

Canadian 505 Class Assoc.(www.505.ca)
Date: January 2007 – April 2007
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Making a 505 mast (Proctor D, older generation epoxy Rondar with P&B sails – loose foot, pole launcher, spin launcher)

Well, it is something that you hope never to have to do, but chances are that while we remain with aluminium masts, we will all have to build a new one for our 505 at some point.

The short story here is that if you are happy with your current rig, then document it NOW. Thoroughly. Use the deck band as your datum and understand all halyard and control layouts. There are SIXTY FOUR holes likely required in your new virgin tube, so get documenting NOW!

When it fails, it is too late to measure many of the dimensions that you would need to exactly replicate the rig, and if you start to investigate what you want by asking (say) 100 questions, you will get 101 answers. At least. I have been through this process recently and here are some of my findings, but please remember that this may only be opinion 102 in that list ☺

Green sleeves : to do this or not is more a question of what or how to do it. I was told by a reliable source that the sleeve for a D is a C section, prevalent on 420's and the like. Could I find one broken 420 mast out there?? So, I set about recovering the sleeve from the existing broken section. It was of course the full length of the last intact piece from the heel up. This piece was about 3'6" long. Not a tough job you might think. Think again. This sleeve was likely put in there some 10 years ago, under gentle persuasion from a hammer, through drilled for all the lower fittings (ram track, goose neck, vang, halyard exits), and sailed in a mix of salt and fresh water to ensure the bond between mast and sleeve was almost as good as epoxy. I spent over 3 hours at first gently, then not so gently pushing, pulling twisting, hammering, grinding and drifting the inner piece out. It came eventually after much BF&I as you can see in the photos, where I had opened the mast section like a can of beans (much bigger can opener of course). Lesson : buy your sleeve ahead of time.

Sail track
(curly bit)

Port side

Sleeve



Starboard side

It is not a pretty way to get at what you need from the old tube, but when needs must.....

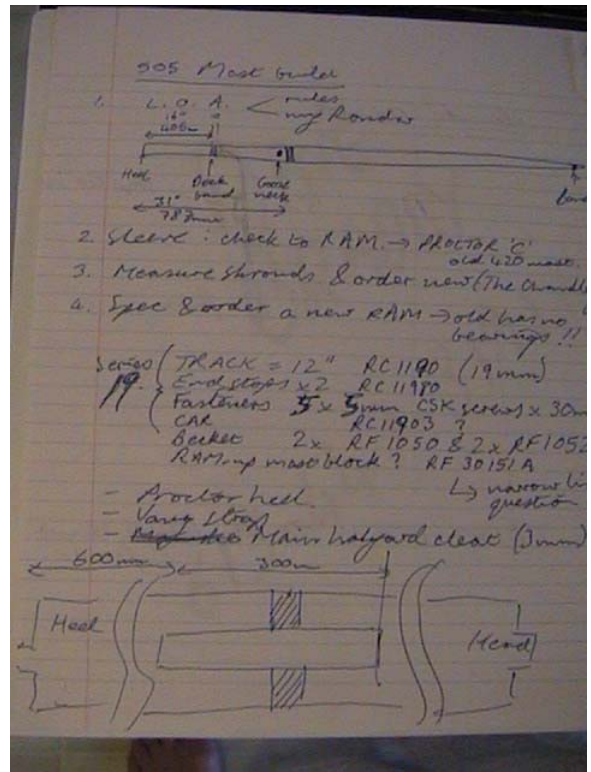
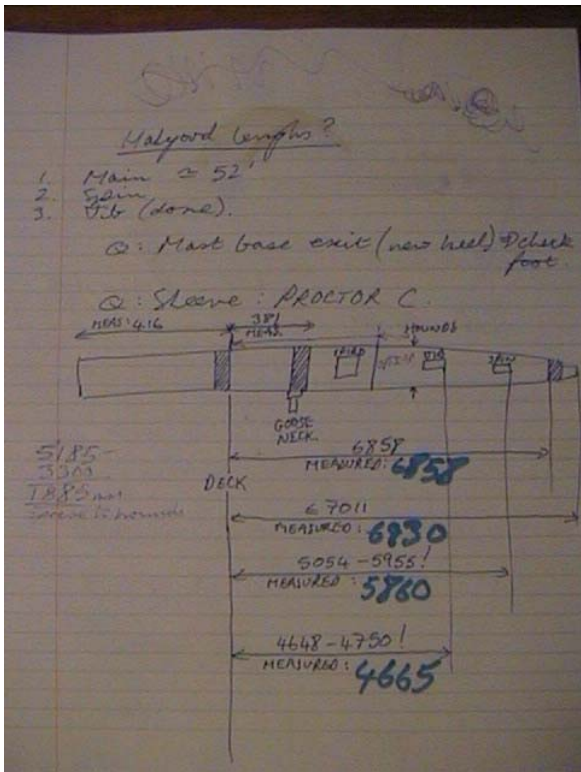


