Differential rudder rake

UPGRADE MANUAL

CAREFULLY READ THIS MANUAL BEFORE OPERATING YOUR NACRA.

V2.0

About Nacra Sailing

Since 1975 Nacra has always been about empowering sailors. Getting the best out of yourself and your team with Nacra supplying the equipment. Reaching new heights and pushing your boundaries, that's Nacra Sailing! Nacra & Performance Sails are based in The Netherlands. Our Dutch company took over the original Nacra factory (Santa Ana, California) in 2007 with all its rights concerning the brand Nacra. Nacra has been originally founded in 1975 and draws its knowledge therefore from a long history of building and supplying catamarans to the world of sailing.

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Differential rudder rake 1

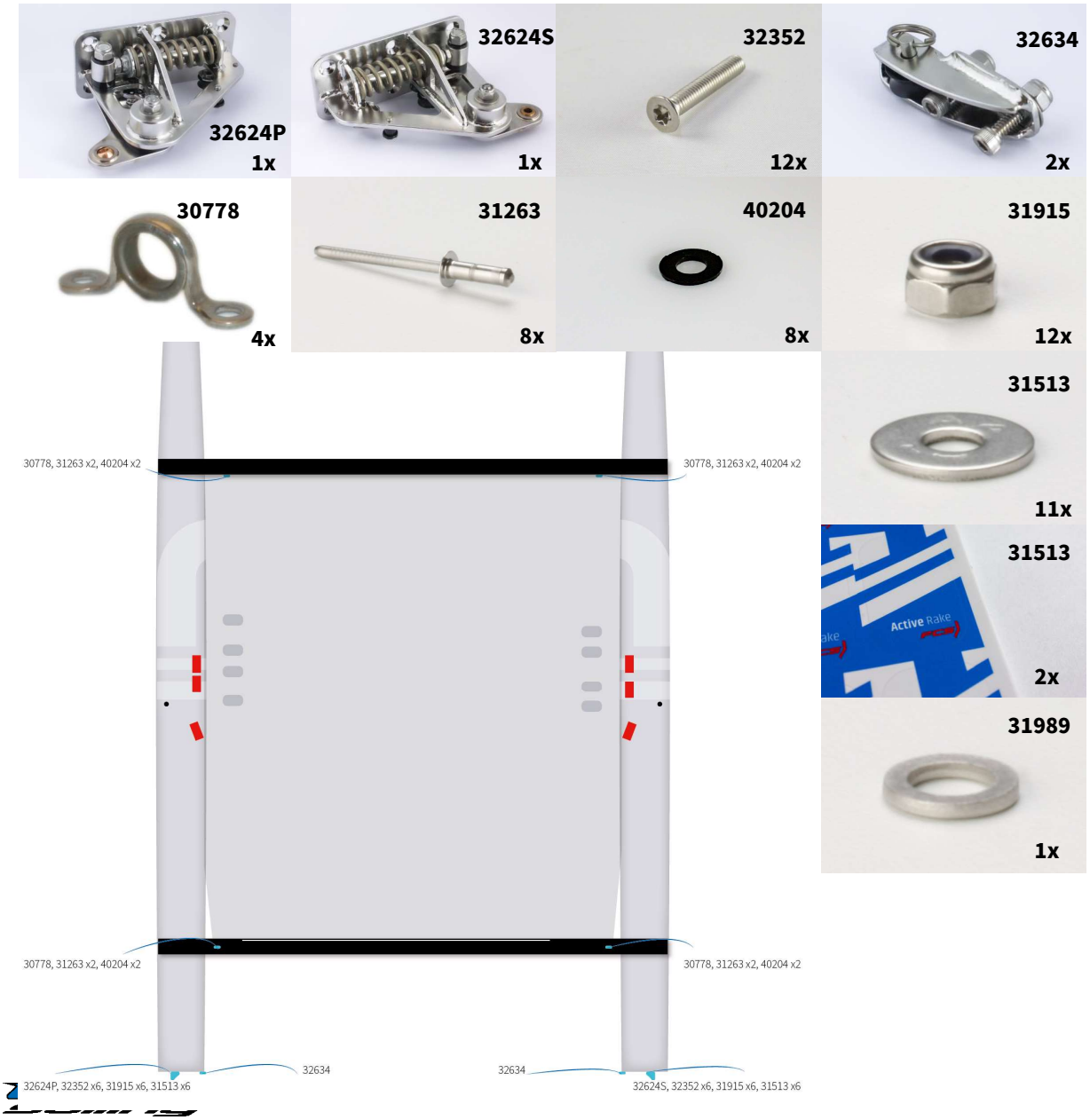
1.1. FCS rudder system with active rake hardware upgrade

Upgrading your pre-2022 Nacra 17 with the active rake and differential rudders requires some technical know-how. Ask your Nacra dealer for help if needed.

Tools needed:
- Drill
- Rivet tool
- Heat gun
- 4.2mm drill bit
- 3.2mm drill bit (included in running hardware kit)
- 5mm drill bit
- 6mm drill bit
- UNC 8/32” tap (included in running hardware kit)
- Transom monofilm template (included in hardware kit) or Transom drill jig (sold optionally)
- Deck cleats monofilm template (included in running hardware kit) or Cleat drill jig(sold optionally)
- Sikaflex or equivalent
- Locktite or equivalent
- Scraping knife
- Adjustable pliers
- Two-component epoxy glue
- Marking pen
- Scriber or awl
- Tape
- Vacuum cleaner
- Measuring tape
- Detergent
- Torx T30 head bit size
- Hex 4 or 5/32” head bit size
- Spanner size 10mm
- Spanner size 10mm or 3/8”
- Spanner size 11mm or 7/16”
- Tools to take apart and build up your boat.

1.1. Upgrade your pre 2022 Nacra 17

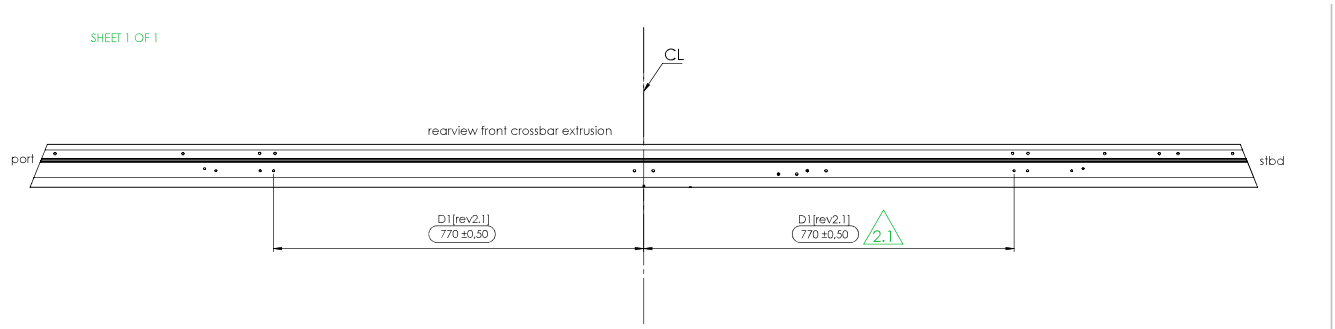
Overview

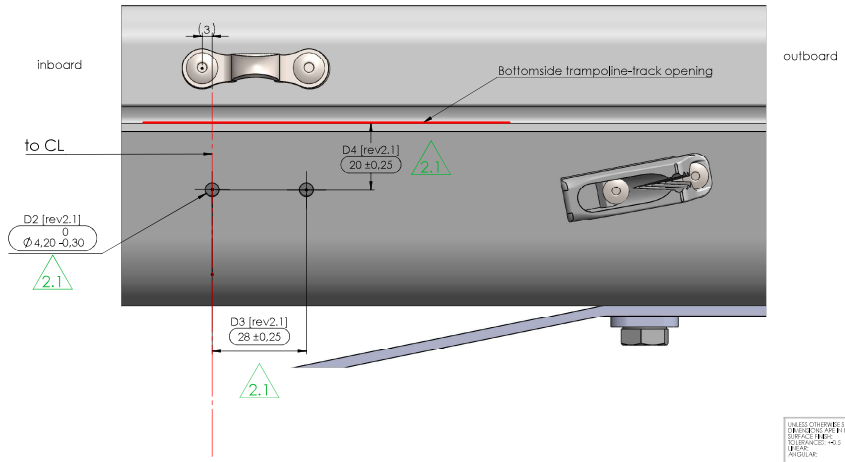


Front crossbar

Class mandatory installation procedure

1. To install the strap eye with ring at the front crossbar.
2. Make a marking at 770mm outboard from the center of the front crossbar.
3. Make another marking 20mm below the trampoline track.





REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
B7, B8, C6, E3	2.1	Mandatory positions for add-on placement of strapeye 30778 for active rudder rake system	8-2-2022	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: ±0.5 FRACTIONAL ANGULAR:	DO NOT SCALE DRAWING	DEBUR AND BREAK SHARP EDGES	10-2-2022 REVISION 2.1
			Description: Front Crossbar Nacra17MK2.1
			Part no: 32305
			SW File name: EXTRUSION_32305_N17MK2_REV2.1_WS
			A3

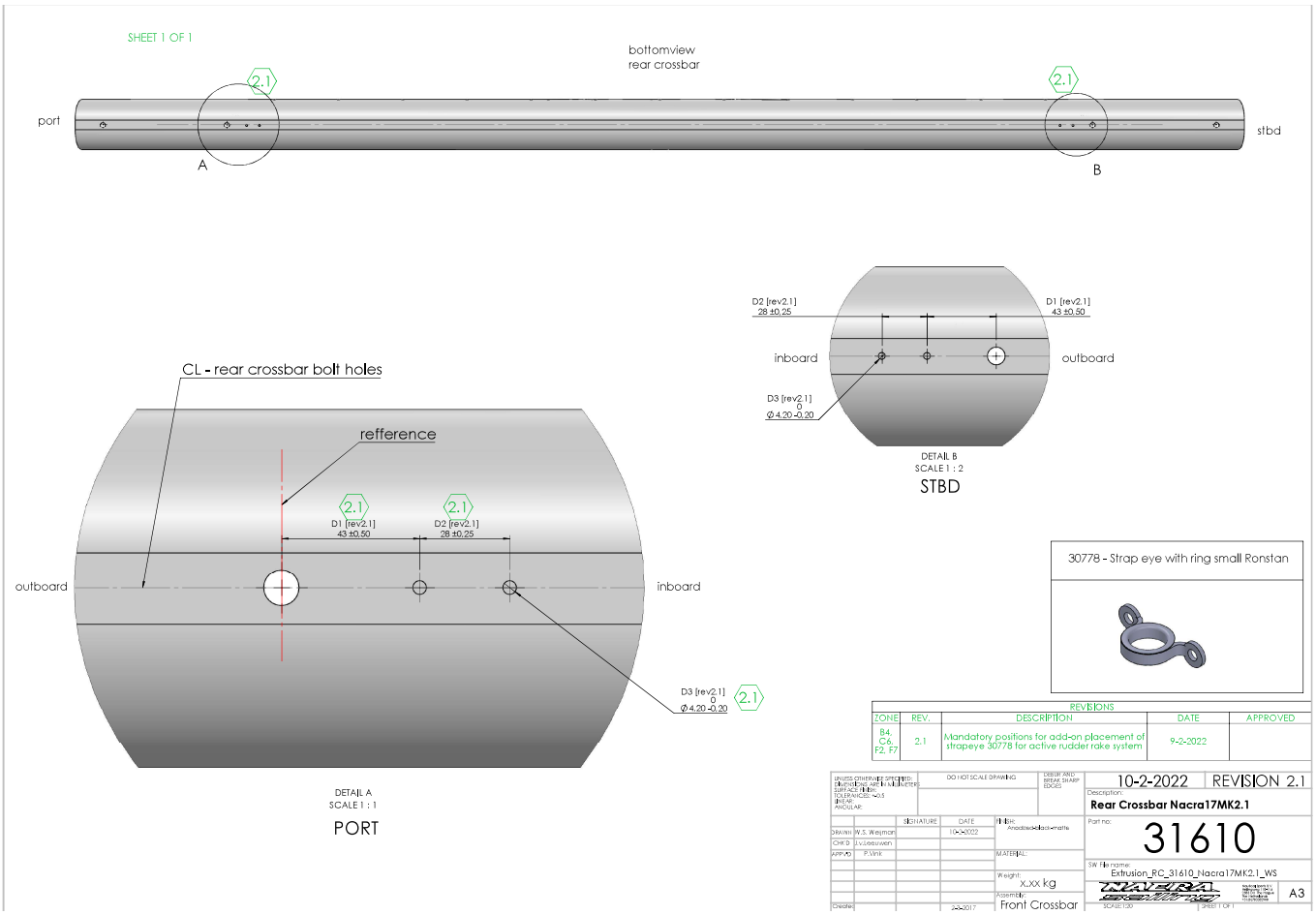
4. Drill on the crossing of the markings using a 4.2mm drill bit.
5. Prepare the strap eye with ring, by combining the 4mm rivet, nylon ring, and strap eye with ring.
6. Rivet the strap eye with ring in place on one side.
7. Rotate the strap eye with ring to a horizontal position and mark the second hole.

