

RAVEN INDUSTRIES, INC.

RAVEN

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16 March 1981

To All Raven Balloon Owners and Repair Stations:


Raven Engineering has been working with the FAA for several months on a recommended maintenance procedure for the hook and pile fastener used to seal the deflation panel in certain hot air balloons. Soon you will be receiving an FAA Airworthiness Directive which summarizes the maintenance procedure. However, we wanted you to know about this as soon as possible; hence the enclosed Raven Service Bulletin. Please note that this information applies only to balloons which have a circular ("rip top") deflation panel, and not to those with parachute tops.

The hook and pile fastener used in your balloon may or may not be manufactured by Velcro U.S.A., although most people still refer to it as "velcro" anyway. Regardless of the manufacturer, it is made to a rigid military specification and is tested for compliance to that specification both by its manufacturer and here at the Raven factory. For this reason, we've come to prefer the generic term "hook and pile fastener." Just so you know what we're talking about.

Hook and pile fasteners have proven over the years to provide an excellent means of sealing the deflation panels in hot air balloons. Naturally, a balloonist must make sure that the deflation panel does not shrink to the point where the fastener is put under stress. But as long as there is sufficient fullness in the top cap, this will not be a problem. Procedures for periodically checking the top cap are outlined in the Raven Maintenance Manual, and should be carried out regularly.

Any textile product, though, can be expected to change its performance characteristics if subjected to enough punishment. That's why Raven and some of the other balloon manufacturers, together with the FAA, have cooperated to produce a specific maintenance procedure. We feel that this procedure is not a great hardship, and will have the added benefit of increasing safety awareness among balloonists, which is always of top priority here at Raven.

Many thanks for your time, and happy flying!



Pat Cannon
Engineering Manager
Applied Technology Division



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SERVICE BULLETIN 112

MAINTENANCE PROCEDURE FOR THE TESTING AND REPLACEMENT OF HOOK
AND PILE TAPE USED TO SEAL THE PERIMETER OF THE DEFLATION CAP
IN FLIGHT

This service bulletin applies to all model hot air balloons certified in all categories which have hook and pile tape used to seal the perimeter of the deflation cap in flight.

The following procedure should be performed within one hundred (100) balloon inflated and buoyant hours or at the next annual inspection, whichever occurs first, unless already accomplished, and repeated at each one hundred (100) hours or annual inspection.

Inspect all fastener surfaces for cleanliness and damage. Remove as much debris and foreign materials as practical. Then inspect for damage or defects due to wear or due to deterioration caused by heat as indicated by yellowing and an increase in hardness or stiffness of the fastener surfaces.

Test the tape for adequate retention by the test procedure outlined below at a minimum of the following locations:

- Areas showing disproportionate amount of debris or foreign materials.
- (2) Areas showing damage due to wear or due to deterioration caused by heat.
- (3) An area within twelve (12) inches of the pull-out cable attachment point.
- (4) Locations adjacent to areas where the hook or pile tape has been replaced.

For model S-series and model W100LB balloons, an area from every fourth gore. For model RX-6 and RX-7 balloons, an area from every other gore.

TEST PROCEDURE

At each test location, press a 6" length of tape together by rolling back and forth three (3) times along its length a roller that exerts a five (5) pound force. This can be accomplished by masking the tape on either side of the test area. Secure a clamping device on a free end of the pile tape such that a tensile gauge can be connected



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to the clamping device. The clamping device should be faced with rubber or other material to prevent slippage or damage to the tape. Hold the opposite free end of the hook tape by hand and exert a force such that the tape is loaded in shear along its length to a minimum of 35 pounds or until the tape separates. Do this three (3) times for each test location and determine the average for each test location.

If all test location averages equal or exceed 30 pounds, the tape passes the test satisfactorily.

HOOK AND PILE REPLACEMENT PROCEDURE

Remove the stitching securing the old fastener tapes and stitch in new hook and pile tapes with size "E" Dacron thread, using a size 18 needle or equivalent. All stitching shall be in accordance 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 $1/16"$ and 8-10 stitches per inch.

If the hook tape shows no deterioration caused by heat or other defects or damage, only the pile tape must be replaced to satisfy the replacement procedure. However, if the hook tape is not replaced, the new pile tape and the old hook tape must be retested by the above procedure in order to insure that the necessary strength requirements are met.