Old mast ram slider turned out to have NO bearings in it at all, and was actually hand made from a piece of chocolate...

....another trip the Chandlery and a wait for the right bits to come from Australia.....



Lots of notes should have helped, but somehow, much was lost in translation.....



Arm yourselves with copies of the 505 Class Rules, photos of your old mast, your best friend's mast, several tape measures (in both metric and imperial), only stainless steel rivets, dry wipe markers, several power tools, a new set of drills and files, a sense of humour and/or a bottle of Mount Gay Rum (coke for colour).....

Grab your courage in both hands (or the glass in one) and start measuring. Measure again, this time marking what it is you think you know. Measure again. Question what it is you think you know – now unable to answer your own questions. Try to convert mm to inches, measure once more and put the smallest drill bit you have in to a hand drill for control, centre punch the intended execution and drill. So so so slowly.

OK – you're off to the races now, so can always go straight to the full size drill for the hole, use a mega watt power tool and drill away like mad. Of course, somewhere in between is most likely. The first hole (few) was very hard to do. Lots of anxiety, re-measuring (who only measures twice before drilling a 505 mast tube???) and re-marking, but I got there. Over two days. And I changed precisely NONE of the set-up or systems. I guess it will take you 10 times that if you want to re-think or invent new systems.

Areas of interest :

- a) Main sail – you might think this is just the main halyard, so thread it and forget it. Do so at your peril. Don't thread ANY halyards until you are done drilling (sounds obvious, but hey...). You need an exit from the mast, but where. Root question : How long should the tube be?? You don't know, because your old mast is broken and you never measured it. The rules are no help as every 505 is different below decks. **I used the deck band as my datum for most things**. This is fairly well nailed down in the rules and also likely to be measurable from the old mast heel – rarely do they break below deck. Establish your deck band, and cut off the bottom of the mast. GULP. If you are not sure, establish the gooseneck band from the rules and measure down again. CUT IT OFF. It's OK!

Now, you need to get the sleeve in before you drill anything in the new tube (hint : it is in the basement where you left it next to the grinder and other weapons of mass destruction). It will be a REALLY tight fit. Make sure it's surface is clean, free from any burrs and then oiled with something that will not evaporate (like engine oil). Then pick up a 5lb two handed sledgehammer and a piece of 2"x4" wood. Fix the wood to the end of the sleeve, because you are NEVER going to find someone stupid enough to hold it for you! Wedge the top end of the mast in an old tyre, pushed in to the corner of something substantial, like your house!. Make sure nobody is watching, and then beat on this like your life depends on it. Do not stop for long either, and yes, it does get tiring. If you stop, the sleeve will bind really hard in the mast

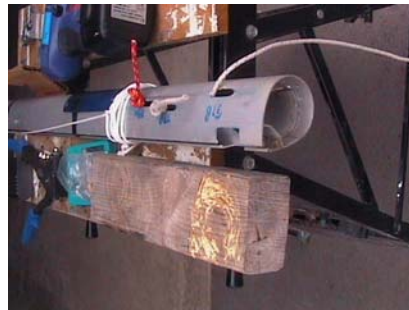
when you are only half done, and sure as hell won't be able to remove it now. Just GIVE 'ER. When the piece of 2x4 is destroyed or you have the sleeve flush with the bottom of your newly cut tube, pick up the mast foot that you have carefully placed to one side, also oiled, and now, changing gears, GENTLY tap the heel as a drift to finish the job to the right depth. Prepare to



Pieces of (useless) sleeve supplied here...