8. Repeat steps 2-6 to rivet the strap eye with ring in place.
9. Repeat steps 1-8 for the opposite side of the boat.

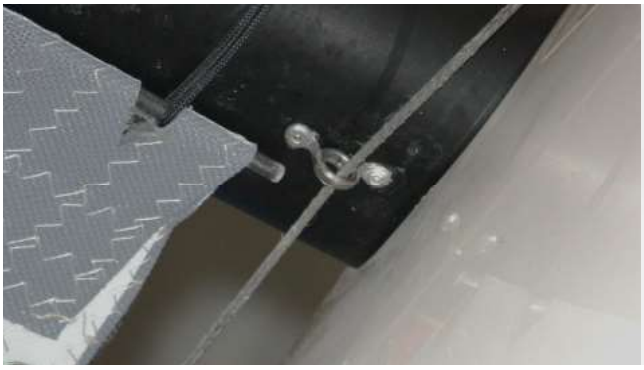
Rear crossbar

Class mandatory installation procedure

1. To install the strap eye with ring at the rear crossbar, detach the rear crossbar.
2. Make a marking at 43mm inboard of the inboard bottom-side beam bolt hole. On the center line of the beam bolt holes.
3. Check the marking with the specification drawing below.



4. Drill on the crossing of the markings using a 4.2mm drill bit.
5. Prepare the eye strap with ring by combining the 4mm rivet, nylon ring, and eye strap with ring.
6. Rivet the eye strap with ring in place on one side.
7. Rotate the eye strap with ring to a horizontal position, in line with the beam bolt holes and mark the second hole.
8. Drill the second hole and rivet the eyestrap with ring into place.
9. Repeat steps 2- 6 to rivet the eye strap with ring in place.
10. Repeat steps 1-8 for the opposite side of the boat.



Drilling transom

Class mandatory installation procedure

1. Take the bolts out of the current upper gudgeon.

2. Carefully heat the current upper gudgeon with a heat gun.

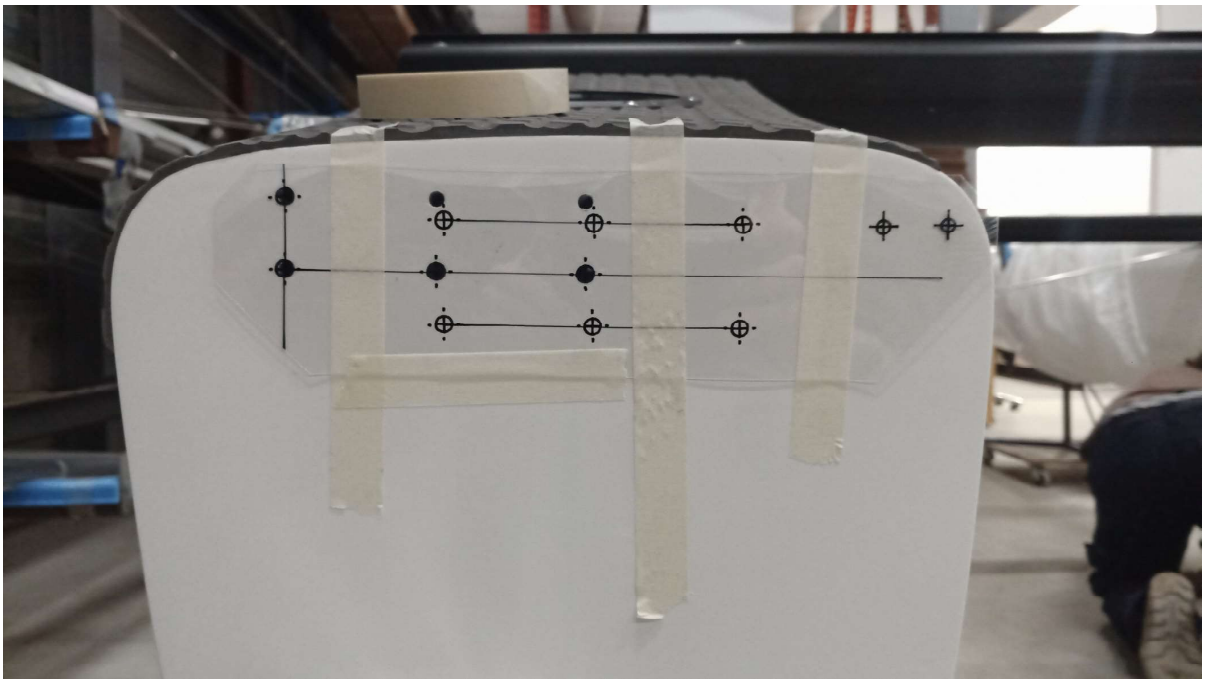
Too much heat can damage your boats gel coat. Do not heat above 100 degrees celcius. Do not point the heat gun

3. Deinstall the upper gudgeon. If it does not come off, apply the heat a little longer. Keep forcing gently by applying momentum.

4. Clear the remaining Sikaflex using turpentine and a scraping knife.

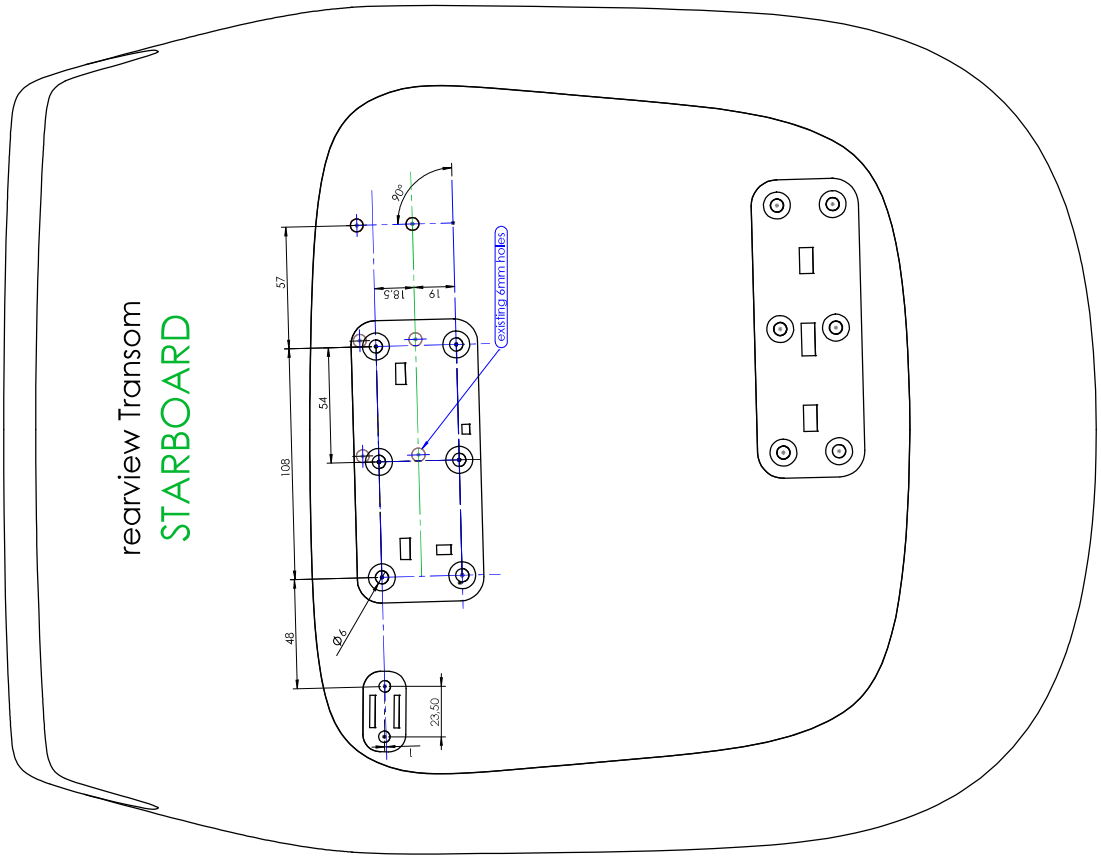
Check your template before use, a primary batch of templates was shipped with starboard and portside switched around. The measurements on the next page remain leading

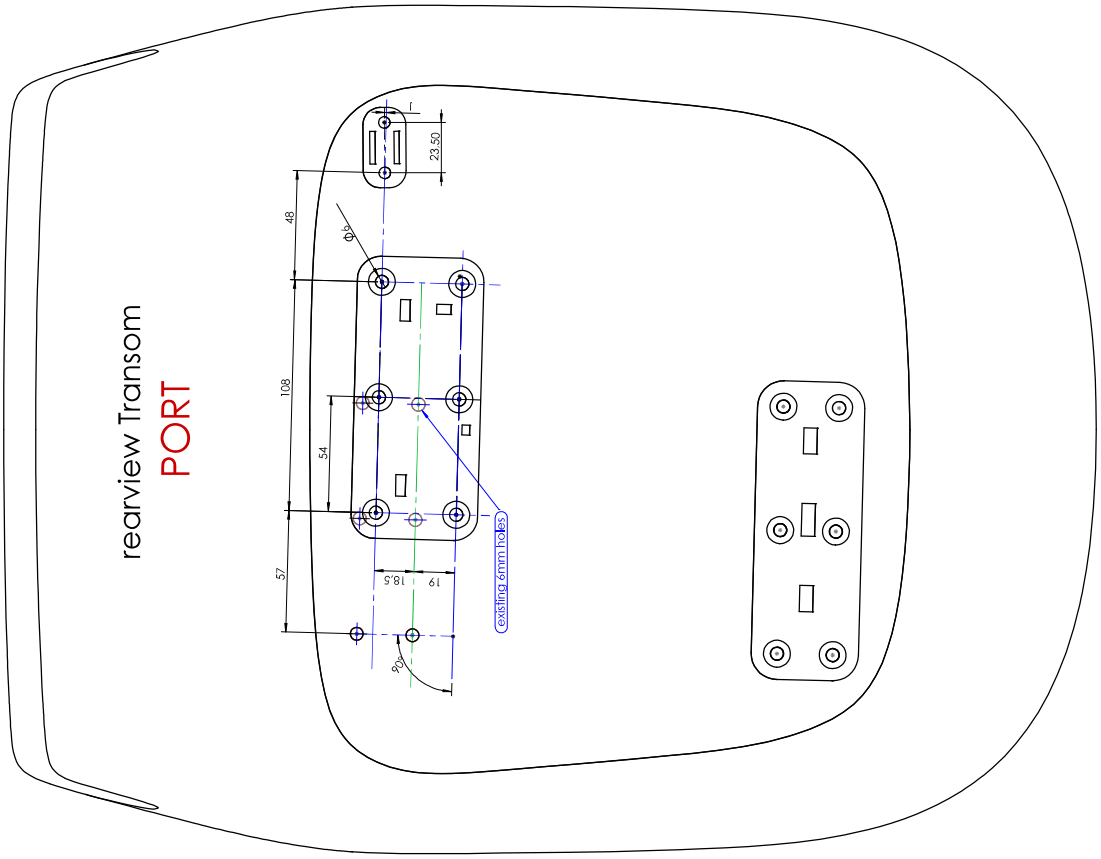
5. Align the transom monofilm drilling template precisely on the old holes and tape the template to the boat.



