



industries, inc.

SERVICE BULLETIN 115

26 October 1983

**SUBJECT** Deflation panel pull forces

**APPLICABILITY** Raven Model S77-A balloons; serial numbers S77-A-101 through S77-A-105 only.

**PROBLEM** The design of these subject serial number balloons has been reviewed on the basis of field reports of low values of pull-out force on the circular top deflation panels. Field reports have confirmed that deflation panel pull forces in the subject balloons are closer than desired to the 25 pound minimum permitted by Federal Aviation Regulations. Therefore, testing has proceeded at Raven to devise a design which would increase the pull force values and keep them consistently at a higher value throughout the lifetime of the hook and pile fastener.

The solution arrived at is to use one and one-half inch wide Velcro fastener (number 80 hook) for a distance of 12 inches on either side of the pull point of the deflation panel line. The remainder of the deflation panel hook and pile fastener is to be left as one-inch wide fastener.

**CORRECTIVE ACTION** Attachments to this bulletin provide specific details to be used in making the required modification. A sufficient amount of approved hook-and-pile fastener is enclosed, and this fastener, **not a substitute**, must be used in the modification. If there are questions, please call Pat Cannon at 605/335-0137.

This modification must be performed by an authorized repair station and must be completed within 30 flight hours of receipt of this service bulletin.

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DWG. AMEND. NO. 200

SHEET

OF 1

DATE 10-20-83

DESCRIPTION:

PART A

IN SEC F-F (SHEET 2), FOR D-51502 (S-77A) ONLY; IN THE TOP CAP, FOR 12" EITHER SIDE OF PULL-OUT D-RING, REPLACE ITEM 27 WITH ITEM 64. IN CORRESPONDING LOCATION IN DEFLATION PORT, REPLACE ITEM 26 WITH ITEM 63. USE 24" CUT LENGTH OF BOTH ITEM 64 AND 63, AND ALIGN EDGES OF ITEMS 64 AND 63 WITH EDGES OF ITEM 25 IN THEIR RESPECTIVE PARTS. ENDS OF ITEM 64 AND 63 SHALL OVERLAP ENDS OF 27 AND 26 RESPECTIVELY BY AT LEAST 1". STITCH ITEMS 64 AND 63 WITH ITEM 19 PER NOTE 1M.

REF TEST REPORT R1093-013. REF PJC MEMO TO LJM DATED 10-18-83. S-77A ENVELOPES WITH SERIAL NUMBER 101 THRU 105 WILL BE RETROFITTED WITH 1/2" FASTENER TAPE PER PART A OF DWG. AMEND 200.

PART B

IN SEC H<sub>2</sub>-H<sub>2</sub> (SHEET 1), FOR D-51502 (S-77A) ONLY; CHANGE CUT LENGTH OF TOP HANDLING LINE FROM 108 TO 112 FEET.

REF PJC MEMO TO LJM DATED 10-18-83.

**\* REPLACE OR COVER (OVERLAY). ITEM 63/64 MAY BE SEWED OVER ITEM 26/27, WITHOUT REMOVING ITEM 26/27.**

REASON: (PART A) TO PROVIDE IMPROVED LEVEL OF PULL-OUT FORCE FOR DEFLATION PANEL.  
(PART B) TO IMPROVE WORKING LENGTH OF LINE

DISTRIBUTION	EFFECTIVITY: PART A EFFECTIVE WITH SER. NO. S-77A-106.	
ENG.	PART B EFFECTIVE FOR ALL FUTURE PRODUCTION	
Q.C.	APPROVED	DATE
PI		10/20/83
FAA	PROJ. ENG.	
LBA	FAA	
KR	DER NO.	

PARTS IN STOCK TO BE MODIFIED FOR PART A, USED AS IS FOR PART B	
INTERCHANGEABILITY EFFECTS:	NONE
OTHER PARTS, ETC AFFECTED	NONE

DWG. TITLE	BALLOON DEFLATION SYSTEM, S-SERIES, RIP-TOP
DWG. NO.	D-52003
REV.	A

DISPOSITION: DATE \_\_\_\_\_ DWG REV. LTR. \_\_\_\_\_

DG-12391 OR DG-51192 REV. LTR.

