36.7

Tuning Guide

NORTH SAILS

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Beneteau 36.7 Sail Development

North Sails began working with the 36.7 as soon as the first boat was launched in 2001. Since then we have built inventories for several of the European boats, the first boat delivered in the U.S. and several of the U.S. built boats. We began our 36.7 sail program by drawing from our extremely successful 40.7 program which has included victories at several high profile events including: Key West Race Week, Kenwood Cup, SORC, Spi Quest (France), Kiel Week, German IMS Championships, North Sails Race Week, Long Beach Race Week, and the top boats in the Chicago and Chesapeake fleets.

We used our 40.7 designs as a starting point to begin our work with the 36.7 with minor modifications to account for the differences in mast bend, sheeting angle, VPP Predictions and overall sail size. The first generation sail designs were very successful, but our worldwide design network has since tweaked the designs to move through our evolution of designs. As the boats have hit the water and the season has progressed, North Sails has seen great success with the 36.7 worldwide. We are now on our 5th generation sails, with many regatta victories. North Sails won the inaugural North American Championships, with great speed in all conditions. Our current designs and tuning techniques produce sails that are extremely versatile and allow for easy adjustment with the backstay for proper mast bend and headstay sag.

North Sails design teams use computer generated Velocity Prediction Programs (VPP) for specific boats to help design sail inventories to maximize the boat's potential through the entire wind range that the boat will race. Analyzing the VPP helps define the base mold shapes for the sails and optimal sail overlaps. The VPP not only calculates how fast the boat will be going for a given windspeed, but also calculates the optimum wind angles that the boat should sail for maximum VPP. This information is critical for designing fast sails, especially spinnakers.

The limited class sail inventory and sail purchase restrictions creates a great advantage for 3DL sail construction. With their efficiency of load distribution through molded construction, 3DL sails have the widest wind range of any other sail construction method and have the longest performance life.

This combination of technical analysis and design and on-the-water experience will ensure that North Sails provides the best sails and tuning information for our clients.

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Base Rig Set-Up

Mast Butt – Proper mast butt location is the critical first step in setting up the rig to achieve proper boat balance and mast pre-bend. The mast butt should be positioned so the forward edge of the mast is **26cm** from the bulkhead. This should be one hole aft of max forward on the step, but you should check the bulkhead measurement to be sure. You may need to modify the floorboards that sit around the mast slightly in order to allow for this position.

Headstay Length – The headstay length will set the base rake of the boat. The base headstay length, measured using the centerline halyard to the bow of the boat at the sheer should be **14.48m** (47.5'). This is a good all-purpose headstay length.

Center the Rig - Put a mark on the rail of the boat on one side even with the chainplates. Measure this distance from the headstay attachment on the bow. Put a corresponding mark on the other side, the same distance from the headstay. At this point the Upper Shrouds (Caps) should be hand tight and the Intermediates (D2s) and the Lowers (D1s) should be loose. Hoist the tape measure to the top on the centerline jib halyard. Measure to the marks on either side and adjust the Caps until they are equal.

Tensioning the Shrouds - Tighten the D2s (intermediate shrouds) and D1s (lower shrouds) to hand tight. Add turns to the V1s (cap shrouds). This should be done incrementally (2-3 turns at a time per side) sighting the mast to be sure that the mast is in column. Add turns to one side and remove turns from the other to bring the mast in column. This added tension that you have applied has probably made the D1s slack, so double check to make sure that they are hand tight.

Check Shroud Tensions with Loos Gauge - Put marks on the shrouds 2m up from the deck. Put the top post of the gauge on this mark when measuring tension. Be sure to have the backstay released when measuring tension with the Loos RT-11 Rod Gauge. For the base setting for 10-14 knots TWS the shrouds should read the following:

