

JOURNAL OF ROLLOVER AND DISMASTING OF WESTSAIL 32 'AISSA'
BY MICHAEL JOHNSON, OWNER

The following events are from the journal of the Westsail 32 'AISSA', owned and skippered by Michael Johnson, during March, 1990, sailing off the southern tip of New Zealand.

March 22, 1990. RW spotted two seals yesterday. The weather has been cool, but generally very good and mild with winds out of the W and SW. We have passed the latitude of South West Cape on Stewart Island. This is the second most southerly of the five great southern capes. We have also passed south of North Trap, South Trap and the Snares Islands - names that suggest tales - and are now near 49 degrees S. latitude. Since yesterday, the winds have been at near gale force and this morning we are in a full gale with winds of near 40 knots out of the SW. The barometer began to fall about noon yesterday, and continued to drop until midnight, when it steadied again. The double reefed main came down at dark. AISSA reached slowly SE under storm jib all night, generally riding the increasingly large seas well. No decrease in wind strength at daylight.

1000 - Winds were alternately strong, with the rigging whining, and then more moderate. Several hailstorms passed by dumping pea sized hailstones on the deck. The seas were large, but not dangerous looking in terms of steepness. Occasionally broken water from a wave would strike AISSA a blow and she would stagger, but sometimes an hour would pass without more than one of these hitting her. I had been told that because of the Campbell Plateau, an underwater rise running SW of South Island, there were sometimes unusually steep seas and swells in this area of the ocean. I was aware of this, but on this day saw no cause for alarm. I had earlier considered that my options were to: (1) continue on to the SE as close on the wind as the storm jib would allow, (2) heave to in a NWly direction with the storm jib backed, (3) stream the sea anchor from the bow, or (4) run in an easterly direction before the wind. However, by the middle of the day conditions seemed as if they were moderating somewhat and the barometer had risen from 29.89 at 0600 to 30.17 at 1000. Shortly before 1400 I looked out the companionway and everything seemed about the same. Both RW and I were below when without any unusual noise AISSA was lifted up and began to go over to port. I was on the starboard pipe berth and RW was at the table. As we continued over I became aware that AISSA was not going to right herself. I crashed into the overhead skylight seeing the blue glass whales up close and realizing that AISSA was upside down. I remember wondering if we would go right on over 360 degrees, or roll back upright as we had gone over. We seemed to hang upside down momentarily, and then AISSA righted herself by rolling right on over. All below was chaos. Cans of food, broken table, cushions, charts, ketchup, books, broken glass, kerosene, water all mixed together, without a place to stand. RW was in a heap near the stove and I was under the skylight. At first she made no response to my calls, but finally groggily said she was alright. I jumped over her and looked out upon the deck, knowing what I was going to find, but still finding it a sight I had hoped never to see. The deck was swept clean of mast, boom, rigging and dingy. The life lines and stanchions supporting them were smashed - the pulpit a twisted mass of tubes, the boom gallows jagged and broken. The wire standing rigging was off to starboard attached to the mast and boom which I could see pulled at the chainplates. I was concerned to put distance between the hull and the mast as there was a danger that AISSA might be holed and mortally wounded by the spars still bound to her. I had RW begin to get to the bilges to check for flooding while I used the bolt cutters to cut the shrouds and stays. I cut the backstay above the turnbuckle - then the running backstays - then the three port shrouds. At this point I stopped and tried to devise some plan to

save part of the rig. I thought it unlikely I could ever recover the mast, but I thought I might save the boom and perhaps the sail to use as a jury rig if I could hold onto them until the seas moderated. I looked forward, and to my dismay saw the bowsprit flexing greatly under the drag of the submerged rig. I crawled out on the smashed platform with the bolt cutters and finally managed to cut the headstay, relieving the bowsprit. On the way back I also cut the staysail stay, saving the staysail and club from going over should the mast pull free. The mast was now attached by the three starboard shrouds and the mainsail halyard. RW reported water was flowing into the bilge, but not at a great rate, indicating there were no bad leaks. The large seas continued to work the boat and the submerged mast.