RAVEN Ind. Inc. Sioux Falls, S.D.		PARTS LIST FOR D-51502-1 (S-77A)	PL-51502 REV. C	
QTY.	TITLE	PART NO.	REF-NOTE	ITEM
-1				
56	COKE (HALF OR MAJCK)	C-51528-77		1
AR	BALLOON FABRIC	B-07733		2
1	SKIRT, BUNNER	D-51529		3
1	LEAD, THERMOCOUPLE	C-10408-7		4
4	SUSPENSION BRACKET	B-51519		5
AR	CLOTH, INSIGNIA	B-51004-35		6
1	TEMP. INDICATOR	B-51054-33		7
1	SNAP, HARNESS, 1-3/4"	B-51031-32		8
1	V-RING	B-51031-26		9
1	D-RING, 1-1/2"	B-51031-33		10
15	D-RING, 1"	B-51031-34		11
2	SLEEVE, NICOPRESS, 3/32	B-51037-07	18-2-G	12
44	SLEEVE, NICOPRESS, 1/8	B-51037-02	18-3-M	13
28	WEBBING FITTING	B-51031-26		14
AR	CORD, 1200 LB, 1/4" NYLON	B-51047-49		15
AR	TAPE, HEAT SHRINK	B-51027-06		16
28	THIMBLE, 1/8"	B-51037-04		17
2	THIMBLE, 3/32"	B-51037-05		18
AR	E-THREAD, POLYESTER V-T-285	B-51046-02		19
1	LOOP CLAMP, 1/8"	B-51031-19	DIG PYRO OPTION	20
AR	AIRCRAFT CABLE, 1/8 GALV.	B-51037-01		
AR	AIRCRAFT CABLE, 3/32 GALV.	B-51037-06		
AR	TAPE, 1" NYLON	B-51047-16	MIL-T-5038, TYPE IV	24
AR	TAPE, 1-1/2" NYLON	B-51047-50	MIL-T-5038, TYPE IV	25
AR	FASTENER TAPE, HOOK, 1"	B-51048-02	MIL-F-21840	26
AR	FASTENER TAPE, PILE, 1"	B-51048-03	MIL-F-21840	27
AR	WEBBING, 1-23/32 RED NYLON	B-51047-51	MIL-W-4088	28
AR	F-THREAD, POLYESTER V-T-285	B-51046-01		29
AR	THREAD, 3 PLY NYLON	B-51046-04		30
				31
AR	NYLON FLARE CLOTH	B-51004-36		32
	COKE, MAN. VENT FLAP	C-51506-4		33
	DRIVE SCREW #4 X 1/4	D-51014-06	TYPE U	34
1	NAMEPLATE, HAB	B-13037		35
2	TAPE, GT-300	B-51054-07	1/2 X 1/2 X 1 X 4" LONG	36
				37
1	LINK, TRIANGLE	B-51031-36	MS 22020-1	38
1	SCREW, 10-32 X 3/8	H-51013-48	(DIG PYRO) MS 51958-61	39
1	NUT, 10-32, LOCKING	B-51015-01	(DIG PYRO) MS 20365-1032A	40
				41
				42
				43
AR	1500 LB NYLON CORD	B-51047-11	MIL-C-7515 TYPE V	44
AR	POWER BRAID 1/2"	B-51007-06		45
AR	HEAT SHRINK TUB 1/2"	B-51027-04		46
				47
				48
				49
AR	FIRE RETARDANT FABRIC	B-51004-34	OPTIONAL	50
AR	FIRE RETARDANT THREAD	B-51046-08	OPTIONAL	51
1	UPPER ENV LEAD	B-51155-3	DIG PYRO OPTION	52
1	LOWER ENV LEAD	B-51156	DIG PYRO OPTION	53
1	TOP ENV SENSOR	B-51158	DIG PYRO OPTION	54

1. SEAMS AND STITCHINGS SHALL BE AS SPECIFIED AND/OR AS SHOWN. EXCEPT AS NOTED, CONFORMITY SHALL BE TO FEDERAL STANDARD 751a, WITH STITCH TYPE 301, AND 7 TO 11 STITCHES PER INCH.

