

SERVICE BULLETIN No: 106
REVISION: ~
SUBJECT: Intermediate Tail Rotor Drive
MODELS AFFECTED: See below.
TIME OF COMPLIANCE: See below.
FAA APPROVAL: FAA Approved 02/15/07.

(Prepared 16 January, 2007)

Introduction

Brantly has had a report of a failure of the horizontal (long) tail rotor drive shaft (p/n 108-31) which is part of the intermediate tail rotor gearbox assembly (p/n 278-100). The purpose of this service bulletin is to inspect the alignment and condition of the shaft and its related components. Alignment and condition is important and must be inspected to ensure safety and part life.

Applicability

Applies to Brantly models B-2, B-2A, or B-2B that meet at least one of the following criteria:

- a) Serial number 2001 and up.
- b) Shaft p/n 108-31 purchased after 1994.
- c) Helicopters that have had a hard landing, tail rotor sudden stoppage, or any incident resulting in damage to the aft and tail fuselage.
- d) Helicopters that have had rebuilding or replacement of fuselage components in the areas of the tail rotor drive shafts. This includes the aft and tail fuselage.

NOTE	Review the maintenance records to determine applicability.
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Compliance

Comply with part 3 thru 9 of this service bulletin within the next 10 hours time in service unless previously accomplished for items (a) and (b) above. Comply with part 1 thru 9 of this service bulletin before further flight for items (c) and (d) above.

Feedback

Please do not hesitate to contact Brantly service department if you have any questions. We appreciate all feedback in regards to this document.

Service Department (service@brantly.com)
Brantly International Inc.
12399 Airport Drive
Vernon, TX 76384
Phn. (940)552-5451
Fx. (940)552-2703

Reference Documents

- Brantly Maintenance Instructions (Maintenance Manual, Service Bulletins, Instructions, Letters)
- Brantly SB-105

Special Tools

Special tools are available for purchase or rent at the Brantly factory.

- AT-108-31A Forward Alignment Tool
- AT-278-100 Aft Alignment Tool
- Class X Pin Gages
- Outside Micrometers (accuracy .00005 in.)

NOTE	Inspect tool AT-278-100 after shipping for damage or bending. If a damaged or bent tool is suspected, return the tool to Brantly for inspection or inspect the tool for run-out per fig SB-106-1.
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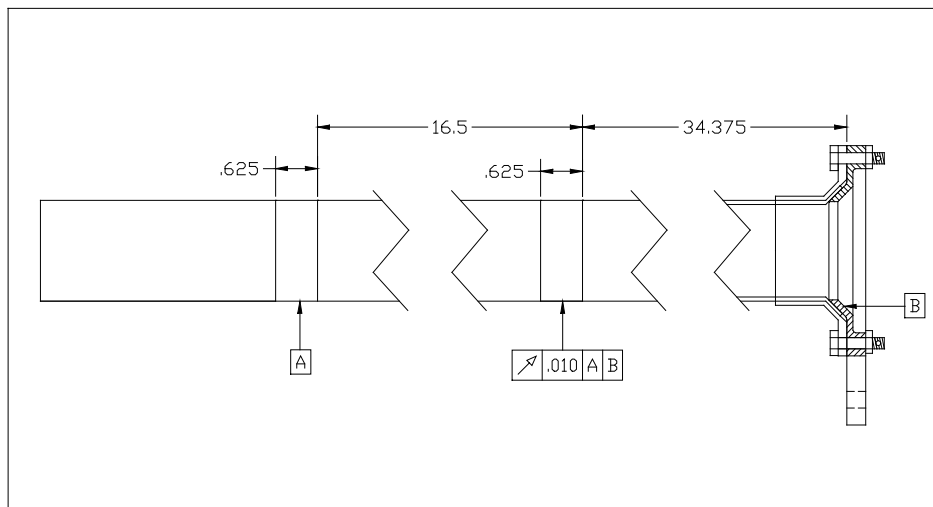


Fig. SB-106-1 AT-278-100 Run-out Inspection

1 Forward End Alignment

- 1.1 Remove the cowling doors and top cowling per the applicable maintenance manual. Remove the two morflex couplings (108-45) and extension drive shaft (108-33).
- 1.2 Mount tool AT-108-31A to the forward side of the long tail rotor drive shaft as shown in figure SB-106-2.
- 1.3 Rotate the tool by hand and adjust the pointer of the tool by moving in the slot to maintain a fixed point.
- 1.4 Measure the distance between this point and the center of the output shaft of the transmission. See fig. SB-106-2.