V1 – 45
D1 – 10
D2 – hand tight plus 3 turns

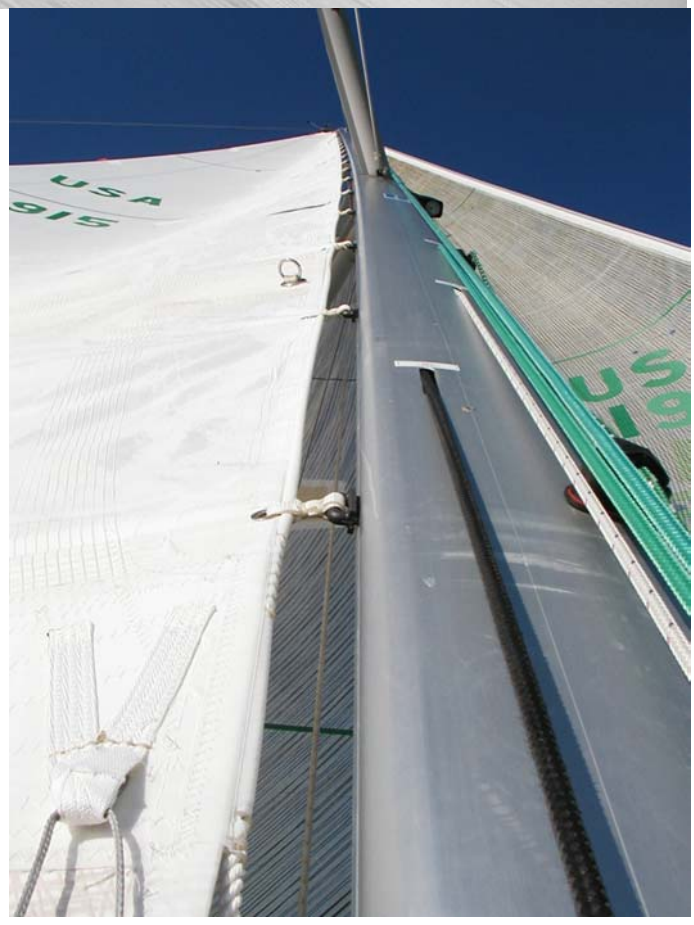
You are now ready to go sailing! On a medium breeze day (10-14 knots TWS), go sailing upwind and check that the mast is in column side-to-side. You may need to adjust the D1s and D2s to keep the rig straight on both tacks.