- A. SEAM TYPE Lsa-2, DOUBLE NEEDLE, 3/8 ± 1/32 GAGE, 3/16 MIN EDGE DISTANCE.
- B. SEAM TYPE Lsc-2, DOUBLE NEEDLE, 3/8 ± 1/32 GAGE, 1/8 MIN EDGE DISTANCE.
- C. DOUBLE NEEDLE, 3/8 ± 1/32 GAGE, 3/16 MIN EDGE DISTANCE.
- D. 4-PT. W-W, 1/16 MIN EDGE DISTANCE, 6-9 STITCHES PER INCH, SIZE F THREAD ONLY.
- E. BOX-X, 1/16 MIN EDGE DISTANCE, SIZE F THREAD ONLY.
- F. DOUBLE NEEDLE, 3/8 ± 1/32 GAGE.
- G. HANDSTITCH WITH LOCKSTITCH (NON-CONFORMING).
- H. 3/16 MIN EDGE DISTANCE.
- J. 64-STITCH BARTACK (3-PT W-W @ 7/8 X 1), SIZE F THREAD ONLY.
- K. SIZE F THREAD ONLY.
- L. 3-PT W-W, 1/16 MIN EDGE DISTANCE, 6-9 STITCHES PER INCH, SIZE F THREAD ONLY.
- M. 1/8 MIN EDGE DISTANCE.
- N. DOUBLE NEEDLE, 3/4 ± 1/32 GAGE.
- P. STITCH TYPE 304 (ZIG-ZAG), TWO ROWS, 1/2" GAGE, 5-7 EDGE STITCHES PER INCH. STITCH WIDTH 3/16 ± 1/16.

USE SEAM 1B AS SHOWN FOR MATERIAL LACKING SELVAGE EDGE. SEAM 1A MAY BE SUBSTITUTED FOR 1B WHEN JOINING TWO SELVAGE EDGES.

CONSTRUCTION STITCHES (TO MAINTAIN POSITION OF PARTS DURING ASSEMBLY, ETC.) MAY BE USED AS REQUIRED, IN ADDITION TO SEAMS AND STITCHINGS SHOWN AND/OR SPECIFIED.

2. GORE PATTERN AND USE OF Lsc-2 SEAM CONSTRUCTION ARE BASED ON USE OF 1-1/8" SEAM ALLOWANCE (BOTH EDGES OF GORE) ON NON-SELVAGE EDGE MATERIAL. SEE DRAWING D-52006, DETAIL D. REDUCE STRAIGHT-SIDE SEAM ALLOWANCE TO 3/8" WHEN USING ALTERNATE 3/4" LAP SEAM (NOTE 1A), PERMITTED WITH USE OF SELVAGE-EDGE MATERIAL.

FABRICATE ENVELOPE WITH 56 HALF-GORES, AS INDICATED. CORRESPONDING INDEX MARKS OF ANY TWO HALF-GORES SHALL NOT MISALIGN MORE THAN 1/2" IN ANY 24" SPAN.

EXCEPT AS NOTED ABOVE, GORE SEAM CONSTRUCTION SHALL BE IN ACCORDANCE WITH DRAWING D-52006, DETAIL D. SEAMS JOINING STRAIGHT EDGES SHALL HAVE DOUBLE TAPES AND ARE ODD-NUMBERED SEAMS. SEAMS JOINING CURVED EDGES ARE NON-TAPED AND ARE EVEN-NUMBERED SEAMS.

LOWER TERMINATION OF VERTICAL LOAD TAPES SHALL BE IN ACCORDANCE WITH DRAWING D-52007, SEC. C-C. UPPER TERMINATION SPLICES SHALL BE IN ACCORDANCE WITH DRAWING D-52003, SECTION H2-H2. OTHER VERTICAL-TAPE SPLICES SHALL BE MADE IN ACCORDANCE WITH DRAWING D-52006, DETAIL E. ANY SPLICE IN ONE TAPE OF A DOUBLE-TAPE SEAM MUST BE AT LEAST 4 FEET FROM ANOTHER SPLICE ON THAT SEAM.

HAND MARK SEAM NUMBERS OF TAPED SEAMS AT TOP AND BOTTOM OF ENVELOPE (SEE VIEWS A-A AND B-B).