NOTE	Use calipers with a .001" inch accuracy for this measurement. This dimension should be 3/64 (.0469) inch or less. See fig. SB-106-2.
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- 1.5 If the alignment is good, proceed to section 2. If not, place shims under the bearing supports (108-3 & 108-4) to achieve a good alignment. See fig. SB-106-4 for shim dimensions and thickness.
- 1.6 Record the results in part 9 of this service bulletin.

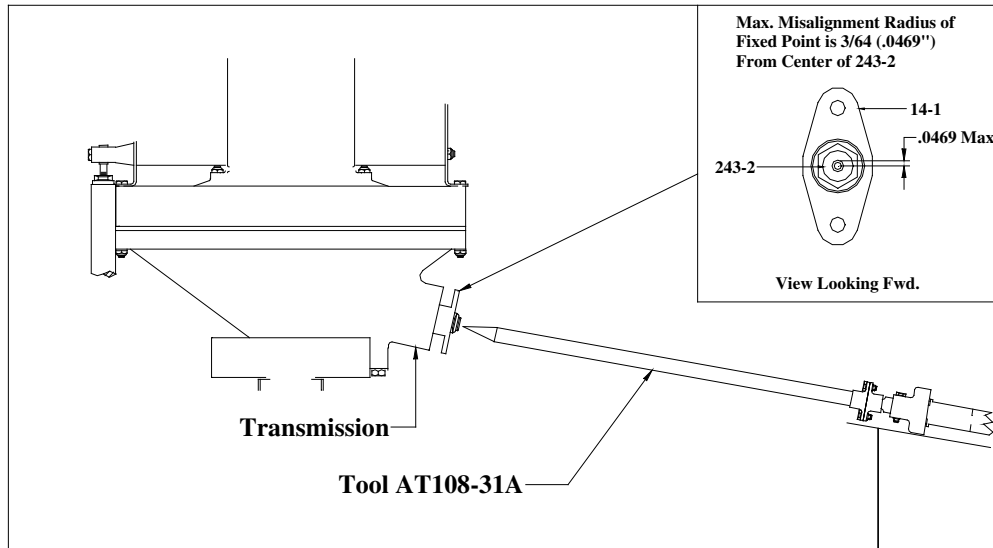


Fig SB-106-2 Forward End Alignment

2 Bearing Support Alignment

- 2.1 Extend a fine thread or wire from the top center hole of the forward bearing support (108-3) to the top center hole of the aft bearing support (108-9). Pull the thread or wire taut. See fig. SB-106-3.
- 2.2 Inspect the top of each bearing support (108-4 thru 108-8) at the center hole. Measure the distance between the center of the hole to the center of the thread or wire. Record the measurements for each bearing support.
- 2.3 Extend a fine thread or wire from the split line (contact point between upper and lower support halves) on the side of the forward bearing support (108-3) to the split line on the side of the aft bearing support (108-9). Pull the thread or wire taut. See fig. SB-106-3.
- 2.4 Inspect the split line (contact point between upper and lower support halves) from the side of each bearing support (108-4 thru 108-8). Measure the distance between the split line and center of the thread or wire. Record the measurements for each bearing support.

NOTE	Use calipers with a .001" inch accuracy for these measurements. These dimensions should be 3/64 (.0469) inch or less. See fig. SB-106-3.
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- 2.5 If the alignment is good, proceed to section 3. If not place shims under the bearing supports (108-4 thru 108-8) to achieve a good alignment. See fig. SB-106-4 for shim dimensions and thickness.

