FIREFLY BALLOONS

MAINTENANCE AND REPAIR MANUAL

for

HOT AIR BALLOONS

Models: FireFly and Galaxy Series,
Type Certificates: A14SO and A10NM
Serial Numbers: ALL

Prepared by Shawn Fraver
Director of Engineering

Firefly Balloons Inc.
810 Salisbury Rd.
Statesville, NC 28677

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LOG OF REVISIONS

REV#	DATE	PAGES	PARAGRAPHS	APPROVALS BY	APPROVALS DATE
A	5/87	I-1 to IV-15; Replace with pages 1-30; 100 Hour and Annual Inspection replace	ALL	SC	5/6/87
B	3/88	T Cont; pg 12; APP B	3 pgs; 1 added; all	SC	3/88
C	3/90	3,5,14,18,21,26,HH,I-1a,b,c,d,I-3b, 100 hr page, 4,6, APP B	ALL	SC	3/15/90
D	2/93	3,5,6,6a,10,11,14,15,18,19,20,22,23, 25,26,28,29,GG, 100 hr, APP B	ALL	SC	2/1/93
E	6/94	Add pg. 30	ALL	SC	6/4/94
F	3/95	Add APP E	ALL	SC	3/20/95
G	2/97	Replace pgs. 30, 10	ALL	SC	2/10/97
H	3/01	Replace cover page, Table of Contents, Page 2, add Appendix F,G	ALL	SC	03/29/01
I	05/04	Replace cover page, change system description, Page 3, B, paragraph 1 and 2.	ALL	SC	06/01/04
J	01/05	Change System Description Page 3, B, paragraph 1	ALL	SC	01/18/05
K	03/06	Removed Drawings, Page 16 through 19, from Sewing Specifications (SP104)	ALL	DSF	03/03/06
L	12/06	Cover page, Table of Contents pages, Front page of I-4, front page of Appendix C, Put page JJ after I-4	ALL	DSF	12/27/06

TABLE OF CONTENTS

Illustrations, Figures, and Instructions

FIREFLY BALLOONS – FIREFLY SERIES OF BALLOONS
ANNUAL AND 100 HOUR INSPECTION CHECK LIST

N_____ System S/N_____Model No._____ Work Order No._____
Owner:_____ Address_____
Inspector:_____ FAA No._____
PASS:_____ Logbook Entry per FAR 43.11_____
DATE:_____ Inspection Report Page_____ through _____ attached.

Check for AD's and Service Bulletins since date of this checklist. A descriptive list of all Service Bulletins as of this date is attached. Check factory for more recent additions.

AD's and Service Bulletins Checked:_____
Inspector's Initials

NOTE: This brief check list presumes familiarity with the details and procedures included in FIRE FLY BALLOONS MAINTENANCE AND REPAIR MANUAL available from FIREFLY BALLOONS Customer Service Department.

ITEM	INSPECT FOR	PASS	REJECT
DOCUMENTS:			
Standard Airworthiness Cert.	Record date_____, N-_____ displayed in carriage. _____	_____	_____
Registration Certificate	Record date_____, Name_____ N-_____.	_____	_____
Flight Manual	Correct manual, supplements, weights recorded.	_____	_____
Aircraft Logbook	Record N-_____ hrs to date _____, hours since last Inspec._____. Component S/N's correspond to AIRCRAFT RECORD – SERIAL NUMBERS in logbook.	_____	_____

BASIC INSPECTION:

A.	ENVELOPE:	Model Number_____ Serial Number_____		
	Name Plate	Legibility, record S/N	_____	_____
	Top Tie Ring	Distortion, cracks	_____	_____
	Load cords:			
	Splice at Tie Ring	Splice length 25 cm.	_____	_____
	Splice Tack	Five or more stitches	_____	_____
	Exposed length	Integrity, 10% max. cross section damage.	_____	_____

BASIC INSPECTION: (con'd)
A. ENVELOPE: (con'd)

