

BACKGROUND: To provide information relating to the TT strap installation installed in the piston helicopters under Airwolf STC SH03465CH.

Enstrom helicopters delivered new from the factory starting in 2017 have the Airwolf TT strap installed. As this is not an Enstrom installation, information relating to the TT strap installation has not been incorporated into the Enstrom maintenance and parts manuals. This Work Aid Document is to provide information regarding TT strap installation parts and maintenance procedures to technicians in the field;

This help aid is not intended to replace the information from Airwolf detailed in the Airwolf Aerospace LLC Report AA-ECD-084-280/-480 ICA Dated March 2016, (REV A).

Airrwolf Aerospace,LLC Report AA-ECD-084-280/-480-ICA Rev A, March 2016

### .CHAPTER 1, INTRODUCTION

1 Type Design Change:This Type Design change consists of the installation of Airwolf Aerospace, LLC Tension-Torsion Strap Assemblies as a direct replacement for the Bertrand Products, Corp. manufactured Tension-Torsion Strap Assemblies, Enstrom Helicopter Corp. Part Number ECD084-1. NOTE:There is no weight & balance change associated with this Type Design Change.

- 2 Scope: The scope of these Instructions for Continued Airworthiness (ICA) focuses exclusively on Maintenance; Inspection & Airworthiness Limitations associated with this FAAapproved Type Design Change.
- 3 Purpose: The purposes of this ICA are to apprise Owner/Operators who have modified their rotorcraft pursuant to this Type Design change: (1) When, where & how to inspect; and (2) When & under what conditions to replace the T-T Strap Assemblies to assure continued operational safety.

4 Arrangement: This ICA is a single document comprised of four (4) chapters: Chapter 1, Introduction Chapter 4, Airworthiness Limitations Chapter 5, Inspection Requirements & Overhaul Schedule Chapter 6, Installation & Removal



- 5 Superseded Documents: This ICA does not supersede any Enstrom Helicopter maintenance document. This ICA specifies how Owner/Operators who modify their rotorcraft with Airwolf Aerospace, LLC T-T Strap Assemblies must life-manage their rotorcraft in accordance with the inspection requirements and Airworthiness limitations cited in this ICA.
- 6. Applicability: This ICA is applicable to the following Enstrom Helicopter Corp. Models: TH-28, 480 & 4808 & F-28/280 Model Series.
- 7. Precautions: There are no precautionary notes associated with this Type Design change other than those stated in Chapters 4 & 5 of this ICA
- 8. Referenced Publications: Enstrom TH-28/480 Series Maintenance Manual, Revision 19, dated 4/25/13.
  Enstrom F-28F & 280F Series Maintenance Manual, Revision 5, dated 1/2/14.
- 9. Distribution: Airwolf Aerospace, LLC will maintain a list of all Enstrom Owner/Operators that have purchased its T-T Strap Assemblies, and should the need arise to modify this ICA, the revision will be sent to all Owner/Operators. For Owner/Operators having internet access, the latest revision to this ICA will be available for downloading from the Airwolf Aerospace, LLC website: http://www.AirwolfAerospace.com

### 10. List of Abbreviations :

Abbreviation	Definition
CFR	Code of Federal Regulations
DER	Designated Engineering Representative
FAA	Federal Aviation Administration
ICA	Instructions for Airworthiness
LLC	Limited Liability Corporation
MM	Maintenance Manual
RPM	Revolutions Per Minute
Т-Т	Tension-Torsion

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### **CHAPTER 4, AIRWORTHINESS LIMITATIONS**

### Airworthiness Limitations

### For TH-28/480 Model Series:

(1) 1200 flight hours from date of installation

OR

(2) 36 months from date of installation, whichever occurs first.

### For F-28/280 Model Series:

5 Years from the date of installation subject to periodic inspections at 1200 flight-hour intervals.

The Airworthiness Limitations Section is FAA approved and specifies inspections and other maintenance required under 14CFR 43.16 and 14CFR 91.403 of the Federal Aviation Regulations unless an alternate program has been FAA approved.

