AEROSTAR CONTINUED AIRWORTHINESS INSTRUCTIONS

FOR

AEROSTAR (RAVEN) HOT AIR BALLOONS

ACAI
PART II

Type Certificate No. A15CE

Date: December 23, 1981

Reissued: November 15, 1999

Revision E: February 04, 2013

AEROSTAR INTERNATIONAL, INC.
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Note

February 1, 1986, Raven Industries subdivided the Hot Air Balloon manufacturing of the Applied Technology Division. Aerostar International, Inc. was formed at that time and performed all hot air balloon manufacturing until 2008. In 2008 Aerostar International, Inc. discontinued the manufacturing of hot air balloon systems, but continued to supply replacement parts for balloons manufactured under FAA Type Certificate A15CE.

As of January 01, 2013 Aerostar International, Inc. no longer provides replacement parts for the hot air balloons previously manufactured under **Type Certificate (TC) A15CE**. Replacement parts are available from various suppliers holding FAA Production Certificates (PC's), Parts Manufacturer Approval (PMA) certificates or Supplemental Type Certificates (STC's).

This manual (Part II) provides the approved inspections including mandatory annual and/or 100 hour inspections as well as procedures for preventative maintenance, maintenance, and repair for Aerostar and Raven Hot Air Balloon Systems.

In accordance with FAR 43.13a, and as specified in the "Maintenance and Inspection" section of Aerostar (Raven) Type Certificate Data Sheet TC **A15CE**, paragraph F, it is required that all persons performing maintenance, alteration, inspection, or preventive maintenance use the most current instructions from Aerostar for the performance of those actions. Regardless of the utilization of Aerostar or Raven Hot Air Balloon systems it is mandatory that the aircraft receive an annual inspection and a 100-hour inspection if it has not had an annual inspection during the most current 100 hours of operation. Both owner and repairman should have full understanding of proper repair and test procedures approved by Aerostar. This manual was issued initially on December 23, 1981, re-issued on November 15, 1999, and revised as detailed in the revision log. This current revision replaces all previous ACAI manuals issued by AEROSTAR INTL., INC.

When an Aerostar envelope is mated with a Balloon Works, Cameron or Thunder/Colt basket-burner-fuel system under one of the applicable STC's held by Aerostar, the various components must be serviced, maintained and inspected in accordance with EACH manufacturer's most current instructions for continued airworthiness, as appropriate. This includes preventative maintenance, airworthiness limitations, maintenance, alterations, inspections, and repairs.

WARNING

Improper inspection, test methods and repair methods will cause the balloon to become unairworthy. The person performing the inspection, tests and repairs is then responsible in the event of any investigation. Make sure all inspections, tests and repairs are done properly.

CAUTION

IN FAR 91.403, THE FAA HAS PLACED THE BURDEN OF RESPONSIBILITY "FOR MAINTAINING THAT AIRCRAFT IN AN AIRWORTHY CONDITION" ON THE OWNER/OPERATOR. IT IS THAT INDIVIDUALS RESPONSIBILITY TO ENSURE THAT THE MAINTENANCE AND INSPECTION PERSONNEL EMPLOYED TO PERFORM NECESSARY UP KEEP ARE PROPERLY TRAINED AND EQUIPPED. IF YOU HAVE QUESTIONS AS TO THEIR QUALIFICATIONS, CONTACT YOUR NEAREST FAA OFFICE.

REVISION LOG				
Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Orig.	Reissue	All pages	Mark L. West, President	11/15/99
Revision A	NOTE re-worded	i	Mark L. West, President	02/15/01
	Revision Log, Revision A list	ii		
	Revision log (continued) page numbers changes	iii, iv, vi		
	Added 5.5.8 Ball Wireless Pyrometer	v		
	Added 6.5.8 Ball Wireless Pyrometer	vii		
	Added Figure 5.4.19	viii		
	Note added “b” to 191	5-5		
	Added “Note for Maneuvering Vent Flaps”	5-7		
	5.1.2 punctuation	5-11		
	5.1.3 re-worded NOTE	5-11		
	5.1.12 changed “must” to “should”	5-17		
	5.3.1 punctuation	5-34		
	5.3.2 Punctuation replaced “is” with “in”	5-35		
	5.3.3 / 5.3.4 / 5.3.5 punctuation	5-37		
	5.3.5 remove “other”			
	5.3.6 replace “submersing” with “submerging” corrected spacing	5-38		
	5.3.10 corrected punctuation	5-40		
	5.4.6 / 5.4.7 change “effect” to “affect”			
	5.4.8 change “exposes” to “expose”	5-42		
	5.4.11 change “manor” to “manner” changed wording of paragraph four	5-46		
	5.4.13 (4) changed “oversleeves” to “over-sleeves”	5-47		
	5.4.15 / 5.4.16 / 5.4.17 added damage limitation of 3/32”	5-49		
	5.4.19 expanded AFX load fitting section added figure 5.4.19	5-50		
	5.5.2 added (4) Ball M57R altimeter, page #	5-53, 5-54, 5-55		
	Added section 5.5.8 “Ball M57 Wireless Pyrometer Operation”	5-55		
	6.1.2 (2) reworded paragraph two and (a) and (b)	6-5		
	6.1.15 added paragraph four	6-26		
	6.5.2 added item (3)	6-68		
	6.5.5 re-worded paragraph	6-69		
	6.5.6 moved Figure 6.5.6 to page 6-71	6-70		
	Added section 6.5.8 “Ball M57R wireless Pyrometer Operation”	6-71		

REVISION LOG				
Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Revision A (continued)	Appendix II-B added envelopes S64A, S57S, S60S. Updated all dimensions to current drawings	B-3 through B-18		
	Appendix II-C added envelope S64A, S60A re-Shape. Updated all gore patterns to current revisions.	C-3 through C-29		
	Appendix II-SS 2.5 re-worded paragraphs two and four.	SS-3		
	Appendix II-ZZ 5.1.10 removed “wire”	ZZ-5		
	5.2.10 / 5.2.11 changes “Leaks” to “No Leaks”	ZZ-8		
	5.3.2 / 5.3.3 / 5.3.10 added “shuts off completely”			
	5.3.6 added leak test			
	5.3.8 changed to “test for no leaks”	ZZ-10		
	5.4.9 removed hardware line	ZZ-11		
	5.4.11 replaced checklist items with Note.	ZZ-12		
	5.4.19 added AFX load fitting items	ZZ-13		
	5.5.2 added Ball M57R altimeter			
	5.5.7 changed to “battery voltage checked”			
	5.5.8 added Ball M57R Pyrometer	ZZ-14		
Revision B	Introduction	Iii	Mark L. West, President	03/01/01
	5.1.1 Envelope Testing (Note)	5-1		
	5.1.c Fabric Testing Flowchart (note)	5-10		
	6.1.2 Fabric Repair and Replacement (Note)	6-2		
Revision C	Cover Page: added revised 12-01-01	cover page	Mark L. West, President	12/07/01
	Introduction pages: changed page numbers	i through ix		
	Note: added revised date 12-01-01	i		
	Revision page: added revision “C”	iii, iv		
	Table of Contents: changed Appendices	vi		
	Illustrations: added figures to Appendix II-A	vii		
	5.1.1 Fabric Testing: moved to Appendix II-A	5-1 through 5-10		
	5.1.9 Hook and Pile Testing: moved to Appendix II-G	5-13, 5-14		

REVISION LOG				
Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Revision C (continued)	5.1.11 Renamed section “Deflation Panel Accessories”	5-17		
	6.1.2 Reworded Note	6-2 & 6-3		
	6.2 (2) reworded	6-27		
	6.2.1(A) (1) (H) added B	6-28		
	6.2.1(A) (2) (D) reworded	6-29		
	(J) reworded	6-30		
	Figure 6.2.1(B) relabeled	6-34		
	6.2.7 (5) added Krytox grease	6-40		
	6.2.13 rewrote instructions	6-43 to 6-6-45		
	Figure 6.2.13a relabeled	6-46		
	Figures 6.2.12 c & 6.2.13d updated figures	6-47		
	Figure 6.2.13e updated, 6.2.13f relabeled	6-48		
	6.3.5 corrected computer errors	6-53		
	6.5.6 updated contact information	6-70		
	Appendix II-A rewrote appendix *FAA Approved w/ section 3.0*	All Pages		
	Appendix II-E rewrote appendix *FAA Approved w/ section 3.0*	All Pages		
	Added Appendix II-G *FAA Approved w/ section 3.0*	All Pages		
	Appendix II-ZZ updated checklist	All Pages		
Revision D	Cover Page, revision date	Cover page	Mark L. West, President	09/15/03
	Changed revision date.	i		
	Moved note for pages 2 – 10 to page 5-2	5-1		
	New page	5-2		
	5.1.6 minor rewording	5-12		
	5.1.10 minor reword of para. 2, add “spring”.	5-15		
	5.1.13(2) change to no damage allowed.	5-18		
	5.2.1 minor reword of note	5-20		
	5.2.6(2) added 1/8 turn to pilot head tighten	5-26		
	5.2.6(3)(a) removed “After brief pause”	5-27		
	5.3.1 added WARNING for 10 gal. tank	5-34		
	5.3.1(D) removed 10 gal. relief valve p/n	5-35		
	5.3.2 remove 10 gal. tank valve p/n’s	5-35		
	5.3.6 added note for Aerostar date stamp	5-39		
	5.4.11 remove S.S. and 3° bend from para. 5.	5-46		
	5.4.19 new depiction and added description	5-50		
	6.1.1 added ° to 250F	6-2		

REVISION LOG				
Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Revision D (continued)	6.1.2 removed 35% replacement note	6-3		
	6.1.2(2)(c) updated alternate fabric chart	6-6		
	6.1.2(2)(c) “new patch” to “damage” in note	6-7		
	6.1.2(2)(c) “new patch” to “damage” in note	6-8		
	6.1.2(3) added panel seam to panel seam, added new para. for fabric orientation.	6-11		
	6.2.1(B) updated figure 3.2.1(B)	6-34		
	6.3.9 deleted entirely	6-54		
	6.5.2 changed mfr to Blue Sky Avionics	6-68		
	6.5.6 changed mfr to Blue Sky Avionics	6-70		
	6.5.8 changed mfr to Blue Sky Avionics	6-71		
Revision E	**Details Listed Below**	**Listed Below**	**Mark West, Chief Technology Officer Raven Industries**	**02/04/2013**
	Cover Page, added Revision E	Cover		
	Introduction NOTE	i		
	Revision pages, added Revision E	v, vi, vii		
	Remove 5.1.1 from table of content	viii		
	Adjusted page numbers for illustrations	xii		
	Introduction / Table of Contents, re-numbered pages	viii thru xii		
	5.1.4 (3), Updated Kevlar cable requalification standards	5-12		
	5.2.2, reworded 1st line	5-21		
	5.2.2(8), part number 52357	5-22		
	5.2.6, added information for use of “go gauge” to inspect pilot light orifice	5-25		
	5.2.6(1)(i), added information detailing use of “go gauge” to inspect orifice	5-26		
	5.4.19(2) reworded source of approved carabineers	5-51		
	5.4.19(3) reworded source of approved parts	5-51		
	6.0 Introduction, added paragraph with information regarding replacement parts	6-1		
	6.1.2(1)(A) re-write of section with additional information on acceptable repair fabrics. Note (1) lists fabrics certified to Aerostar specifications; 52910, 52809, 52812, 51004-40, 51004-130, 51004-131, 51004-132 and 51004-133.	6-2,6-3		
	6.1.2A(2) Figure 6.1.2A(2) moved to page 6-4	6-4		
	6.1.2(2)(c) re-write of section with addition of acceptable alternate fabrics and updated chart	6-6		
	6.1.2 Chart 6-1 moved to page 6-7	6-7		
	6.1.4(2) revise replacement requirements and removed reference to Aerostar Supplied Cables	6-18		
	Figure 6.2.6A updated illustration with additional details for vapor regulator	6-36		

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Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Revision E (Continued)	**Details Listed Below**	**Listed Below**	**Mark West, Chief Technology Officer Raven Industries**	**02/04/2013**
	Figure 6.2.6B updated illustration with additional details for vapor convertor	6-37		
	6.3.1 added 2nd paragraph to WARNING	6-52		
	6.3.4 rewrote 1st paragraph	6-53		
	6.4.1 rewrote 1st paragraph with additional rattan detail	6-55		
	6.4.1(4) updated connector fitting part number information	6-56		
	6.4.9(1) CW and CW-S Skid Corner Gusset, updated retrofit kit information	6-59		
	6.4.9(1) Complete CW and CW-S Skid Replacement, re-wrote paragraph (A) with FAA approved parts	6-60		
	6.4.9(1) Complete CW and CW-S Skid Replacement(I), re-wrote NOTE concerning wear resistant materials/kits	6-61		
	6.4.19(1) reworded first line to remove (obtained from factory)	6-65		
	6.4.19(5) removed reference to Aerostar factory, replace with FAA approved parts	6-65		
	6.4.20(3) changed to “contact the Aerostar Technical Support”	6-66		
	6.5.2(1), (2) and (3) removed contact information for Blue Sky Avionics LLC, added information for Aerostar Technical Support	6-68		
	6.5.6 Removed contact information for Blue Sky Avionics LLC, added information for Aerostar Technical Support	6-70		
	6.5.6 Removed reference to “Aerostar” for part number 51686.	6-71		
	6.5.7 Updated contact information to Aerostar Technical Support	6-72		
	6.5.8 Removed contact information for Blue Sky Avionics LLC, added information for Aerostar Technical Support	6-72		
	Appendix II-A Cover Page, Updated to add revision date	II-A-1		
	II-A.1.1(3)(d) changed 1” Tensile lab test standard to ASTM D5035	II-A-2, II-A-3		
	II-A.1.1(3)(e) changed Tongue Tear lab test to ASTM D2261	II-A-3		
	II-A1.1(7)(d) NOTE, updated note to include ASTM test requirements	II-A-6		
	II-A ABADS 1096, Revision B, updated with test method D5034 of ASTM2261	II-A-13		

REVISION LOG				
Rev. Ltr.	Paragraphs	Pages	Approved By	Date
Revision E (Continued)	**Details Listed Below**	**Listed Below**	**Mark West, Chief Technology Officer Raven Industries**	**02/04/2013**
	II-A ABADS 1096 2.0 specified test method ASTM D5034	II-A-14		
	II-A ABADS 1205 Revision A, removed test method 191, replaced with ASTM D2261	II-A-16		
	II-A ABADS 1205 2.0 specified test method ASTM D2261	II-A-17		
	II-A, Removed Federal Test Method Standard 191b Methods 5100, 5012, 5134, 5136	II-A-19 thru II-A-23		
	II-A Moved ABADS 1206 Hot Air Balloon Fabric Test Field Porosity to begin on page II-A-19	II-A-19 thru II-A-21		
	II-Appendix A pages updated with revision date	II-A-1 thru II-A-21		
	Appendix II-B (Attention) removed 1st paragraph with reference to continuing changes to Aerostar production documents. Updated contact information to Aerostar Technical Support.	B-2		
	Appendix II-C (Attention) removed 1st paragraph with reference to continuing changes to Aerostar production documents. Updated contact information to Aerostar Technical Support.	C-2		
	Appendix II-D (Attention) removed 1st paragraph with reference to continuing changes to Aerostar production documents. Updated contact information to Aerostar Technical Support.	D-2		
	Appendix F changed “Aerostar Customer Service” to Aerostar Technical Support	F-2		
	Appendix II-SS 1.0 change contact information to Aerostar Technical Support	SS-1		
	Appendix II-SS 2.5 last paragraph, change contact information to Aerostar Technical Support	SS-3		
	Appendix II-SS 2.6, change contact information to Aerostar Technical Support	SS-*3*		
	Appendix II-ZZ Envelope 5.1.4 added Kevlar Cable Require Proof Loading check line. Updated note with Kevlar Cable Proof Loading information	ZZ-4		
	Appendix II-ZZ Burner Systems 6.2.6 updated inspection requirement for pilot light orifice to include use of Go Gauge	ZZ-8		

T A B L E O F C O N T E N T S

APPENDICES

ILLUSTRATIONS

5.0 REQUIRED ANNUAL OR 100 HOUR INSPECTION

The following maintenance and inspection MUST BE PERFORMED at each Annual/100 hour inspection. FAR 91.409 requires that this inspection to be in accordance with the manufacturer's most recent instructions for Continued Airworthiness.

As part of Revision “C” dated December 01, 2001 pages 5-2 through 5-10 have been removed and the information previously found on these pages included in Appendix II-A of this manual

5.1 ENVELOPE TESTING AND INSPECTION

Envelope testing and inspection is performed to ensure that the strength and integrity is sufficient for safe operation, no damage or wear is present which would create a hazard and that prior maintenance has been performed properly

Attention

For complete fabric testing instructions including testing criteria, testing methods and test result determination, refer to Appendix II-A of this manual.

Appendix II-A is FAA approved as part of the Airworthiness Limitations section of this document.

5.1.2 Fabric Inspection Procedure

Inspect envelope gore by gore to identify holes, tears, abrasions, seam separation and heat damage. Aerostar recommends that all small damage be repaired at annual/100 hour inspections irrespective of allowable damage limitations. Inspect previous repairs performed per 2.1. Re-do these repairs as necessary as specified in Section 6.1.2.

NOTE

Stitching may be used around adhesive repairs in order to ensure the longevity of the repair. See section 6.1.2 for proper repair procedures.

When inspecting for fabric damage, remember that damaged areas may have additional abrasions (evidenced by broken threads or yarns surrounding the area) which make the adjacent fabric structurally unacceptable. Likewise, burn holes may be surrounded by a considerable area of heat-damaged fabric that will require substantial fabric replacement. Heat damage is generally indicated by shrinking, scorching or stiffening of the fabric.

5.1.3 Webbing

Check for no burned, cut, or abraded webbing. The stitching securing it to the envelope must not be loose. More than 3 adjacent broken stitches must be repaired. Webbing must be replaced if cut or abrasion exceeds 1/4" in any 12" length of webbing.

NOTE

On S57S, S60S, appendage and special shape envelopes, all internal webbings must be inspected to insure that there are no cuts, abrasions, loose or broken stitching and burn damage.

5.1.4 Suspension Cable Inspection

(1) Steel Cables

Check for no broken wires. This may be done by running the cables through a soft cloth or cloth gloves slowly and feeling for sharp spots that may snag indicating a broken wire. Cables should be free of discoloration, rust, corrosion and areas where kinks appear. In addition, there must not be areas with permanent blackening or bluing which indicates that the cable may have been overheated and weakened.

(2) Kevlar cables

Check for damage to outer covering (Dacron braid) on the cables. If the Kevlar core (yellow) is exposed or the covering is heat damaged to the extent that the cable is no longer flexible and easily bent, the cable must be replaced with new parts obtained from the factory.

Inspect the whip wrap at splice to identify any broken threads, heat damage or abrasion. Check stainless steel thimble for proper orientation, security, distortion or deformation. If cable shows signs of the above condition, return to Aerostar for testing, evaluation and repair/replacement as indicated.

(3) Kevlar Cable Requalification

Kevlar Suspension Cables that reach 2000 hours in service must be removed from the envelope and proof load tested to a dead load value of 1800 lbs. per cable or 3600 lbs. per cable pair. (note: cable pairs must be tested as a pair. Loading an individual leg of a pair will cause damage to the common end termination of the cable pair.)
The cables must also be thoroughly inspected to ensure that there is (a) no damage to the parent material, (b) no damage to the outer braid exposing the Kevlar core, (c) no damage to the eye splices including the thimbles or whip wrap as detailed in 5.1.4(2) .
The proof load tests must be repeated every 500 hours thereafter
Appropriate maintenance entries shall be made to document the results of the proof load testing, reinstallation of the cables and return to service.

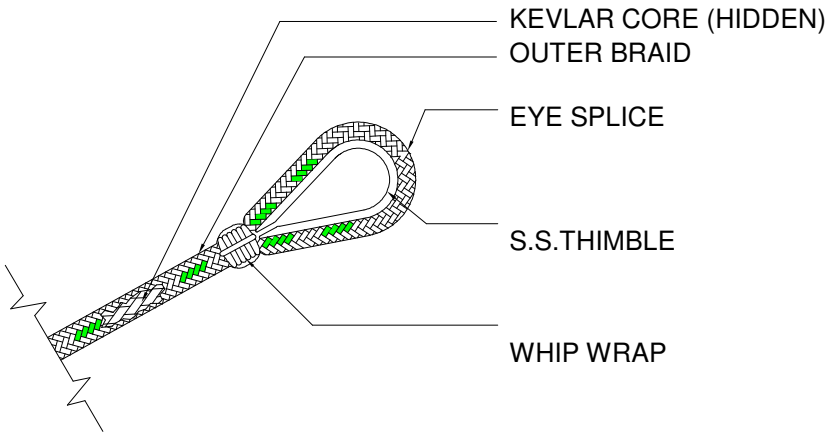

Fig. 5.1.4 Kevlar Cable End

5.1.5 Rally Load Frame

The envelope load frame must be structurally sound. Check to insure that there are no cracks or broken welds present, the frame must be in square and must not be bent more than 5º out of square. All quick pins must operate properly and be secured to the load fitting by their lanyards.

5.1.6 Envelope Suspension Fittings

The suspension fittings must be structurally sound. Replace if cracked or broken. Inspect the portion of the fitting which the cables pass through. Inspect the quick release pin and replace if damaged. Some normal wear is acceptable, but if cables are cutting into the suspension fitting, replace the damaged components. Fittings that have a bolt, nut, washer and spacer, check the tightness of all components.

5.1.7 Carabineer

Inspect carabiner to identify any cracking, thread damage or bending and to insure smooth operation. Inspect carabiner to insure that the spring-gate returns to the closed position and that the threaded lock functions properly.

5.1.8 Rip Top and Para Rip Deflation Panel Fit

The deflation panel must fit properly in the deflation port. The top deflation panel must be larger than the port in the top of the balloon. Install deflation panel and check fit by aligning one index mark with the respective vertical load tape. Then stretch the sides of the hook and pile and compare excess amount on panel side. (See Figure 5.1.8)

If there is any question as to the proper fit of the top cap or the seal of the vent, inflate the envelope to isolate the problem.

There MUST BE a minimum of **2" excess material in the deflation panel between each vertical load tape on the S-Series balloons and a minimum of 3" on the Model RX-6 and Model RX-7 balloons. If the deflation panel is too small, replace it (See section 5.1.8).**

Check fabric for tears or highly stressed areas.

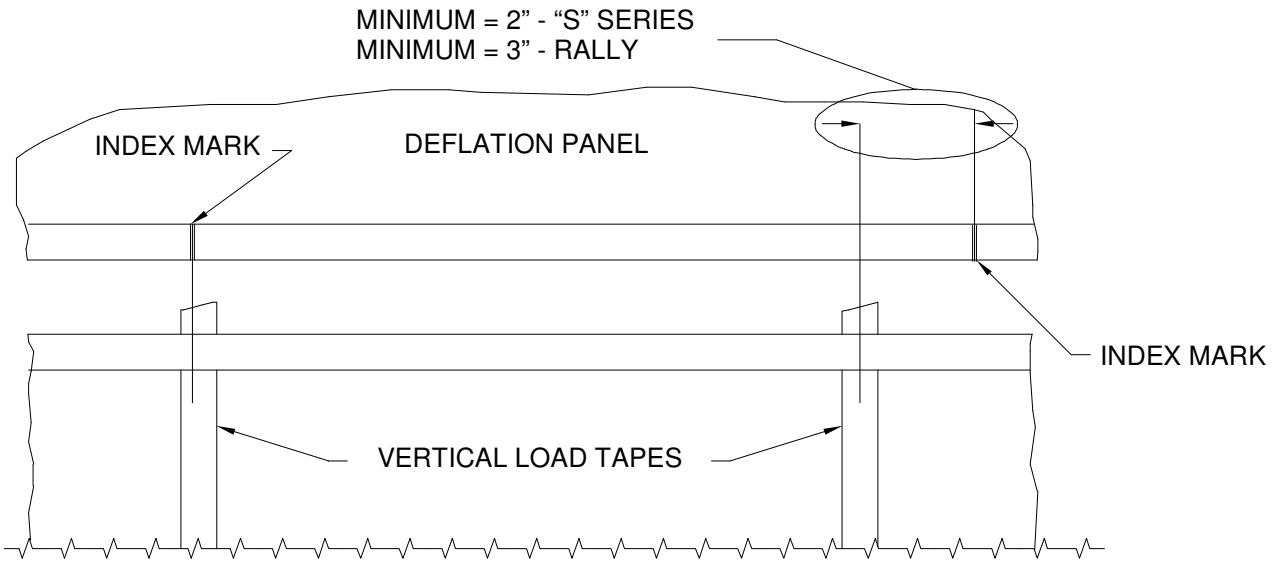

Figure 5.1.8 Method For Determining Minimum Excess For Top Fit (Rip and Para Rip)

5.1.9 Hook and Pile Inspection and Testing

The hook and pile fastener tape used in the deflation panels of the para-rip top and rip top envelopes must be tested and inspected during each Annual/100 hour inspection.

Attention

For complete velcro testing instructions including testing criteria, testing methods and test result determination, refer to Appendix II-G of this manual.

Appendix II-G is FAA approved as part of the Airworthiness Limitations section of this document.

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5.1.10 Spring Top™ Deflation System

The Spring Top™ must fit properly in the deflation port. Section 2.1 requires operators to notify the inspector at the time of Annual/100 hour inspection if the deflation panel has been sealing poorly or if fuel consumption has been abnormally high. If this occurs or if there is evidence of heat damage on the deflation panel or port that would indicate that leakage may be occurring, an inflation test must be accomplished to check for proper fit. If the Spring Top™ deflation panel fits properly, the top will be fairly well centered in the deflation port. It will also display a visible and distinct outline of the deflation port edge behind the deflation panel fabric. A blurred outline of the deflation port edge indicates a poor seal. In the paravent area, no slack should be present in any of the centering cords and the lines from the panel to the confluence point should hang relatively equally. The edge of the deflation panels should be pulled approximately 1/2 the distance over between the port edge and the Velcro tab when the tabs have been separated.

Each spring pocket must be visually inspected to determine that no excessive deformation has occurred that will significantly lower its retention capability. Note that the final two pockets on each side of the deflation panel have a wider opening for spring insertion than the remaining pockets. Note, also that some Rally series require two styles of pockets, a trapezoidal and rectangular, in addition to the differing opening size. The RX-8, RXS-8, RX-9 and S66A Spring Tops have a third style of pocket. The four center pockets that match the springs attached to the deflation line are of heavier construction, identifiable by the large backup patch and red colored material. These four pockets have a yet narrower spring insertion opening.

Inspect the following:

(1) Inspect for no broken or missing stitches around the perimeter of the pocket installation as well as the stitching forming the pockets.

(2) On superpressure systems, a 10" strip of hook fastener is attached to the envelope between the spring pocket and opening. This must be inspected for debris (remove any debris present).

(3) Lubricate each torsion spring with lubricant as specified in Section 2.0. If spring wire is bent, or if it does not return to an approximately flat configuration, it must be replaced.

(4) Para-vent and Spring Top™ Lines should be free of fraying, cuts, abrasion or burn damage.

(5) RX9/S66A pulley operation must be inspected. The pulley must roll freely. Ensure that the pulley is not cracked or broken. Lubricate with silicone spray or Tri-Flow lubricant. Replace pulley if necessary.

(6) Inspect the top attachment points for no tearing of stitching or fabric. Top is attached at overstrap webbings in vent area and at deflation port edge.

This attachment style differs from the "rip top" attachment and earlier models of Spring Top™.

NOTE

Refer to Aerostar Service Letter 101 for upgrade of early model Spring Top™/Paravent systems to current revision status. This procedure is recommended.

NOTE

Inspect Rally Spring Top™ at envelope to port attachment points. Stitching here may need reinforcement to avoid tearing the envelope fabric.

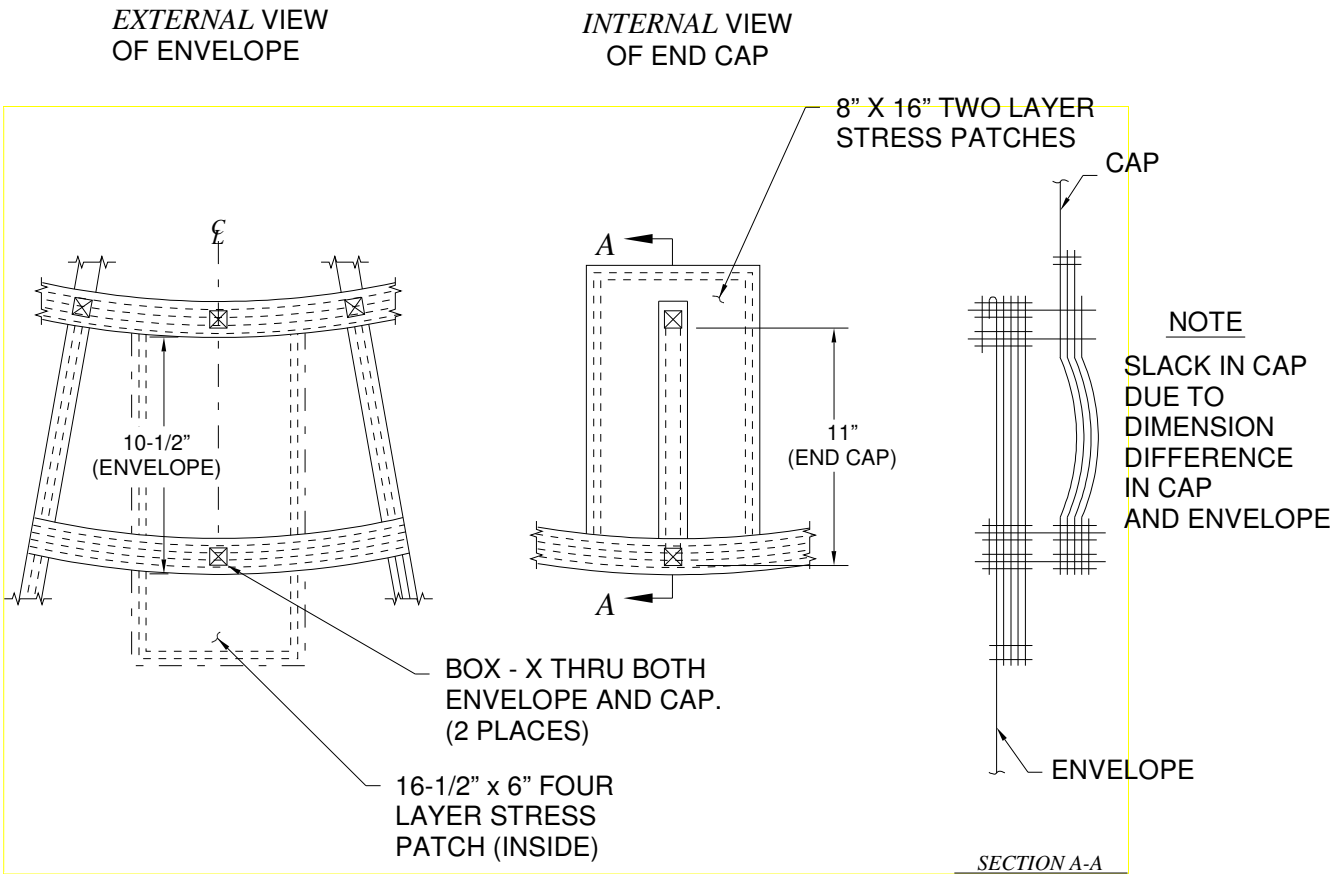


Figure 5.1.10 Rally Spring Top™ Attachment Reinforcement

5.1.11 Deflation Panel Accessories

Inspect the fabric and stitching, at the pull out D-ring located on the deflation panel and at the V-ring or 3" diameter routing ring located on the sidewall of the envelope, must not be torn, abraded, or broken. A deflation panel pull out cable was used in early rip top deflation panels. This 3/32" cable passes through a V-ring. The cable must not have broken wires, kinks, or be rusted. Replace if necessary. Replace the V-ring if worn by the deflation pullout cable more that 1/16".

The deflation panel pull out strap comes in two varieties; A Kevlar strap which is continuous from cap to gondola, and a nylon strap, which is the lower half of the two piece deflation line used in older rip top deflation panels. Neither type of strap may have more than 20% of its fibers in any 12" section damaged from abrasion, cuts or burns. No damage that could cause jamming in the routing ring may be present within the upper 55 feet of the Kevlar type of strap (as measured from the upper end of the strap).

The snap and D-ring on the gondola end of the deflation panel pull out strap must function properly.

The stitching securing the snap and D-rings to the deflation panel pull out strap must not be abraded, broken or loose.

5.1.12 Parachute Top Deflation System

(1) The parachute deflation panel must fit properly in the deflation port. Section 2.1 requires operators to notify the inspector at the time of Annual/100 hour inspection if the deflation panel has been sealing poorly or if fuel consumption has been abnormally high. If this occurs or if there is evidence of heat damage on the deflation panel or port that would indicate that leakage may be occurring, an inflation test must be accomplished to check for proper fit. If the parachute deflation panel fits properly, the top will be fairly well centered in the deflation port. It will also display a visible and distinct outline of the deflation port edge behind the parachute panel fabric. A blurred outline of the deflation port edge indicates a poor seal. No slack should be present in any of the centering cords and the lines from the panel to the confluence point should hang relatively equally. The edge of the deflation panels should be pulled approximately 1/2 the distance over between the port edge and the Velcro tab when the tabs have been separated.