ITEM		INSPECT FOR	PASS | REJECT
Top Girdle		**Integrity, Stitching**	_____|_____
Fabric and Seams:		CAUTION: any damage should be the starting point for a peripheral search for additional less obvious damage.	_____|_____
	(a)	Hole max. dimensions: 2cm above or below equator. Max. 4 holes per panel if they are more than 30 cm apart. No holes may be in adjacent panels.	_____|_____
	(b)	40 lbs. GRAB test in warp and fill directions, 4 or more locations (8 pulls). Two must be within 180 cm from top girdle and two must be from below the equator. Test must be done where fabric shows most signs of deterioration and aging. (See test procedure in Appendix A).	_____|_____
	(c)	Panels or structural members adjacent to panels which are repaired or re-placed must be tested for strength. Signs that fabric, webbing or cords have been taken over 300° include glassy-looking areas, crinkles, stiffness, shriveling of fabric or stitching and heat curled fabric edges along seams. Discoloration may indicate excessive temp. without other indicators.	_____|_____
	(d)	Check any envelope attachment (anchor loops, velcro etc.) for safe installation.	_____|_____
Centering Cord Anchor		Integrity, stitching secure.	_____|_____
Temperature Sensor		Securely stitched in place. Location – 60cm. from top girdle On gore seam 10 (12 gore env.), 15 (18 gore env.), 20 (24 gore env.) and 30 (36 gore envelopes).	_____|_____

BASIC INSPECTION: (con'd)
A. ENVELOPE: (con'd)

ITEM		INSPECT FOR	PASS	REJECT
Temperature Telltale		Located 60cm from top girdle on gore seam (see Appendix B) or in valve. Record S/N and max. temp. indicated. If 300 deg. is tripped, leave in place and add new indicator marked '2' or subsequent.		
Repair Patches		Per repair specifications		
Load Cords:				
Stitching bot. girdle		Integrity		
Stitching top girdle		Integrity		
Eye-splice tacks, top and bottom.		Integrity		
Suspension Cables:				
Metal Toggles		Intact, in place		
Metal Cables		Fraying, kinks, overheating		
Kevlon Cables		Fraying, sheath/Kevlon intact		
Wood Toggles		Integrity		
Cables, nicopress at toggles.		Intact, sharp edges, burrs		
Kevlon, lashing		Intact, fraying		
Valve:				
Temp. Telltale		If fitted in valve, record S/N and max. temp. indicated. If 300° F tripped, leave in place and add new indicator marked '2' or subsequent. See Appendix B.		
Fabric and Seams	(a)	Full surface inspection for discrepancies. CAUTION: SEE PAGE 3, (a).		
	(b)	Hole max. diam. 1 cm (3/8")		
	(c)	Grab tensile test of 40 lbs., warp and fill direction, 2 places (4 pulls) of fabric showing greatest age and deterioration. See Appendix A.		
	(d)	Panels or structural members adjacent to panels which are repaired or replaced should be carefully pull-tested for strength. Signs that fabric, cords and webbing have been heat damaged include glazed appearance, crinkles, curled and shriveled edges and discoloration.		

BASIC INSPECTION: (con'd)
A. ENVELOPE: (con'd)

ITEM	INSPECT FOR	PASS | REJECT
Centering Cords	Integrity, knots tight, fraying stitching to valve edge. Pull **test by hand to approx. 10 lbs.**	_____|_____
Jumpers	Integrity, knots tight, fraying.	_____|_____
Bridle Cords	Integrity, knots tight, fraying.	_____|_____
Valve Line Cable	Integrity, cable fraying	_____|_____
Valve Line Guide Ass'y	Integrity, anchors, knots tight	_____|_____
Valve Line/Cable Ass'y	Integrity, steel bandit/joint	_____|_____
B. CARRIAGE:	Model Number_____ Serial Number_____	
Burner Supports:		
Pins and Bands	Security, condition	_____|_____
Square Pins	Security, condition	_____|_____
Bolts and Fasteners	Security, condition	_____|_____
Rattan Structure	Integrity, condition	_____|_____
Suspension Ropes:	Abrasion, condition, max 25% cross-section damage except for 10% within 25 cm (10") of tie plates under floor. Interference with fuel lines and carriage structure.	_____|_____
Rope Retainers	Integrity	_____|_____
Plastic Covers	Damage which might affect rope strength.	_____|_____
Eye-Splice Lashing	Integrity, shrinkage of eye diam.	_____|_____
Wicker	Integrity, holes max. diam. 12"	_____|_____
Rattan Frame	Integrity, cracks, breaks.	_____|_____
Corner Panels	Integrity, security	_____|_____
Floor:		
Wood Runners	Integrity	_____|_____
Tie Plate Hardware	Integrity	_____|_____
Eye Splices	Integrity	_____|_____
Plywood Floor	Integrity, top and bottom	_____|_____