NOTE	If shims are added in any location, re-inspect the forward alignment per section 1.
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- 2.6 Record the results in part 9 of this service bulletin.

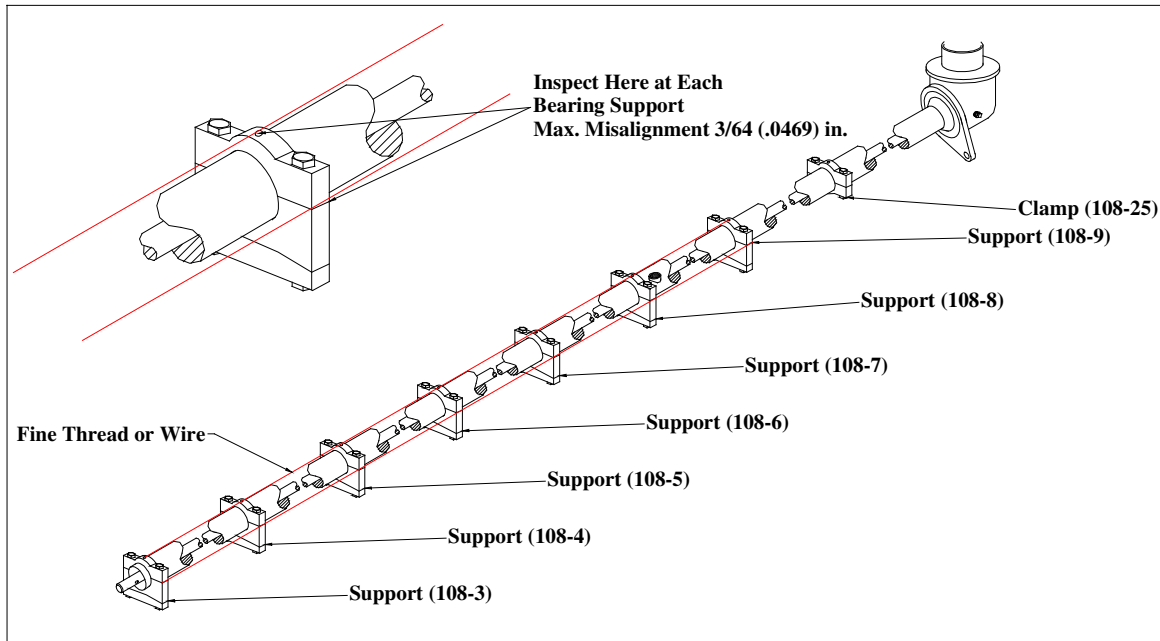


Fig SB-106-3 Bearing Support Alignment

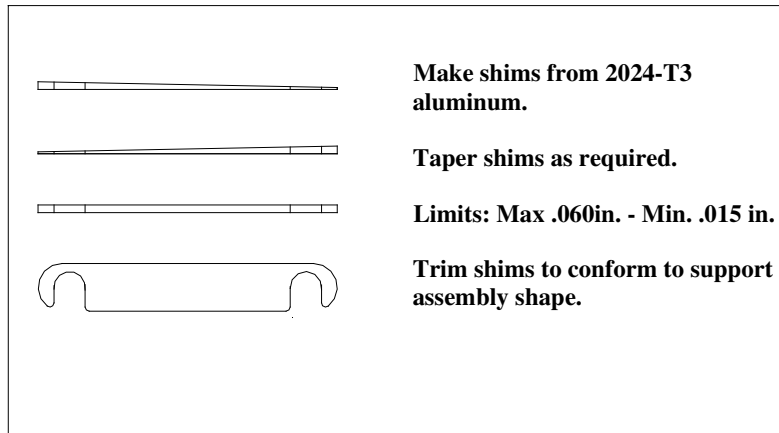


Fig. SB-106-4 Shim Specifications

3 Aft End Alignment

- 3.1 Remove the tail rotor guard, upper tail rotor gearbox, and intermediate tail rotor gearbox per Brantly maintenance instructions.
- 3.2 Install tool AT-278-100 through the aft end of the tail cone. Install two AN4 bolts through the mounting flange holes of tool AT-278-100 into the bulkhead mounting holes on the aft side of the tail cone.
- 3.3 Leave at least a .010 in. gap between the mounting flange and bulkhead. Install at least the two aft bearing supports (108-8 & 108-9) in place and snug the bolts. See fig. SB-106-5.