FAA Approved

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Manager, Airframe & Administrative Branch Chicago Aircraft Certification Office Des Plaines, IL 60018

3/18/16

Date

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Aircraft Series: Effectivity: Model (S):

### CHAPTER 5, INSPECTION REQUIREMENTS & OVERHAUL SCHEDULE 1) Inspection Requirements

(A) When to Inspect: There are scheduled inspections for the Tension-Torsion Strap Assemblies at 1200 flight-hours from the date of installation and at 1200 flight -hour's intervals thereafter. Additionally, there is a required conditional inspection that must be conducted following the occurrence of a Main Rotor Overspeed as follows:

- (1) Following 385 to 405 RPM for 5 second; or
- (2) Following 406 to 420 RPM
- **NOTE:** When 420 RPM is exceeded, remove T-T Strap Assembly and return to Enstrom for inspection, overhaul/replacement. Reference: Enstrom TH-28/480 Model Series Maintenance Manual, Rev. 19, dated 4/25/13 or later FAA-accepted revision.
- **(B)** How to Inspect/ Rejection Criteria: Visually inspect each T-T Strap Assembly, and replace with an airworthy assembly, any assembly exceeding any one of the below listed rejection criterion:

(1) There are 25 or more broken wires (50 wire ends) at any corner, or a total of 200 on more broken wires (400 wire ends protruding through the urethane coating; or (2) There is evidence of a crack in either Bushing.

- (C) Required Consultation with Airwolf Aerospace,LLC: Should results of the T-T Strap Assembly's visual inspection reveal evidence of any of the below listed conditions, Owner/Operators must consult with Airwolf Aerospace,LLC before returning the T-T Strap Assembly to service:
  - 1) Cracks in the Urethane Coating;
  - 2) Delamination of the Urethane Coating; and
  - 3) Strap swelling or bulging

CHAPTER 6, INSTALLATION & REMOVAL

(A) Installation: Install T-T Strap Assemblies in accordance with Enstrom TH-28/480 Maintenance Manual, Revision 19, dated 4/25/13 Section 9-18, paragraphs (1) through (10), page MM-9-46; and paragraph 9-18 C., paragraph (17), page MM-9-49.

(B) Removal: Disassemble T -T Strap Assemblies from the Main Rotor Retention Assembly in accordance with Enstrom T H -28/480Maintenance M a n u a I, Revision 19, dated 4/25/13 Section 9-15B., paragraphs (1) through (8), pages MM-9-31 and MM-9-32.

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23	28-14382-21	Pin
24	28-14381-902 - 28-14383-13 - 28-14389-13	Cylinder assembly - Cylinder - Cover
25	AA-ECD-084-280	Tension Torsion Strap
27	Not Used	Oring
29	28-14381-901 - 28-14384-13 - 28-14389-11	Lug Assy - Lug - Cover
30	28-14382-19	Pin
31	VH-75	Retaining ring
33	CR17240	Seal
	AN 3-12A AN960-10 & 10L	Bolt Washers



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**Aircraft Series: Effectivity:** Model (S):

## The following section is condensed from THE ENSTROM TH-28/480 Series Maintenance Manual and covers maintenance on the TT style retention assemblies. The information is called out in the Airwolf ICA, Chapter 6. (page 4 of this document)

## Section 9-15. Disassembly - Retention Assembly (Figure 9-7)

(1) Remove the retention assembly from the main rotor hub (para. 9-14).

### NOTE

### TO REMOVE THE TT STRAP ONLY, SKIP TO STEP (16)

### NOTE

### IT IS NOT NECESSARY TO REMOVE THE GRIP FROM THE SPINDLE TO CHANGE OR INSPECT TT STRAPS. IF CHANGING OR INSPCECTING THE TT STRAPS ONLY OMIT STEPS (2 – 15).

### CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

- (2) Clamp the retention assembly vertically in a vise.
- (3) Remove the dust cover (18) from the blade end of the retention assembly.
- (4) Remove one of the retaining rings (31) securing the pin in the lug at the outboard end of the retention assembly. Remove the pin (30) and the remaining retaining ring.
- (5) Pull the blade grip (28) from the spindle.



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Aircraft Series: Effectivity: Model (S):

### NOTE

Only remove the seal from the blade grip if replacing a defective seal or blade grip.

(6) Remove the seal (33) from the grip (28-14381-3 Retention Assembly).

### NOTE

The pin used to secure the tension-torsion strap at the inboard end is not secured with retaining rings.

- (7) Remove the spindle from the vise and push the tension-torsion strap (25) back through the spindle.
- (8) Remove the pin (23) from the cylinder (24) and separate the tension-torsion strap from the cylinder.
- (9) Remove the retaining ring (10) from the spindle.

### NOTE

Do not remove the cylinder alignment pin from the spindle unless required.

- (10) If required, remove the flapping pin alignment pin from the ear of the spindle and the cylinder alignment (32) pin using a small punch.
- (11) Install a press tool between the seal (6) and the bearing (7) on the spindle. Using a hydraulic press, press the bearings (7 & 9) and spacer (8) from the spindle.
- (12) Remove the seal (6).

