

# ***UKIDA Technical Manual***

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### **1. INTRODUCTION**

The U.K.I.D.A. TECHNICAL MANUAL has been produced to both replace and update the original "Silver Technical Manual". It is provided by the UK International Dart 18 Association. Over the years a wealth of useful information has appeared in various issues of Dart News, dealing with topics and issues of relevance to Dart 18 sailors of all abilities. The most informative of these we have included in this manual. In addition to these re-printed articles we have invited the cream of the current UK fleet to write specific articles for inclusion in the publication. The aim of the manual is to create a comprehensive library of information, together with a list of contacts and the job descriptions of all the U.K.I.D.A. Committee members. It is our hope that this new Technical Manual will be of as much use to the association membership as the original manual was.

It has been interesting to observe during the research for this manual that many aspects of fast Dart sailing have changed over the years. Most interesting is the fact that the people who were winning a few years ago, are still winning today, but with totally different rig settings. These have not just been across the board changes by everyone. At present, some of the top echelon of the fleet sail with a loose rig and tight battens, etc., and some sail with a tight rig and loose battens. I think that this underlines the fact that there is no instant go-faster solution to sailing the Dart 18. My advice is to think about the different suggestions in this manual, then try them out and see if they suit you. Each set of rig settings requires a slightly different technique or style of sailing. They all require a certain amount of time to learn to get the best out of them, so give it a go. Some of the older articles have been re-printed as they originally appeared in *Dart News*. This is because their content is as relevant today, as it was when they were first printed.

**{Ed's Note, The terms :- He, Him & His, also mean, She, Her & Hers and no sexist offence is intended}.**

The Technical Manual also compliments the Training Courses that your Class Association already provides. The courses are designed for all levels of ability, from the novice Dart 18 sailors, right through to the experienced Open Meeting racer. These courses include the Dart 18 Teach-In, held every year at the Grafham Water Residential Centre. The Teach-In is supplemented by regional training and race training events held at various clubs around the country. There is always however, a need for experienced Dart sailors to get involved in assisting and instructing at these courses. Specific dates, venues and other details about these training courses are available through *Art of Dart* or alternatively through the U.K.I.D.A. Secretary {Lin Wilson email: ukida@globalnet.co.uk}, who will put you in contact with the U.K.I.D.A. Training Co-ordinator.

- **THE FIRST STEPS OF DART SAILING** *by Robin Smith*

## RIGGING

The shrouds should be placed on the 4th or 5th hole down from the top of the chain-plates. The rigging should be slack enough to allow 12 > 18 inches of fairly easy fore and aft movement of the forestay attachment to the two bridle wires - in other words you should be able to stand between the bows and push and pull the forestay backwards and forward the stated amount. Keep the jib fairleads in the standard position, i.e. approximately in the middle of the patch on the trampoline.

## SAILS

The Battens should be a snug fit in the pockets - don't try to stretch the sailcloth. The best way to tie the battens into the sail, is to bring the two strings up through the hole in the batten and then down through the eyelet on the sail coming out of the pocket on either side of the in-going lines and tie a Reef knot on top of them. Hoist the mainsail and attach the luff downhaul loosely. {When attaching the main, the knot in the halyard at the lock ring must be towards the stern}. Next, hoist the jib {Shackle on so that the open side of the hook is pointing towards the mast}. One of the most common faults that people make is to over-tighten the jib luff. A good way to learn to get it right is to attach the main- sheet to the mainsail, then pull on the main-sheet until the rigging is really tight. Now tension the jib luff until you see a fold appear in the cloth just behind the forestay, then release the tension until the fold just disappears. Knot the jib downhaul in this position, taking the downhaul round the forestay so as to ensure that the tack of the jib stays as close to the forestay as possible.

Please Note that it is advisable to have the assistance of your partner {crew} during this process. The boat must be head-to-wind and if possible in a sheltered position. They should keep the main-sheet to hand so that they can release it if a gust should catch the sail.

The next step is to go afloat, where you can then set the tension on the mainsail luff downhaul. To do this easily, sheet in the mainsail tight enough to sail to windward in the prevailing conditions. If necessary, luff into the wind while you do this. Then quickly get the crew to tension the luff downhaul just enough to pull the creases out of the lower part of the sail. You are now ready to go.

## WEIGHT DISTRIBUTION

It is vitally important to keep the boat trimmed correctly in the fore and aft plane. Normally aim to keep the waterline in the gel-coat of the leeward hull level with the water surface at all times. When sailing, it is easy to keep an eye on the leeward bow waterline, making sure it stays in the water.