(2) The webbing sewn to the parachute top cap should not be torn or separated from the fabric.

(3) Cords attached to the parachute top must not be abraded, cut or burned. Replace cords if necessary. Ensure that all knots are secure. The inner braided core of the parachute top pull line must not be damaged. Damage to the line's outer braided nylon cover is permitted only if the parachute line operation is not affected. Remove knots in the pull line that may interfere with valve line operation or shorten the valve line excessively. The pull line must not have shrunken excessively. There should be a minimum for 5' of slack in the pull line. See Section 2.1.(6).

(4) The anchor points (stickmen) on the side of the envelope where the cords retaining the parachute top are fastened, should be free from wear, abrasion, broken stitches or damaged webbing.

(5) The pull line routing ring and its attachment cords and anchor points near the base of the envelope must be structurally sound. Abraded, cut or burned stitching, webbing or cords must be repaired or replaced. Cords must be securely tied. The ring must not be excessively worn or have cutting edges.

(6) Parachute tops using a pulley must be checked closely for fraying of the line that passes through the pulley as well as proper lubrication of the pulley.

5.1.13 Aerochute Top Deflation System

The Aerochute deflation panel must fit properly in the deflation port. Section 2.1 requires operators to notify the inspector at the time of Annual/100 hour inspection if the deflation panel has been sealing poorly or if fuel consumption has been abnormally high. If this occurs or if there is evidence of heat damage on the deflation panel or port that would indicate that leakage may be occurring, an inflation test must be accomplished to check for proper fit. If the Aerochute deflation panel fits properly, the top will be fairly well centered in the deflation port. It will also display a visible and distinct outline of the deflation port edge behind the Aerochute panel fabric. A blurred outline of the deflation port edge indicates a poor seal. No slack should be present in any of the actuation cords and the lines from the panel to the confluence point should hang relatively equally.

Inspect the following:

(1) The webbing sewn to the Aerochute top cap must not be torn or separated from the fabric. The center reinforcing patch must be free from cuts, tears, broken stitching.

(2) Cords attached to the top cap and must not be abraded, cut or burned. Replace cords if necessary. Ensure that all knots are secure. The inner braided core of the Aerochute pull lines must not be damaged. Damage to the outer braid of the cords is not permitted, any damage to the exterior braid may effect the operation of the deflation system.

Remove knots in the pull line that may interfere with top cap operation or shorten the line lengths excessively. The pull line must not have shrunken excessively. There should be a minimum for 5' of slack in the pull line. See Section 2.1(6).

(3) The anchor points (stickmen) and rings on the side of the envelope must be undamaged and free from wear, abrasion, broken stitches or damaged webbing.

(4) The pull line routing ring and its attachment cords and anchor points near the base of the envelope must be structurally sound. Abraded, cut or burned stitching, webbing or cords must be repaired or replaced. Cords must be securely tied. The ring must not be excessively worn or have sharp cutting edges.

(5) Top caps fitted with a pulley must be checked closely for fraying of the line that passes through the pulley as well as proper lubrication of the pulley.

(6) Aerochutes fitted with apex cords must be checked thoroughly for wear, abrasion, and knot security. Verify cord lengths and replace if excessively shrunk or stretched.

5.1.14 Maneuvering Vent/Rotator

The maneuvering vent/rotator (if applicable) must be in good operational condition. Check the following items:

- Remove contaminants from hook and pile fasteners, then test for proper adhesion. Replace fasteners if they are excessively worn and will not stay fastened in normal use.

- Fabric and stitching at ends of vent overstrap must not be torn, abraded, or broken.

- The control line guide rings must be securely attached to the balloon sidewall. Fabric and stitching must not be torn, abraded, or broken.

- The maneuvering vent/rotator control lines must not be twisted or damaged. All knots must be secure. Replace lines that are abraded, cut or burned. For the ¼" or ½" diameter pull line, if damage is limited to the outer braided nylon cover and the inner braided nylon core is undamaged, the line is considered usable unless the damage will hamper actuation as the line passes through guide rings.

5.1.15 Envelope Skirt or Dipper

The envelope skirt or dipper must be inspected for fabric damage, loose or missing stitches or weak Velcro. Inspect fabric damage per section 5.1.2, inspect webbing per section 5.1.3.

For standard skirt inspect the skirt hoop for breaks and for the security of the retaining bolts.

5.2 BURNER SYSTEM

5.2.1 Burner Assembly

Inspect burner system for general structural integrity.

Check the following:

(1) Tighten screws and bolts if necessary. Replace screws or bolts that have damaged threads.

(2) Replace or reshape burner cans that are severely distorted.

(3) Ensure that the reducing union nuts and the swivel fittings are tight. Avoid overtightening, which may crack the pilot light (screen type) reducing union nuts.

(4) Inspect burner coils. Replace if cracks, deep gouges or pressure rupture are evident.

(5) Inspect burner frame for no cracked welds. If damaged, they must be returned to Aerostar for inspection and repair/replacement.

(6) Inspect fuel inlet fittings. Replace them if they show a significant amount of overtightening, corrosion or crossthreading. Tighten them if loose.

(7) Inspect for foreign material in nozzle coil orifices. Use a wire of suitable gauge or similar device to remove it.

NOTE

To remove any obstructions, remove the nozzle coil if necessary. Clear orifice with wire or similar device. Clear coil with high pressure air, and reinstall.

O-RING COMPARISON GUIDE

USE:	PILOT TOGGLE VALVE	COLD TEMP BLAST VALVE	REGO 9107 CYLINDER VALVE	REGO POL OR SHERWOOD CYL VLV	FISHER POL
COLOR:	BLACK OR GREY	BLACK	BLACK OR GREY	BLACK OR GREY	BLACK
P/N:	51034-06	52357	51034-07	51034-08	51034-04
XSECT:	.070"	.074"	.103"	.103"	.103"
I.D.:	.145"	.192"	.299"	.362"	.424"

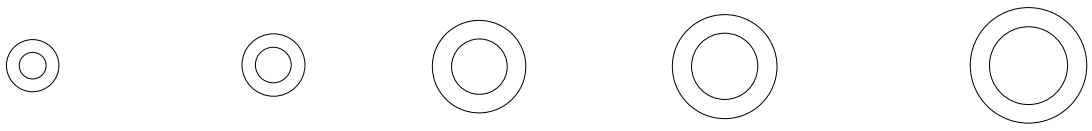


Figure 5.2.1

5.2.2 Blast Valve Servicing

Three types of blast valves have been used in Aerostar (Raven) systems: P/N 12722 (Rego 7553S, Rego 7553T, and Sherwood LV440.) DO NOT interchange parts between Sherwood & Rego. The O-ring, Teflon spacer and copper gasket are the only interchangeable parts although the valves maintain the same external dimensions.

As required at each Annual/100 hour inspection, the blast valve O-rings MUST be replaced following the procedures listed below.

(1) Identify burner.

(a) HPII and earlier model burners:
Remove the nut, #3 screw, and washers from the Rego valve toggle handle.
(A #2 screw is used on the Sherwood valve.) Remove the rollpin using the proper tool. DO NOT DRIVE THE ROLLPIN OUT WITH A HAMMER AND PUNCH OR THE STEM MAY BE BENT.

(b) HP III Zone V and Zone V Turbo Burners:
Begin by removing the trigger locking screws, followed by the trigger adjustment screw. Remove the screws securing the burner handle to the burner tray. Make note of the orientation of the handle to ensure proper reinstallation of the handle after servicing. Remove burner handle and set aside. Remove the E-ring and pin securing the trigger assembly to the valve bonnet stem.

(2) Lay burner on its side. Use a fine file or a piece of emery cloth to remove any burrs around the rollpin hole on the valve stem that could score the cylinder wall of the bonnet when the valve stem is removed from the bonnet.

(3) Clean filings from valve stem area.

(4) Remove the bonnet assembly.

Note

The bonnet is made from a relatively soft metal. DO NOT USE adjustable wrenches or twelve-point socket wrenches. Use a six-point 1-1/4" socket. When working on HPI and HPII burners, it may be necessary to use a chain plier (Vise Grip, P/N 20R) to hold the valve body securely for removal of the bonnet assembly.

(5) Remove the valve stem from the bonnet. If the stem does not withdraw easily, there may still be a burr that must be removed. Forcing the stem out may damage the cylinder wall of the bonnet requiring replacement.

(6) Carefully inspect for the presence of foreign material and scoring of the bonnet cylinder wall. Hold the bonnet up to a light source in such a manner that will highlight any scoring or scratches in the cylinder wall. Scratches in the area where the O-ring seals require replacement of the bonnet. (Rego Bonnet, P/N 12722-08, Sherwood Bonnet, P/N 12722-07). Either of these two conditions can cause valve leakage. Inspect the security of rubber blast valve seal and its attachment to the brass seal holder. If attaching rivet shows signs of loosening, replace entire assembly.

NOTE

Do not interchange Sherwood and Rego valve bodies and bonnet assemblies. Use only Sherwood bonnets in Sherwood valve bodies and likewise use only Rego bonnets in Rego Valve bodies

(7) Remove O-ring, Teflon back up ring and copper gasket.

(8) Lubricate a new O-ring (Part Number 52357) with KRYTOX fluorinated grease lubricant, #240 AC (P/N 51008-52). DO NOT SUBSTITUTE ANY OTHER LUBRICANT.

(9) Install the new stem seal O-ring. Do not slide the new O-ring over the rollpin hole in the stem without protection. The edges of the hole may be sharp and cut the O-ring. A small piece of balloon fabric may be laid over the end of the stem and the O-ring slid over this. A permanent tool may be made by placing a 1" piece of heat shrink tubing over a stem just shy of the groove and heating. A bullet shaped tool may be cut from a large crochet needle (#13) or by soldering a 5/16" rod inside a 5/16" I.D. tube (available at hobby shops) and grinding or turning the end.

NOTE

The O-ring 52357 replaces all previous O-rings in blast valves. It is slightly larger and has much better sealing capacity in cold temperatures. It will not fit well in Rego 7553S bonnets. "S" type bonnets have a one-piece stem and seal holder. New Rego bonnets for 7553T must be used for replacement. "T" type bonnets have a two piece design that allows the seal holder to swivel independently from the stem. Do not use any other O-ring. See Figure 5.2.1.

(10) Inspect and reinstall the Teflon wiper ring, replace if damaged or misshapen.

NOTE

Make sure to install the O-ring stem seal on the pressure side of the stem and the Teflon backup washer on the handle side of the stem.

(11) Ensure that bonnet threads are clear of previous Teflon tape, dirt or other debris. Place two wraps of ½ inch or less Teflon tape on bonnet threads to prevent galling. Keep the two lower threads of the bonnet clear of Teflon tape.

(12) Reassemble valve using a new copper gasket 51040-55 for both Rego and Sherwood valves.

NOTE

To ensure a proper seal and compression of the copper gasket, lubricate with Krytox O-ring lubricant.

(13) Torque the hex blast valve bonnet to 60 ft-lbs.

(14) Reinstall blast actuation;

(a) HP II and earlier model burners: Position the toggle handle over the valve stem and press the rollpin back into place. Reinstall nut, screw and washers. DO NOT USE A HAMMER TO DRIVE IN THE ROLLPIN.

(b) HPIII Zone V and Zone V Turbo Burners: Reinstall the burner handle in the proper orientation as noted when removed. Secure the handle to the burner tray, start the trigger locking screws but do not tighten. Insert the trigger adjustment screw and adjust as described in section 5.2.4. Tighten the trigger locking screws.

NOTE

Use Loctite 242 when installing the 3 types of screws used in step 14 (b).

5.2.3 Blast Valve Operation

The blast valve must be free from leaks, operate smoothly, and shut off completely. Check the valve stem area for leaks as the blast valve is opened and closed. Check for leaks past the bonnet threads. Valve stem area leaks will require disassembly as outlined in section 5.2.2.

If propane leaks past the bonnet threads, torque the hex bonnet up to an additional 20 ft-lbs. If there is still leakage past the bonnet threads, disassemble the valve and replace the copper gasket, (section 5.2.2). Lubricate the copper gasket with the O-ring type lubricant to help create a better seal by allowing more compression of the gasket for the same bonnet torque value. If leak persists, replace blast valve bonnet insert assembly.

5.2.4 HPIII Blast Valve Trigger

Blast valve triggers of the HPIII burner must operate smoothly with 1/16"-1/8" free play. If the trigger is adjusted with no free play, the blast valve may not close completely. Conversely, if there is too much play, the valve will not open completely and burner output will be reduced. Adjust trigger play as explained in Section 6.2.1(B)(3).

5.2.5 Metering Valve

The metering valve must be free from leaks, operate without binding and shut off completely. Check the valve stem area for leaks throughout the opening range from closed to open. Check the valve stem for wobble when fully opened.

Tighten valve stem packing nut if:

- There are leaks around the valve stem
- The valve stem wobbles when open
- The valve turns with little or no resistance

NOTE

Metering valve knobs on HPIII burners have some play in the stem. Do not mistake this for stem wobble and overtighten the packing nut.

To tighten packing nut: (NUPRO valve)

The nupro valve is distinguishable by an all brass valve body and bonnet assembly and a small red plastic handle, which is held in place by an allen set screw through the side of the handle.

(1) Open the valve enough to prevent damage to the seat and stem.

(2) Loosen the panel mounting on the outside of the burner tray.

(3) Use a 9/16 inch modified "crow's foot" or open end wrench to adjust the valve stem packing nut on the inside of the burner can. Tighten the packing nut so that the valve turns with moderate resistance.

(4) DO NOT over-tighten the valve stem packing nut. This will make it difficult to open and close the valve.

If the valve cannot be adjusted acceptably to be free from leaks and excessive binding, replace the valve. If the valve knob is loose, tighten the set screw.

If the valve knob is still loose after tightening the set screw, remove the knob. File a small flat spot on the valve stem where the set screw locates. Use a drop of medium strength (Loctite 242) thread locking compound on the set screw. Be careful not to allow

the filings to enter the valve. Reinstall the valve knob with the set screw seated on the flat.

To tighten packing nut: (HOKE valve)

The Hoke style valve is distinguishable by a steel valve body and bonnet. The old style handle is a black plastic handle, the handle on the HPIII burners is a red aluminum handle. Both handles are secured in place with a small nut through the top of either style handle.

(1) Open valves enough to prevent valve damage. Valves on HPIII burners must be opened far enough to allow access to the packing nut.

(2) Use a 7/16" open-end wrench to adjust nut (located on outside of burner tray). Tighten the packing nut so the valve turns with moderate resistance.

(3) Do not overtighten packing nut.

5.2.6 Pilot Light (HP II Update, HP III Standard and Turbo)

As required at each Annual/100 hour inspection, the pilot light vapor convertor MUST be serviced following the procedures listed below.

As detailed in Aerostar Maintenance Bulletin 08-05-11, and in accordance with Chart 302 of the Airworthiness Limitations, the following action must be taken;

Action: To ensure that the orifice is open or clear to design specifications, a .011 “go gauge” tool should be used to verify that the pilot light orifice has a sufficient opening to provide the proper fuel flow to the pilot light head. This “go gauge” is to be used during each Annual Inspection, 100-hour inspection and or servicing of the pilot light assembly.

(1) Pilot light Vapor Convertor Disassembly

Note

For burners with the glow option installed, the glow burner pilot light tube should be removed at the base of the copper tube. This can be accomplished by loosening the ferrule nut with a 7/16 wrench.

(a) With a 1-1/8 inch open-end wrench, enter through the side of the burner. Place the wrench on the upper portion of the vapor converter. Loosen the upper portion of the vapor convertor. If the entire convertor begins to rotate, use a modified 1-1/8 inch crows foot on an extension to hold the lower portion of the vapor convertor, while removing the upper portion.

(b) When removing the upper portion of the vapor convertor be careful not to lose any of the internal components.

(c) The internal piston of the vapor convertor can be removed by using a wobble motion while pulling it out of the regulator body.

(d) Place the upper convertor body in a bench vice. Place a mark on the converter body and the stem of the pilot light head, this can be used during re-assembly for proper alignment of the pilot light head.

(e) Place a metal punch or the shaft of a Phillips-tip screwdriver, through the holes in the pilot light head and loosen the pilot light head from the vapor Convertor body.

(f) The pilot light orifice can then be removed from the upper portion of the vapor convertor.

(g) Clean all parts with a dry silicone spray (True Test Brand Silicone Spray) wipe all parts clean. Be sure the spray used to clean the parts does not leave any residue.

(h) Replace the O-rings on the piston if they appear stretched, damaged, or deformed. Apply a very thin film of Krytox lubricant on O-rings prior to re-assembly.

(i) Clean pilot light orifice with silicone spray or compressed air. Push a .011 tip of a “go gauge” through the opening in the pilot light orifice stating from the backside of the orifice. This action will verify that the orifice is open to the specification necessary for the proper operation of the pilot light. Some loosely held contaminates may become dislodged during this action; if so, make sure that the contaminants are not pulled back into the orifice when removing the go gauge. If the “go gauge” will not pass freely through the pilot light orifice, install a new orifice (P/N 52153) Look through the orifice to ensure that the orifice is clear. If the orifice remains obstructed install a new orifice.

(j) Reassemble the pilot light and vapor convertor in the reverse order, with the exception of the glow pilot tube (if installed). Attach the glow pilot light tube to the glow valve prior to re-installing the upper portion of the vapor convertor. Use Loctite 290 when installing the pilot head into the upper vapor convertor.

Note

Be careful to use only a small amount of Loctite when reassembling the pilot head. If an excessive amount is used the excess may drip down to the pilot light orifice, thus clogging the orifice.

(2) HPII Update & HPIII Pilot Light Troubleshooting

Tall Noisy Flame or Erratic Flame

Washer excessively cupped - both washers and the orifice should be removed and replaced with orifice, P/N 52153 (requiring no washers)

Pilot head not tight enough – tighten pilot head an additional 1/8 turn.

Regulator is malfunctioning - disassemble, clean & lube w/blast valve lube. Replace if necessary.

Low Quiet Flame, Easily Extinguished

Orifice plugged or dirty - clean with fine wire or air, or replace orifice

Inlet filter plugged - replace (Burner Assembly Figure 6.2.6A & B)

Slug plugged – clean, or replace

Regulator malfunctioning - disassemble, clean and lubricate. Replace if continued malfunction.

Slow Shut Off Time

Convertor, Slug and valve body not properly seated. Tighten 1/8 turn. If shut-off time is still excessive, repeat. Replace slug if the ends are damaged, Convertor may require replacement if the seating is surface damaged.

(3) The pilot light must also be inspected for proper operation, as specified below. Use a propane source of 120 psi or greater. Refer to Section 6.2 for repairs.

(a) Turn on pilot. Igniter should light flame within 2-3 tries. Electrode must be 1/4" from hole in shoulder of pilot head. Adjust electrode or replace sparker if necessary. If pilot refuses to light, proceed to troubleshooting.

(b) Open blast valve and burn 5-10 seconds to ensure that liquid propane is available at pilot.

(c) Flame should be 4-6" tall, primarily blue with yellow tips. If not, proceed to troubleshooting.

(d) Flame should not extinguish easily - try blowing it out. If it does, proceed to troubleshooting.

(e) The pilot light should operate steadily with no extreme flame disruptions (indicated by change in sound).

(f) Turn off pilot valve. Flame should extinguish within 3 seconds. If not, proceed to troubleshooting.

5.2.7 Liquid Pilot Light Valve Servicing

Inspect the valve for proper operation and to insure that there are no leaks past the valve stem. If leaks are found service as detailed in section 6.2.7.

HPII update burners use a small brass toggle handle to open and close the valve. Apply a small amount of spray lubricant between the toggle handle and the washer on top of the valve body.
HPIII standard and Turbo burners use a swivel style pilot light handle composed of a pilot handle barrel, the pilot handle and a retainer pin and e-clip that attach to the valve stem. Apply a small amount of spray lubricant between the barrel and handle assembly and also to the retainer pin.

5.2.8 Pilot Light (Screen Head Style)

The pilot light should burn properly. With the burner pilot light valve open 1/2 turn or more, ignite the pilot light. If the pilot light is being operated off a tank with a vapor pressure regulator, the pilot should burn steadily with slight yellow tips in the flame with no further adjustment of the pilot light valves. Non-regulated pilot lights will require a finer adjustment of the pilot light valve to achieve proper pilot light operation.

Remove the pilot light assembly to clean or replace it, if . . .

- The pilot light will not stay lit.
- Burning is erratic.
- The pilot light does not ignite the burner properly.

If the pilot light screen is corroded severely with voids in the screen material, replace it. See section 6.2.8, Screen Head Pilot.

5.2.9 Vapor Pilot Light Valve Servicing

As required by 3.10 tighten the valve stem packing nut on Nupro pilot light valves using the following procedure:

The nupro valve is distinguishable by an all brass valve body and bonnet assembly and a small red plastic handle which is held in place by a allen set screw through the side of the handle.

(1) Open the valve by rotating the valve handle COUNTERCLOCKWISE TWO COMPLETE TURNS from the closed position.

NOTE
This prevents damage to the valve stem tip when the valve stem packing nut is tightened.

(2) Tighten the valve stem packing nut in a CLOCKWISE direction to a torque value of 60 in-lbs. or 5 ft-lbs. (IMPORTANT: Torque values greater than 60 in-lbs. may make the valve difficult to operate.)

Tools:

- Torque wrench calibrated in inch-lbs.

- 9/16" "crow's foot" wrench. (When using, orient the "crow's foot" 90 degrees to the torque wrench to prevent inaccurate torque readings. (See figure 5.2.9.)

- OR -

- Torque wrench calibrated in inch-lbs. and a 9/16" socket. (Remove the valve handle before tightening the valve stem packing nut).

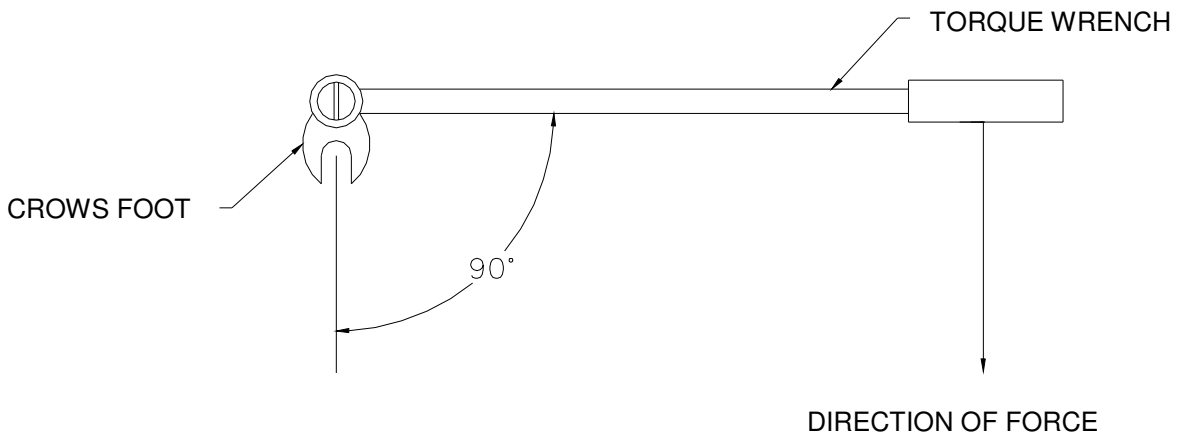


Figure 5.2.9

When reinstalling the valve handle use a drop of medium-strength thread locking compound, such as Loctite 242, on the set screw.)

If the handle is still loose after tightening the set screw, remove the handle and file a small flat spot on the valve stem where the set screw sets. DO NOT allow the filings to fall around the valve stem. Reinstall the valve handle with the set screw seated on the flat area.

(3) With the valve stem packing nut properly tightened, some resistance should be felt as the valve handle is rotated after the initial opening force is overcome.

(4) Replace valve if defective.

5.2.10 Burner Fitting Leak Check

Pressurize system to at least 120 psi fuel pressure. All fittings must be free from leaks. Check fittings upstream of the blast and metering valves with the blast and metering valves in their closed positions. To check for leaks in burner fittings downstream of the blast and metering valves, one of the two valves must be open, with burner operating.

Note

Several changes were made to internal burner fittings with HPII update burners. If replacement of a fitting is required, be sure not to interchange parts between the two types of fittings. To differentiate, Swagelok fittings are identifiable by a small "C" on the fitting body or "Swagelok". Parker fittings are identifiable by a "P" or "Parker".

5.2.11 Pressure Gauge

The pressure gauge must be free from leaks and operate properly, the indicated pressure must be read easily. With all the burner valves in the closed position, the pressure gauge should indicate tank pressure. If the gauge is not functioning properly, replace it. If the pressure gauge lens is cracked, broken or damaged in a way making the gauge unreadable, replace the lens or the entire gauge depending on gauge type.

Note

A small amount of condensation can build up inside the pressure gauge. If this small amount does not interfere with the proper operation or readability of the gauge, the gauge does not require replacement.

Note

If the gauge is a Wika or McDaniel gauge, the type with red, yellow and green ranges, the lens is not replaceable as it is a sealed unit.

If a gauge does not work properly in an HPII burner, it may indicate that the push check in the gauge inlet is plugged with foreign material. (See Aerostar Service Bulletin #113) See Section 6.2.1(A) for HPII Burner Disassembly

5.2.12 Burner Operation

When the blast valve is opened, the pilot light should ignite the burner readily. The flame should have good directional control. It should bathe the coils in flame but not be directed out the side of the burner between the coil and burner can where it might contact the suspension cables during flight. After the blast valve or metering valve is closed, there will be a period, up to several seconds when residual fuel exits the heat exchanger coils. If the flame burns continuously after this period, the blast valve or metering valve is not shutting off completely. Take the appropriate valve apart and check for foreign material in the valve seat area or damage to the valve seat or stem. Clean or replace as necessary.

Note

Burner tests should be done in low light conditions to properly observe flame quality.

To adjust the flame on HPII nine-hole "S" coil:

(1) Use a 1/8 inch diameter punch.

(2) Insert the punch into the nozzle orifices and pry toward the center of the burner to redirect the propane gas jets.

(3) DO NOT redirect the flame further inward than necessary to remove large "spurs" from the flame. The burner coils might not receive enough heat to vaporize the fuel properly.

(4) Replace the nozzle coil if there is a serious flame misalignment.

To adjust the flame of HPII update & HPIII nozzle (Standard19 jet, Turbo 13 jet):

(1) Use a 5/32 I.D. tube or similar device that fits snugly over the jet to prevent pinching on the 19 jet HPIII Standard. (Aerostar nozzle adjusting tool available from factory at no charge).

(2) Use a 3 /8 " deep well socket and a 12 – 24" one piece extension to adjust the nozzles on the 13 jet HPIII Turbo.

(3) Adjust the jets to allow flame impingement on the coils without causing spurs.

CAUTION

THE HPII BURNER NOZZLE MUST NOT BE ADJUSTED TOO TIGHTLY AS FLAMEOUTS MAY OCCUR AT HIGHER ALTITUDES AS WELL AS SEVERE CARBON BUILDUP ON THE BURNER COILS.

Note

Jets located at corners of nozzle coil, nearest coil supports, should be directed slightly toward heat exchange coil supports (away from center). Adjusting the nozzle coil for greater flame impingement will reduce coil carbon-buildup.

Proper operation can be checked for both HPII and HPIII burners by operating the burner for about five seconds. After the burner "settles in" (after one or two seconds) observe the quality of propane vaporization between the nozzle jets and the flame front.

If the burner runs too "lean", there will be no visible propane, and the heat exchange coils will be hot with little or no water condensation on them. The cause, a wide flame pattern that is transferring too much heat into the heat exchange coils. The cure is to tighten the flame pattern.

Conversely, if the burner runs too "rich", there will be abundant liquid propane from the jets, frost may appear on the nozzle coil with excessive amounts of water condensation on the heat exchange coils. The cause, a tight flame pattern that is not transferring enough heat into the heat exchange coils. The cure is to widen the flame pattern.

The ultimate goal is to find a compromise between these two conditions. There should be primarily vapor with an occasional spurt of liquid propane visible at the jets.

5.2.13 Gimbal Operation

Check gimbal action for freedom of movement.

Burner gimbal should move freely without binding and return to center when released. On HPII and early HPIII single burners replace springs that are stretched or heat damaged. On HPIII burners verify that the drive pins are tight and not backing out. On HPIII dual and later model single burners, inspect the ½" pin at the gimbal blocks and replace if bent. (See Service Bulletin 131)

5.2.14 Burner with Electric Blast

If the burner is equipped with an optional electric blast valve, check the following:

(1) Verify that battery is charged. Recharge or replace as necessary.

NOTE

Lack of charge or charging may be caused either by the battery or the charger.

(2) Inspect power cables and connectors. Replace any damaged components.

(3) With fuel turned on, check valve for no leaks. Operate burner using the electric solenoid valve. If the valve does not operate properly, replace with valve obtained from the factory.

Note

Foreign particles imbedded in the valve seat can keep the electric blast from fully closing. If it is suspected that there are foreign particles in the valve seat, disassemble the solenoid valve, clean it, reassemble and test for proper operation..

5.2.15 Burner with Electric Ignition

If the burner is equipped with an optional electric ignition system, check the following:

(1) Verify that battery is charged, recharge or replace as necessary.

(2) Inspect power cables and connectors. Replace any damaged components.

(3) Inspect and clean or replace igniter as required:

With fuel shut off operate igniter and observe spark quality at spark plug electrode. Turn pilot light fuel supply on, operate igniter to ensure positive ignition of pilot light. Adjust orientation of pilot head and spark plug, if necessary to obtain reliable ignition.

5.2.16 Piezo Electric Igniter

Clean any soot buildup from the exposed portion of the electrode, check for proper operation. Adjust the electrode as shown in Figure 2.3. If there is no spark or it is weak (yellow rather than blue), replace the piezoelectric igniter.

5.2.17 Glow Valve Option

The glow valve option, fitted on HPIII burners only, must be free from leaks, operate smoothly, ignite readily when activated and shut off completely.

The handle should be free from damage, and unable to rotate or lock in the on position.

The nozzle bracket should be tight and free from excessive heat damage, replace if damage affects alignment or integrity of the glow head.

Nozzle orifices are to be unobstructed, clear any obstructions with a small wire or similar device.

The copper pilot tube should be directed past the main burner pilot light and towards the glow burner nozzle head to ensure immediate ignition of propane at the nozzle head. The flame from the glow burner pilot light should not hit the inside of heat exchange coils.

5.3 FUEL SYSTEMS

5.3.1 Tank Servicing and Inspection

WARNING

Aerostar Service Bulletin #137 specifies that all 10 gallon aluminum fuel cylinders must be removed from service. The continued use of these cylinders poses a serious safety risk in the event of an onboard fire or contact with power lines. Refer to Aerostar Service Bulletin #137 for additional information.

In order to perform a proper and thorough inspection of the fuel cylinder, remove all tank covers, pads and / or heat tapes. It may be necessary to clean any excessive adhesive residues left from the installation of heat tapes to perform the required leak tests. Inspect each fuel cylinder as follows.

(A) Fuel tanks MUST be inspected to insure that there are no leaks. Apply a liquid soap solution or a liquid commercial leak detector to all welded seams, around all tank fittings, valves or plugs, or any area of the fuel tank that is suspected of a leak. The leak inspection should be performed at a tank pressure of 100 psi. or higher.

(B) Fuel tanks MUST be visually inspected during the Annual/100 hour inspection. A cylinder that has leaks, defective valves, safety devices, or quantity gauges must be repaired. A cylinder that is bulged, or has evidence of physical abuse such as fire or heat damage, detrimental rusting, corrosion, dents or gouges beyond specified limits must be removed from service and marked as unairworthy.

NOTE

National laws (equivalent to United States DOT Regulations) vary slightly from one country to another. All fuel tanks must be tested, inspected and maintained in accordance with the applicable laws of the country of registration. These regulations may be more stringent than the servicing and inspection procedures defined herein. Compliance with these regulations may also apply.

(C) Each fuel tank must be re-inspected periodically. The first requalification is required 12 years after manufacture of the tank with each subsequent retest at 5-year intervals. A repair station may perform the visual requalification.

Certified repair stations or qualified test facilities MUST perform the tests in accordance with the visual test methods as described in DOT code 173.34(e)(10) and NLPGA pamphlet 118-91. Record the retest date on the tank collar by stamping or etching. (Note: Stainless steel tank damage limits are those specified for 60 lb. cylinders with .078 wall thickness).

NOTE

Appendix E of this manual contains the damage limitations for the different types of fuel cylinders used in Aerostar (Raven) hot air balloons. In addition, it contains the instructions for the stamping or tagging of fuel cylinders following the recertification inspection, as well as the proper procedures for identification and disposal of fuel cylinders that are found to be in an unairworthy condition.

(D) Pressure relief valves on 10-gallon fuel tanks MUST be replaced every 5 years. A logbook entry including tank serial number must be made to document that the replacement has been accomplished.