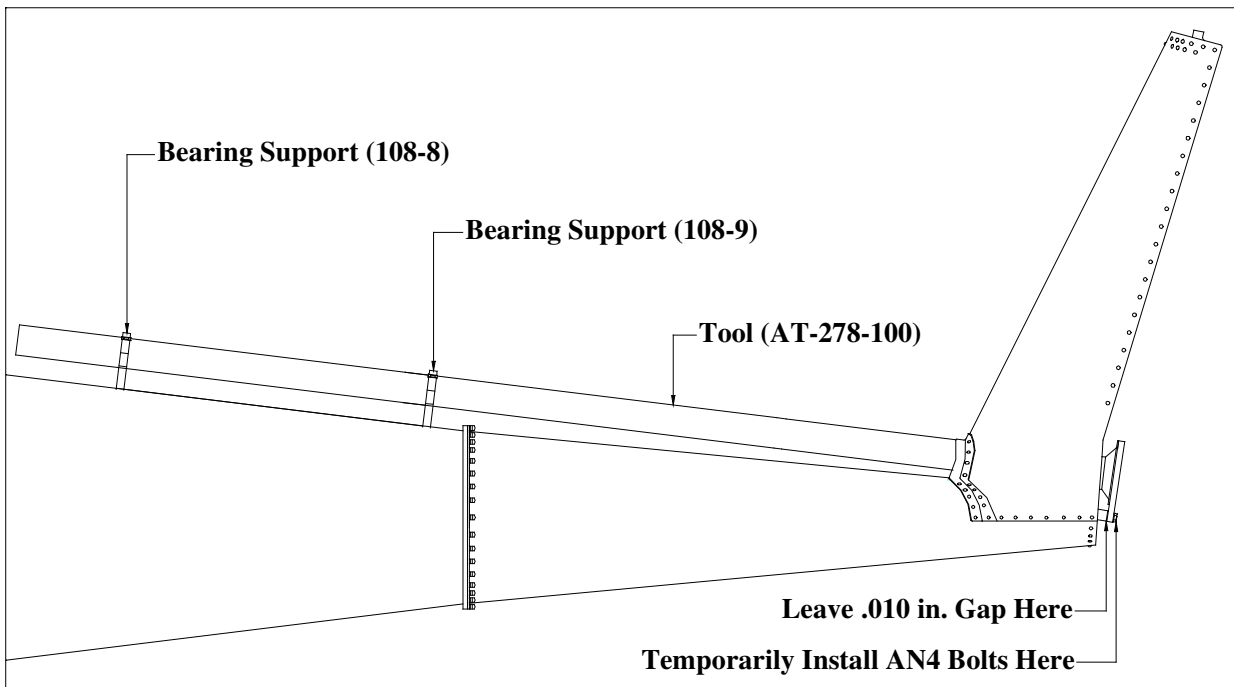


Fig. SB-106-5 Aft End Alignment Tool (AT-278-100) Installation

- 3.4 Remove the two bolts from the mounting flange of tool AT-278-100 and inspect the alignment of the holes paying particular attention to the left hole.
- 3.5 The holes should not shift more than $\frac{1}{4}$ hole or .0625 inch and tool AT-278-100 should not make contact with the sheet metal hole on the aft side of the tail cone. See fig. SB-106-6 Detail B.

