Corbin 39

Hull design – preliminary analysis

working slides to support collaboration of all of us

with many thanks to Jean-François Masset

Broader goals

- To better understand the various design & technical operational aspects of the Corbin 39 (both sailing & stability);
- To seek to understand the extent of, and curability of, the weather helm issue (especially to help mk1 owners);
- To create the minimum items needed as part of the EU RCD Technical File (i.e. GZ curve and STIX);
- To properly document the design for reference in the future ;
- To learn !

Introduction

Jean-François Masset

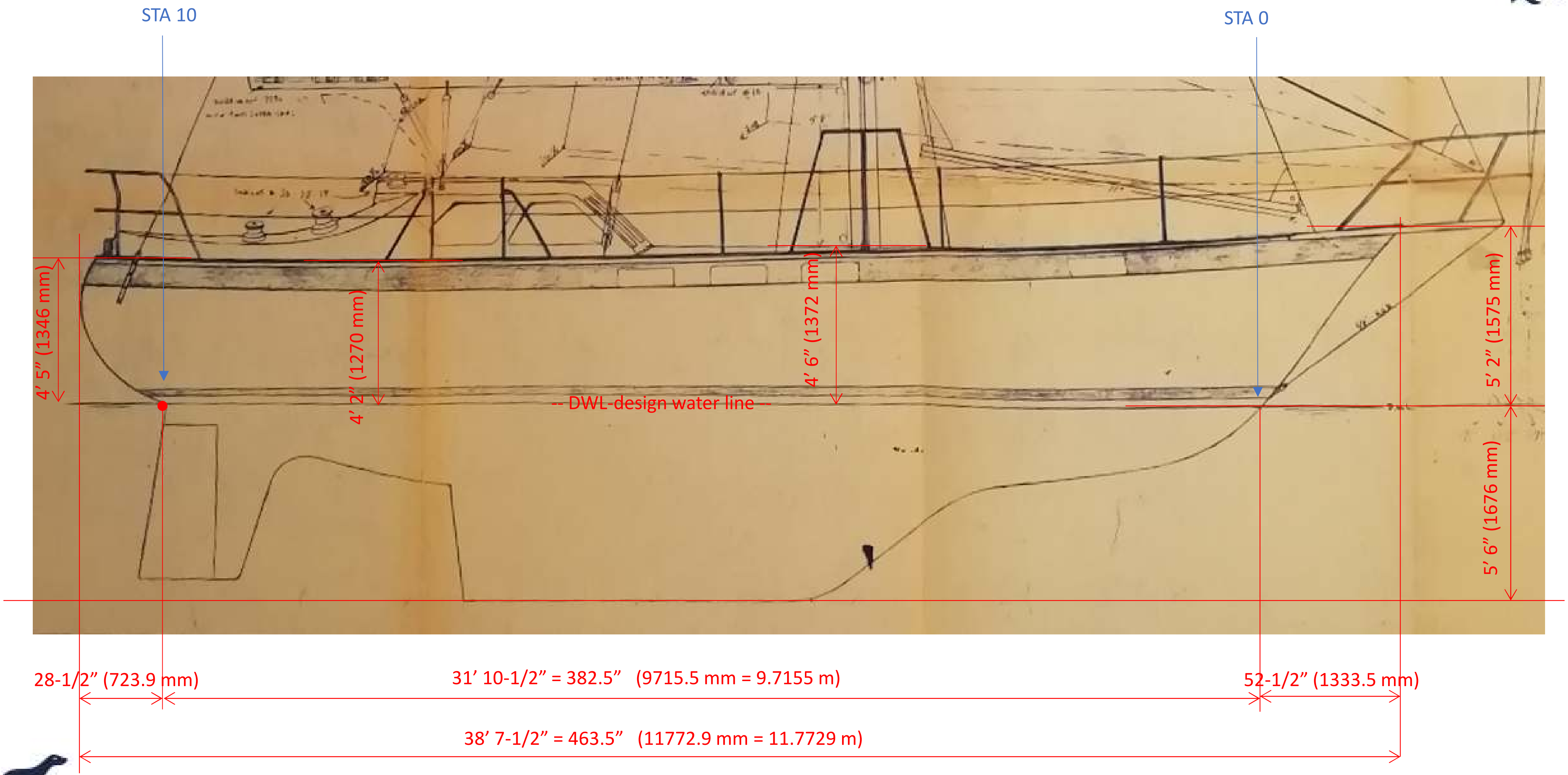
- Is a retired naval architect assisting us as a volunteer.
- He created the free Gene-Hull spreadsheet program we are using to conduct the preliminary analysis.
- Further analysis will be needed, but this is a start.

