

This document supports a complete article on the building, by GMT Composites of Bristol, Rhode Island, of a mast for the sailing vessel *Morgan's Cloud*. It should be read in conjunction with the article, available at:

[http://www.morganscloud.com/gear\\_failures\\_fixes/gfmast.htm](http://www.morganscloud.com/gear_failures_fixes/gfmast.htm)

To learn more about *Morgan's Cloud* and her owners, Phyllis Nickel and John Harries, go to:

[www.morganscloud.com](http://www.morganscloud.com)

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### Inspection report

John Harries & Phyllis Nichel  
c/o MORGAN'S CLOUD  
55' McCurdy & Rhodes Aluminum Sloop  
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November 4, 2005

Spar Inspection performed 10-10-05

Some observations after meeting John Harries & Phyllis Nichel aboard MORGAN'S CLOUD and inspecting the GMT spar system commissioned May 2005:

- MC is in fact an expedition sailing vessel which spends the majority of its sailing time far north.
- MC is sailed short handed which puts a premium on a thoroughly reliable spar system.
- My initial impression of the basic spar system was that it was basically well built and very strong, which has been substantiated by the owners 2005 season long shakedown which involved intentionally sailing in windy conditions and "pushing MC harder than he would normally push her"- John quote. However there were details I observed which need attention while the spar is out for the winter of 2005/2006. It was my impression over the course of my gathering of information that it was John and Phyllis' intention to pull the spar for the winter of 2005/2006 to complete the refit at the Billings Yard in Maine which included work other than spar details.

#### **Original Contract**

It has been established by the signed arbitration agreement (dated Oct 14, 2005) between John & Phyllis and David that the "original agreement" be defined as the 18 pg PDF file of 9/23/05 and "all agreed upon emails/correspondence which dealt with additions to the specifics within the PDF file".

Some background considerations based on my knowledge of GMT and my impression of John Harries & Phyllis Nichel.

I reviewed GMT as a company and researched their their track record during the last 15 years as a supplier of carbon spars and components to sailing vessels of all types, sailing in many venues. Being a custom spar builder/rigger in the marine industry for 27 years, I have always been on top of developments in spar building, closely following the development of carbon spars produced by GMT, Hall, Southern Spars, Composite Engineering, Offshore Spars, and any others I happen to come across. I spend a great deal of time in the field inspecting some of these spars and noting whose product seems to be reliable over time and why. The GMT product has always impressed me as being a top choice among demanding yachtsman, many of whom depend on them, shorthanded, in the most demanding sailing arena in the world, the Southern Ocean. The GMT carbon products have been incredibly durable.

My meeting with John & Phyllis combined with the detailed correspondence between Jay and GMT over the course of this spar project provided me with a personal profile which indicated very accomplished sailors with many thousands of sea miles on MC, who had definitive ideas concerning

how MC's new carbon spar was to be built to fulfill their specific needs They are very intelligent people who know exactly what they want their spar and related hardware to do.

Having been both a very demanding customer and a detailed oriented manufacturer over the past 30 years I am sensitive to both perspectives. I understand what it takes to marry a customer's specific needs to a manufacturer's product. I also know many of my demands include products which are not as evolved as I want them to be. It is humanly impossible to make every product completely fit every discerning customer's picture. Perfection is nothing we can humanly attain, only a goal we strive to come very close to.

It is impractical to consider alloy mast design features incorporated in the old mast, built some 30+ years ago to be part of a new generation carbon spar system which has been engineered and developed using modern, proven features, tested over time on similar spars in the world's most turbulent oceans. These new engineered components have proven to be as or more trustworthy than the older ones. I would think that these are the exact reasons why John & Phyllis approached GMT for this project. After reviewing the list of "defects and omissions" and inspecting the spar system in question (with the addition of some input from Jay Maloney) I have prepared the following analysis of the spar/spar components MC.

**Masthead/Sheaves-** alloy head fit into top section slot- head assembly has seated due to headstay/backstay pressure and caused the section, where the alloy vertical plates bear on the slot corners, to compress.

-This is not a structural problem. I have seen similar compression of these areas in other spars and have looked at one other since my initial inspection of MC and found a similar situation (this particular spar system is 8 years old and has some serious ocean sea miles).

-I do not suggest removing the masthead, I suggest cleaning up these areas (relieving them could result in more serious masthead damage). The masthead is now within mls of where it wants to be.