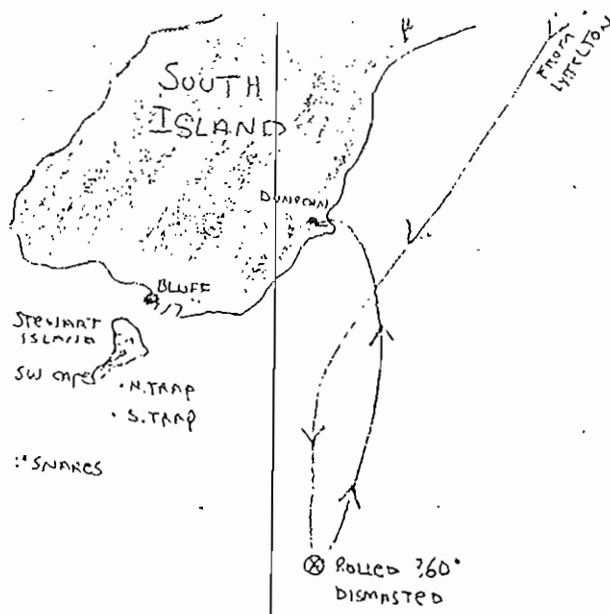


The chainplates distorted and began to snap the bolts and pull free from the boat's topsides. I cut the aft shroud and tried to cut the other two, but the reach was, by this time, too far. I finally released them, pulling the safety rings and knocking out the pins. The mast now was connected only by the halyard and this streamed it some distance from the hull. I went below and we pumped the bilges. The water was controllable. The starboard fuel tank had broken away, but was still sitting upright in the engine compartment, with the fill pipe open and slopping out fuel. Both batteries had broken loose, but were unbroken, although drained. I reconnected the batteries and braced the fuel tank to keep it from turning over. The engine checked out, and I tried to start it - it ran - I shut it down and went back topsides to check on the mast. It had chafed through the halyard and was gone. I rewired the SAT NAV and tried it - it also worked, and gave us a position about 1600, of 48 59' S Lat, 170 37' E Long. RW and I had earlier secured the skylight which had a broken latch and had lashed down the lazarette hatch to keep the breaking seas out. While working on the latter, I had been struck by a large green wave which washed me toward the side. The only thing that stopped me going over through the broken lifelines was the winch which caught me short. I was later to learn that this had cracked a piece of bone out of my lower rib and broken it.

Taking inventory at this stage, we had lost the mast, boom, standing rigging, running rigging, mainsail, storm trysail, dingy, 5 gallon Jerry can of diesel fuel, as well as assorted boathooks, oars and small gear lashed on deck. The stanchions were smashed, the pulpit and boom gallows destroyed, and the skylight and lazarette hatches broken open. We had the staysail club and the whisker pole with which to create spars for a jury rigged sail. We had plenty of sails and wire rope, food and water and diesel fuel, and most important, the hull and rudder were undamaged. Our position was approximately 180 miles S of Otago Harbor (Dunedin) and 170 miles SE of Bluff. The wind was still gale force out of the SW, but things looked promising. We had several options for propulsion, and land was not so far away. On the other hand, if we had been forced to abandon AISSA for the life raft, I think our chances would have been minimal with the cold and the westerly winds and easterly drift. By evening we had cleared away enough below to move around. The abrupt motion of the boat made it difficult to work or rest, but as night fell we changed into dry clothes and tried to get some sleep. Setting an alarm to periodically check the bracing on the wedged and plugged fuel tank. Sometime past 2200 the fuel tank shifted and wedged against the engine. I was afraid in this position it would damage the engine. We started to work trying to move it with levers back up on the remaining starboard shelf. This proved impossible with the nearly 35 gallons of fuel it contained, our positions, and the seas throwing us about. I tried to devise some means of pumping the fuel from the loose starboard tank to the secured port tank. The port tank had shifted but had not broken loose, probably because it was partially empty and lighter. Because of the tubing available and the distance between tanks, nothing could be devised to shift the fuel within the engine compartment. The only other option available was to siphon the fuel from the starboard tank into our remaining five gallon Jerry jug - carry this onto the deck, with an occasional sea still breaking over the stern and pour it through a funnel into the port tank without allowing any water to mix with the fuel as it was being transferred. I braced the tank in the engine room, holding it as the boat rolled. RW siphoned the fuel and carried five Jerry cans onto the deck and poured them into the port tank. After this, we were able to force the tank up on the shelf - nail some bracing around it, and secure it with rope and Spanish windlasses. By this time it was 0300 and we were covered with diesel fuel, but we had saved the engine from damage.