Corbin 39

- The actual hulls are all from the same mould. But there are many fitting out and rigging options.
- The original hull lines drawing by Robert Dufour are subject to copyright restrictions and are drawn in imperial measurements. The original Robert Dufour rigging drawings are freely available.
- There may be inconsistencies in the Marius Corbin manufacturer’s brochures and drawings.
- So the first task is to create new hull lines drawings and a hull model, and to minimise the inconsistencies, and to create a **validated** basis for further work.
- These slides help explain what we are doing and help everyone to contribute.

Side elevation of a mk2 pilothouse version with cutter rig - note the hull is common to all Corbin 39

STA 10 at DWL is the datum point for many measurements. It is at the aft intersection of the hull with the rudder & skeg



Question 1.

We are trying to establish how well the **as-designed** hull drawings correspond to the **as-built** Corbin 39 hulls. **You can assist us with this.**

To do this we can compare the calculated volume of the submerged part of the hull at its design draught, with the actual position of the waterline of the hull and its actual weight. This assists us to **validate** the hull model.

The volume of the submerged part of the hull is of course a function of the weight of the boat when hanging in a crane hook, and the density of the water in which it was previously.

At this stage any estimated or observed data is helpful, even if we cannot yet conduct proper tests.

QUESTION 1: So the question is fourfold:

a. Where is the waterline on your Corbin ?

b. Are you measuring your waterline when floating in fresh water or in salt water ?

c. How much does your Corbin weigh when you lift her in/out ?

d. What is the 'condition' of your Corbin when you are weighing her ?

The ideal weighing & waterline measurement condition is the "lightship" condition, which is the design waterline on the drawings. This is when the vessel is complete and ready for service in every respect, including permanent ballast, (normal, but not excessive) spare parts, lubricating oil, and working stores but is without fuel, cargo, drinking or washing water, officers, crew, passengers, their effects, temporary ballast or any other variable load. If you cannot give a weight in the lightship condition please state what the actual condition is and we can estimate a correction.

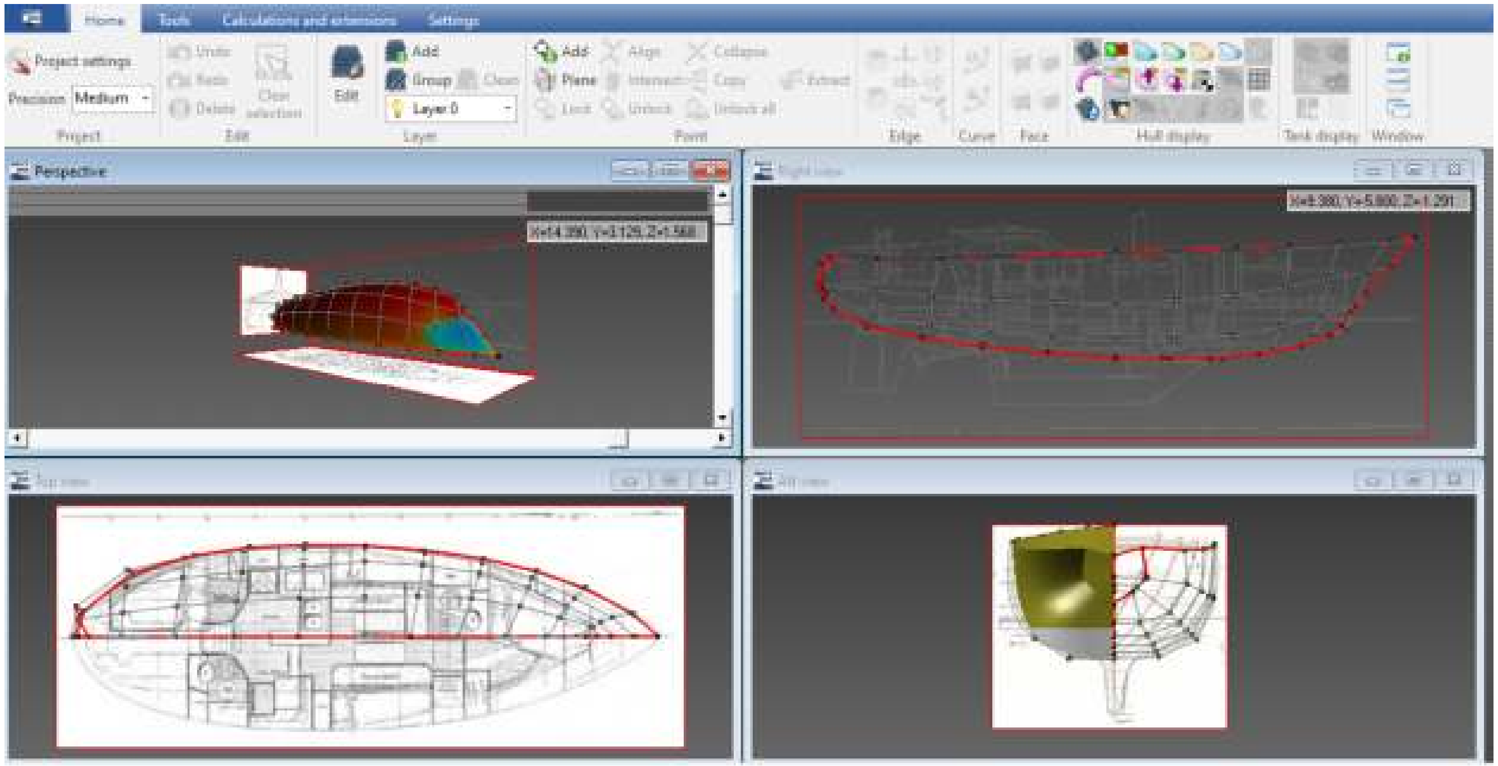
You can state your waterline position any way you like. So you could state the actual exact draught (for info: the design draught in lightship condition was nominally 5'6" = 1676mm) and also comment whether your keel has been modified (as some have been). Or you could give a freeboard at one or more of the three noted positions (stern, bow, and the freeboard low point which is station #8 midway between keel aft edge and skeg fwd edge). Or you could comment on where the 'scumline' sits in relation to the aft datum point which is at the intersection of the stern and the rudder skeg.