5.3.2 Tank Liquid Valves

Inspect tank valves to insure compliance with Aerostar Service Bulletin No. 135. If not in compliance, replace valve bonnet as directed in the Service Bulletin.

The tank liquid valve must operate without binding, be free from leaks, and shut off completely. Be sure to check the valve stem for leaks when the valve is in a partially open position and also in the full open position. Check the valve handle for looseness and tighten its attachment screw if necessary. A defective valve MUST be replaced.

In single burner multiple-tank systems, check each tank valve bonnet with its valve closed, and with one of the remaining tank valves opened to pressurize the bonnet in question. Open and close that valve several times to break loose the O-ring. If the valve leaks through its bonnet - replace the O-ring. If bonnet inner walls are scored or pitted, replace the bonnet.

Defective O-rings may be replaced with: (See Figure 5.2.1)

Valve	O-Ring	Bonnet
Rego 9101CI	P/N 51034-07	P/N N/A
Sherwood 3250(15 & 20 gal tank)	P/N 51034-08	P/N 52275-05

5.3.3 Tank Pilot Light Valves (Nupro) if installed (includes new style nupro valve with additional locking nut, used for liquid withdrawl on ELS and ELSS gondolas with horizontal tanks)

For systems using vapor pilot lights, a Nupro valve is used to control the fuel flow from the fuel tank.

Check for leaks at the valve stem area as the valve is opened and closed. Also, check that the valve shuts off completely when closed. As required in section 3.3, tighten the valve stem-packing nut on Nupro pilot light valves using the following procedure:

(1) Remove all ignition sources from work area.

(2) Insure fuel line is connected to both tank and burner to prevent fuel leakage.

(3) Open the valve by rotating the valve handle COUNTERCLOCKWISE TWO COMPLETE TURNS from the closed position, this prevents damage to the valve stem tip when the valve stem-packing nut is tightened.

(4) Loosen locking nut if applicable to the valve being serviced.

(5) Tighten the valve stem packing nut in a CLOCKWISE direction to a torque value of 60 in-lbs. or 5 ft-lbs. (IMPORTANT: Torque values greater than 60 in-lbs. may make the valve difficult to operate.)

WARNING

If a fuel cylinders has any amount of propane remaining in the tank and the valve stem-packing nut is rotated in a counterclockwise or loosening direction, the valve bonnet may come loose from the valve body resulting in propane being expelled from the tank at a high rate.

Recommended Tools:

- Torque wrench calibrated in inch-lbs.

- 9/16" "crow's foot" wrench. (When using, orient the "crow's foot" 90 to the torque wrench to prevent inaccurate torque readings. (See Figure 5.2.2)

- OR -

- Torque wrench calibrated in inch-lbs. and a 9/16" socket.

(6) With the valve stem-packing nut properly tightened, some resistance should be felt as the valve handle is rotated after the initial opening force is overcome.

(7) Snug locking nut if installed.

(8) Replace valve if defective.

5.3.4 Pilot Light Regulators (Vapor pilot lights only)

The regulators must be leak-free. Three types of regulators are used on the fuel tanks:

- A non-adjustable, long, brass-bodied regulator, Part No. 51043-27.

- An adjustable, aluminum alloy bodied regulator, Part No. 51043-10.

- A non-adjustable, short, brass-bodied regulator, Part No.51043-03.

The pressure supplied to the pilot light should provide a flame 4"-8" tall. Regulator P/N 51043-10 may be adjusted using the adjustment screw on the bottom of the regulator. Turn the screw clockwise to increase output, counterclockwise to decrease output. If the regulator cannot be adjusted into tolerance, replace it with regulator P/N 51043-27. If the regulator P/N 51043-03 does not provide a proper flame, replace it with regulator P/N 51043-27.

5.3.5 Fuel Quantity Gauges

Check the four retaining screws on the fuel gauge for tightness. The fuel gauge must not leak. If there is a leak and the retaining screws are tight, the rubber gasket is damaged and must be replaced. To replace the fuel gauge gasket, FIRST drain the tank, remove the gauge assembly by removing the four retaining screws. Remove the damaged gasket and replace with a new gasket.

Check the fuel quantity gauge for proper operation. On the top of each quantity gauge is an arrow that indicates the direction of the float device attached to the gauge assembly. To check the operation of a vertical fuel tank with an indicated quantity of 40% or higher, tip the fuel tank in the opposite direction of the arrow. The fuel gauge should indicate a

decreasing fuel quantity. With an indicated fuel quantity of 40% or lower, tip the fuel tank in the direction of the arrow. The gauge should indicate an increasing fuel quantity. For horizontal fuel tanks use the same technique but determine the direction to tip the tank based on an indicated fuel quantity above or below 50%.

If the fuel quantity gauge does not operate properly or sticks during testing, drain the fuel tank, remove the gauge assembly. Inspect the gear assembly for possible defects. Repair if applicable or install a new gauge assembly. See section 6.3.5 for repair procedures.

The fuel quantity gauge dial must be readable. If the dial is damaged or is unreadable for any reason, install a new dial. The dial can be replaced without draining the tank and removing the entire fuel quantity gauge assembly.

5.3.6 Fuel Hoses

Perform a visual inspection of each fuel hose looking for any minor abrasions to the outer braided cover. If the outer covering is worn exposing the inner metal braid the hose MUST be replaced. Run your hand slowly down the length of each hose, noting any bulges, kinks or other imperfections.

Perform a leak test by submerging each fuel hose in water and pressurizing the hose to a minimum of 120 psi. using any non-flammable compressed gas source available. (Nitrogen, compressed air) Allow time for the outer braid to become saturated in order to release any bubbles contained in the outer braid. Any continuous trails of bubbles are an indication of a leak in the fuel hose. Replace any defective fuel hose.

Note

Do Not use Helium gas for the purpose of leak testing fuel hoses.

Inspect the hose end connections to ensure that fittings are not corroded, overly worn or have stripped threads. On those fuel hoses equipped with hand-operated POL fuel tank connections, replace the O-ring on the male POL fitting as follows (See Figure 5.2.1).

If the male POL fitting is:	Use:
Fisher P/N 51042-01 (M388) (TI2945)	Fisher O-ring P/N 51034-04
Rego P/N 7193 C-10 (Do Not Stock) (7193-1)	Rego O-ring P/N 51034-03

Fuel hoses used in Aerostar (Raven) systems requires a one-time inspection to verify that the manufacture date of that hose is not 3Q84, 4Q84, 1Q92, 2Q92, 3Q92, or 4Q92. A logbook entry must appear stating that this one-time inspection has been performed. See Service Bulletins 120 and 132. This bulletin applies to balloon systems and fuel lines manufactured prior to September 1993.

Note

Fuel hoses must be replaced at 10-year intervals. A log book entry must be made to properly document this replacement.

Note

Starting in 1996 all fuel hoses manufactured by Aerostar were stamped with the quarter and year on the fitting at one end of each individual hose assembly.

Note

For fuel hoses manufactured prior to 1996, if the hose manufacturing date, (year and quarter), is clearly readable on the fuel hose outer braid, etch the date and quarter onto the hose end fitting for future reference. If the date cannot be clearly identified, do not mark the hose end fitting.

5.3.7 Fittings

All fittings must be free from leaks. Replace fittings that show a significant amount of overtightening, corrosion or crossthreading.

5.3.8 Fuel Supply System (Operational and Leak Check)

To test the fuel supply system for leaks, use a household soap and water solution or a commercial product such as Nupro Snoop Liquid Leak Detector. For temperatures below freezing, use Nupro Real Cool Snoop Leak Detector. Cover the test area with the leak detecting solution. Leaks are indicated where the solution foams or bubbles. Flush with water to remove the leak solution after testing.

Test the following areas for leaks and check for proper operation or condition: Tank valves in a partially open and full open position, fuel line fittings at tank and at burner, fuel hose connections, additional fittings and regulators (if so equipped).

The operational checks should be performed in conjunction with the burner operational tests required in section 5.2.

When the blast valve is opened, the pressure gauge will normally indicate a pressure drop of 5 to 20 psi., with the larger pressure drop occurring with the higher tank pressures. There is a fuel supply problem if:

- Pressure drops more than 20 psi.
- Operating pressure decreases rapidly during a burn of 20 to 30 seconds.

The cause of the problem could be:

- The liquid tank valve is not open fully.
- The fuel line or burner is obstructed.
- The tank liquid withdrawal tube is obstructed, cracked or disconnected.

To isolate and remedy the malfunction, interchange properly working components (tanks, fuel lines, burners) with components that have questionable operation.

5.3.9 Pressure relief valve

Inspect the pressure relief valve for leaks or for signs of discharge; insure that all adapters and dust caps (if applicable) are in place.

On 10 gallon aluminum fuel cylinders verify that the valve has been replaced at the required intervals. If the valve is out of the five-year requirement, replace the valve as described in section 6.3.9.

5.3.10 Liquid Level Valve

Inspect the liquid level valve or spit valve for proper operation and to insure that there are no leaks past the valve seal. If leaks or defects are found, repair as specified in section 6.3.10.

5.4 GONDOLA INSPECTION

Begin the gondola inspection by assessing the overall condition of the gondola. Evaluate the shape of the lower woven portion of the basket. Areas of broken or scuffed rattan or leather may be indications of possible hidden structural damage. With the uprights installed evaluate the proper alignment of the gondola frame. This can best be accomplished by viewing the basket from a short distance in order to see the gondola as a complete assembly. Pay particular attention to any suspected damaged areas during the following inspections.

5.4.1 Rattan

The rattan must be sufficiently intact so that the occupants and their equipment are enclosed and protected. Repair areas with vertical or horizontal damage greater than 4 inches or within 18 inches of another damaged area. Trim any broken rattan that protrudes into the basket and could injure occupants. If there are more than two adjacent vertical rattans broken at the skid, repair as per 6.4.1.

5.4.2 Plywood Floors

Plywood floors must be free from damage due to decay, delamination, or other damage that might affect their strength. Damage to the floor can be considered “minor damage” if it does not penetrate more than 2 plies of the floor and has a diameter of no more than ¾ inch. Minor damage may be repaired as specified in section 6.4.2 of this manual

If damage is extensive, affecting the security of the floor, floors of RWS, RWSW, ELS, ELSS, CW, CWS and RB gondolas must be replaced.

TW & RW floors may be repaired by any method approved by Aerostar, since their floors are not replaceable. Consult with the factory to evaluate damage, and for recommendations for proper repair techniques.

5.4.3 Tank Straps and Moorings

Check all fasteners, webbing, stitching, buckles, etc. in the assembly that holds the fuel tank in the gondola. Slight abrasion of the webbing is allowed, but no more than 20% of the webbing material may be damaged or missing. Wear or breakage of any part that may cause failure of the tank restraint system is grounds for replacement of that part. In vertical tank systems, check vertical stakes for breakage where the webbing passes through. Cracking of vertical stakes at that location is acceptable, but total failure of the stake calls for replacement of the failed piece, (see section 6.4.1).

When 15 gallon or larger vertical tanks are installed in the basket, ensure that the upper tank strap securing the tank to the gondola passes up and over the shoulder of the tank so as to apply downward pressure on the tank holding it in place.

5.4.4 Tank Pads or Shoes (Optional on some models)

Inspect the tank shoes or pads (if installed) to insure they are securely fastened to the gondola floor. If they are damaged to the extent that they no longer protect the floor from possible damage they must be replaced. (see section 6.4.4).

5.4.5 Fire Extinguisher

The fire extinguisher must be in good overall condition, including the safety pin and actuation handle. Check the extinguisher gauge to insure that it is properly charged. Check to see if the extinguisher bracket or pouch is properly secured in the gondola. Verify the required recharge of extinguisher has been performed as specified in section 2.4(3).

5.4.6 Interior Passenger Handles (where applicable)

Inspect the interior passenger handle ropes for damage that may affect their strength or ability to restrain the passenger in a hard landing. Inspect the handle attachment points for possible damage that may allow them to break loose during a rough landing, this may include vertical canes, siderail frames, etc.

5.4.7 Exterior Carrying Handles

Inspect the exterior carrying handles and their ropes for any damage that may affect their strength and/ or security, replace any damaged parts.

5.4.8 Scuff Leather

The leather scuff protector at the bottom of the basket must protect the rattan beneath it from abrasion. If the leather is loose, reattach or repair as needed. Replace severely worn leather that exhibits abraded holes or tears that in turn expose the rattan or lower frames to possible damage.

5.4.9 Hardware (Including quick pins, wirelock pins, superstructure bolts and locknuts, floor and skid hardware and optional seat hardware

Inspect all gondola hardware for damage that might affect its strength. Any hardware that is worn, bent, cross-threaded, stripped or shows sign of metal fatigue or stress must be replaced with FAA approved parts. Inspect the following hardware for specific damage:

(1) Quick Pins

For Model RW, RWS, RWSW, CW, CWV, CWS, RB or TW baskets, replace bent pins, pins with the head loose from the shank or pins with any of the ball bearings missing from the tip. Lubricate with a silicone spray, Tri Flow or similar lubricant. If the quick release pins used to connect the support tubes to the lower frame tubes are in good condition, but they can still be removed without depressing the release button, replace with a quick pin with a keeper plate or a bolt and locknut.

Note

Some models of baskets, mfr'd after 5/86 have a retaining plate attached. Should the support tube holes elongate enough to allow the pin to be removed without depressing the release button, the pin lanyard may be released from the basket and re-attached closer to the holes so that the retaining plate may be used.

(2) Wirelock pins

Wirelock pins used on the ELS, ELSS and RB baskets, are two completely different strength grades very similar in appearance. The ELS, ELSS pins are stamped with the letter "A" on the head, while the RB pin is stamped "S".

CAUTION

Either “A” or “S” style pins may be used on the ELS and ELSS gondolas, however the “S” style pin MUST be used on all RB model gondolas.

The spring gate should require some effort to snap it into place. The ends may be compressed together to increase the closing effort required. Otherwise, if the spring is non-functional or the pin is bent, replace the entire pin assembly. RB wirelock pins should always be installed with the heads toward the exterior of the basket.

(3) Aircraft Bolts and Locknuts

Damaged or excessively worn bolts or locknuts must be replaced. Check to be sure that all bolts/nut are snug and that the end of the bolt extends through the edge of the locknut.

(4) Floor and skid hardware

Check to insure the floor and skids are held securely in place. Replace any hardware that is damaged or does not adequately hold the item in

place. Replace any skid hardware that extends to the bottom edge of the skid and is worn. (See section 6.4.10 of this manual for repair techniques)

(5) Seat Hardware

A variety of hardware has been used throughout the years to secure the optional seats over horizontal 20 and 25-gallon fuel cylinders. For older seat assemblies inspect the coated cable, rapid links, nylon straps, buckles and anchors for damage that might effect the security of the seat. For gondola seats build after 1995 inspect the u-bolts, locknuts, hinges and spacer blocks for damage that might affect the security of the seat installation. Replace any damaged parts.

5.4.10 Skids

(1) Model CW, CWV or CWS Baskets (Old style)

The skid made from oak 2" x 4" must be securely fastened to the floor, at its corner butt joints, free from decay, without serious cracks, and without excessive wear. If skid bolts are wearing, replace or repair the skid.

(2) Model RW, RWS or TW-1 Baskets

The skid is made from oak 1" x 4". It must be securely fastened to the gondola substrate and floorboard. It must be free from decay and excessive wear. Replace the skid if it is worn enough to expose the skid attaching bolts to abrasion. Replace splintered skid boards. Replacement of the skid is accomplished by removal of attaching bolts through the floor. Use new mounting hardware if worn or broken.

If the edge of the skid board is worn so that the weaving substrate above it is exposed to abrasions, replace the skid board.

If the 2" x 4" substrate becomes cracked, the crack may be filled with waterproof carpenter's glue and the board clamped until cured.

(3) Model TW-2,

The skid for the TW-2 made from oak 1¼" x 3. ". It must be securely fastened to the gondola substrate and floorboard. It must be free from decay and excessive wear. Replace the skid if it is worn enough to expose the skid attaching bolts to abrasion. Replace splintered skid boards. Replacement of the skid is accomplished by removal of attaching bolts through the floor. Use new mounting hardware if worn or broken.

If the edge of the skid board is worn so that the weaving substrate above it is exposed to abrasions, replace the skid board.

If the 2” x 4” substrate becomes cracked, the crack may be filled with waterproof carpenter's glue and the board clamped until cured.

(4) ELS, ELSS or RWSW (Aurora) Baskets

The skid for the RWSW and ELS, ELSS basket (Aurora 54K) is constructed using 1½” x 2½” oak. The skid should be replaced if it is worn down to the attachment or lag bolts. Also replace it if cracks threaten the strength of the board.

(5) Model CW, CWS, RB5, RB6, RB8 or RB12 Baskets (New Style)

The skid made from 2” x 4” must be securely fastened at its corner and butt joints, free from decay, without serious cracks and without excessive wear.

Note

Poly skid protectors (alternative wear-resistant materials) are available from Aerostar as optional retrofit kits to be installed in addition to the skid board on all models. These poly skid protectors are standard on RB5, RB6, RB8 and RB12 baskets. (See allowable skid damage prior to installation.)

Note

All baskets manufactured since February 1, 1992 are equipped with readily removable skids for ease of replacement.

5.4.11 Aluminum and Stainless Steel Tubing

The tubing that is used to form the structural load-carrying portion of the basket is made of either aircraft grade aluminum or stainless steel. You may identify stainless steel by the manufacture’s markings, shinier appearance and heavier weight when compared to aluminum.

The tubing, regardless of type must not show signs of cracking, kinking, buckling, collapse, localized overstress, or corrosion/scratches/gouges other than minor (less than 1/32” deep) surface scratches.

There are three types of bends that may be present on the tubing: 1) **controlled designed bends-** used to form the shapes of the basket components. 2) **Uncontrolled localized bends-** abrupt bends occurring during use due to impact or excessive stress

where the bend occurs at a distinct location. 3) **Uncontrolled gradual bends-** a bend that occurs over a length of tube due to the application of excessive force.

The aluminum and stainless steel tubing must not be bent in an uncontrolled localized manner. Any visible signs of bending in this manner and/or distinct crease lines from such a bend indicates that the part MUST be replaced. Uncontrolled bend radius deformation of tubing may weaken it below acceptable limits.

The aluminum tubing must not be bent in an **uncontrolled gradual manner.** Any visible signs of bending in this manner on aluminum tubing dictate that the part MUST be replaced. Stainless steel tubing may be bent back into its original shape if the bend does not exceed 5°.

The various components of the basket may be subjected to forces sufficient to slightly straighten or over-bend components formed with **controlled designed bends.** In the event the basket appears to be misshapen, leans, or it is difficult to install the uprights on the basket, this may indicate that a change has taken place to one or more of the shaped components of the structure of the basket. Contact Aerostar customer service for specifications to be checked to determine whether the basket remains serviceable.

Particular care should be taken when inspecting superstructures, which may use a combination of aluminum and stainless steel tubing (through the exercise of options, replacement parts, etc.). In these instances, the added strength of the stainless steel members may induce extra bending stresses in the aluminum tubing and result in localized tube damage.

Note

There may be a combination of aluminum and stainless steel superstructure parts in some baskets. These combinations may be acceptable. For example: Stainless steel support tubes and aluminum side frames.

5.4.12 Lower Gondola Frame

Depending on model of gondola the lower frames may be aluminum or stainless steel. Inspect the lower frame tubes to insure that there is no bending or other damage that exceeds the limitations as stated in section 5.4.11. Check to see that the lower frames are properly secured to the gondola floor or skids, depending on model.

5.4.13 Lower Frame / Superstructure Interface

The connection of the superstructure or uprights to the lower gondola is accomplished with a variety of assemblies depending on model of gondola. The components (lower frames, support tubes and assorted hardware), that make up these interfaces should be inspected as specified in their appropriate paragraphs of this section.

Inspect each type of interface as follows:

(1) Model RW gondola:

This interface is accomplished by inserting the superstructure tubes inside the lower frame tubes, and is secured with eight quick release pins. Inspect to see that the quick pinholes are properly aligned with the uprights installed. If the quick pinholes exceed .215 in. keeper tab must be used or the pin should be replaced with an aircraft bolt and locknut. If the diameter of the quick pins hole exceeds .220 in. the parts must be replaced

(2) Model CW, CWS, RWS, and TW gondolas:

This interface is accomplished with a aluminum interface pin that is bolted into the side frames of the superstructure. The interface pins are then inserted into the lower frame and secured with eight quick release pins. The interface pin MUST be completely removed and inspected. The interface pin MUST not be bent, or show signs of damage other than minor (less than 1/32 " deep). If the quick pin holes in either the support tubes or the interface pin exceed .215 in., a keeper tab must be used or the pin should be replaced with an aircraft bolt and locknut. If the diameter of the holes exceeds .220 in. the part must be replaced.

(3) Model RWSW gondola:

This interface is accomplished with a aluminum interface pin that is bolted into the lower frame. The superstructure is then placed over the interface pin and secured with eight quick release pins. The interface pin must be completely removed and inspected. The interface pin MUST not be bent or show signs of damage other than minor damage (less than 1/32 inch deep). If the quick pin holes in either the support tubes or the interface pin exceed .215 in., a keeper tab must be used or the pin should be replaced with an aircraft bolt and locknut. If the diameter of the holes exceeds .220 in. the part must be replaced.

(4) Model ELS, ELSS gondola:

This interface is accomplished with an aluminum or stainless steel removable over-sleeves that fits over both the lower frame and the superstructure support tubes. The oversleeve has two upper holes and two lower holes in order for the operator to adjust the height of the uprights and burner. The oversleeve is secured to the lower and upper frames by the use of eight wirelock pins. The oversleeve must be inspected to insure that it is not bent, twisted or has any other damage other than minor damage (less than 1/32 inch deep). If any of the holes in the support tubes or the oversleeve exceed .295 in. the part must be replaced.

(5) Model RB gondolas

This interface is accomplished with an aluminum interface pin in combination with a steel oversleeve which are both bolted to the lower frame. The superstructure is then place over the interface pin while inside the oversleeve, and is then secured with four steel wirelock pins. It is not required to remove either the interface pin or the oversleeve, however both should be inspected to insure that the wirelock pin holes are not elongated. They should also be inspected to insure that they are not bent, twisted, out of alignment or have damage other than minor damage (less than 1/32 in. deep). If any of the holes in the interface pin, oversleeve or the support tubes exceed .295 in. the part must be replaced.

5.4.14 Superstructure

Gondola superstructure or upright tubes may be aluminum or stainless steel. The main support tubes or side frames are connected to the crossbar sections using a variety of extruded fittings and / or load blocks. In addition the connections are secured with several different kinds of hardware, including aircraft bolts, locknuts, quick release pins and wirelock pins. Inspect the individual components as outlined in the appropriate section. Inspect each superstructure as follows.

(1) Inspect for bends per section 5.4.11

(2) It is recommended that the upright covers and /or pads be removed to perform a thorough inspection of the superstructure tubing and fittings.

(3) Inspect the superstructure for overall symmetry. Inspect the extruded connector fittings for security and uniform position. Check to insure that all associated hardware is tight and /or in good condition.

(4) On all aluminum 4-point superstructures the load blocks must be lower and the holes through the superstructure tubing inspected for cracks, breaks or significant fretting corrosion.

(5) Install the burner onto the superstructure in order to inspect the burner blocks for proper positioning and alignment with the burner holes. Adjust the superstructure or burner blocks if needed to improve alignment. See section 6.4.16.

Note

Aerostar Service Bulletin # 133 requires that a cable back up redundancy system be installed to any RWS, CW and CWS 4-point gondola with aluminum superstructure tubes.

5.4.15 4-Point Load Blocks

4-point load blocks can be for either A-block style envelope load fittings or carabiner connectors. The blocks must not be bent, damaged, cracked or have damage other than minor (less than 3/32" deep). Replace any unairworthy parts. All hardware must be tightened as specified in section 6.4.16.

5.4.16 Burner Blocks (4-Point & AFX)

There are two styles of the burner block. The standard block has a set of holes for burner installation. The speed block has a set of oblong holes in place of the standard burner holes. One speed block may be installed as an option.

The burner block must not be bent, damaged, cracked or have damage other than minor (less than 3/32" deep). Replace any unairworthy parts. All hardware must be tightened as specified in section 6.4.16.

5.4.17 2-Point Load/Burner Blocks

Inspect the load blocks to insure that they are not bent, cracked or have damage other than minor (less than 3/32" deep). Check to see that the block is secured in place and is properly aligned for burner and envelope load block installation. Replace any unairworthy parts.

5.4.18 RB Passenger Ride Gondolas

The RB series of partitioned ride gondolas are designed to separate and protect multiple passengers. These gondolas contain additional structural components that must be inspected as part of each annual / 100 hour inspection.

The metal siderail frame including compartment siderails must be inspected to insure that the frame in intact. Check all welded or clamped connections for possible breaks or loose fittings. See section 6.4.18 for repair techniques.

Inspect each compartment to insure that the interior pads are in place. The cable lacing the upper portion of the partitions or pads must be intact. Inspect the interior passenger handles per section 5.4.6.

RB6, RB 8 and RB 12 gondola incorporate secondary lower frame tubes that are utilized for additional structural support and to secure the fuel cylinders into the pilot compartment. These gondolas also include a protective frame that bolts into the siderail frame and continue over the collars of the fuel cylinders. These tubes may have small dents (less than 1inch in. diameter), minor surface damage (less than 3/32 in depth), or minor bends (not to exceed a 5º bend).

The pilot compartment may contain a small plywood sub floor with one, two, or three foam spacers used to elevate the pilot platform to the desired height. The sub floor and

any installed spacers must be removed to properly inspect the gondola floor. The pilot sub floor and spacers must be inspected for damage. Replace any broken components. The RB series of gondolas include additional passenger entry steps. Inspect the support ribs and leather covers to insure that no sharp edges protrude through the rattan.

5.4.19 AFX Gondola (CW and RWSW)

Refer to Section 6.4.19 for repair and replacement of components.

(1) Inspect the top frame load fittings to insure that damage does not exceed the following limitations:

(A) Main Load Blocks: no dents, digs gouges, scratches or damage other than minor (deeper than 3/32").

(B) Socket Tubes : no dents, digs, gouges, scratches or damage other than minor (deeper than 1/32"), the tube MUST not be bent or collapsed, the welds connecting the socket to the main block MUST not be cracked.

(C) Lugs : Must not be bent or cracked, the carabiner and cables MUST fit easily into the lugs, the interior of the lug may be worn, but MUST have minimum thickness of .160".

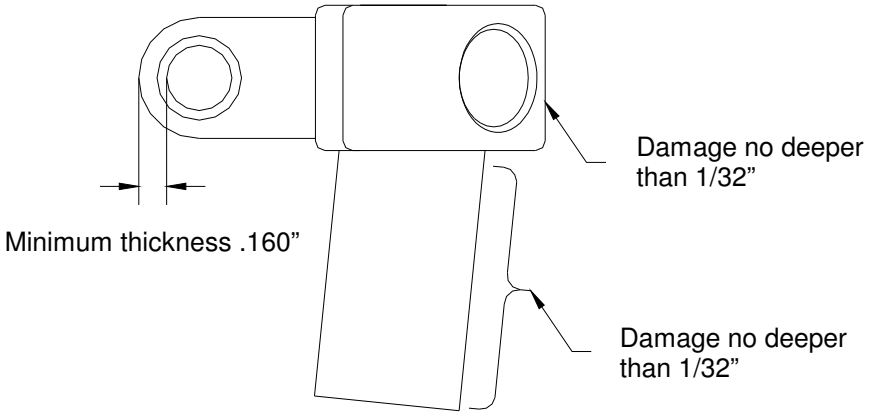


Figure 5.4.19 AFX Load Block

Note

In 2003 a modular AFX load block was introduced allowing the replacement of damaged components instead of the entire block assembly.

In addition inspect the hardware as specified in section 5.4.9. Replace any unairworthy parts.

(2) Inspect carabiners for smooth operation and locking collar function. Replace if bent, abraded or excessively worn. USE ONLY PROPERLY CERTIFIED, FAA APPROVED CARABINEERS.

(3) Remove and closely examine support rods for nicks, scoring, gouges, bending or signs of heat damage. REPLACE WITH PROPERLY CERTIFIED, FAA APPROVED PARTS.

(4) Remove leather cover by cutting nylon "zip tie" in bottom hem, undoing small rapid link to the cable at the top, and pulling cover off over lower socket. Inspect leather for wear in the "hinge" area at the bottom. The lower portion (approximately 8") can be replaced if excessively worn, without replacing the entire cover.

(5) Ensure that the stitching is intact at the webbing where the cable rapid link is attached, and at the top of the hose sleeve.

(6) Disassemble lower rod socket by removing bolts, washers, cable thimble and nuts. Inspect rod sockets and top of lower frame tubes for cracks, bends, and bolt hole distortion.

Note

Aerostar Service Letter #112 outlines the instructions for the replacement of the lower AFX cable with a cable constructed from Stainless Steel cable in place of the Galvanized cable used prior to November 1999. After this retrofit is completed it is not required to disassemble the lower rod socket, remove and inspect the lower cable.

(7) Inspect the cables, both upper and lower, for fraying or other damage. This may be done by running the cables through a soft cloth or cloth gloves slowly and feeling for sharp spots that may snag indicating a broken wire. Cable should be free of rust and corrosion. Damaged parts must be replaced with new.

(8) Check stabilizer brace for integrity and security. Tighten bolts and nuts. Replace damaged parts with factory obtained parts if needed.

(9) Inspect nuts, bolts and washers for damage, and replace with new parts if needed.

5.4.20 Model G Gondola (Aluminum Square Tubing)

The aluminum square perimeter tubing must not be cracked, broken or have weld failures.

5.4.21 Model G Gondola (Fiberglass Liners & Panels)

Fiberglass liners and panels should have no un-repaired holes or cracks.

5.5 INSTRUMENT INSPECTION

5.5.1 General Inspection

The altimeter, rate-of-climb and pyrometer or envelope temperature indicators must be in operating condition. Section 2.1 requires the operator to notify the inspector at the time of the inspection in any of the instruments is not functioning properly during flight operations. If any of the instruments are malfunctioning, see section 6.5 for further information. The instrument bracket or strap should be fastened securely in or on the gondola. Batteries (if equipped) should be replaced or recharged as appropriate, if 20% or more of the rated voltage has been lost. (20% of 9 volts = 7.2 volts) Batteries should be tested while installed in the instrument and the instrument operating. For Ball 655 and M55 models, be sure to test the appropriate battery for the position of the power switch.

Altimeters are to be accurate to within plus or minus 200 feet, and pyrometers to within plus or minus 5^{o}F.

5.5.2 Altimeters

Altimeters are to be accurate to within plus or minus 200 feet.

(1) For standard altimeters determine function by getting current barometric pressure and set this reading in the Kollzmann window. The indicated altitude should closely match the known elevation of the repair facility.

(2) For Ball 655R model instruments determine function by setting the current barometric pressure into the instrument the indicated altitude should match the known field elevation within 200 feet. In addition, place the unit on the floor, zero the altimeter or set the repair station's altitude and raise the Ball 655 up to at least 6 feet in height (10 feet recommended). Note change in the altimeter display and verify proper reading.

(3) The Ball M-55 has a barometric setting that corresponds to the indicated altitude. Obtain the current barometric pressure, set this reading with the selection switch on BAR, switch to ALT and verify the altitude reading with the reference altitude.

(4) The Ball M-57 model instrument has a barometric setting that corresponds to the indicated altitude. Obtain the current barometric pressure and adjust the barometric pressure display using the following procedure:

(A) With the instrument on and the flight screen displayed press the ➲ button twice to place the cursor to the BAR position.

(B) Using the ➚ and ➘ buttons, adjust the barometric pressure to the current Pressure. The altitude will change as the barometric pressure is changed. When the current pressure is set the altitude shown MUST be +/- 200 ft. of the known field elevation.

5.5.3 Rate-of-Climb Indicator

Without the proper equipment, verifying operation of rate-of-climb is not possible. The operator is the best source of information concerning operational history. It is possible to verify that the instrument zeros out in a resting position. The VSI should indicate 0 + or – 50 feet per minute. If equipped with an electronic VSI, raise and lower the instrument. The VSI should indicate a trend corresponding with the movement of the instrument.

5.5.4 Wire Style Pyrometers

Inspect the wire, where possible, for burns, cuts and other obvious damage. Disconnect the throat connector (when not covered with heat shrink) on the Ball system and inspect for damage, corrosion and oxidation of the connector pins.

(1) Thermocouple pyrometer wires.
Visually inspect the thermocouple sensor for cracking and/or separation of the two wires. If the end is not intact, proper operation may not be possible.

(2) Digital Pyrometer Wires
Check for broken wires and/or plug connectors. Look for corrosion and oxidation. On Ball pyrometer sensors there should be an even white coating (paint) on the entire surface of the sensor and housing. Without this coating improper operation is possible. (See Aerostar Service Bulletin #121)

5.5.5 Thermocouple Operation

Verify the performance and accuracy of the instrument and its sensor. Locate the end of the thermocouple wire and immerse in a thermos of hot water or similar method. Use a calibrated thermometer to determine the temperature of the water. Read the indicated temperature on the pyrometer's display and compare. If not within ± 5 degrees calibrate as per Section 6.