6. Or mount the hard drill jig into place, using the previous 6mm.

7. Check the positioning with the specification below.





8. Centerpunch the holes before drilling.

9. Drill the **Gudgeon** holes with a 3.2mm then 4.2mm a 5mm and lastly 6mm drill bit. Unless you use the drill jig

10. Drill the **Corner block** holes with aa 3.2mm, then 4.2mm, and lastly 5mm drill bit. Unless you use the drill jig

11. Fill the old upper gudgeon holes with two-component epoxy glue.

12. Clean the surplus using detergent

13. Install the corner block using the bolts, nuts, washers, and evenly applied Sikaflex.

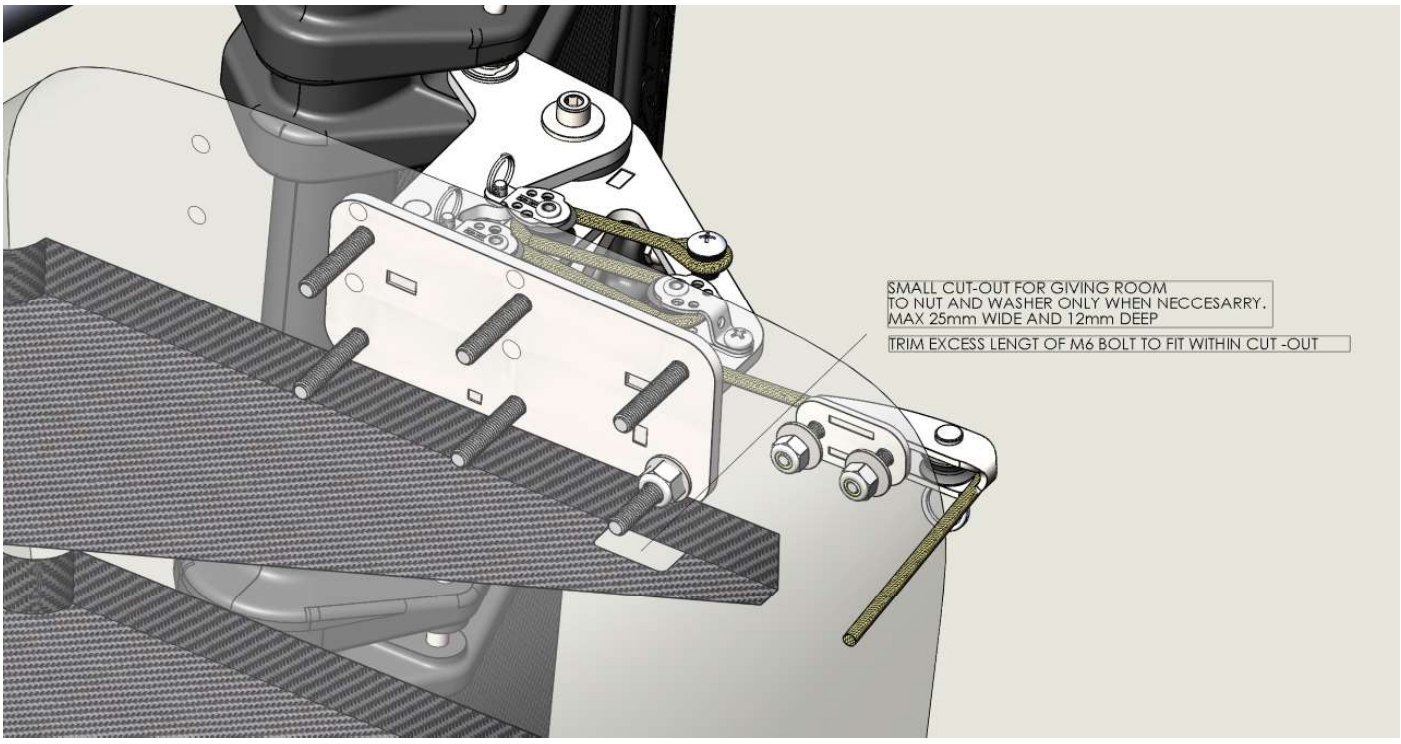
14. Insert the six bolts into the new upper gudgeon. Pull the lever away to insert the inboard bolts.

15. Evenly apply Sikaflex(more evenly than the photo portraits) to the back of the gudgeon.

In the occasion of the situation like 1st photo below when a frame interferes with a bolt, and nut, and washer ; you could just make a tiny cut-out only in the horizontal frame to make room .

Keep this cut-out as small as possible to maintain structural integrity and only cut from the Horizontal plane : max 25mm wide for giving room to : washer + M6 Nylocka + wrench(tool) ; and max 12 mm deep for the depth of the Nut and Bolt

Also shorten M6 bolt in case when necessary due to interference with the frame extending further then the recommended cut-out depth of 12mm.



16. Fasten the gudgeon on the transom using hand tension.

- Use the washers and nuts(31915) on the inside. Use the 31989 washers in places where the larger 31513 washer does not fit.
- Use locktite or an equivalent on the nuts.

17. Tighten the inboard four bolts using a 10mm spanner and the Torx T30 bit.

18. Use a piece of rope to pull the lever away and tighten the last two bolts.

19. See the “FCS rudder system with active rake gudgeon adjustment” chapter to pre-tension the gudgeon spring before sailing.

20. Place the active gudgeon sticker over the filled holes after hardening.

21. Repeat mirrored for the opposite hull.

Free choice of placement within boundaries specified on the next page.