EXAMPLE ANSWER

As an example for my #123, "Bockra" I was given an approximate "hook weight" by the crane operator at the last lift-out of 15,000 kg, and then I destored about 1,000 kg of excess spare parts, excess tools, clutter, fuel, and water to bring her to approximately 14,000 kg in lightship. I will check more carefully when I next do a lift as those are very approximate numbers. And on Bockra in the heavier condition the scumline is approximately 6" (150mm) above the stern datum point when floating in seawater (see photos).

What comes next

A few years ago I did this quick try at doing the hull lines in Delftship, using only easy-to-locate internet data. Now we are trying to do this for real, and then conduct all the interesting analysis that this will enable.

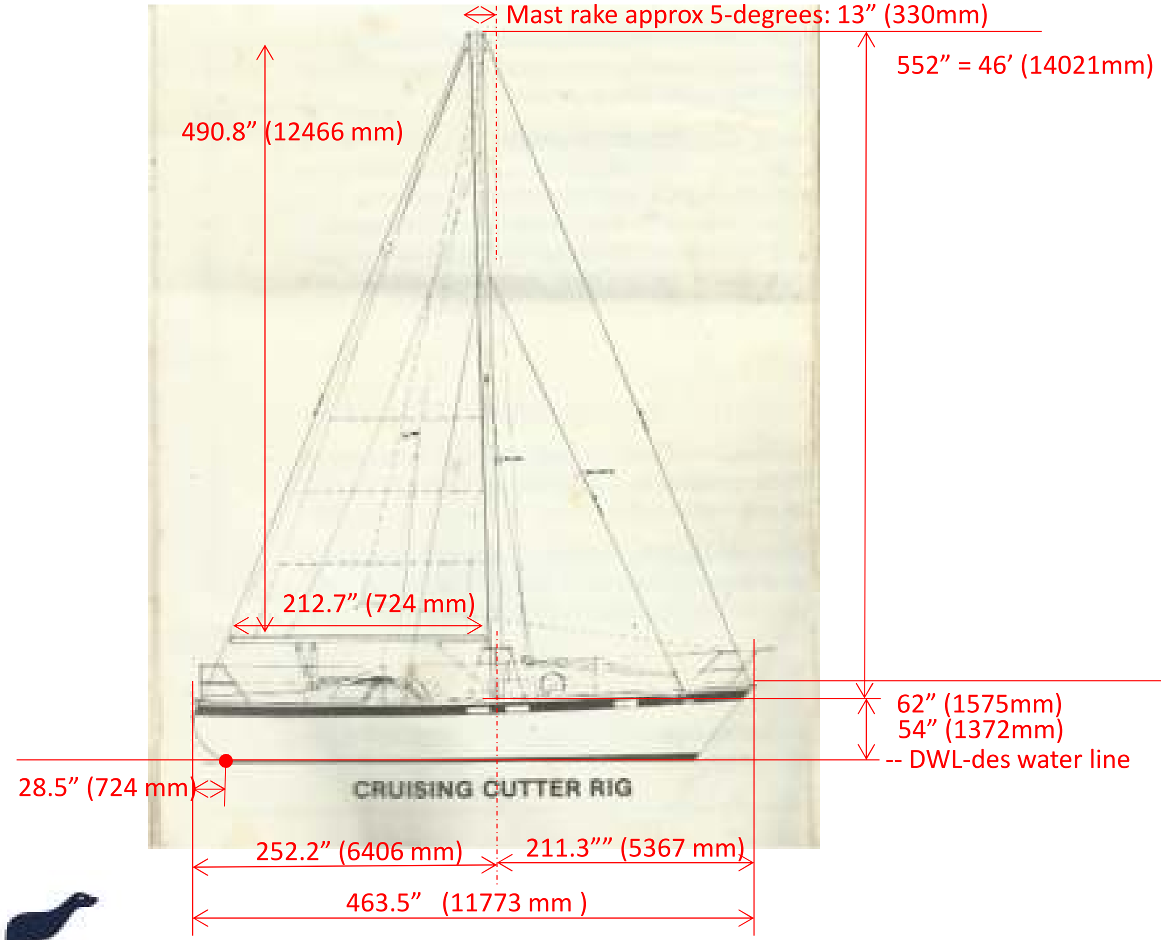


Datum point

Scum line is waterline on Bockra in heavy condition

Sailplans – Corbin 39 Mk1 shortmast 46’ ‘cruising’ cutters with single spreader – measurements for calculations

WARNING : These measurements are taken from old drawings and are intended for performance/design calculation purposes only.
Do not assume they are correct for equipment / spar / sail ordering or manufacture.
Also not all Corbins used the same mast & spar suppliers, or even the ‘standard’ dimensions. Measure your own boat !



		inch	ft inch	mm
	stern vertical to mast centre (x)	252.2	21 ft. 0.2 in.	6,406
	stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773
	stern vertical to bowsprit (x)	-	-	-
	DWL to mast foot (z)	54.0	4 ft. 6 in.	1,372
	DWL to bow (z)	62.0	5 ft. 2 in.	1,575
	DWL to boom (z)	115.2	9 ft. 7.2 in.	2,926
	boom length (x)	212.7	17 ft. 8.7 in.	5,403
	mast height from mast foot (z)	552.0	46 ft. 0 in.	14,021
	mast height above DWL (z)	606.0	50 ft. 6 in.	15,392
I	Foretriangle height	552.0	46 ft. 0 in.	14,021
J	Foretriangle base	207.2	17 ft. 3.2 in.	5,263
	100% triangle area, theoretical		397.1 sq ft	36.9 m2
P	Mainsail hoist	490.8	40 ft. 10.8 in.	12,466
E	Mainsail foot	190.8	15 ft. 10.8 in.	4,846
	100% triangle area, theoretical		325.2 sq ft	30.2 m2
Iy	Inner staysail height	349.0	29 ft. 1 in.	8,865
Jy	Inner staysail base	144.0	12 ft. 0 in.	3,658
	100% triangle area, theoretical		174.5 sq ft	16.2 m2
EY	Mizzen mainsail foot			
PY	Mizzen mainsail hoist			
	100% triangle area, theoretical		0 sq ft	0 m2
	100% triangle area, total theoretical		896.8 sq ft	83.3 m2
ISP	Spinnaker halyard elevation			
TPS/STL	Bowsprit length			
	100% triangle area		0 sq ft	0 m2

Sailplans – Corbin 39 Mk1 tallmast 51' cutters with double spreader – measurements for calculations