3. CIRCUMFERENTIAL BANDS ARE REQUIRED AT STATION LOCATIONS INDICATED ON ELEVATION VIEWS. ADDITIONAL CIRCUMFERENTIAL BANDS BELOW STATION 66 ARE OPTIONAL. BANDS AT STATIONS 76 AND 86 SHALL INCLUDE A CROSSOVER BAND, ATTACHED IN ACCORDANCE WITH DRAWING D-52001, SEC. S-S, WITH LENGTH OF CROSSOVER BAND 9" ± 1/2 SHORTER THAN DISTANCE FROM SEAM 1 CENTERLINE TO SEAM 5 CENTERLINE (MEASURED ON LAYFLAT UNDER NOMINAL HAND TENSION). SPLICE JOINTS SHALL BE IN ACCORDANCE WITH DRAWING D-52006, DETAIL E.

4. IN SIDE-LOCATED MANEUVERING VENT, ORIENTATION OF FLAP GORE (DRAWING D-52001, SEC. W-W; ITEM 33) SHALL BE WITH CURVED (LONGER) EDGE ATTACHED AT ENVELOPE GORE SEAM, AND STRAIGHT (SHORTER) EDGE HANGING FREE TOWARD INSIDE OF ENVELOPE. TAPE SHALL BE SEWED TO FREE EDGE OF FLAP WITH ENOUGH PUCKER IN FLAP MATERIAL TO MAKE FREE EDGE 12" ± 1 SHORTER THAN ATTACHED EDGE, MEASURED BETWEEN COMMON POINTS AT TOP AND BOTTOM OF FLAP.

STITCH BOX-X REINFORCEMENT THROUGH VERTICAL AND HORIZONTAL TAPES AT TOP AND AT BOTTOM OF VENT. 3/8 GAGE STITCHING ON CIRCUMFERENTIAL BAND SHALL BE INTERRUPTED AT LOCATION OF BOX-X.

CUT LENGTH OF LOWER ACTUATION LINE TO BE 40'6" ± 6". UPPER ACTUATION LINE TO BE CUT 2'0" LONGER THAN LOWER LINE (40'6" + 2'0" = 42'6", NOMINAL, REFERENCE). CUT LENGTH OF PULL LINE TO BE 80'0" ± 6". BECKET-LOOPS ON ACTUATION LINE MIDPOINTS SHALL ATTACH TO EYE-SPLICE LOOP ON PULL LINE. SEE DRAWING D-52001, DETAIL R.

5. SHEATH PKG ITEM 52 SHALL BE CONTINUOUS ALONG SEAM 7 (PER DRAWING D-52006, DETAIL P) FROM TOP END TO LOWER END. (SEE DRAWING D-52005, DETAIL Q; AND DRAWING D-52007, SEC. C-C).