-The genoa halyard sheaves should be inspected, side walls cleaned up/faired (John has done this).

-The main halyard sheave is a Harken 712, suitable for use as a halyard sheave for 1/2" composite cordage (Harken Specifics)- it uses a Teflon composite bushing to carry the high radial loads and ball bearings for side loads. It is my experience that this bearing material is quite acceptable as are the present diameters- they are within today's engineered industry guidelines. It is also my experience that this main halyard sheave is the sheave of choice. I do not suggest the use of "roller bearing sheaves" in halyard applications due to the fact that they do not appreciably reduce friction at high halyard loads and they can pose a maintenance/compression problem.

-The chafe bar as it is now installed is a suitable chafe preventer for the long term- again used widely even for the most demanding sailing. GMT should compensate John for its installation.

-A rocker sheave (Harken 727) **could** be installed in the crane for the main halyard (aft of the present sheave) to reduce compression on the Antal Headboard Carriage as the main approaches full hoist by allowing the halyard to drop more vertically to the headboard carriage. To my knowledge I am one of the only spar builders to have employed this technique to reduce friction on luff car systems. This is not GMT's responsibility.

**Mast heel-** the mast appears to be exiting the partner with a slight forward attitude which has resulted in more than normal aft lower shroud tension to prevent more than normal prebend. The aft 15% of the heel cap is all that is in bearing on the keelson surface which is exacerbating the issue.

The butt should be relieved midsection aft (more rocker +/-5/32") and the step moved forward 1/2". I would consider this a commissioning task, not a defect or omission in original workmanship. Having

commissioned many new spars, I find many do not fit existing heel plug/step areas with acceptable contact and need to be trimmed to fit properly.

**Electrical wiring-** on all spars I build I install Anchor marine electrical wire- I find #14 acceptable for most wiring applications with the exception of masthead tricolor lights for which we commonly use #12. I would suggest the masthead trilight wiring be replaced w/ # 10 wire.

**Shepards Crook** at masthead for Burgee- this item was not available for me to inspect- John had removed it and given it to the yard to modify- GMT had agreed to correct this- If John chooses to have the yard repair it it should be at his cost. If he does not want to incur cost he should let GMT do the modification- it can be installed prior to resteping, GMT should share some cost of removal and reinstallation, however it was John's choice to remove it while mast was up.

**Spreader angle-** I cannot detect a twist in the mast section- in fact it appeared very symmetrical and quite fair from masthead to partner. I could also not detect an "off angle issue" at the butt/step area other than the aforementioned heel contact issue.

It does appear the port spreader bracket was installed slightly forward on the spar sidewall which accounts for an angle discrepancy from side to side. The fact that the topsail leech, when sheeted in for beating, differs from tack to tack by 6" does support this.

Proper symmetry is an issue- I would suggest redoing the inboard end of the port spreader, drilling only the forward pin, setting the mast up on its face and realigning the port lower spreader and drilling it in place, then repainting.

**Spreader base SS stock** is of acceptable gauge.

**Spreader Length:** I understand David's point concerning "poke" and it's value in side to side spar support. I cannot believe that if these spreaders are in fact 2" longer than the originals that it would make any difference in pointing ability and given the nature of this vessels sailing adventures I would embrace the added support. However, if the length of both lower spreaders was found to be long by more than 2" I would have to redo both inboard ends and refit/repaint both lower spreaders (the flag halyard blocks should be repositioned on both lower spreaders at this time). GMT's responsibility.

### **Fasteners/Fitting Isolation:**

A few fasteners have been drilled/tapped/fitted off angle. I believe most of these to have been in the storm trysail track ramp. These effect the slides at the upper end of the ramp and should be refit properly. John should be compensated for his time spent modifying these to allow the sail slides to pass properly. This is a safety issue.

-I asked Jay Maloney to remove 15 random fasteners (5 from mainsail track, 5 from spin track, 5 from storm trysail track which he did. They were all found to be properly threaded and bedded (note: some fasteners removed may appear dry but in fact were installed with epoxy bedding). If John wants every fastener removed and rebedded he should do this at his own expense.

-With reference to hardware isolation- carbon spars are epoxy laminates with many mils of fairing and paint. For most of the hardware this is adequate isolation (common to the carbon spar industry) .