5.5.6 Digital Pyrometer Operation

Verify the performance and accuracy of the instrument and its sensor.

Note

DO NOT place digital sensors directly into hot water. Before immersing, place the sensor into a watertight protective sleeve.

Locate the digital pyrometer sensor and place the sensor in a watertight plastic sleeve, then immerse the sensor into a thermos of hot water or similar method. It is necessary to heat soak the sensor unit for 15 to 20 minutes. Use a calibrated thermometer to determine the temperature of the water. Read the indicated temperature on the pyrometer's display and compare with the known temperature of the water. If not within ± 5 degrees refer to Section 6.5.

5.5.7 AEGIS IR™ Operation

Remove the transmitter from the top cap pocket and remove the battery. After 7-10 minutes (or placing a coin across the terminals for 1 minute to discharge the transmitter's capacitor), install a sufficiently charged battery and the unit will begin transmitting the current room temperature.

Observe the transmitter window to verify operation. A small green LED will blink every 3-4 seconds continuously for about 1 hour. Compare the room temperature with the instrument data. The indicated temperature on the receiver should read no more that ± 5º of the calibrated thermometer's room temperature, if not see Section 6.5.

Inspect the temperature probe at the transmitter to ensure that it is straight (perpendicular to face) and undamaged. The receiver unit and its wire connections must be free from damage. Inspect the lens for scratches or other damage.

5.5.8 Ball M57 Wireless Pyrometer Operation

Locate the transmitter at the top of the envelope. Remove the battery and verify proper voltage as specified in section 5.5.1. While the battery is removed, locate the Day/Night switch in side the battery compartment. The Day/Night switch must be flipped to the Day position in order for the auto On/Off feature to operate.

NOTE

When the Day/Night switch is in the night position the transmitter will bypass the photocell and operate continuously. When the switch is in the Day position the transmitter turns on automatically when the photocell is exposed to light, and turn off within 5 minutes when the photocell is covered.

If the battery voltage is adequate, re-install battery. If voltage is not adequate install new battery. The transmitter will begin to emit a short beep every four seconds if the transmitter is functioning properly. If the transmitter emits a continuous signal the transmitter is malfunctioning and MUST be returned to Ball Variometers for repair.

With the main instrument on and displaying the flight screen, verify that an envelope temperature is displayed. The temperature displayed should be +/- 5º of a calibrated thermometer's room temperature, if not see Section 6.5.

6.1 ENVELOPE REPAIR

The following paragraphs are designed to detail the procedures for the repair of all the components of the hot air balloon envelope.

6.1.1 Tell-tale Replacement

The temperature "tell-tale" must be replaced on Annual/100 hour inspections only if the 250°F tab has been turned black. The telltale is held in a thin porous pocket sewn to the center of the top cap. Care must be taken not to sew through the sealed telltale. Moisture that could pass through stitch holes will cause the telltale to turn black.

6.1.2 Fabric Repair and Replacement

(1) General Information

(A) Damaged fabric must be repaired or replaced by one of the methods described in the next section, using only materials that are FAA approved for use in hot air balloons manufactured under FAA Type Certificate A15CE.

Note

Fabric used to repair Aerostar/Raven hot air balloon envelopes must be FAA approved for use in balloons manufactured under Type Certificate A15CE. Approved fabric may come from several sources;

1) Fabrics manufactured and certified to Aerostar specifications;
    a. 52910, 2.2 oz. Diamond Weave Ripstop, urethane coated nylon
    b. 52809, 2.25 oz. Diamond Weave Ripstop, silicone coated nylon
    c. 52812. 1.25 oz. Diamond or Square Weave, silicone coated nylon.
    d. 51004-40, 53144 Aerostar Adhesive Fabrics
    e. 51004-130 2.2 oz. Lindstrand Diamond Weave 52910, EN0003
    f. 51004-131 2.0 oz. Lindstrand Standard Ripstop, EN0001, EN0002
    g. 51004-132 2.8 oz. Lindstrand Hyperlife, EN0004
    h. 51005-133 1.25 oz. Lindstrand Soarcoat, EN1011
2) Fabrics approved under an FAA PMA certificate for use in balloons certified under Type Certificate A15CE.
3) Fabrics approved under an FAA STC for use in balloons certified under Type Certificate A15CE.

For all repairs performed with a fabric other than those manufactured to the Aerostar specification listed in item 1 above, a copy of the required test results must be attached to the FAA Supplemental Type Certificate (STC), FAA Parts Manufacturer Approval (PMA) or FAA Form 337, which must be filed to create a legal repair.

The required reports must include fabric tensile and tear strengths, yarn composition, weave specification, yarn count, porosity level, heat and ultraviolet resistance. The test results must be from a Certified Testing Laboratory or a certified laboratory associated with a fabric mill or fabric finishing facility.

If the fabric is not manufactured and certified to the Aerostar specifications previously listed or FAA approved by a Production Certificate (PC), Parts Manufacture Approval (PMA) or Supplemental Type Certificate (STC), it MUST NOT be used in an Aerostar (Raven) balloon.

In order to trace test results, repairs involving more than 50 yards of replacement fabric must be documented by a maintenance entry of logbook entry stating the source of the fabric, their invoice number on which the fabric was billed, and also the fabric lot or batch number.

Note

Fabric replacement is limited to a one-time replacement of up to an accumulated total of 65% of the original fabric at the time of manufacture, except for minor patches and repairs.

Note

"100% rebuilding" of balloon envelopes constitutes manufacturing rather than rebuilding. Manufacturing can only be accomplished with complete approved type design information as defined in FAR 21.31. This manual includes information for maintenance repair and inspection but does not constitute complete type design. Therefore use of this information as type design data is expressly prohibited according to the manufacturer, this manual and subsequently FAR 43.13.

(B) Stitching shall be in accordance with Federal Standard 751, using size "E" polyester thread unless otherwise specified. The actual stitch type to be used is a Type 301 and is illustrated in Figure 6.1.2A(2).

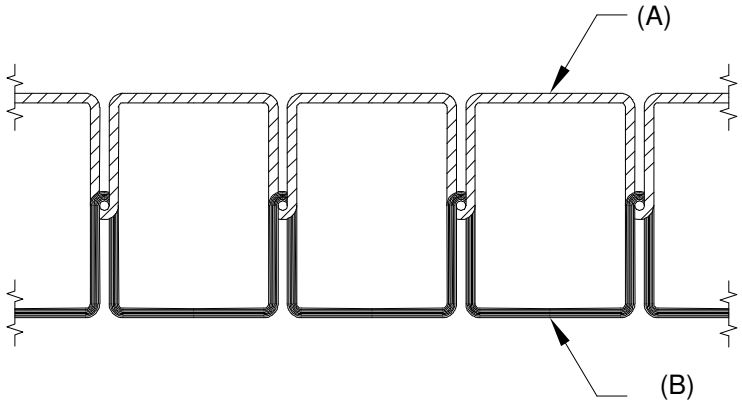


Figure 6.1.2A(2) Stitch Type 301

This type of stitch shall be formed with two threads: One needle thread (A) and one bobbin thread (B). A loop of thread shall be passed through the material and interlaced with thread (B). Thread (A) shall be pulled back so that the interlacing shall be midway between surfaces of the material or materials being sewn.

(B) The seam types that are to be used in all repairs must also be in accordance with Federal Standard 751. The primary seams are illustrated in Figure 6.1.2A(3).

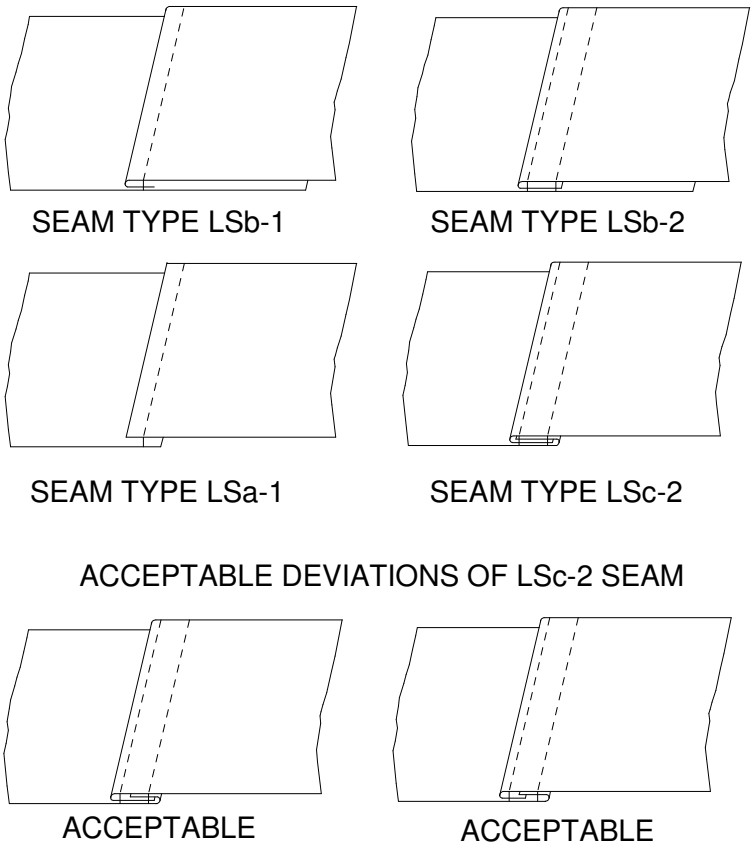


Figure 6.1.2A (3) Seam Types

(2) Fabric Repair - Small Damage

Aerostar recommends that all small damage be repaired at annual/100 hour inspections irrespective of allowable damage limitations.

Small damage is defined as burns, tears, chaffing or scorching with a total damage dimension of up to 12" for tears and other damage as shown in Figure 6.1.2B.

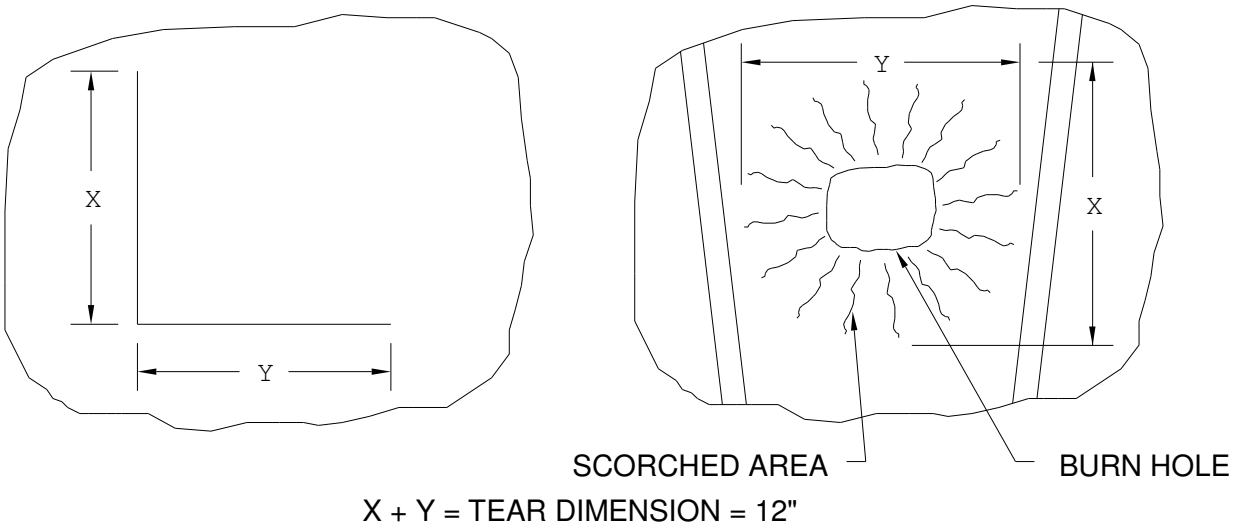


Figure 6.1.2(B) Fabric Damage Dimension

Several different repair techniques are available for this type of small damage. Various limitations exist for each type of repair and are included with the following repair descriptions.

Repairs may be accomplished by the owner/operator or repair station in either a temporary or permanent basis using the methods described below. The differentiation between temporary and permanent are as follows:

(a) Any repair of damage smaller than 2“ in. (or smaller based on the “Allowable Damage Limitations Table” if accomplished by the owner/operator) in maximum damage dimension may be repaired with any adhesive method described below (for the applicable type of fabric) and be considered permanent as long as the patch remains well adhered.

(b) Any adhesively applied repair for damage greater that a 2” in in. maximum damage dimension (but still eligible for temporary repair per the “Allowable Damage Limitations Table”) is considered temporary until stitching is applied around the perimeter of the patch per method 4 of this section of the manual.

(c) Any patch that is to be considered permanent must be from fabric which is of the same type (or alternate shown below) as the fabric being repaired. Other FAA approved Nylon hot air balloon fabrics may be used to make temporary repairs. To convert to permanent, that repair must be re-done at the next annual or sooner with the appropriate fabric. Alternate fabrics that may remain as permanent are as follows:

Damaged Fabric Type	***Acceptable Aerostar Alternate Fabric***	***Non-Aerostar Alternate Fabric***
Aerostar Square Weave *Aerostar p/n 14307*	*Aerostar Diamond p/n 52910** *Lindstrand Diamond weave p/n 51004-130** *Ripstop nylon fabric p/n 51004-131*** *Aerostar Adhesive Fabric p/n 51004-40,53144*	*Urethane coated, Rip-stop nylon fabric certified by FAA PC, PMA or STC for use in Raven / Aerostar balloons manufactured under FAA Type Certificate A15CE.*
Aerostar Diamond *Aerostar p/n 52910*	*AeroMax p/n 52809** *Lindstrand Diamond weave p/n 51004-130* *Ripstop nylon fabric p/n 51004-131*** *Aerostar Adhesive Fabric p/n 51004-40,53144*	*Urethane coated, Rip-stop nylon fabric certified by FAA PC, PMA or STC for use in Raven / Aerostar balloons manufactured under FAA Type Certificate A15CE.*
AeroMax *Aerostar p/n 52809*	*Aerostar Diamond p/n 52910** *Lindstrand Diamond weave p/n 51004-130** *HyperLife Nylon p/n 51004-132****	*Silicone coated, nylon fabric certified by FAA PC, PMA or STC for use in Raven / Aerostar balloons manufactured under FAA Type Certificate A15CE.*
AeroLite *Aerostar p/n 52812*	*AeroMax p/n 52809* *Soarcoat p/n 52812***** *Lindstrand Soarcoat p/n 51004-133*	*Silicone coated, nylon fabric certified by FAA PC, PMA or STC for use in Raven / Aerostar balloons manufactured under FAA Type Certificate A15CE.*

* Equivalent to Lindstrand Balloons US Diamond 52910 p/n EN0003
** Equivalent to Lindstrand Balloons US Ripstop p/n EN0001, EN0002
*** Equivalent to Lindstrand Balloons US HyperLife p/n EN10004
**** Equivalent to Lindstrand Balloons US Soarcoat nylon fabric p/n EN1011

WARNING

Nylon and Polyester fabric yarns posses different characteristics and will stretch or elongate in different manners, therefore Polyester fabric MUST not be used for any type of repair.

Note

Silicone coated fabrics (Aeromax and Aerolite) MUST not be used for envelope repairs within 18 feet of the base of the envelope.

Note

If multiple repairs are required in close proximity in the same panel, replace the full gore panel with a seam to seam repair. Perform stitching and seams as described above.

TABLE 6-1
ALLOWABLE DAMAGE LIMITATIONS

LOCATION	AGE OF ENVELOPE	
	*	**
Above first horizontal band below equator:	1 in.	3/8 in.
Below first horizontal band below equator and above 6 feet from mouth:	2 in.	1 in.
Within 6 feet above mouth:	18 in.	12 in.
Envelope Skirt ***	no more than 10%	no more than 10%

* Balloons with less than 100 hours AND less than 3 years old with 250 tell-tale unturned.
** All other balloons.
*** Damage may not exceed more than 10% of the total skirt area.

Method 1 For repairs on Standard Aerostar Fabrics:

Standard Aerostar fabric with an adhesive backing may be used for repairs and accomplished by a repairman or owner/operator where the damage does not exceed the maximum allowable damage limits as listed in table 6-1. This type of repair cannot be used on AeroMax or AeroLite fabric. ". Any damage outside the allowable damage limits must be repaired by a certified repairman.

Steps:
1. Clean exterior of damaged area so it is free of dirt or dust.
2. Cut a patch 1" larger than the tear or hole in all directions.
3. Align weave of the patch with that of the area being repaired.
4. Remove paper backing and adhere patch in place.

Note

A smaller adhesive backed piece may be placed over the damage from the inside if any adhesive is exposed through the damaged area

Method 2 For repairs on standard Aerostar fabrics:

A contact adhesive/balloon fabric repairs may be accomplished by an owner/operator where the damage does not exceed the "allowable damage limits". Any damage outside the allowable damage limits must be repaired by a certified repairman.

Steps:
1. Clean exterior of damage area so it is free of dirt or dust. Cut a patch of material which is a minimum of 1" beyond edges of tear or hole in each direction.
2. Apply contact adhesive to the coated side of the patch and the area to be repaired on the outside. Allow to set as specified on adhesive instructions.

3. Align weave of the patch with that of the area being repaired and adhere patch in place.

Note

Adhesive such as "Tru-Bond" or "Formica Adhesive" or other contact type adhesives may be used (consult MFR's limitations) to determine that the cement's solvent does not attack nylon. Clean excess adhesive from around edges of patch and patched area on inside of balloon and allow patch to cure several hours before storage or use.

Method 3 For repairs on Aeromax and Aerolite fabrics:

Silicone adhesive/balloon fabric repairs may be accomplished by an owner/operator where the damage does not exceed the "allowable damage limits" listed in Method 1. Any damage outside the allowable damage limits must be repaired by a certified repairman.

Note

This type of repair is the only “adhesive repair" which will work on AeroMax and AeroLite materials.

Steps:
1. Clean exterior of damage area so it is free of dirt or dust.
2. Cut a patch of material which is a minimum of 1" beyond edges of tear or hole in each direction.
3. Apply silicone adhesive/sealant liberally to a coated side of the patch.
4. Align weave of the patch with that of the area being repaired and adhere patch in place.

Note

Clean excess silicone from around edges of patch on inside of balloon and allow to cure several hours before storage or use.

Note

A smaller adhesive backed piece may be placed over the damage from the inside if any adhesive is exposed through the damaged area

Adhesive repairs may be sewn around to ensure the longevity of the repair. This may be accomplished only by a certified repairman and may be used on any repair classified as "small damage" at the beginning of this Section (B).

Step 1 Stitch around the adhesive patch using a type 301 (LSa-1) single needle stitch and 7 to 11 stitches per inch with a minimum edge distance of ¼".

Method 4 A sewn patch on a "small damage" area using standard balloon fabric may only be performed by a certified repairman.

Steps:
1. Cut a patch of material which is a minimum of 1½" beyond edges of tear or hole in each direction.
2. Align weave of the patch with that of the area being repaired.
3. Fold a hem and stitch over damaged area using a type 301 (LSb-1) single needle and 7-11 stitches per inch and an edge distance of 3/16" ± 1/16".
4. The damage behind this type of repair may be trimmed out and an additional row of stitching sewn around the damaged area to better secure the repair. When trimming out the damaged area round the corners of the areas to prevent further tearing. Maintain the edge distance of 3/16" ± 1/16".

Note

When trimming the area behind a patch be sure not to enlarge the area beyond the allowable damage limitations of the 12" maximum dimension.

Note

Method 4 may be used on any type of small damage.

Method 5 An inlaid patch for "small damage" repairs using Aerostar balloon fabric may only be performed by a certified repairman.

Steps:
1. Trim away any bad material from the damaged area to form a small rectangular hole bounded with good fabric.
2. Cut the patch of material so that it extends at least 2¼" beyond each damaged edge. (If the hole is ½" square, the patch should measure 5" x 5".) See Diagram One.

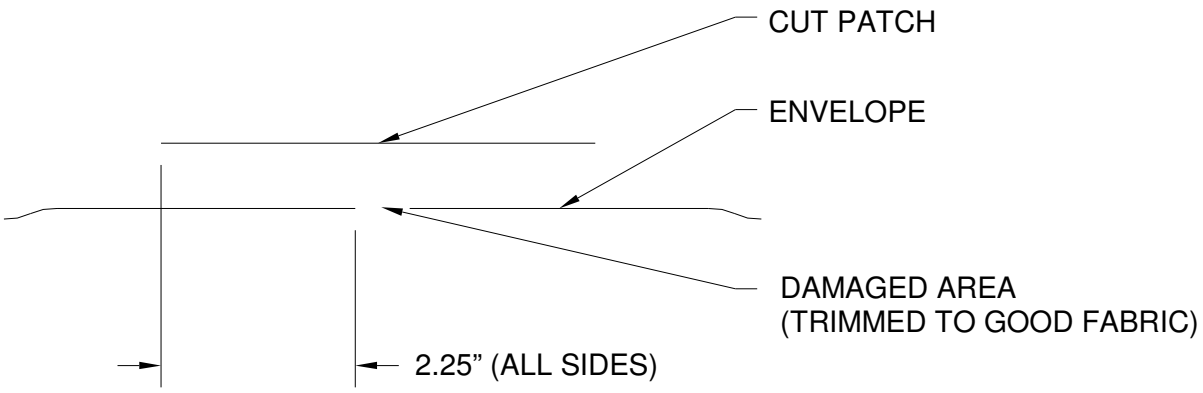


DIAGRAM ONE

3. Align weave of the patch with that of the area being repaired.

4. With the coated side of the patch material facing toward the inside of the envelope, roll under the patch edge 3/4” on all four sides. Sew the patch to the balloon with a type 301 (LSb-1) with a single needle, with an edge distance of 3/16” +/- 1/16” then cut out the damaged area, under the patch, 1-1/2” in from the outer patch edge, all sides. See Diagram 2.

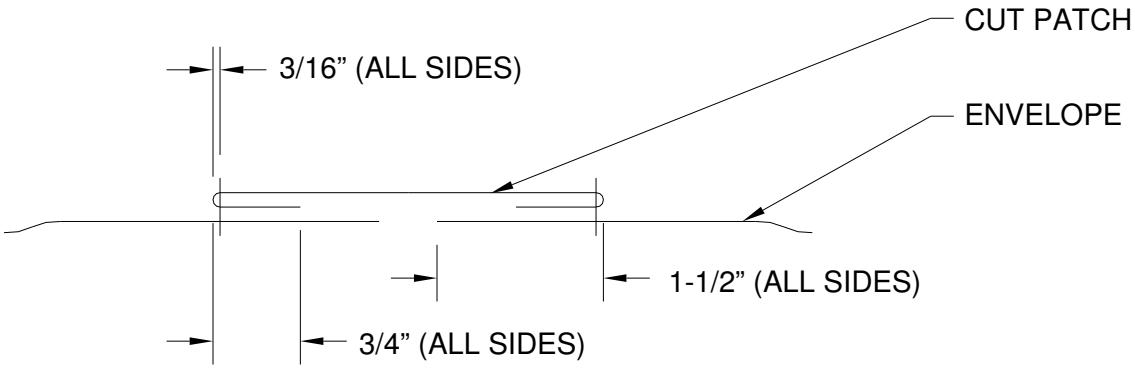


DIAGRAM TWO

5. Cut the four corners of the damaged region under the patch approx. 3/4" diagonally toward the corners. Roll the fabric under the patch to form a 3/4" hem and sew all sides, as shown in Diagram 3, to complete the LSC-2 seam.

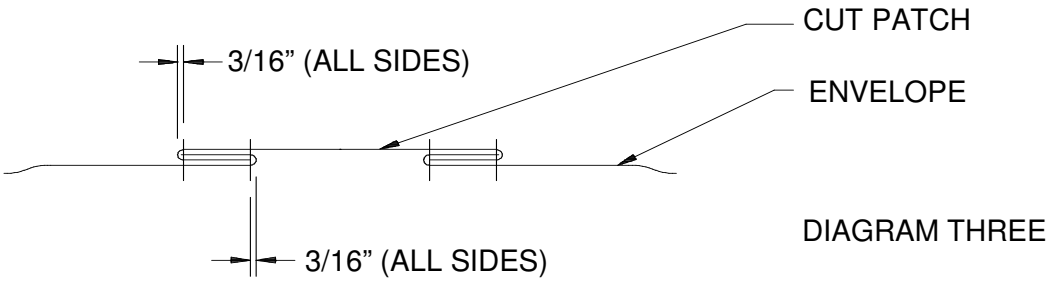


DIAGRAM THREE

Note

The finished patch must lay flat. The seams should not pucker, nor should there be any other form of stress concentration.

(3) Fabric Repair/Replacement Large Damage

If the hole or other damage exceeds the "small damage" limitations (larger than 12 “ maximum dimensions), the fabric MUST be replaced from gore seam-to-gore-seam or panel-seam-to-panels-seam. These vertical gore seams may be load-taped seams or mid-gore seams either of which have French fell construction (LSc-2). In the case of detailed inlaid designs, only the damaged sections of fabric need to be replaced.

When a section of a gore or panel requires replacement, the replacement fabric MUST be cut using the original material dimensions, since fabric changes its dimensions in service. If the fabric is replaced using the dimensions of the old fabric, it will not fit properly after being exposed to service conditions for a relatively short period of time.

Envelopes may be built with the fabric in the vertical or horizontal orientation or a combination of both as described in the introduction to Part I. When performing large damage repairs (partial panel replacements) with the original fabric in the vertical orientation the partial panel must be installed from vertical gore seam to vertical gore seam. When performing large damage repairs (partial panel replacements) with the original fabric in the horizontal orientation the partial panel must be replaced from the horizontal panel seam to horizontal panel seam.

For original gore panel dimensions, see Appendix C. The gore panel width is given in inches and includes the 1 1/8" seam allowance necessary for 3/4" French fell or 3/4" rolled hem seams. The length of the gore panel is generally dimensioned in two-foot station increments. The locations of the circumferential bands are marked with a triangle on the gore panel drawing.

For envelopes in the Horizon Series, the corners of each panel are cut to create a bulbous contour when sewn into the balloon. These corner cuts will vary from the top and bottom of each panel. After removing a partial or full damaged panel the corner cut can be traced from the original panel to create the proper contour. However, it is recommended that replacement panels or patterns be acquired from the factory to insure the proper fit of the panel being replaced.

On all special shape balloons, consult Aerostar Customer Service for pattern details before repairs can be accomplished. On most special shape envelopes, it will be faster and easier to order precut replacement panels.
During the manufacture of the envelope, index marks were used at the edge of the gore panels to indicate the station location. On the constructed balloon, the index marks will occur at slightly less than two-foot intervals because of "needle shrinkage" during the construction of the seams.

To ensure the proper fit of the replacement fabric, replace fabric from index mark to index mark.

On replacement panels other than for the top or bottom gore panel stations, allow a 1 1/8" seam at both the lower and upper ends of the replacement gore panel section to form a 3/4" French fell or 3/4" rolled hem seam. This allows for the construction of the horizontal seams to join the repair fabric and original envelope fabric.

Note

Cut the fabric so that the straight edge of the pattern is parallel to the long edge of the fabric. This will ensure that the weave direction of the replacement material is aligned with the weave direction of the original envelope fabric.

Steps: 1. Cut adjacent to seams along the vertical length of the gore panel area to be replaced from the index mark above to the index mark below the damage area.

Note

Stitching need not be removed unless this area has multiple repairs (3-4) which has left sufficient old seam material to cause the load tape to become stiff and thick. In which case, all layers of material should be removed from the load tape and a french fell seam should be reformed.

2. Cut horizontally across from seam to seam to remove the damaged fabric.

Note

If the gore panel is being replaced from index mark to index mark, as described above, the horizontal cuts made should leave a 1 1/8" seam allowance both above the lower index marks and below the upper index marks.

3. Compare the vertical edge of the repair fabric with the vertical seams on the balloon where the fabric is to be mated. If the repair fabric is significantly longer, the edge of the repair fabric should be shrunk by placing a row of stitching along that edge of the repair fabric. This can be repeated several times until the index marks match.

4. Stitch in the replacement panel along the vertical seams with the coated side of the repair fabric toward the inside of the envelope.

Note

For horizontal or vertical seams where only one of the adjoining panels is being replaced, and a french felled seam was previously present, use seam type LSb-2, stitch type 301, two rows of stitches with 3/8" ± 1/16" between rows, and 7 to 11 stitches per inch, with a minimum edge distance of 3/16" ± 1/16". For all other seams, use seam type LSc-2, stitch type 301, two rows of stitches with 3/8" ± 1/16" between rows, and 7 to 11 stitches per inch, with a minimum edge distance of 3/16" ± 1/16".

5. Stitch in the replacement panel along the horizontal seam. It will be necessary to cut back an additional 3/4" along the vertical seams to make the 3/4" seam fold for the horizontal seams. If the horizontal seam is to be located on a circumferential band, use the same seam type as for the vertical seams. To simplify the repair procedure, index the fabric edges at regular intervals to insure proper alignment during sewing.

6.1.3 Webbing Repair and Replacement

(1) Stitching Repair

Webbing is utilized as load tapes and circumferential bands. It is sewn to the balloon using a 3/8" gauge (3/4“ gauge at envelope throat) double needle sewing machine with stitching as specified in Section 6.1.2(B). Where broken threads are found or the webbing has actually come loose, reattach using either a single or a double needle.

(2) When it is necessary to replace webbing, the following applies:

(A) The ends of all webbings must be heat seared. This can be accomplished with a flame or a hot wire/knife cutter.

(B) The webbing splice must have a minimum overlap of 12" (after stitching). Ensure enough overlap exists to allow for needle shrinkage. See Fig. 6.1.3

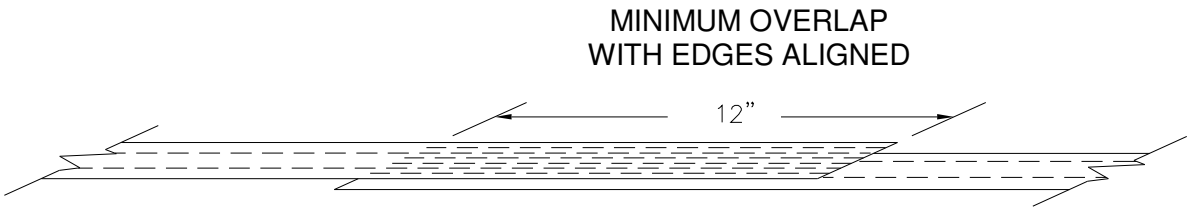
(C) When working on a balloon which utilizes a double load tape (S-66A and larger) splice on each layer of the double load tape must be staggered a minimum of 48” and have a minimum overlap of 12" each (after stitching). See Figure 6.1.3.

(D) On double load tape areas of Rally balloons (i.e. near throat and near deflation panel), no splice is allowed in the double load tape area. The splice must be in the single load tape area. Replace the webbing to the top or bottom termination if either load tape is damaged.

(E) Base webbing terminations for Double load tape balloons are shown in Figure 6.1.3E

(F) Base webbing terminations for single load tape balloons are shown in figure 6.1.3F

SINGLE WEBBING



BACKSTITCH ENTIRE OVERLAP LENGTH WITH 3 PASSES OF DOUBLE NEEDLE 3/8” +/- 1/32” GAUGE 7 - 11 STITCHES PER INCH. (POLYESTER THREAD, V-T-285, TYPE I OR II CLASS 1 OR 3, SIZE E)

DOUBLE WEBBING

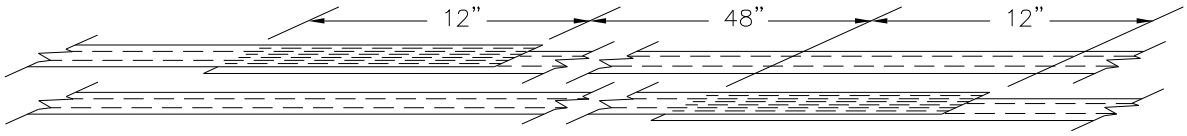


Figure 6.1.3 Overlap Splice Detail

Splices in 1" vertical webbing shall be made with 12" minimum lap as shown above. NOTE that on S-66A, S71A, S-77A and S81A envelopes along odd numbered (straight) vertical seams carry double load tapes. Any splice in a double tape seam must be at least 4 feet from another splice on that seam. On circumferential bands, lap joint may be located to suit.