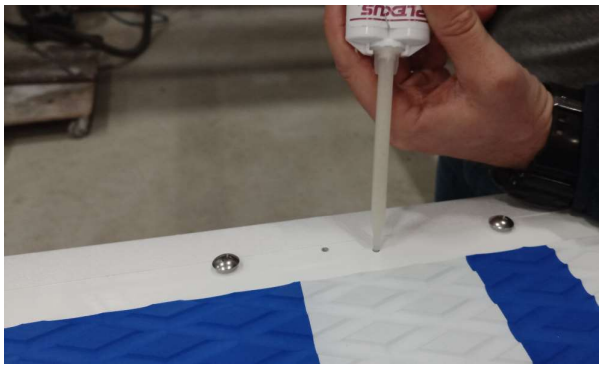
Drill template

Jig

Monofilm

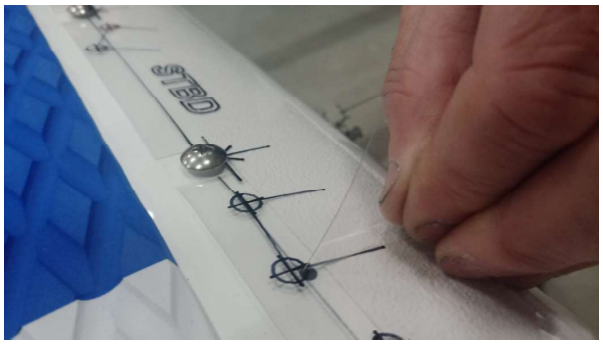
Drilling cleats

1. Remove the current mast rotation cleat.
2. Fill the mast rotation cleat holes with two-component epoxy glue.

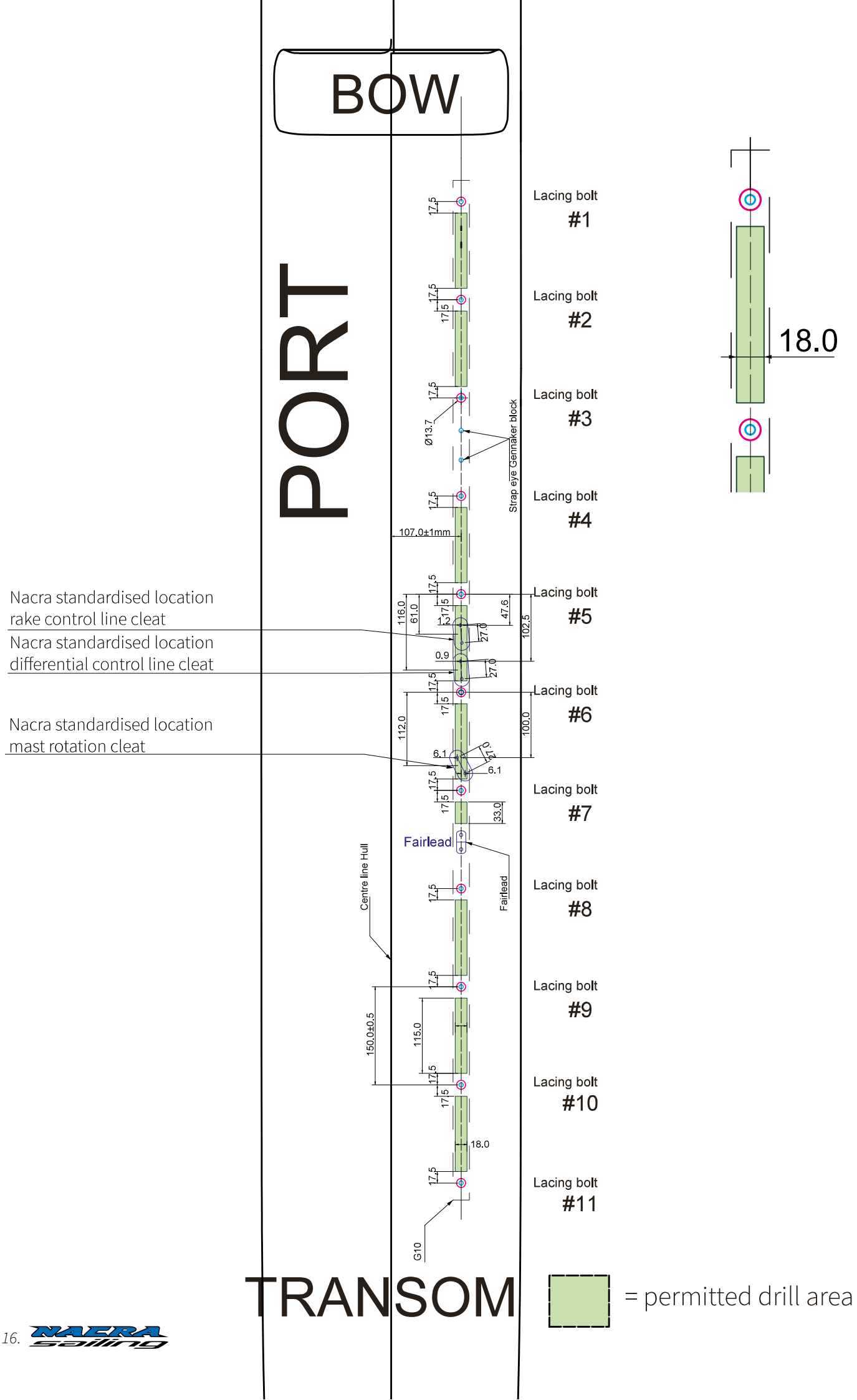


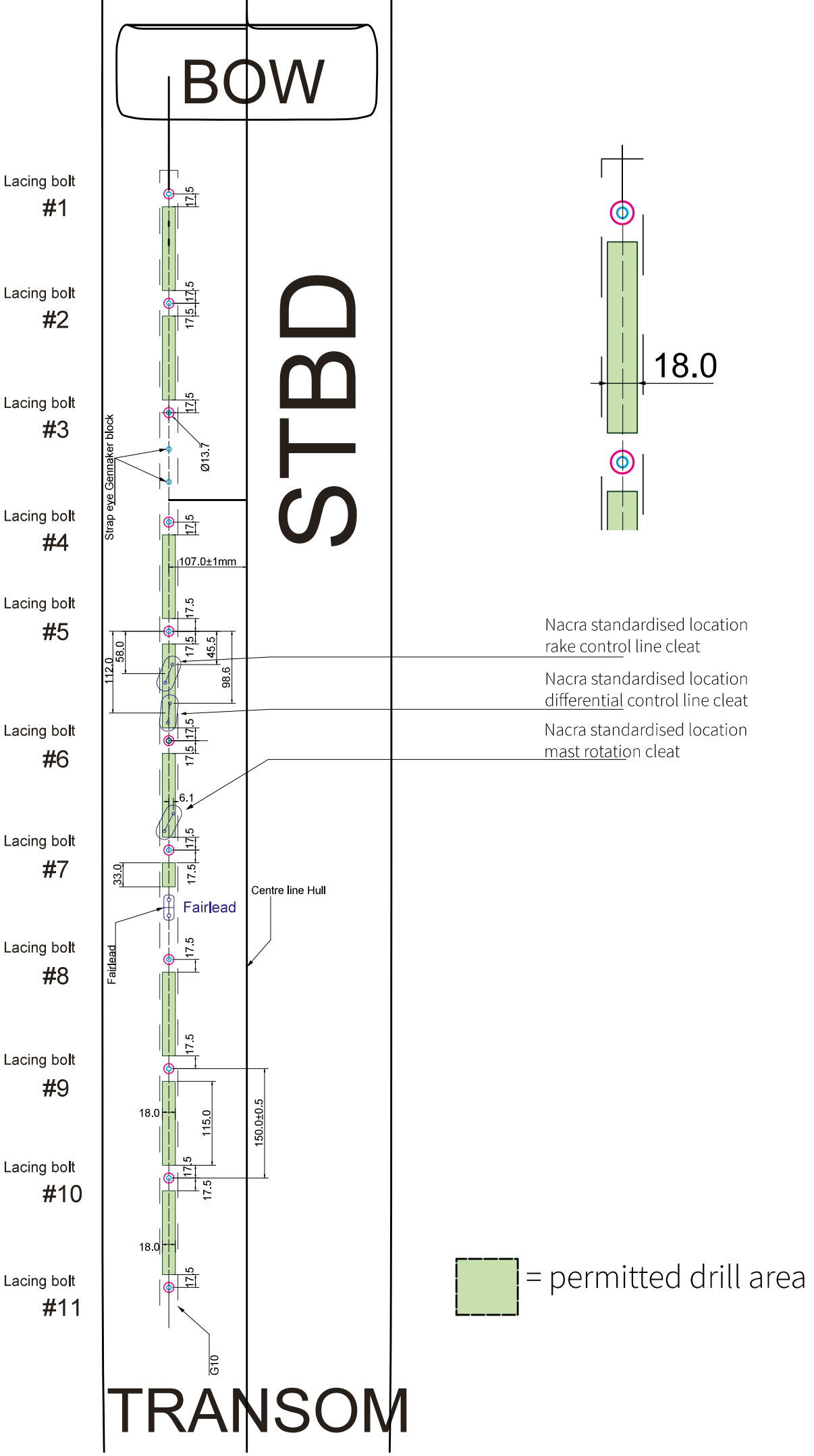
3. Place the cleat drilling template precisely on the alignment hole and tape to its position (in this case lacing bolt #5). Or place the cleat drilling jig over the lacing bolts. Pay attention to the text on the templates.

4. Centerpunch the middle of each of the cleat holes. Not necessary with the drill jig.
5. Drill holes with a 15 degree angle using a 3.2mm drill bit. You can use the drill template as an angle reference. Place the opposing side's template on the black line as shown below.



6. Thread the holes using a UNC 8/32" tap.
7. Repeat for the aft cleat holes, and the holes for the new mast rotation position.
8. Repeat steps 4-8 for the opposite hull.


BOW
PORT
TRANSOM
Lacing bolt #1
Lacing bolt #2
Lacing bolt #3
Lacing bolt #4
Lacing bolt #5
Lacing bolt #6
Lacing bolt #7
Lacing bolt #8
Lacing bolt #9
Lacing bolt #10
Lacing bolt #11
Strap eye Gennaker block
Ø13.7
107.0±1mm
Nacra standardised location rake control line cleat
Nacra standardised location differential control line cleat
Nacra standardised location mast rotation cleat
Fairlead
Fairlead
Centre line Hull
G10
18.0
= permitted drill area


BOW
STBD
TRANSOM
Lacing bolt #1
Lacing bolt #2
Lacing bolt #3
Lacing bolt #4
Lacing bolt #5
Lacing bolt #6
Lacing bolt #7
Lacing bolt #8
Lacing bolt #9
Lacing bolt #10
Lacing bolt #11
Strap eye Gennaker block
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Nacra standardised location rake control line cleat
Nacra standardised location differential control line cleat
Nacra standardised location mast rotation cleat
Fairlead
Centre line Hull
18.0
= permitted drill area

1.2. FCS rudder system with active rake installation

Tools needed:
- Phillips screwdriver size 2
- Flathead screwdriver size 7
- Locktite or equivalent

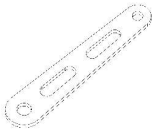
2.1. Blocks

30647
16mm
1x

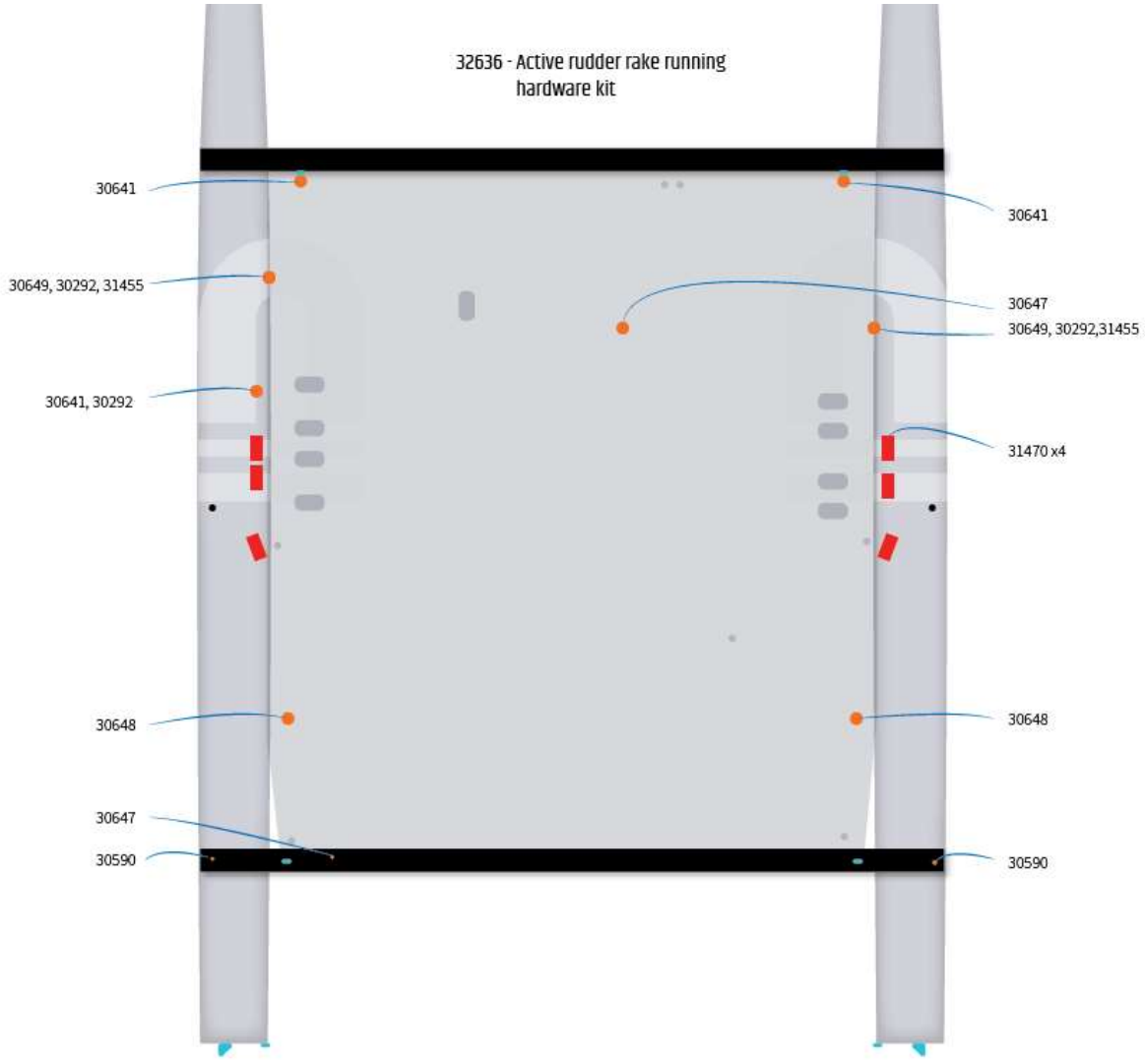
Double block **30649** **16mm** **2x**

Forkhead block **30641** **16mm** **3x**

Narrow shackle **31455** **2x**



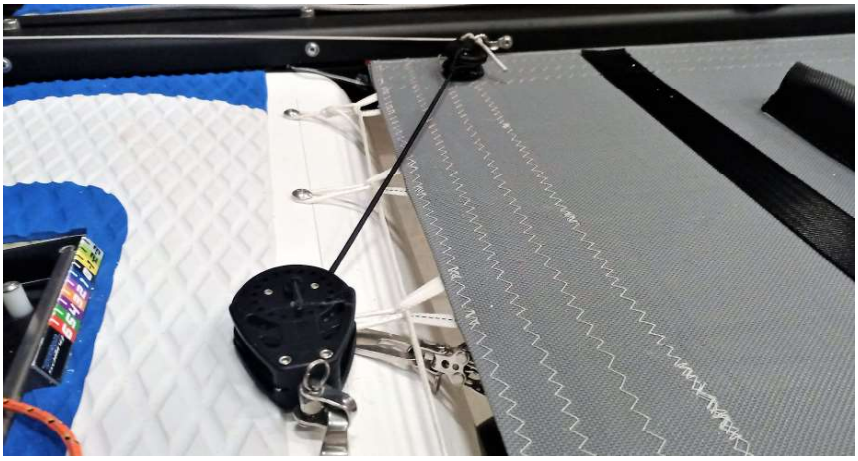
Extention plate **30292** **3x**



1. Detach the side lacing of the trampoline.

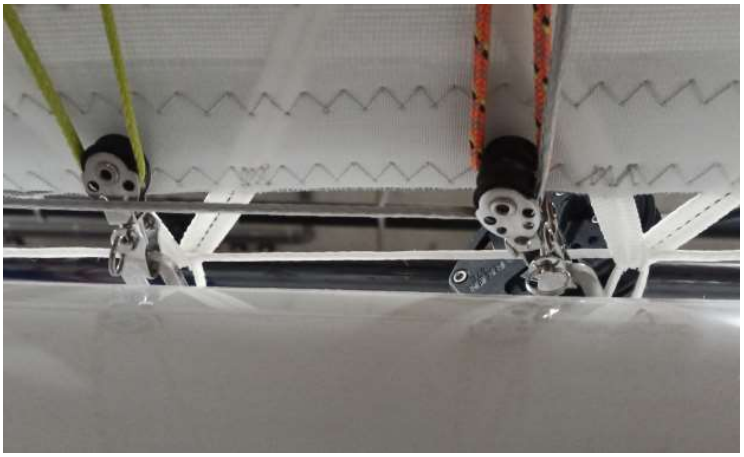
2. Attach 16 mm forkhead block (30641) to both newly placed front eyestraps.