Measuring Rig Tension with the RT-11m Gauge

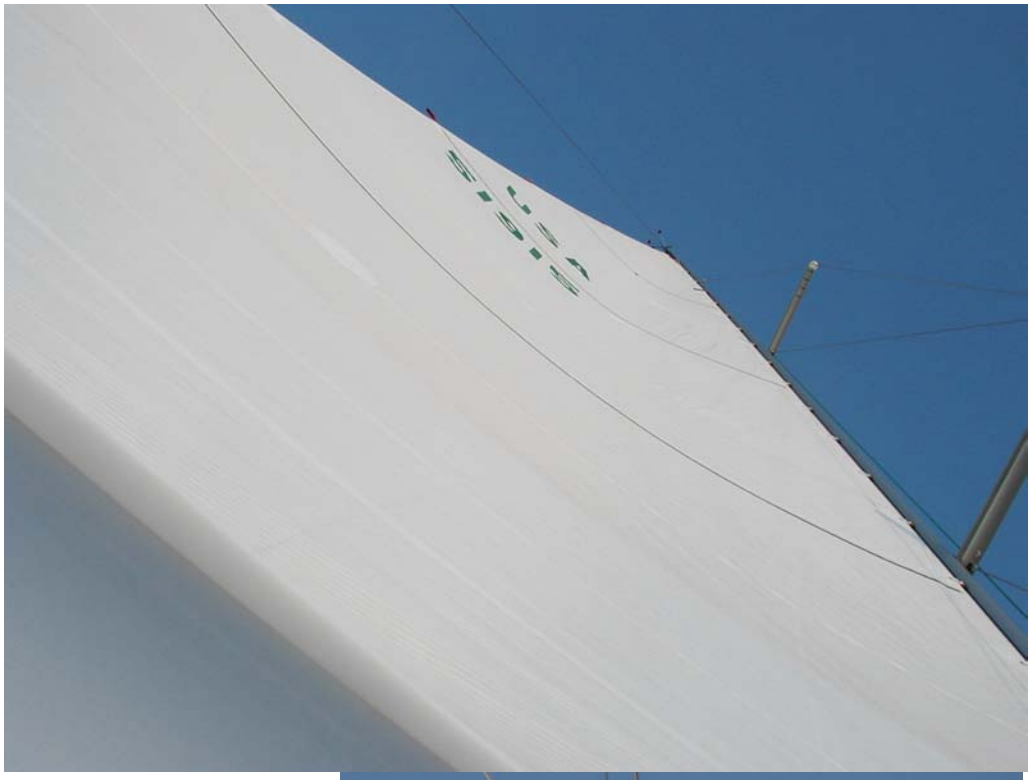
3DL TF Main with No Backstay

Mast Bend with No Backstay

Rig set to Base Setting

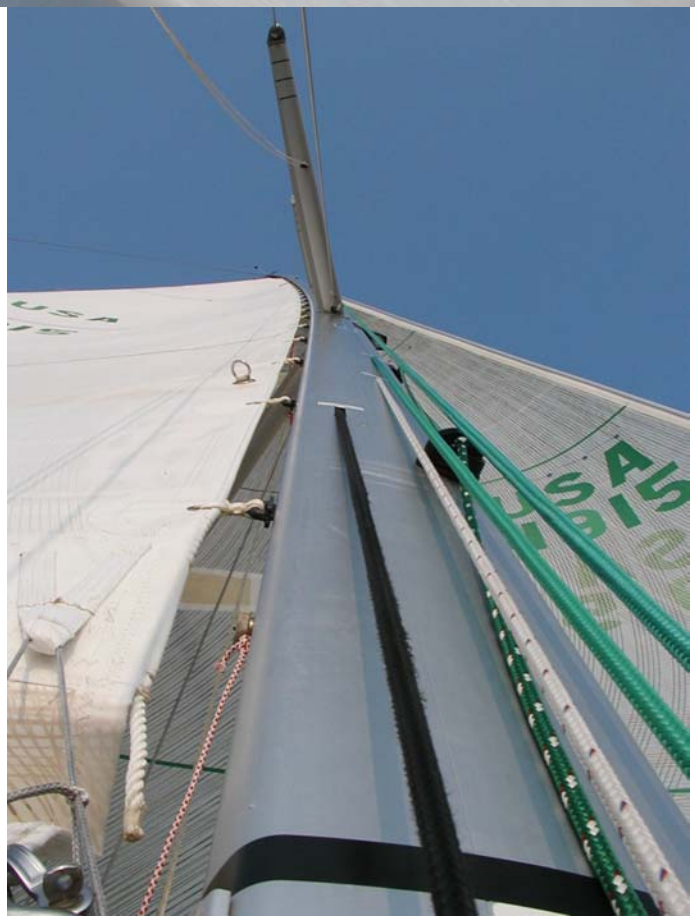


3DL TF Main with Medium Hard Backstay



Mast Bend with Medium Hard Backstay

Rig Set to Base Setting



3DL AP #1 with Hard Backstay

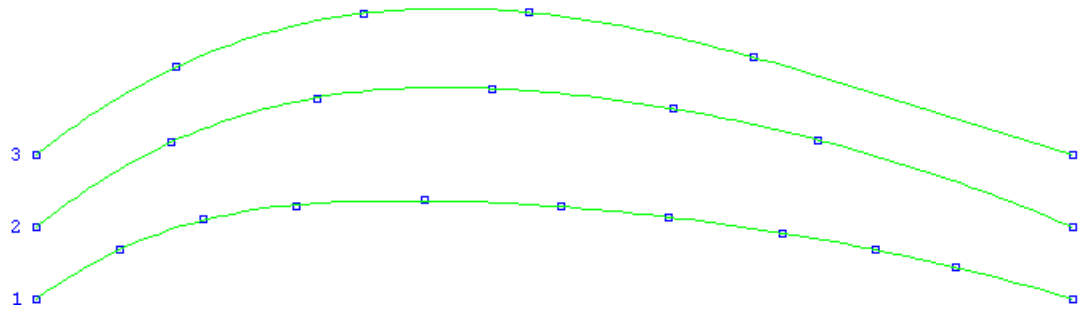
SailScan v2.21t 17-Jul-2001 for North Sails
C:\My Documents\Boat Files\Beneteau 36.7\Crocodile\Sail photos\M1 Hard Backstay SailScan.

