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light perations

January 8, 1999

BY PRIORITY MAIL

Hon. James E. Hall
Chairman
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, DC 20594

RE: BK-117 Accident of April 15,1997
Reg. No. N909CP NTSB ID NYC97FA076

Dear Chairman Hall:

I recently advised Investigator-In-Charge Robert Hancock that I had additional inforination that might be useful to the Board and res onsive to the inquiries raised in the recent hearing. Mr. Hancock suggested that I send any such information to the attention of the full Board. I believe the following documents and comments will be helpful to your investigation:

RK-117 INSPECTION INTERVALS

As you are aware, aircraft ins ection and TBO intervals are regularly increased or decreased based upon aircraft fleet ex erience. I was recently transferring files between my old la to into my new one. During that rocess, I discovered a letter I had sent to American Euroco ter Cor oration (AEC) in November of 1990 on the sub ect of tailbooin cracks. Ho efully the attached c o will be useful in your search for data su orting the 1,200-2,400-3,600 hour intervals on the BK-117.

Informal information obtained within the community of BK-117 o erators indicates that re air rocedures were a roved by MBB Helico ter Cor oration, West Chester, PA for one or more unidentified aircraft several years ago. It is also our understanding that re air rocedures were a roved by AEC for two Arch (St. Louis) BK-117s some months before our accident. As far as we know, this informatioii was not officially disseminated by the manufacturer. The detailed technical information on those a rovals is not available to us, but may rove useful in evaluating that com onent s fleet history.

VERTICAL FIN SPAR CRACKS

We are in agreement with the Board s request for detailed information concerning the s ar cracks on all other BK-117s. We believe the s ar crack to have been the rimary cause of the catastro hic failure of the vertical fin. Since we had performed a detailed ins ection of that area during the aircraft's revious 3,600-hour inspection (590.9 flight hours rior to the accident). it seems obvious that our s ar crack develo ed in less than 00 hours. As we stated in an earlier

submittal, we believe that it is critically im ortant that the flight hour and cycle histories of those other BK-117s be reviewed in detail. The FAA/Eurocopter mandated re air scheine (ASB-MBB-BK117-30-106) must be confirmed adequate for the long-term safe o eration of the active BK-117 fleet.

Review of those histories, in conjunction with the structural data su orting the re air scheme. should also clearly illustrate that the re air scheme is unrelated to a rivet roblem. It is s ecifically targeted at a s ar structural deficiency. This deficiency is a result of the long history of that tailboom design. Several aircraft gross weight increases and the repeated modifications installed to address other cracking roblems over the course of the last fifteen years have a arently caused vibrations and structural stress to focus in the area that failed in N909CP. The blind rivets layed no rimary role in the failure. It is inconceivable that the vertical **fin** would have suffered a catastro hic failure without first ex eriencing the failure of the s ar, its primary structural com onent.

USE OF BLIND RIVETS COMMON INDUSTRY INFORMATION

We were concerned that during Mr. Hancock's resentation to the Board, he described our use of blinds rivets in the re lacement of the yaw SAS mount su ort as "*improper*". As outlined below, there is a significant body of literature, including FAA regulations, that su orted the use of blind rivets in the re air. Mr. Hancock s Factual Re ort (*italicized*) included the following comments:

1. AC 43.13-1A, Sec , Par 99, RIVETING c. "*….unless h lower r g h is adequately mp by r r gr r mb r of r v .* Five aragra hs earlier. the re ort noted: *Th r /32 h m r r v that were oversized by 1/64 of an h.*"

   I suggest the use of oversized rivets meets this recommendation, es ecially in light of the following:

2. AC 43.13-1A, Ch 5, Sec 1, Par 2 , j. "*Blinds r v the MS-20600 through MS-20603 r r v h m h y k m NA 1398, 1399, 3 and 1739 rivets may h b r r v r h h blind rivet or aircraft manufacturer's r mm .*"

. The re ort also notes: "*a h k h T x r A r p Fasteners and h AA failed to pr y r m h r g h substitution.*" They a arently failed to recall or mention:

   Cherry Aeros ace Products advertising contained in World Aviation Directory (Summer 1995) states: "The Bulbed CHERRYLOCK is a high strength blind rivet system articularly suitable for high vibration areas.. ..Conforms to NAS 1740 s ecification and NAS1738…"

   Another Cherry TEXTRON chart titled "Interchangeability As Ado ted By Industry" lists P/N CR3243 as interchangeable with NAS1738B.

