

# **NANOLIGHT TRIKE WING**

# **COMBAT 12T**

## **OWNER / SERVICE MANUAL**



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## **AMMENDMENTS**

No.	Section	Pages	Date of correction	Comments
1		3	30.11.2021	Text correction: contents changed
2		20-21	30.11.2021	New pages added

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## **INTRODUCTION**

Thank you for purchasing an Aeros wing for your nanolight trike.

The Combat 12T is a highest step in nanolight technology. It is designed for those who want to extend their abilities of flying faster and further with their light weight trikes with maximum level of safety. With this wing you will get an extremely pleasurable flying experience.

Please read and be sure you thoroughly understand this manual before flying the Combat 12T. Be sure that you thoroughly familiar with the wing and the contents of this manual before initial operation.

We encourage you to read this manual thoroughly for information on the proper use and maintenance of your Aeros wing. If you have access to the Internet, please visit us regularly at <http://www.aeros.com.ua>

In case of any doubts or questions contact your local dealers or Aeros directly.

***We wish you safe and enjoyable flying career.***

Aeros Ltd.

### **Definitions**

Definitions used in this Manual such as WARNING, CAUTION and NOTE are employed in the following context:

#### **WARNING**

OPERATING PROCEDURES, TECHNIQUES, ETC. WHICH IF NOT FOLLOWED CORRECTLY, MAY RESULT IN PERSONAL INJURY OR DEATH.

#### **CAUTION**

OPERATING PROCEDURES, TECHNIQUES, ETC. WHICH IF NOT STRICTLY OBSERVED, MAY RESULT IN DAMAGE TO THE AIRCRAFT OR ITS INSTALLED EQUIPMENT.

#### **NOTE**

Operating procedures, techniques, etc. which considered essential to highlight.

## TECHNICAL INFORMATION AND OPERATING LIMITATIONS

### WARNING

THE Combat 12T IS DESIGNED FOR FLYING WITH A NANOLIGHT TRIKE ONLY.

The Combat 12T wing has been designed **especially for nanolight trikes**, using a Combat 12 hang glider as a base.

Flight operation of the Combat 12T should be limited to non-aerobatic maneuvers; those in which the pitch angle will not exceed 30 degrees nose up or nose down from the horizon and bank angle will not exceed 60 degrees.

<b>Sail area, sq.m. (sq.ft.)</b>	12.8 (138)
<b>Wing span, m (ft.)</b>	10.0 (32.7)
<b>Aspect ratio</b>	7.8
<b>Nose angle, °</b>	130
<b>Weight (without bags), kg (lb)</b>	39 (86)
<b>Number of upper sail battens</b>	24
<b>Number of bottom sail battens</b>	6
<b>Breakdown length, m (ft)</b>	4/5.6(13/18.4)
<b>Min. airspeed*, km/h (mph)</b>	38 (24)
<b>Max. airspeed*, km/h (mph)</b>	85 (53)
<b>Min. clip-in weight, kg (lb)</b>	104 (230)
<b>Max. clip-in weight, kg (lb)</b>	155 (341) /178(392)**

\* Airspeed measured with Aeros ANT nanolight trike.

\*\* Valid for the wings, manufactured after January 1<sup>st</sup> 2014.

Aeros recommends that no attempt should ever be made to deliberately spin this wing.

The stability, controllability, and structural strength of a properly maintained Combat 12T has been determined to be adequate for safe operation when the wing is operated within the entire manufacturer specified limitations.

No warranty of adequate stability, controllability, or structural strength is made or implied for operation outside of these limitations.

Operating the Combat 12T outside of the above limitations may result in injury and death.

Flying a nanolight trike with the Combat 12T wing in strong or gusty winds or turbulence may result in loss of control of the wing, which may lead to injury and death.

Do not fly in such conditions unless you realize and wish to personally accept the associated risks.

## Combat 12T REASSEMBLY AFTER SHIPPING PROCEDURE

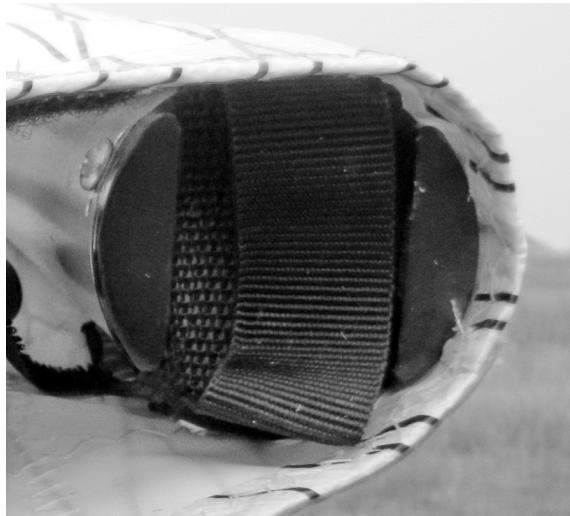
1. With the wing in the bag (4 meters long) lay the wing on the ground.
2. Unzip the bag. Undo the Velcro straps. Remove the batten bag, the control bar and the outer leading edge tubes # 3 from the bag.
3. Unfold the sail along the leading edge to its full length. Attach the outer leading edge tubes # 3 to the front leading edge tubes # 2 according to the markings (L-left, R-right marks must be on top).

Working on one wing at a time and working with the appropriate leading edge # 3, fold the outer sprog, which is attached to the outer leading edge, towards the inboard end of the leading tube # 3. Slide the inboard end of the leading edge tube # 3 into the sail.

Then slide the outer leading edge forward, allowing the sprog end to come outside the sail at the corresponding hole, and slide the rear leading edge into the inner leading edge.

Align the outer leading edge properly so that the sprog is on the inside of the leading edge, and slide the outer leading edge forward, rotating as necessary, until the button spring in the outer leading edge engages securely into the holes in the front leading edge. When the outer leading edge is fully engaged, you will not be able to rotate it.

4. Tighten the sail along the leading edge by putting the sail mount webbing into the slot in the end cap of the leading edge # 3.



**NOTE**

The sail mount screws on the front part of the leading edge tubes # 1 must be unscrewed, otherwise the excess sail tension will not allow tightening the sail.

The sail mount screws have to be screwed back after you accomplish all steps in section "Combat 12 T set-up procedure" from item 1 through item 12.

5. Secure the sail mount webbing to the leading edge # 3 with the sail mount webbing Velcro.

**NOTE**

When spreading the wings with the sail mount screws having been unscrewed check that the sail mount webbing is in proper position in the slot of the end cap of the leading edge # 3.

6. Install the wing tip bags.

Put battens on top of the wing between Mylar pockets in the front part of the wing.

Place Velcro ties around the wing.

Put the control bar between leading edges in the rear part of the wing.

Put the wing bag back on and zip it up.

## **Combat 12T BREAKDOWN FOR SHIPPING PROCEDURE**

This process will basically be the reverse of reassembling after breakdown for shipping. Before beginning, read through the section above on how to re-install the rear leading edges.

1. Lay the wing on the ground or floor, unzip the bag and remove the Velcro ties. Remove the control bar and battens from the wing. Remove the protection wing tip bags.
2. Check to see that the leading edges are marked "Left" and "Right". If they are not, mark them with an indelible marker.
3. Unscrew the sail mount screws from the leading edges # 1.
4. Undo the sail mount webbing Velcro and remove the sail mount webbing from the leading edges end caps. With the outboard sprog folded towards the nose pull the rear leading edge straight aft while pressing the button spring in to disengage it from the front, and then slide it backwards carefully out of the sail. Tape or pad the exposed ends of the inner leading edge tubes # 3, and do the same for the outer leading edge tubes # 2 in order to prevent sail damage during transportation.

5. Carefully fold the outermost area of the sail over onto the innermost area of the sail, place Velcro ties around the wing and put on the wing bag, turning the bag 180 deg (i.e. matching the front part of the bag to the rear part of the wing).
6. Zip up the wing bag zipper.

## Combat 12T SET-UP PROCEDURE

1. Lay the wing on the ground, with the bag zipper up and the nose of the wing pointing into the wind.
2. Undo zipper and take out the battens and the control bar.
3. Lift and separate the control frame uprights.

Remove the quick pin from the corner bracket. Insert the corner bracket all the way into the control bar.

Install the quick pin bolt (from front to rear), securing the bracket to the control bar.



### CAUTION

DO NOT FORCE THE FITTING INTO THE CONTROL BAR IF IT DOES NOT SLIDE IN FREELY AND CHECK FOR DIRT OR DAMAGE TO THE FITTING OR THE INSIDE OF THE CONTROL BAR.

4. Flip the wing upright on the control bar. Try to set the control bar on level ground. Remove the wing bag and all the Velcro sail ties. Do not remove the leading edge tip protection bags at this time.



5. By lifting up the nose battens, push the nose battens fully back into the sail so that the batten tips rest in the corresponding holes in the keel tube.
6. Take the keel tube stinger out and protect the keel tube end with the cover.

7. Spread the wings almost all the way so that the glider is resting on the wing tips and on the keel tube. Let the keel tube end rest on the ground. Check all cables for any twisted thimbles or tangled cables.

8. Attach the bottom front wires to the hook on the bottom nose plate.



9. Attach the struts to the control frame corner fittings using clevis pins and safety rings. Each strut is marked as left and right. Attach the struts to the cross bar fittings using clevis pins and safety rings.



10. Holding the pullback wire handle with one hand lift the keel tube end up. Place the end of the keel tube on the keel tube stinger.



11. Remove the battens from the batten bag and check each batten for symmetry against the corresponding batten from the other wing. Align the battens at their front tips, and at about the 60% of the chord point. There should not be any deviation of more than 3 mm (1/8") from one batten to the other along the full length of the battens.

If you choose not to check your battens for symmetry before each flight, you should, at a minimum, check them once a month.

Aeros convention is that the red marked battens go in the left wing and green marked battens in the right wing. Battens are numbered from the center outwards, and the longest batten in a Combat 12T is designated as the "No. 1" batten. Install the cambered battens in the sail.

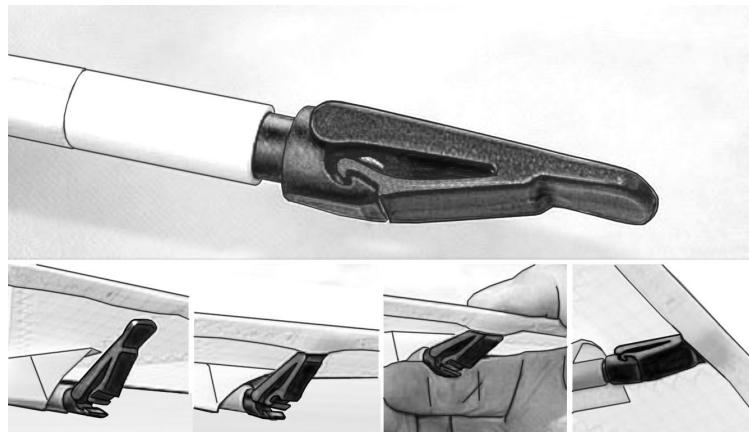
Install the batten tips into the hem of the trailing edge. At each batten, make sure the opening in the underside of the trailing edge hem is spread to accept the tab on the batten tip. Make sure the tab slides fully into the hem.