Line	Front-%	Draft	Camber	Back-%	EntAng	ExitAng	Twisting
3:	0.76	0.41	14.14	0.67	34.33	16.98	-7.68
2:	0.78	0.40	13.50	0.74	34.24	21.20	-4.63
1:	0.83	0.37	9.52	0.75	30.16	15.29	0.00

Line	Luff	1/8	2/8	3/8	4/8	5/8	6/8	7/8	Leech
3:	1.26	1.47	1.59	1.39	1.00	0.64	0.29	0.00	0.25
2:	2.17	2.49	2.45	1.85	1.00	0.90	0.87	0.82	0.78
1:	4.59	4.81	3.11	1.18	1.00	0.83	0.87	1.04	1.16
3:	0.72	0.83	0.90	0.79	0.57	0.36	0.16	0.00	0.14
2:	0.26	0.30	0.30	0.22	0.12	0.11	0.11	0.10	0.09
1:	0.15	0.16	0.10	0.04	0.03	0.03	0.03	0.03	0.04

Boat Name: Crocodile B 36.7
Date: 8/14/02
Genoa Code: 3DL 860M M#1 150%
Notes: Rig - V1 50, D1 10, D2 to keep in column

True Wind Speed: 15-17 knots
Headstay Tension: Hard
Car Position:



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Advanced Tuning

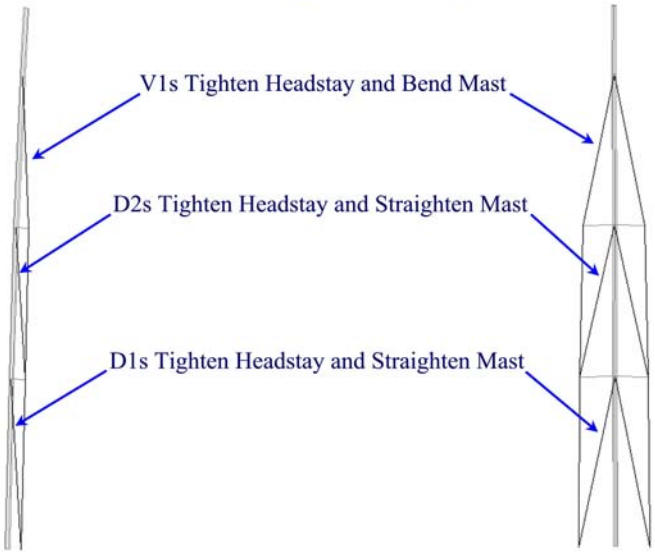
For club and casual racing, the base setting will provide a good all-purpose setting for most conditions. North standard designs have won many races using the base setting alone. For the more discerning eye, or sailing in heightened competition, some rig adjustment will be necessary. Below is an overview of the goals and results of rig tuning.

Changes to shroud tension affect the rig in two ways: 1) headstay tension & 2) mast bend. Tighter V1s generate more headstay tension by pulling back against the headstay. A good guide for V1 shroud tension is that the leeward shroud should just go slack in all but the heaviest of wind conditions. Tighter D1 (lower) and D2 (intermediate) shrouds generate more headstay tension by reducing mast bend and compression. The important factor of the D1 and D2 adjustment is the relationship to the amount of backstay used in each wind condition, which affects mainsail shape. Tight D1s and D2s will make the mast too straight (main too full and draft forward) when no backstay is used, and conversely loose D1s and D2s will allow the mast to bend too much (main too flat or even inverted) when a lot of backstay is used. The final D1 and D2 rig tension will be dictated by mainsail shape.

For boats with the Tuff Luff headstay, with an adjustable turnbuckle, changing the headstay length can control the V1, D1 and D2 tensions. As the headstay is shortened, the V1s, D1s, and D2s become tighter, which is desired in heavy air. A properly set up rig can be adjusted with headstay length alone for many conditions. A longer headstay will generate more prebend and sag, so the headsail gets more powerful without the main getting too full. In extreme conditions, small shroud adjustments will be necessary as well.

For boats that are racing with the Harken Furling headstay, adjustments must be made to the V1s, D1s and D2s because adjusting the headstay length with this system is difficult and should not be done on the water. On the following page there are matrixes of each tuning method that can be used with the different headstay styles. Even more advanced development will combine headstay and side shroud tensions for Tuff Luff headstay boats.