On the morning of the 23rd we started out early to work. I checked the electrical system and reconnected all of the fuel lines. Then we started to work topsides, cutting away and securing all loose gear and lines. By 1500 we were ready to start back to South Island. We had been fortunate that conditions had moderated considerably (Force 4), and that the wind was still out of the SW, which aided us in heading N toward Otago Harbor. The wind continued out of the W or SW for the next three days. The engine developed a crack in the heat exchanger box, but this didn't worsen and we were able to continue on a direct course for Otago. We sighted Tairaroa Head at 0530 on the morning of March 25, and we had negotiated the long channel into Dunedin by 1030, where we made fast alongside the public wharf. It had been seven days since we departed Lyttelton, and we had logged a total of 669 miles - 200 logged miles since we were rolled over. We had experienced half gale conditions (Force 7) on our return, but had no further difficulties. I am looking back at the conditions prior to our dismasting. I am still not sure that faced with the same conditions, I would choose a different course of action. The vessel seemed to be riding well, conditions moderating, the seas large but not particularly menacing looking. Considering what followed I have reconsidered our options at that time. If we had been heading NW it seems to me we would have been equally vulnerable, as our position vis-a-vis the seas would have been similar. If we had been running before the wave that struck us, it is difficult to be sure of the outcome, but there seems to

me to be a good possibility that we might have been pitchpoled stern over bow. Someone would have also been on deck. Frank Robb in his book 'Handling Small Boats in Heavy Weather' states in the course of his discussion of the Ultimate Wave - It would appear from accounts that if one has to make a choice in the matter, it is preferable to be rolled rather than pitchpoled, but in either event, you will be lucky to escape at all, and almost sure to suffer dismasting and fairly severe damage.' The other option I considered - streaming a sea anchor from the bow - might have aided AISSA, but that is certainly open to doubt in my mind. A sea anchor would not help a boat rise to a sea, but might pull her through the oncoming wave. Perhaps this would result in less damage than rolling or pitch poling. Robb concludes it is unlikely you would have masts left, although perhaps you would stay right side up. On the other hand, a sea anchor to accomplish this end would have to be very large, considerably distant from the vessel, and attached to some point of immense strength (?), else it would not have the power to accomplish the above, would be picked up and thrown toward the vessel by the wave, or would part from the vessel with the great strain. To conclude, I am not sure what the proper course of action should have been, and I find this disturbing. It goes against the grain to believe that there are situations where exercise of proper skill or judgment cannot prevent disaster. I am not sure that this is one of these situations, but I do not have a better answer. The British Admiralty Mariner's Handbook has the following to say concerning abnormal waves - 'when waves are distorted by meeting shoal water, a strong opposing tidal stream or current, or another wave system, abnormal steep fronted waves must be expected. Abnormal waves may occur anywhere in the world where appropriate conditions arise. In places where waves are normally large, abnormal waves may be massive and capable of wreaking severe structural damage on the largest of ships, or even causing them to founder.'