**CAUTION**

INSERT THE BATTENS CAREFULLY, SO AS TO MINIMISE STRESS AND WEAR ON THE SAIL.

Never insert or remove battens with the crossbar tensioned (except for up to the last three on each side) and never insert or remove battens with heavy wind pressure on the top of the sail or in any condition which causes the battens to slide with great resistance in the pockets.

To open or close the batten tip lever, press firmly on the undersurface of the tip lever to disengage or engage it.



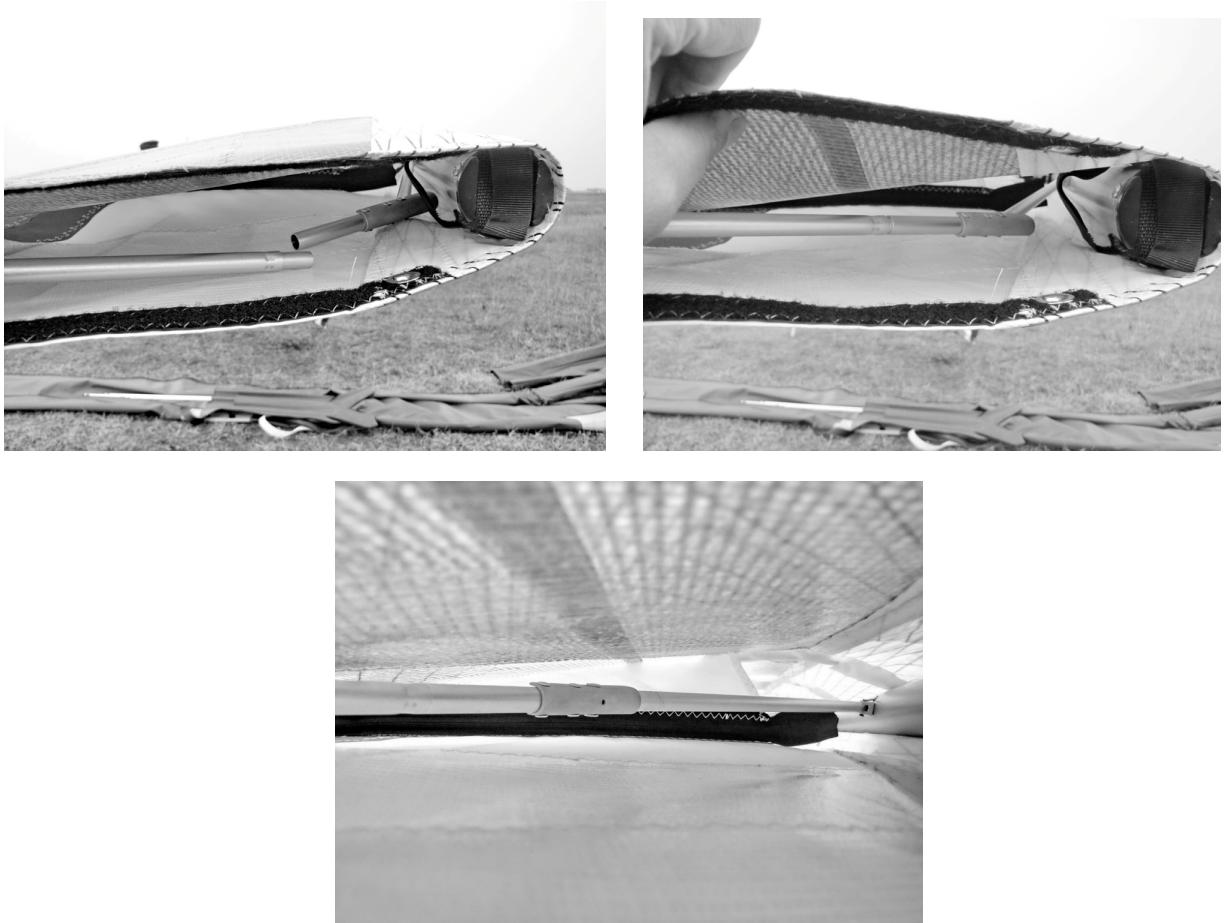
12. At the rear inside of the keel pocket find the sweep (cross tube tensioning) wires handle. Pull the sweep wires handle out of the rear end of the keel pocket, and check that the sweep wires are not twisted and not wrapped around the keel. Attach the shackle of the sweep wires to the hook, placed on the keel tube.



**WARNING**

IN-FLIGHT DISENGAGEMENT OF THIS ATTACHMENT WILL CAUSE A COMPLETE LOSS OF STRUCTURAL SUPPORT OF THE WING AND A TOTAL LOSS OF CONTROL. NEVER ATTACH THE PULL HANDLE WEBBING OF THE SHACKLE TO THE HOOK, EVEN TEMPORARILY.

13. The tip lever batten is fixed to the sail with one end and to the leading edge tube with another end. Install the tip lever battens as shown on the photos.



14. The next step is to install the inboard and outboard sprogs and secure them in position. Before doing so, working through the sprog access zippers, preflight the following items:

- internal ribs to confirm that they are fully zipped up;
- the sprog hardware and the sprog cable attachments at both ends of each sprog cable.

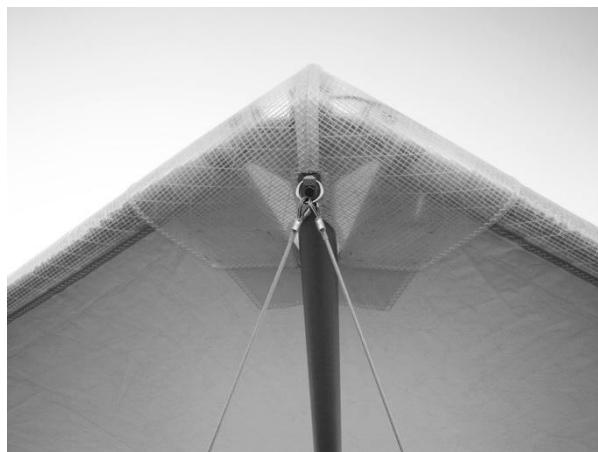
To deploy and secure each sprog, swing the sprog away from the leading edge and align it in the center of the rear end of the sprog access zipper. Fully close the sprog access zipper and this will secure the sprog in the proper position underneath the transverse batten and capture it in position.



15. Attach plastic winglets. Put the front part of the winglet between the sail and the outer part of the leading edge tube. Put the winglet tightly inside the sail, fixing it with Velcro. Make sure the winglet is properly installed and secure it with a bolt, a nut and a safety ring. Note the plastic washers are to be installed on top and bottom of the sail.



16. Mount the hang block to the keel tube.
17. Install the nosecone, taking care to align it so that it lies flat on top and bottom of the sail.



Now your wing is ready to be mounted on your nanolight trike.

**WARNING**

BEFORE MOUNTING THE WING TO THE TRIKE INSTALL THE NOSE CONE. DO NOT FLY WITHOUT THE NOSECONE!

## PREFLIGHT PROCEDURE

Conduct a complete preflight inspection of the wing, checking all assemblies, which have not already been checked. Every bolt, nut, pin, safety ring, and fastener of any kind should be checked during every pre-flight. A full pre-flight inspection should precede every flight you make, not just the first flight of the day.

Carefully check the entire length of the leading edge pocket to insure that the Mylar insert is lying flat in the pocket. If any section of the Mylar is folded under, de-tension the crossbar, remove as many battens as necessary and unfold the Mylar.

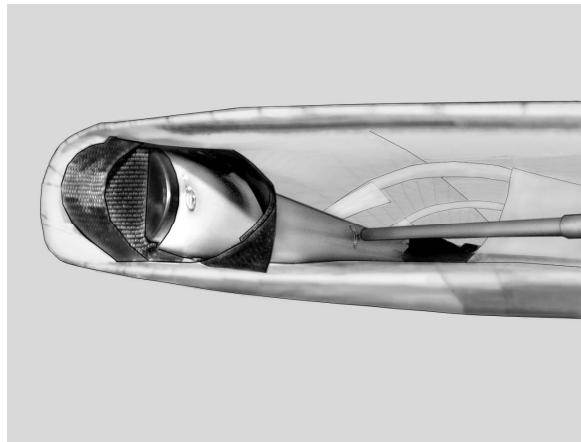
### Along the left leading edge:

Open the main sprog access zipper and look inside, making sure that the crossbar / leading edge junction is assembled properly and safely secured, struts are properly attached to the crossbar. Check that the sail is not caught on the crossbar end, or on any of the hardware. Remember to close the access zipper.

### At the left wingtip:

This procedure is to be performed before plastic winglets have been installed.

Look into the sail from the wing tip. Tip folded batten must be properly engaged. The washout tip must be installed. Check for any evidence of dents, deep scratches, cracks or bends in the LE tube. Be sure that the sail mount webbing is properly installed in the end cap slot and safely and correctly secured with the Velcro around the leading edge.



#### **Along the trailing edge, left wing**

Check that there are no tears in the sail material along the trailing edge.

Check that all battens are properly secured.

Check that the outboard and inboard sprogs are properly secured in position supporting the transverse battens, and that the sprog access zippers are properly closed.

Check that the sprog bridles are properly engaged.

#### **From the rear keel**

Check that the sweep wires are tight and secured on the hook on the keel tube.

Check the rear wires / keel tube junction. The assembly must be connected with the pin and secured with the safety ring.

**Along the trailing edge, right wing:** Same as for the left wing.

**At the right tip:** Same as for the left tip.

**Along the right leading edge:** Same as for the left leading edge.

**Under the wing at the control bar:** Sight down the downtubes, making sure that they are straight.

#### **WARNING**

**DO NOT FLY WITH BENT DOWNTUBES!**

Check for proper installation of all hardware at the control bar corners. Make sure the struts are properly secured.



Check the sweep wire for wear where it passes next to the hang point channel.  
Check the crossbar center plate's assembly including the sweep wires/X-bar junction and the center bolt.



Also, visually inspect the cross tubes by sighting along the length of the cross tubes looking for any evidence of damage.  
Check the control frame apex and the hang block bracket hardware.



## SPEED TO FLY

The range of **trim speed** for the Combat 12T is 51 - 55 km/h (32-34 mph).  
The range of the **stall speed** for the Combat 12T, depending on the wing load, is 36 - 38 km/h (22-24 mph). The wing is stable at the beginning of stall. While pushing out the speed bar, the bar pressure is progressively increase.