   A Skybolt Aeromotive Cor oration 1997 catalog, age , contains a section on Cherry Structural Blind Rivets and states: "The CherryLock rivet was develo ed to gain strength ratings equivalent to solid AD rivets.. The CherryMax rivet was develo ed to re lace

the CherryLock.. The Oversize CherryMax has strength ratings that meet or exceed solid AD rivets." It continues: "CherryMax are structural rivets". "CherryMax can be substituted for.. CherryLock" and "Cherry Max is an a roved substitute for Solid Rivets in a structural a lication."

Those documents are references commonly circulated in the industry and were a licable at the time of our re air. They remain legitimate references today. They make it abundantly clear that our maintenance ersonnel were correct in their choice of the CherryMax, had no cause to consider tlie use of these rivets "im ro er", and needed no further a rovals rior to their use.

4. The Factual Re ort also notes *Th v g r v that the majority of the rivets used with h y SAS m g support r y accessible with a bucking bar."* That statement greatly underestimates the degree of technical difficulty and physical dexterity required for this rocedure.

CONCLUSION

If the information you have received from Euroco ter and Cherry Textron (indicating that blind rivets are inferior to solid rivets in certain a lications) is accurate, then wc fully agree that the rivet information currently available in the aviation system is incomplete, outdated, and incorrect The ultimate correction of this ossible discrepancy could have a major beneficial effect on aviation safety on a global scale.

It is critically im ortant, however, that this discovery not overshadow the specific cause of this accident: The fatigue failure of the vertical fin's rimary structural com onent.. The vertical fin s ar.

I welcome your review of these items and the co ies of the su orting documents. I remain available for further contact and discussion at your convenience. Thank you for the care and attention the Board is giving to this accident and investigation.

Sincerely,

[redacted]

George M. Jones
Manager Cor orate Aviation Services

cc: Hon. Robert Francis, Vice Chairman
Hon. John Hammerschmidt, Meinber
Hon. John Goglia, Member
Hon. George W. Black, Member
Mr. Gene Sundeen, De uty Director, Regional/Technical Investigations
Mr. Robert Hancock, Investigator

(All by Priority Mail)

November 29, 1990

Mr. Donald Lambert
MBB Helicopter Corporation
P.O. Box 2349
West Chester, PA 19380

Dear Don:

The discovery of cracks in the tailboom and tailcone of our BK-117 B-1 and the extent of the damage, including the report of a twist in the tailboom concerns us greatly. Having experienced somewhat similar tailboom cracks in our BK-117 A-3 at the 3,000-hour point, and in spite of the greater take-off power available in the B-1, we are unable to understand how such greater damage could occur to our B-1 with only 467 flight hours.

I request that you investigate the following areas:

1. Do you have any indication that other B-1s (or A-4s) in the commercial fleet are experiencing tailboom/tailcone cracks at a similarly accelerated rate as compared to A-3s?
2. Have you had any previous reports of tailboom twists If so, in what aircraft
3. If you have not had such reports, is it possible to examine a tailboom for such a twist while installed on an aircraft
4. Should that be possible, I would request that our A-3 be inspected in order to help determine whether a twist could be caused simply by the higher take-off power limits of the B-1, or alternatively, by long-term use of the lower A-3 take-off limits. I suspect that similar inspections on other B-1s in the fleet would assist in that determination.

Being familiar with our operation, I am sure you realize that although our operating profile is demanding, our procedures are consistently conservative and conscientious. It is therefore imperative that this situation be promptly investigated in order to allow for a rapid correction of the origin of the defect, be it design or procedure. Our long-term confidence in the quality of the MBB product line is a critical part of our operation.