On the Teach-ins we do at Grafham Water, this is one of the most common mistakes amongst new Dart sailors. You really must be prepared to move your weight backwards and forwards as well as in and out, especially in marginal trapezing conditions.

## WIND INDICATORS

To get the best out of the Dart 18, we will be concerned with five airflow indicators. These are:-

- The ribbon wind indicator hanging between the forestay bridle wires.
- The lowest set of wool tell-tales on the jib.
- The upper set of wool tell-tales on the jib.
- The upper set of wool tell-tales on the mainsail - in the same panel as the insignia - you can ignore the rest for the time being.
- The Burgee at the top of the mast. I am always amazed at the number of people who sail without the aid of a burgee, especially in light airs when the wind indicator on the bridle wires is hanging limply.

## SAILING TO WINDWARD

Normally the Jib should be sheeted quite tight {ease slightly in light conditions}. The mainsheet traveller should be central and the mainsheet in tight. One of the most common mistakes is that people don't get enough mainsheet on to get the twist out of the sail. A good way to measure your performance on the mainsheet is to set the boat up head to wind on the beach, then pull the mainsheet in with both hands as tight as you can. Mark the mainsheet with a waterproof marker pen where it comes out of the cleat. You can now use this mark as reference point. You probably won't be able to, or don't need to sheet the sail in that tight when you are sailing, but at least you will be able to see where the mark is and be able to sheet the sail in to the same tension on each tack.

{**Ed's Note** :- On the newer boats with Ball Bearing Blocks it is much easier to oversheet than with the old blocks. We recommend that you do not pull in with both hands as described above. Pull tight by all means, but not that tight.}

The aim in sailing to windward is to keep the bottom set of tell-tales on the jib flowing straight back. If the windward one is lifting continually, then you are pinching {sailing to close to the wind} too much and slowing the boat down. Forget about the other boats near you pointing higher, just sail your own course according to your tell-tales, concentrating 100% on keeping that lower windward tell-tale just off the lift point. Don't get involved in luffing battles; if someone is attacking you from behind, trying to overtake close to windward, the answer is to bear off onto your proper close-hauled course and leave them behind!!

In lighter conditions, it is possible to stall the top of the main, so it is essential to keep an eye on the top leeward tell-tale on the main and keep it flowing. If it is waving about, then the airflow has drastically broken down. Ease the main a fraction, sometimes an inch or two of mainsheet is the difference between having the airflow going across the back of the sail or being stalled out.

In heavier winds, as you get overpowered, you will need to move your weight back on the boat to keep the helm balanced. In marginal trapezing conditions, up to and including about force four, the crew should be trapezing up by the shroud with the helm sitting on the center toe loop; but move your weight to keep the boat balanced, with just a touch of weather helm being ideal. If you sit too far forward, you will have excessive weather helm and the rudders will easily stall out.

In strong winds it definitely pays to ease the jib in unison with the main, in fact we often sail with half the jib backed when going to windward. Not because we are

luffing to spill wind, but because the jib has been deliberately eased. Obviously you cannot sail on the jib tell-tales when doing this, and it does take some practice to get it right. The sequence goes something like this:- You are sailing close hauled, all the tell-tales on the jib flowing straight back - a gust hits - hold a steady course and ease the jib to depower the rig {and main slightly if necessary} - the boat accelerates through the gust - you have to move your weight back slightly as the jib is eased to compensate for the increased weather helm. The other boats around you may have luffed into the wind in the same gust and will have slowed dramatically while you have gained.

## THE BEAM REACH

This is probably the easiest point of sailing. The main sail traveller needs to be central, the helm plays the mainsheet continually to keep the top leeward tell-tale on the main flying at all times. The crew plays the jib, using the top jib tell-tales, keeping them both flying. If the leeward one lifts, the jib is in too tight; if the windward one lifts, then the jib is out too far. Don't just sail with the sails cleated because the tell-tales are all flying; the sails may be out too far; constantly adjust it to check that you are just on the stall point. In variable conditions, luff up in the lulls to keep the apparent wind speed up. Then bear off in the gusts to accelerate and also to give yourself more room to luff again in the next quiet spot.

The crew will need to trapeze much further back in stronger winds, sometimes with one foot either side of the helm, using the restraining line to hold him back securely.

