

## SERVICE BULLETIN

### Super Raven Dash-M Series

#### TITLE: LINE ATTACHMENT STRUCTURAL ENHANCEMENT

##### 1) Effectivity

This Service Bulletin applies to Raven Dash-M reserve parachutes and P-124 reserve parachutes that were manufactured before April 12, 1999

##### 2) Non-Effectivity

This Service Bulletin does not apply the original Raven series, Super Raven series, Micro Raven series, or to any Raven Dash-M canopy manufactured since April 12, 1999, or to any canopy not specified in section (1) above.

##### 3) Identification

All Dash-M reserve canopies have serial numbers beginning with either 51, 52, 53, 54, 55, 56, 57, or 58, and all P-124 reserve canopies have serial numbers beginning with either 65, 66, 67, or 68

Both the Dash-M and the P-124 parachute canopies have been manufactured in several different configurations, as indicated by either a date of manufacture range or a Configuration Stamp letter change. The information below specifically identifies parachutes that are affected by this service bulletin.

Affected canopies have serial numbers whose last 5 digits are below 35937 and can be further identified by the single 42 stitch bartack in the .75" T-III MIL-T-5038 tape line attachment loops (Image 1).

Canopies manufactured after 12 April 1999 are stamped with config stamp 'a', but they are not affected because they were manufactured with two bartacks in the .75 x T-III MIL T-5038 tape line attachment loops.

Date of Manufacture	Configuration	Config Stamp	Affected?
03 Oct 1996 to 12 Apr 1999	Original Version	a	yes
03 Oct 1996 to 12 Apr 1999	Zero Porosity Upper Surface	z	yes
12 Apr 1999 to 31 Oct 1999	T-III x .75 Line Attach Loops w/ 2 tacks	a	no
12 Apr 1999 to 31 Oct 1999	Same as above but with ZP Upper Surfaces	z	no
01 Nov 1999 to 26 Apr 2000	T-1 x .5625 Line Attach Loops w/ 2 tacks	aa	no
01 Nov 1999 to 26 Apr 2000	Same as 'aa' but with ZP Upper Surfaces	zz	no
26 Apr 2000 to present	No End Cell Logo Panels	b	no

#### About Precision Aerodynamics, Inc. Service Bulletins:

Precision Aerodynamics, Inc. issues Service Bulletins in three types. The first type is MANDATORY and contains information that is critical to flight safety. MANDATORY Service Bulletins contain modifications and/or inspections in which compliance is MANDATORY. MANDATORY Service Bulletins are identified with the red "MANDATORY" stamp in the upper right-hand corner of the Service Bulletin. The second type of Service Bulletin issued by Precision Aerodynamics, Inc. is the RECOMMENDED Service Bulletin. RECOMMENDED Service Bulletins contain information or modifications that are not considered MANDATORY at the time of issuance, but compliance is highly RECOMMENDED for the benefit of the user at an increased level of safety. RECOMMENDED Service Bulletins are identified by the black "RECOMMENDED" stamp in the upper right-hand corner of the Service Bulletin. The third type of Service Bulletin is OPTIONAL, and contains information regarding modifications or improvements, and compliance is left to the discretion of the owner. OPTIONAL Service Bulletins are identified by the blue "OPTIONAL" stamp in the upper right-hand corner of the Service Bulletin.

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#### **3) Background**

The Raven Dash-M and P-124 series of reserve parachutes were tested within a range of 300-360 lbs at 180 knots and developed opening forces in the range of 2168 to 3660 lbs as measured in accordance with Aerospace Standard 8015b, the drop test standard for parachutes certified under FAA TSO C-23d.

Since the introduction of the Dash-M Series in 1996, we have seen hundreds of documented saves throughout a wide variety of emergency situations. Reserve parachutes are generally designed, rigged, and packed to open more quickly than main parachutes, but until recently we had never seen canopy damage when used within the Maximum Operating Limitations of Weight and Speed.

Within the past 30 days, we have witnessed 2 separate occasions wherein the integrity of the line attachment system of 2 different Dash-M canopies has been compromised during normal use by persons who are documented as having been within the Maximum Operating Limitations of Weight and Speed. In both cases, the jumpers reported exceptionally hard opening shocks resulting in canopy damage and hard landings.

#### **4) Description**

Damage to the referenced canopies was consistent with canopies having been tested to destruction when dropped beyond the limits of Maximum Operating Limitations of both Weight and Speed, while at the same time tumbling or otherwise presenting a non-symmetrical loading scenario to the deployment sequence.