Whole lotta hurt going on



Then pick the right side that the halyard should exit (as on the old mast), drill 3 connecting holes and file them in to a nice rounded oval. Below that, drill holes to fit a main halyard cleat, and a main halyard hoisting block. Now you need to be able to get the main in to the mast, requiring a bolt rope cutout. This is easy again – go for about 4" above the goose neck. To cut the sides of this parallel with the mast, most hacksaws have blades you can turn by 90 degrees, or use a Dremel (never forget your safety specs....). It is SO important to smooth off the edges of the upward track cutout as your brand new (loose footed?) main is going to go through that cut metal at about 2m/s. If you can feel anything when running your fingers over it, then you are not done!

Cutout is good with no snagging – spreaders look a little low (no rivets)



- b) Jib. This is just the halyard right? Well, in this case, yes. To establish where the jib sheave should go is non-trivial. It will depend on the rules, whether you are going for a stuff-luff or hoisting jib, and bow fitting (maybe). I am a hoisting person, so needed the sheave and a fixed point. At the bottom end of the mast you need a cutout for the halyard to exit too. Try to put it in the old spot as well to ensure that it will go in to the boat's systems without a hitch. Remember, the new jib sheave (or old one, if you MUST), has a little arrow on it pointing upwards. If it is pointing down once the mast is in, take the mast out, turn it over and mount it on its pointy end. Alternatively, drill out the sheave, re-thread the halyard (yes, you will have to) and re-seat the right way up. No, I didn't make this mistake, thankfully, as I did notice the little arrow in time. The sheave hole needs to be quite accurately filed as the mast wall is all that holds the sheave's pin once in place – any slop causes wear, right?



- c) Spinnaker. Just a halyard again, right? Yes. This is higher than it used to be as we all know by now. Much higher and quite variable according to the rules, so where the hell should I put it?? Same distance from the jib sheave as on your old boat (about a meter or so up). Duh. This is a tougher one to fit (on a D at least) as the tapering weld is now in full force along the forward edge of the tube, right where you want to drill and mount the sheave. Lots of good counter-sinking required.

Careful ; cutting through the weld isn't easy



- d) Spinnaker pole. On my boat that is the Spiro and pole launch system. Again, where they were on your old boat. Don't forget to drop in the pole launcher cleat chocks in the sail track BEFORE you rivet on the vang and goose neck – there really is no need for that extra cutout in the sail track ☺ On the Spiro, I bet I am the only boat in the fleet that has the middle screw in place on the Spiro as the outside rivets are easy. Middle screw hard. Need to remove the UHMW wheel and then drill carefully.



- e) where i
omethin
old mas
are
his
car,
the track bent, the blocks all flatted out. Don't under-estimate how much this bit costs. \$300 for car and track alone. This is going in to the sleeved portion of the mast if you have got it right, and it is personal preference as to whether you use enough and correct (large) self-tap screws or you go the tapped hole and set-screw route. There are pros and cons to each. Personal choice, but the set-screw route is much harder to initiate as it involves locating at least 4 nuts on the inside of the mast in the right locations. Not easy at all – Dave Adams has mastered that (no pun intended). The half-way house here would be to tap the double wall thickness mast and rely on that. No worse than the self-tap route in terms of thickness, but thread pitch is likely too small to hold well. Use thread lock whatever route you go. The ram is under tremendous pressures, both on to and up from the mast. End stops essential (imagine what happens to your lovely new rigged mast when your ram up string breaks in 25 knots after putting the spin pole out..... - go back to item a))

Always support the tube on soft car



- f) Boom. This is the goose neck, basically. You have your black bands established, so this is to be positioned in the sail track so that the very top edge of the fitting is against the bottom edge of that black band – imagine the sail on there and you want to get the bottom of the sail as low as legally possible on the boom, anyway.

Much done, but.....