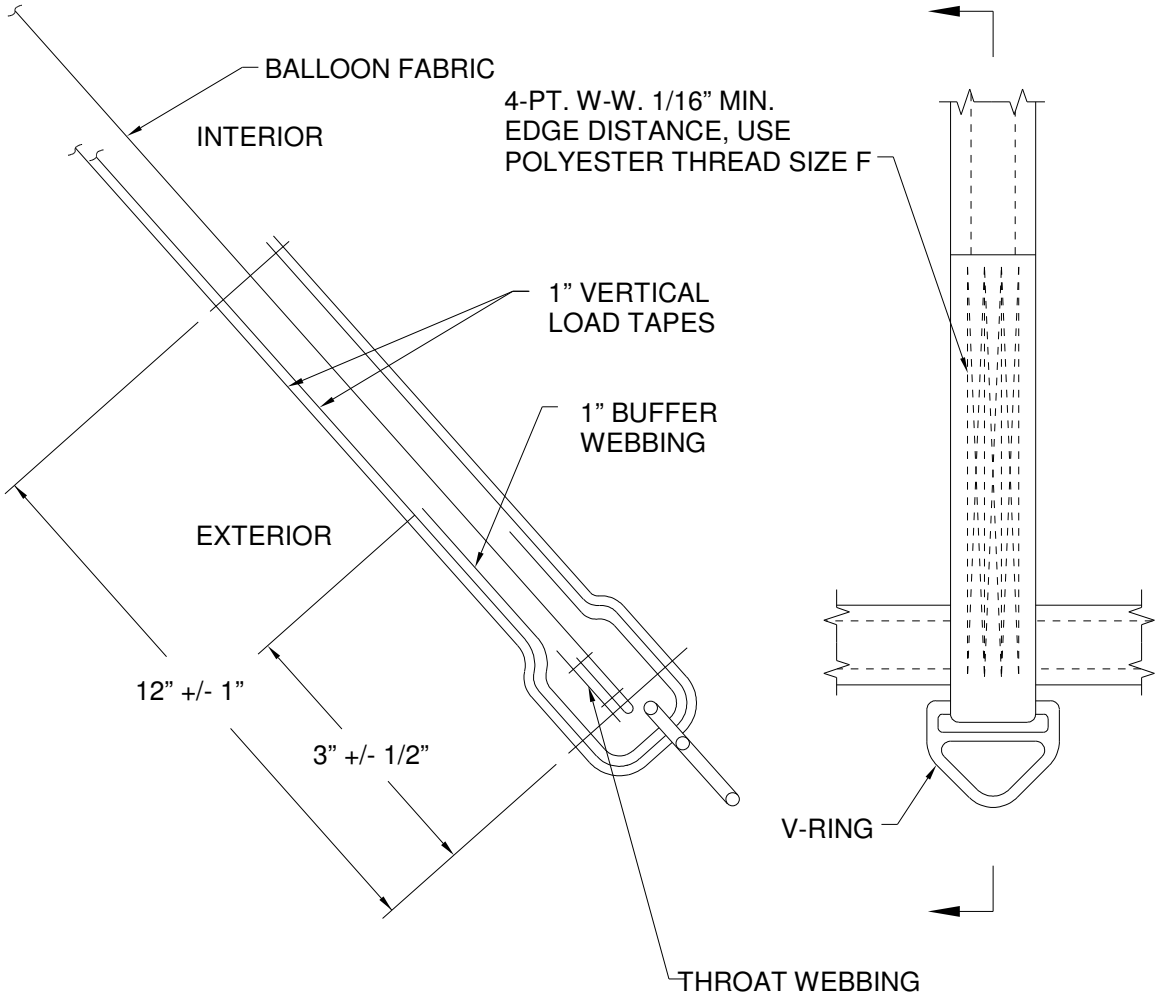


Figure 6.1.3E Double Webbing Splice Construction

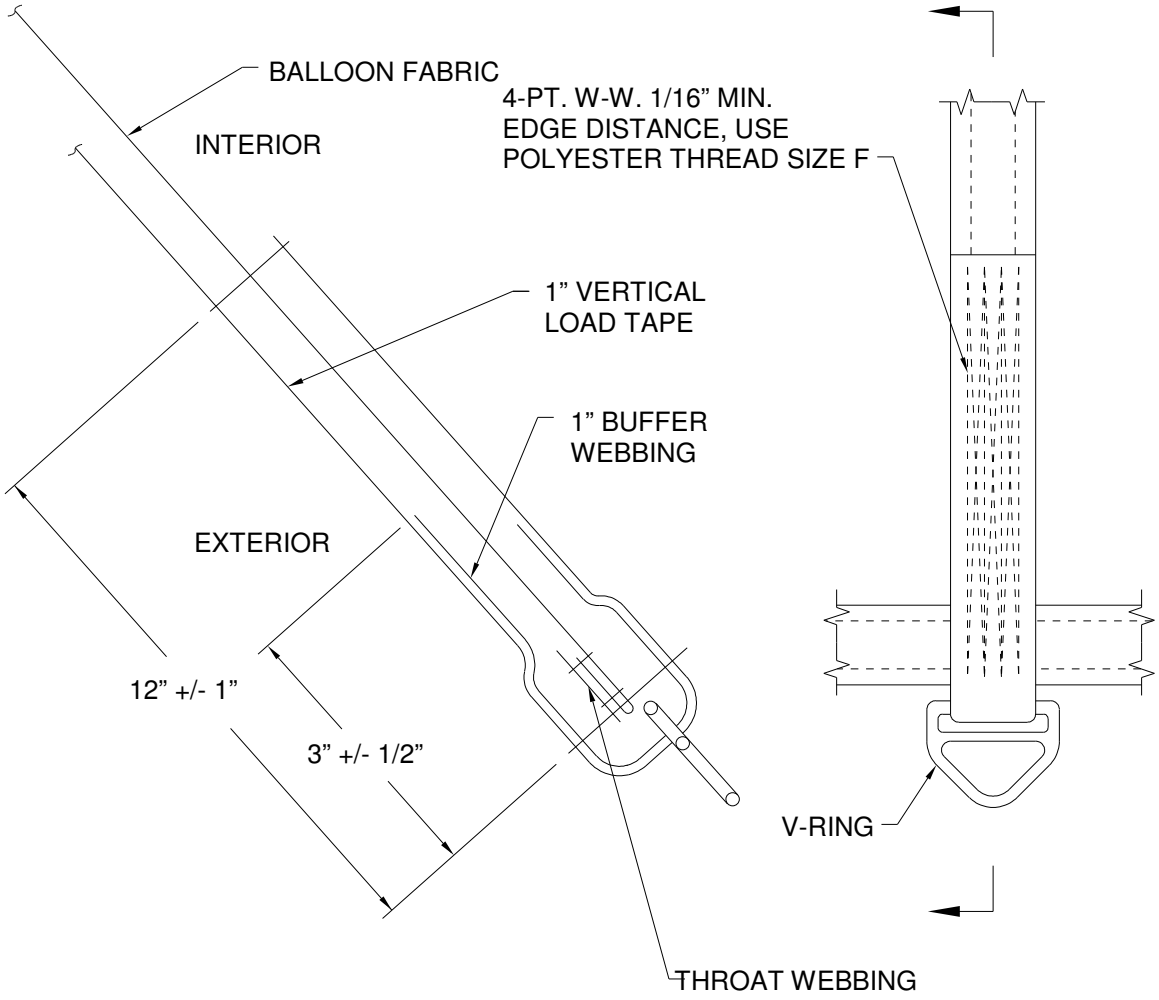


Figure 6.1.3F Single Webbing Splice Construction

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6.1.4 Suspension Cables

(1) Steel Cables

Any damage to steel cables requires replacement. NO REPAIR METHODS ARE AUTHORIZED. Replacement may be accomplished by the following methods:

(A) Replace using factory pre-fabricated cables. This is only possible where removable cables are installed on the balloon.

(B) Field fabricated cables may be used if the field facility has a calibrated Nicopress tool (National Telephone Supply Company's tool number 51-M850). Proper cable Part Numbers may be found in Appendix D under the appropriate envelope size. The length dimension is measured from outside loop end to outside loop end. When a thimble is required, ends of thimble should mate with end of nicopress sleeve as tightly as possible or be slightly inside sleeve. (The sharp ends of the thimble should be cut off before use.) Three compressions of the sleeve are required with the first being in the middle followed by either end, 1/16" apart. Cable ends are to be flush or recessed a maximum of 1/16" from the end of the sleeve. Check the sleeves with a gauge provided with the nicopress tool to verify adequate compression. Finished cable length tolerance is ± ¼".

(2) Kevlar Cables

Any damage to Kevlar cables requires cable replacement.

(3) Rapid Links

When rapid links are used to connect the cable to the envelope base fitting apply Locktite 242 to rapid link threads and wrench tighten.

6.1.5 Rally Load Frame Repair

If the Rally load frame is found to be bent so it is more that 5° out of square, then the frame must be replaced. Any bends less than 5° may be straightened. After straightening, inspect welds for cracking.

Weld repair must be performed in accordance with ABADS 1087, which may be obtained by contacting Aerostar.

6.1.6 Envelope Suspension Fittings

NO REPAIR OF THESE PARTS IS AUTHORIZED. If damaged, the fitting MUST be replaced.

6.1.7 Carabiner

NO REPAIR OF THESE PARTS IS AUTHORIZED. If damaged, the carabiner MUST be replaced.

6.1.8 Rip Top and Para-Rip Deflation System Repair and Replacement

(1) Top Cap Replacement

When top cap replacement is necessary, the top cap must be replaced with an Aerostar manufactured replacement panel.

(2) Top Cap Repair

Repair to the fabric in a top cap should be accomplished using the same procedures set forth in Section 6.1.2.

(3) The paravent operates in the same manner as the parachute deflation system. If sealing problems occur, refer to Section 6.1.12 for Troubleshooting Procedures. Line lengths are located in Appendix B.

6.1.9 Hook and Pile Fastener Tape Replacement.

(1) Remove the stitching securing the old fastener tapes.

(2) Stitch in new hook and pile tapes with size "E" polyester thread, using a size 21 needle or equivalent. For all stitching, follow with Federal Standard 751 and use stitch type 301, two rows of stitches 3/4", +0", -1/8" between rows, with a minimum edge distance of 3/32" and 7 to 11 stitches per inch.

Note

It is important to maintain the minimum edge of 3/32". If stitching is closer to the edge, the hook and pile fastener may fray and separate.

If only one side of the fastener tape shows deterioration caused by heat or other defects or damage, it is possible to replace only the unairworthy tape. However, if only one side is replaced, the new tape and the old tape MUST BE retested by the procedure outlined in Section 5.1.9 to ensure that it meets the necessary strength requirements.

6.1.10 Spring Top Deflation System Repair and Replacement

(1) Pocket Installation

If the stitching around the pocket perimeter is pulled loose, it should be restitched using type "F" thread and 6 to 9 stitches per inch with type 301 stitching. If the pocket is no longer serviceable, replace with new and attach with stitching per above.

(2) Spring Removal and Replacement

If the spring becomes inoperative and requires replacement, remove the spring by pulling out one end of the wire inserted in the spring coil. Slip spring out of webbing and insert new spring in the same manner. Ensure that when the wire end is reinserted in spring coil, it is effectively retained. If not, adjust the bend at the end and reinsert. Be sure to install the spring in the proper orientation, see Figure 1.1.6 in Part 1 of this manual.

(3) Top Cap Replacement

When top cap replacement is necessary, the top cap must be replaced with an Aerostar manufactured replacement top cap. Attachment should be accomplished per Figures 6.1.10A and 6.1.10B.

(4) Top Cap Attachment Points And Reinforcement Patches

In the event any of the stitching is broken or overstressed, re-stitch these areas using type "F" thread. In the event that the top cap attachment point is damaged and requires repair or replacement, the envelope reinforcement, top cap reinforcement, and top cap attach should be accomplished as shown in Figure 6.1.10a below.

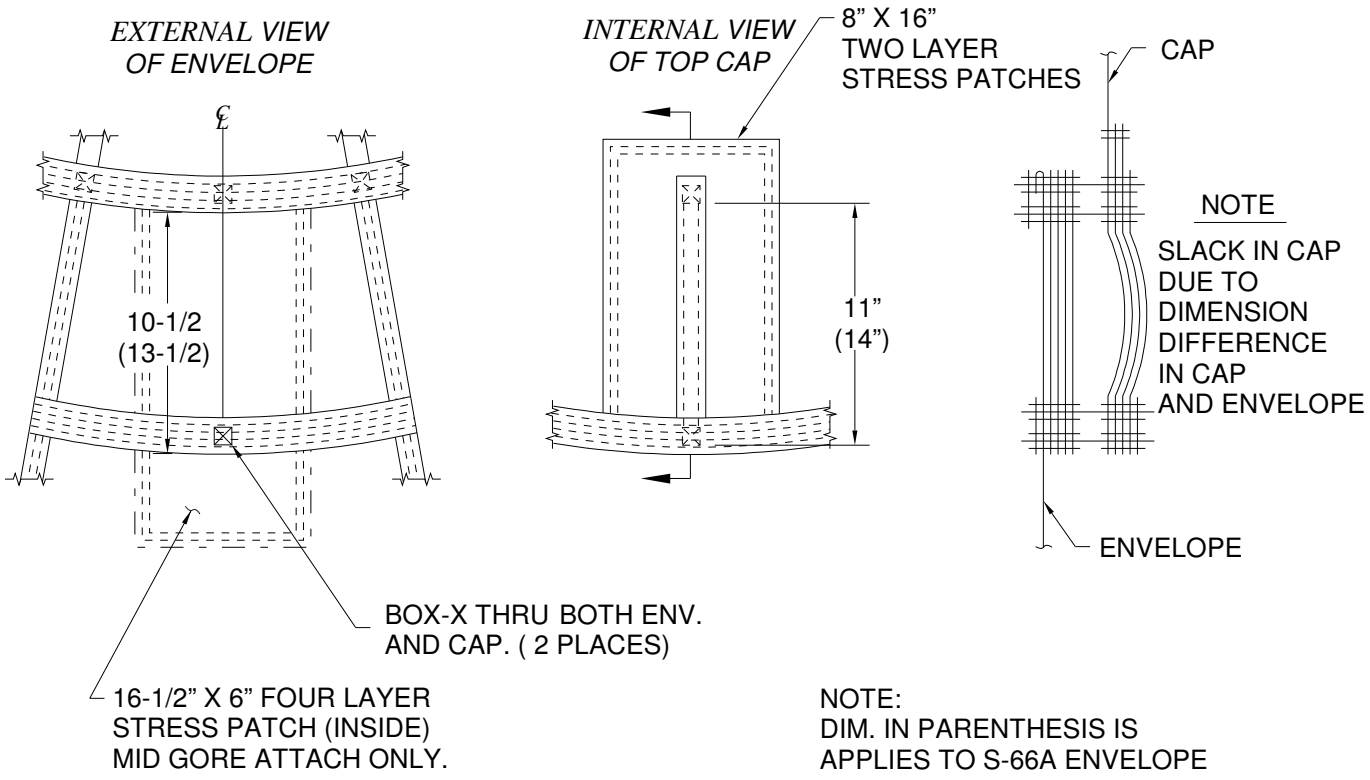

Figure 6.1.10A Spring Top Attachment and Reinforcement

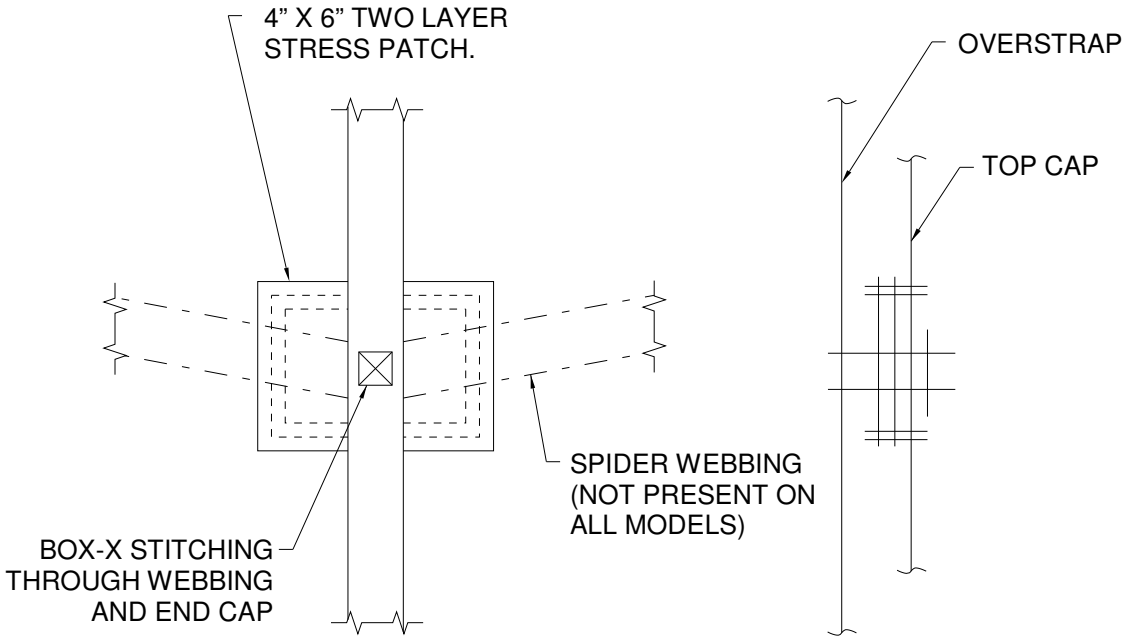

Figure 6.1.10B Spring Top Attachment and Reinforcement

(5) Paravent Adjustment

The paravent operates in the same manner as the parachute deflation system. If sealing problems occur, refer to Section 6.1.12 for Troubleshooting Procedures. Line lengths are located in Appendix B.

6.1.11 Rip Top, Para-rip Top and Springtop Deflation System Accessories

(1) Actuation Line Repair and Replacement

The actuation line for the deflation panel is one of two types.

(A) 3/32" cable passing through a "V" ring and connecting to a 2" red webbing.

OR

(B) A 2" red webbing passing through a 3" diameter routing ring.

If the cable is damaged or severely twisted (coiled when slack) replace cable with a new cable replicating original installation. If "V" ring is worn more than 1/16", replace. If red strap (described in A above) is damaged, replace the entire deflation rigging assembly with a new 2" strap and routing ring described in (B) above.

For 2" strap with 3" routing ring, if strap is damaged a splice in the lower portion of the strap may be made. No splices are allowed in the upper 55'.

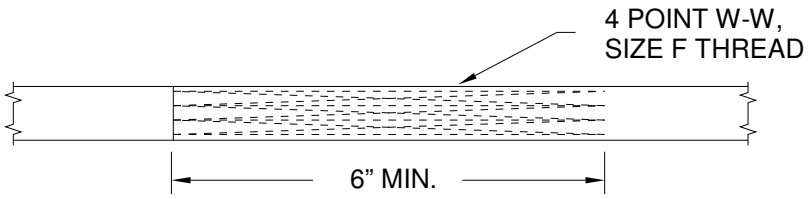

Figure 6.1.11 - 2” Strap Splice

(2) The para-vent portion of the para-rip top and spring top deflation systems use centering cords, confluence lines and a actuation line, similar to the parachute top. These lines are not repairable and must be replaced if damaged. For dimensions of replacement lines see appendix B.

6.1.12 Parachute Top Deflation System Repair and Replacement

(1) Line Adjustment or Replacement

If the lines in the parachute system are damaged, see appendix B for proper replacement line information.

Note

Ensure that Aerostar materials are used for replacement parts.

Adjust the fit of the parachute top by changing the lengths of the centering cords fastening the parachute top to the stickman on the side of the envelope.

The following is a troubleshooting chart to assist in proper adjustment of the parachute top deflation panel:

CONDITION	CAUSE	CORRECTION
Parachute top leaking, edges of parachute appear to hang straight down and loose. In extreme cases it may be possible to see through edges of parachute top and port edge.	Cords to long Cords much to long	Follow steps A through D, shorten cords to specified lengths, and continue to shorten cords if needed until a seal is achieved.
Parachute top pulled downward and leaking at cord attachment points. The visible line of the port edge fades or disappears near the centering cord attachment point. It may be possible for sunlight to pass between the port edge and the top cap, and appear on the side of the envelope.	Cords Too Short or to Tight	Follow steps A through D, lengthen cords to specified lengths. Continue to lengthen cords if needed until a proper seal is achieved.
Parachute top positioned off center.	Cords change length in service or improper adjustments have been made.	Follow steps A through D to achieve uniform cord lengths. Shorten or lengthen cords as needed, maintaining a uniform cord length until a proper seal is achieved.

To adjust centering cord lengths:

(A) Refer to Appendix B for parachute cord lengths.) Measure from end-of-loop to end-of-loop while applying a nominal two pounds of tension.

(B) Check <u>all</u> cord lengths so that the centering cords may be adjusted to within an inch of the same overall length.

(C) Adjust all the centering cord lengths to within one inch of the appropriate Appendix B dimension by retying the cords where fastened to the stickman anchors on the side of the envelope. Extra cord length is provided for this purpose.

The alternative method to adjusting the centering cords in a troublesome parachute top installation is to stretch the gore tight between Velcro tab on balloon and cord attachment at "stickman". Then adjust the line length so that the line is also tight when Velcro tabs are installed with the edge of the tab flush with the top port circumferential band. (Gore length equals line length.)

If all cords are being replaced, use new line lengths listed in Appendix B.

(D) Perform a hot inflation of envelope. Pull on actuation line to break loose ALL the Velcro tabs. Pull the top cap with enough force to unseat the top cap from all the overstraps. Release the actuation line quickly to allow the top cap to *snap* into place. With envelope close to gross lift, achieve buoyancy and observe the seal of the top cap against the port edge. See section 5.1.12(1) for inspection criteria for the top cap.

For Paravent applications, pull the actuation line to break loose the Velcro tabs. The excessive application of a pull force may induce additional damage to the top cap attachment points. Allow the vent portion of the top cap to snap into place, and inspect for proper seal.

(2) Top Cap Replacement

When top cap replacement is necessary, the top cap must be replaced with an Aerostar manufactured replacement top cap.

(3) Top Cap Repair

Repair to the fabric on a top cap should be accomplished using the same procedures set forth in Section 6.1.2.

6.1.13 Aerochute Top Deflation System Repair and Replacement

(1) Line Adjustment and Replacement

If the combination lines (centering/confluence) in the Aerochute system are damaged, replace using dimensions in Appendix B for the appropriate model. Check the upper vent line length for shrinkage, and replace if needed.

Apex Cords (if installed):

(A) Check apex cord lengths using dimensions in Appendix B, if any damage is found, replace with new cords.

(B) If the top cap is drifting off center the apex cords may be too long, verify the lengths carefully, noting that in some models the lengths are different for each cord.

(C) Measurements should be from end-of-loop to end-of-loop while applying a nominal two pounds of tension.

(2) If top cap is leaking or sealing poorly:

(A) Measure Aerochute top cap diameter and compare with drawing dimensions checking for shrinkage, which may reduce top cap overlap.

(B) Measure overstraps and compare with drawing dimensions checking for stretching, which may reduce top cap overlap.

(C) Check upper pull line length for shrinkage which may be holding the cap off the port edge. If the pull line is excessively short it may jam against the routing ring at the lower end thus holding the top cap slightly open.

(3) Top Cap Replacement

When top cap replacement is necessary, the top cap may be replaced with an Aerostar manufactured replacement top cap.

(4) Top Cap Repair

Repair to the fabric on a top cap should be accomplished using the same procedures set forth in Section 6.1.2.

6.1.14 Side Maneuvering Vent/Rotator

Repair material if damaged or torn using procedures as set forth in Section 6.1.2. Lines that are damaged must be replaced. (See Appendix B for proper replacement line information.) All lines should be terminated with a bowline knot followed by an overhand end knot where a knot is required.

6.1.15 Envelope Skirt or Dipper

Damage to the fabric portion of the skirt or dipper may be accomplished as detailed in section 6.1.2.

Any damage to other components of the skirt, i.e. webbing, Velcro etc., replace the damaged part.

Some skirts may use a fiberglass hoop in the bottom band of the skirt. If the fiberglass band is cracked or broken, replace with a new metal hoop supplied by the factory.

As stated in Part I section 2.0 item (4), owner/operators are allowed to perform repairs to the envelope skirt regardless of size of damage as preventive maintenance. These repairs MUST be performed using approved methods and materials. However, the maximum number of stitches may be increased up to 15 stitches per inch as listed in section 2.1 item (9).

6.2 BURNER SYSTEM REPAIR AND REPLACEMENT

General Information

The fittings used in the burner assemblies are high quality commercial pipe fittings that connect valves, tubing, or hoses.

If components are disassembled for repair, fittings can be considered reusable if undamaged.

Only pipefittings require the use of a thread sealant. There are two general types of thread sealants used:

(1) ¼ or ½" wide Teflon tape.

(2) A liquid thread sealant, Loctite Pipe Sealant with Teflon, or PLS2.

When Teflon tape is used the tape should be applied to male threads, wrap the Teflon tape around the threads a minimum of two wraps, leaving the first thread clear of the Teflon tape in order to prevent Teflon tape particles from entering the fuel system. If liquid sealant with Teflon is used, it should also be applied to the male threads only, with no sealant applied to the first thread.

CAUTION

Foreign particles such as thread sealant and Teflon tape in the fuel system can cause improper valve shut-off or pilot light failure.

Teflon tape is well suited for disassembling and reassembling of fittings, since it is easily removed from old fittings. Loctite pipe sealant with Teflon is recommended where the fittings are subject to a loosening torque during routine disconnection of fuel hoses, such as the fuel inlet fitting (JIC).

6.2.1(A) HPII Burner & HPII Update Procedure

(1) Disassembly Procedures;

When it is necessary on an HPII or HPII update burner to repair or replace fittings, valves or other components that are enclosed within the burner square tube and shield, the following procedure is recommended for disassembly and re-assembly.

Note

The nozzle coil assembly, pilot light assembly, and the pilot light valve can be removed directly without disturbing other components.

REMEMBER, it is only necessary to disassemble the burner to the point where the defective components can be repaired or replaced. It is recommended to

note the spacing between fitting prior to disassembly in order to properly orientate the fittings or components during re-assembly.

Note

Should gimbal limiter require replacement because of excessive deformation of shoulders, identify type of limiter. Some HPII update dual burners have gimbal limiter installed with "SP" stamped on inside face of that part. Use of non-"SP" limiter on those burners will severely limit gimbal range.

(A) Remove individual burner from burner frame by unfastening frame bolts. (Omit this step for HPII Rally and Rally Dual Inlet Burner Assembly).

(B) Remove liquid fuel inlet fitting(s).

(C) Remove the 8 bolts, nuts and washers that hold coil supports to square tube.

(D) Remove the 2 bolts that fasten the nozzle coil to the square tube.

(E) Remove screws at base of burner (8 places).

(F) Use a thin blade knife to break the seal between the square tube and the tray.

(G) Remove the square tube from the burner assembly.

(H) For SCREEN HEAD PILOT, use an 11/16" "crow's foot" wrench to remove pilot light and reducer as an assembly from the bulkhead adapter. (See Figure 6.2.1)

For HPII UPDATE PILOT, use 1 1/8" wrench to remove the regulator and pilot head assembly. Use lower set of flats on the regulator for removal to prevent disassembly of vapor converter. (See figure 6.2.6B)

(I) Bend the 1/8" copper aspirator tube as necessary away from the bottom of the tray. DO NOT break the aspirator tube off where brazed.

(J) To remove, lower plumbing and tray as an assembly from the burner, disconnect it from the hex nipple.

(K) Disconnect 1/8" copper tube from pressure gauge and fuel inlet tree.

(L) To remove blast valve hold down bracket, drill out pop rivets with a #30 drill. Removing retaining nuts from the back of the pressure gauge. Remove gauge.

(M) Loosen sets crew to remove handle from metering valve.

(N) Remove pilot valve and bulkhead adapter from tray. Use "crow's foot" wrench if necessary.

(O) Remove metering valve panel mounting nut and washer.

(P) Remove 2 screws securing tray to plumbing manifold. (Rally Dual Inlet Burner Assembly only).

(Q) Remove tray from plumbing manifold.

(R) To further disassemble the plumbing manifold, disconnect the various pipe fittings. Note orientation and spacing of fittings and valves for re-assembly purposes. Align directional flow arrows on valves with burner fuel flow.

(S) To remove the coil assembly from the square tube, remove the 8 bolts and nuts for the lower coil support. Loosen the nuts and ferrules at the tube connectors and remove the coil assembly.

(2) Assembly Procedure

Assembly is the reverse order of disassembly. Remember the following points.

(A) Remove all old thread sealant and tape from pipefittings to prevent foreign particles from entering fuel system.

(B) Wrap male threads of pipefittings and valves with Teflon tape, except at the two pipe swivel fittings, (not used on Rally Dual Inlet Burner Assembly), where it is not required.

CAUTION

DO NOT allow pieces of Teflon tape to enter fuel or pilot system where they might cause pilot light or valve failure.

(C) Use Loctite 242-thread sealant on pressure gauge studs and also on the panel mounting nut area of the bulkhead adapter. DO NOT overtighten nuts on pressure gauge studs. For Rally Dual Inlet Burner Assembly only, use Loctite 242 on the two screws securing plumbing manifold to burner tray.

(D) Leak check the plumbing subassembly before continuing

Note

McDaniel's gauges supplied for retrofit are slightly larger in diameter than previous Wika gauges. See retrofit instruction provided with replacement gauge for installation. For older burners with US Gauges contact Aerostar for installation procedure.

(E) Use two new AD-42-BS pop rivets to reattach blast valve hold down bracket. To align pop rivet holes, a 1/8" diameter punch and clamping pliers are helpful.

(F) Clean mating surfaces of square tube and tray. Apply a bead of silicone sealant to the mating area of the tray before installing the square tube in place. Remove excess sealant after installation is complete.

(G) To obtain a watertight seal with the rubber blast valve gasket work the gasket into the proper position with a small screwdriver. Use a small bead of silicone sealant around the blast valve to eliminate leaks.

(H) Check the 1/8" aspirator tubes for obstructions and relocate free end in depression in tray.

(I) To install new coil assembly, mate the tube connectors using new nuts and ferrules. The nuts are to be finger tight plus 1 1/4 to 1 1/2 turns, as per manufacturer's recommendations. Reinstall coils in the burner can using 10 bolts and nuts.

(J) Make necessary leak tests and operational tests.

Note

Tubing fittings used in HPII Update burners may be one of two kinds, Swagelok or Parker. Swagelok used two ferrules in sealing between the tube and fitting. Parker fittings use one ferrule, which has been determined to provide equivalent seal. DO NOT ATTEMPT TO USE PARTS OF PARKER FITTINGS WITH PARTS OF SWAGELOK FITTINGS INTERCHANGEABLY. Swagelok fittings may be identified by the word "Swagelok" or "Crawford" appearing on the fitting.

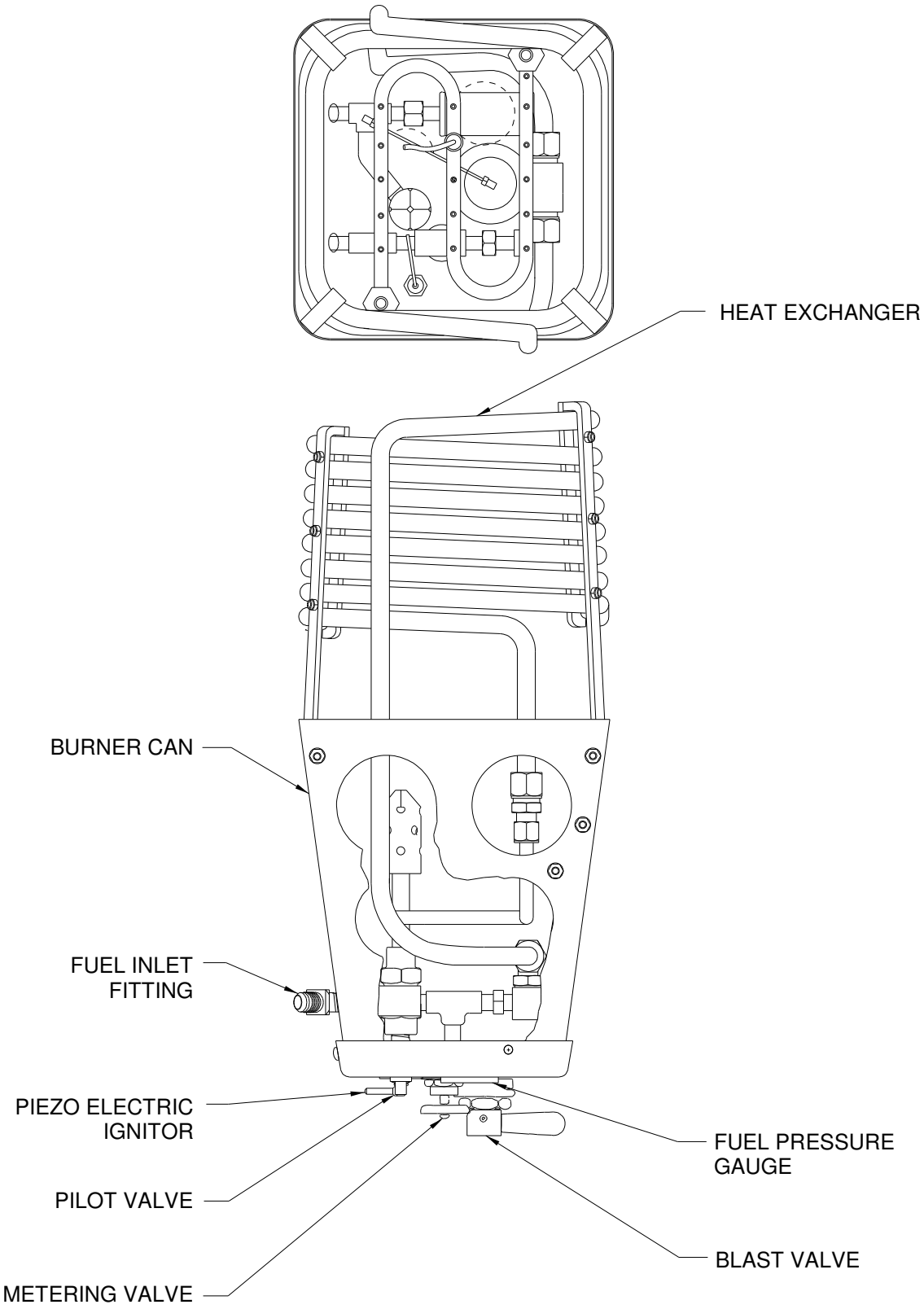

Figure 6.2.1A HPII Update Burner

6.2.1(B) HPIII Burner Procedure

The HPIII burner may be disassembled a number of different ways depending upon what needs servicing. (See Figure 6.2.2(a))

(1) To service the blast valves on the HPIII burners, the cast handle must be removed. (On dual burners, make note of the orientation of the handle so it may be reinstalled the same way.)