3. Use the extender plate (30292) and shackle(31455) to attach a 16mm double block (30649) to the 3rd trampoline tie button on the port side. Use locktite or equivalent when screwing the trampoline tie button back into place.



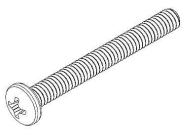
4. Use the extender plate(30292), and shackle to attach a 16mm double block (30649) to the 3rd trampoline tie button on starboard. Use locktite or equivalent when screwing the trampoline tie button back into place.

5. Use a plate and attach a single 16mm block (30641) to the 4th tie button on portside. Use locktite or equivalent when screwing the trampoline tie button back into place.



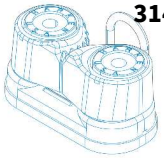
2.2. Cleats

Tools needed:
- Phillips screwdriver size 1
- Grease



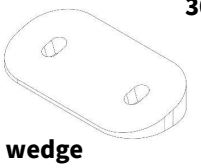
31466

8-32 UNC bolt **8x**



31470

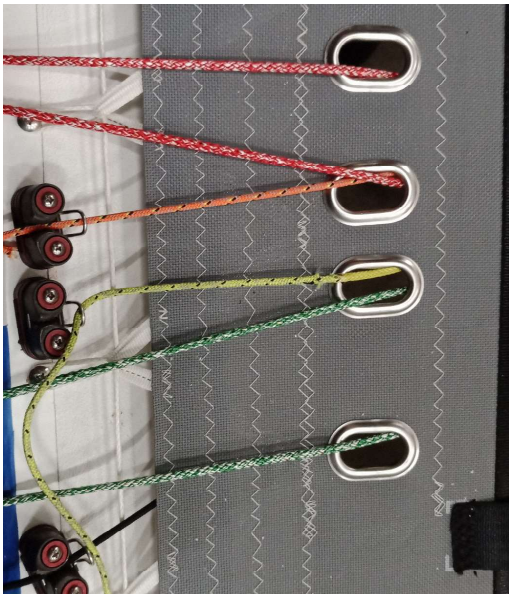
4x



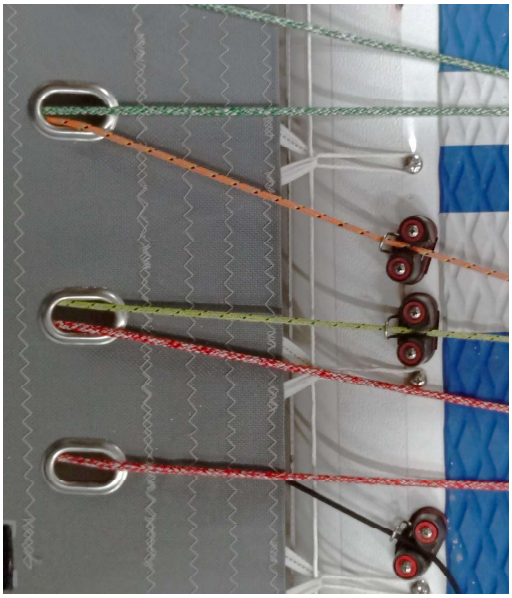
30574

Cam wedge **6x**

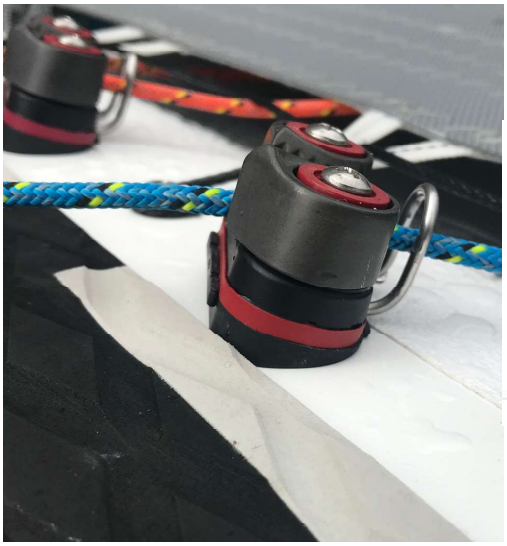
1. Grease the drilled holes next to the daggerboard case.
2. Screw the harken cam cleats on the hulls using the bolts (8-32 UNC). With the wire fairlead facing inwards. Use a cam wedge between the cam cleat and the hull to install the block at a 15 degree angle.



Port side

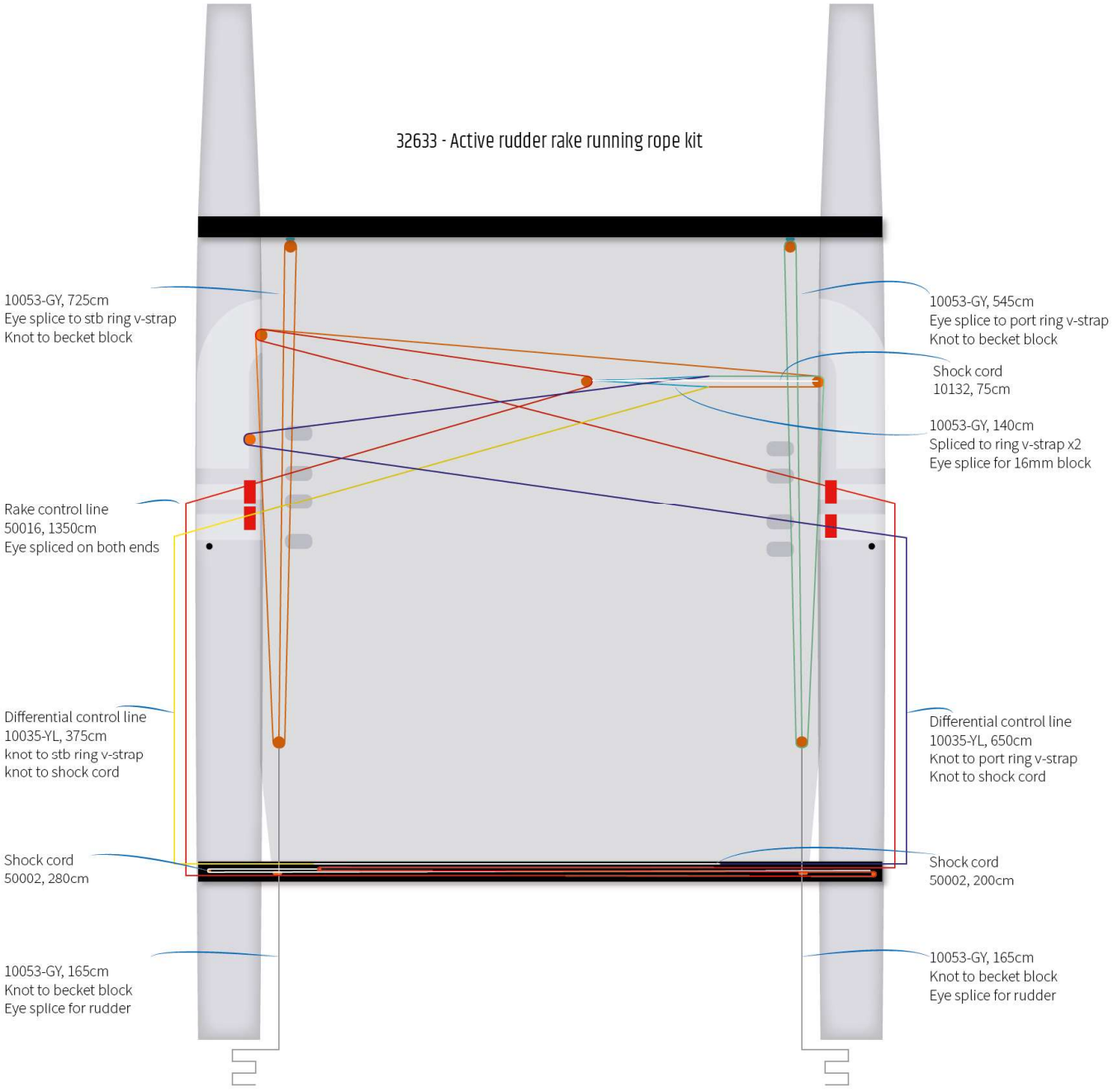


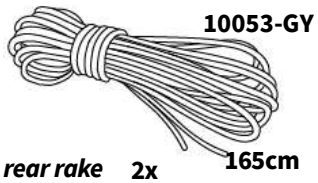
Starboard side



2.3. Lines

Overview





10053-GY

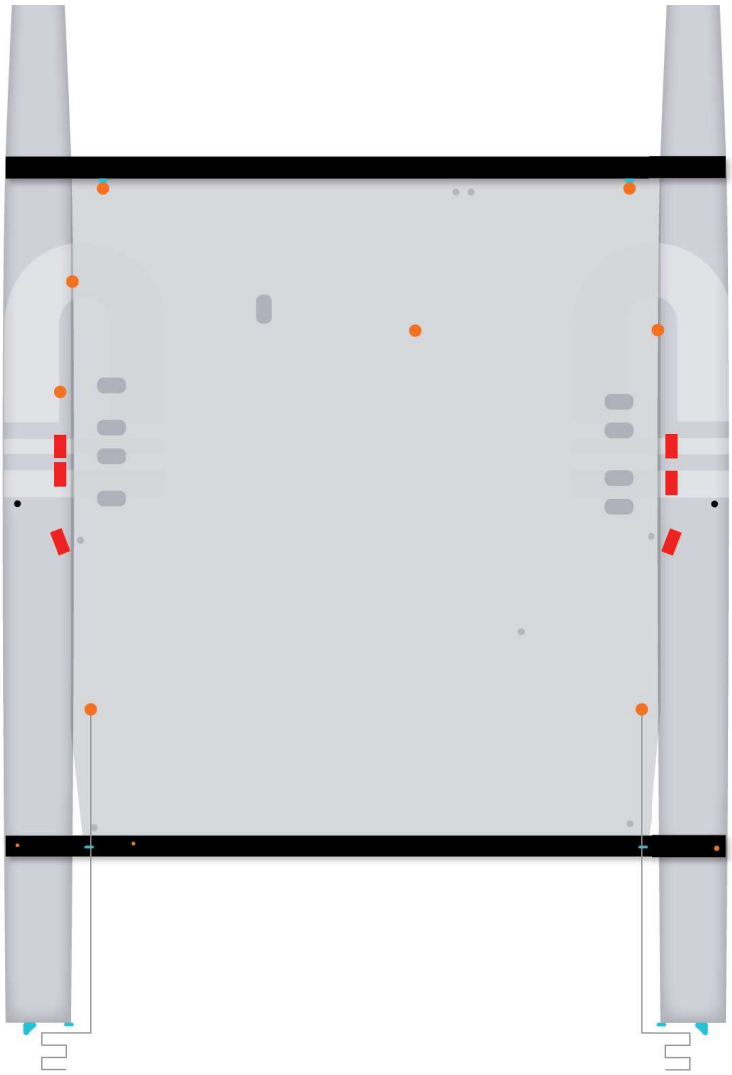
rear rake 2x 165cm

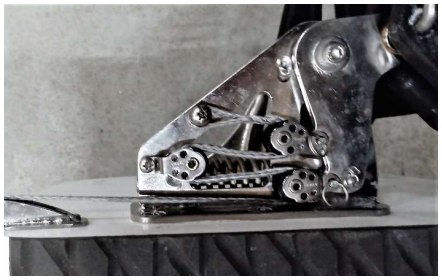
30648

16mm

becket block 2x

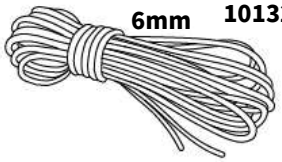
1. Install the port and starboard rear rake lines(grey in the overview). Start with the 16mm becket block in front of the rear crossbar. Thread the free end through the eyestrap, corner block, and gudgeon. Attach the eyesplice to the gudgeon.