D-51502  
(Part of D-51502)  
SHEET 2 OF 3

HAVEN INDUSTRIES, INC  
NOTES FOR  
ENVELOPE, BALLOON,  
HOT AIR, S-77A

REV DESCRIPTION  
C SEE D-51502

8. APPROVED ALTERNATE FOR ITEM 7 IS TELATEMP CORN. (MILLEPTON, CA) MODEL 110-5 FOR 260° TO 310° INCL. SEAL TEMP INDICATOR BY FOLDING ITEM 36 IN HALF LENGTHWISE AND HEAT SEALING AROUND THREE SIDES WITH INDICATOR BETWEEN FOLDS. PLACE SEALED INDICATOR, FACING INWARD, ON INWARD SURFACE OF ENVELOPE, COVERED WITH ONE THICKNESS OF FLAKE CLOTH. STITCH COMPLETELY AROUND FLAKE CLOTH, BUT NOT INTO INDICATOR SEAL. LOCATE INDICATOR APPROX. CENTERED IN DEFLATION CAP. SEE D-52005, DETAIL L.
- RIG SUSPENSION CABLES PER TABLE, BELOW. SEE DRAWING D-52007, SEC C-C; AND D-51502, VIEW B-B. EACH CABLE MUST BE WITHIN ± 1/2" OF NOMINAL LENGTH SHOWN. IN ADDITION, DEVIATION FROM NOMINAL LENGTH MUST BE SAME WITHIN ± 1/4" FOR ALL CABLES IN SAME ENVELOPE.
9. BURRER SKIRT ATTACHES WITH VERTICAL STRIPS OF FASTENER TAPE PILE AT EVEN-NUMBERED SEAMS. (REF. DRAWING D-52007, SECTION N-N).
9. INSTALLATION OF ITEMS 52 AND 53 SHALL BE IN ACCORDANCE WITH D-52005, DETAIL O; D-52006, DETAIL P; AND D-52007, SECTION C-C. EXCESS LENGTH OF ITEM 52 SHALL NOT BE CUT OFF BUT SHALL BE FOLDED WITHIN SHEATH OF ENVELOPE. CONSTRICT LOWER END OF SHEATH BY GATHERING EXCESS MATERIAL AND HAND-STITCHING TO VERTICAL SEAM TAPE AT BASE OF ENVELOPE, PER NOTE 1G, USING ITEM 30.
10. FABRIC COLOR FOR STRESS PATCHES SHALL MATCH FABRIC BEING REINFORCED. REF. DRAWING D-52003, SEC. F-F; AND DRAWING D-52001, LET. K.
11. REINFORCE SECTION OF ENVELOPE THROAT (INSIDE) IN ACCORDANCE WITH DRAWING D-52007, DETAIL BF, BETWEEN SEAMS 1 AND 3.
12. TO PROVIDE ADEQUATE LEVEL OF VISIBILITY, PATTERN AND COLOR(S) SHALL BE SUCH THAT AT LEAST 10% OF VISIBLE PORTION SHALL BE OTHER THAN WHITE OR GRAY, AS VIEWED FROM ANY ANGLE.
13. PL-51502 (PARTS LIST), N-51502 (NOTES), H-51507 (TOP FITTING), AND APPLICABLE DETAILS OF D-52001 THRU D-52007 ARE ALL PART OF D-51502.
- D-51502-1 ENVELOPE IS FOR USE WITH CLASSIC 1A (TW) CONDOLA ONLY.
14. IN COLOR CONTRASTING TAPE COLOR, STENCIL PART NUMBER (51502 AND REVISION LETTER) AND SERIAL NUMBER ON CIRCUMFERENTIAL BAND AT STATION 52 APPROX. OVER SEAM 1. (REF. DRAWING D-52005, DETAIL Y)
15. ATTACH NAMEPLATE PER DRAWING D-52007, SEC C-C.
16. IN COLOR CONTRASTING TAPE COLOR, STENCIL "FRONT" AT BASE OF ENVELOPE BETWEEN SEAMS 1 AND 3, USING 1/2" MINIMUM HEIGHT BLOCK-FORM LETTERS. SEE VIEW B-B.
17. BALLOON REGISTRATION MARKS SHALL BE ATTACHED IN ACCORDANCE WITH D-52005, DETAIL V; IN COMPLIANCE WITH PART 45 OF FAR, IDENT AND REGISTRATION MARKING MARKS SHALL NOT FALL ON VERTICAL LOAD TAPES.
18. (NOTE 18 OMITTED).
19. SEE DRAWING D-52006, DETAIL FN, FOR CONSTRUCTION AND ATTACHMENT OF OPTIONAL FIRE-RETARDANT LINER, WHICH HAS 28 FULL CORES BASED ON LOWER 24" OF ENVELOPE (HALF-CORE X2) PATTERN. LONGITUDINAL SEAMS (LSc-2, PER NOTE 1B) SHALL BE LOCATED IN ALIGNMENT WITH, BUT NOT ATTACHED TO, NON-TAPED ENVELOPE SEAMS. LONGITUDINAL ATTACHMENT TO THE ENVELOPE SHALL BE WITH EITHER SINGLE-NEEDLE OR DOUBLE-NEEDLE STITCHING, AT TAPED ENVELOPE SEAM; WITH AT LEAST 3 BACKSTITCHES AT LOWER END OF ATTACHMENT.
20. SEE DRAWING D-52002, DETAIL M-M, FOR ATTACHMENT OF OPTIONAL D-RINGS AND FOR TIEING OF OPTIONAL SIDE-HANDLING LINES.
21. INLAID DESIGN FEATURES MUST BE MADE WITH APPROVED HOT AIR BALLOON FABRIC E-077J3. OVERLAID DESIGNS ARE NOT REQUIRED TO BE MADE FROM HOT AIR BALLOON FABRIC. ATTACHMENT OF OVERLAID DESIGN FEATURES SHALL BE MADE WITH EDGES FOLDED UNDER, AND STITCHED WITH EITHER SINGLE OR DOUBLE ROW OF STITCHING; SEAM TYPE LSc-1 or LSc-2.
- VENTING IS RECOMMENDED FOR ANY OVERLAID DESIGN WITH AN AREA OF AT LEAST FOUR SQUARE FEET. SEE DRAWING D-52002, DETAIL VN, FOR CONSTRUCTION OF VENT. MULTIPLE VENT HOLES SHALL BE SPACED AT LEAST 24" APART.
- EXCEPT AS SPECIFICALLY PROHIBITED OTHERWISE, INLAID-DESIGN SEAMS (COLOR-SPLITS) MAY BE USED IN ANY LOCATION AND ARRANGEMENT. SEAMS SHALL BE TYPE LSc-2 AT 3/8" ± 1/8 GAGE.