BASIC INSPECTION: (con'd)
B. CARRIAGE: (con'd)

ITEM	INSPECT FOR	PASS	REJECT
Fuel System:	Close inspection for integrity, worn spots or abrasions on lines, interference from tanks or any part of structure, damage to fittings and connectors.	_____	_____
Fuel Hoses	Wear or abrasion spots, kinking Or too tight bend radii, interference from tank collars or carriage structure. Secure ties. Life Limitation of fuel hoses of 9 years from certification date. See SERVICE BULLETIN B-24.	_____	_____
Regulator	Leaks, correct operation	_____	_____
Pressure Relief Valve	Life Limitation of 10 years from certification date. See SERVICE BULLETIN B-24.	_____	_____
Fuel Pressure Gauge	Reads correctly when line is pressurized, within 5% of 0 when line is drained.	_____	_____
Fuel Tanks	Visible damage, valves, fittings undamaged, dust cap on pressure relief deflector. DCM Electri-Shield, if fitted, intact with target decal readable. Check tank dating for hydrostatic test. See SERVICE BULLETIN B-24.	_____	_____
Tank Straps	Integrity, no less than 80% of cross-section intact.	_____	_____
Tank Gauges	Operational	_____	_____
Instruments:	Operational, Check ser. numbers	_____	_____
Temp. Indicator	Correct amb. temp. within 4%. Batteries good and wiring secure.	_____	_____
Altimeter	Right Alt. at current bar. press.	_____	_____
Rate-of climb	Operational, zeroed.	_____	_____
C. BURNER:	Model No_____ S/N_____		
Can, coils	Integrity	_____	_____
Joints, connections	Security	_____	_____
Pilot light tubes	Aligned, secure	_____	_____
Aspirator	In position, secure, open.	_____	_____
Allen head bolts	Retorque. See page 30.	_____	_____

BASIC INSPECTION: (con'd)
C. BURNER: (con'd)

ITEM	INSPECT FOR	PASS	REJECT
Trigger Valve	Replace "O" ring (Rego Valves only), setscrew locked 10 in/lb cotter pin handle, torque specs for bonnet.	_____	_____

D. INFLATION CHECK

A.	Envelope:			
	Holes and Rips	Within specs.	_____	_____
	Patches	Integrity, security	_____	_____
	Valve	Fit around girdle, centering	_____	_____
	Valve Line	Greater than 5 ft. slack	_____	_____
	Crown Line	Greater than 4 ft. slack	_____	_____
	Temp. Indicator	Approx. correct indication	_____	_____
	Bottom girdle	Fabric intact around perimeter	_____	_____
B.	Carriage:			
	Plumbing	Sniff test for propane leaks with system under pressure.	_____	_____
	Fuel Flow	Full flow from each tank. Check press. drop with burner operating.	_____	_____
	Tank Gauges	Indicating correctly.	_____	_____
	Fire Suppression	If fitted, gauge indicating.	_____	_____
	Suspension Ropes	Position, length, integrity	_____	_____
	Structure	Wicker, rattan, frame, burner supports, pins, attachments.	_____	_____
	Temp. Indicator	Giving reasonable indication	_____	_____
	Fire 2 Burner	Valve operates properly, flame alignment correct.	_____	_____
C.	Burner:			
	Pilot Lights	Blue flame, inner peaks extend at Least 3/8" over tube ends. Will not blow out.	_____	_____
	Main Jets	Positive ignition, thin flame shape, No flame extending through coils.	_____	_____
	Trigger Valve	Positive action, no leaks.	_____	_____
	Connections, Joints	Leaks	_____	_____
	Fire 2	Alignment proper with no flame extending outside of can. Pos. ignition and burning.	_____	_____

ANNUAL AND 100 HOUR INSPECTION CHECK LIST

INSPECTION AND REPAIR REPORT

N_____ System S/N_____ Model No._____
Work Order No._____ Date:_____
Owner:_____
Address_____

Item No.	Discrepancy/Correction	**Initials**	
		Repair	Inspect.