Best regards,

George M. Jones
Chief Pilot

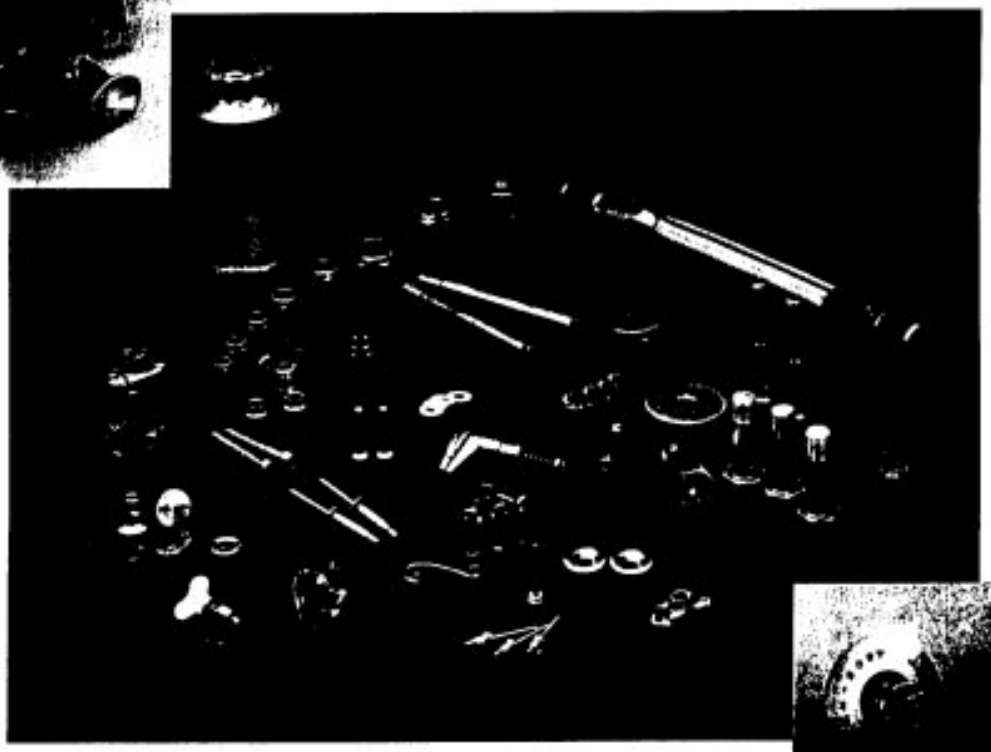
1997

PRICE $4.

Skybolt

AN-MS-NAS FASTENERS

551 North Park Avenue • Apopka, lorida 3 71 • (407) 889 613



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Minimum Pur hase Requirements

CHERRY Structural Blind Riv ts

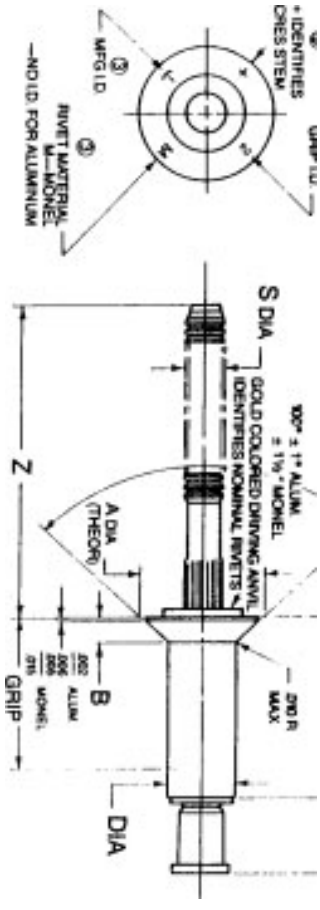
Traditional "Cherry Rivets" were originally designed with a knob stem, the most ommonly used was the CR162/CR163 MS Series These rivets require spe ial tooling to install, and leave a protruding break stem that must be trimmed Cherry developed the CR9162/CR9163 MS Series rivet to repla e the knob stem, thus simple pulling tools ould be used The CherryLo k rivet was developed to gain strength ratings equivalent to solid AD rivets The CherryLo k rivet required double a tion pulling tools to install CherryLo k rivets are all oversize diameters The CherryMa rivet was developed to repla e the CherryLock, required simple pulling tools to install, and is available in Nominal and versize Shank The Oversize CherryMax has strength ratings that meet or e eed solid AD rivets The drawba k to the CherryMax is removal The reak Stem is onstru ted of 8740 **Alloy** Steel and is very diffi ult to drill out f h e NEW Cherry INTERMAX rivet is manufa tured to NASI7 0 and NAS1721 spe s, has strength ratings similar to the Nominal CherryMa , but uses a 7075 aluminum reak Stem, thus it an be drilled out for removal The InterMa also has greater grip ranges than previous rivets