Exceptionally hard opening shocks generated by the subject canopies have prompted this Service Bulletin. Forces generated during opening shock resulted in a cataclysmic compromise of the line attachment system, with collateral damage extending upward generating torn canopy fabric and downward generating broken lines. The initial point of failure appeared to be similar in both cases, beginning in the region of the off-center A line attachment point. Subsequently, transient loading migrated outward and rearward affecting the integrity of some of the adjacent line attachment loops.

The failure mode was in the destruction of the .75 x T-III MIL T-5038 line attachment loop tape, manifested by pulling the attachment loop tape away from the canopy but leaving the associated stitching intact (image 2).

Compliance with this Service Bulletin enhances the line attachment structure of the original Dash-M and P-124 configuration and subsequent test data indicate that it increases the line attachment integrity by more than 100%.

#### **5) Compliance**

Precision Aerodynamics, Inc. has requested that the Federal Aviation Administration issue an Airworthiness Directive on the matter covered by this Service Bulletin. Precision Aerodynamics, Inc, considers this to be a mandatory modification and must be accomplished at the next scheduled repack interval after the receipt of this Service Bulletin, but no later than 180 days from the effective date of this Service Bulletin.

#### **6) Manpower: Time and Rating Required**

Estimated man-hours for compliance: 1.0 hours by a qualified Master Parachute Rigger, or foreign equivalent if outside the USA. This estimate is based on properly skilled and experienced personnel utilizing appropriate equipment and tools as specified in Section 7 of this Service Bulletin. Occasionally, after the work is started, conditions may be discovered which could result in additional time for compliance.

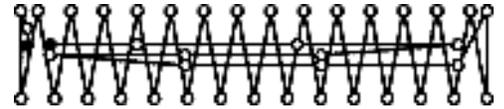
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#### 7) Materials & Equipment

Singer 269W or equivalent bartack machine using a #19 needle and size 69 MIL-VT-295 or equivalent nylon thread with the machine set up for a 1/8 inch x 5/8 inch, or 16mm x 3mm, 42 stitch pattern as indicated. Alternatively, an equivalent stitch pattern that starts and stops in the middle of the pattern may be used.



#### 8) Accomplishment Instructions

The canopy's front risers lead to eight 'A line' attachment points and eight 'B line' attachment points. It is these sixteen line attachment points that will be enhanced with the addition of a 42 stitch bartack as indicated. Compliance with this Service Bulletin consists of installing one additional bartack at each of the A line attachment points and one bartack at each of the B line attachment points, for a total of sixteen additional bartacks.

Set up the bartack machine with a new #19 needle and #69 Nylon thread. Thread color is optional, but should be different from that used in the original installation (Image 4). Set the stitch pattern as indicated. Alternatively, an equivalent stitch pattern that starts and stops in the middle of the pattern may be used.

The seam where the Lower Surfaces join are sewn with a single pass using a double needle machine. The original line attachment loop is secured with a single bartack between the stitch rows of the double needle seam that joins the lower surfaces (Image 1). You will notice that the leading edge of the canopy already has a 28 stitch tack on the loadbearing stitchrow beneath the line loop (Image 3). You will be placing your new bartack right over the top of the existing tack, except that you will be sewing through the Type III loop material as well.

Place the additional bartack precisely on the loadbearing stitch row of the double needle seam (Image 4), above the existing line attachment bartack that is already between the stitch rows. Be very careful that the underside of the T-III loop tape does not curl under on the blind side of the setup. The additional bartack must be centered evenly within the .75 inch T-III loop material.

When the installation of additional 16 bartacks has been accomplished, inspect your work and count your tools. Permanently and legibly mark "SB 1221 CW" in three places: on the data panel of the canopy, in the parachute packing record, and in your technician's log book. The documentation in your technician's log book should also indicate the date the work was completed and the canopy serial number.

#### 9) Distribution

FAA Flight Standards District Office, Southern Region  
Registered Owner's of Record  
Parachute Dealerships and Lofts  
National and International Parachuting Publications  
PIA and Commercial Parachute Riggers Lists  
Precision Aerodynamics, Inc. website <http://www.aerodynamics.com>  
Parachute Industry Association website <http://www.pia.com>

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#### 8) Supplemental Data

- 1) affected canopies use a single 42 stitch bartack in the .75" T-III MIL-T-5038 tape line attachment loops (Image 1).
- 2) damaged tape (image 2).
- 3) notice the 28 stitch tack on the loadbearing stitchrow beneath the line loop (Image 3)
- 4) add new bartack precisely on the loadbearing stitch row of the double needle seam" (Image 4)