FIREFLY BALLOONS
810 SALISBURY ROAD
STATESVILLE, NORTH CAROLINA 28677

SEWING STANDARDS

SPECIFICATIONS SP 104 C
FIREFLY DRAWING 2046 REV. C

FIREFLY SERIES OF BALLOONS

C	3102	12/27/06	DSF
B	3089	2/28/2006	DSF
A	3001	2/12/2001	FAA
REV	**ECO #**	**DATE**	**APP.**

SIGNED: Shawn Fraver

Shawn Fraver
Director of Engineering

SEWING STANDARDS

SPECIFICATION SP104

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FIREFLY BALLOONS

SPECIFICATION SP104

SEWING STANDARDS

SECTION I

PURPOSE:
This specification defines the types of sewing used in the manufacture and repair of the Firefly series of balloons.

DESIGNATIONS:
5 types of basic stitches are used.

Designation letters are as follows:

1st Space (Letter)

C	- Straight Chain Stitch
S	- Straight Lock Stitch
Z	- Zig Zag Lock Stitch
W	- Serpentine Zig Zag Lock Stitch
T	- Tack Lock Stitch

2nd & 3rd Spaces (Letters)

Dn	- Double Needle
Sn	- Single Needle
4n	- Four Needle
6n	- Six Needle

4th & 5th Spaces (Numbers)
- Stitch Specification

6th & 7th Spaces Number
- Thread Specifications
Old Z3W1 – 30

Example: Z Sn01 - 30

1 2&3 4&5 6&7

1st = Zig Zag
2nd & 3rd = Single Needle
4th & 5th = Zig Zag Stitch Spec. #1
6th & 7th = Thread Specification #30

SECTION 2

CROSS REFERENCE OF OLD DESIGNATIONS TO NEW

Old Designation	New Designation
Straight Chain Stitch	
C Dn	CDn01-30
C	CSn01-30
Straight Lock Stitch	
SDn-T-L-G	SDn01-30
S16	SSn01-16
S30	SSn01-30
Zig Zag Lock Stitch	
ZWL 30	ZSn01-30
ZWL 16	Zsn01- 16
ZMT 30	Zsn02- 30
ZMT 16	ZSn02-16
ZNT 30	ZSn03-30
ZNT 16	ZSn03-16
Z3WL 30	ZSn04-30 or ZSn05-30
Serpentine	
Z4WL 30	WSn01-30
Tack	
Tack #1A	TSn01-138
Tack #1B	TSn02-138

SECTION 3

STRAIGHT CHAIN STITCHES SPECIFICATION

General:

Seam Ends: Both ends of seams must be locked to prevent raveling. Usually this will be done, with a cross seam. Where there is no cross seam, alternate methods must be used such as back sewing, cross-stitching with stitch SSn01, and/or gluing.

Skips Maximum skips are 4 stitches or 1 cm. From one needle only with no other skips from same or adjacent needle within 10 cm. Skips exceeding these standards must be resewn or over-sewn with stitch SSn01 or CDn01, over-sewing on each side of the skip at least 2 cm. And crossing over the CDn01 stitches at a narrow angle at least once each side of the skip. All observed skips not exceeding above standard and not repaired by sewing must be sealed by a drop of A2226-1, or equal, applied to the looper threads opposite the directions of succession stitch formation.

Fabric Damage: Fabric damage when using this stitch will average 2 or less broken threads in warp and 2 or less broken threads in fill per needle perforation. This average will be over any 15 cm. of single seam length.

Thread Length: The chain stitch thread lengths, both top (needle thread) and bottom (looper thread) control the stretch of the seam. On the balloon envelope, the gore seams (sewn on the fabric bias) stretch with load. It is necessary that the seam stretch with the fabric t prelude thread breakage.