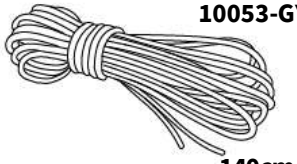
30647

16mm



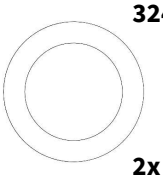
6mm 10132

shockcord 75cm



10053-GY

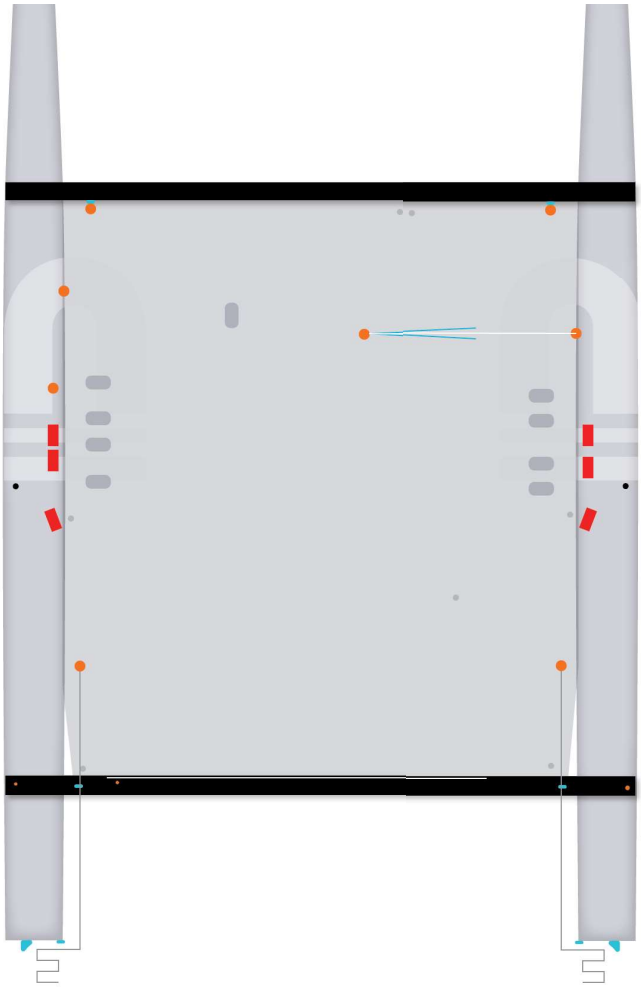
V-line 140cm

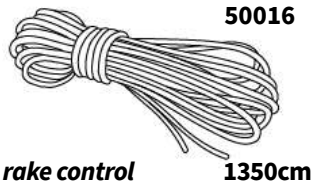


32476

2x

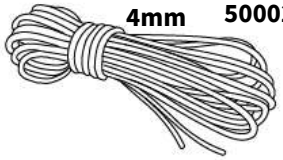
1. Tie the 16mm block to the 75cm shock cord. Tie the other end of the shock cord to the starboard shackle on the double block.
2. Knot the middle of the v-line to the 16mm block.
3. Tie two rings to the ends of the v-line.





50016

rake control 1350cm



4mm 50002

shockcord 280cm

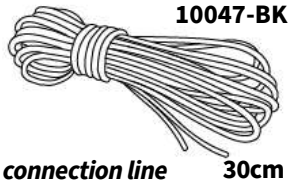
30590

22mm

2x

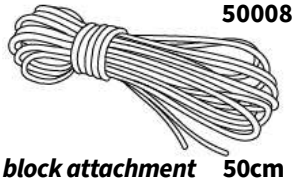
30647

16mm



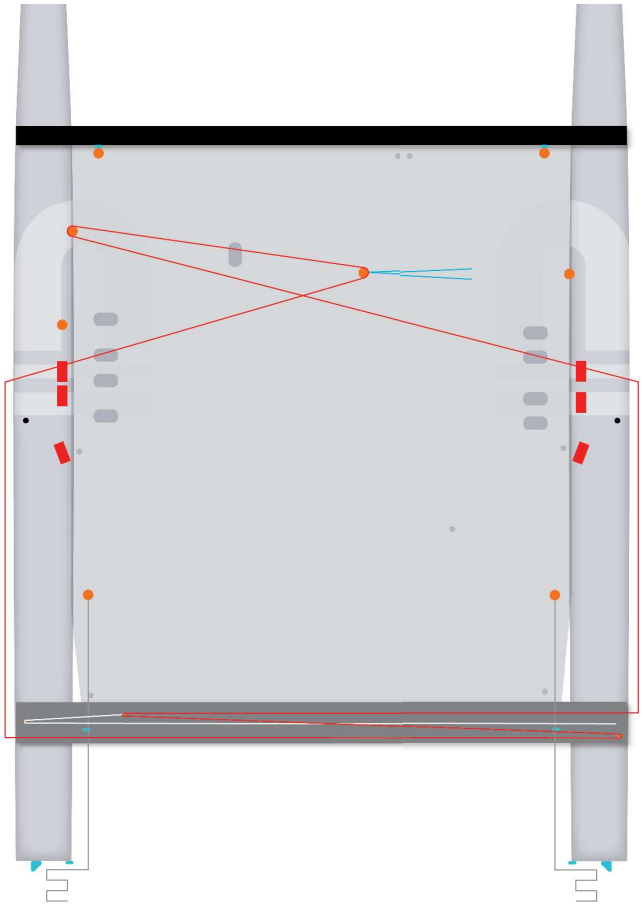
10047-BK

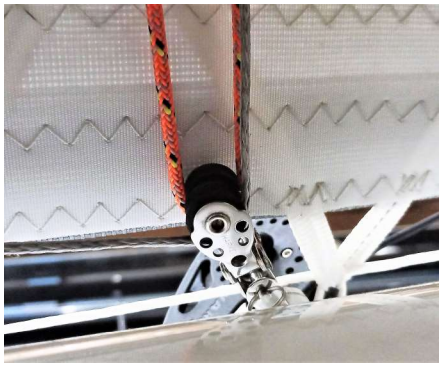
connection line 30cm



50008

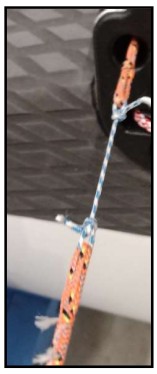
block attachment 50cm

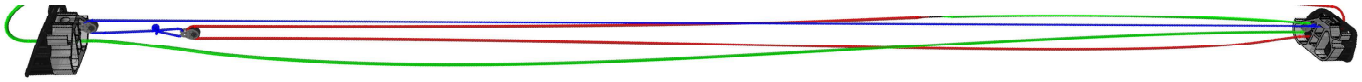


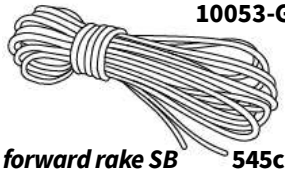


1. The rake control line is a continuous system like the cunningham. Knot the shock cord to a 16mm block. This block will become a running block.
2. Attach a 22mm block to the starboard beam insert and one to the port beam insert.
3. Thread the shockcord through the block from the previous step, and attach the loose end to the port insert.
4. Take the one end of the control line and thread it through:

- The port cleat from outside to inboard.
- The 16 mm block under the trampoline
- The port double from forward to aft, upper block.
- The starboard cleat from inboard to outboard.
- The upper aft hole in the starboard endcap.
- Through the 16mm block attached to the shock cord.
- Through the 22mm block attached to the starboard endcap
- Out the upper aft hole in the port endcap.
- And tie off to the other end of the line using the connection line.

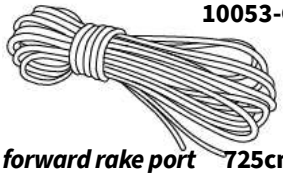






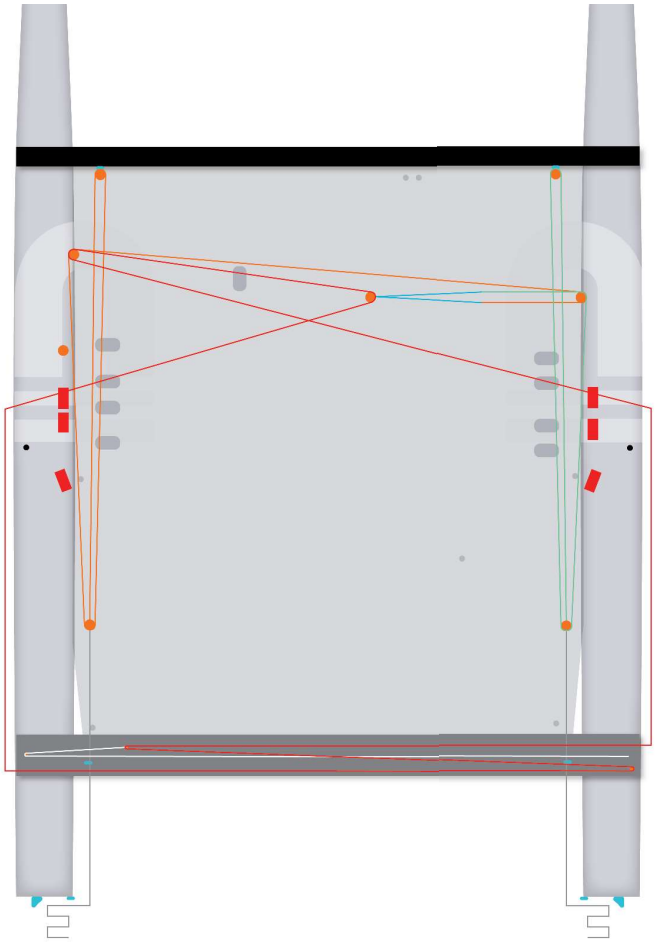
10053-GY

forward rake SB **545cm**



10053-GY

forward rake port **725cm**



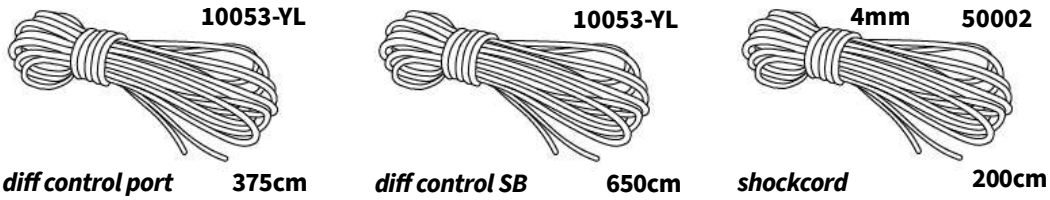
1. Thread the forward rake adjustment lines(green and orange in the overview) as shown in the overview. Tie off on the becket of the 16mm becket block.
2. Tie the port differential control line (yellow in the overview) to the ring with the port side rake line(orange in the overview) and v- line(light blue).
3. The port differential control line threads through:

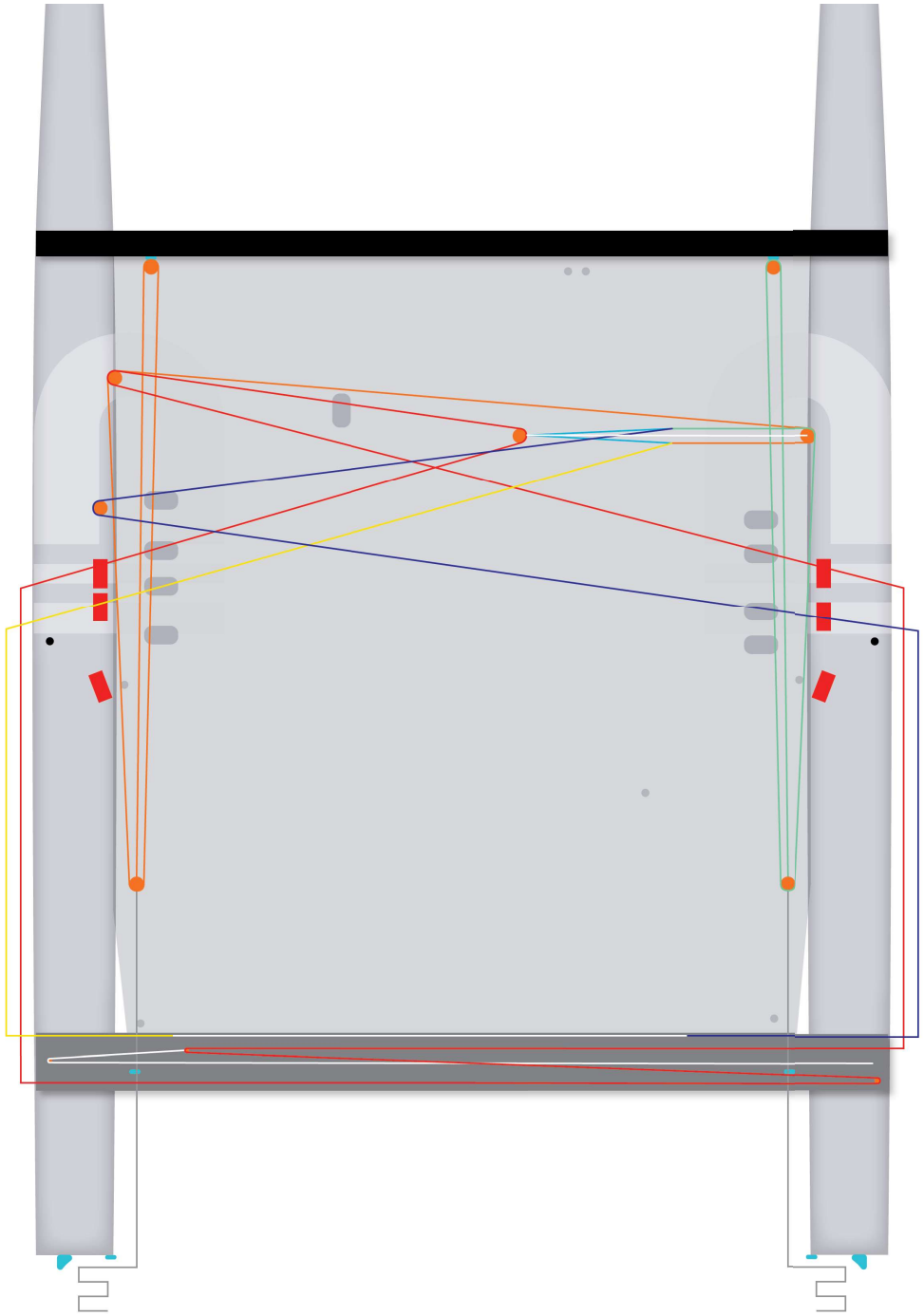
- The eyelet in the trampoline.
- The aft cleat.
- Around the stay.
- And tie to one end of the 2m shock cord.

4. Tie the starboard differential control line (dark blue in the overview) to the ring with the starboard side rake line(green in the overview) and v-line(light blue).
5. The starboard rake differential line(blue in the overview) threads through:

- The 16mm single block on the port side.
- After that, it goes through the eyelet in the trampoline.
- The aft port cleat.
- Around the stay.
- And attaches to the other end of the 2m shock cord.

6. Lead the shock cord through the rear crossbar using a long stick.

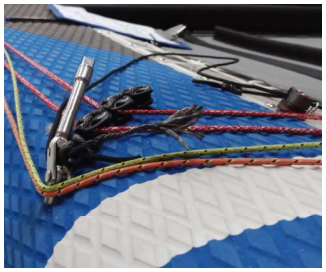




1. Tie the port differential control line (yellow in the overview) to the ring with the port side rake line(orange in the overview) and v- line(light blue).

2. The port differential control line threads through:

- The eyelet in the trampoline.
- The aft port cleat(not counting the mast rotation cleat).
- Around the stay.
- And tie to one end of the 2m shock cord.



3. Lead the shock cord through the rear crossbar using a long stick.

4. Tie the starboard differential control line (dark blue in the overview) to the ring with the starboard side rake line(green in the overview) and v-line(light blue).

5. The starboard rake differential line(blue in the overview) threads through:

- The 16mm single block on the port side.
- After that, it goes through the eyelet in the trampoline.
- The aft starboard cleat(not counting the mast rotation cleat).
- Around the stay.
- And attaches to the other end of the 2m shock cord.

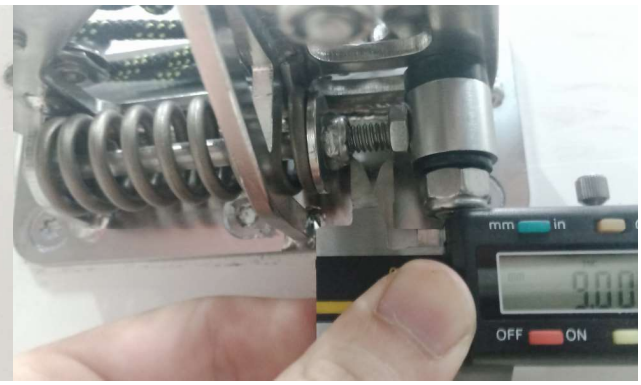
1.3. FCS rudder system with active rake gudgeon adjustment

Tools needed:
- Spanner size 11mm or 7/16”
- Allen key

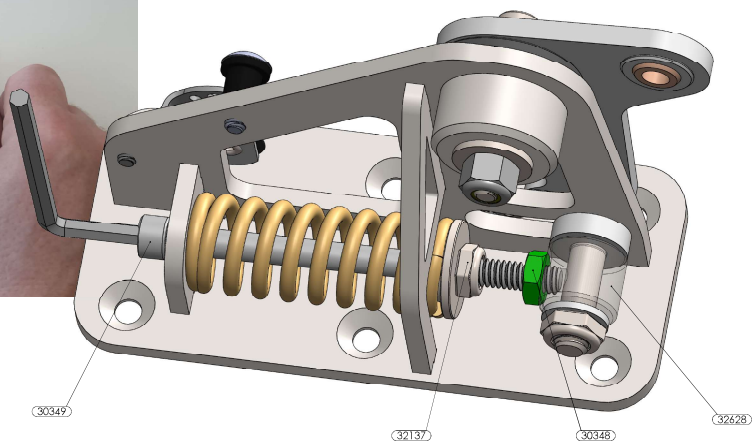
The Active rake gudgeon needs to be tensioned before sailing and can be adjusted.
After installation the rake gudgeon needs to be pre tensioned.

3.1. Adjustment

1. Set the nut to 9mm between the head of both nuts. By tightening the inboard bolt with a 11mm or 7/16” spanner. Hold the bolt in place using an allen key.



2. The nut can be tensioned more or less to the sailors wishes. This adjusts the push back strength of the spring.



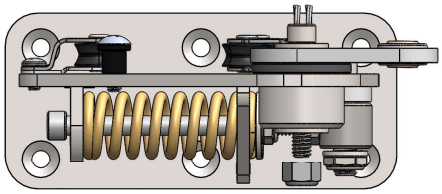
Proper functioning of the gudgeon depends on proper maintenance. Lack of maintenance can cause failure, which can result in hazardous situations.

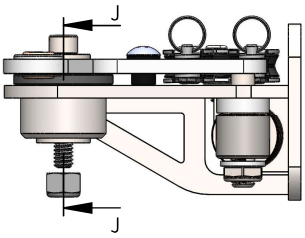
Make sure you:
Keep all bearing surfaces lubricated with acid free grease
Keep the nut directly outboard from the adjustment nut tightened at all times, check this after sailing.
Do not over tension any bearing bolts, this will cause malfunction.
Do not under tension any bearing bolts, this will cause malfunction.
Use OEM parts if repairs are needed.

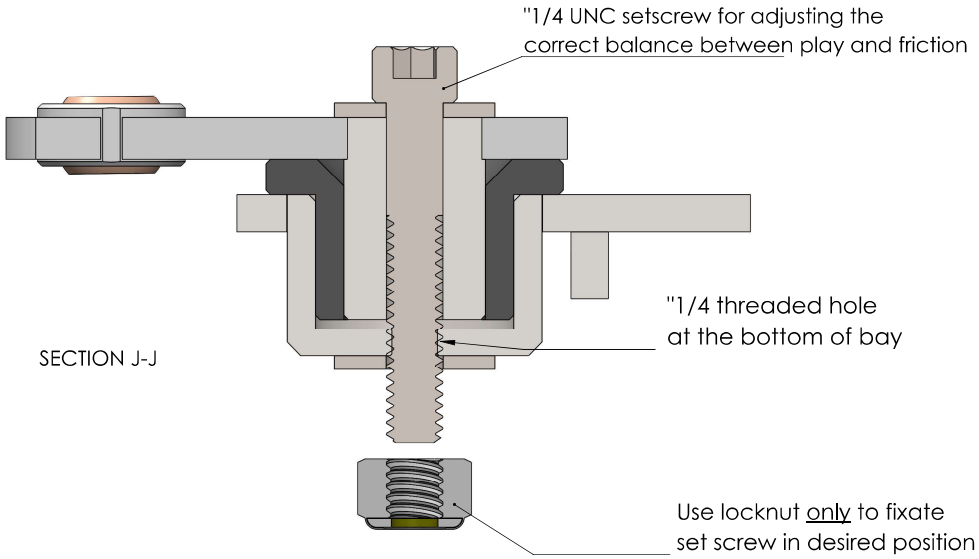
WARNING:
Using this product can be dangerous by Improper use and may cause serious injury or death.
Do not use in shallow water or in proximity to other people.
Only use this product if you are in excellent physical condition and good health.
It’s strongly recommended to use personal safety equipment while using product.

