Soggy Paws – 44' CSY Walkthrough – 5'4" draft – July 2013
Subject Area: **Ground Tackle Recommendations (Part 1 of 2)**

Dear SSCA,

For those that are looking to buy primary anchor ground tackle or upgrade their current anchoring system, I'd like to offer the following thoughts. They are based on a great deal of research (with current literature), conversations with other seasoned cruisers and 15 years of cruising on our CSY 44 in the Florida Keys, around the Caribbean and now almost five years in the Pacific. Our current cruising boat, *Soggy Paws*, is a 40,000 lb. CSY 44 Walkthrough, so much of the numerical data is sized for our boat, but the information, scaled up or down, and allowing for differences in displacement, windage, hull form, etc., is applicable to any serious cruising boat.

We think bullet-proof ground tackle is one of the most important systems on the boat. Just consider how vulnerable we cruisers are for disaster every night while sleeping if a sudden strong storm should come through our anchorage. Because of my experiences in the Florida Keys with strong storm fronts and wind reversals, our ground tackle and primary anchor are sized to hold us in up to at least 60kn of wind, assuming reasonable protection from big seas. Anything much more than that would hopefully be forecast in advance so that we could prepare.

Ground Tackle Loads: Some time ago I acquired a mechanical engineer's calculation sheet of loads on a CSY 44's ground tackle based on wind speed. Here are a few of the highlights from that document for a single anchor:

30kn of wind produces	410 lbs. load
50kn	1135 lbs. load
60kn	1635 lbs. load
70kn	2225 lbs. load
90kn	3680 lbs. load
120kn	6545 lbs. load

The above data confirms, roughly, that when doubling the wind speed, loads quadruple. Note that the load on the ground tackle in up to 30kn is minimal, and that it really starts to ramp up after about 60kn, which is about when you would want to seek better shelter or add additional anchors. The above does not include additional loads produced by yawing/pitching, wave action, roller furlers and large fixed dodgers/hardtops, all of which may be significant. Some of the literature I have read suggests that at least twice the above loads can be expected due to yawing and pitching. Nigel Calder, in his 2001 *Cruising Handbook*, suggests blue water cruisers use up to four times the above loads for sizing ground tackle!

Anchors: Most information on anchors divides commonly available anchors, suitable for cruising boats, into several categories. They include:

Hooking/Kedge - Fisherman/Yachtsman, Luke, Herreshoff, Admiralty
Rotating Fluke - Danforth, Fortress, West Performance, Sentinel
Claw - Bruce, Manson Ray, Super Max
Plow, Hinged - CQR, Manson
Plow, Fixed - Delta, Anchorlift Shark, Hydrobubble

Modern Generation/Scoop - Bugel/Wasi, Raya, Spade, Ultra

Modern Generation/Scoop with Roll Bar - Rocna, Manson Supreme, Mantus

There are many others, including knockoffs of the older anchors, that may be suitable in some conditions. Extreme care, however, must be used in selecting one of the knockoffs, as they often don't perform well in holding tests and may be made inferior material.

Delta

Manson Supreme

Spade

Ultra Stainless Steel

Rocna

Bugel/Wassi

PRIMARY anchors should have several important characteristics. They are:

- High relative holding power – minimum Super High Holding Power rating
- Won't pull out of the bottom if dragged in homogeneous bottom
- Holds well in wide range of sea beds
- High strength design and material
- Always positions itself correctly on bottom for rapid setting
- Superior resetting ability – turns with wind and tide without pulling free or being fouled with rode
- Easy stowage and launching ability

For a PRIMARY anchor, suitable for use in most bottom conditions, including the tropics, I think any of the modern generation anchors, in the range of 70-100 lbs., would be right for our size boat. Less holding capability demands a larger anchor, however, while bigger is usually better, there is a practical limit. The above weight is at least two sizes up from manufacturer recommendations (usually based on only 30kn of wind!) for our boat. This size opinion is based mainly on my personal experiences, but also from discussions with other serious cruisers, current literature from other cruisers and published anchor test reports and from talking to anchor manufacturers.

We purchased a Delta 88lb. anchor 10 years ago before the modern crop of anchors became widely available. It has proven itself to hold us in sand bottoms in up to about 60kn of wind. That is the most I have ever seen in a sudden squall or frontal system, but it is certainly possible, though very rare, to get more. In both cases, in the Florida

Keys (at night, of course), the anchor reset quickly in sand during a 180° wind reversal. If choosing a PRIMARY cruising anchor now I would research carefully each anchor's construction, performance in recent anchor tests against other modern anchors, manufacturer's information and owners' thoughts before making a purchase.

Hurricane Anchoring: If I were preparing to anchor in a hurricane with more wind than about 60kn, I would rig three anchors, each on 50' of chain led to a central point with a heavy sentinel. Then I would secure the boat to that central point with chain and strong snubbers and heavy nylon line with great chafe gear. Well set big anchors, full strength ground tackle hardware and bullet proof chafe gear are extremely important in this kind of situation.

While anchoring with two anchors, spread about 60° apart, has the advantages of limiting swing and, if the wind is steady from one direction, improving the strength of the set, there are significant potential problems. If the wind backs or clocks more than about 30°, as is the case with a common frontal passage, and the anchors are smaller than can hold the boat in the wind by themselves, a big problem develops. In this case the entire load is placed on one anchor. If it drags the other anchor may get in the way as the rodes cross. If you need to bail out of the anchorage there is the difficulty in retrieving two anchors instead of just one in heavy conditions. And then there are always issues with storing, handling, rigging and setting two anchors and their associated snubbers and chafe gear. Considering the weight and cost and for the above reasons we believe it is much better to use one modern oversized anchor with good wind swing setting characteristics rather than two smaller anchors.

Anchor Tradeoffs: All anchors have flaws, some more serious than others. Not all problems with each anchor are published in the anchor tests or have been experienced by individual owners. If you are really serious about learning what is wrong with a particular anchor, one of the best ways to find out is to just ask any of their competition! Among the more modern anchors some of these flaws are:

Delta - Although very strong and with good holding power, the Delta has one major flaw. It is stable upside down in very soft mud or silt and therefore can be quite difficult to set in those conditions. We discovered this several years ago, after having continuous trouble setting the anchor in soft mud, by observing the anchor try to set in a soft silty bottom. Deltas are very common on cruising boats, having for the most part replaced the older CQRs. The price is right, but their holding power is still significantly less than the modern Scoops, but greater than the CQRs and Claws.

Modern Scoops with roll bar (Rocna, Manson Supreme) - Some of the more modern anchors, like the Rocna and Manson Supreme, have a roll bar attached to the top of their flukes to prevent inverted stability. If that bar catches coral or other bottom material, such as grass, it can prevent penetration. The bar also inhibits deep penetration in harder homogeneous bottoms, as its position high on the rear of the flukes works against the geometry. I had been told of this problem by a salesman for one of their competition and then I talked to two cruisers that validated it. One cruiser we know well returned his new Rocna for a Delta after having problems setting the anchor in the mixed sand and grass bottoms in Australia.

Spade - This anchor has better weighting in the tip than most other anchors and a lighter box shank, so it is not so inclined to remain upside down in soft mud

bottoms. And it has no roll bar. The owners I have talked to give it rave reviews. But the steel version of the Spade cannot be regalvanized with hot dip zinc due to the open construction of its lead weight tip container. The solution here is to hot flame spray the anchor with zinc, which might be a better galvanizing method anyway, or use the company's cold zinc spray kit.

Ultra – May be the perfect anchor, but for a very high price. Like the Spade it has better weighting in the tip and a hollow shank. Its lead weighted tip is completely encapsulated by its welded stainless steel base." It is made of 316L stainless steel which has about the same tensile strength as mild steel so the material it is made of is not as strong as that of some of the other anchors. So far I have found no other negatives with this anchor and the few owners I have talked to speak highly of them. The only problem is that for an anchor of a size I feel is suitable for our boat, 77 lbs., the cost is nearly $3,000.

The Spade, Rocna and Manson Supreme all have much better holding characteristics than older plows and claw anchors and somewhat better than Deltas. But in a similar size to our Delta they are now over $1,000, with the SS Ultra at $3,000. So for someone buying new that may be a consideration relative to how much better holding, for a given anchor size, is worth. One solution would be to just buy a larger Delta. We bought our Delta 88 from West Marine for about $500 eight years ago, before most of the modern scoop anchors had been tested and became available.

I specifically avoided choosing a Claw/Bruce, Hinged Fluke/CQR or Fluke/Danforth style anchor as a PRIMARY for our cruising because of the multiple problems with these anchors.

I specifically avoided choosing a Claw/Bruce or Hinged Fluke/CQR style anchor as a PRIMARY for our cruising because of the problems with these anchors in some common bottoms as highlighted in recent testing and owner comments. I have tried both in the past as a PRIMARY anchor and was not satisfied. And I have discussed their merits with those cruisers we have travelled with still using them. Many cruisers have circumnavigated with them in the past. They are no worse or better than they have ever been. But the new generation of anchors just performs better in almost all required characteristics. The other two styles of anchors, the Kedge/Luke and Rotating Fluke/Danforth, are not really candidates for a PRIMARY anchor. Some of the problems with these anchors are listed below.

The Claw/Bruce, although very strong, can catch large coral pieces and rocks preventing a set, and their fluke area is small, requiring a much larger weight anchor for the same setting strength. However, recent tests in Patagonia have shown them to be excellent in that rocky/weedy bottom environment.

Broken shank on old stainless CQR

The CQRs, although strong, have a small fluke area, a heavy high hinge joint that tends to lay the anchor over on its side on the bottom and hinder smooth penetration, a wide shank that hinders penetration in some bottoms, have poor holding performance in recent tests, and they are

still very expensive. Based on the above there is good reason that no other anchors have a hinged joint.

The lightly constructed, but high holding power Fluke style anchors are too lightly made to keep from bending the flukes in anything but a homogeneous soft bottom. So they are better suited for special occasions when there is good bottom and high load requirements. The lightweight and take-apart Fortress anchors make great spare anchors and for use in muddy mangrove areas where one might go for the best hurricane protection.

There are other less familiar, but available anchors, but none that perform well enough in the tests to make me interested in using one as a PRIMARY.

Backup Anchors: Besides the Delta 88 we also carry a Delta 55 as a backup for the 88, two large Fortresses for use in sand and mud and as part of a storm mooring or in mangroves and a Danforth High Tensile 35 as a stern anchor. Given the problem with our Delta and our future cruising plans into the western Pacific there may be a change in our primary anchor coming. If I were buying new now I would probably buy one of the newer Scoops, mainly because of the significantly higher holding power in most homogeneous bottoms and the lack of a problem in soft silty mud.

Sizing Your Anchor: Regarding sizing an anchor for your cruising boat I like to use the following rule of thumb:

Add the boat's length in feet to the boat's weight in thousands of pounds. This gives a number roughly equal to the anchor weight for strong wind conditions. As an example, *Soggy Paws* is 44' and weighs 40,000 lbs., so 44+40=84. So we use an 88 lb. Delta anchor for our PRIMARY. If we go to a modern scoop anchor, probably a Spade in the future, I might consider an anchor in the 75-80 lb. range due to the greater holding power of those anchors. If I had a Bruce or CQR I would not consider anything less than 100 lbs.

COMMODORES DAVE (KE4BKF) AND SHERRY (KN4TH) MCCAMPBELL

Part 2 of *Soggy Paws* letter on ground tackle will be published in the Nov. *Bulletin.*

More in Melbourne: *Commodore Dave McCampbell will be presenting a seminar on Modern Ground Tackle at the upcoming Melbourne Gam.*

Active Transport – 37' Tayana Pilot House Cutter – 5'10" draft
Subject/Area: **St. Helena**

Dear SSCA,

St. Helena was a logical stop for us on our way from Walvis Bay, Namibia to the West Indies. It breaks up the long haul to Barbados or Trinidad and is a very interesting place to visit. St. Helena is 860nm from Walvis Bay and about 1,500nm from Cape Town.