The Combat 12T speeds up to 85 km/h (53 mph), being essentially roll neutral, with no tendency to yaw. The bar pressure will increase progressively as the speed increases.

### **WARNING**

ALL SPEEDS ARE MEASURED WITH AEROS NANOLIGHT TRIKE.

## COMBAT 12T BREAKDOWN

Breakdown of the wing is the reverse of assembly.

1. Remove the nosecone (if it has not been removed when dismounting the wing from the trike). Remove any instruments.

2. Remove the hang bracket.
3. Remove plastic winglets.
4. Lift the keel tube up to your chest. Remove the keel tube stinger out of the keel tube. Place the end of the keel tube on the keel tube stinger.
5. Unzip the sprog access zippers all the way to the leading edge end of the zippers. Pull out the inboard and outboard sprogs.
6. Remove the undersurface battens. Remove the tip lever battens.
7. De-tension the crossbar sweep wires.
8. Remove all cambered battens except the first inboard longest battens.
9. Roll the outboard section of the sail and install the outboard wing protection bags on.
10. Remove the keel tube stinger, protect the keel tube end with the cover and let the keel tube end rest on the ground. The glider will be resting on the wing tips and on the keel tube.
11. Detach the front wires at the nose plate.
12. Disconnect the struts from the cross bar fittings at first. Swing the strut forward to be able to disconnect it from the control frame. Disconnect the strut from the control frame corner.
13. Fold the wings all the way in to the keel pulling the sail over the top of the leading edges. At each wingtip, remove the tip cover bag. Install the protective pad and sock over the rear wires junction bolt and the rear end of the keel.
14. Pull the sail out away from the keel until it is even on top and bottom. Roll the sail gently and carefully, parallel to the trailing edge of the front and then outboard portion of the sail.

**NOTE**

Try to roll the sail in such a way that the leading edge portion remains as smooth as possible. Do not attempt to stuff the sail between the Mylar pocket and the leading edge tube at any point where you feel resistance, and do not attach the Velcro ties tight so as to induce creases in the Mylar or leading edge sail material.

- Working from the trailing edge, roll the sail tightly to the leading edge and install the wing tip cover bag.
15. Finish rolling the sail in the area of the sprogs. Secure the sail with the Velcro sail ties.
  16. Stow the battens in the batten bag and stow it in the front part of the wing.
  17. Install the sail mount Velcro straps around the sail and stow the nosecone under the most forward Velcro.
  18. Install the wing bag. Flip the wing over onto the ground. Detach the control bar. Fit the control bar in the protection bag and stow it between the leading edges in the aft part of the wing.
  19. Fold up the control frame and install the control frame bag. Lay the control frame down against the keel and stow the cables between the control bar legs.
  20. Zip up the wing bag.

## **WING TUNING**

Properly tuned, the wing is safe, comfortable and fun to fly. The wing has been tested and tuned by the manufacturer or your dealer. However, in case you have enough experience, you may tune the wing by

yourself, as written below, if necessary. There are a number of adjustments that affect the flight characteristics of the wing.

### **WARNING**

DO NOT PERFORM MORE THAN ONE ADJUSTMENT AT ONCE. IF YOU DO NOT HAVE ENOUGH EXPERIENCE TO TEST FLY THE WING, ASK MORE EXPERIENCED PILOT TO DO IT FOR YOU. THE TEST FLIGHT SHOULD BE PERFORMED IN SMOOTH AIR AND WITH CAUTION.

### **BATTENS**

The battens will need to be compared and adjusted to match the batten profile template at regular intervals. Small variations in batten camber ( $\pm 5$  mm at the trailing edge) will not have significant effect on flight characteristics.

### **BATTENS TENSION**

With some airtime on the wing the battens tension may get too loose, this may cause the trailing edge to flatten. If the battens tensioned too much, the handling will become harder. Make sure the battens tensioned on both wings identical.

All battens on the Combat 12T (except the outboard lever battens) are tensioned by lever batten tips. The desired batten tension can be easily adjusted by the threaded batten tip adjuster.

To increase batten tension rotate the threaded lever batten tip adjuster counter clockwise. To decrease batten tension rotate the threaded lever batten tip adjuster clockwise.

The batten tension can be checked on the wing which is completely rigged and all battens are tensioned. Open the batten tip lever (it has to be opened but not removed from the hem of the trailing edge). The angle between the lever tip and the batten has to be approximately 30 degrees, which indicates correct batten tension.

The outboard lever batten consists of two parts – one is fixed to the leading edge and another one is fixed to the sail. To increase the batten tension rotate the fixed to the leading edge part of the batten counter clockwise.

### **SAIL MOUNT CAPS ADJUSTMENT**

The turn of the wing can be corrected by rotating one of the sail mount plastic caps. A left turn is corrected by twisting the right sail cap clockwise (twisting the sail up at the trailing edge). A right turn is corrected by twisting the left sail mount cap counter clockwise (twisting the sail up at the trailing edge). If rotation of the plastic cap on one side is not enough to compensate turn, you can at the same time rotate the plastic cap on another wing in opposite direction.



## CG ADJUSTMENT

CG adjustment is done by changing the location of your hang point along the keel. The farther forward your hang point is, the faster the wing will trim, the less effort will be required to fly fast, and the more effort will be required to fly slow.

On the Combat 12T, the hang point position is adjusted by repositioning the hang bracket along the keel tube.

## SPROG MEASUREMENT

The Combat T uses inboard and outboard sprogs in combination with one transverse batten on each sprog. Each transverse batten spans two top surface battens, so a total of eight top surface battens are supported. The sprog system is the primary component of the system, which provides pitch stability. The function of the system is to support the trailing edge of the sail at low angles of attack, and thus provide a nose-up pitching moment. The sprogs are adjusted at the factory to their proper settings. The sprog angles should be checked regularly. This can be done with any digital electronic angle meter as follows:

1. Fully set up the wing on a reasonably level surface.
2. Rest the keel tube on a support and using the angle meter as shown on the photo set the angle meter to zero. This angle of the keel tube has to be maintained during further measurements.



3. Fully open the sprog access zipper. Place the worktop of the angle meter under the middle part of the sprog so that the entire worktop surface of the angle meter touches the sprog.

The scale of the angle meter will show the sprog angle.



The sprog measurements for combat 12T should be as follows:

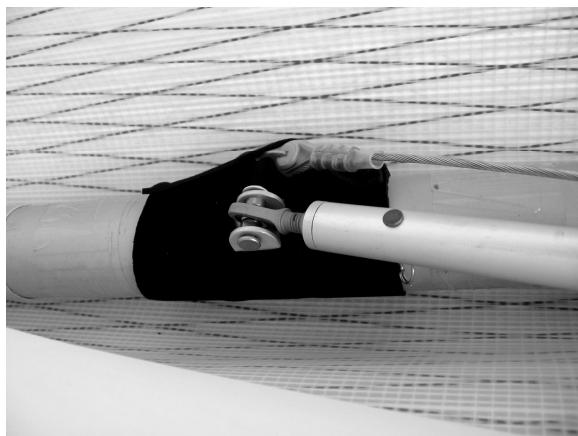
Main sprogs: 6.5 deg.

Outboard sprogs: 7 deg.

## METHOD OF SPROG ADJUSTMENT

### To adjust the outboard sprog angle:

1. Fully unzip the access zipper to gain access to the sprog-LE tube connection.
2. Remove the pin from the sprog threaded adjuster at the front of the sprog. To raise the sprog angle turn the end of the sprog threaded adjuster counter clockwise. To lower the sprog angle turn it clockwise.
3. Re-install the pin to the sprog threaded adjuster, zip the access zipper up and press down firmly on the rear end of the sprog to seat the cable before checking the measurement again.



### To adjust the main sprog angle:

1. Fully unzip the access zipper to gain access to the crossbar-LE junction.
2. Remove the pin from the sprog threaded adjuster at the front of the sprog. To raise the sprog angle turn the end of the sprog threaded adjuster counter clockwise. To lower the sprog angle turn it clockwise.
3. Re-install the pin to the sprog threaded adjuster, zip up the access zipper and press down firmly on the rear end of the sprog to seat the cable before checking the measurement again.

## MAINTENANCE

This section contains a recommended schedule of periodic maintenance. None of the items in this section are a substitute for the continual and consistent practice of proper pre-flight inspections and immediate maintenance of any items on the wing, which require it. Safety requires that your wing be fully airworthy for every flight. Nuts and bolts must always be secure, safety rings must always be in place, and damage to any part, which could compromise the airworthiness of the wing, cannot be tolerated. If you have a question about the need to repair or replace some part of your wing, feel free to contact your dealer or Aeros directly. It is not always obvious which items require attention and which may not. Minor dents or dings in a non-critical location on an airframe tube may not require any repair or maintenance. On the other hand, a wire that has been kinked one time can fail very quickly after that, and should be replaced immediately.

We recommend that you have all maintenance work done by your Aeros dealer.

### EVERY SIX MONTHS

1. Measure the sprog angle as described in the last section.

2. Check your battens on a flat level floor against the batten diagram provided and correct any that deviate from the pattern by more than 6 mm (1/4").
3. If you fly in a dusty or sandy environment, it will help to prolong the life of your batten pockets if you wipe each batten with a rag before you install it in the sail.
4. Have a complete inspection performed on the wing and replace any suspension system component that shows any wear, and any cable that shows any kinks, wear, damage, corrosion, etc.
5. Inspect all bolts for tightness, all safety rings for proper installation and possible damage. Inspect plates and fittings for damage, holes in tubes for elongation.
6. Inspect the sail for wear, tears, UV damage, loose stitching, etc.
7. Lightly spray all zippers on the wing with silicone spray lubricant. Also spray your battens before you install them in the wing to lubricate the insides of the batten pockets. Do not use any other type of lubricant. Wipe off any excess silicone so that it does not attract dirt.
8. Inspect the sprogs, sprog hardware and sprog cables. If the sprogs have been loaded heavily, it is possible that the sprog tubes may have been bent and the cables may have been stretched.

### **EVERY YEAR**

In addition to the normal six month service items, also perform the following:

1. Have the sail completely removed from the frame and disassemble all frame components. Inspect every part of the wing for any damage or wear. Inspect the tubes for straightness and for signs of corrosion.
2. Anytime you have the sail off the frame, inspect all of the batten pockets and batten pocket terminations.
3. Replace hang block heart bolt.
4. Remove the transverse battens and inspect for damage.