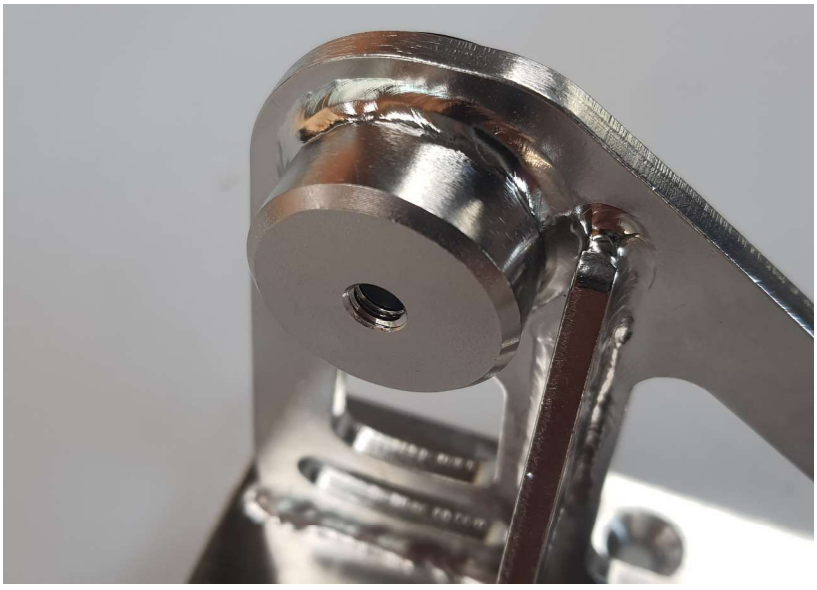
3. You can adjust the play or friction in your rake gudgeons.

Do minimise play in the system. Too much play can cause failure.







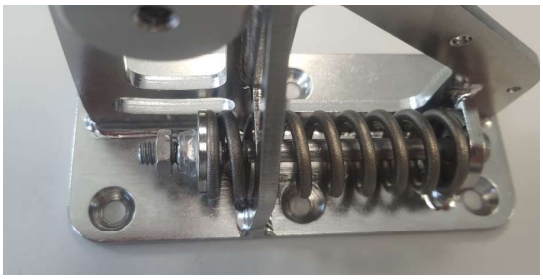


3.2. Repairs

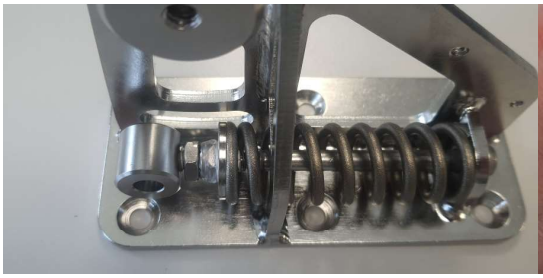
In the case your active rudder gudgeon comes apart, for servicing or repair, here is how to reinstall.

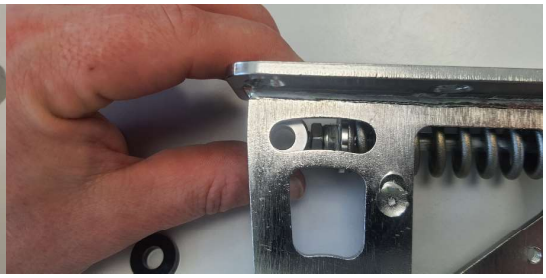
1. First you must release the control lines completely (unload) and take as much tension of the spring as possible.
2. If connected, disassemble the adjuster plate (32626) .
3. Connect the Bolt joint active FCS (32628) to the long socket head cap screw(30349) .

- Reinstall the flat nut (30348).

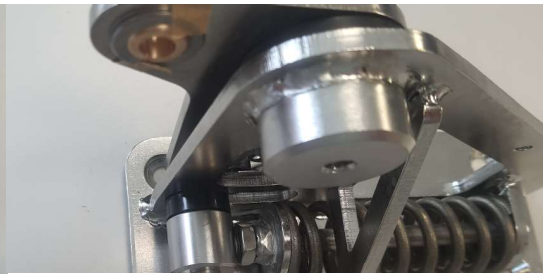


- Reinstall the bolt joint.





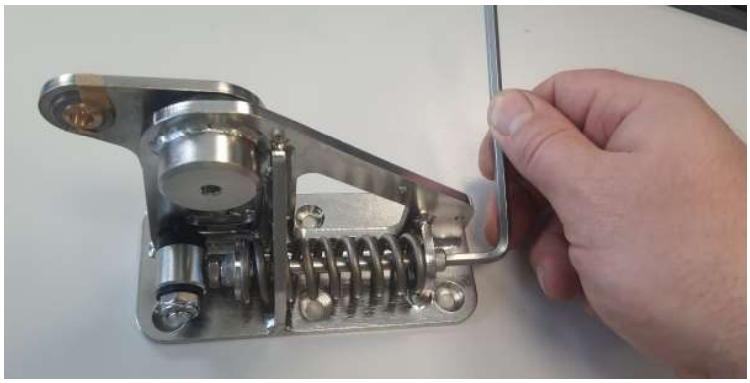
4. Reinstall the adjuster plate, mind the nylon washer (40201).



5. Reinstall the Nylon-ring (32135) and 5/16 nut (32158).

Don't tighten the nylock nut yet.

6. Tighten the long socket head cap screw until you feel it locking into Arm-rod of lever.



7. Untighten long socket head cap screw half a winding.

8. Firmly lock the long sockethead cap screw to the Bolt joint using the flat nut.

9. Reinstall the shorter sockethead bolt(30344) and flat washer(31513). Also reinstall the ¼ nylock nut(30347) and flat washer (31513) at bottom. **But don't tighten yet.**

10. Only tighten the shorter sockethead bolt until you feel it lock. Then untighten ¼ winding (or 90 degrees). Don't tighten the nylock nut yet.

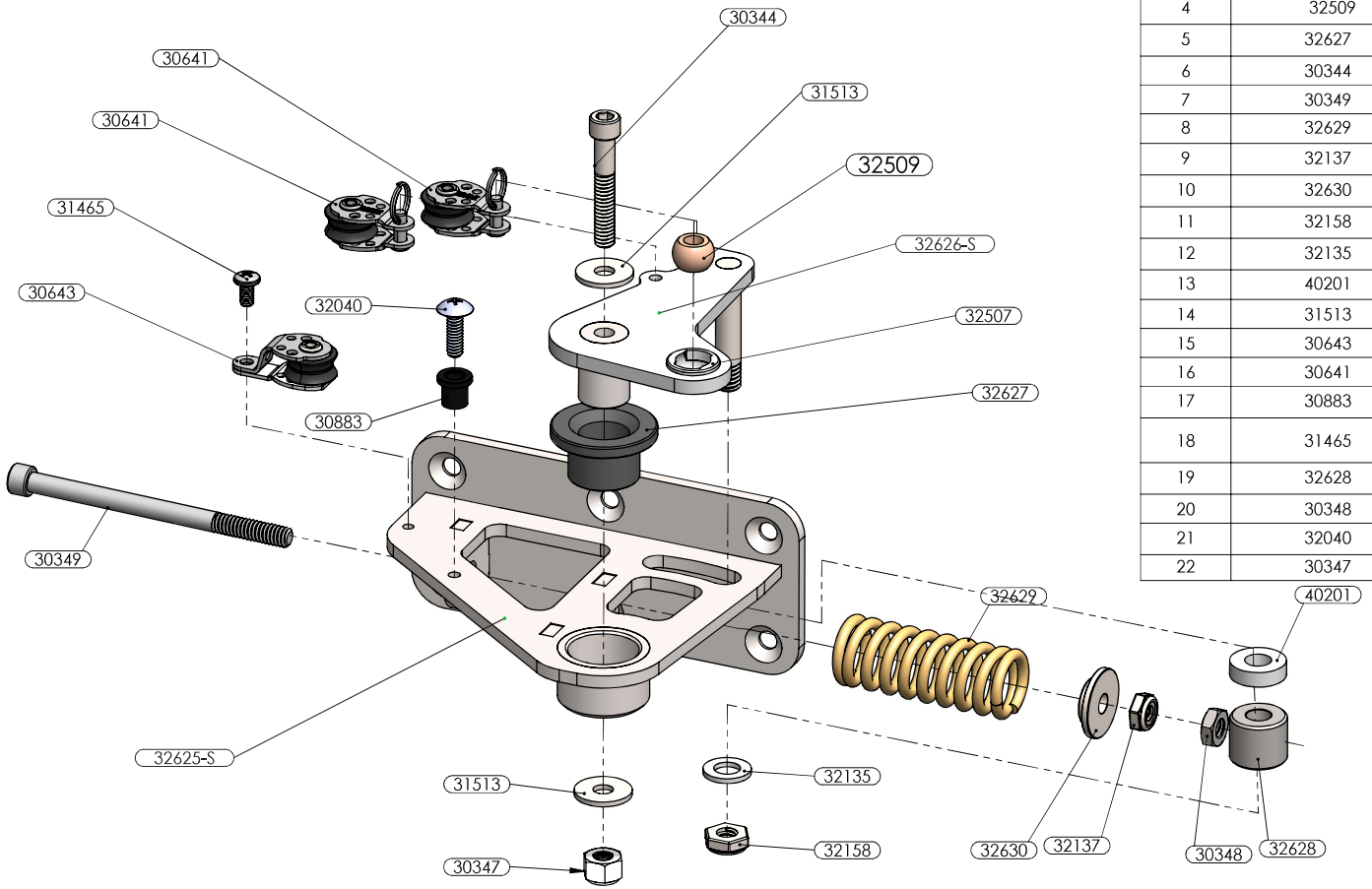
11. Then untighten the bolt ¼ winding (or 90 degrees).

12. Hold the shorter socket head bolt in position while locking it with the ¼ nylock nut.

13. Tighten the nylock nut.

- The amount of friction versus play should now be correct again, and your gudgeon should work properly.

Starboard assembly



BOM Table			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	32625-S	Rudder gudgeon upper base active FCS Stbd	1
2	32626-S	Rudder gudgeon upper adjuster plate ACTIVE FCS Stbd	1
3	32507	Rose bearing house for FCS gudgeon	1
4	32509	Rose bearing ball for FCS gudgeon	1
5	32627	Bearing bushing adjuster plate active FCS	1
6	30344	1/4 x 1 1/2" socket head UNC	1
7	30349	1-4x20_3 3-4 TYPE 316 SS SOCKET HEAD CAP SCREW	1
8	32629	Spring for FCS active uppper gudgeon	1
9	32137	1/4 nylock nut low	1
10	32630	Spring dish for FCS active upper gudgeon	1
11	32158	5/16 nylock nut low	1
12	32135	nylon washer 8.4x15x1,6mm	1
13	40201	Shackle washer nylon	1
14	31513	washer ss 6.4 standard	2
15	30643	Cheek Pivot Block 16mm Harken	1
16	30641	Forkhead Block 16mm Harken	2
17	30883	Trampoline tie button	1
18	31465	8-32x5-16_TYPE 316 SS PAN HEAD PHILLIPS MACHINE SCREW	1
19	32628	Bolt joint active FCS	1
20	30348	316 Stainless Steel Thin Hex Nut	1
21	32040	10-24x5-8 UNC Truss head Philips	1
22	30347	Nylock nut 1/4 UNC	1

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The Netherlands

Phone: + 31703382900
Email: info@nacrasailing.com
Website: www.nacrasailing.com

Distributor / dealer: