unrepaired damage	

Parachute Centering Lines	Each line must be checked for correct length, no abrasions, all knots secure	
Shroud Lines and Upper Pulley	Shroud lines in good condition, knots secure	
	Upper pulley in good condition, free running	
	Pulley lubricated with silicone spray	
Velcro Tabs	Clean and free of debris	
	Holding force good	
	Stitching intact	
Parachute Fit	Overlap equal around circumference	
	No daylight visible	
	No excessive tension in centering lines	
	No excessive stress wrinkles at parachute edge	
	Visible seal between parachute fabric and hole edge	
FAST DEFLATION SYSTEM		
Pulleys or Rings at Parachute Edge	Pulley undamaged, sheave spins freely	
	Inspect rings for wear	
	No abrasion on attachment loop	
	Verify presence and condition of line stoppers when pulleys are at end of kevlar centering lines	
Pulleys or Rings at Side of Envelope	Pulleys undamaged, sheave spins freely	
	Inspect rings for wear	
	Check condition of attachment loop	
Internal Load Tapes Cross on Centre Patch	Check stitching is secure	
	Check attachment of FDS solid red line or bridle lines	

	Check condition of pulley (if installed in larger balloons)	
Combination Centering Pull-Down Lines	Check general condition , no abrasion, heat damage or excessive dirt	
	Check knot at parachute edge	
	Check attachment to quicklink at red (or red/white) line pulley (secure, no abrasion)	
BURNER		
Outer Frame	General condition	
	Corner sockets and cable plates in good condition	
	Condition of corner welds	
Centre Gimbal Frame	General condition	
	All bolts secure and in good condition	
	Check gimbal tension in both directions	
Carabiners	Free of distortion	
	No corrosion or rust	
	Locking gates operate freely	
Coil Assembly	Coils straight, all welds secure	
	Coil support brackets straight and secure (no missing stainless rivets)	
	Check main jets for blockage and tightness	
	Slurper tubes secure and positioned over the low point of the block.	
Pilot Light	Pilot light cup secure (check set screw) and aligned with piezo ignitor	
	Pilot jet free of obstruction (check fuel flow, sound and flame appearance)	
Pilot Light Regulator	Regulator valve handle turns freely	
Piezo Ignitor	Piezo ignitor electrode in good condition	
	Piezo ignitor actuator button in good condition	

	Piezo ignitor actuator set screw secure	
	Check for strong spark to pilot light cup	
	Inspect damage to ceramic tube	
	Bezel ring around ignitor tight	
Main and Liquid Fire Valves	Check for smooth operation and no leaks	
Pressure Gauge	Functions correctly	
	Needle zeros	
	Bezel ring tight	
Fuel Lines	Replace fuel hoses after ten years in service	
	No cuts or abrasions	
	No bulging or swelling	
Rego Hose Connector	Good overall condition, no dents or corrosion	
	Threads in good condition	
	Mates to tanks and/or manifolds	
	Functional test for ease of connection and leaks	
	Check valve for self seal function	
	Lubricated with silicone grease / spray	
Tema Hose Connector	Good overall condition, no dents or corrosion	
	Inner and outer "O" rings in good condition (replace if damaged) All bearings free and lubricated	
	Locking ring functional	
	Functional test for ease of connection and leaks	
	Check valve for self seal function	
	Lubricated with silicone spray	
Functional Test	Burner tested, each valve with each tank (minimum 4 activations)	

	Pilot light / piezo ignitor tested, with each tank (minimum 3 activations)	
BASKET		
ID Plate	Present, numbers match log book	
Cushion Floor	Removed for basket inspection	
	In good condition	
Outside Runners	In good condition and bolts tight	
	Nylon runner protectors intact and secure	
Cables Across Bottom	Leather / rawhide protective covering in good condition	
	No evidence of corrosion or abrasion of cables	
Plywood Floor	In good condition (only surface cracking permitted)	
	Attachment to stainless frame secure	
	Check integrity of plywood at skid bolts	
Rawhide or Bottom Scuff Leather	Check general condition and lacing secure	
Cables and Covering	Cables undamaged	
	Thimbles in good condition	
	Vinyl tubing sleeves in good condition	
	Heat shrink at swaged area intact	
Stainless Steel Top and / or Bottom Frame	Shape correct (not bent)	
Top Bolster, Padding and Leather / Suede	Leather or suede, general condition and lacing secure	
	Foam padding general condition, upright socket covers, general condition and lacing secure	
Wicker	No holes in excess of 100 mm at the widest dimension	
	No more than 4 broken vertical strands out of 12 Consecutive vertical strands	

	No more than 12 broken horizontal strands in a 600 mm by 600 mm area					
	No excessive breakage of wicker at belt or step holes					
Flexi Poles	Intact					
Cylinder Straps	All present and in good condition					
	Clasps fully functional					
Rope Handles	Check for excessive wear					
Manifolds (Rego) or Tema Hose Connector (if fitted)	Replace fuel hoses after ten years in service					
	Correctly installed, no overly sharp bends in hoses					
	No conflict with other equipment					
	Fuel lines in good condition. No cuts or abrasions. No bulging or swelling					
	Hose end fittings in good overall condition, no dents or corrosion					
	O-Rings and square rings in good condition. (replace if necessary)					
	(Tema) inner and outer "O" rings in good condition (replace if damaged)					
	(Tema) ball bearings free and lubricated					
	(Tema) locking ring functional					
	Mates to tanks and burner fuel line					
	Functional test for ease of connection and leaks					
	Check valve for self seal function					
	Lubricate with silicone spray					
FUEL CYLINDERS						
	1	2	3	4	5	6
Serial No.						
Check valve handle for tightness						

O-Rings on Rego style valve Checked for damage						
Test Rego / Tema fittings for self seal						
Test QSO valve with burner connected to assure function						
Protective caps present and in good condition						
Pressure relief valve clean and covered						
15% valve operation checked						
Tightness of (4) fuel quantity gauge screws checked						
Tank body free of dents or gouges						
Tank welds in good condition						
Tank covers in good condition						
PRV and Internal inspection within date.						
Cylinder manufactures maintenance manual checked for any further checks required.						

INSPECTION DAMAGE LOG

DAMAGE	AREA OR COMPONENT	RECOMMENDATION	SIGNED

APPENDIX B

DAMAGE / REPAIR INSPECTION CHART FOR SERIES 1, 24 GORE ENVELOPE RANGE

Panel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Init/Date		
PARA																											
Panel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
V																											
U																											
T																											
S																											
R																											
Q																											
P																											
O																											
N																											
M																											
L																											
K																											
J																											
I																											
H																											
G																											
F																											
E																											
D																											
C																											
B																											
A																											
Model No.:												Serial No.:								Registration No.:							