We had been told that the sailing up the Atlantic would be some of the best sailing of our circumnavigation and the legs from Africa to St. Helena and then on to Ascension certainly turned out that way for us. It was day after day of 15kn winds on the beam with very moderate seas.

The people who live on St. Helena call themselves saints. They are very friendly and very British. St. Helena had a reputation as a place with very bad holding in an

meager chandlery and a boat yard with a 100-ton Travelift.

It is in a remote location with little to remind you that you are only a couple of miles from the crossroads of the maritime world. A couple of hundred yards from the marina you are in dense jungle with monkeys, snakes and other creatures mostly oblivious to your presence. There is an old Army base nearby that the U.S. army uses for training purposes. You'll soon become accustomed to the sound of helicopters flying low overhead.

It is a fairly long taxi ride to the nearest (loosely defined) civilization at Colon. This wild, densely populated city is pretty spooky and has a high crime rate. It is highly advisable to be out of Colon before nightfall.

The Caribbean

Just outside the breakwater of the Colon harbor we entered the Caribbean Sea. What a thrill for folks who have spent their lives cruising in the Pacific! A whole new sea to explore! We covered over 7,000nm in just over a year to get from our northernmost port of call in Prince Rupert, British Columbia to the Canal. Our hard travel was driven in large part by the seasons and the requirement of our insurance company that we be south of 12.5° N before June 1, the beginning of hurricane season. Now we will slow down and enjoy a more leisurely pace. Instead of measuring our average transit in 100 miles-plus legs, we will hop along a few miles at a time at our leisure. Life is good.

COMMODORES DOUGLAS AND GERRY COCHRANE

Soggy Paws – 44' CSY Walkthrough – 5'4" draft – July 2013
Subject Area: **Ground Tackle Recommendations (Part 2 of 2)**

Dear SSCA,

Chain Rode: We use all 3/8-inch High Tensile G4 chain for our PRIMARY anchor rode because it is the normal size for this boat and is completely chafe resistant. But more importantly it is strong enough to hold us in 60kn of wind without deformation. All of this size chain weighs about the same per foot, but there is a difference in link length and a big difference in strength. BBB and Proof Coil chain have a working strength of only about 2,900 lbs. while G4 High Tensile's working strength is 5,400 lbs. and costs about the same. G7 Hi Test is stronger, but twice the price. So we have 300' of G4 aboard, but have yet to need more than 200'. In order to remove some weight from the bow, the last 100' of our chain is stored in the shallow bilge space just in front of the mast, led aft through a 4" PVC pipe.

We also have an assortment of backup rodes and chain for use with the other anchors and for a three-point storm mooring. For cruising in the deep Pacific coral anchorages there is just no substitute for an all chain rode, unless you are willing to carry at least 200' of chain and the rest line.

We mark our chain with plastic cable ties and red, white, and blue ribbon every 33'. We find it works much better than paint and can easily be reversed when we end-for-end the chain every couple of years. Marking the chain every 33' provides enough visual indication of how much we have out without getting confusing. And I can easily

remember the sequence red, white and blue.

Regalvanizing Chain and Anchors: Because our chain is high tensile and difficult to find here in the Pacific, we have opted to regalvanize, rather than buy new, our chain when necessary, which has been about every 4-5 years. We have had various parts of our ground tackle regalvanized along the way in Guatemala, Colombia, Ecuador, and now Fiji.

Recently we had the chain "hot flame sprayed" in Fiji instead of hot dipped. Based on the research and literature I found, the flame spray technique has several advantages. First the chain is carefully cleaned and then shot blasted to bare shiny metal. The system uses the same hot zinc galvanizing material, but rather than dipping the chain it is hung and sprayed with the hot zinc. Then it is rehung and sprayed again so that all sections of the links are covered. Finally, it is coated with a very hard spray coating that seals the zinc and keeps it from getting scratched as the chain moves around. It looks like brand new chain without the rough surface hot dipping produces. It is also possible using this method to only do a portion of your chain—the part that really needs it. According to the independent literature I read it should hold up longer than any paint or hot dip system. We also had our big Delta anchor done at the same time, and so far it is holding up really well.