In 'Heavy Weather Sailing', K. Adlard Cole states, "When a yacht suffers damage in a gale, it is usually due to being struck by a sea and literally thrown down in the trough on her lee side, so that the doghouse or coachroof is stove in on the lee side." This is an almost exact description of the way AISSA was stressed - fortunately she was not stove in. There was flexing of the hull on the lee side where the trunk cabin joins the deck to a degree that interior woodwork was shifted and/or crushed as much as an inch along about half of the length of the cabin. This wood did not recover, as the hull and cabin did and therefore left a record of the stresses encountered as AISSA smashed down on her port (lee) side and rolled over. Jean Gau in his

ketch ATOM (29'6") was caught in Sept. 1957 about 360 miles south of Long Island in the path of hurricane Carrie. He survived lying a-hull, streaming one warp with oil bags trailed. However, on Feb. 26, 1966 Gau was off of S. Africa again lying a-hull with wind and sea on ATOM's port beam when she was rolled 360 degrees. ATOM lost her spars and sails. Gau cut away spars threatening to damage the hull, cleared rigging and dried out the engine and then under power managed to make a landfall some 75 miles distant. Coles states, "Jean Gau's experiences show that one can voyage time after time across the oceans without harm, but it takes only one freak wave of particular size and shape, catching the boat on the wrong foot, to do real and sometimes disastrous damage."

Moitessier, in discussing dangerous seas, says they do not always have breaking crests. Instead he feels the most dangerous seas in the S. Pacific are extremely steep and not necessarily breaking - capable of picking up a yacht and throwing it into the trough. He also mentions waves much bigger than the norm at a given time coming from a different direction. While I was not in a position to see the wave that rolled AISSA, I was aware of no sound as we lifted and went over. There was no 'freight train rush' as we had heard many times before just before we were struck by a breaking sea. This would seem to argue for a steep faced wave cresting. Both RW and I commented later on the absence of the sound of breaking water as AISSA lifted.

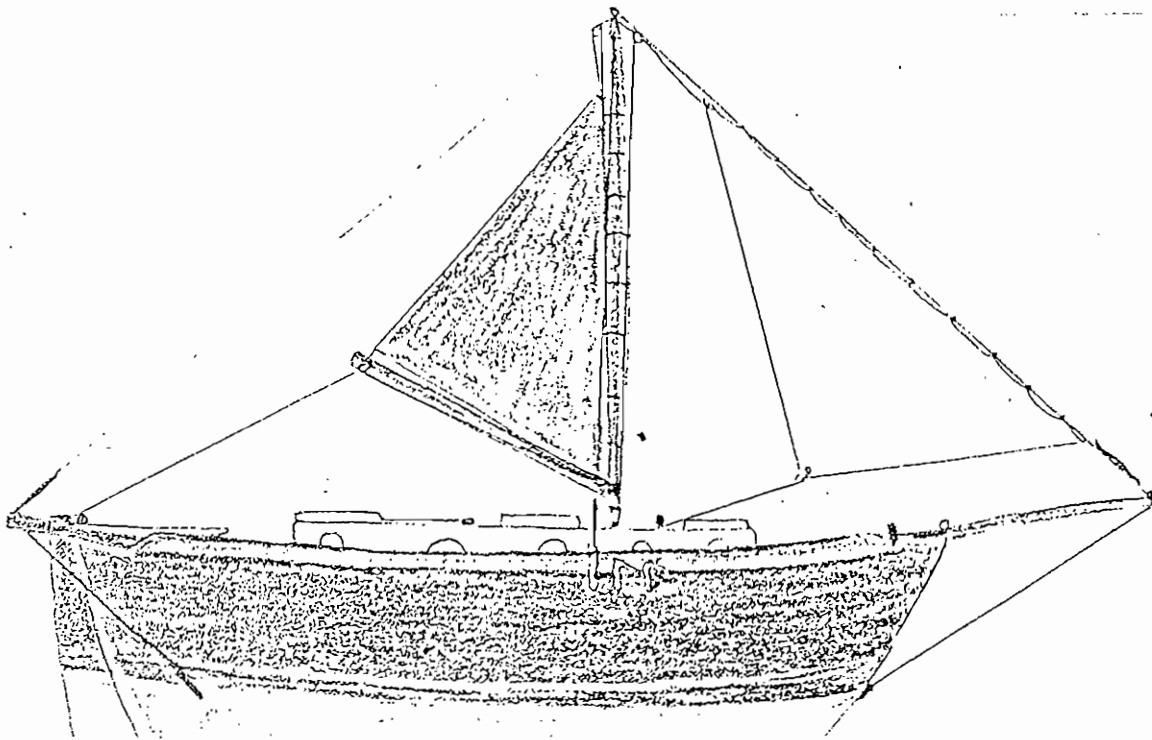
Coles in his 'heavy weather conclusions' says 'It is not the size of the wave that is necessarily dangerous, but its shape and steepness (which can be nearly vertical), and the angle at which it strikes the yacht.' 'High waves following on a succession of low ones form a common pattern of the sea, but to merit the label of a 'freak', the wave must be abnormal in height or shape.' 'Such waves, attaining dangerous dimensions, are few and rare between, and their life is short ...but it is interesting to note that they can occur in winds as low as Force 6 (22-27 knots).. An American yacht encountered two immense seas in the North Sea when the wind was no more than Force 5 (17-21 knots)." In reviewing 'Heavy Weather Sailing' I noted a recommendation from Warren Broom that the cockpit be criss-crossed with lines to provide added security. Although I did not do this as a precaution, I did find it useful as a means of providing the helmsman with some security after the mast had been lost and AISSA was making her way back to South Island with her lifelines and stanchions down.