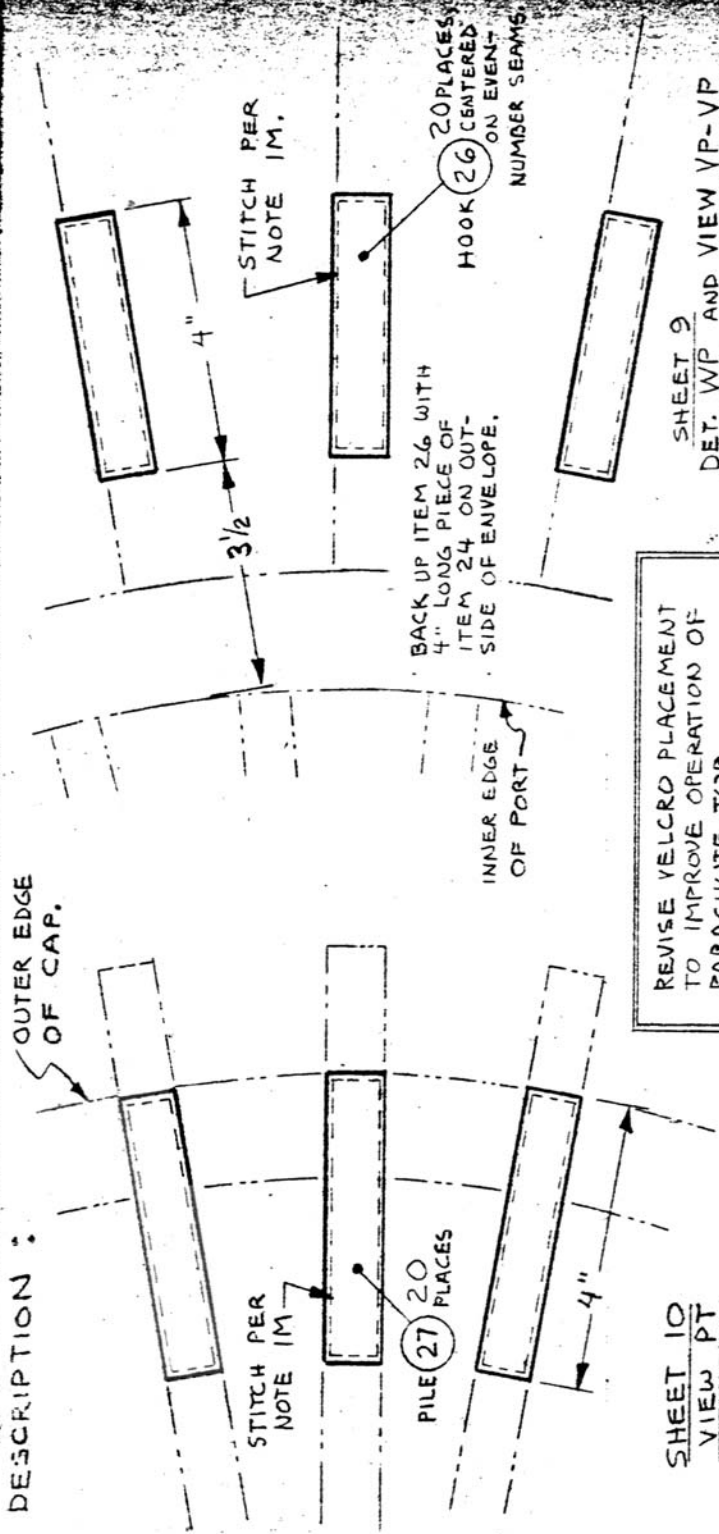
PROCEDURAL SUGGESTION: A half-gallon glass container completely filled with water comes very close to five pounds, and can be used as a roller to press the tapes together. A scale must be used to be sure that you don't end up with a roller that weighs more than 5 lbs.; slightly less than 5 is O.K.

AMENDMENT NO. 146

SH. OF 1

DATE 3-25-80

DESCRIPTION :



REVISE VELCRO PLACEMENT TO IMPROVE OPERATION OF PARACHUTE TOP
MAJOR CHANGE
 (REF. DR 8604)

CHANGE BASIS (WHY, WHO ETC)
 DR 8604

EFFECT ON PARTS
~~IN STOCK~~

THIS CHANGE IS OPTIONAL FOR UNITS NOW IN SERVICE

FAA APPROVAL *[Signature]* ALL LETTERS IN APR 11 80
 DATE 14 APR 80

BY D.E.R. *[Signature]*

DISPOSITION: DATE 7-7-80

DWG. TITLE
 ENVELOPE, S-50 A

DWG. NO.
 D-05957

REV.
 AM

REV. LTR. Y
 DG-1230