You cannot regalvanize chain forever, because you lose a tiny bit of surface metal every time it's done. But if you regalvanize ***before*** the rust really sets in, the losses are minimal and acceptable.

Chain Accessories: The largest shackle that will fit through a 3/8" G4 chain link is 7/16". So in order to match the strength of the chain I use 7/16" G4 HT shackles to make up the connection to the anchor. A standard 7/16" shackle is far too weak. Since my anchor shank thickness is too great for the 7/16" shackle I use a 5/8" standard galvanized shackle to finish the connection. 5/8" SS or standard galvanized shackles both have working loads greater than the chain, ½" shackles do not. The situation is similar for each chain size so it is worth checking strengths of each item in your ground tackle carefully.

About 10 years ago, when I purchased the Delta 88, I also purchased a high quality, Italian-made Kong SS swivel special order through West Marine. It has a working load of 6,000 lbs. and is a massive piece of gear. This allows me to easily rotate the heavy anchor to the proper position before I pull it over the roller. Without this swivel it would be nearly impossible to get the anchor over the roller. If the stainless steel to galvanized steel connections were in saltwater for an extended period of time there might be a problem with corrosion. Mine is not, but I keep a close eye on this, take it apart for greasing annually and after careful inspection have found no deterioration. Do not use any of the lighter Suncor or Chinese swivels as they are way undersized for this size boat. At least one boat I know of has been lost due to a cheap broken swivel, and I'm sure many more have become detached from their anchors due to undersized or heavily corroded shackles.

About the same time I bought the new anchor I had a large aluminum chain roller custom-made with a 5/8" pin and a chain groove in it. The aluminum roller will not

chip the galvanizing on the chain, and the chain will not gouge the aluminum as is the case with nylon or delrin rollers made for line rodes. The groove in the roller allows me to keep the chain from twisting as it is being brought aboard. Once in the past, I have had the chain twist up in the anchor locker so that I could not pull it out. What a mess that was! So now we make sure all the links go into the locker straight when retrieving the anchor and check this every two years when we end for end and remark the chain.

Windlass: We started out in 1998 with a Simpson Lawrence Sea Tiger 555 manual windlass. By the time we got down to Trinidad I knew we needed an electric windlass for our 3/8" chain and then Delta 55. We bought a Lofrans Tigress with the 1200 watt motor. It is more than adequate for our 500 lbs. of ground tackle in 100' of water. Again bigger might be better, in a few situations, but in this case the price is double and weight and installation are an issue. For UV and water intrusion protection it is always kept covered with a custom Sunbrella cover. The snap-on cover my wife made also helps keep the water out of the chain pipe when we are in heavy seas.

To power the windlass we use 2/0 electrical cable run from the house battery bank through a big circuit breaker to the windlass, rather than a separate battery with its installation and charging issues. There is normally no problem with voltage drop because we have a big battery house bank and are running the engine while operating the windlass. We operate the windlass with a wireless remote control that I can move around with anywhere on the boat and on the foredeck while keeping an eye on the chain. That also allows me to sit on the bow seat and operate the windlass while rinsing the chain outside the boat with the deck wash hose. These inexpensive (about $20) battery- powered wireless remotes with sending units are used in industry for overhead chain hoists in large warehouses and are available on the internet/Amazon.com. You could also spend $250 on the marine version if money was no issue.

Snubbers: The purpose of a snubber is first to make a strong chafe-free attachment between the chain and boat in all conditions and then to provide some shock loading protection in very heavy wind situations. In light conditions, less than about 15kn, with light strain on the chain, the chain catenary will provide adequate protection against dislodging the anchor. In this case a short piece of smaller line with a chain hook that is easily installed and removed will do. But in heavy conditions, with the boat yawing and pitching wildly, the snubber must be very robust, provide some stretch to absorb shock loading, be immune to chafe, and be easy to install, adjust and remove. Therefore, we see a need for at least two different snubbers.