Specifications: (Gore Seams)
A sample 20 cm. Length of chain stitch will be cut from a sample seam. Both top and bottom threads will be removed. For the sewing machine and seams sewn to be acceptable, the following lengths must be met:

Top thread not less than 30 cm.

Bottom thread not less that 43 cm. (48 preferred)

Total of both threads not less than 90 cm.

Total of both threads not more than 110 cm.

NOTE 1: This is a manufacturing and repair specification and is not a 100/hr. Annual requirement.

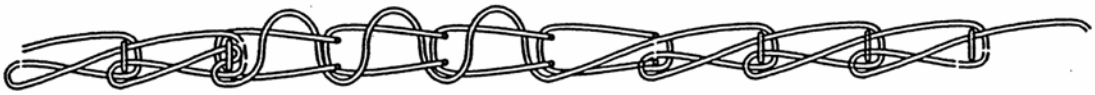
NOTE 2: The major cause of short thread length has been the lack of machine tension set-up, periodic servicing, and the tension of the thread from its cone.

SECTION 3

GOOD STITCH

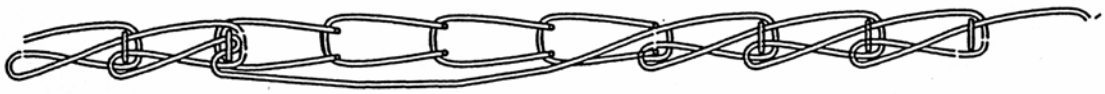
NEEDLE LOOP SKIP

LOOPER THREAD SIDE OF TRIANGLE SKIP



NEEDLE ENTERING IT'S OWN LOOP

BOTTOM SIDE OF LOOP SLIDING TOO FAST
(MALFORMED STITCH)



NEEDLE ENTERING IT'S OWN LOOP

TOP SIDE OF LOOP SLIDING TOO FAAST
(101 STITCH)

SP104

SECTION 3 (con.)

STRAIGHT CHAIN STITCHES SPECIFICATION

CDn01	(Old CDn) Federal stitch type 401 (Ref. Federal Standard 751) Gauge between needle 13 mm (1/2”) Stitches per cm 2 1/3 to 4 1/2 Stitches per inch 5.9 to 11.4
CSn01	(Old C) Same as CDn01 except with one needle
C4n02	Federal Stitch Type 401 (Ref. Federal Standard 751a) Gauge between needles 0.6, 1.3, 0.6 cm (1/4”, 1/2", 1/4") Stitches per cm 2 1/3 to 4 1/2 Stitches per inch 5.9 to 11.4
C6n04	Federal Stitch Type 401 (Ref. Federal Standard 751a) Gauge between needles 0.6, 1.3, 1.9, 1.3, 0.6 cm (1/4”, 1/2", 3/4", 1/2", 1/4") Stitches per cm 2 1/3 to 4 1/2 Stitches per inch 5.9 to 11.4
CDn03	Federal Stitch Type 401 (Ref. Federal Standard 751a) Gauge between needles 0.6 (1/4”) Stitches per cm 2 1/3 to 4 1/2 Stitches per inch 5.9 to 11.4

SECTION 4

STRAIGHT LOCK STITCH SPECIFICATIONS

GENERAL:

Tension
Thread tensions should be adjusted equally so that locks are not visibly displaced from needle hole. (Maximum 0.05 cm) Sewing outside this specification will be removed and resewn.

Skips
Skips in excess of 4 stitches in a 10 cm. Length must be removed and /or over-sewn with same stitch overlapping at least 2cm each side of skip.

Fabric Damage (Panel & Gore Seams and Repair)
Fabric damage when using this stitch will average 2 or less broken threads in warp and 2 or less broken threads in fill per needle perforation. This average will be over any 15 cm of single seam length.

STITCH SPECIFICATIONS:

SDn01 (old SDN-T-L-G)
Federal Stitch Type: 301 (Ref. Federal Standard 751)
Gauge between needles 13 mm (1/2”)
Stitches per cm: 4 to 5 (stitches per inch: 10.2 to 12.7)

SSn01 (old S16 and S30)
Same as SDn01 except with single needle.

SECTION 5

ZIG ZAG STITCH SPECIFICATIONS

GENERAL: Applicable to all stitches.