### **SPECIAL CIRCUMSTANCES**

1. Any time you suffer a crash or extremely heavy landing you should have an "annual" inspection done on your wing to insure that you find all damaged parts.  
Heavy landings may also impose very high loads on the sprogs and bridle lines. Inspect them accordingly.
2. If your wing is ever exposed to salt water you will need to have the wing completely disassembled in accordance with the recommended annual inspection procedure. All frame parts will need to be disassembled, including the removal of all sleeves and bushings, flushed liberally with fresh water and dried completely.
3. A wet wing must be dried before storing. Do not leave your wing wet for more than one day, because corrosion may result.
4. Take special care to avoid ice-covering the wing, particularly the leading edge in wintertime.
5. If you fly regularly at the coast in windy conditions, be aware that the sea mist spray can have the same effect. Hose down your wing after such flights, and keep a special lookout for corrosion.
6. Keeping your sail clean will extend the life of the cloth. When cleaning the entire sail you should generally use only water and a soft brush. You may clean small spots or stains with any commercial spot remover that is labeled for use on polyester.

## A NOTE ABOUT CABLES AND CABLE MAINTENANCE

The cables which support the wing's airframe are critical components of the wing's structure, and must be maintained in an airworthy condition. It is a general practice in the design of aircraft structures to design to an ultimate strength of 1.5 times the highest expected load in normal service.

The wing's cables, like other structural components on the wing, are typically designed with a structural safety factor of only about 50% above the expected maximum load. No significant loss in cable strength can be tolerated.

A cable with even a single broken strand must be replaced before the wing is flown again. A cable which has been bent sharply enough to have taken a permanent set must also be replaced immediately.

## IN CLOSING - A FEW FINAL WORDS ON YOUR SAFETY

- Flying nanolight trikes is a great fun but it is, as any form of flying, associated with risks. Your safety can be greatly enhanced by following a few simple rules:
  - Your wing is delivered to you ready to fly. Do not make any adjustments, which are not described in this manual.
  - If you are in doubt about any aspect of your wing, you should consult your dealer or Aeros for advice.
  - Fly a wing suited to your level of ability. A new risk may arise when you first fly a new type of the wing.
  - The reactions of your new wing may well differ from those of the wing you were used to. In order to keep this risk low, we recommend that you gradually become familiar with your new wing.
  - Before every take-off always do both an assembly check and a pre-flight check of your wing and a trike unit.
  - Do not take off if the sail is wet, especially the leading edge, as the stall speed will increase significantly.
- ***Always fly with a dry sail!***
  - A wet wing must be dried before storing. Do not leave your wing wet for more than one day because corrosion may result.
  - Don't push your luck; it is your responsibility to know the limits of your wing and the limits of your own experience. Remember that ultimately your safety is your responsibility.
  - Fly only in places that are suitable for flying.
  - With proper care and maintenance, your wing will retain a high level of airworthiness for many years.

Have fun. Fly safely.  
Aeros Team

## **REMOVING THE SAIL FROM THE AIRFRAME AND RE-INSTALLING**

Many maintenance and repair procedures will require the removal of the sail from the frame. Please follow these instructions when removing and reinstalling the sail. Please read all the instructions for each operation before beginning.

### **1. SAIL REMOVAL**

You will need an unobstructed area 2 m by 10 m (6x30 ft). Make sure the surface is clean. If it is abrasive, you should either put down a protective tarp or be extremely careful not to scrape your sail.

1.1. Lay the wing on its back, unzip and remove the wing bag. Untie Velcro ties, remove the hang bracket, the base bar, battens and put them aside. Remove the control frame protection bags.

1.2. Spread the wings slightly. Remove central battens from the sail. Dismount the sail from the front leading edge by unscrewing the sail mount screws. Undo the sail mount webbing Velcro and remove the sail mount webbing from the plastic end at the rear leading edge.

1.3. Put a chair or other similar height support under the nose of the wing.

1.4. Remove the screw from the keel pocket webbing at the rear part of the keel tube. Detach the rear cables from the keel tube.

1.5. Dismount the control frame apex assembly from the keel tube.

#### **NOTE**

**Reassemble the hardware removed back in place in the original order so that it doesn't get lost.  
All disassembled assemblies on the wing must be reassembled in the proper order and orientation.**

1.6. Open the undersurface main zipper. Slide the sail slightly forward, lifting the nose opening of the sail up until you get the nose of the frame out and below the nose opening of the sail.

Now slide the complete frame out through the opened center zipper. If you encounter resistance, stop and find out what is hanging up.

1.7. If you need to send the sail to the factory for repair, remove the Mylar inserts and the transverse battens. The Mylar insert is to remove from the front end of the Mylar pocket. It helps to secure the opposite end of the sail to something solid, so that you can lay the leading edge out straight and pull the Mylar straight out of the pocket.

1.8. Fold and pack up the sail carefully if you plan to ship it in for repair. Be sure to include written instructions of what you want done, your name and a phone number.

### **2. RE-INSTALLING THE SAIL ON THE FRAME**

2.1. Install the Mylar inserts in the sail. Make sure you install them right side up; the slit edge is at the front and on the bottom. The easiest way to install the Mylar insert is to push it into the pocket using a long lofting batten attached to the end of the Mylar insert, which is first inserted in the pocket.

You will have to stop from time to time to make sure the Mylar insert is properly lying flat in the pocket. Do not push the Mylar insert too far into the pocket. Make sure there are no folds in the Mylar insert, especially at the tips. Make sure the Mylar wraps in the proper direction to follow the sail around the leading edge as it enters the pocket.

2.2. Install the transverse battens in the sail.

2.3. Position the sail on the floor with the keel pocket facing down and the wings folded over so that the leading edges lie along the length of the root line, with the Mylar pockets lying on top.

2.4. The frame is most easily inserted with the rear leading edges installed.

2.5. Tie all sprogs down to the leading edges so that the sail doesn't get caught on to them during installation.

2.6. Position the frame with the top nose plate facing up and with the rear end of the leading edges at the nose of the sail. Slide the frame into the sail through the open bottom surface zipper, making sure that the leading edges of the frame pass properly inside the sail and don't get caught at the rear of the bottom surface near the root. As you feed the frame slowly into the sail don't forget to insert the keel into the keel pocket of the sail. Check periodically to see that none of the hardware is snagging on the sail or internal sail ribs.

2.7. Make sure you untie all sprogs from the leading edges and get them out of the sail through the sprog access zippers.

2.8. Continue to slide the frame into the sail until you will be able to get the nose of the frame out through the nose hole of the sail.

2.9. Install central battens in the sail.

2.10. Mount the control frame apex assembly to the keel tube.

2.11. Mount the sail mount webbing straps on the plastic caps of the rear leading edge tubes and secure them with the sail mount webbing Velcro. (See the section at the beginning of the manual about re-assembly after shipping.)

2.12. Attach the keel retainer webbing strap to the keel tube with the screw.

2.13. Attach the rear wires to the rear of the keel.

2.14. Set the wing up onto the control bar.

2.15. Spread the wings slowly and carefully, making sure that the sail rides forward as necessary at the nose without catching.

**CAUTION**

**Be careful: you can easily tear the sail open at the nose at this point.**

**NOTE**

**When spreading the wings with the sail mount screws been unscrewed check that the sail mount webbing is in proper position in the slot of the end cap of the leading edge # 3.**

2.16. Finish the assembly of the wing completely according to the normal assembly procedures.

**NOTE**

**Secure the sail mount webbing with the screws to the front leading edges after you accomplish all steps in section “Combat 12T set-up procedure” from item 1 through item 10.**

2.17. Do a very careful and complete preflight inspection of the wing according to the normal preflight procedure as explained in this manual.

CBT.12T.040.000.AD

Перв. примен.

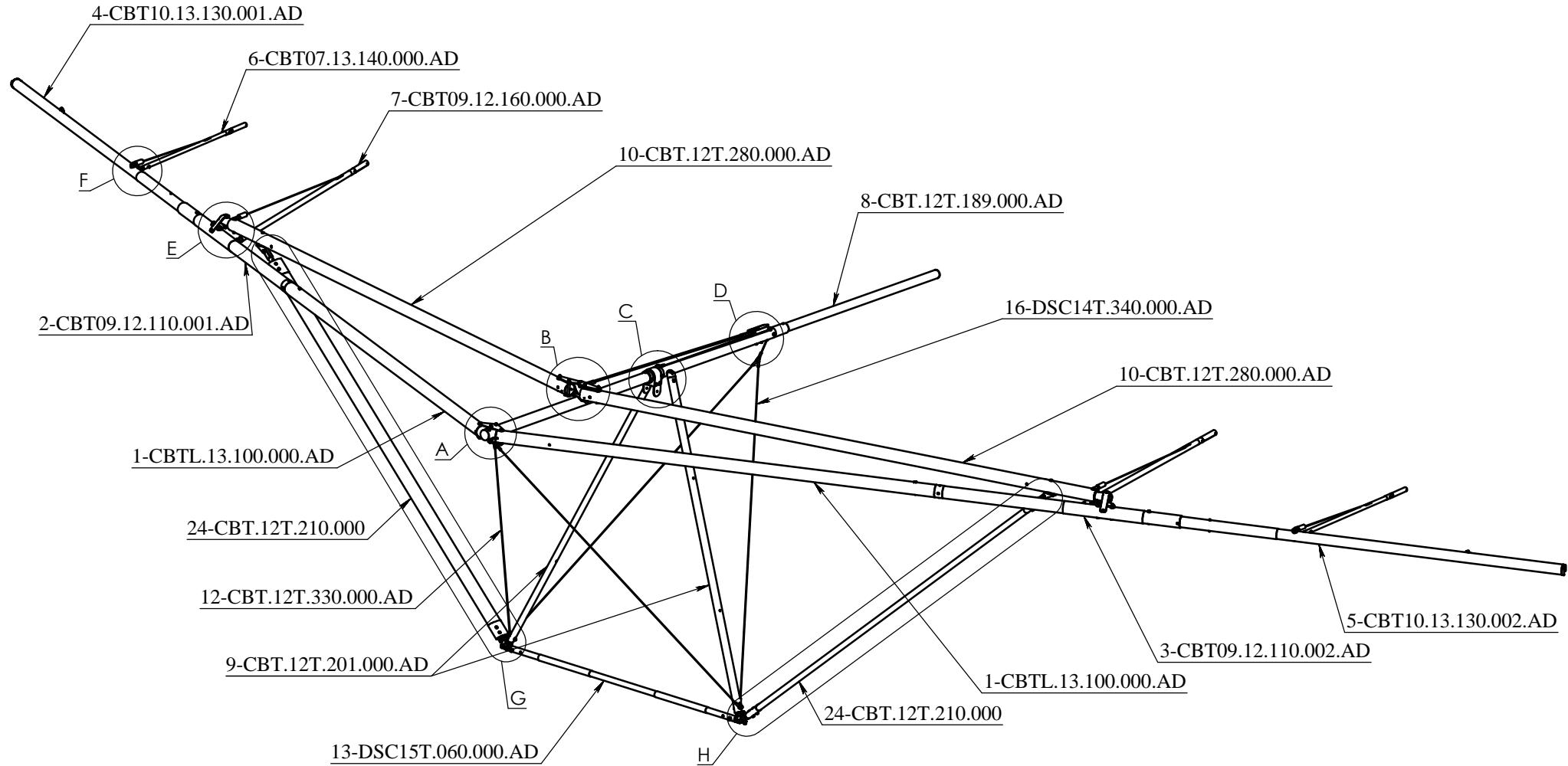
Справ. №

Подпись и дата

Взам. инв. №

Инв. № дубл.