First 36.7 Rig Geometry



BENETEAU
FIRST 36.7

Beneteau First 36.7 Tuning Matrix - Tuff Luff Headstay							
Basic Set-Up							
Mast Butt:	26 cm from bulkhead to front of mast = 1 hole aft of max fwd.						
Headstay:	14.48 m measured from max hoist on centerline halyard to stem @ sheer.						
J:	3.98 m this is a fixed dimension with the collar, but should be checked.						
Pre Bend:	25 mm with no main up.						
Rig Tensions - Measured with Loos RT-11 Rod Gauge							
	V1		**D1**		**D2**	**Headstay**	
	Loos	**Turns**	**Loos**	**Turns**	**Turns**	**Length**	**Turns**
0 - 6 kts	39	-2	0	-2	-1	14.48m	-8
6 - 10 kts	42	-1	5	-1	base	14.49m	-4
10 - 14 kts	45	base	10	base	base*	14.48m	
14 - 18 kts	47	+1	15	+1	base	14.47m	+4
18+ kts	50	+2	20	+2	+1	14.46m	+8

* Base setting for the D2s should be fine-tuned under sail to keep rig in column.

Beneteau First 36.7 Tuning Matrix - Harken Furling Headstay							
Basic Set-Up							
Mast Butt:	26 cm from bulkhead to front of mast = 1 hole aft of max fwd.						
Headstay:	14.48 m measured from max hoist on centerline halyard to stem @ sheer.						
J:	3.98 m this is a fixed dimension with the collar, but should be checked.						
Pre Bend:	25 mm with no main up.						
Rig Tensions - Measured with Loos RT-11 Rod Gauge							
	V1		**D1**		**D2**	**Headstay**	
	Loos	**Turns**	**Loos**	**Turns**	**Turns**	**Length**	**Turns**
0 - 6 kts	39	-3	0	-2	-1	14.48m	base
6 - 10 kts	42	-1.5	5	-1	base	14.48m	base
10 - 14 kts	45	base	10	base	base*	14.48m	base
14 - 18 kts	47	+1.5	15	+1	base	14.48m	base
18+ kts	50	+3	20	+2	+1	14.48m	base

* Base setting for the D2s should be fine-tuned under sail to keep rig in column.

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Beneteau First 36.7 Quick Reference Tuning Guide

Harken Furling Headstay

Basic Set-Up	
Mast Butt:	26 cm from bulkhead to front of mast = 1 hole aft of max fwd.
Headstay:	2.1 m arc measurement*.
J:	3.98 m this is a fixed dimension with the collar, but should be checked.
Pre Bend:	25 mm with no main up.

Rig Tensions - Measured with Loos RT-11 Rod Gauge							
	V1		**D1**		**D2**	**Headstay**	
	Loos	**Turns**	**Loos**	**Turns**	**Turns**	**Length**	**Turns**
0 - 6 kts	39	-3	0	-2	-1	2.1m	base
6 - 10 kts	42	-1.5	5	-1	base	2.1m	base
10 - 14 kts	45	base	10	base	base*	2.1m	base
14 - 18 kts	47	+1.5	15	+1	base	2.1m	base
18+ kts	50	+3	20	+2	+1	2.1m	base

*** Arc measurement** - pull genoa halyard to the top of the black band @ the gooseneck. Swing the halyard out to the headstay and make a mark. Measure from mark down to the deck at the headstay intersection.

* Base setting for the D2s should be fine tuned under sail to keep rig in column.

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Beneteau First 36.7 Quick Reference Tuning Guide

Tuff Luff Headstay

Basic Set-Up	
Mast Butt:	26 cm from bulkhead to front of mast = 1 hole aft of max fwd.
Headstay:	2.09 m arc measurement*
J:	3.98 m this is a fixed dimension with the collar, but should be checked.
Pre Bend:	25 mm with no main up.

Rig Tensions - Measured with Loos RT-11 Rod Gauge

	V1		D1		D2	Headstay	
	Loos	**Turns**	**Loos**	**Turns**	**Turns**	**Length**	**Turns**
0 - 6 kts	39	-2	0	-2	-1	2.11m	-8
6 - 10 kts	42	-1	5	-1	base	2.1m	-4
10 - 14 kts	45	base	10	base	base**	2.09m	
14 - 18 kts	47	+1	15	+1	base	2.08m	+4
18+ kts	50	+2	20	+2	+1	2.07m	+8

*** Arc measurement** - pull genoa halyard to the top of the black band @ the gooseneck. Swing the halyard out to the headstay and make a mark. Measure from mark down to the deck at the headstay intersection.

** Base setting for the D2s should be fine tuned under sail to keep rig in column.