Tension

1. Thread tensions should be adjusted equally. Locks at or in needle holes.
2. Material sewn should not be puckered across width of Zig Zag.
3. Neither needle or bobbin thread should be loose.

Skips

1. Missed Stitch
2. Unequal Tension

Skips in excess of 4 stitches in a 10 cm length must be resewn or over sewn wih same stitch overlapping at least 2 cm each side of skip.

Fabric Damage (Panel & Gore Seams and Repair)

Fabric damage when using this stitch will average 2 or less broken threads in warp and 2 or less broken threads in fill per needle perforation. This average will be over any 15 cm of single seam length.

Secure Stitch

Secure stitches are zig zags used to fasten tape to tape, cords to tape, etc.

The fabric damage limitation above does not apply to secure stitches or ZSn01.

SECTION 5 (con.)

ZSn01 (old ZWL30 and ZWL16)

Federal Stitch Type: 304 (REF: Federal Standard 751)

Width of Zig Zag = 0.4 to 0.7 cm (0.157 to 0.276 inch)
Length of Zig Zag = 0.3 to 0.5 cm (0.118 to 0.197 inch)
Stitches per throw = 1
Zig Zags per inch = 8.5 to 5.1

ZSn02 (old ZMT30 and ZMT16)

Secure stitch only.
Federal Stitch Type: 304 (REF: Federal Standard 751)

Width of Zig Zag = 0.3 to 0.5 cm (0.118 to 0.197
Length of Zig Zag = 0.10 to 0.15 cm (0.039 to 0.059)
Stitches per throw = 1
Zig Zags per inch = 25.4 to 16.9

ZSn03 (old ZNT30 and ZNT16)

Secure stitch only.
Federal Stitch Type: 304 (REF: Federal Standard 751)

Width of Zig Zag = 0.2 to 0.3 (0.079 to 0.118 inch)
Length of Zig Zag = 0.1 to 0.2 (0.039 to 0.079 inch)
Stitches per throw = 1
Zig Zags per inch = 25.4 to 12.7

(Valve Webbing Secure Cord)

SECTION 5 (con.)

ZSn04 (old Z3WL30)

Federal Stitch Type: 308 (REF: Federal Standard 751)

Width of Zig Zag = 0.5 to 0.7 (0.6) cm (0.197 to 0.276 inch)
Length of Zig Zag = 0.7 to 1.0 (0.85) cm (0.276 to 0.394 inch)
Stitches per throw = 3
Zig Zags per inch = 3.6 to 2.5

ZSn05

Federal Stitch Type: 308 (REF: Federal Standard 751)

Width of Zig Zag = 0.5 to 0.7 (0.6) cm (0.197 to 0.276 inch)
Length of Zig Zag = 0.7 to 1.0 (0.85) cm (0.276 to 0.394 inch)
Stitches per throw = 4
Zig Zags per inch = 3.6 to 2.5

ZSn06 (Flex-Net panel seams, fabric to tape) or (Flex-Net gore seams tape to tape)

Federal Stitch Type: 308 (REF: Federal Standard 751)

Width of Zig Zag = 0.25 to 0.35 (0.30) cm (0.098 to 0.138 inch)
Length of Zig Zag = 0.40 to 0.80 (0.50) cm (0.157 to 0.314 inch)
Stitches per throw = 1
Zig Zags per inch = 6.3 to 3.2

SECTION 5 (con.)

ZIG ZAG LOCK STITCH SPECIFICATIONS:

ZDn06 (Flex-Net Gore Seam, tape to tape) or (Flex-Net Panel Seams, fabric to tape)
Same as ZSn06 with gage between needles = 1.59 cm

ZSn07 (Flex-Net Gore Seams, fabric to tape)

Federal Stitch Type: 308 (REF: Federal Standard 751)

Width of Zig Zag = 0.25 to 0.35 (0.30) cm (0.098 to 0.138 inch)
Length of Zig Zag = 0.20 to 0.32 (0.26) cm (0.079 to 0.138 inch)
Stitches per throw = 1
Zig Zags per inch = 12.7 to 7.9

ZSn08 (Gore Tape & Girdle Interface)

Federal Stitch Type: 308 (REF: Federal Standard 751)

Width of Zig Zag = 0.4 to 0.7 cm (0.157 to 0.276 inch)
Length of Zig Zag = 0.1 to 0.2 cm (0.39 to 0.079 inch)
Stitches per throw = 1
Zig Zags per inch = 25.4 to 12.7

SECTION 6

SERPENTINE LOCK STITCH SPECIFICATIONS

GENERAL – Applicable to all stitches.