Подпись и дата



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Изм.	Лист	№ докум.	Подп.	Дата
Разраб.				04.10.11
Пров.				
Т.контр.				
Нач. КБ				
Н.контр.				
Утв.				

Combat 12T Air-Frame (Combat 12T Каркас)

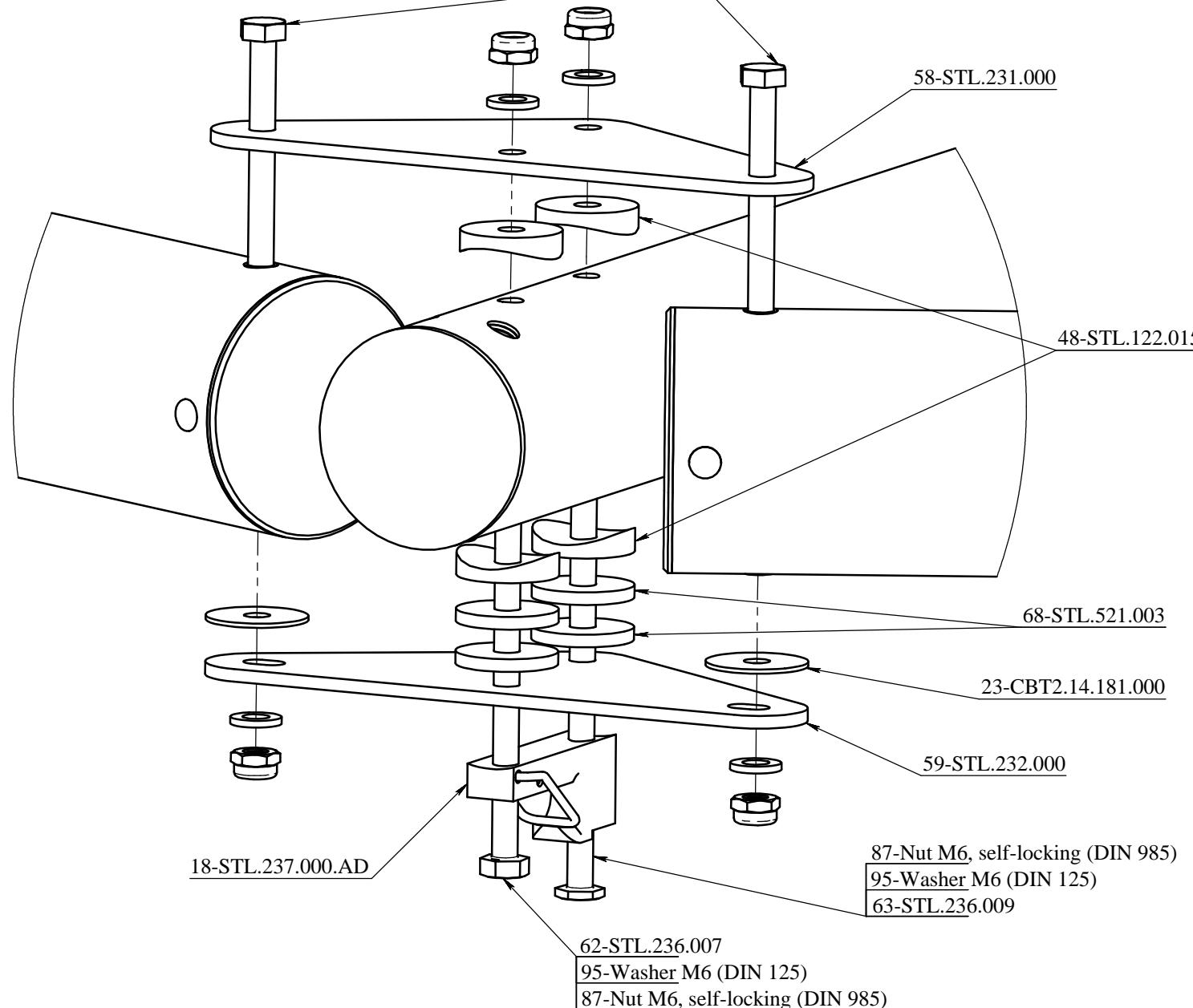
Лит.	Масса	Масштаб
		1:20
Лист 1	Листов 9	

A(1:1)

87-Nut M6, self-locking (DIN 985)

95-Washer M6 (DIN 125)

78-Болт 6-78 OCT131120-80



B(1:1)

45-DSC14A.265.000

97-Washer M8 (DIN 125)

89-Nut M8 OCT133042-80

93-Splint 2,0 x 20 SBS2020

55-STL.181.000

94-Tapping Screw 4.2-16

43-DSC14A.261.000

47-STL.122.013

44-DSC14A.262.000

11-CBT.12T.320.000.AD

60-STL.235.000

44-DSC14A.262.000

47-STL.122.013

42-DSC14L.260.000

14-DSC14A.263.000.AD

42-DSC14L.260.000

82-Болт 6-79 OCT131155-80

95-Washer M6 (DIN 125)

87-Nut M6, self-locking (DIN 985)

83-Болт 6-86 OCT131155-80

95-Washer M6 (DIN 125)

87-Nut M6, self-locking (DIN 985)

15-DSC14A.264.000.AD

Перв. примен.

Справ. №

Подпись и дата

Взам. инв. №

Инв. № подп.

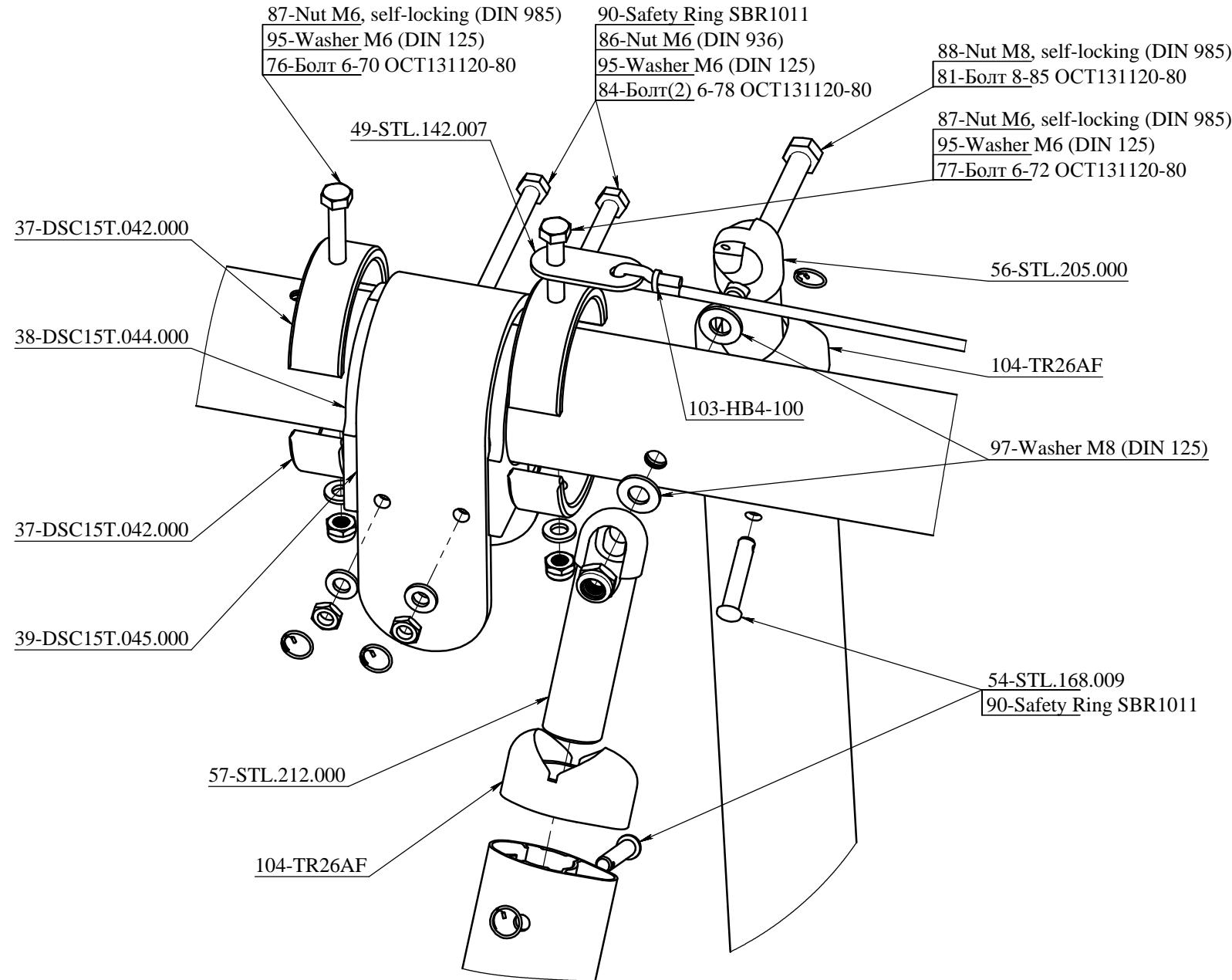
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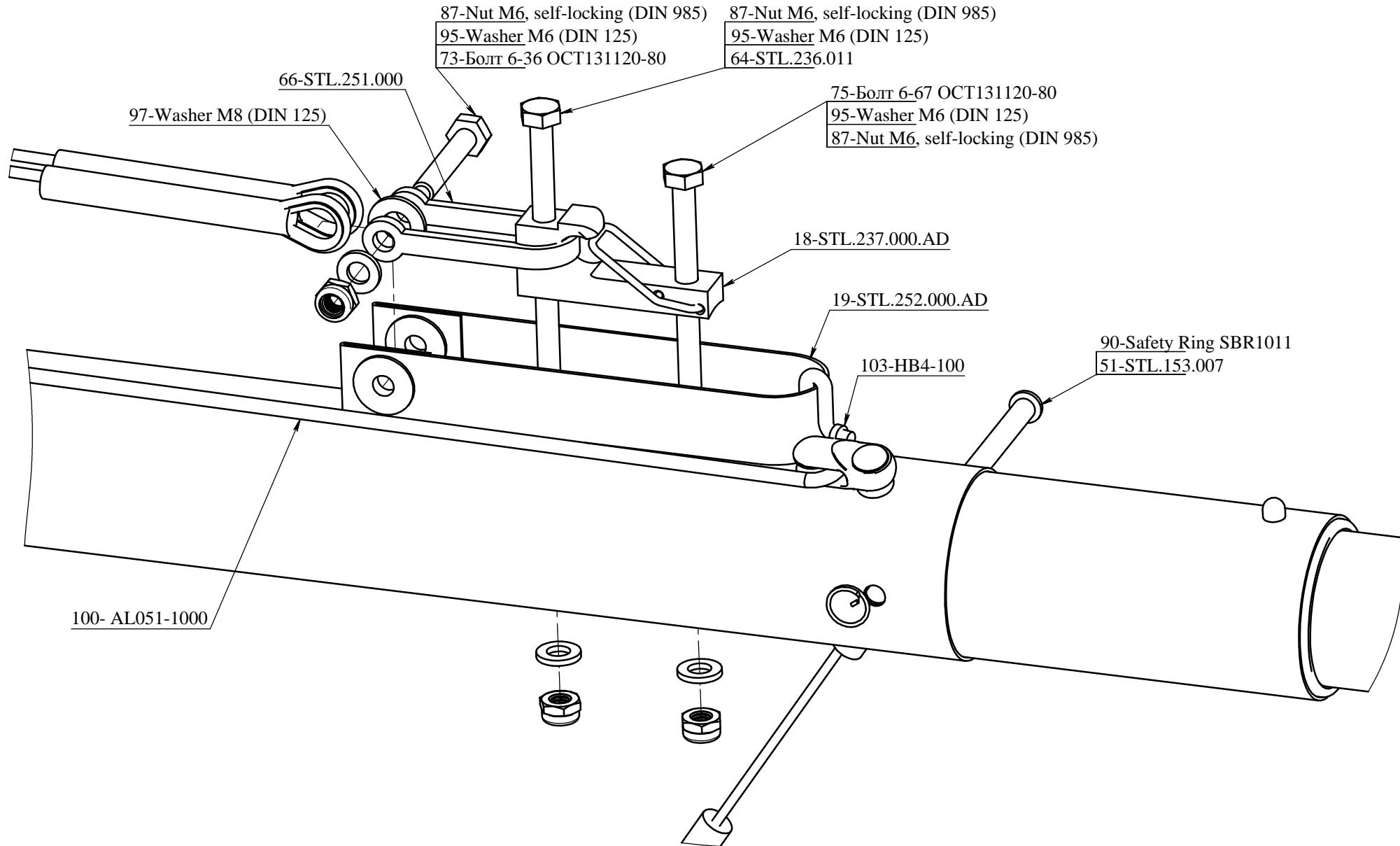
Подпись и дата