(A) Remove the two screws at the end(s) of the handle holding the Pivot block(s).

(B) Remove the countersunk pivot block adjustment screw(s).

(C) Remove the screws holding the handle to the tray(s), remove handle.

(D) Remove the E-clip from the rivet pin attaching the trigger link to the blast valve(s). Early HPIII's used a roll pin at this location. Remove trigger(s).

(E) Service the valve as explained in section 5.2.2.

(2) To service the valves and plumbing, the trays are removable from the square tube.

(A) Remove handle, then the tray(s) can be removed. Or, the trays can be removed as a pair still attached to the handle.

(B) Loosen the swivel fitting attaching the plumbing to the heat exchanger coils. This is accessible through the slot in the side of the can. A 7/8" open-end wrench cut to 5¼" (measured from the bottom of the open end) is required for dual burners.

(C) Remove the 8 screws around the perimeter of the tray. The tray may then be separated.

(D) The plumbing is fastened to the tray by the two screws in the bracket on the blast valve and the tray mounting nuts on the pilot and metering valves.

Note

Before disassembling any portion of the plumbing, take measurements and reassemble to the same Dimensions so that the plumbing will match the holes in the tray.

(E) To remove the heat exchanger coil, remove the 10 screws, where applicable, fastening the coil and brackets to the burner can and loosen the swivel fitting attaching the coil to the plumbing. The coil may now be removed. The S-nozzle will still be attached to the coil assembly

Re-assembly is the reverse order of disassembly.

Be sure to use a medium strength thread locking agent on the pilot valve nut, metering valve nuts, the two blast valve bracket screws, and all screws in the handle. Loctite 242 is recommended. Use new nuts and ferrules. The nuts are to be finger tight plus 1 1/4 to 1 1/2 turns as per manufacturer's recommendations.

(3) To reinstall the trigger handle assembly: (See Figure 6.2.4)

(A) Place the handle on the burner while inserting the free end(s) of the trigger(s) into the recess(s). This places the travel-limiting washer of the trigger inside the plastic guide/stop screws in the handle.

(B) Install and tighten the screws holding the handle to the burner. Use a very small amount of medium strength thread locking agent on all trigger handle screws. Loctite 242 is recommended.

(C) Install the adjustment screw(s) in the counter-bore hole(s) loosely.

(D) Install the pair(s) of end screws into the handle and draw down but not tight.

(E) Tighten the adjustment screw(s) until there is 1/16" to 1/8" of free play in the trigger(s).

(F) Tighten the end screws fully and recheck the trigger free play.

CAUTION

Overtightening of the adjustment screw until there is no free play in the trigger may result in the failure of the blast valve to close properly.

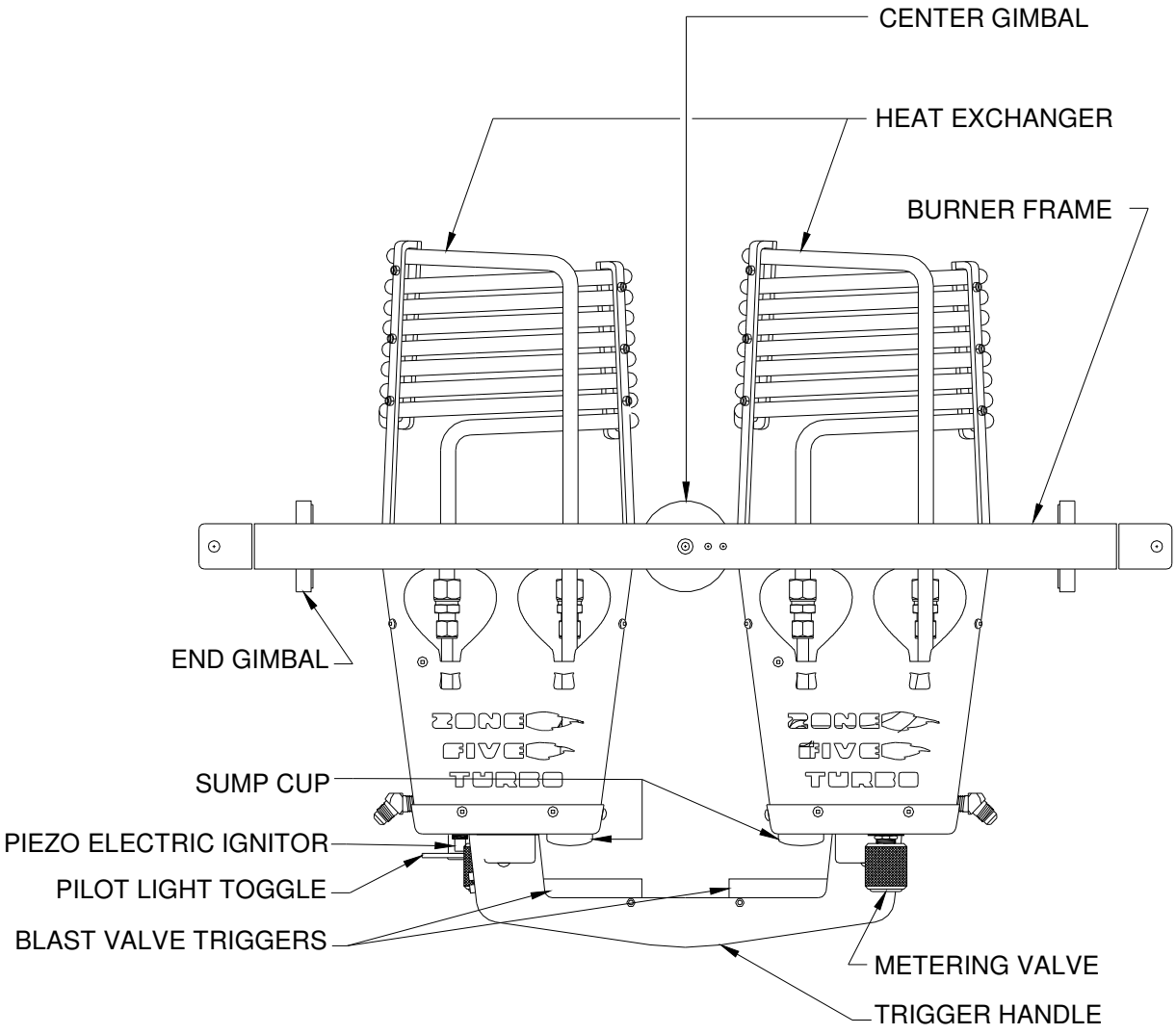

Figure 6.2.1(B) HPIII Burner Assembly

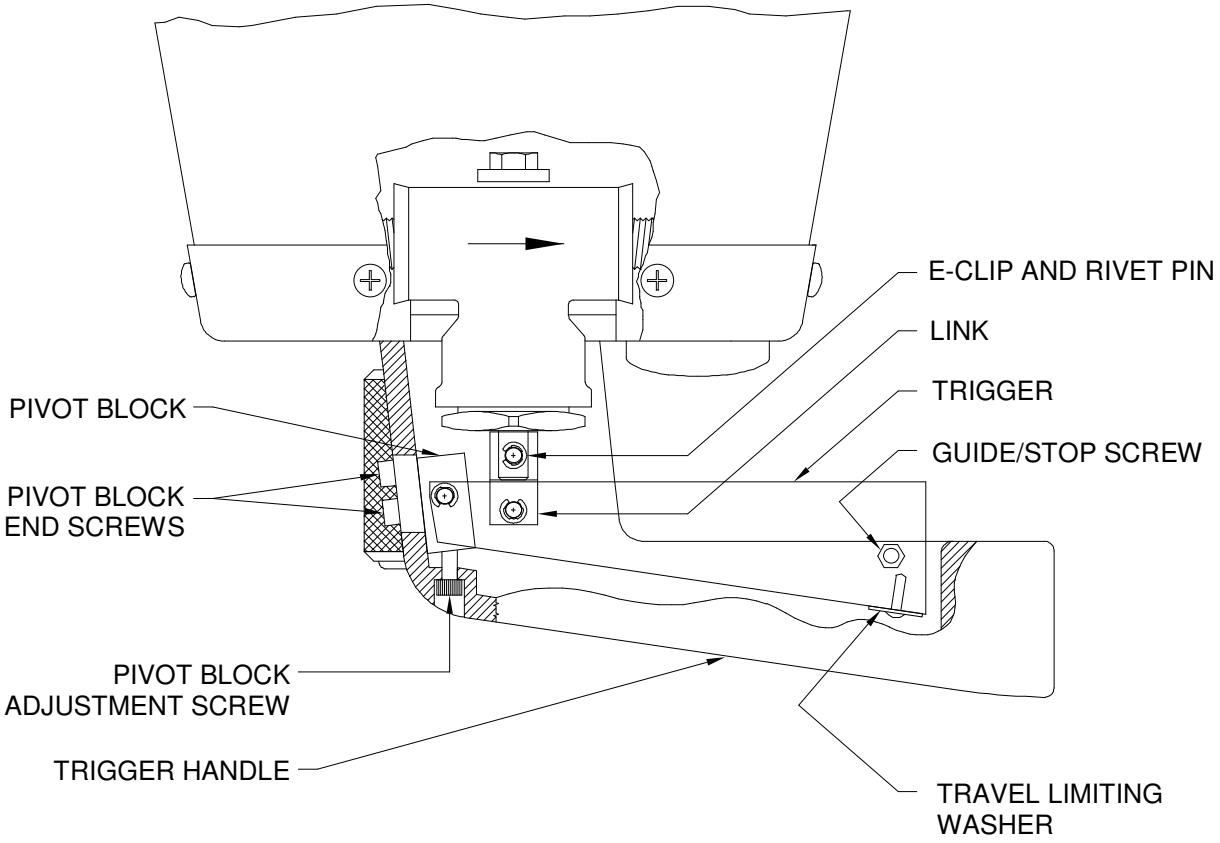

Figure 6.2.4 HPIII Trigger Handle Assembly

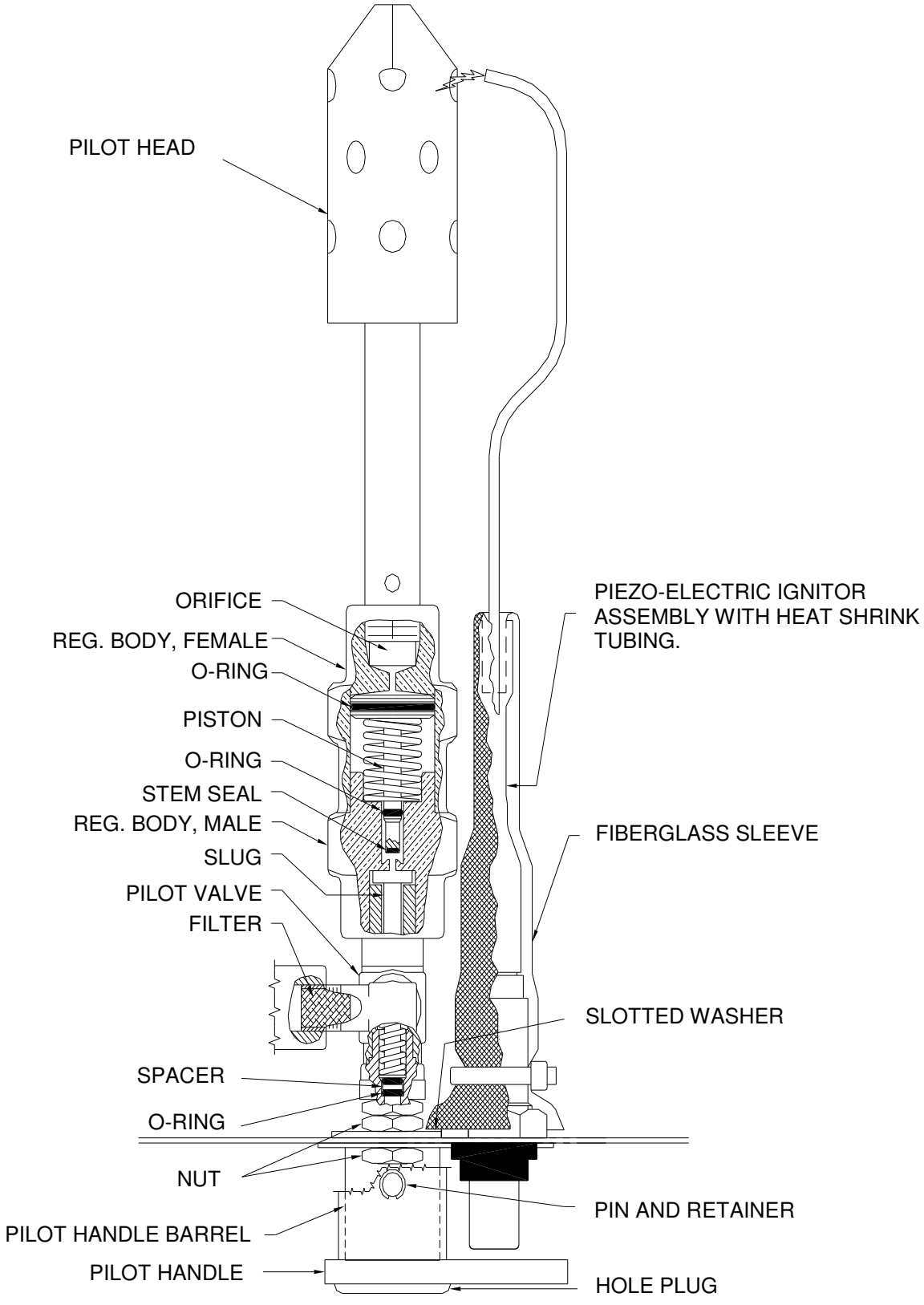

Figure 6.2.6A HPIII Pilot Assembly

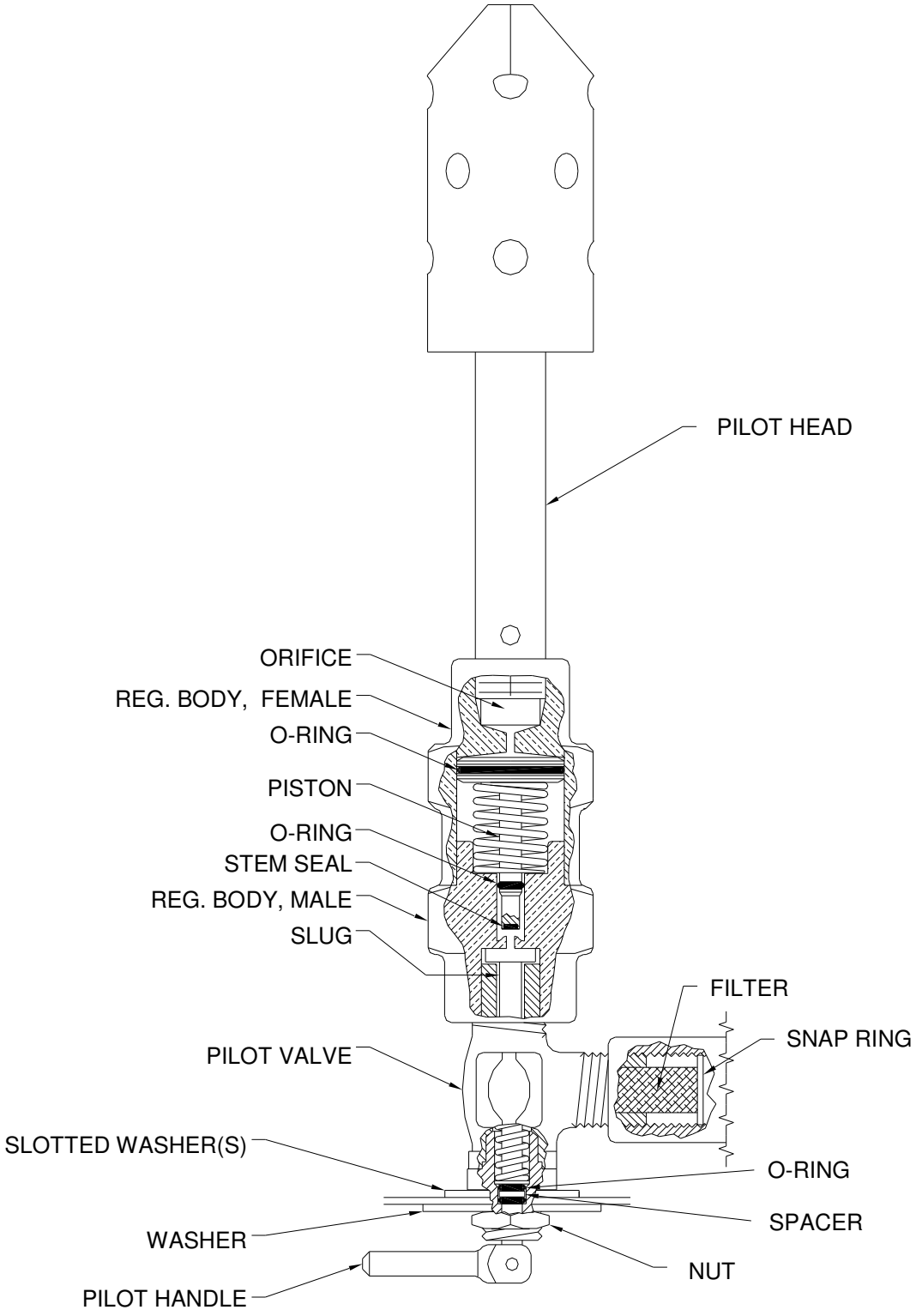

Figure 6.2.6B Update Pilot Assembly

6.2.2 Blast Valve Repair

See section 5.2.2 for step by step instructions of blast valve servicing or repair. If the blast valve body is damaged it MUST be replaced. Follow the procedures outlined in section 6.2.1 for disassembly of the burner and plumbing assembly.

6.2.3 Blast Valve Operation

Any discrepancies found during the operational check of the blast valve must be must be repaired as detailed in the appropriate section for the component causing the discrepancy.

6.2.4 HPIII Blast Valve Trigger

If damage is found on any component of the trigger assembly, look for any signs of binding or excessive wear. If damage is found the affected parts, it may be necessary to file a minimal amount off the part to ensure proper operation. If light filing does not correct the problem, replace the effected parts. Follow the procedures outlined in section 6.2.1(B), for removal and installation of the trigger and handle.

6.2.5 Metering Valve

If the metering valve cannot be repaired as outlined in section 5.2.5, the defective part or the entire metering valve must be replaced.

(1) Nupro Valve
If the Nupro metering valve leaks or is otherwise damaged beyond the limits of 5.2.5 replace the entire valve assembly, as valve stem assemblies only are not available. See section 6.2.1(A) for burner plumbing disassembly and re-assembly instructions.

(2) Hoke Valves
If the valve stem is bent or cannot be tightened to prevent a leaking valve as detailed in section 5.2.5, install a new valve stem and seal kit.

(A) Remove the valve handle.

(B) Loosen the packing nut and rotate the stem to remove from the valve body.

(C) Install the spacer kit components onto the new stem in the same configuration as the stem that was removed.

(D) Install the stem assembly into the valve body, an tighten the packing nut as outlined in section 5.2.5

(E) Reinstall the valve handle. When installing the plastic end cap into the red handle on HPIII burners,

Note

Place a small bead of silicone adhesive inside the rim of the cap prior to installation. After installation remove any excess adhesive.

6.2.6 Pilot light (HPII Update & HPIII)

Each component of the liquid style pilot light used on the HPII Update and HPIII burner may be repaired or replace if damaged or malfunctioning.

(1) Pilot light Vapor Convertor

When it is necessary on the Update pilot light assembly to clean or service the pilot light vapor converter (or regulator), see section 5.2.6 for detailed disassembly and service instructions.

(2) HPII Update & HPIII Pilot Light Troubleshooting

Tall Noisy Flame or Erratic Flame

(Old style bullet tip orifice) washer excessively cupped - both washers and the orifice should be removed and replaced with a new style orifice, P/N 52153 (requiring no washers)

Pilot head not tight enough

Regulator is malfunctioning - disassemble, clean & lube w/blast valve lube. Replace if necessary.

Low Quiet Flame, Easily Extinguished

Orifice plugged or dirty - clean with fine wire or air, or replace orifice

Inlet filter plugged - replace (Burner Assembly Figure 6.2.6A or B)

Slug plugged – clean, or replace

Regulator malfunctioning - disassemble, clean and lubricate. Replace if continued malfunction.

Slow Shut Off Time

Convertor, slug and valve body not properly seated. Tighten 1/8 turn. If shut-off time is still excessive, repeat. Replace slug if ends damaged, Convertor may require replacement if seating surface damaged.

6.2.7 Liquid Pilot Light Valve

If the pilot light valve is leaking past the valve stem replace the o-rings as follows.

(1) (HPII Update) Remove roll pin and handle
(HPIII) Remove the hole plug, pin and retainer, pilot handle and pilot handle barrel.

Note
It may be easier to remove the burner tray and plumbing on the HPIII burners for better access to the pilot light valve on the HPIII burner. See section 6.2.1(B)(2).

(2) Remove nut and washer.

(3) Slide slip washers out.

(4) Insert 9/16 socket through tray onto bonnet or use crow's foot from behind. Remove bonnet through tray.

(5) Replace O-rings, P/N 51034-06 and lube with Krytox grease.

(6) Reassemble reverse order - Use Loctite PST on bonnet threads. Use low torque to tighten - seal tray with silicone sealant.

6.2.8 Screen Head Pilot

To clean screen head pilot light: (See Figure 6.2.8)

(1) Remove pilot light from burner assembly by loosening the reducer ferrule nut.

(2) Dismantle the pilot light by unscrewing the pilot light tube from the pilot head and screen.

(3) Remove the orifice (which is press-fitted into the end of the pilot tube) and clean with solvent.

(4) Blow dry with compressed air. To remove possible contaminants, also blow compressed air through the pilot hose adapter, pilot valve, and bulkhead fitting.

(5) To reassemble, use Loctite 271 on the threads of the pilot tube. Be careful not to plug the orifice.

If the pilot light will not operate properly:

(1) Remove the pilot light filter by removing the pilot hose adapter on the burner pilot light valve.

(2) Clean filter in solvent.

If cleaning the filter does not cure the problem, check the pilot light regulator for proper operation.

6.2.9 Vapor Pilot Light Valve Servicing

The valve used for control of vapor pilot light is a Nupro brand valve. A leaking valve can be repaired by following the procedures outlined in section 5.2.9. If a leak cannot be stopped, the valve assembly should be replaced as follows:

(1) Secure the brass bulkhead fitting at the base of the burner with a ¾ " wrench.

(2) Using a 5/8 " wrench remove the Nupro valve.

(3) Place the valve body in a bench vice and remove the fuel inlet adapter fitting using a ¾ " wrench. A small mesh metal filter should remain in the adapter fitting.

(4) Re-assemble the pilot light valve and fitting in the reverse order listed above. Use ¼" or ½" Teflon tape on all pipe fittings.

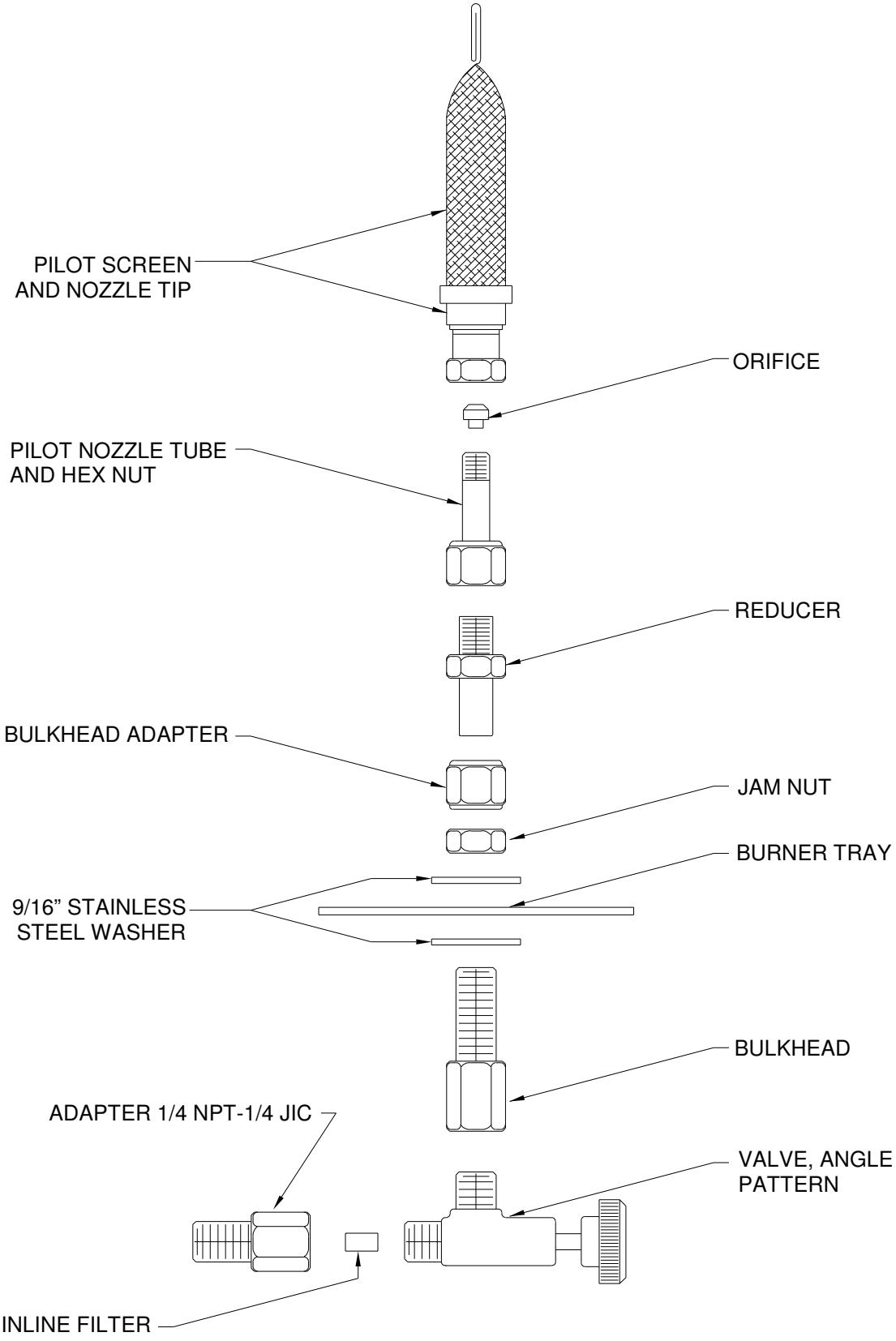

Figure 6.2.8 Screen Head Pilot Assembly

6.2.10 Burner Fitting

Replace any damaged inlet fitting with a new fitting supplied by the factory. Use a Teflon pipe sealant (Loctite pipe sealant with Teflon), when installing the new fitting.

6.2.11 Pressure Gauge

(1) HPII & HPII Update burners

Follow the instructions in section 6.2.1(A)(1), steps (A) through (L), to remove the pressure gauge. Re-assemble in reverse order, and following the assembly points in section 6.2.1(2).

(2) HPIII Burners

(A) Follow the instructions in section 6.2.1(B)(2), steps (A) through (C) to remove the burner tray and plumbing.

(B) Remove the copper tube connecting the gauge to the plumbing assembly.

(C) Remove the three screws and nuts securing the gauge to the burner tray.

(D) Re-assemble in reverse order.

6.2.12 Burner Operation

Any discrepancies found during the operational check must be repaired as outlined in the appropriate section for the component causing the discrepancy.

6.2.13 Burner Gimbals

(1) HPII Update and earlier model Burners
Using a needle nose pliers replace any damaged springs

(2) HPIII Burners
To repair or replace the end gimbal components on HP3D and HP3T burners use the following procedures:

(A) Position the burner on a flat surface, coils down, so that the trigger handle is up. Prop a block of wood beneath the gimbal block on the end being repaired.

(B) Secure gimbal cups with c-clamp or vise grips. Using a hammer and a 3/16” punch, completely drive out the roll pin as applicable, from the gimbal block.

(C) Grasping the gimbal assembly securely, removed the c-clamp or vise grip. Slide the gimbal block off of the gimbal plate shaft. Remove the thin thrust washer from the gimbal plate shaft. Slowly slide the remaining gimbal assembly through the burner frame. USE CAUTION The spring may release if the spring

cup is not held securely onto the gimbal plate. Still holding the gimbal assembly together, places the assembly on a work bench with the shaft pointing upwards. USE CAUTION! Grasp the spring cup and slowly raise it off the gimbal plate to unseat the gimbal spring. If the spring does not release immediately, raise the spring cup enough to insert a screwdriver or similar device to pry the spring from the locking pin. Remove the spring.

(D) Inspect the hole in the burner frame for elongation or excessive wear with a dial caliper. The hole should not be elongated to a diameter greater than 0.540" in any direction. Inspect the bearing, clean as needed. Apply a small amount of Krytox lubricant to the bearing and washers.

(E) Assemble the stack of washers and bearing on the gimbal plate shaft as applicable and shown in figure 6.2.13(a)

(F) Place the gimbal plate with washer/ bearing stack in a bench vice with the inside surface of the spring plate flush with the top of the vice, (shaft pointing upward), and tighten securely.

(G) With the smaller center pin in the 12:00 o'clock position, place the legs of The spring at the 1:00 o'clock position, between the smaller center pin and the larger pin to the right. (See photo 6.2.13a)

Photo 6.2.13a

(H) Using a tapered drift tool, twist the right leg of the spring past the left leg and over the small center pin while holding the spring flat against the plate with the other hand. (See photo 6.2.13b)

Photo 6.2.13b

Tap the legs down securely over the small center pin (while still holding the spring against the plate). Then tap the legs of the spring towards the center of the plate so that the legs do not overlap past the plate edge, while holding the spring down to the plate with a tapered punch or similar tool. (See photo 6.2.13c)

Photo 6.2.13c

CAUTION

This procedure must be performed with extreme caution. The spring has a mind of its own. Any one performing this procedure should wear safety glasses and leather gloves. The area should be cleared of bystanders while installing the gimbal spring.

Slide the spring cup down over the spring plate shaft and into position over the spring and washer assemblies. While removing the tapered punch, keep downward pressure on the spring cup.

(I) Apply a small amount of Krytox to the shaft of the gimbal plate, then insert the gimbal assembly into the burner frame. Align the drive pins on the burner frame with the two holes on the spring cup. Be sure the small center pin on the gimbal plate is positioned between the two holes in the spring cup. Slide the gimbal assembly flush against the burner frame.

(J) Install the thin thrust washer onto the gimbal plate shaft. Slide the gimbal block onto the shaft and align the gimbal block hole with the shaft hole. It will be necessary to use a “C” clamp to squeeze the assembly together.

(K) Using the block of wood propped under the gimbal block, drive the roll pin through the gimbal block and gimbal plate shaft.