I have tried all sorts of snubber rigs over the past 15 years, including single and bridled nylon and polyester attachments to a stem eye, over the rollers, through the forward chocks, and large and small diameter and long and short lines. All seem to have one problem or another. Bridled snubbers need heavy chafe gear where they come through the bow chocks, take time to rig and unrig and allow more yaw if they attach to the deck any distance back from the stem. Attachment of a snubber to a stem eye near the waterline will allow it to be chafed by the chain loop from the chain roller above in heavy conditions. Several years ago while rigged to a stem pad eye my snubber was almost chafed through in heavy winds in just three hours! Short snubbers that attach to the chain above the water's surface remain clean from surface scum but don't provide adequate snubbing stretch for heavy conditions.

I currently use a 10' length of ¾" braided nylon line over the bow roller, with a ½" Wichard shackle and stainless steel chain hook as a working snubber and to initially set the anchor. Because of the chain hook and shackle, this setup is strong but is not equal to the full strength of the chain, but it doesn't have to be. Chain hooks also have a tendency to drop off unexpectedly, so I use this rig for short stays and lighter conditions in less than 20kn of wind.

My previous storm snubber was made of a 35' length of ¾" good quality nylon with a 6" loop seized in the exact middle of the line. The two ends were attached to the bow cleats through the forward closed chocks. I used white 1.5" white PVC sanitation hose tied on to the lines for chafe protection through the chocks. This gives the hot line room to breathe while under heavy strain. At the loop end I had an ABI chain grabber shackled with two G4 ½" shackles. The problem with this rig, and any bridle snubber, is that it is a bit clumsy to rig and unrig the shackles. So we would normally leave it rigged to the cleats and just pull the working end up to the anchor roller tray while moving around in reasonable conditions from anchorage to anchorage. The bridle had to be unrigged and stowed when we went to sea.

For a heavy snubber I am currently trying out a relatively new piece of equipment, an Ultra Chain Grabber, with a doubled length of 5/8" braided nylon. It is rigged with fire hose chafe gear, alongside the chain, over the bow roller and then to two strong bow cleats. This is much easier to rig and unrig than the bridle snubber and the length is adjustable. It is extremely strong, can be easily attached and detached from the chain, and holds the chain firmly. It could also be rigged with a single ¾" nylon line. I have noticed recently that there are a growing number of snubber attachment devices becoming available, such as the one produced by Mantus, so it is worth looking around before buying.

Anchoring in Coral: We have also experimented on and off with the technique of using plastic buoys attached to the chain, to suspend the chain off the bottom in areas of heavy coral heads. This was especially useful in the deeper anchorages of the Tuamotus of French Polynesia. This technique helps somewhat in keeping the chain from wrapping a tall coral head and reducing the scope and catenary. Coral head wraps can be a big problem for anyone cruising in locations where there is a sandy bottom with closely spaced coral heads.

In about 50' of coral-strewn water, with coral heads rising to 10-15' off the bottom, we put one float about 60' from the bow, a second float 60' farther along toward the anchor, and let the rest of the chain (about 90') lie on the bottom. We used a small snap-shackle, a 2' piece of line, and two plastic "pearl farm" buoys for each float. This made it easy to fasten and unfasten the floats as we deployed and retrieved our anchor/chain. You need to experiment with the placement of buoys to suspend your chain 10-15' over the tops of the coral heads, without reducing the angle of pull on your anchor.

More in Melbourne: We hope our experience and the above information on ground tackle helps others with their selection of anchoring equipment. If you are at the 2013 Melbourne Gam look for our seminar on Modern Ground Tackle for more information and equipment displays.

COMMODORES DAVE (KE4BKF) AND SHERRY (KN4TH) MCCAMPBELL

Part 1 of Soggy Paws *letter on ground tackle was published in the Oct.* Bulletin.