Изм.	Лист	№ докум.	Подп. Дата

C(1:1)



D(1:1)



E(1:1)

87-Nut M6, self-locking (DIN 985)  
 95-Washer M6 (DIN 125)  
 61-STL.236.005

55-STL.181.000

69-Болт 8-66 SPH  
 97-Washer M8 (DIN 125)  
 88-Nut M8, self-locking (DIN 985)

97-Washer M8 (DIN 125)

67-STL.521.000

55-STL.181.000

85-Blind Rivet d4x10 A2

36-CBT07.13.637.000

22-CBT07.119.000

47-STL.122.013

87-Nut M6, self-locking (DIN 985)  
 95-Washer M6 (DIN 125)  
 41-DSC14A.114.000

52-STL.154.000

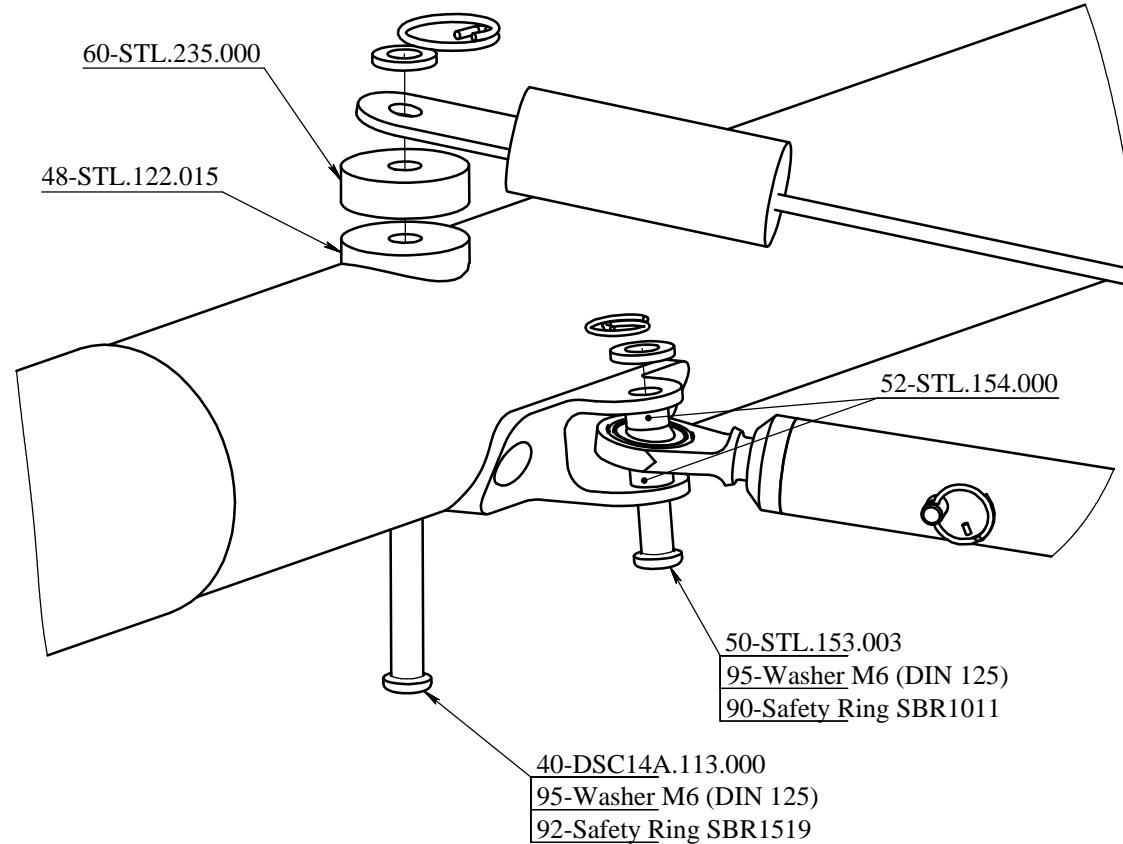
50-STL.153.003  
 95-Washer M6 (DIN 125)  
 90-Safety Ring SBR1011

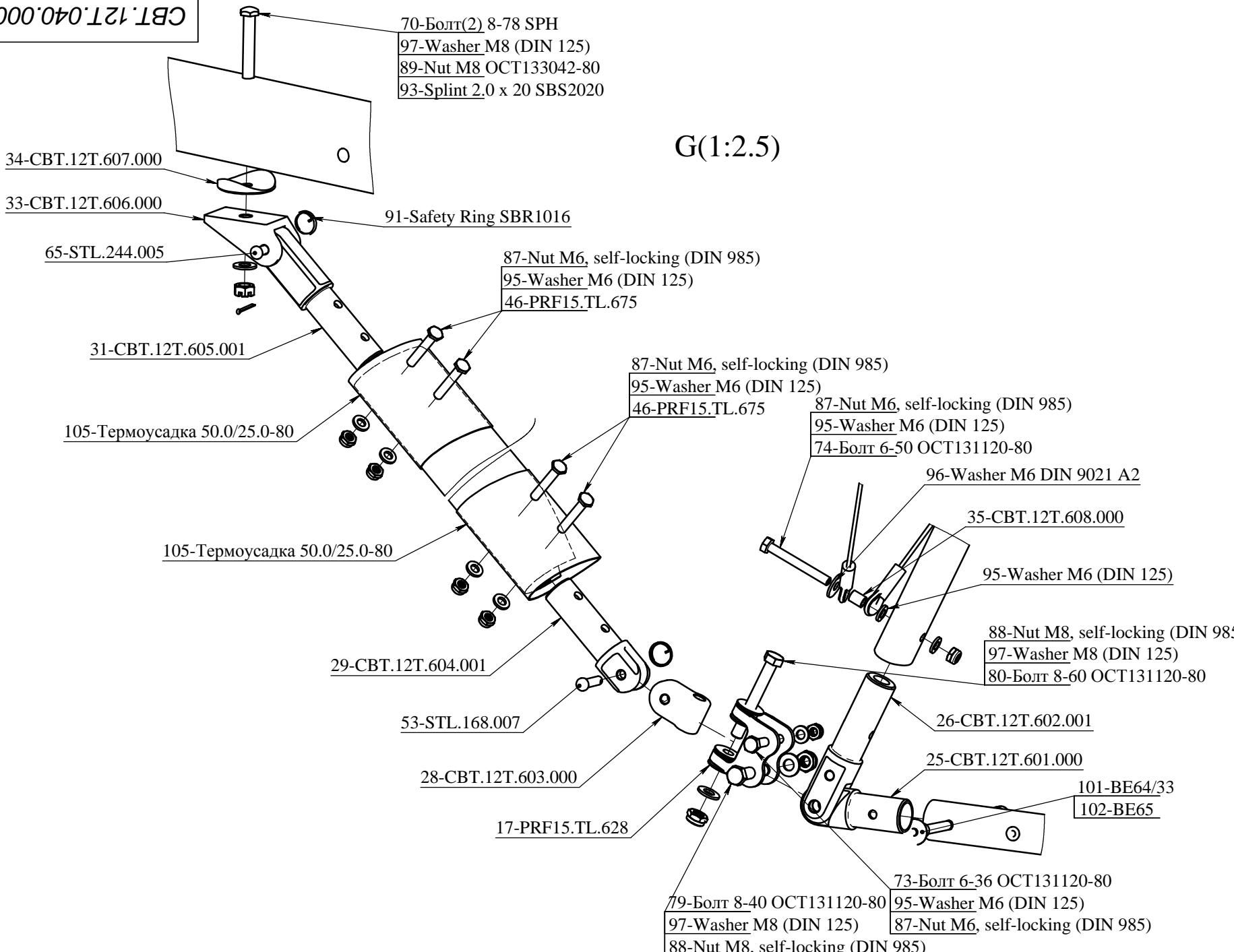
Изм.	Лист	№ докум.

СВТ.12T.040.000.AD

Лист  
6

F(1:1)





Термоусадка устанавливается на подкос  
поверх установленного крепежа

Изм.	Лист	№ докум.

93-Splint 2.0 x 20 SBS2020  
 89-Nut M8 OCT133042-80  
 97-Washer M8 (DIN 125)  
 70-Болт(2) 8-78 SPH

Перв. примен.