WARNING : These measurements are taken from old drawings and are intended for performance/design calculation purposes only.
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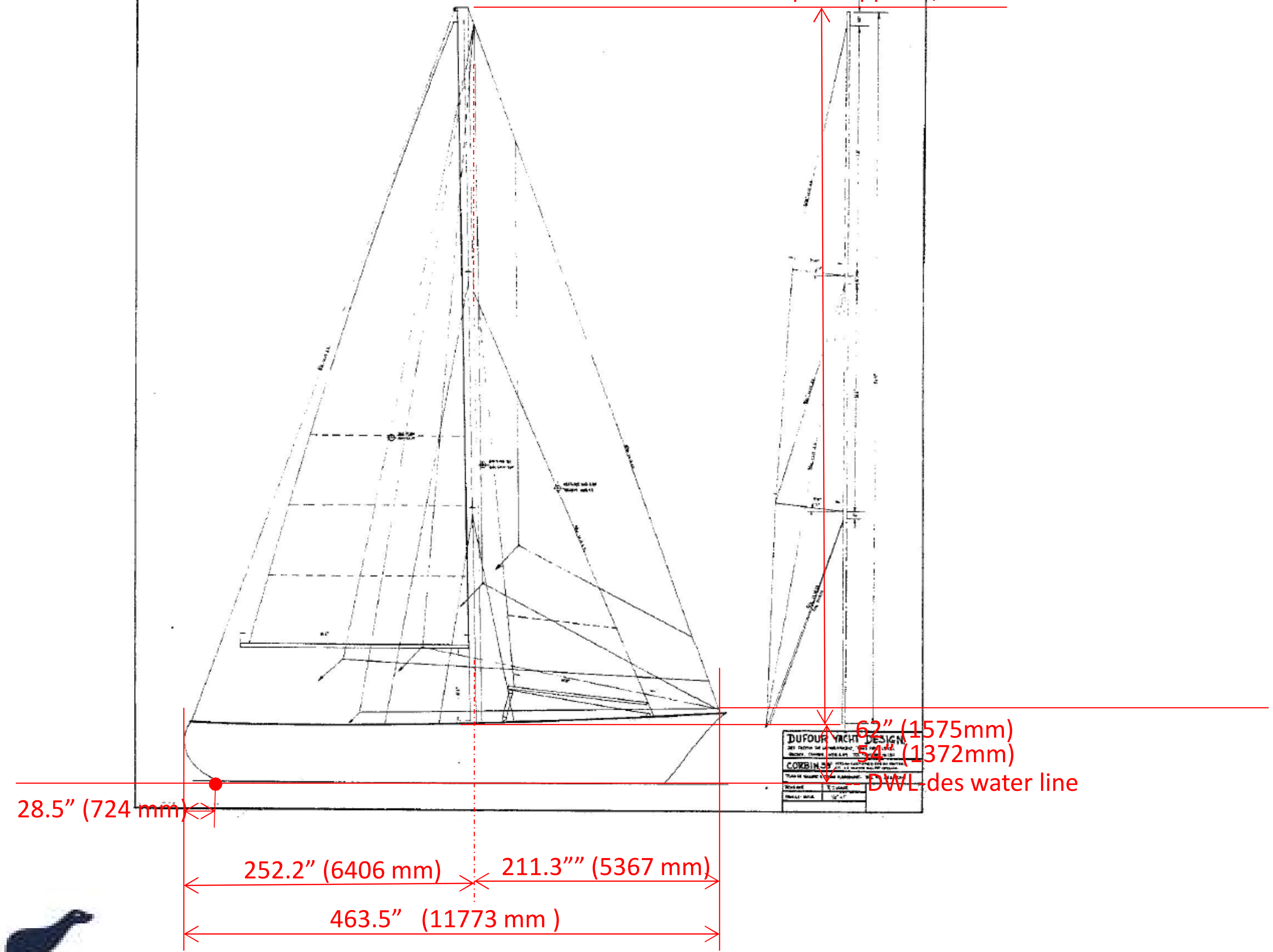
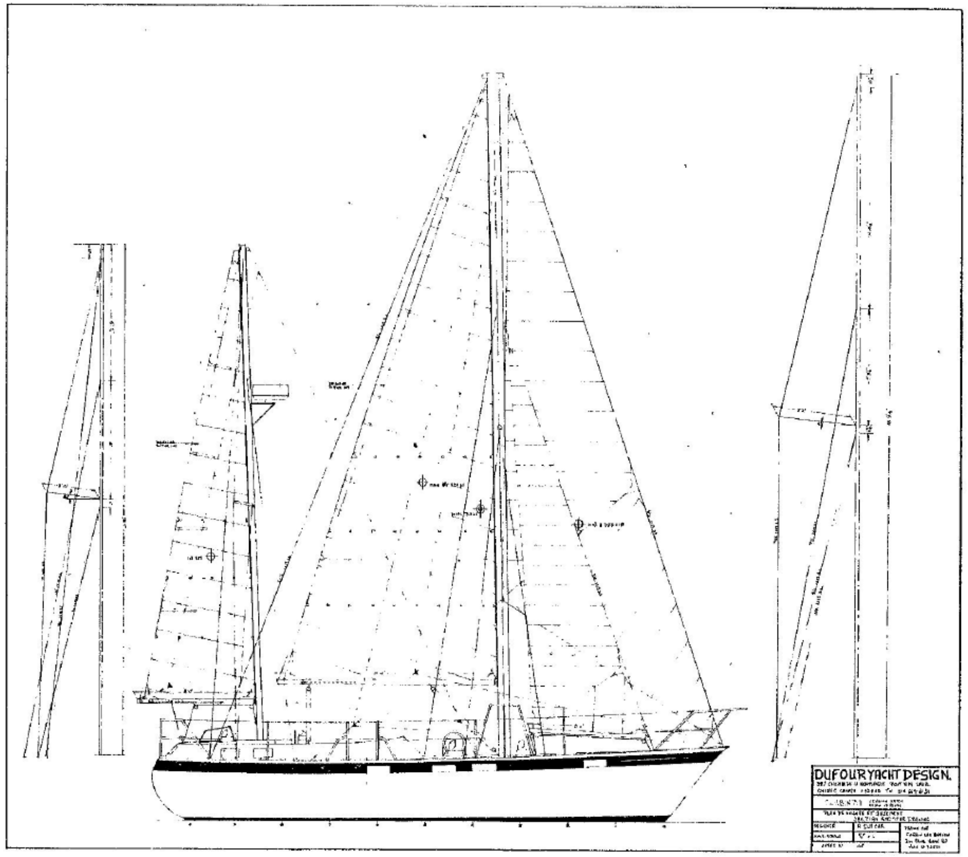
Also not all Corbins used the same mast & spar suppliers, or even the 'standard' dimensions. Measure your own boat !