Considerations for using Cherry lind Rivets:

1) CherryMa and InterMa are stru tural rivets, Cherry Q or P P Rivets are not
) Panels must be lamped before installing CherryMa or InterMa These rivets are not designed for e essive panel "Takeup"
3) CherryMa an be substituted for spe ifi ations alling for CR162/CR162 or CherryLo k
4) CherryMa is an approved substitute for Solid AD Rivets in a stru tural appli ation
5) InterMa should be onsidered for all Non Stru tural or Semi Stru tural appli ations su h as windshield frames or lose out panels

SKYBOLT only supplies a tory New Cherry produ ts with full tra eability, no surplus, no sweepings, no aftermarket parts

art#	Size	Grip Limit	Shear Lb	Tensile Lb	25 Bag Each	100
CR3212-4-2	1/8	.063-.125	411	285	$0. 9	$49.00
CR3212-4-3	1/8	.126-.187	5 1	285	$0.69	$49.00
CR3212-4-4	1/8	.188-.250	51	285	$0. 9	$49.00
CR3212-4-5	1/8	.251-.312	4	285	$0.70	$5 .17
CR 212-5-2	5 2	.065-.125		445	$0.70	$54.00
CR 212-5-	5 2	126-.187	714	445	$0.70	$54.00
CR 212-5-4	5 2	188-.250	8 2	445	$0.72	$55.20
CR 212-5-5	5 2	.251-.312	1012	445	$0.7	$58.10
CR3212-5-6	5 2	.313-.375	10 0	445	$0.7	$ 0.90



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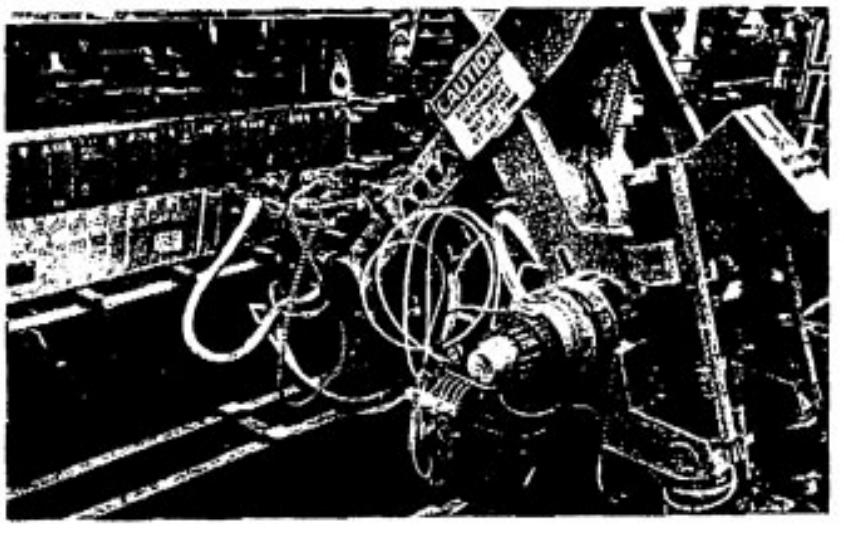

Sikorsky installing CherryMAX rivets with a **robot** in produ tion of the SH-60B Seahawk. CherryMAX is the ideal fastener for robotic/automatic **blind** riveting — epulling **head** installs si diameters and five different **head** styles with no tooling **c ang s** or **adjustm nts!**