Other gimbal assemblies can be disassembled with the use of standard hand tools. Use the technique described in step (H) to install the gimbal spring into position, where applicable, reassemble in the proper configuration for the burner being repaired as shown in the following Figures 6.2.13(b) through (f)

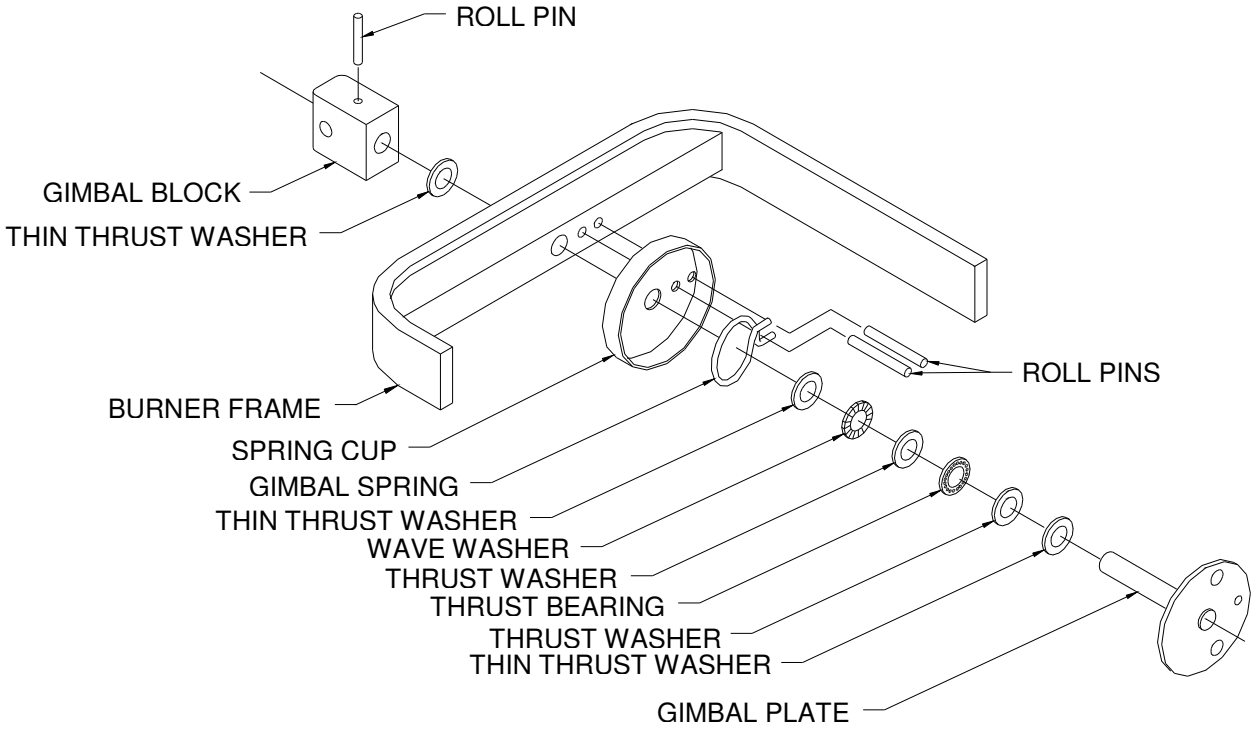

Figure 6.2.13a – Gimbal Spring & Pivot; Ends

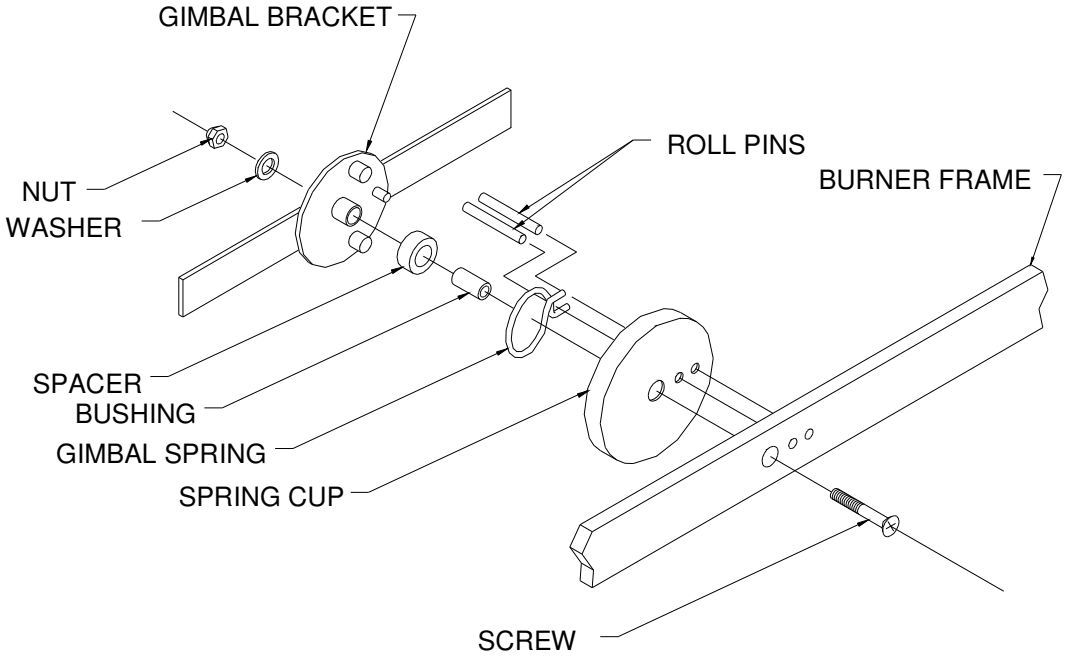

Figure 6.2.13b – Gimbal Spring & Pivot; Sides

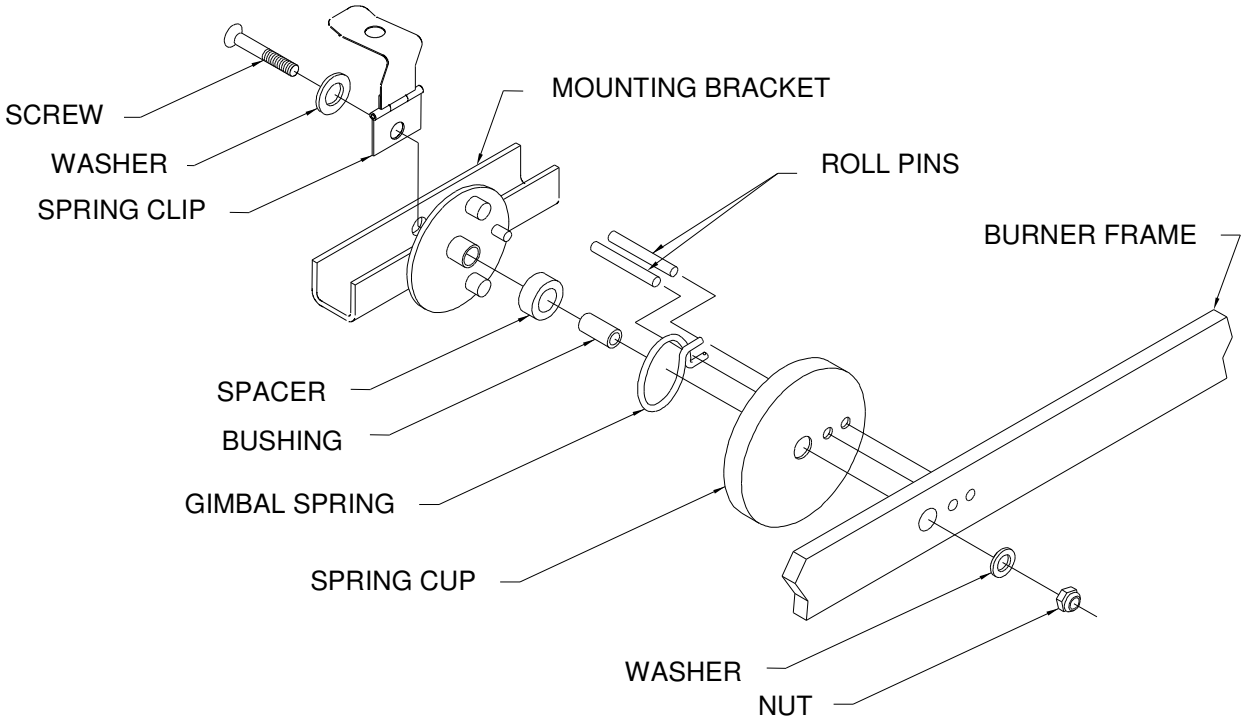

Figure 6.2.13C – Gimbal Spring & Pivot; ELS

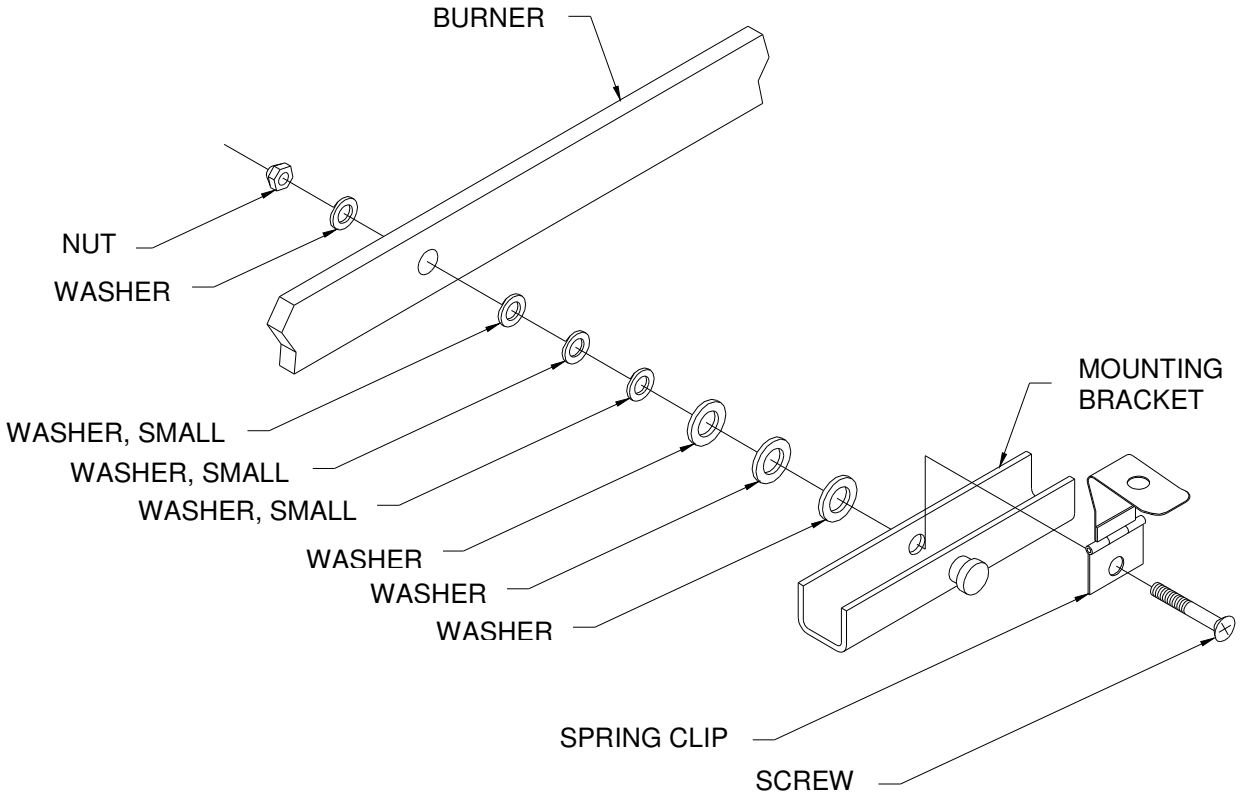

Figure 6.2.13D – Gimbal Pivot: ELS

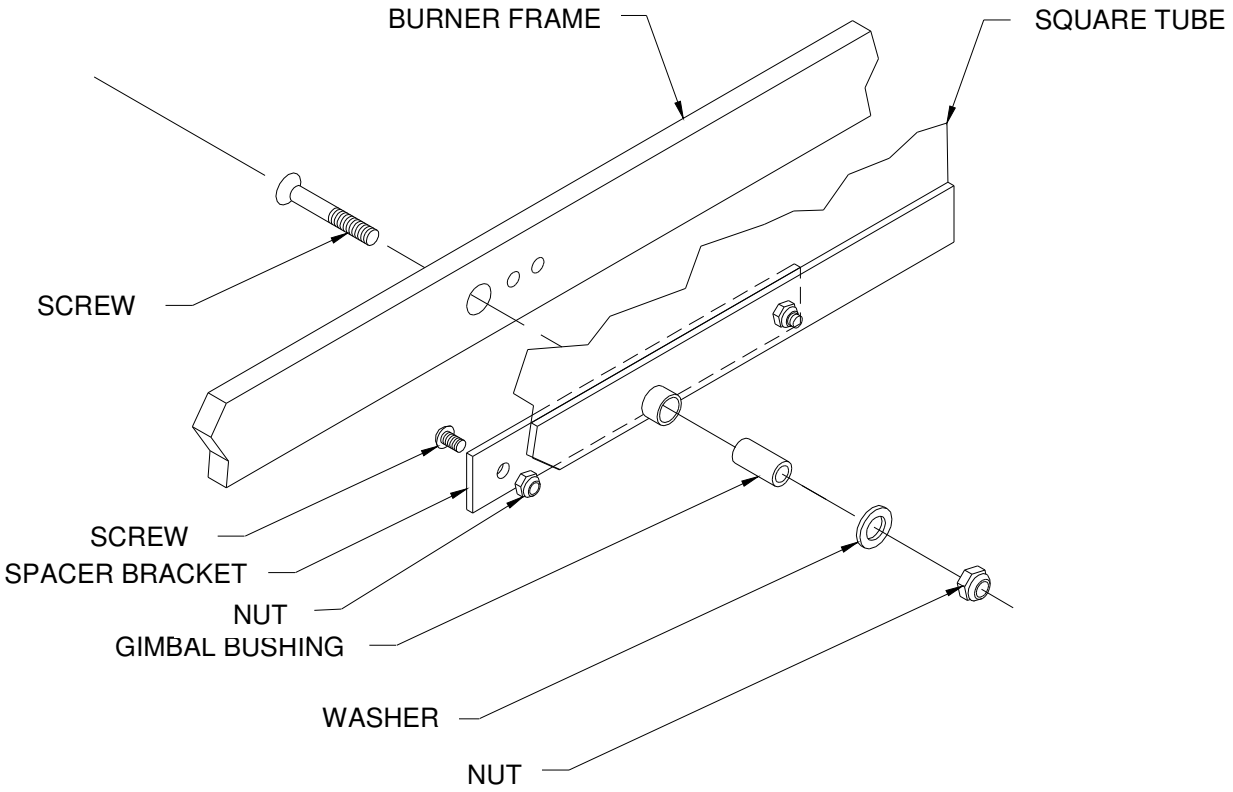

Figure 6.2.13E – Gimbal Pivot; HPIII Single

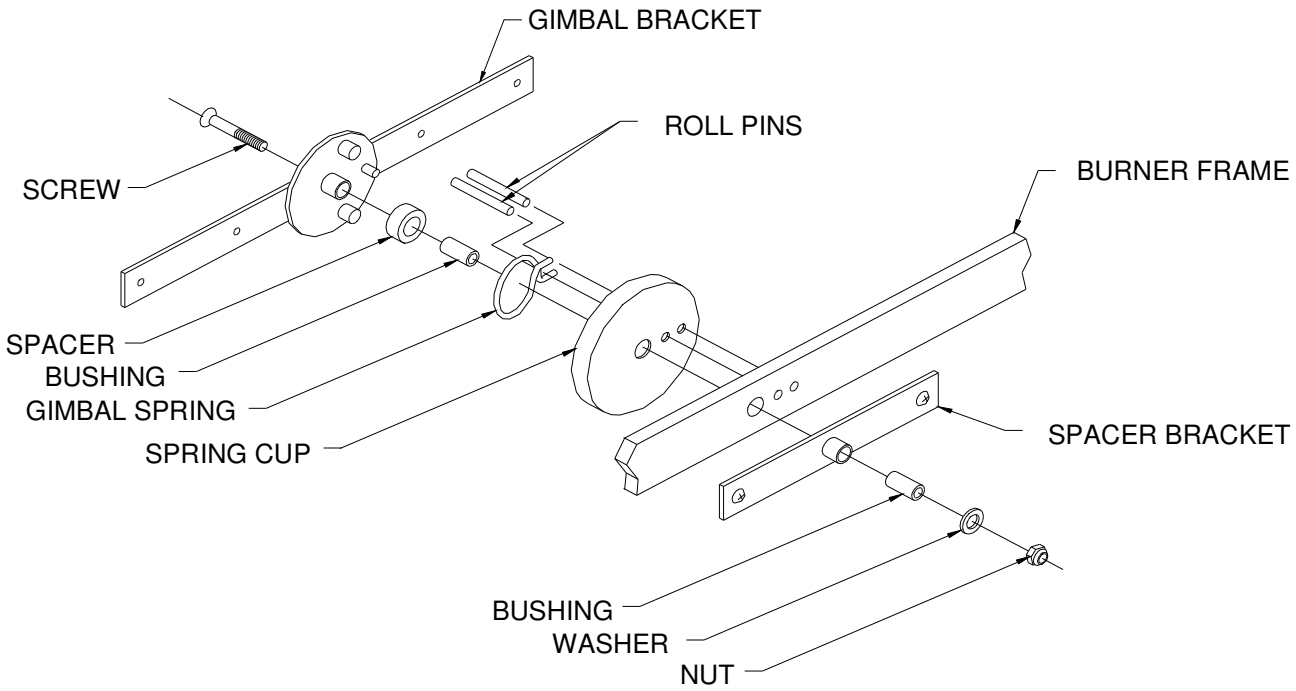

Figure 6.2.13f – Gimbal Spring & Pivot; HP3T Center

6.2.14 Burner with Electric Blast

Contact the Aerostar factory for details and instructions for the repair of this component.

6.2.15 Burner with Electric Ignition

Contact the Aerostar factory for details and instructions for the repair of this component.

6.2.16 Piezo Igniter

(1) To replace a defective igniter start by clipping the plastic tie wrap holding the fiberglass sleeve onto the base of the igniter

(2) Remove the retaining nut on the inside of the burner tray, and remove the igniter.

(3) Clean the dried silicone sealant from the hole in the burner tray.

(4) Insert the new igniter into the burner tray

(5) Place a small bead of silicone sealant around the base of the igniter on the inside of the burner tray.

(6) Install and tighten the retaining nut.

(7) Slide the fiberglass sleeve over the igniter and secure to the base with a plastic tie wrap.

Note

For HPIII model burners, it may be easier to replace the piezo igniter by first removing the burner tray and plumbing for better access to the restraining nut. See section 6.2.1(B)(2) steps (A) through (C)

6.2.17 Glow Valve Option

The glow valve option, fitted on HPIII burners only, must be free from leaks, operate smoothly, ignite readily when activated and shut off completely.

The handle should be restrained from rotation, spring loaded to prevent locking in the on position, and free from damage. Replace with new parts obtained from the factory if needed.

Tighten screws holding nozzle bracket if loose, replace bracket if excessively heat damaged or broken.

Clear nozzle orifices with wire if obstructed.

Adjust direction of pilot tube towards the glow head and not impinging on the heat exchange coils.

If the spring clip that holds the valve handle in position and returns the valve to the closed position when released is no longer functioning. Bend the spring back into position or replace it with a new spring. Replacement can be accomplished by the following:

(A) Remove the roll pin securing the valve handle, and remove the handle.

(B) Loosen the packing nut holding the spring clip in place, and remove the spring.

(C) Install a new spring clip in the proper orientation and reassemble in the reverse order.

6.3 FUEL SYSTEM REPAIR

General Information - Fuel System

The fittings used to construct the fuel hoses and fuel tanks are high quality commercial fittings of three general types:

(1) Flare fittings, used to connect the burner assembly and fuel hoses.

(2) Compression fittings used on the tubing connections.

(3) Pipe fittings, used to connect valves, tubing or hoses together.

(4) Hand turn POL fittings or CGA-555 fittings, used to connect the main fuel hose to the fuel tank withdrawal valve.

If components are disassembled for repair, fittings can be considered reusable if undamaged. Fuel hose end fittings must not be removed from the raw hose. Fuel hoses should be replaced as complete units only.

CAUTION

ONLY AEROSTAR REPLACEMENT HOSES ARE TO BE USED IN YOUR EQUIPMENT.

Only pipe fittings require the use of a thread sealant. There are two general types of thread sealant used:

(1) ¼ “ or ½ " wide Teflon tape.

(2) A liquid thread sealant or Loctite pipe sealant with Teflon.

The Teflon tape is applied to male threads by wrapping the Teflon tape around the threads approximately twice, leaving the first thread without the Teflon tape in order to prevent Teflon tape particles from entering the fuel system. If liquid sealant is used, it should also be applied to the male threads only, with no sealant applied to the first thread.

CAUTION

FOREIGN PARTICLES SUCH AS THREAD SEALANT AND TEFLON TAPE IN THE FUEL SYSTEM CAN CAUSE IMPROPER VALVE SHUT-OFF OR PILOT LIGHT FAILURE.

The Teflon tape is well suited for disassembling and reassembling of fittings, since it is easily removed from old fittings. Loctite Pipe Sealant with Teflon is recommended where the fittings are subject to a loosening torque during routine disconnection of fuel hoses, such as on fittings connected to the pilot light regulator.

6.3.1 Fuel Tanks

WARNING

FUEL CYLINDERS THAT HAVE DAMAGE TO THE BODY OF THE TANK BEYOND THE ALLOWABLE LIMITS ARE NOT REPAIRABLE, AND MUST BE REMOVED FROM SERVICE.

ANY FUEL CYLINDERS THAT LEAK AT A WELDED SEAM SHOULD BE REMOVED FROM SERVICE. THE CYLINDER SHOULD BE DRAINED OF ALL FUEL, PURGED WITH NITROGEN AND PROPERLY DISPOSED OF. NO FIELD REPAIR IS APPROVED

CAUTION

BEFORE COMMENCING ANY VALVE OR FITTING REMOVAL, THE TANK MUST BE COMPLETELY EMPTY AND FREE OF VAPORS.

6.3.2 Tank Liquid Valves

Installing a new bonnet assembly into the valve body can repair most liquid valve problems. Make sure the valve handle is in the open position when tightening the bonnet into the valve body.

If replacing the bonnet does not repair the problem or if other discrepancies exist in may be necessary to replace the entire liquid valve assembly.

(1) Make note of the orientation of the valves position

(2) Secure the tank

(3) Using the appropriate size crows foot tool, ratchet, and cheater bar remove the liquid valve. The application of heat from a hair dryer of heat gun may help to loosen the valve.

(4) With tank placed on its side to prevent contaminants from falling into the tank clean leftover sealant from the threads of the cylinder.

(5) Apply a lead based pipe dope/sealant to the new valve assembly, and install the new valve.

(6) Verify the valve for proper orientation.

(7) Pressurize the tank to a minimum pressure of 150psi and test for leaks.

With liquid withdrawal valves, confirm compliance with Service Bulletin No.135. The bonnet assembly can be replaced with appropriate (Rego or Sherwood) parts.

CAUTION

REGO AND SHERWOOD TANK VALVE PARTS ARE NOT INTERCHANGEABLE.

6.3.3 Tank Pilot Light Valves (Nupro) if installed

If vapor pilot light valve is leaking, tighten valve stem packing nut as per 5.3.3. If the valve is defective, replace with current valve and regulator. Use sealant on male threads.

If the handle is loose after tightening the set screw, remove the handle and file a small flat spot on the valve stem where the set screw sets. DO NOT allow the filings to fall around the valve stem. Reinstall the valve handle with the set screw seated on the flat.

When reinstalling the valve handle, use a drop of medium-strength thread locking compound, such as Loctite 242, on the set screw.)

6.3.4 Pilot light Regulators

Only one type of regulator is serviceable. This is the long bodied brass regulator and is the same regulator used in the burner as the vapor convertor part number 51043-27. If the regulator is malfunctioning disassemble and clean the interior of the regulator. The two O-rings may be replace is needed. Re-assemble and test for proper operation.

All other style regulators must be replaced if malfunctioning. Use pipe sealant or Teflon tape as necessary when installing the new regulator.

6.3.5 Fuel Quantity Gauge

To replace a fuel gauge dial;

(A) Make note of the orientation of the fuel gauge dial
(B) Remove the two screws securing the old dial.
(C) Install the new dial in its proper orientation.

To replace fuel gauge float assembly;

(A) Purge all fuel from tank.
(B) Remove the four screws, which hold the gauge in place.
(C) Install a new gasket.
(D) Orient the fuel gauge in its original position, otherwise the liquid withdrawal tube may interfere with fuel gauge float operation.
(E) Use Loctite 242 on when installing the four retaining screws. Tighten the retaining screws alternately to seat the gasket properly.

6.3.6 Fuel Hoses

(1) Use ½" Teflon tape (1 ½ to 2 turns) on male threads of all pipe fittings. Take care to leave the first thread bare so as not to introduce debris into the fuel system.

(2) When reassembling fuel systems, note the configuration of angles, fittings, and elbows so that fuel hose routing is proper and hoses are not kinked or rubbing against tank collar or other hard objects.

6.3.7 Fittings

When replacing any fuel assembly fitting, use the appropriate teflon tape or pipe sealant. Make sure to pressurize and leak test the repaired assembly prior to return to service.

6.3.8 Fuel Supply System

Any discrepancies found during the operational and leak test of the fuel system must be repaired as detailed in the appropriate section for the component causing the discrepancy.

6.3.9 Liquid Level Valve (spit Valve)

If liquid level (bleed) valve is defective, replacement of the spit valve bonnet will normally repair the problem. If not, replace entire valve assembly. Drain and purge the tank of all fuel, secure the tank, unscrew old valve and clean female threads. Apply sealant to male threads on replacement valve, and install.

6.4 BASKET OR GONDOLA REPAIR

WARNING

On TW (Classic IX & X) baskets, ensure that Service Bulletin #122 is complied with. This bulletin requires that a cable redundancy of factory origin be installed. This back up is not required on baskets of S/N TW 3004 and later.

WARNING

Aerostar Service Bulletin #133 requires that all RWS; CW and CWS gondolas that have a 4-point aluminum superstructure have a cable redundancy retrofit kit installed. This cable kit is not required on ELS and ELSS gondolas.

6.4.1 Rattan (Does not apply to Model G Aluminum Gondola)

The rattan repairs detailed below are to be performed with natural style rattan of a diameter similar to the diameter of the damaged area. Vertical rattan is 9-10 mm (p/n 51007-03), horizontal rattan is a 4-7 mm (p/n 51007-04).

Repair damaged areas greater than 4" in diameter or within 18" of another damaged area. Remove broken rattan that protrudes into the basket and could injure occupants.

An overlap style splice may be used to repair any breaks or cracks in a vertical rattan. The rattan used to splice the damaged area must overlap the original rattan by a minimum of 4 inches in each direction from the crack or where the rattan is damaged or missing due to a break. A polycarbonate or nylon rod may also be used to splice a broken or damaged vertical rattan. If this substitute is used the overlap must be a minimum of 8 inches in each direction.

If more than two adjacent vertical rattans are broken at the skid:

(1) Remove the broken section and replace with a new vertical rattan of the same approximate diameter.

Polycarbonate rod is also available from Aerostar for this purpose.

(2) Allow enough material for a minimum overlap of 4" with the original vertical rattan. When polycarbonate rod is used, minimum overlap should be 8" or greater.

(3) Soak the rattan in water until pliable and weave the repair areas using the original weave pattern.

(4) Do not put all horizontal rattan ends in a vertical line. It may be necessary to remove some of the original rattan adjacent to the damaged area to do this.

To repair damage to horizontal rattan (any size or rattan styles) clip out the damaged area and reweave with the same style and size of rattan. When clipping and reweaving a horizontal repair, stagger the points where the horizontal rattan is spliced. On some older style gondolas, 4 –

7mm rattan may be used to replace the original 4 mm dyed round reed. For any other changes or substitutions of rattan sizes or styles contact the factory. A typical horizontal splice or Weave end in shown in figure 6.4.1a

Each reed is woven alternately behind one spoke, then in front of the next spoke. Terminate between spokes and trim flush with weaving.

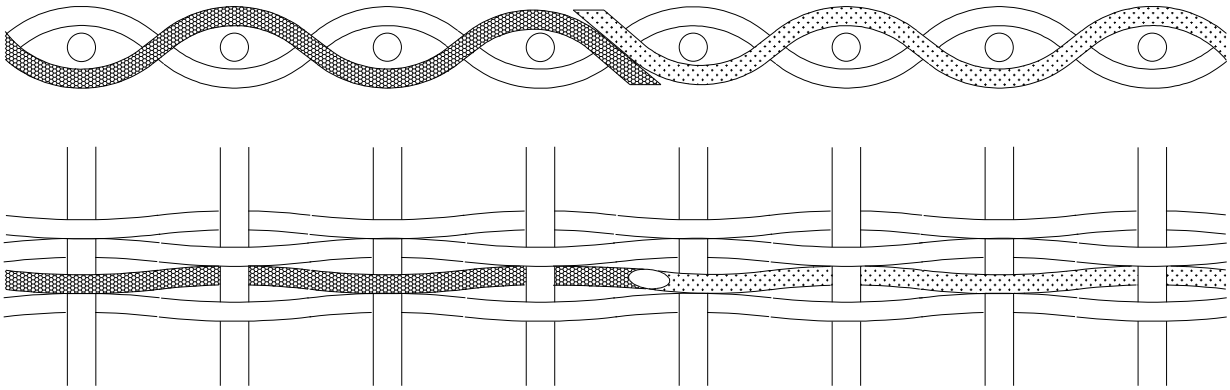

Figure 6.4.1a Weave End

Gondolas built after 1993 may have accent colors stripes woven with a poly tubing. This may be repaired by clipping the damaged area and splicing in a new piece of tubing. A splice is performed with the use of a connector fitting part number 51003-82, see figure 6.4.1b. Cut ends squarely, join ends with barbed connector

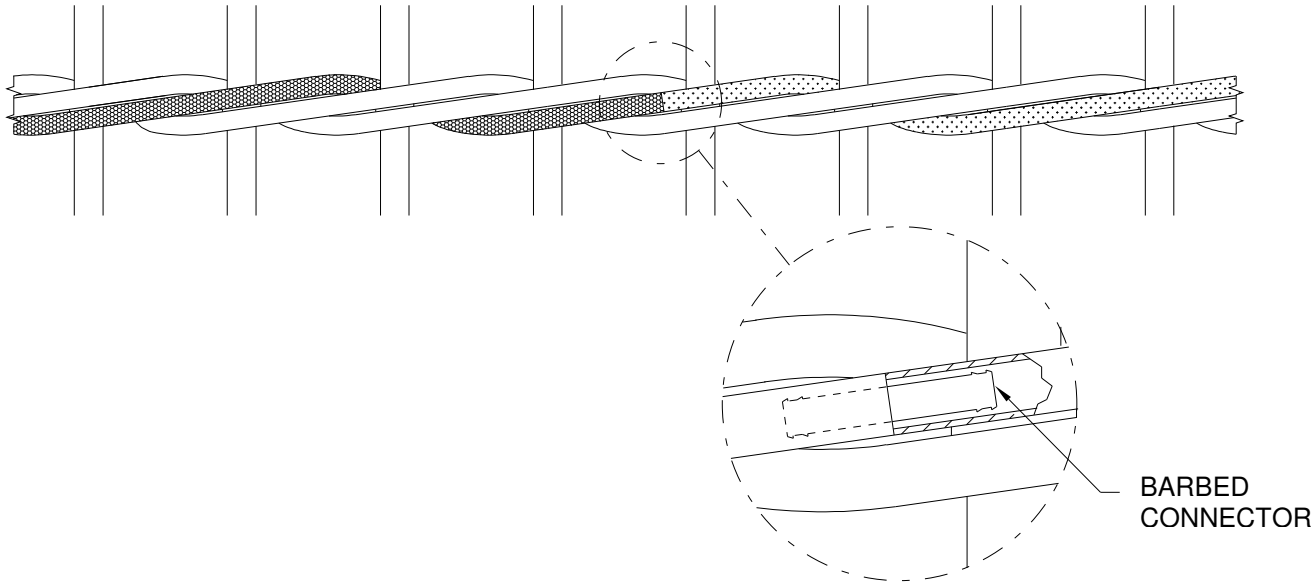

Figure 6.4.1b Poly Tube Splice

6.4.2 Plywood Floors

Minor damage to the plywood floors may be repaired with the use of a marine type epoxy, or bondo style filler. Follow the manufacturer's instructions for application, sand the epoxy patch smooth and finish with varnish or polyurethane. Floors damaged by fuel cylinder abrasion should be repaired by installing a tank "pad" or tank shoe. If damage is extensive, affecting the security of the floor, floors of TW-2, RWS, RWSW, ELS, ELSS, CW, CWS & RB gondolas MUST be replaced. TW-1 & RW floors may be repaired by any method approved by Aerostar, since their floors are not replaceable.

6.4.3 Tank Straps and Moorings

If any of the stitching is broken or loose, re-stitch using size FF thread. Any webbing damaged beyond the 20% limit must be replaced.

6.4.4 Tank Pads or Shoes

The tank shoes and pads are not repairable, replace any shoes or pads that no longer protect the floor from possible damage caused by the tank. Replace any damaged hardware.

6.4.5 Fire Extinguisher

There are no repair procedures for the fire extinguisher. Replace if damaged or malfunctioning.

If the bracket of pouch is not properly secured, replace the lacing or tighten the hardware as appropriate.

6.4.6 Interior Passenger Handles

These handles are not repairable. Any handle assembly that is not adequate for passenger safety should be rewoven into the upper portion of the gondola. It may be necessary to remove portions of the horizontal rattan to remove and replace a damaged handle assembly. After a new assembly is woven into place, secure the new rope handle in place by reweaving any rattan that may have been removed. If any vertical cane that supports the handle assembly is damaged, repair as outlined in section 6.4.1.