		inch	ft inch	mm
	stern vertical to mast centre (x)	252.2	21 ft. 0.2 in.	6,406
	stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773
	stern vertical to bowsprit (x)	-	-	-
	DWL to mast foot (z)	54.0	4 ft. 6 in.	1,372
	DWL to bow (z)	62.0	5 ft. 2 in.	1,575
	DWL to boom (z)	115.2	9 ft. 7.2 in.	2,926
	boom length (x)	193.0	16 ft. 1 in.	4,902
	mast height from mast foot (z)	612.0	51 ft. 0 in.	15,545
	mast height above DWL (z)	606.0	50 ft. 6 in.	15,392
I	Foretriangle height	610.0	50 ft. 10 in.	15,494
J	Foretriangle base	207.2	17 ft. 3.2 in.	5,263
	100% triangle area, theoretical		438.9 sq ft	40.8 m2
P	Mainsail hoist	490.8	40 ft. 10.8 in.	12,466
E	Mainsail foot	181.5	15 ft. 1.5 in.	4,610
	100% triangle area, theoretical		309.3 sq ft	28.7 m2
Iy	Inner staysail height	367.0	30 ft. 7 in.	9,322
Jy	Inner staysail base	144.0	12 ft. 0 in.	3,658
	100% triangle area, theoretical		183.5 sq ft	17 m2
EY	Mizzen mainsail foot			
PY	Mizzen mainsail hoist			
	100% triangle area, theoretical		0 sq ft	0 m2
	100% triangle area, total theoretical		931.7 sq ft	86.6 m2
ISP	Spinnaker halyard elevation			
TPS/STL	Bowsprit length			
	100% triangle area		0 sq ft	0 m2

Sailplans – Corbin 39 Mk1 ketch with 46’ single spreader mast – measurements for calculations

WARNING : These measurements are taken from old drawings and are intended for performance/design calculation purposes only.
Do not assume they are correct for equipment / spar / sail ordering or manufacture.
Also not all Corbins used the same mast & spar suppliers, or even the ‘standard’ dimensions. Measure your own boat !



		inch	ft inch	mm
	stern vertical to mast centre (x)	284.2	23 ft. 8.2 in.	7,219
	stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773
	stern vertical to bowsprit (x)	-	-	-
	DWL to mast foot (z)	54.0	4 ft. 6 in.	1,372
	DWL to bow (z)	62.0	5 ft. 2 in.	1,575
	DWL to boom (z)	123.0	10 ft. 3 in.	3,124
	boom length (x)	173.0	14 ft. 5 in.	4,394
	mast height from mast foot (z)	552.0	46 ft. 0 in.	14,021
	mast height above DWL (z)	606.0	50 ft. 6 in.	15,392
I	Foretriangle height	550.4	45 ft. 10.4 in.	13,980
J	Foretriangle base	174.0	14 ft. 6 in.	4,420
	100% triangle area, theoretical		332.5 sq ft	30.9 m2
P	Mainsail hoist	483.0	40 ft. 3 in.	12,268
E	Mainsail foot	172.0	14 ft. 4 in.	4,369
	100% triangle area, theoretical		288.5 sq ft	26.8 m2
Iy	Inner staysail height	340.0	28 ft. 4 in.	8,636
Jy	Inner staysail base	112.0	9 ft. 4 in.	2,845
	100% triangle area, theoretical		132.2 sq ft	12.3 m2
EY	Mizzen mainsail foot	93.0	7 ft. 9 in.	2,362
PY	Mizzen mainsail hoist	363.0	30 ft. 3 in.	9,220
	100% triangle area, theoretical		117.2 sq ft	10.9 m2
	100% triangle area, total theoretical		753.2 sq ft	70 m2
ISP	Spinnaker halyard elevation			
TPS/STL	Bowsprit length			
	100% triangle area		0 sq ft	0 m2
	mizzen mast height from mast foot	398.0	33 ft. 2 in.	10,109
	mizzen mast boom height above DWL	96.5	8 ft. 0.5 in.	2,451

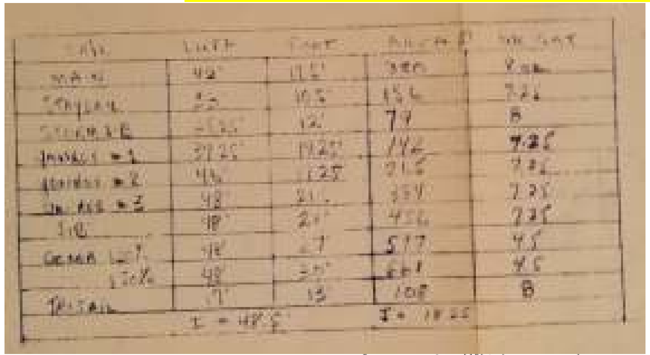
Sailplans – Corbin 39 Mk1 modified cutter with & bowsprit – measurements for calculations