.....at least it is still straight ☺



- g) Shrouds. Don't get the wires made up before you have had a chance to measure where you put the fittings on your new mast. Chances are you will either want to change where they were, believing that this will reduce the chances of a future breakage (poor misguided creature), or not get them in exactly the same spot despite your best efforts. This will mean that the shrouds are either un-useable or have to be changed.
- NEWSFLASH – do not re-use old shrouds, no matter how tight a budget you are on. It is the most false economy. If your mast has given in for some reason that *wasn't* shroud failure, chances are they are ready for replacement or have been stressed way beyond design. Decide where your spreader bracket should go – this one is now pretty accurately defined by the rules and previous assumptions on black bands etc.. Always drill the central hole first, then stress the fitting equally port / starboard to drill the side holes, otherwise you risk distorting the fitting. Remember spreader brackets point upwards at the outer ends. Then you need to decide where you want your hounds to go. Again, lots of variation possible. I opted for where they were before (roughly) but with a slight rules tweak. You can put them higher than you think sensible and low enough that they just look wrong. Your choice. Look where your jib exit point is. Big clue. Using the little inserts, mark on the outside of the mast where you want them (widest part and symmetrical of course). Then drill your holes and start filing. Once happy, tie whipping twine (important, as it is waxed) around the big hole in the middle and push the hole thing in to the mast. Jiggle it about. Swear. Get some pliers. Jiggle more. Swear more. Get tweezers. Jiggle more. Swear and ask why you didn't just buy the fitted mast. Get thin spikey things. Jiggle more. Hold breath. Pickup rivet gun that is already loaded with right sized rivet, that you have also already checked in the hole that you intend to put it in. Put down rivet gun, rewind about 6 lines after getting a beer. You are going to repeat this 4 (FOUR) times. And then, only 4 if you do it perfectly each time. Once the first rivet has partially closed, snip the whipping twine and gently pull it out without dislodging the insert. Finish with the first rivet. Get the second one, hoping that it all still lines up. Rivet again. Hoping that the rivet tang

doesn't disappear in to the mast before pulling it up with the rivet gun.
More beer. Repeat last 10 lines or so for a couple of hours. Go to bed.



- h) Trapeze. This is very similar to the hounds / shrouds, but again, quite the choice as to where you put it or them. Yes, them. You can have two sets of trapeze mount points if you are going for the "Hank-yank" system – see the 505 website for a full description. Anyway, I put mine a bit higher than before, not co-incident with the shrouds, but close. Option later to put them much higher and have either HY's or trapeze twing lines from the old trap mount points. Yea, I know. As the reader you should now have a rum on the go (I do).

Centre spreader hole, then pressure on the
bracket when drilling the others....



- i) Topping lift. Simple. One hole, just beneath the jib fix point. Needs an exit at the mast base too – in the same place as the old mast to ensure boat controls mate up perfectly. My system is simply the stainless piece of brake pipe from a 1978 Ford Explorer (guess), gently curved to allow the spectra to make the 180 degree corner. Try not to drop that piece of stainless in to the mast as it is difficult to get out (so I am told). Also it is correct with the long tail inside the mast, short outside.
- j) Vang. Mine is of the through mast base fitting type. If you just have a simple rivet on strap, then it is easier to mount as you only need to drill two holes, BUT you will need a nuclear powered rivet gun capable of swallowing small children and dogs for the rivets. Mine is a "u" hoop all the way through the base of the sleeved mast and then decent rivets. There is an additional eye strap required in the sail track somewhere between the

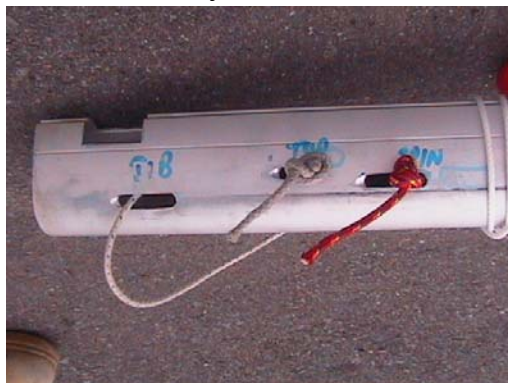
boom and nearer the vang strap. This is for the cascade on my system – check yours and mimic what is there.