APPENDIX B

LOWEST NYLON PANEL DESIGNATION

70	P	120	S
80	Q	150	T
105	R	180	V

APPENDIX C

FIGURES AND DIAGRAMS

Figure 1 - Series 1, 24 Gore Envelope

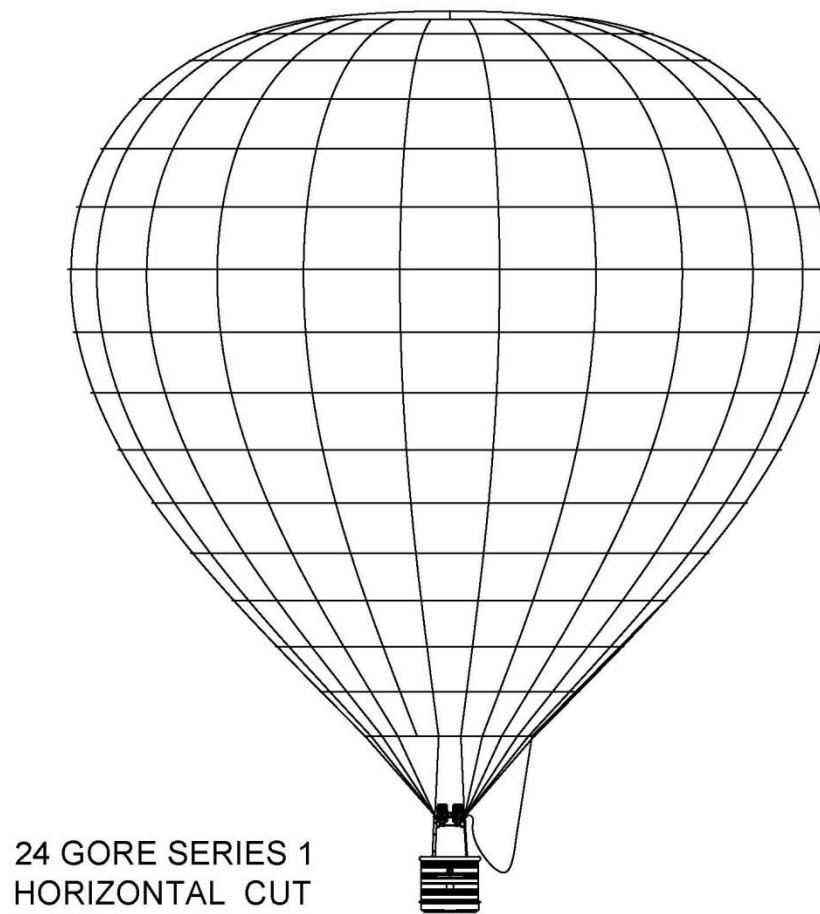


Figure 2 - Overview of Vortech Double Burner

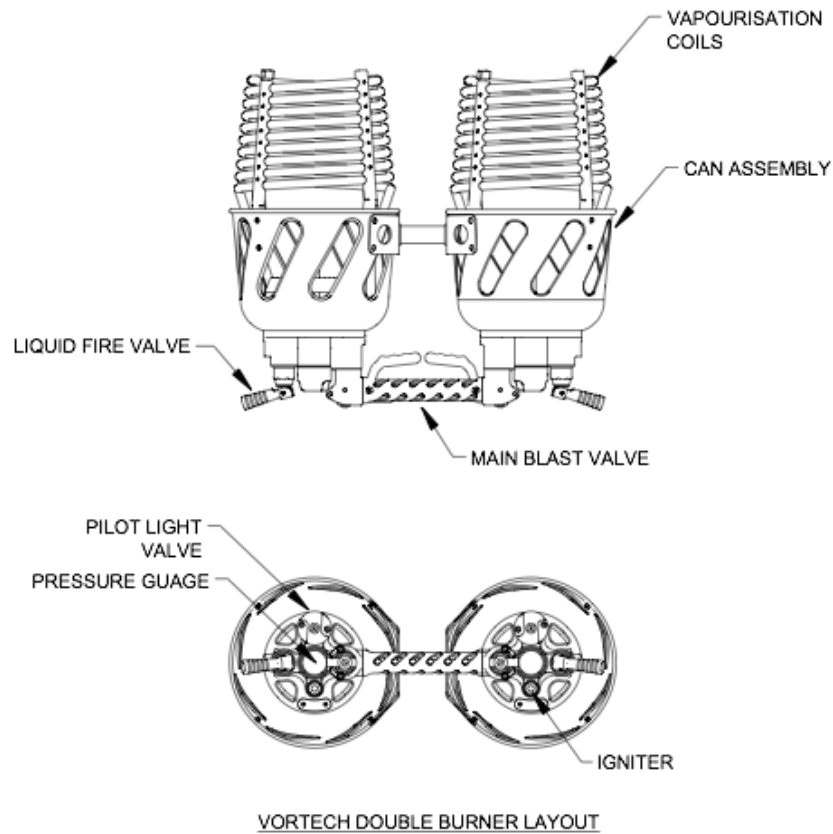