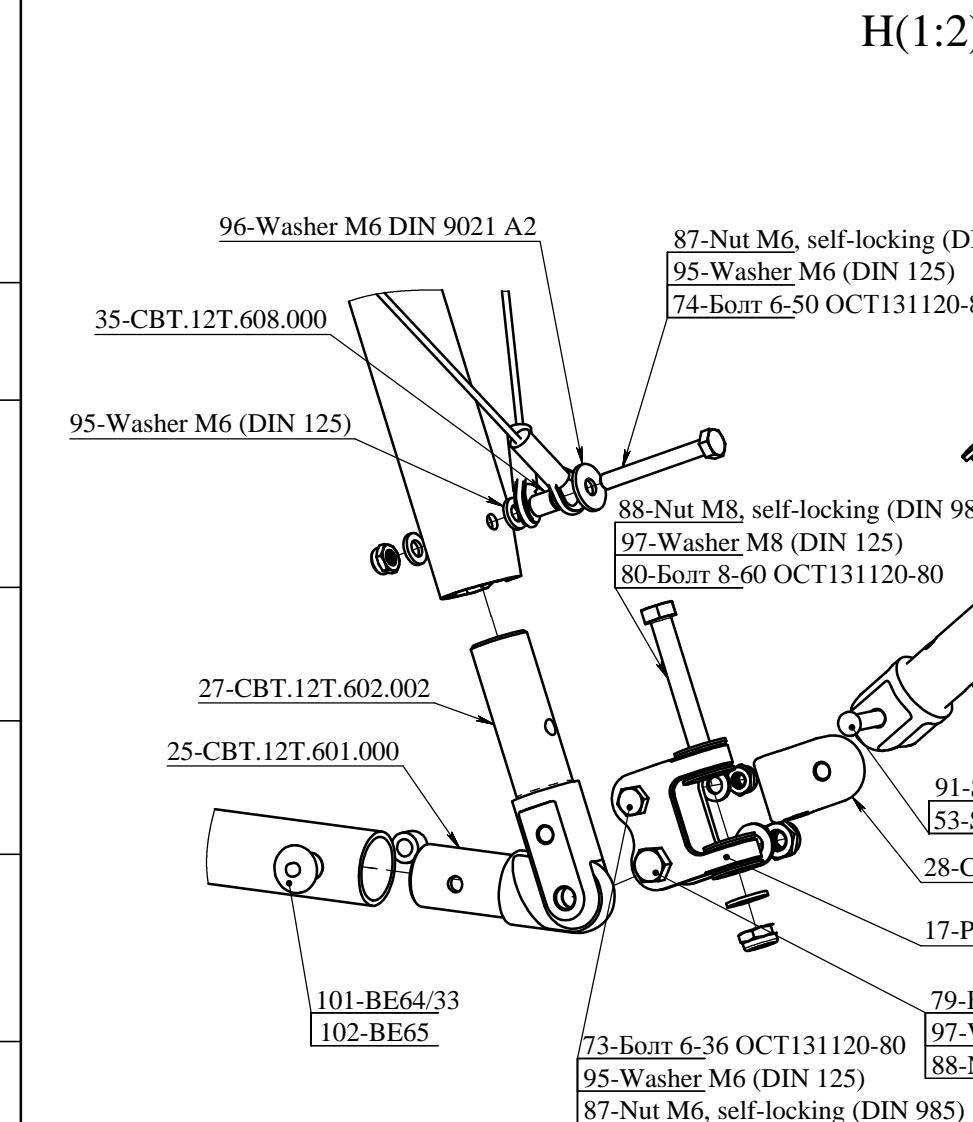
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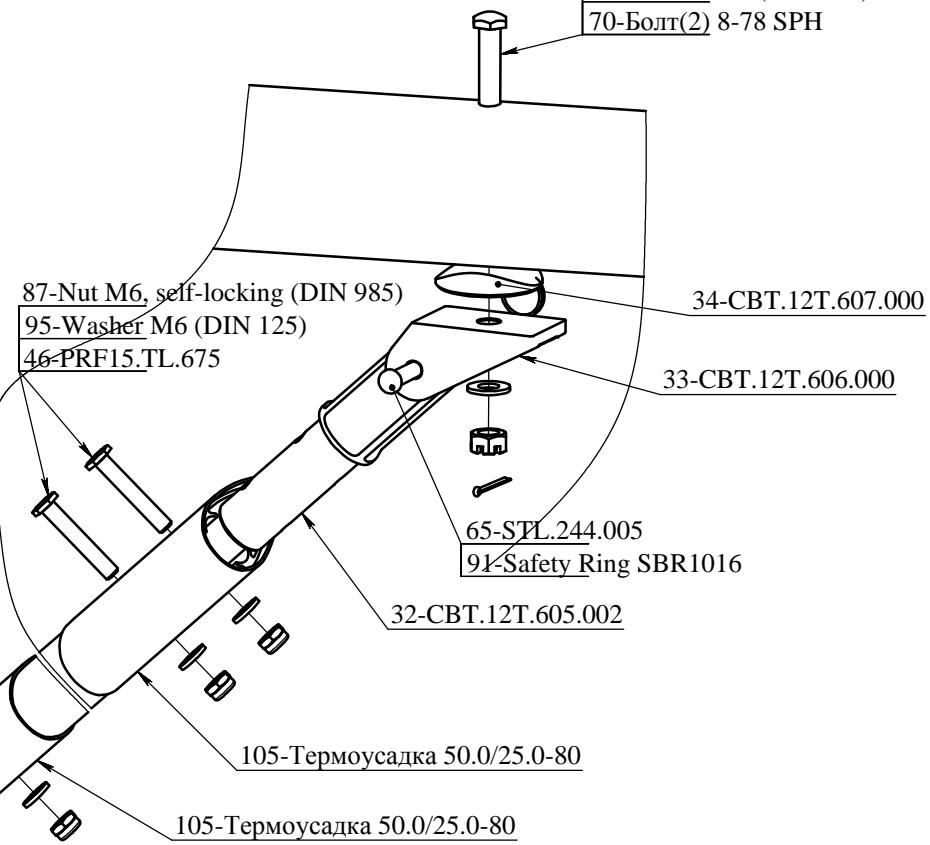
Взам. инв. №

Подпись и дата

Инв. № подп.



H(1:2)



Термоусадка устанавливается на подкос  
поверх установленного крепежа

Изм.	Лист	№ докум.	Подп.	Дата

CBT07.13.140.000.AD

Кол. на изделие - 2шт.

Перв. примен.

Справ. №

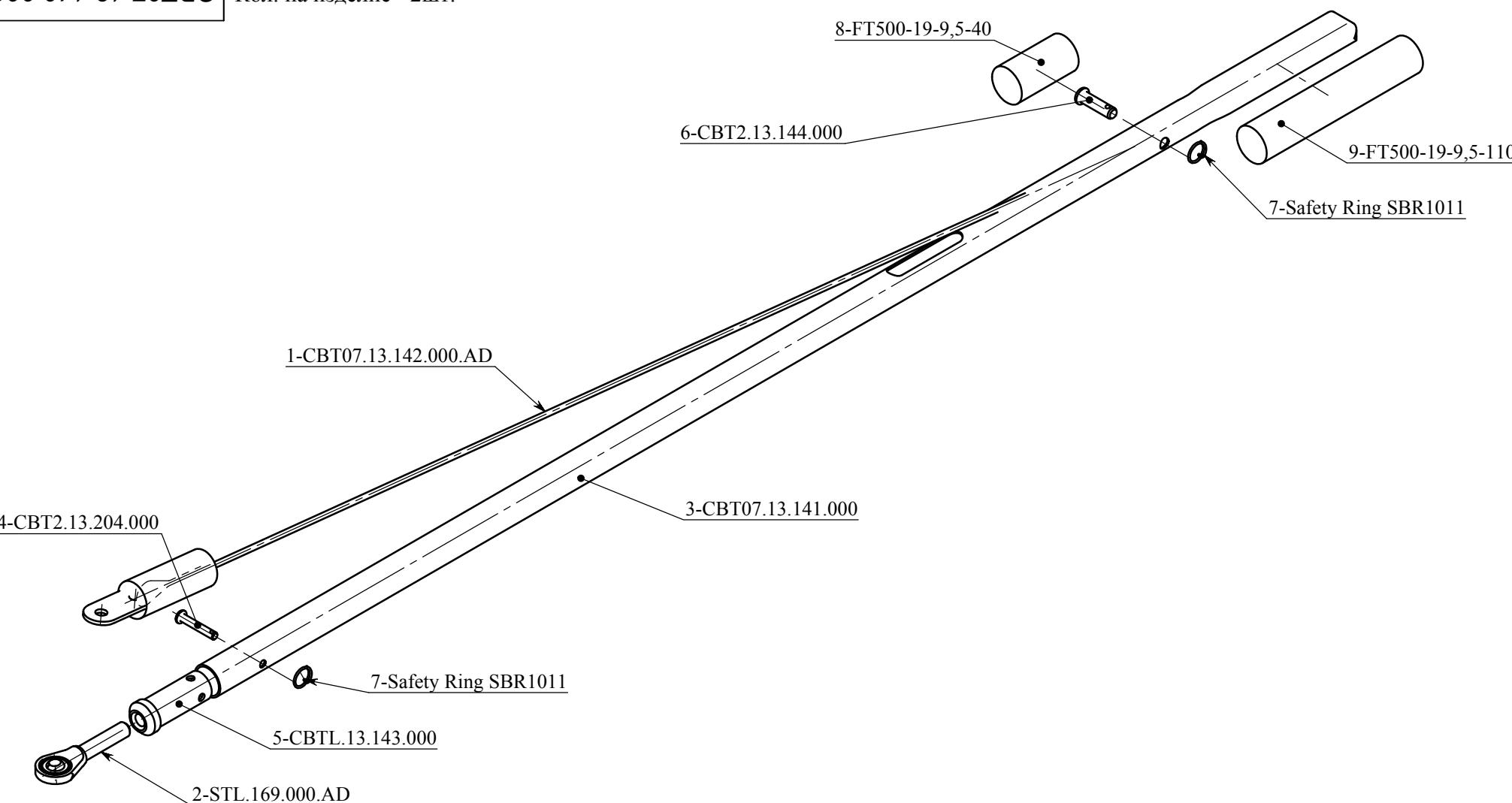
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Инв. №

Взам. инв. №

Подпись

Инв. № подп.