TENSION:

1. Thread tensions should be adjusted equally. Lock at or in needle holes.
2. Material sewn should not be puckered across width of zig zag.
3. Neither needle or bobbin thread should be loose.

SKIPS:

1. Missed stitch.
2. Unequal tension.
3. Skips in excess of 8 stitches in a 10 cm length must be resewn or over sewn with same stitch over lapping at least 2 cm each side of skip.

SECTION 6 (con.)

STITCH:

WSn01 (old Z4WL30)

Federal Stitch Type: 308 (REF: Federal Standard 751) except that successive groups of 4 stitches form a symmetrical sine wave pattern

Width of Serpentine Stitch = 0.5 to 0.7 cm (0.195 to 0.27 inch)
Length of Serpentine Stitch = 0.7 to 1.0 cm (0.27 to 0.39 inch)
Stitches per throw = 5

NOTE: This stitch is generally used to apply artwork to the balloon envelope or to attach long lengths of fabric to tapes.

SECTION 7

TACK SPECIFICATIONS

TSn01: (Old Tack #1A)

TSn01 is formed by Juki Industrial Sewing Machine Model LK 984-24. Stitches are lock stitches in accordance with Federal Stitch Type #304. Stitch pattern consists of a line of 13 stitches over laid by 29 zig zag stitches, nominal pattern dimensions 3.5 mm by 24 mm. This pattern is described in Juki Catalog No. LK-980-1E dated July, 1977.

Tensile strength of a connection formed by one TSn01 shall be not less than 500 lbs. 226.8 kg).

TSn02: (Old Tack #1B)

TSn02 is formed by Singer Industrial Sewing Machine Model 269W11. Stitches are lock stitches in accordance with Federal Stitch Type #304.

Stitch pattern consists of a line of 7 staying stitches over laid by 32 zig zag stitches and 3 typing stitches, nominal pattern dimensions 3.5 mm by 22.2 mm. This pattern is described in The Singer Industrial Sewing Catalog.

Tensile strength of a connection formed by one TSn02 shall be not less than 500 lbs. (226.8 kg).

SECTION 8

THREAD SPECIFICATIONS:

Panel and Gore Seams (General Use) – No. 30 per Drawing 2130

Secure Stitching – No. 16 per Drawing 2116

Tacks – BT/138 per Drawing A2138

Skirt Stitching – Nomex, No. 69 per Drawing 2232

SECTION 9

SEAM MARGIN SPECIFICATIONS:

Two Items, Control the Seam Margins:

1. Fabric Overlay
2. Sewing Accuracy (drift off evenly centered seams).

FABRIC TO FABRIC PANEL AND GORE SEAMS USING CD_N OR CS_N STITCHES SPECIFICATION:

Manufacturing and Repair:

1. Overlap……3 + 0.7-0.3 cm.
2. Margin…….0.9 + 0.5-0.3 cm.
   Margin Minimum…….0.6 cm.
   Margin Maximum…….1.4 cm.

Airworthinewss Minimums:

1. Overlap……2.7 cm.
2. Margin…….0.4 cm.

NOTE:
When sewing, if the overlap is allowed to get on the small side of the tolerance, it reduces the space available to the sewer to keep the margins within specifications.

FABRIC TO TAPE PANEL AND GORE SEAMS SPECIFICATIONS:

NOTE:
Zig zag margin is fabric edge distance from nearest stitch holes.

Margin Seams: (Manufacturing and Repair:)

Tape - .20 cm. min. .80 cm. max.
Fabric - .60 cm. min. 1.2 cm. max.

NOTE:
Fabric will be sewn to tape with single zig zag stitch only.

Margin Sews: (Airworthiness Minimums:)

Tape - .20 cm. min.
Fabric - .30 cm. min.