6.4.7 Exterior Carrying Handles

A broken or damaged handle rope may be repaired by pulling a new section of 5/16-inch polypropylene rope through the skid and the gondola in the identical position as the original. Use a half hitch knot to secure the new rope at the skid, install the handle and secure with a half hitch knot. The distance from the basket to the handle should be between 3 and 5 inches.

6.4.8 Scuff Leather

Any loose scuff leather should be replaced as needed to secure the leather in place to protect the rattan and lower area of the gondola. Use a high quality leather lace or 1/8 inch nylon lacing to secure the scuff pad. If a hole is worn through the scuff leather exposing the rattan, a small piece of similar quality leather may be glued to the inside of the scuff pad using contact cement. An alternative repair method is to vertically cut out the damaged area and splice in a section of new leather of the same type and quality. Use a lacing technique similar to the original installation to secure the repaired or spliced area.

Hardware

Damaged hardware is not repairable, replace any damaged hardware.

All quick release pins must be structurally sound and operate properly.

For Model RWS, RWSW, CW, CWV, CWS, RB or TW baskets replace bent pins or pins with the head loose from the shank. If necessary, lubricate with a silicone spray or similar lubricant. If the quick release pins used to connect the support tubes to the lower frame tubes are in good condition, but they can still be removed without depressing the release button, replace with a quick pin with a retaining plate or a bolt and lock-nut.

Note

All models of baskets, mfr'd after 5/86 have the retaining plate attached. Should the support tube holes elongate enough to allow the pin to be removed without depressing the release button, the pin lanyard may be released from the basket and re-attached closer to the holes so that the retaining plate may be used.

For Model RW baskets, if the quick release pins used to connect the support tubes to the lower frame tubes are in good condition, but they can still be removed without depressing the release button, replace with a bolt.

Wire lock pins used on the ELS, ELSS and RB baskets, are two completely different strength grades very similar in appearance. The ELS, ELSS pins are stamped with the letter "A" on the head, while the RB pin is stamped "S".

CAUTION

Either “A” or “S” style pins may be used on the ELS and ELSS gondolas, however the “S” style pin MUST be used on all RB model gondolas.

The spring gate should require some effort to snap it into place. The ends may be compressed together to increase the closing effort required. Otherwise, if the spring is non-functional or the pin is bent, replace the entire pin assembly. RB wirelock pins should always be installed with the heads toward the exterior of the basket.

6.4.9 Skids

(1) Model CW, CWV or CWS Basket (old style skid)

The skid made from oak 2 x 4 must be securely fastened at its butt joints, free from decay, without serious cracks, and without excessive wear. If skid bolts are wearing, replace or repair the skid.

If a butt joint is loose and tightening the bolt does not alleviate the problem:

(A) Use a 5/16" x 3½" stainless steel lag bolt.

(B) Locate the lag bolt 3/4" to 1" directly below the existing bolt.

(C) Countersink the hole 3/4" diameter to a depth sufficient that the bolt head is flush or recessed.

(D) Drill a ¼" diameter pilot hole 4" ± ¼" deep.

(E) Re-drill the ¼" diameter hole to 21/64" diameter for a depth of 2" or until the joint is reached.

(F) Use soap in the pilot holes to lubricate the lag bolt during assembly.

(G) Use a ¼" plated steel plain washer under the head of the bolt.

(H) Use waterproof glue between butt joint surfaces.

The countersunk hole on the bottom of the skid may be deepened and the bolt shortened to allow for greater skid wear. When increasing the depth of the countersink, a minimum of 2.6" of oak skid must remain un-countersunk. This will allow the skid to wear down to a minimum thickness of 2.9" from the original 3.5" when new.

If the skid bolts are beginning to wear:

CW AND CW-S SKID BOLT COUNTERSINK

(A) Remove the nut, bolt, and washers and re-countersink to leave a minimum of 2.6" un-countersunk.

(B) Re-install nut, bolt and washers and torque in place. Check bolt length. Bolt must be cut or ground to leave a minimum of 2 threads beyond the end of the nut. (Special thin lock nuts are available from Aerostar as P/N 51015-24 that work well for this purpose).

(C) Remove the bolt, cut or grind and re-install.

To repair cracks that cause the skid board ends to separate:

CW AND CW-S SKID CRACK REPAIR

(A) Loosen the floor and skid bolts to remove the gondola floor. Clean the cracked area with high-pressure air or other means then fill the area with high quality waterproof carpenter's glue.

(B) Clamp the cracked area together until the glue has cured.

(C) Re-install floor and bolt into place.

CW AND CW-S SKID CORNER GUSSET

If the skid board is cracked in the area where the end lag-bolts can't hold, and there is no room to re-locate the lag-bolts, installation of 52381-01 (left) or 52381-02 (right) gusset plates is recommended. These plates are available as a kit for all four corners only. Retrofit Kit 52381-01 Left; 52381-02 Right.

Two options are available for CW and CW-S skid repair where the skid is too worn or is cracked or broken beyond repair:

(A) Replace complete skid as a whole with Aerostar supplied components; or

(B) Replace complete skid with Aerostar supplied components utilizing the skid split method.

COMPLETE CW AND CW-S SKID REPLACEMENT

This method is recommended when the vertical wicker entering the skid is in poor condition (cracked and broken):

(A) Establish condition of skid and fasteners. Use only FAA approved repair parts. Obtain either P/N 52403 Polycarbonate wicker splices (32 required for CW-S, 28 required for CW for complete skid replacement) with several spares in case of breakage on installation, or obtain an appropriate quantity of vertical reed for splicing.

(B) Remove skid bolts and floor, basket emptied and overturned. Spray with water to soak all wicker within about 12" of affected areas. (Scuff pads will have to be removed).

(C) Clip all wicker "U"s adjacent to inside of skid on affected skid(s). The remaining wicker will be left sticking into the thickness of the skid for alignment during assembly. Remove bolts holding together affected skid(s).

(D) Remove skid(s) by prying from wicker extensions. If skid is being replaced as a unit, the complete skid may be removed without disassembly with a significant amount of prying on wicker extensions, however it is recommended that each board be removed individually. Stainless tube re-enforcements near the step area of newer model baskets will require removal by sawing the tube on the outside of the skid.

(E) Re-install new skid(s) as a reverse procedure as (4). Pry wicker extensions back, working the skid into position to allow each wicker extension to snap back through its respective hole. If stainless tube step reinforcements are present, remove them completely from the weaving and replace with new ones. They will require re-insertion into their respective holes in the skid at this time.

(F) Re-assemble the skid assembly with appropriate lag screws, lubricate them with liquid soap.

(G) Starting near the center of each skid, cut two wicker extensions at the outside of the skid where one "U" was previously formed. Remove the two wicker stubs from the skid.

(H) Insert a wicker "U" shape with 2¼" spacing between legs of the "U" and at least 8" long legs, or insert a P/N 52403 Polycarbonate "U" through the skid holes formed in step (7). Polycarbonate repair pieces must be manually bent to conform to the basket shape before use, otherwise the repair area will deform to the polycarb's straightness, resulting in an unusual looking basket.

(I) Align the ends of the "U" shapes alongside of its associated vertical wicker at the entry into the weaving. Spray the affected area with water. Slowly drive the "U" alongside of the vertical while guiding the legs around the curve with a screwdriver or other blunt object. Use only a rubber or plastic headed hammer while stabilizing the un-inserted legs of the "U' with one hand, gently tapping and aligning.

(J) Drive the "U" completely flush to the inside of the skid, being careful to align horizontal weaving. Squeeze the horizontal separation back down created during the insertion process. If wicker "U"s are used, assure a minimum of 4" overlap with horizontal wicker.

(K) Repeat steps (7) through (10) for remaining wicker pairs previously forming "U"s, working "U" pairs simultaneously on each side of center. Hole separations requiring greater than 2¼" "U" base width will require splitting pre-fabricated "U" shapes into two pieces to form an "L".

(L) Go back and re-seat any "U"s P/N 51040-47 which may have slipped during the complete installation, then secure each "U" P/N 51040-47 with a ½" "U" P/N 51040-47 nail or wiring nail around the base (near the center) leg of the inserted "U" P/N 51040-47. "L" shapes need to be secured near the end of the base of the leg.

(M) Spacing between horizontal weaving in the working area will need to be reduced back to approximately flush with the skid by prying and tapping on the wicker and skid.

(N) Re-assemble the floor and basket.

The following method is recommended when the vertical rattan is in good condition at the skid interface.

(A) Obtain the appropriate approved repair parts; replace worn nuts and bolts, etc.

(B) Remove skid bolts and floor, basket emptied and overturned.

(C) Remove all lag fasteners from affected skid boards.

(D) Cut affected skid boards horizontally immediately adjacent to weaving holes in skid at the appropriate angle to avoid cutting the wicker. Use a "Sawzall" or power "key-hole" saw for this operation.

(E) Remove loose skid half. Break out or carefully cut out the area near each weaving hole and remove the last skid half.

(F) Cut the replacement skid-board horizontally at the appropriate angle through the middle of the weaving holes to form two halves. Use a thin-blade jig-saw or other power saw. It is critical that material removal by sawing by kept to less than 3/16".

(G) Spread high-quality waterproof carpenter's glue over each half of the cut area.

(H) Re-install skid halves over the existing wicker, being careful to align the ends and the weaving. Clamp into place using floor bolts inserted through the skid board as alignment. Allow the glue to cure.

(I) Remove clamps and install skid assembly lags using soap as a lubricant. Install floor, etc. and re-assemble basket.

Note

Wear resistant materials/kits are available that can be installed on the CW type of basket skid as a replaceable wear buffer.

Note

All baskets manufactured since February 1, 1992 are equipped with readily removable skids for ease of replacement.

(2) Models RW, RWS or TW-1

The RWS skid is made from oak 1 x 4. It must be securely fastened to the gondola substrate and floorboard, free from decay, without serious cracks, and without excessive wear. Replace the skid if it is worn enough to expose the skid attaching bolts to abrasion. Replacement of the skid is accomplished by removal of attaching bolts through the floor. Use new mounting hardware if worn or broken.

If the 2 x 4 substrate becomes cracked, the crack may be filled with waterproof carpenter's glue and the board clamped until cured.

(3) Model TW-2

The skid for the TW-2 made from an oak 1 ¼ x 3 ½, must be securely fastened to the gondola substrate and the floor board, free from decay, without serious cracks, and without excessive wear. Replace the skid if it is worn enough to expose the skid attaching bolts to abrasion. Replacement of the skid is accomplished be removal of the attaching bolts through the floor. Use new mounting hardware if worn or broken.

If the 2x4 substrate becomes cracked, the crack may be filled with waterproof carpenter’s glue and the board clamped until cured.

(4) Model ELS, ELSS and RWSW

The skid for these gondolas are made from oak 1 ¼ x 3 ½, it must be securely fastened to the gondola floor and the adjoining skids, it must be securely fastened at its butt joints, free from decay, without serious cracks, and without excessive wear. Replace the skid if it becomes worn enough to expose the skid attachment hardware. Replacement of the skid is accomplished by removing the attachment floor screws and the lag bolts in the corners of the skid assembly. For RWSW gondolas using horizontal fuel cylinders, it will be necessary to remove the tank strap anchors from the skid in order to replace the skid. When installing a replacement skid, be sure to align the vertical canes in the slots of the skid before tightening into place.

(5) Model CW, CWS, RB5, RB6, RB8 or RB12 (New Style)

The skid for these gondolas are made from oak 2 x 4, it must be securely fastened to the gondola floor and the adjoining skids, it must be securely fastened at its butt joints, free from decay, without serious cracks, and without excessive wear. Replace the skid if it becomes worn enough to expose the skid attachment hardware. Replacement of the skid is accomplished by removing the attachment floor screws and the lag bolts in the corners of the skid assembly. For gondolas using horizontal fuel cylinders, it will be necessary to remove the tank strap anchors from the skid in order to replace the skid. When installing a replacement skid, be sure to align the vertical canes in the slots of the skid before tightening into place.

6.4.10 Stainless Steel Tubing - Straightening Procedure

WARNING

The straightening of aluminum parts is not allowed. Before attempting any bending procedures be sure the frame piece in question is stainless steel and is not more than 5 º out of alignment. Any aluminum part that is damaged beyond the specified limits MUST be replaced. Any part that is bent beyond the specified limits MUST be replaced.

The stainless steel tubing must not be bent in excess of allowance, cracked, collapsed or show signs of damage other than minor (less than 1/32" deep) surface scratches. Uncontrolled bend radius deformation of tubing may weaken it below acceptable limits.

Bend Allowance:

Distortion of the stainless steel superstructure from 0° to 3° out of original alignment is allowable, and may be flown as is. Bends ranging from 3° to 5° must be re-straightened in accordance with acceptable methods. Distortion in excess of 5° requires replacement of the bent piece with new parts obtained from the factory.

In addition, any stainless steel tubing which shows any signs of cracking, kinking, buckling or localized overstress must be replaced.

Any method that induces a gradual and uniform loading to straighten the bend is acceptable. The use of an outer sleeve or internal insert may be employed to apply the straightening load depending upon bend location. Consult the factory for any unusual situation.

Any method that results in additional tube damage, cracking, buckling, or localized stress damage is unacceptable and will necessitate replacement of the damaged piece with new parts obtained from the factory.

6.4.11 Gondola Lower Frames

Only stainless steel lower frames may be straightened if the bending does not exceed 5º, aluminum lower frames cannot be straightened. Follow the instructions in section 6.4.11 to straighten a lower frame.

6.4.13 Lower frame / Superstructure Interface

When replacing the superstructure support tubes, if the aluminum interface pins are bent, fractured or unusable, new aluminum pins must be used. At each Annual/100-hour Inspection, the aluminum interface pins must be completely removed and thoroughly inspected. If replacement is necessary, drilling of the replacement pin supplied from the factory is accomplished as follows:

(1) Bolt pin in upper frame.

(2) Insert upper frame into matching lower frame.

(3) Mark aluminum pins through lower frame quick release pinholes: both sides.

(4) Remove upper frame, mark alignment, remove aluminum pins from frame.
(5) Carefully drill pins, aligning bit with both marked locations. Use 13/64 drill bit. Deburr ends of holes. (Connector pin holes may be oversized to 0.215".)

(6) Install the quick pins.

6.4.14 Superstructure

Only stainless steel superstructure frames may be straightened if the bending does not exceed 5º, aluminum frames cannot be straightened. Follow the instructions in section 6.4.11 to straighten a superstructure frame. Replace the frame piece if damaged beyond the limits as listed in section 5.4.11.

6.4.15 4-Point Load Fittings

The load fittings located on top of the support tubes must not be bent or cracked. Damaged parts must be replaced with parts obtained from the factory.

6.4.16 Burner Support Block

Check the burner support block to ensure that it does not slip. If slippage occurs, replace insert piece with 51082-02 and 51082-03 with (3) set screws, 51014-21. Torque set screws to 25-45 in lbs. as necessary to prevent slippage.

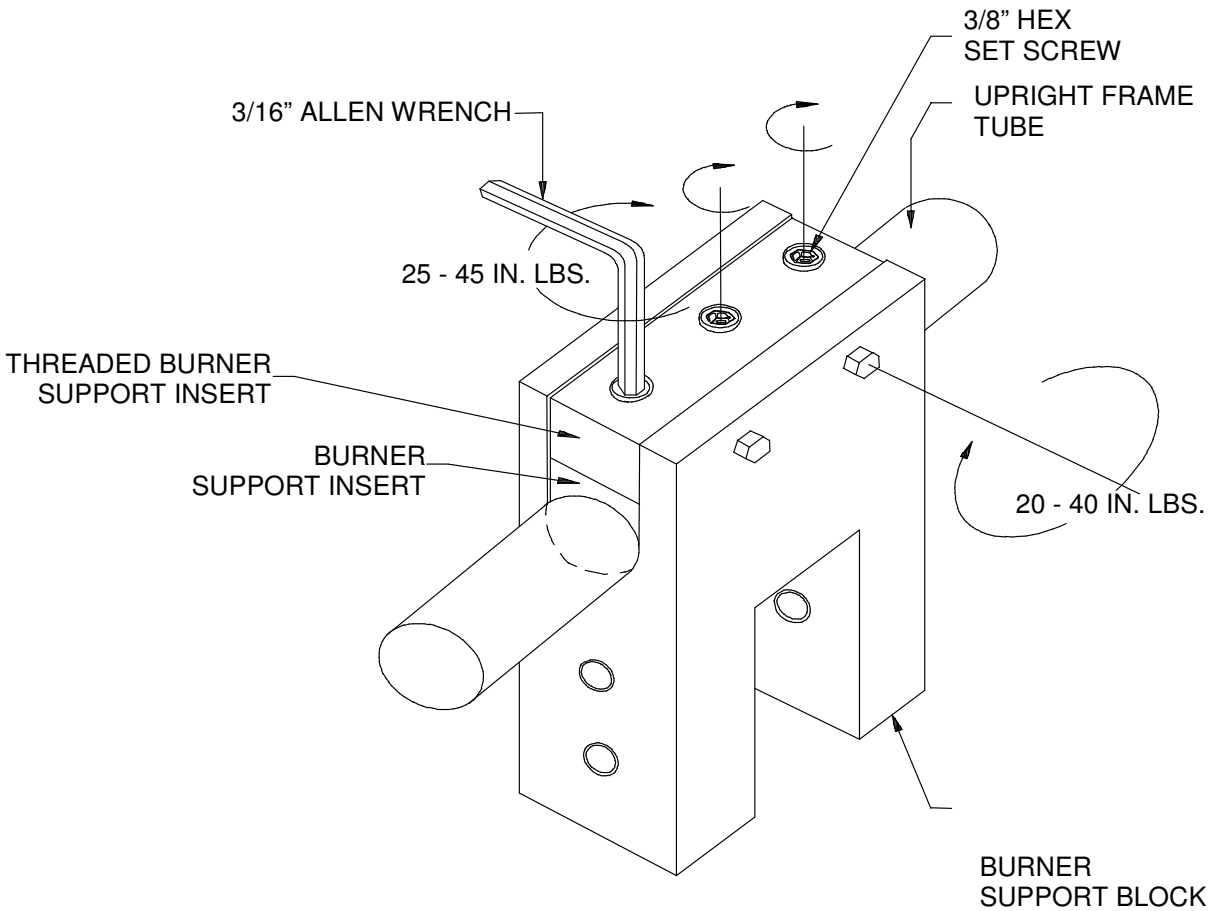

Figure 6.4.16 Burner Support Block Adjustment

6.4.17 2-Point Load/burner Blocks

No repair to this block is allowed other than repositioning and the tightening of the hardware. Replace any parts damaged beyond the specified limits.

6.4.18 RB Passenger Ride Gondolas

Due to the complex structural frame of the RB style gondolas, repairs to the structural components of these gondolas may performed only after consultation with the Aerostar factory. Repairs to the components standard to all gondola models, (i.e. rattan, skids, floors etc.), should be repaired as outlined in their respective sections.

The cable lacing used to secure the partitions may be spliced at any location using the proper plastic coated cable, nicopress sleeve and the appropriate nicopress tool.

6.4.19 AFX Basket Option (Model CW or RWSW Only)

(1) To replace upper cables, remove lower bolt and washers, and install new cable using new washers, bolt and locknut. Note that cable thimble has a washer on each face and is installed on the head (unthreaded) side of the bolt, with the third washer and locknut on the threaded end. Take care to ensure that the lower cable loop (inside lower frame tube) is caught by the upper cable bolt. The wire lanyard at the top of the cable should face outward to connect easily to the leather sleeve cover.

(2) To replace lower cable loop (inside lower frame tube), first remove upper cable bolts. Pull the cable out after attaching a "fish" line to one end. Attach the new cable to the "fish" line and pull back through. The nicopress sleeve (splice) should be near the middle of the cable loop. Use new washers, bolt and locknut to install the new lower cables following step (1) above.

(3) If lower rod sockets or upper load frame fittings are bent, cracked or bolt holes are distorted, they must be replaced with new parts obtained from the factory.

(4) If leather sleeve is worn excessively at the "hinge" portion, or stitching is broken at top web loop (for cable hook up), or at the top of the hose sleeve, repair as needed. Note that the lower "hinge" portion of the sleeve can be replaced without replacing the entire cover.

(5) Replace support rods if broken, bent, scratched, or heat damaged. Use only properly certified FAA approved replacement parts.

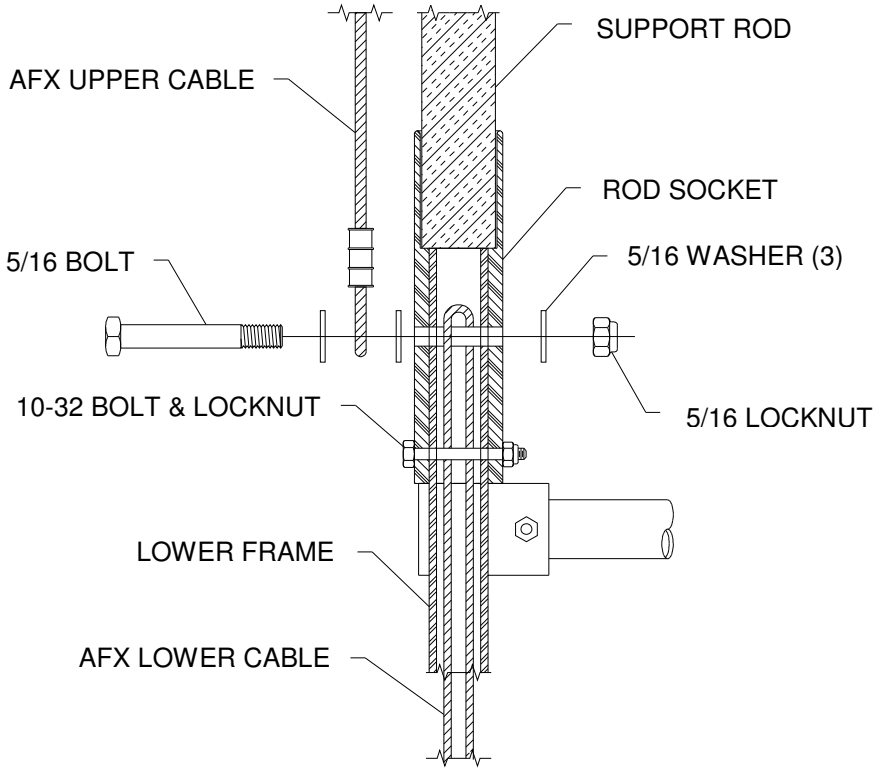

Figure 6.4.19 AFX Cable Interface

6.4.20 Aluminum Square Tubing (Model G Gondola Only)

To repair cracks, weld failures and/or damaged welds in the tubing:

(1) Insert a three-inch long, 2017-T451 aluminum rod with 23/32 " diameter, into the tube.

(2) Center rod insert on splice.

(3) Secure joint as follows:

- Use a 3/16 " drill to drill tubing at a location one inch either side of splice.
- Insert 3/16 " diameter rollpins, one inch long, into holes.
- Have the joint welded in accordance with ABADS 1021.
  Contact the Aerostar Technical Support through the Raven/Aerostar web-site for a copy of ABAD 1021.

All weld failures and/or damaged welds, except those discussed above, MUST be repaired in accordance with Aerostar ABADS 1021.

6.4.21 Fiberglass Liners and Panels (Model G Gondola Only)

Fiberglass liners and panels with holes greater than 3" in diameter or cracks in excess of 4" in length must be repaired or replaced. To repair, use standard commercial quality fiberglassing techniques:

(1) Apply three layers of 1½ oz. chopped strand fiberglass mat saturated with polyester resin.

(2) Extend the layered mat a minimum of three inches beyond the damaged area.

(3) Size the replacement fiberglass mats to provide a smooth transition from the original fiberglass to the replacement material.

6.5 INSTRUMENT REPAIR AND CALIBRATION

6.5.1 General Repair

WARNING

Federal Aviation Administration repair facilities with Limited Instrument ratings are the only facilities allowed to calibrate or repair aircraft Instrumentation. Appendix II-F (Instrument Repair and Calibration), is available to Repair Stations holding a Limited Instrument Rating.

The altimeter, rate-of-climb and pyrometer or envelope temperature indicators must be in operating condition, if not see the proper associated section for further information.

Accuracy: altitude plus or minus 200 ft., temperature plus or minus 5^{o} F.

If the instruments cannot be fastened securely in the gondola, repair or replace the item with the correct Aerostar part number. Batteries should be in working condition, if not, replace.

6.5.2 Standard Altimeter

If the facility performing the repair is an FAA certified limited instrument repair facility, follow the manufacture's recommended procedures. Otherwise, return to the manufacturer.

(1) Ball 655 Altimeter
If a certified limited instrument repair facility, follow Ball's recommended procedures. Otherwise, contact Aerostar Technical Support for additional information or contact information for an approved facility.

(2) Ball M-55 Altimeter
If a certified limited instrument repair facility, follow Ball's recommended procedures. Otherwise, contact Aerostar Technical Support for additional information or contact information for an approved facility.

(3) Ball M57R Altimeter
If a certified limited instrument repair facility, follow Ball's recommended procedures. Otherwise, contact Aerostar Technical Support for additional information or contact information for an approved facility.

Technical Support
Hot Air Balloon Systems

Aerostar International, Inc.
909 West Algonquin Street
Sioux Falls, SD 57104
(605) 331-3500

AEROSTARSUPPORT@RAVENIND.COM
http://ravenaerostar.com/owner-center

(4) DigiTool DBI-002 Altimeter

The DBI-002 contains no internal serviceable parts. If subject to malfunction or other damage an approved service agent or the manufacturer shall be used for the needed repairs. If you are a certified limited avionics repair facility, follow DigiTool's recommended procedures. Otherwise, return to:

Digitool Instruments AB
Box 6190
S-102 33 Stockholm, Sweden
Tel: +46 8 34 34 10
info@digitool.se

6.5.3 Rate-of-Climb Indicator

If a certified limited instrument repair facility, follow the manufacturer's recommended procedures. Otherwise, return to the manufacturer.

6.5.4 Wire Style Pyrometers

Several types of wires have been used in pyrometers.

(A) Thermocouple type is a thick black wire. Several repairs are possible:

(1) If wire breaks at plug end, wire can be cut, stripped and re-installed in plug. Wires should be stripped ½" and split apart as necessary to connect to terminal screws.

(2) Cracks in the insulation may be repaired with electrical tape. Care must be taken to ensure that no short exists between the two wires.

(3) A broken wire can be spliced by stripping wire back 1/4" and twisting like wires together then wrapping with electrical tape ensuring that the two wires cannot short at splice location.

(B) Digitron (tan) and Ball 655/M-55 (white) wires are thermistor wires.

(1) Wire removal and replacement is accomplished by attaching the bottom end of the new wire to the top end of the old wire and pulling the old wire out of the sleeve and the new wire in at the same time. A line may also be attached if the old cable is to be removed and reinstalled. After installation, the top end of the wire should be bent down over the sleeve and the sensor/thermocouple should be lashed to the edge of the sleeve with several loops of heavy thread. Excess cable at the base may be stored in the sleeve and hand stitched in place if desired.

(C) Connectors

For dirty and/or corroded contact and pins at the connector, clean with contact/switch cleaner (vapor degreasing solvent 1,1,1 Trichlorethane is recommended). Ball systems may have heat shrink tubing covering the connector between the upper and lower lead assemblies to help prevent moisture damage. Consult your Aerostar parts manual for the proper part number if replacement is required.

6.5.5 Thermocouple Pyrometers

Replace or repair the thermocouple wire assembly if cracking and/or separation of the two wires is visible and proper readings are not obtainable. If the sensor end is intact and no temperature registers, disassemble the plug at the lower end of the wire and check for loose connections or broken wires. If a broken wire is found it will be necessary to trim both wires back an equal length, strip off ¾" of the wire insulation and re-attach to the proper connections on the plug. If there are breaks at locations other than the ends, the wire MUST be replaced. No splicing of the wire is approved.
If the thermocouple temperature does not read within ± 5 degrees of a calibrated thermometer, calibrate the pyrometer by turning the screw on the face until the reading agrees. If the pyrometer cannot be calibrated returned to:

PCSI (LFE)
11993 Ravenna, Suite 5A
Chardon, OH 44024
Call 1-800-645-1180

6.5.6 Digital Pyrometers

If the digital pyrometer temperature does not read within ± 5°F of a calibrated thermometer, contact the manufacturer for calibration procedures.

For digital pyrometers manufactured by Digatron, contact:

Digitron
8102 N. Freya Street
Spokane, WA 99207
(509)-467-3128

For digital pyrometers manufactured by Ball Variometers, Inc., contact Aerostar Technical Support:

Technical Support
Hot Air Balloon Systems

Aerostar International, Inc.
909 West Algonquin Street
Sioux Falls, SD 57104
(605) 331-3500

AEROSTARSUPPORT@RAVENIND.COM
http://ravenaerostar.com/owner-center

For a digital pyrometer with HS sensor, if dirty and/or corroded contact and pins, remove and clean the contact and pins with contact switch cleaner (vapor degreasing solvent 1,1,1 Trichlorethane is recommended). If not repairable replace with Aerostar P/N 51158.

Note

Ball Variometer pyrometers may be one of two style sensors as depicted in Figure 6.5.6. The old style sensor is no longer available as a new part. If no used old style sensor is available, a new style sensor may be used. However the instrument will need to be re-calibrated to the new sensor. In addition it will be necessary to replace both the ambient and the envelope sensors for the pyrometer to operate properly. An appropriately rated instrument repair station may perform this calibration as outlined in appendix F, or return to the Aerostar factory or Blue Sky Avionics for calibration.

For systems with a Ball sensor, unscrew the small Phillips screw and clean the connector with contact switch cleaner. There should be an even white coating of the entire surface of the sensor and housing. If not, reapply coating up to but not past the connector (Rustoleum stain white #7791 recommended). If not repairable replace with P/N 51686.

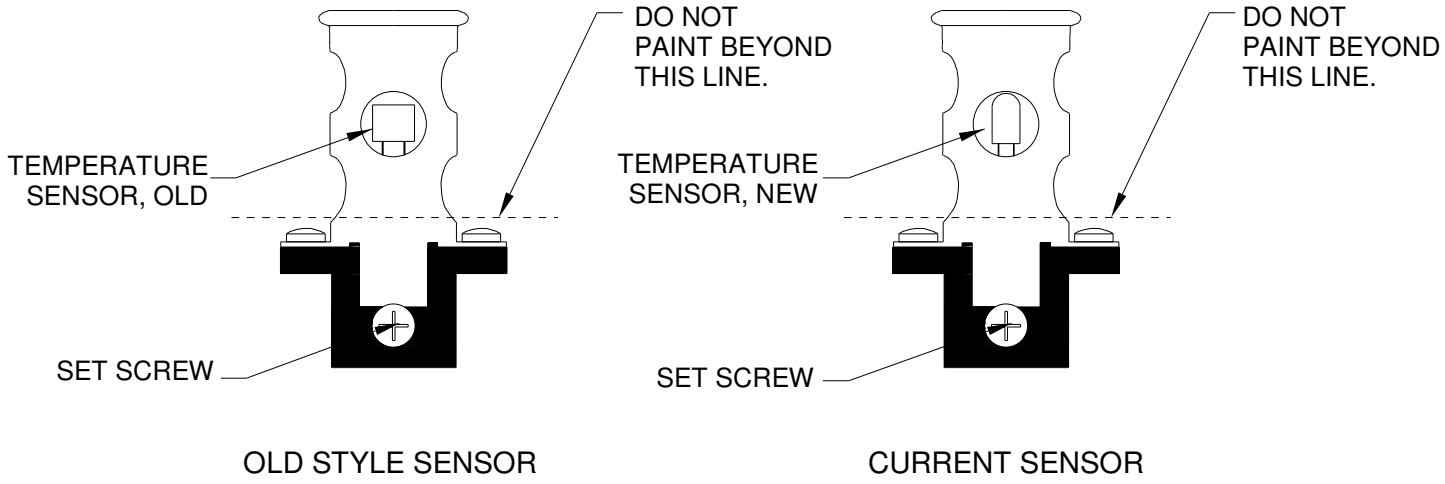

Figure 6.5.6 Ball Temp Sensor w/ Coating

6.5.7 AEGIS IR* Operation

If the temperature indicated at the receiver is out of the ± 5°F range call Aerostar Technical Support for further instructions.

6.5.8 Ball M57R Wireless Pyrometer Operation

If the temperature indicated is out of the +/- 5˚F range, or if the instrument and transmitter is malfunctioning, the affected components MUST be returned to the Manufacturer or approved facility for the needed repairs. Contact Aerostar Technical Support for additional information.

Technical Support
Hot Air Balloon Systems

Aerostar International, Inc.
909 West Algonquin Street
Sioux Falls, SD 57104
(605) 331-3500

AEROSTARSUPPORT@RAVENIND.COM
http://ravenaerostar.com/owner-center

6.5.9 DigiTool Instruments Wireless Pyrometer Operation

The DBI-002 contains no internal serviceable parts. If the temperature indicated is out the +/- 5ºF range, or if the instrument and/or transmitter is malfunctioning, or subject to other damage the affected components MUST be returned to:

Digitool Instruments AB
Box 6190
S-102 33 Stockholm, Sweden
Tel: +46 8 34 34 10
info@digitool.se

Or another approved service center if available.