Поз.	Обозначение	Наименование	Материал	Кол.
1	CBT07.13.142.000.AD	Wire Outboard Sprog (Трос концевого АПУ)		1
2	STL.169.000.AD	Washout Eye Bolt (Болт ушковый с ШС)		1
3	CBT07.13.141.000	Tube (Труба)	Труба Д16Т d18x1 ОСТ192096-83	1
4	CBT2.13.204.000	Clevis Pin (Валик) 4x23.5	Круг В8 30ХГСА ГОСТ 2590-88	1
5	CBTL.13.143.000	Washout Threaded Adjuster (Втулка АПУ)	Пруточ Д16Т кр.20 ОСТ 190395-91	1
6	CBT2.13.144.000	Clevis Pin (Валик) 6x21.5	30ХГСА-6 ГОСТ2590-88	1
7		Safety Ring SBR1011		2
8	FT500-19-9,5-40	Hot Shrink Tube (Термоусадка) L=40		1
9	FT500-19-9,5-110	Hot Shrink Tube (Термоусадка) L=110		1

CBT07.13.140.000.AD

Копировано

Формат А3

CBT07.13.140.000.AD

Sprog Outboard (Концевой АПУ)

"AEROS"

Лит.	Масса	Масштаб
	0.299	1:2

Лист 1 Листов 1

Изм	Лист	№ докум.	Подп.	Дата
				25.05.10

CBT07.13.140.000.AD

Копировано

Формат А3

CBT09.12.160.000.AD

Кол. на изделие - 2шт.

Перв. примен.

Справ. №

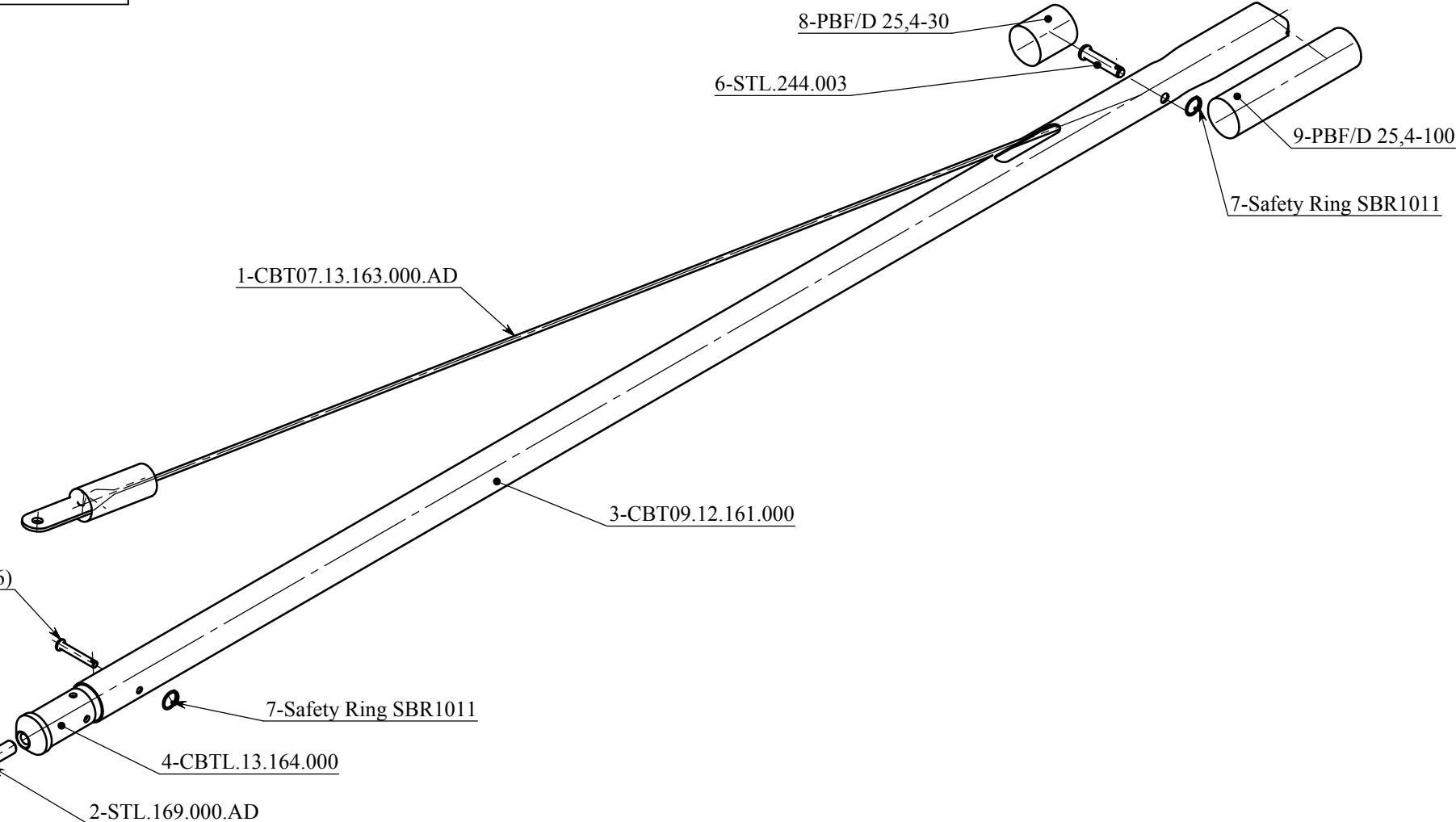
Подпись и дата

Взам. инв. №

Инв. № дубл.

Подпись и дата

Инв. № подп.



Поз.	Обозначение	Наименование	Материал	Кол.
1	CBT07.13.163.000.AD	Wire Internal Sprog (Трос корневого АПУ)		1
2	STL.169.000.AD	Washout Eye Bolt (Болт ушковый с ШС)		1
3	CBT09.12.161.000	Tube (Труба)	Труба Д16Т d25x1 ОСТ192096-83	1
4	CBTL.13.164.000	Sprog Threaded Adjuster (Втулка АПУ)	Пруток Д16Т кр.25 ОСТ 190395-91	1
5	Pin 4x28(26)	Pin (Валик)	Круг В8 30ХГСА ГОСТ 2590-88	1
6	STL.244.003	Clevis Pin (Валик) 6x29	Круг 10-В 30ХГСА ГОСТ2590-88	1
7		Safety Ring SBR1011		2
8	PBF.D 25,4-30	Hot Shrink Tube (Термоусадка) L=30		1
9	PBF.D 25,4-100	Hot Shrink Tube (Термоусадка) L=100		1

CBT09.12.160.000.AD

Sprog Internal (АПУ корнеевое)

Лит.	Масса	Масштаб
	0.421	1:2.5

Лист 1 Листов 1

"AEROS"

СВТ.12Т.189.000.АД

Кол. на изделие - 1шт.

Перв. примен.

Справ. №

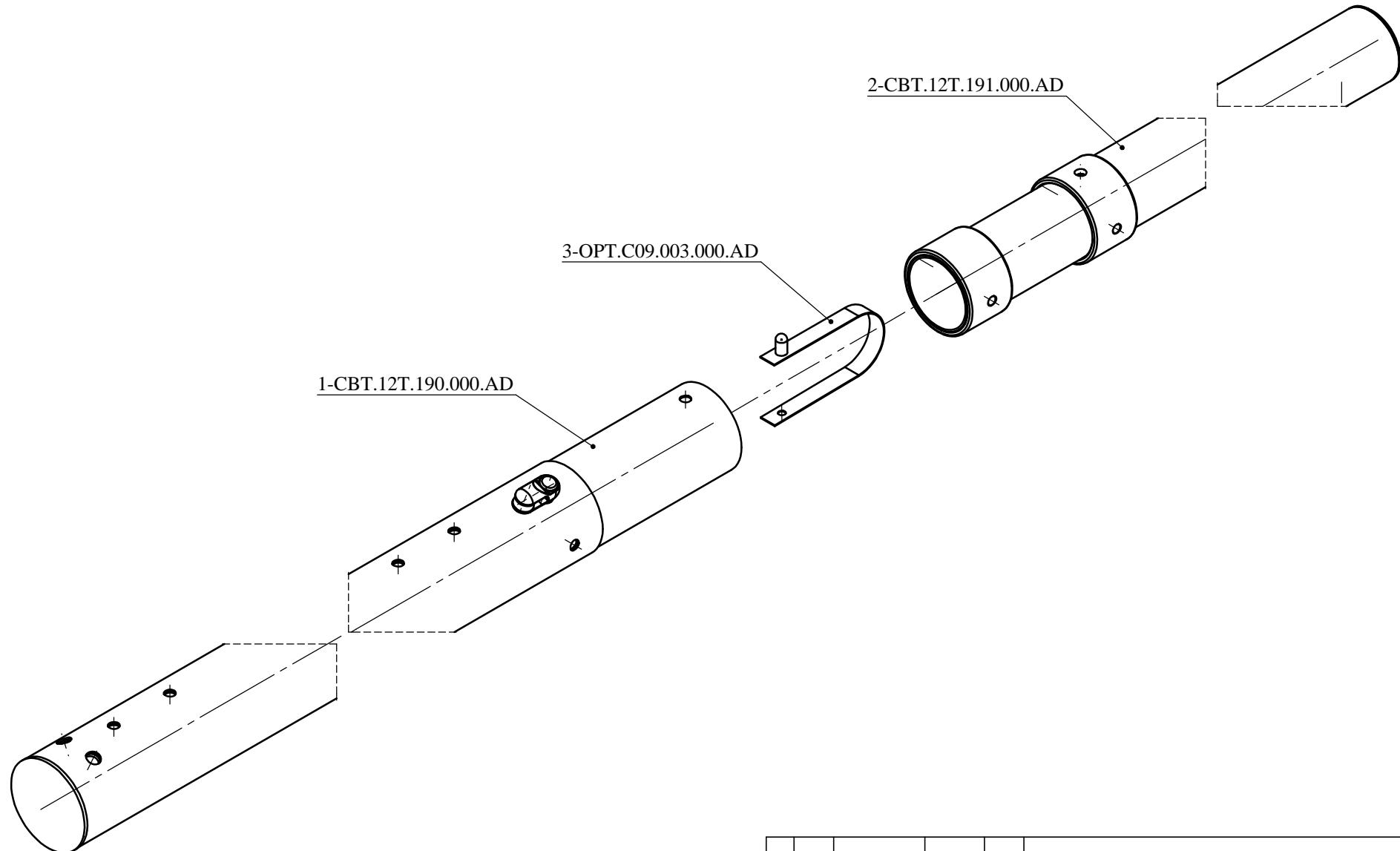
Инв. №

Подпись и дата

Взам. инв. №

Инв. № дубл.

Подпись и дата



Поз.	Обозначение	Наименование	Кол.
1	СВТ.12Т.190.000.АД	Keel Tube №1 (Килевая труба №1)	1
2	СВТ.12Т.191.000.АД	Keel Tube №2 (Труба килевая №2)	1
3	ОПТ.С09.003.000.АД	Button Spring One-sided (Фиксатор односторонний )	1

СВТ.12Т.189.000.АД

Копировано

Формат А3

Изм.	Лист	№ докум.	Подп.	Дата	Лит.	Масса	Масштаб
Разраб.				13.09.11			
Пров.							
Т.контр.							
Нач. КБ							
Н.контр.							
Утв.							
Keel Tube Assembled (Труба килевая СБ)					Лист 1	Листов 1	1:2