Cherry G-704-40SR Split Riveter utilized In the Sikorsky robot

C LUMN	COLUMN 2	C LUMN
NAS PART NUM ER	M7885 PART NUM ER	CHERRYMAX PART **NU BER**
NAS1398B & D	M7885/2	CR37 13 or CR3223
NAS1399B & D	M7885/3	CR3212 or CR3222
NAS1398M	M7885/4	CR3523
NASI398MW	—	CR3523P
NAS1399M	M7885/5	CR3522
NASI 399MW	—	CR3522P
NAS1919B	M7885/2	CR3213 or CR3223
NAS 92 B	M7885/3	R3 1 or CR3222
NAS1738B	M7885/6	CR3243
NAS1738E	—	CR3253
NAS1739B	M7885/7	CR3242

C LUMN 1	C LUMN **2**	C LUMN
NAS PART NUM ER	M7885 ART NUM ER	CHERRYMAX PART NUM ER
NAS1739E	—	CR3253
NAS1738M	M7885/8	CR3553
NAS1738MW	—	CR3553P
NAS 739M	M7885/Q	CR3552
NASI739MW	—	CR3552P
NAS1768D	M7885/6	CR3243 or CR3253
NAS1769D	M7885/7	CR3242 or CR3252
NAS1768M	M7885/8	CR3553
NAS1768MW	—	CR3553P
NASI76QM	M7885/9	CR3552
NASI769MW		CR3552P

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1995

[redacted]

L ULBED CHERRYMAX® IVETS

Bulbed CHERRYMAX® is a high stem retention lo k spindle blind rivet with a visibly inspe table me hani al lo king devi e CHERRYMAX® blind rivet system retains the large blind head of the ulbed CHERRYLOCK® rivet Ea h rivet is supplied with its own installation anvil whi h eliminates the problems resulting from worn anvils CHERRYMAX® tooling provides the simplest, most trouble-free installation tooling system CHERRYMAX® fasteners are urrently available in 1/8″ through 1/4″ diameters in both nominal (NAS1400 sizes) and 1 64" oversize diameters (NAS1740 sizes) The tools utilize one pulling head to install many diameters and head onfigurations and material ombinations Use with G704 CHERRYMAX® installation tools

WIREDRAW CHERRYMAX® 'A' IVETS

CHERRYMAX® ''A'' rivets are shank e pansion, locked-spindle, flush fa turing rivets meeting the requirements of NAS 1400 spe ifi ations and onforming to NAS1398A/1399A ode standard pages, but offering non shift tooling installation without hanging pulling head Use with CHERRYMAX® tooling

CHERRY® MA IBOLT BLIND BOLTS

The C ERR MAXIBOLT lind olt alloy steel and A-286CRES onforms to MS90353/90354, and MS21140/MS21141, and meets the requirements of MIL-F-81177 and MIL-F-8975 and is listed in QPL851177 and QPL8985. Use with Cherry tools

BULBED CHERRYLOCK® IVETS

The Bulbed CHERRYLOCK® is a high strength blind rivet system parti ularly suitable for high vibration areas and dimpled appli ations, with the strength of a solid rivet Available in 1/8″ through 3 16" diameters Several head styles and various material strengths and ombinations Conforms to NAS 1740 spe ifi ation and NAS1738/1739 standards pages Use with G 700 and G 784 CHERRYLOCK® hydroshift tools

WIREDR/ CHERRYLOCK® IVETS

Wiredraw holefilling CHERRYLOCK® rivets offer the widest range of sizes (3/32″ through 1/4″ diameters), materials and strength levels of any blind fastening system Conforms to NAS1400 spe ifi ation and NAS1398/ 1399 standards pages Use with G 700 and G 784 hydroshift tools

CHERRY® MS IVETS

Cherry MS self plugging and pull-through rivets and tooling systems have been a reliable standard of the industry sin e their introdu tion Although superseded by the new locked-spindle spe ifi ations NAS1400 and NAS1740, Cherry MS rivets are still widely used under MS20600/01/04/05 part numbers Use G 715 and G 740 installation tools

C..E.... NUTPLATE IVETS

Cherry® Nut-plate blind rivets are manufa tured in 3 3 " and 1/8″ diameters, steel or CRES, for qui kly and e onomi ally installing nut-plates to MIL-N-25027 requirements, with one operator There are no blind side or limited a essibility problems, no damage or distortion to the surrounding material or nut baskets They are available in pull-through or self plugging styles and may be installed with hand or pneumati tools Use G 70 power or G 9 hand tools or hydroshift tools