- here you see the vang cut-out (sleeve in)



Cautionary tales (take care – these are IN ORDER) :

- Tools – you got most them, but you need several drills of each size : 1/8", 3/8", 1/4". A GOOD quality rivet gun. A cordless and a real power drill. Cordless for when you doing things the way you think they should be, and a real power one for when things don't. Dremel, grinder, BIG hammer, two centre punches (you WILL lose one), at least 2 work benches, etc.etc.. You will know what you need only when you don't have it, so good luck and do it during regular Lee Valley trading hours.
- Establish your black bands by at least 3 independent measurements. Using tape is OK at this stage, but watch out for movement, and be aware that in the end, a measurer likes to see 10mm wide PAINTED lines. I know. I don't either.
- Cut the tube to length and finish as square as possible with a file. Doesn't need to be perfect (think about where it is going).
- Ensure heel fitting will go in easily.
- Get sleeve, cleaned, oiled, heavy hammer etc.. Have a grown up do this bit for you.
- Now measure, mark and drill all your holes. All of them. All sixty f'ing four. It is a pain and you begin to think that your old broken mast is looking remarkably sleeveable at this stage.
- With EACH FITTING, offer it up and put the rivets in the place where they are going to go to ensure easy fit. If they don't go now, they wont later when you have 3 sharp tools in one hand and a mouthful of rivets. Ease any drill holes and filing required.
- Take everything off the mast (except the sleeve of course, which would now need dynamite to remove it anyway). I repeat, everything.
- Now start to feed halyards. Do them together. Start at the top with the mast at a slight angle.
- Get the main one to the jib box exit – make sure you thread the sheave right.
- Get the spin to the jib box exit – make sure you thread the sheave right.
- Get the topper UP to the jib box exit.
- Obviously the jib is right there at the jib box exit – make sure you thread the sheave right.
- TRICK – find something made of stiff wire, tape all 4 lines to it and push it down the mast. This will remove any chance of inter-halyard twist. Biggie that one! Try to remember before doing this, that the wire needs to be longer than your spare 505 shroud. Duh. I used an Aussie 18' forestay (tee hee). Heavy things do not work well, will not work with all halyards at once, thus increasing twists, can't be easily inserted in to the jib box hole, require you to live in at least a 3 story house etc. etc..



- Once threaded, go through the mental arithmetic (?) to get them cut to the right length. What? I can't believe you are going to all this trouble and using those crappy old halyards off the old mast where they likely got stressed or damaged in the trouble.
- Feed them in to their respective exit holes at the base of the mast.
- Grab ear defenders and your rivet gun. Go go gadget. Rivet for all your worth.
- Rivet tip #1 : always rivet (usually) the top rivet on anything, as this will be more stressed than the bottom – this applies to halyards sheaves mostly.
- Rivet tip #2 : always rivet (usually) the centre rivet of a fitting and work outwards.
- Rivet tip #3 : NEVER use aluminium rivets on the mast, except for locating the mast partners.
- Rivet tip #4 : not all rivets are created equal! Make sure there is enough head on the rivet to leave a suitable “muchroom” on the inside of your joint. Also make sure the rivet shoulder is big enough for what you are asking it to hold down.
- Rivet tip #5 : WHEN you need to drill out a mistake, always use the real power drill and the sharpest drill of the same size as that to drill the original hole. Don't pilot hole it – you will never get it on centre again (you can get away with this and a centre punch if you are pushing an aluminium rivet).
- Rivet tip #6 : just like the man over board drills – number your rivets and when you are done, count the spent rivet tangs. One of those is easily (but rather expensively) discovered right around now when you switch from your winter to summer tyres.
- Rivet tip #7 : always, always, always centre punch where you intend to drill a rivet hole. Addendum to this tip is that is you cannot centre punch (space or surface finish), then use a cross of electrical tape – it will allow the drill to self centre in the softer vinyl material.

....count 'em all.....



- Tip (general) : it is quite possible (and somehow preferred) to do this whole thing on your own. Occasionally an extra pair of hands is useful, but

- slowly, SERIALY going through this lot is much more likely to not f&*k it up.
- There are NO old parts on my mast. Just a personal preference as I already have a spare mast, and had no intention of putting all this effort in to building another spare.
 - Generally you are done. Of course, the whole mast will now need to be carefully fitted to the boat and everything re-calibrated. There are books written on this subject elsewhere, by people far more qualified than I am.

Footnote :

BF & I : this is a technical term I picked up from my Dad, "Brute Force and Ignorance". Very useful in this whole thing.