With reference to the four winches on the mast, only the starboard upper (43 CST) had a pad under the bronze base- this was the only one still in one piece from the old mast winch installation-they are not necessary at all. The bases on the GMT mast are potted on epoxy/G10 (FRP) bases which employ no aluminum whatsoever and do not require any additional isolation. Evidence of aluminum chips in one winch would be inconsistent with the reinstallation on the carbon mast. The winches should have been overhauled prior to this reinstallation and I find no evidence that this was GMT's responsibility. All other hardware appears to be properly installed.

The lightning chaser should have been installed with a delrin base as specifically outlined in email from Tony Knowles and consistent with my practices. John should be compensated for this.

**Spinnaker Pole Inboard End/Car-** John Harries original requirements of 9/22/04 specifically state (item G) “design of system to prevent breakage of mast dick or car by inadvertent athwartship movement of the pole when removing from storage”. When I was on the boat I purposely removed the pole from its stored position and with it completely vertical moved it to the rail and beyond repeatedly without incurring any damage. It becomes a matter of degree- “how much inadvertent athwartship movement” is needed to damage the car/dick assembly.

-I have extensively used this Harken/Forespar System for many mast stored pole systems and find it adequate. Additionally, I realize if when the pole is absolutely vertical and off its storage chocks it gets completely away laterally by more than 6-8’ feet, damage can occur to the car/dick assembly, however I consider this to be human error and I am confident that John and Phyllis, as seasoned sailors, would come up with deployment technique to avoid such an uncontrolled occurrence. Marine hardware is always evolving, it is impossible to design “failsafe hardware” for each inadvertent act on the water. I am familiar with the Selden Car/Dick System and I am sure in the scenario previously outlined it too can be damaged. This item was not something intentionally deleted and with proper use will not be an issue.

**The halyard clutches** on both sides of the mast are located within acceptable linear tolerances of the winch drum bearing surfaces.

**Storm Trysail Track Fastenings-** these are 5mm, fine thread SS fasteners tapped into the carbon. The reason there is no aluminum backer is that GMT’s engineering along with their on the water experience has proven that this type of storm trysail track will pull though the fasteners or the fasteners themselves will yield at the outside wall before the thread will pull from the carbon. The reason the main track and spin track use aluminum backing is they use larger, coarser threaded fasteners which require more thread support and thus more material. I find no fault with this track fastening system.

**Storm trysail track ramp** should be polished to a mirror finish as specified in the original GMT quote. Some of the fasteners were installed off angle which prevented the sail slides from properly sliding- they should be removed, properly installed and bedded, slides checked for clearance. GMT is responsible here.

**Clearance of section through the partner** – the clearance is adequate for proper support- mast can be removed without damage- spar can be properly tuned.

**Spinnaker halyard entrance** near masthead has very sharp edges- never rounded prior to fairing/painting. Needs to be rounded and repainted. GMT responsibility.

**Gooseneck/ Vang Bracket Components:** basic design/fabrication is very strong.

- Roll pins do have a tendency to work out- use a bolt w/ locknut (loctited) or a cotter pin to secure.
  - Vertical gooseneck pin is in fact too short- it does not engage the lower flange- replace the pin with one of correct length.
  - Vang gooseneck play was initially solved with nylon washers which were not adequate- proper SS shims should be provided (can be ordered from McMaster Carr).
- All three issues are GMT responsibilities.

**Spin Pole Topping Lift Box-** will handle the rope diameter and the task at hand, but a chafe cage needs to be added as specified in original GMT spec 8.2- chafe protection is a necessity here. GMT to provide parts and installation.

**Threaded Nuts-** peening of threads at the nut/thread face is acceptable as provided.

**Water Dam-** if a water dam is specified and cannot be installed to do the job, it should not be installed at all. I suggest a reasonable amount of time be spent on this dam to modify it to do the job (the electrical conduit and wire leads into the conduit at the masthead and wherever wiring enters the mast/conduit should be checked for proper seal). With the mast down, access through the storm try halyard exit (other exits in the vicinity also) should provide a way to get a light inside to inspect the dam area from the butt, particularly around the conduit to see where more sealant is required.

I believe that some early problems with this spar (tangled messengers, trysail track fasteners, port spreader angle- compounded by some tuning & boat inaccuracies, main halyard chafe, water dam leakage, etc) combined with some poor communications between the two parties led to an inordinate amount of suspicion.