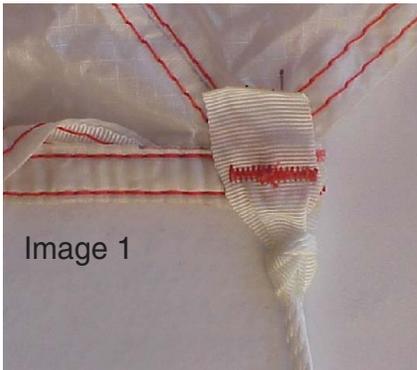


Image 1: Affected canopies have a single 42 stitch bartack pattern in .75 inch T-III tape loop



Image 2: Damage at one of the 'B' line attachment points

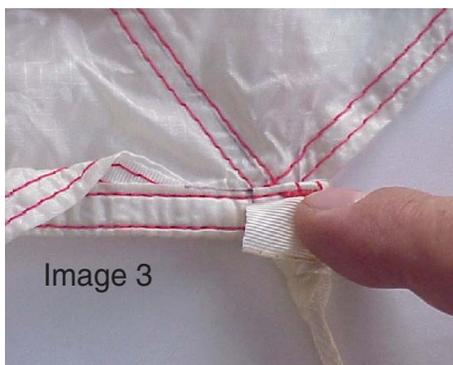


Image 3: Pulling back the line attachment loop reveals the 28 stitch tack in the leading edge.



Image 4: Compliance with this Service Bulletin requires adding a 42 stitch bartack in 16 places, one at each of the eight 'A' line loops and one at each of the eight 'B' line loops.

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##### 9) Supplemental Data for Three Alternate Methods of Compliance

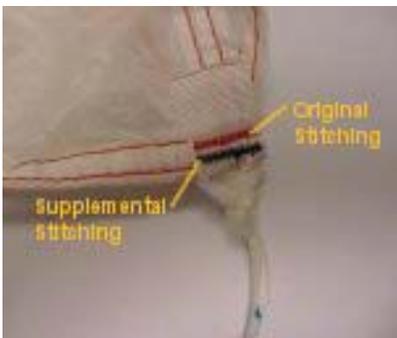
Since the original release of SB1221, we have approved three additional alternate methods of compliance for the structural enhancement for canopies affected by SB1221. All three methods are equally acceptable in terms of compliance with SB1221, provided the stitching meets the following criteria:

- supplemental stitching must be placed on or between the double needle stitch row AND
- supplemental stitching must capture the roots of the legs of the 3/8" T-III that extends diagonally up the rib.

The first alternate method of compliance allows rigger discession regarding the placement of supplemental stitching.

The second alternate method of compliance allows replacement of loops with new MIL-T-5038 Type III material.

The third alternate method of compliance allows the replacement of loops with new MIL-W-4088 Type1 material.



The first alternate method is based on the observation that there are occasions in which the original line attachment stitch was placed a little above or a little below center of the double needle stitch rows, clearly favoring one side over the other. The original specification for the location of this tack was "between" the stitch rows, but clearly there are cases in which the supplemental stitching may be better placed "below" the original tack rather than above it. In these cases, the master parachute rigger (or foreign equivalent) may use his/her judgement and discession to determine the best location of the supplemental tacking



The second alternate method of compliance allows rigger's discession to replace the line attachment loops with new .75 inch MIL-T-5038 (now PIA-T-5038) Type III material utilizing two 42 stitch bartacks as previously described (or equivalent). When this method is selected, it is not necessary to use a different color thread for each bartack as specified in the original compliance method. Additionally, either size 46 or 69 nylon thread may be used. Carefully remove the original stitching with a seam ripper, taking care not to allow penetration into the canopy fabric. Any penetration into the canopy fabric disqualifies this method as compliant, and the canopy must be returned to the manufacturer for inspection and repair.



The third alternate method of compliance allows rigger's discession to replace the line attachment loops with new .5625 inch MIL-W-4088 (now PIA-W-4088) Type 1 material, condition R utilizing two, .375 inch x .125 inch, 42 stitch bartacks as previously described (or equivalent). When this method is selected, it is not necessary to use a different color thread for each bartack as specified in the original compliance method. Additionally, either size 46 or 69 nylon thread may be used. Carefully remove the original stitching with a seam ripper, taking care not to allow penetration into the canopy fabric. Any penetration into the canopy fabric disqualifies this method as compliant, and the canopy must be returned to the manufacturer for inspection and repair.