INLAID DESIGN SEAMS LOCATED ALONG CIRCUMFERENTIAL BANDS SHALL HAVE THE FABRIC SEAM STITCHED FIRST, WITH THE CIRCUMFERENTIAL BAND THEN STITCHED DIRECTLY OVER THE FABRIC SEAM. NO DESIGNS, OVERLAID OR INLAID, SHALL BE INCORPORATED INTO CONSTRUCTION OF DEFLATION (TOP) CAP.

22. D-RINGS FOR BUNTING MAY BE ATTACHED TO VERTICAL LOAD TAPES, AT INTERSECTION WITH CIRCUMFERENTIAL BAND. DETAIL OF ATTACHMENT SHALL BE SAME AS DRAWING D-52002, DETAIL M-N, EXCEPT BOX-X IS OPTIONAL.

BUNTING MUST NOT BE LOCATED WHERE IT COULD INTERFERE WITH OPERATION OF SIDE MANEUVERING VENT.

23. OPTIONAL SIGN ANCHORS SHALL BE CONSTRUCTED IN ACCORDANCE WITH DRAWING D-52002, DETAILS EA AND FA. VERTICAL SIGN ANCHORS SHALL BE BACKED BY VERTICAL LOAD TAPES. HORIZONTAL SIGN ANCHORS SHALL BE BACKED BY CIRCUMFERENTIAL BANDS, EXCEPT THAT BELOW STATION 34, THE SIGN ANCHOR MAY BE BACKED BY AN ADDED PARTIAL-CIRCUMFERENTIAL BAND, ADDED SPECIFICALLY TO BACK THE SIGN ANCHOR.

D-RINGS SHALL BE ATTACHED ABOVE TOP CORNERS OF SIGN AREA, AND MAY BE ATTACHED BELOW BOTTOM CORNERS OF SIGN AREA. SEE DRAWING D-52002, DETAILS EA AND FA.

SIDE MANEUVERING VENT AREA MUST BE KEPT CLEAR OF OBSTRUCTION BY SIGNS, ETC. SIGN ANCHORS SHALL NOT BE ATTACHED IN THE AREA WITH BOTTOM AND TOP BOUNDARIES AT STATIONS 66 AND 96, AND SIDE BOUNDARIES AT SEAMS 1 AND 5. IN ALL CASES, THE FASTENER TAPE (ITEM 27) SHALL END AT AN INTERSECTION OF VERTICAL LOAD TAPE WITH HORIZONTAL BAND, AS SHOWN.

24. PENNANTS, IF ANY, TO BE MADE WITH FREE EDGES FINISHED, USING STITCHING, TYPE EPB-1 (ROLLED-EDGE SEAM).

PENNANTS SHALL BE ATTACHED AT VERTICAL SEAMS. IN NON-TAPED SEAMS, ATTACHMENT TO BE AS SHOWN IN DRAWING D-52002, DETAIL PB. IN TAPED SEAMS, ATTACHMENT TO BE AS SHOWN IN EITHER DETAIL PA OR PB.