Included in Coles' book on 'Heavy Weather Sailing' is a report from the National Institute of Oceanography on Freak Waves. The following is from that report: "Amongst sailors there are many stories of freak waves, usually concerning great waves maybe 100 ft. high (which may or may not have grown with the telling) and which overwhelmed or badly damaged many a vessel... There is no need to invoke the supernatural to account for such oddities, because the occurrence of unusually high waves does seem to fit into established patterns... There are many wave components present, each with its own period and height, traveling along together at slightly different, but constant, speeds. As the components continually get into and out of step ... every now and then, just by chance, it so happens that a large number of these components get into step at the same place and an exceptionally high wave ensues. The life of such a wave is only a transient one, being not much more than a minute or two in the deep ocean... Because each wave component is traveling at its own characteristic speed, the faster ones will escape from the others and the monster wave will die just as surely as it was born... Although we are never likely to be able to predict just where and when an exceptionally high wave will appear... the probability of occurrence of any such wave in finite can be predicted... It has been shown that whilst one wave in twenty-three is over twice the height of the average wave, and one in

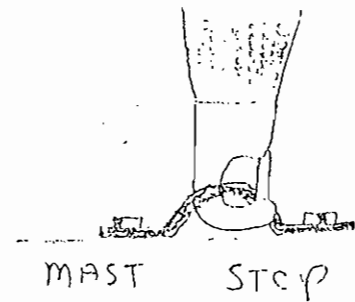
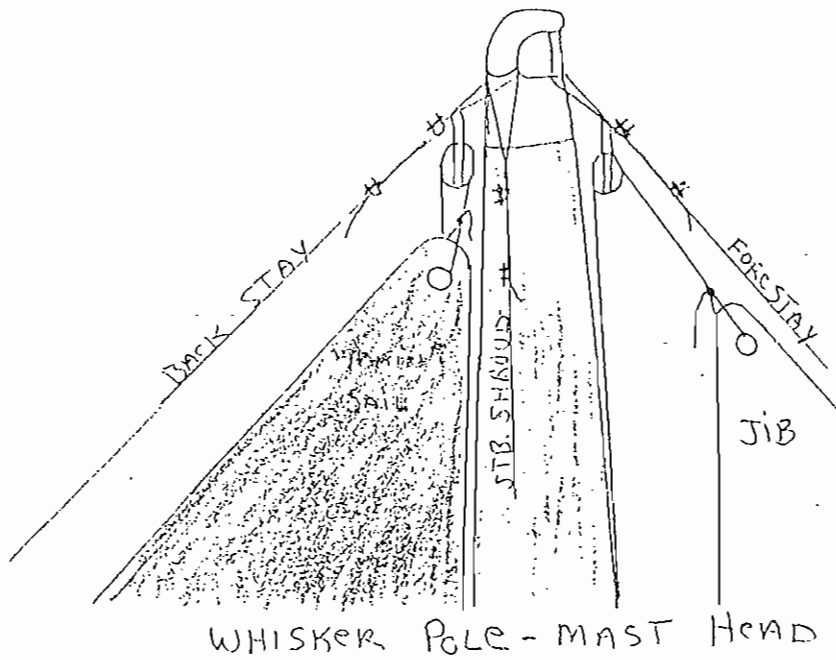
1,175 is over three times the average height, only one wave in over 300,000 exceeds four times the average height... One of the most damaging features to a small yacht must be the breaking of waves, when the actual slope of the surface can reach the vertical. There is a theoretical limit to the height which a progressive wave can sustain for a given wave length, when the wave height reaches one-seventh of its length the acceleration required of the particles become too large for the gravity to restrain, and the wave crest disintegrates... it needs little imagination to decide what will happen to any luckless vessel which finds itself at the crest... frightening wave heights can occur in generally moderate conditions. Although freak waves over deep water come in a vast assortment of shapes and sizes, they have the common characteristic that they appear with little or no warning..."