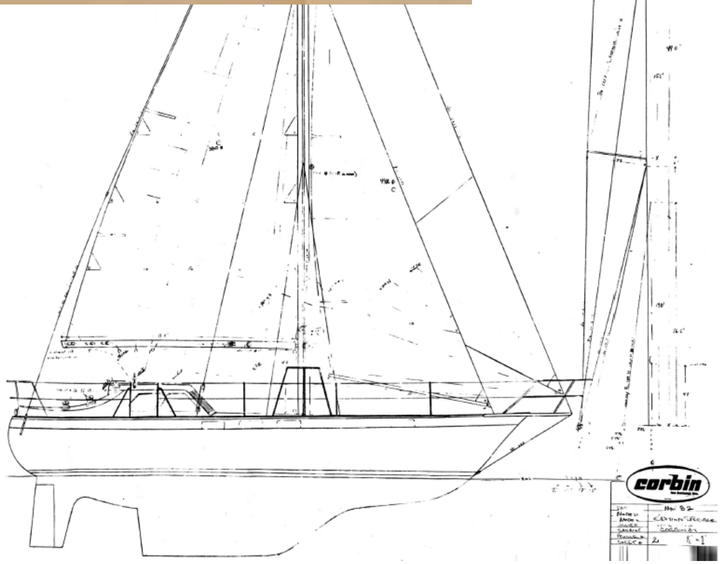
See ‘collected’ tab
in spreadsheet

Sailplans – Corbin 39 Mk2 cutter with double spreader – measurements for calculations

WARNING : These measurements are taken from old drawings and are intended for performance/design calculation purposes only.
Do not assume they are correct for equipment / spar / sail ordering or manufacture.
Also not all Corbins used the same mast & spar suppliers, or even the 'standard' dimensions. Measure your own boat !

NOTE : The mast location shown in this drawing (which is by Corbin, not Dufour) does not correspond with information from owners.
For performance purposes the information from owners has been shown in the table and is used in calculations.





		inch	ft inch	mm
	stern vertical to mast centre (x)	284.2	23 ft. 8.2 in.	7,219
	stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773
	stern vertical to bowsprit (x)	499.5	41 ft. 7.5 in.	12,687
	DWL to mast foot (z)	54.0	4 ft. 6 in.	1,372
	DWL to bow (z)	62.0	5 ft. 2 in.	1,575
	DWL to boom (z)	118.0	9 ft. 10 in.	2,997
	boom length (x)	212.0	17 ft. 8 in.	5,385
	mast height from mast foot (z)	594.0	49 ft. 6 in.	15,088
	mast height above DWL (z)	606.0	50 ft. 6 in.	15,392
I	Foretriangle height	594.0	49 ft. 6 in.	15,088
J	Foretriangle base	235.1	19 ft. 7.1 in.	5,972
	100% triangle area, theoretical		484.9 sq ft	45 m2
P	Mainsail hoist	504.0	42 ft. 0 in.	12,802
E	Mainsail foot	210.0	17 ft. 6 in.	5,334
	100% triangle area, theoretical		367.5 sq ft	34.1 m2
Iy	Inner staysail height	416.5	34 ft. 8.5 in.	10,579
Jy	Inner staysail base	164.0	13 ft. 8 in.	4,166
	100% triangle area, theoretical		237.2 sq ft	22 m2
EY	Mizzen mainsail foot			
PY	Mizzen mainsail hoist			
	100% triangle area, theoretical		0 sq ft	0 m2
	100% triangle area, total theoretical		1089.6 sq ft	101.2 m2
ISP	Spinnaker halyard elevation			
TPS/STL	Bowsprit length			
	100% triangle area		0 sq ft	0 m2

Collected

See 'collected' tab in spreadsheet for readable version !