**The facts I find most pertinent are:**

-the spar was built, inspected, paid for, and used rigorously over the 2005 season without any failures while being admittedly pushed harder than normal.

-the “original agreement” was established while drafting the arbitration agreement. An “original agreement” which without getting into a battle of semantics has for the most part been met with the aforementioned exceptions.

-“Bomb proof” is terminology which I find sensational and impractical when used when referring to spar design. I believe with the above modifications completed “under good normal mast building/installation practices” this spar system will stand up to tens of thousands of sea miles in the northern latitudes and that GMT is more than capable of doing these repairs (in fact in a June 9 email David makes specific references to many of these problem areas, undoubtedly expecting to pursue their repairs during the fall/winter 2005/2006). John has done many of these repairs plus some others which I will make reference to in my findings concerning “pay backs”.

-Warranty- I have read the standard GMT warranty and in lieu of the present situation I would suggest it be extended another 8 months starting when the spar is recommissioned in spring 2006.

***I must interject at this point*** that I specified and accepted a \$ 1500 fee to travel to Maine. inspect the spar system in MC, study all forwarded paperwork pertaining to the situation, and submit a report which was to include my findings (what the actual “defects and omissions” are and assign responsibility to repair these areas). This fee did not include an obligation to oversee and certify each remedy and repair nor to adjudicate any financial disagreements between the owners and the manufacturer. I will make suggestions as to how these repairs should be made and by whom. I will suggest what I believe to be fair dollar values for these repairs. If I am asked to oversee said repairs and to arbitrate future disagreements among the parties, including inspection of said repairs, I will do so for additional fees to be based upon the extent of my involvement.

Given these guidelines John should be comfortable having Jay do the repairs with some direction from GMT. GMT and Jay should be able to work together to a successful conclusion and reach some financial agreement.

**The following is a list of suggested repairs:**

**-Masthead-**

*corners of section slots where head plates bear should be cosmetically repaired-GMT/Jay 500.00*

**-Mast heel-** *whomever commissions the spar fits the heel- John/Jay*

**-Spin halyard** *entrance slot- cleaned up so halyard chafe is not an issue-GMT/Jay 200.00*

**-Electrical wiring-** *GMT may want to supply wire- trilight increased to 10ga.GMT/Jay 600.00*

**-Shepards crook-** *non issue*

**-Spreaders-** *port lower spreader should be redone so angle matched starboard side-send spreader to Metalmast, replace plate, realign, redrill, repaint (burgee hlyd blocks relocated at the same time-GMT/Jay 900.00*

*Length at this point is not an issue as I have no data comparing the original lengths as compared to those on the carbon spar.*

**-Storm Trysail Track Ramp-** *removed polished (per GMT spec)- properly fastened to allow proper slide movement. 800.00*

**-Partner-** *not an issue*

**-Gooseneck/Vang Bracket-**

*-Roll pins need to be secured 90.00*

*-Vertical gooseneck pin should be replaced with one of correct length-GMT/Jay 90.00*

*-Vang toggle should be properly shimmed-GMT/ Jay 150.00*

**-Spin Pole Topping Lift-***Schaefer Internal Box needs a SS chafe cage 125.00*

**-Threaded Bolts/Nut Assemblies-** *peening is acceptable- not an issue*

**-Spreader Base Stock-** *is acceptable*

**-Water Dam-** *water dam needs to be sealed up - Jay 450.00*

**-“Pay backs”** I do not find it extraordinary to visit a commissioned spar job after queries from a concerned owner, especially due to the number of “shop abnormalities” found during commissioning. I personally would want to make sure that the spar system I had supplied was in fact what I myself would want to go to sea with, shorthanded, in the northern latitudes. I have had spreader angle issues similar to the one found on this spar and find plug welding due to the nature of the alloy and the parts positioning unacceptable- choosing rather to cut the plate out and replace it (rewelding of course is used in this fix also, but I believe of an acceptable nature). I have found such trips more of a relief than an aggravation and a necessary part of the job, not an addendum to it. Good customer relations and a chance to learn if you will.

I do find John’s bill of 9/29/05 to be well founded and accurate with the exception of the Windex/VHF antenna bracket work- this was more than likely not necessary.

Note: Johns invoice of 9-29-05 should be paid by GMT with the exception of the Windex/VHF work. John should not have to pay GMTs travel invoice.

I respectively submit this report,

Charles E. Poindexter III, President - Sound Rigging Services Inc.