Figure 3 - Load Tape Repairs

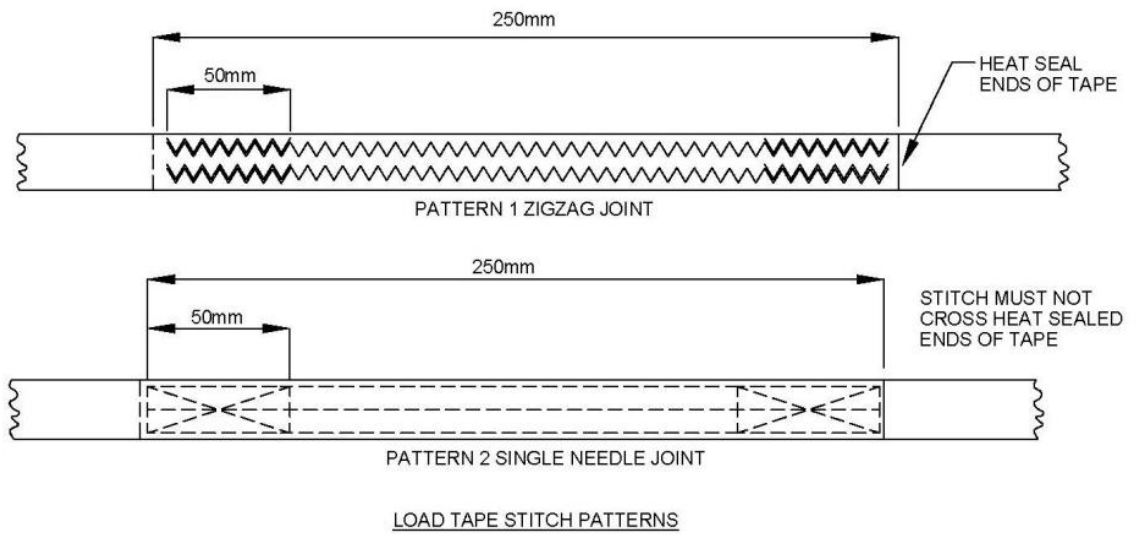


Figure 4 - Overlying Tape Repairs

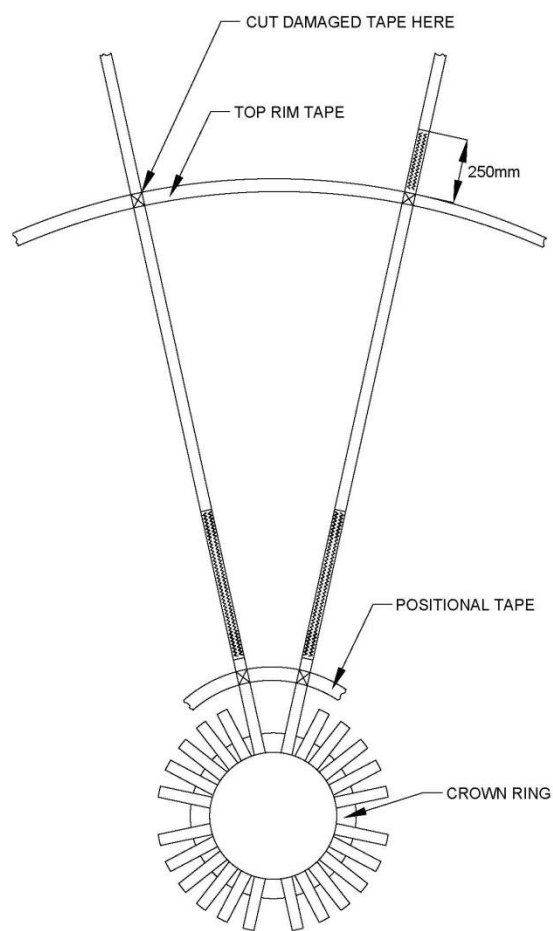


Figure 5 - Envelope Cable Loop Repairs

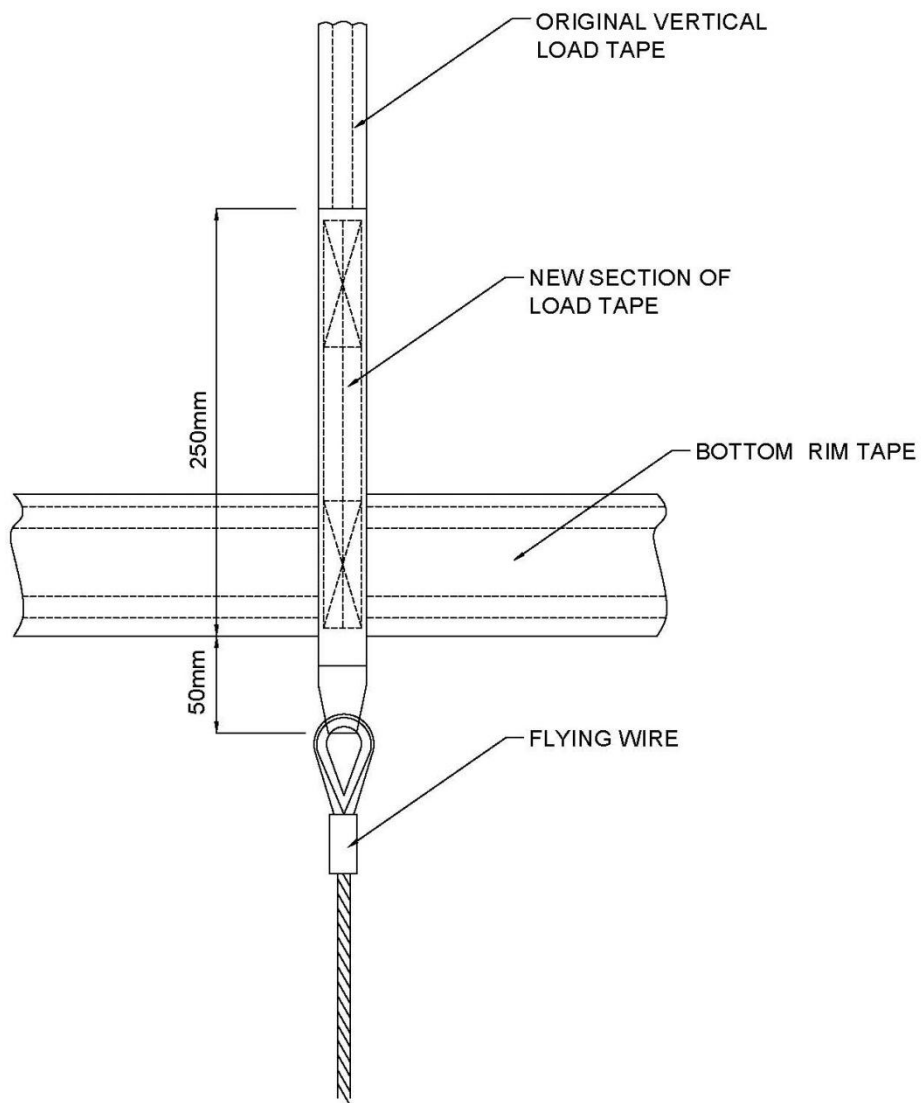


Figure 6 - Overhand Loop Knot