		mk1 cutter 46' shortmast			mk1 cutter 51' tallmast			mk1 ketch 46' mast	
	inch	ft inch	mm	inch	ft inch	mm	inch	ft inch	mm
MEASURED OFF PLANS by Dufour									
stern vertical to mast centre (x)	252.2	21 ft. 0.2 in.	6,406	252.2	21 ft. 0.2 in.	6,406	284.2	23 ft. 8.2 in.	7,219
stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773	463.5	38 ft. 7.5 in.	11,773	463.5	38 ft. 7.5 in.	11,773
stern vertical to bowsprit (x)	-	-	-	-	-	-	-	-	-
DWL to mast foot (z)	54.0	4 ft. 6 in.	1,372	54.0	4 ft. 6 in.	1,372	54.0	4 ft. 6 in.	1,372
DWL to bow (z)	62.0	5 ft. 2 in.	1,575	62.0	5 ft. 2 in.	1,575	62.0	5 ft. 2 in.	1,575
DWL to boom (z)	115.2	9 ft. 7.2 in.	2,926	115.2	9 ft. 7.2 in.	2,926	123.0	10 ft. 3 in.	3,124
boom length (x)	212.7	17 ft. 8.7 in.	5,403				173.0	14 ft. 5 in.	4,394
mast height from mast foot (z)	552.0	46 ft. 0 in.	14,021	612.0	51 ft. 0 in.	15,545	552.0	46 ft. 0 in.	14,021
mast height above DWL (z)	606.0	50 ft. 6 in.	15,392	606.0	50 ft. 6 in.	15,392	606.0	50 ft. 6 in.	15,392
foretriangle, 100% area		397.1 sq ft	36.9 m2		438.9 sq ft	40.8 m2		332.5 sq ft	30.9 m2
mainsail, 100% triangle area		325.2 sq ft	30.2 m2		309.3 sq ft	28.7 m2		288.5 sq ft	26.8 m2
staysail, 100% triangle area		174.5 sq ft	16.2 m2		183.5 sq ft	17 m2		132.2 sq ft	12.3 m2
mizzen mainsail, 100% triangle area		0 sq ft	0 m2		0 sq ft	0 m2		117.2 sq ft	10.9 m2
total sail, 100% triangle area		896.8 sq ft	83.3 m2		931.7 sq ft	86.6 m2		753.2 sq ft	70 m2
							32.0	inches between mast locations	
		mk1 cutter 46' shortmast c/w typical bowsprit modification			mk1 cutter 51' tallmast c/w typical bowsprit modification			n/a	
	inch	ft inch	mm	inch	ft inch	mm	inch	ft inch	mm
TYPICAL based on owner info									
stern vertical to mast centre (x)	252.2	21 ft. 0.2 in.	6,406	252.2	21 ft. 0.2 in.	6,406			
stern vertical to bow (x)	463.5	38 ft. 7.5 in.	11,773	463.5	38 ft. 7.5 in.	11,773		n/a	
stern vertical to bowsprit (x)	499.5	41 ft. 7.5 in.	12,687.3	499.5	41 ft. 7.5 in.	12,687.3		(believe none modified)	
DWL to mast foot (z)	54.0	4 ft. 6 in.	1,371.6	54.0	4 ft. 6 in.	1,371.6			
DWL to bow (z)	62.0	5 ft. 2 in.	1,574.8	62.0	5 ft. 2 in.	1,574.8			
DWL to boom (z)	115.2	9 ft. 7.2 in.	2,926.1	115.2	9 ft. 7.2 in.	2,926.1			
boom length (x)	212.7	17 ft. 8.7 in.	5,402.6	-	-	-			
mast height from mast foot (z)	552.0	46 ft. 0 in.	14,020.8	612.0	51 ft. 0 in.	15,544.8			
mast height above DWL (z)	606.0	50 ft. 6 in.	15,392.4	606.0	50 ft. 6 in.	15,392.4			
foretriangle, 100% area	typically as per mk1, set onto new forestay			typically as per mk1, set onto new forestay					
mainsail, 100% triangle area	typically as per mk1			typically as per mk1					
staysail, 100% triangle area	typically as per mk1			typically as per mk1					
mizzen mainsail, 100% triangle area									
total sail, 100% triangle area									
					mk2 cutter 49' tallmast			mk2 ketch	
				inch	ft inch	mm	inch	ft inch	mm
MEASURED OFF PLANS by Marius Corbin with known drawing errors corrected									
stern vertical to mast centre (x)				284.2	23 ft. 8.2 in.	7,219			
stern vertical to bow (x)		n/a		463.5	38 ft. 7.5 in.	11,773		no drawing located yet	
stern vertical to bowsprit (x)		(believe none built)		499.5	41 ft. 7.5 in.	12,687			
DWL to mast foot (z)				54.0	4 ft. 6 in.	1,372			
DWL to bow (z)				62.0	5 ft. 2 in.	1,575			
DWL to boom (z)				118.0	9 ft. 10 in.	2,997			
boom length (x)				212.0	17 ft. 8 in.	5,385			
mast height from mast foot (z)				594.0	49 ft. 6 in.	15,088			
mast height above DWL (z)				606.0	50 ft. 6 in.	15,392			
foretriangle, 100% area					484.9 sq ft	45 m2			
mainsail, 100% triangle area					367.5 sq ft	34.1 m2			
staysail, 100% triangle area					237.2 sq ft	22 m2			
mizzen mainsail, 100% triangle area					0 sq ft	0 m2			
total sail, 100% triangle area					1089.6 sq ft	101.2 m2			
				36.0	inches of bowsprit				