### NOTE

## Removal/replacement of the retention stops are necessary only if the stops are damaged or the adhesive has loosened.

(13) Remove the retention stops (1 & 4).



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Aircraft Series: Effectivity: Model (S):

(14) Remove the hardware securing the lug to the blade grip and remove the lug (29).

(15) Remove the pitch horn (21) from the blade grip.

(16) To remove the TT strap from the retention assembly without disassembling the retention assembly:

- (a) Lay the retention assembly down on a table protected with a soft cover.
- (b) Remove the dust cover (18) from the blade end of the retention assembly.

(c) Remove one of the outboard retaining rings (31) securing the pin in the lug at the outboard end of the retention assembly.

(d) Remove the pin.

(e) Use a razor blade or sharp knife to cut the silastic sealer securing the cylinder (24) into the root end of the spindle. Take care not to damage the spindle or cylinder.

(f) Insert a pry tool such as the large end of a 3/8 inch socket extension into the outer end of the TT strap (inside the lug (29) and pry the TT strap out of the inboard end of the spindle.

(g) Remove the pin (23) from the cylinder and withdraw the TT strap from the cylinder.

- (h) Inspect the TT strap in accordance with Chapter 5 of the Airwolf ICAS
- **9-16 Inspection Retention Assembly** Inspect the spindle in accordance with table 9-2 in the Enstrom MM. (See the end of this Work Aid Document)

### 9-17 Repair - Retention Assembly

A. Repair or replace the components of the retention assembly as required in accordance with Table 9-2.



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### **9-18** Assembly – Retention Assembly (See Figure 9-7)

### NOTE FOR TT STRAP INSTALLATION ONLY, SKIP TO SECTION (C 16)

- A Lamiflex equipped aircraft. (Not applicable)
- B Tension-Torsion Retention Assembly, (P/N 28-14381-1) (Not applicable)
- C. Tension-Torsion Retention Assembly, P/N 28-14381-3
  - (1) If removed, install the grease seal (33) into the blade grip using the following procedure:

a. P I a c e the replacement seal on the seal installation tool (T-0149-11) with the open face against the tool.

b. P I a c e the blade grip over the seal installation tool.

c. Place tool T-0149-13 onto the blade grip and using a press or other suitable device, press the seal into the blade grip seal bore.

- d. Remove the installation tools.
- (2) If required, bond the covers for the cylinder and lug (not shown in Figure 9-8) using the following procedure:
  - a. Remove residual adhesive from the cover and cylinder/lug as required.
  - b. Slightly abrade the bonding surfaces of the cover and cylinder/lug. NOTE

Follow the mixing and application instructions for the DP420 adhesive or the DP420 will not cure or adhere properly.

- c. Bond the cover to the cylinder/lug using DP420 adhesive. Allow the DP420 adhesive to cure for 24 hours.
- d. Apply a light bead of silicone sealant (732-RTV) around the cover.



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Aircraft Series: Effectivity: Model (S):

(3) If installing new retention stops (1 & 4), follow the procedures in paragraph 9-18,A,1.

### CAUTION

Use brass protector plates in the vise jaws to prevent from damaging the retention assembly.

- (4) Clamp the spindle in a vise in the vertical position.
- (5) If removed, apply a small amount of Loctite 635 (green) to the alignment pin (32) and press the alignment pin into the spindle until the end is slightly recessed from the seal surface.
- (6) Lubricate (MIL-PRF-81322) the seal surface of the spindle and install the seal (6) with the spring side facing toward the ears of the spindle.
- (7) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing(7) using a plastic mallet.
- (8) Install the spacer (8).
- (9) Lubricate (MIL-PRF-81322) the bearing surface and install the bearing(9) using a plastic mallet.

### NOTE

Ensure the bearings are seated firmly against the spindle shoulders.

(10) Install the retaining ring (10).

(11) Install tool (T-0036) behind the seal with the chamfered side of the tool toward the large radius of the spindle.

(12) Remove the spindle from the vise and insert the grip installation pilot tool (T-0149-12) into the spindle.

(13) Lubricate (MIL-PRF-81322) the seal surface on the adapter in the outboard end of the spindle.



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(14) Lubricate (MIL-PRF-81322) the bore of the blade grip and install the grip (28) on the spindle. Tap the grip onto the spindle with a plastic mallet until the seal in seated in the grip. Remove the pilot tool (T-0149-12) and the seal tool (T-0036) from the spindle.

(15) Install the lug (29) onto the end of the blade grip. Apply Loctite<sup>®</sup> 222MS to the threads of the hardware and install the hardware and torque.

(16) Install the tension-torsion strap (25) into the cylinder (24) so that the chamfer on the cylinder is facing inboard (center of main rotor hub) when the tensiontorsion strap is installed in the spindle and install the retention pin (23).