NOTE	The $\frac{1}{4}$ hole requirement may be inspected using a .187 in. pin gage or drill rod. Try to insert the pin gage without making contact with the sides of the hole in the tool mounting flange. Keep the pin perpendicular to the face of the tool mounting flange.
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CAUTION	If the misalignment is more than $\frac{3}{32}$ (.0938) inch, replace the shaft (108-31) with a new one.
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- 3.6 Use light hand pressure to move tool AT-278-100 in all directions. It should spring back to a position that does not make contact with the sheet metal.
- 3.7 If the hole in the back of the tail cone interferes with this inspection, profile the hole to provide some clearance.

CAUTION	Do not remove more than .062 inch on any side. The bottom should be flush with the top of the bulkhead. Do not remove any material from the bulkhead. Be sure the finished hole is a smooth contour and is de-burred properly. See fig. SB-106-6 Detail A.
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- 3.8 If both requirements are met and the alignment is good, proceed to section 4. If not, contact the factory about correcting this misalignment.

CAUTION

Correction of this misalignment must be accomplished by Brantly authorized personnel only.

3.9 Record the results in part 9 of this service bulletin.

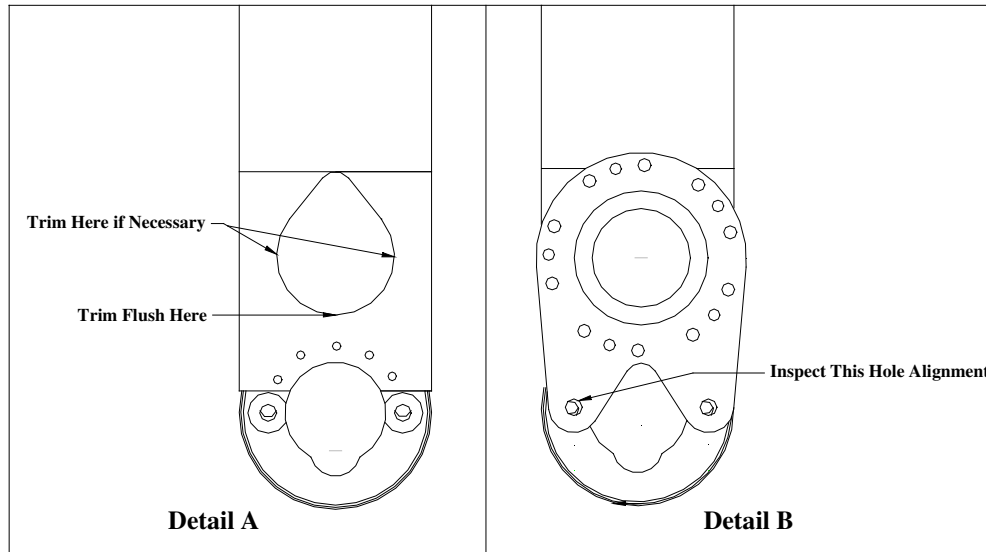


Fig. SB-106-6 Aft End Alignment

4 Flair Retainer (15-17) and Housing (14-13) Inspection

- 4.1 Disassemble the intermediate tail rotor gearbox (278-100) per Brantly maintenance instructions.
- 4.2 Visually inspect the flange retainer (15-17) and housing (14-13) for permanent deformations resulting from bending. None are permitted.
- 4.3 If the parts fail inspection, replace with airworthy parts. Record the results in part 9 of this service bulletin.

5 Bevel Gear (249-5) Inspection

- 5.1 Remove the bevel gear (249-5) from the shaft (108-31) per Brantly maintenance instructions.
- 5.2 Using a suitable light, visually inspect the bevel gear, paying particular attention to the bore, for nicks, scoring, excessive wear, bolt hole elongation, burrs, and evidence of misalignment.
- 5.3 Damage is acceptable only if it can be removed with light hand polishing using Scotch Brite (maroon or white) and maintaining all tolerances.
- 5.4 Measure the diameter of the bolt hole. Size must be $\text{\O} .1894$ to $.1899$ inch.

NOTE

Use class X pin gages to measure the bolt hole. A $.190$ minus pin gage should be a "No Go".

- 5.5 Measure the bore diameter. Size must be $\text{\O} .6248$ to $.6250$ inch.