Also from Coles "Size is not essential to survive in heavy weather, as has been proven... by the increasing number of small boats which have accomplished long voyages... Nevertheless, there is a lot of luck in the success or otherwise of long voyages, whether the yacht is large or small, and when it comes to meeting the graybeards in the Southern Ocean or round Cape Horn, a large yacht stands a better chance than a small one." Coles ends his book with a quotation from John F. Wilson, Master, S.S. Pioneer, which appeared in 'Heavy Weather Guide', "Whatever decision you make if you get into trouble you may be sure that someone, who was not there will come up with something you should have done." I'm sure that there is truth in this remark.

While it was not necessary to jury rig a sail in order to return to South Island, I had immediately begun to think of how I would go about this if it proved necessary. This was foremost in my mind (together with preventing the hull from being damaged) when I tried unsuccessfully to save the mast and boom. Even after the loss of these spars and the main and storm trysail, I still had a number of sails, an entire set of standing wire rigging, plenty of turnbuckles and a number of Norseman fittings, wire clamps and shackles with which to work the wire into desired lengths. Also I had two spars remaining: A whisker pole of solid wood 16.5' in length and the club for the staysail, an aluminum tube 11.5' in length. With this gear I felt confident that I could construct an adequate jury rig if the engine had failed to start or if it had failed enroute (It was later determined in Dunedin that some water had gotten in the engine when the boat rolled over.) The following is a plan of the jury rig I envisioned.



I planned to step the mast to the deck by fastening the end to a step or strap screwed into the coach roof where the destroyed mast step had been. The "mainsail" would have been laced to the mast and sheeted to one of the sheet blocks remaining on the boomkin. The club could have functioned as a boom or the main could have been sheeted in loose footed, whichever method proved most satisfactory.



The forestay could have been secured at the end of the bowsprit or at the forestaysail eyebolt at the bow of the vessel. For sails, I had an assortment that would have been useful with a mast of this length - two storm jibs, two working jibs, and two staysails, as well as other sails that could have been modified if this had been necessary. The wind direction in this area is primarily from some variant of west, so this should not have proved a hindrance in sailing a northerly course back to South Island.