(17) Lubricate (MIL-PRF-81322) the portion of the inner spindle bore (3) that contacts the O.D. of the cylinder (24).

- (18) Install the tension-torsion strap into the spindle and ensure the groove in the cylinder engages the pin in the spindle.
- (19) Install one of the retaining rings (31) into the lug. Align the tension-torsion strap to the lug and install the retention pin (30). Install the other retaining ring.
- (20) Install the dust cover (18)
- (21) Apply a bead of silicone sealant (732-RTV) around the perimeter of the cylinder assembly (24) to form a seal between the cylinder and the spindle.
- (22) Install the flapping pin alignment pin into the spindle ear if it was removed.(23) Install the retention assembly onto the main rotor hub assembly (para. 9-19).
- (24) Install the pitch arm onto the blade grip. Install the hardware and torque to 75 in-lbs/8.5 Nm. Lockwire the hardware (.032) in horizontal pairs.



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(25) Service the blade grip.

a. Purge lubricate the retention assembly (para. 4-35).

### NOTE

### IT IS NECESSARY TO ROTATE THE GRIP IN THE FEATHER AXIS WHILE PURGE LUBRICATING THE RETENTION ASSEMBLY TO PREVENT DAMAGE TO THE SEAL.

### CAUTION

# DO NOT OVER ROTATE THE GRIP WHEN THE PITCH LINKS ARE DISCONNECTED (18° MAX)

b. Ensure the seal (6) is not dislocated from the blade grip. If it has moved, remove the purge screw from the top of the blade grip. Insert the blade of a flathead screwdriver between the seal and the spindle. Carefully work the seal back into the grip. It is normal if grease is displaced out of the purge hole as the seal is pushed back into place. Reinstall the purge screw.



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**Aircraft Series: Effectivity:** Model (S):

### **ENSTROM TH-28/480 SERIES MAINTENANCE MANUAL**

Table 9-2. Retention Assembly

### Inspection Requirements\* P/N Fig. 9-7 Part Name Inspection Serviceable Limits **Repair Limits** Repair or Action Item # General Condition 003 wear 28-14240-1 Droop Stop Not Repairable Replace Stop 28-14282-13 3 Spindle Lamiflex bearing tab +.002 Not Repairable Replace Spindle slot width .187 to .189 -.0003 Small bearing surface Not Repairable Replace Spindle Dia. 1.9996 to 2.0003 Large bearing surface -.0003 Not Repairable Replace Spindle Dia. 2.4996 to 2.5002 Seal surface Dia. 2.872 -.002 Not Repairable Replace Spindle to 2.878 Flapping pin bore Dia. +.0005 Not Repairable Replace Spindle 1.7495 to 1.7500 Replace Spindle Threads (crossed or None Allowed Not Repairable missing) Nicks, scratches, or None Allowed Blend and polish out ≤ .010 deep corrosion smooth Cracks None Allowed Not Repairable Replace Spindle 28-14231-1 4 Up Stop General condition .003 wear Not Repairable Replace Stop O.D. 3.2492 to 3.2500 40NBC20-7 No Tolerance Bearing Not Repairable Replace Bearing 52YZP Allowed I.D. 2.4993 to 2.5000 No Tolerance Not Repairable Replace Bearing Allowed Ratcheting or Not Repairable **Replace Bearing** None Allowed rouahness Length 3.061 to 3.062 28-14261-1 8 Spacer -.001 Not Repairable Replace Spacer Ends parallel Within .0012 FIM Not Repairable Replace Spacer 32NBC20-9 Bearing O.D. 2.7494 to 2.7500 No Tolerance Not Repairable Replace Bearing 44YZP Allowed I.D. 1.9993 to 2.0000 No Tolerance Not Repairable **Replace Bearing** Allowed Ratcheting or roughness None Allowed Not Repairable **Replace Bearing** 28-14279-3 13 Blade Grip Blade retention bolt +.0005 Not Repairable Replace Blade Grip bore Dia. .875 to .876 Not Repairable Replace Blade Grip Large bearing bore Dia. +.0018 3.2512 to 3.2522