NOTE	Use bore gages or inside micrometers with an accuracy of .00005" to measure the bore.
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- 5.6 If the part fails inspection, replace with a new airworthy part. Record the results in part 9 of this service bulletin.

NOTE	Gears come in matched sets. If the bevel gear (249-5) is replaced, then the gear and shaft assembly (249-100) must also be replaced.
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6 Bolt (15-201) inspection

- 6.1 This bolt inserts into the bevel gear. Inspect the bolt (15-201) for excessive wear or damage where the bolt contacts the shaft. None is permitted.
- 6.2 Measure the bolt grip diameter. Size must be \varnothing .1889 to .1894 inch.

NOTE	Use outside micrometers with an accuracy of .00005" to measure the bolt.
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- 6.3 If the part fails inspection, replace with a new airworthy part. Record the results in part 9 of this service bulletin.

7 Shaft (108-31) Inspection

- 7.1 Inspect the aft end of the shaft (108-31) using a suitable inspection light, paying particular attention to a circular area of .500 inch radius from the center of the bolt hole, for nicks, scoring, excessive wear, bolt hole elongation, burrs and evidence of misalignment.
- 7.2 Damage is acceptable only if it can be removed with light polishing using Scotch Brite (maroon or white) and maintaining all tolerances.
- 7.3 Measure the diameter of the bolt hole at the aft end. Size must be \varnothing .1894 to .1899 inch.

NOTE	Use class X pin gages to measure the bolt hole. A .190 minus pin gage should be a "No Go".
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- 7.4 Measure the outside diameter of the shaft along the length 2.0 inches from the aft end. Size must be \varnothing .6240 to .6250 inch.

NOTE	Use outside micrometers with an accuracy of .00005" to measure the outside of the shaft.
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- 7.5 Inspect the shaft per the ASTM-E-1444 (magnetic particle) method at the aft end near the bolt hole. No cracks, surface or subsurface discontinuities are permitted.
- 7.6 If the part fails inspection, replace with a new airworthy part. Record the results in part 9 of this service bulletin.

8 Final Inspection and Assembly

- 8.1 Re-assemble the intermediate tail rotor gearbox (278-100) per Brantly maintenance instructions.

- 8.2 Install the intermediate tail rotor gearbox on the helicopter and install the bearing supports (108-3 thru 108-9) and torque the bolts 50-70 in. lbs.
- 8.3 Inspect the shaft (108-31) for binding by turning it by hand. It should turn with light finger pressure. If not, inspect the system to determine the cause and correct before operating the helicopter.
- 8.4 Install the upper tail rotor gearbox (278-200) per the Brantly maintenance instructions and inspect the alignment.
- 8.5 Re-install all components per Brantly maintenance instructions.

9 Inspection Report for SB-106

Please complete this report and send it to Brantly Int. Use the feedback information given in this service bulletin. Make an entry in the maintenance records.

Helicopter Information

AC S/N	Reg #	TTIS	Date
278-100 S/N	278-100 TTIS	Name	
Address		Tel.	E-mail

Part 1 Results- Forward End Alignment

Misalignment	Corrective Action(s)	New Alignment

Part 2 Results- Bearing Support Alignment

Support #	Misalignment	Corrective Action(s)	New Alignment
108-3			
108-4			
108-5			
108-6			
108-7			
108-8			
108-9			

Part 3 Results- Aft End Alignment

Misalignment	Corrective Action(s)	New Alignment

Part 4 Results- Flair Retainer (15-17) and Housing (14-13)

Part Name	Deformations	Pass	Fail
Flair Retainer (15-17)			
Housing (14-13)			

Part 5 Results- Bevel Gear (249-5)

Damage	Action	Bolt Hole Ø	Bore Ø	Pass	Fail

Part 6 Results- Bolt (15-201)

Damage	Grip Ø	Pass	Fail

Part 7 & 8 Results- Shaft (108-31)

Damage	Action	Bolt Hole Ø	Outside Ø
Rotation	Action	Pass	Fail