### Small bearing bore Dia. +.0011

Not Repairable

Replace Blade Grip



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			1	Table 9-2. Retentio	n Assembly			
	Inspection Requirements*							
P/N	Fig. Iten	9-7 Part Nam n #	е	Inspection	Serviceable Limits	Repair Limits	Repair or Action	
28-14279-3	3 1:	3 Blade Grip (C	ont'd) Ti	nru bore Dia. 1.5145 to 1.5165	+.0015	Not Repairable	Replace Blade Grip	
			Dr	ag link ear width .745 to .747	001	Not Repairable	Replace Blade Grip	
			1	Threads (crossed or missing)	None Allowed	Not Repairable	Replace Blade Grip	
			1	Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth	
				Cracks	None Allowed	Not Repairable	Replace Blade Grip	
28-14007-1 &-3	1	9 Blade Retentio	n Bolt	D.D8738 to .8745	0002	Not Repairable	Replace Bolt	
			(	Threads crossed or missing)	None Allowed	Not Repairable	Replace Bolt	
			1	Nicks, scratches, or corrosion	None Allowed	≤ .010 deep	Blend and polish out smooth	
				Cracks	None Allowed	Not Repairable	Replace Bolt	
28-14283-1	2	0 Drag Link	c Di griț	stance between blade b ears .748	" 001	Not Repairable	Replace Link	
			Di root	stance between blade ears .564 to .566	±.0005	Not Repairable	Replace Link	
			Rete	ntion bolt hole Dia. (2 aces) 3745 to 3750	0002	Not Repairable	Replace Link	
			Nicks scratches or corrosic		None Allowed	≤ .010 deep	Blend and polish out smooth	
			Cracks	5	None Allowed	Not repairable	Replace Link	
28-14278-1	21	Pitch Arm	Pitch ch and mou Dia. (5 p	ange link bolt unt bolt hole blaces) .312 to .315	001	Not Repairable	Replace Arm	
			Nicks, co	scratches, or Norrosion	None Allowed	≤ 0.10 deep	Blend and polish out smooth	
8-14382-11,	23, 30	Retention Pin	O.D	748 to .750	002	Not Repairable	Replace Pin	
-13,-15,&-17			Nicks,	scratches, or N prrosion	None Allowed	≤ .005 deep	Blend and polish out smooth	
			C	Cracks N	Jone Allowed	Not Repairable	Replace Pin	
-14382-19,&	23, 30	Retention Pin	O.D	746 to .478	002	Not Repairable	Replace Pin	
-21			Nicks,	scratches, or Morrosion	None Allowed	≤ .005 deep	Blend and polish out smooth	
			(	Cracks N	Jone Allowed	None Allowed	Replace Pin	



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	28-14383-13, &	24	Cylinder	O.D. 2.101 to 2.100	002	Not Repairable	Replace Cylinder	
	-15			Pin bore .750 to.751	002	Not Repairable	Replace Cylinder	
				Index groove width .125 to .129	+.005	Not Repairable	Replace Cylinder	
				Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth	
	c			Cracks	None Allowed	Not Repairable	Replace Cylinder	
I	ECD084-1	25	Tension-Torsion Strap	Broken wires	None Allowed Notify Enstrom	Not Repairable	Replace Strap	
				Strap bulge	Notify Enstrom			
				Cracks in urethane coating	Notify Enstrom			
				Delamination of urethane coating	Notify Enstrom			
				Swelling from grease contamination	None Allowed	Not Repairable	Replace strap if swollen. Clean strap with denatured alcohol	
				Cracks in strap bushings	None Allowed	Not Repairable	Replace Strap	
	P/N	Fig. 9-7 Item #	Part Name	Inspection	Serviceable Limits	Repair Limits	Repair or Action	
	ECD084-1	25	Tension-Torsion Strap (Cont'd)	Fretting corrosion on bushing flange	.002 deep over 25% of total flange area	Not Repairable	Replace Strap	
			(contra)	Fretting corrosion in bushing bore	.002 deep over 25% of bore area	Not Repairable	Replace Strap	
I	28-14385-11, -13 & -15	26	Spindle	Cylinder bore Dia. 2.102 to 2.106	+.003	Not Repairable	Replace Spindle	
			Inspect remainder o	f spindle following the insp	ection criteria listed earli	er in this table		
28-14386-1 & -3 28 Blade Grip O-ring bore Dia. 2.016 + .002 Not Repairable Re to 2.018							Replace Blade Grip	
	Inspect the remainder of the blade grip following the inspection criteria listed earlier in this table							
	28-14386-5	28	Blade Grip	Seal bore Dia. 2.249 to 2.250	+.002	Not Repairable	Replace Blade Grip	
	Inspect the remainder of the blade grip following the inspection criteria listed earlier in this table							
	28-14384-13	29	Lug	Pin bore Dia752 to .754	+.002	Not Repairable	Replace Lug	
				Nicks, scratches, or corrosion	None Allowed	≤ .005 deep	Blend and polish out smooth	
				Cracks	None Allowed	Not Repairable	Replace Lug	