Once again in lighter winds, remember to trim the boat level on the waterlines. Be prepared to move up and down the boat fairly rapidly in marginal conditions to keep the trim right.

## THE BROAD REACH OR TACKING DOWNWIND

The object is to sail as far off the wind or as deep as possible without stalling the sails. The mainsail traveller must be right out and the mainsheet right out. As a general rule, keep the wind indicator just behind the bridle wires. In other words, keep it virtually at right angles across the boat.

In light to moderate winds, the crew should sit on the leeward hull, facing forwards, holding the jib by the strops in front of him and keeping the leach tight by pulling downwards, but always keeping those tell-tales flying. At the same time, the helm should be sitting right forward up against the main beam on the windward hull, watching the wind indicator like a hawk, bearing off every time the ribbon starts to come back and luffing up as it starts to go forward of the forestay bridle wires.

As the wind increases, the helm will need to sheet in a little and move back and the crew can move up to the windward side, playing the jib sheet through blocks.

In very rough conditions, both the helm and crew will need to sit as far back as possible on the windward hull. Sometimes it even pays for the crew to sit between the helm's legs on the trampoline so as to get the weight even further back. The crew should concentrate on the bows in these conditions, if the bows start to bury, the crew should immediately ease the jib a considerable amount so as to prevent the jib forcing the bows further down as the boat slows and therefore preventing a pitchpole.

## TRANSITIONAL

The difference in wind direction between being on a broad reach, beam reach or a close reach is fractional. If you are sailing towards a distant buoy on a broad reach, traveller right out, sails right out and a wind shift brings the wind indicator ribbon back on the bridle wire more than an inch or two, sheet the mainsail traveller to the central position, luff slightly and gradually sheet in the main and jib together. Tighten the mainsail and play the sail using the top leeward tell-tale as for a beam reach. The apparent wind speed will increase dramatically and so will your boat speed. Once the speed is up, you can bear away onto your original course or lower.

I very rarely sail with my mainsheet traveller in any position other than central or right out.

## TACKING AND GYBING

It is difficult to describe how to tack and gybe correctly, but there are some golden rules that certainly make things easier.

Let us consider a tack starting with the crew out on the trapeze. The helm warns the crew of his intention to tack and when he is ready, he gives the final command. The crew comes in off the trapeze smartly, leaving the jib cleated on the leeward side. As the crew comes onto the hull, the helm puts the helm down to start the tack {no, he doesn't let go; he pushes the tiller away from him}. Once the helm is down, it must be held constantly in the same position right through the tack and until the boat is starting to move on the new tack. At no time must it be allowed to centralize, especially when the boat is in the head-to-wind position.

The crew should go across the trampoline facing forwards, reaching to free the jibsheet

from the jaws of the cleat when the jib is seen to back firmly. Quickly pulling the new jibsheet through to set the sail on the new tack as soon as possible. Only start to clip on to the trapeze wire when the sail is in on the new tack - don't try to do them both at the same time or the helm, {at least this helm} will get very annoyed if he is trying to set the boat up on the new tack with a half in jib and a body half out on the trapeze. out on the trapeze.

As the helm goes across the trampoline, he should ease out a couple of feet of mainsheet to stop the boat from trying to luff up back to head-to-wind, and also to put some twist into the sail to correct the stalled top part of the near stationary sail. As the boat starts to move, pull the mainsheet back in again

At least if the jib is in, the helm can sail the boat on line while the crew sorts out the trapeze.

My technique for Gybing defies all attempts to describe it with pen and ink, but here goes. Imagine that you are on a port gybe, that is with the main sail out over the starboard side of the boat, and with the helmsman steering, holding the tiller extension with his right hand. Lift the tiller extension over or round so that it is just touching the mainsheet about one foot below the clew of the mainsail. While doing this you will obviously have to move towards the centre of the boat, but try not to look

at what you are doing; just keep looking forward at where you are going, and hold your original course whilst putting the tiller across. {You may be coming up to the gybe mark with 50 other Dart 18's!!!

Now reach across under the mainsheet falls with your left hand and grab the end of the tiller extension; let go of the tiller with your right hand {the old tiller hand} and grab the falls of the mainsheet about one foot below the clew or mainsheet hook.

You will now be moving right across the boat, but you should still be able to see forward and you should still be able to hold your original course.

Now push the tiller extension across to where you were sitting on the old port tack and the boat will gybe. You can check the mainsail as it goes across by pulling down hard in the centre, and as you spin round, everything should be in the correct hand! That is, tiller in the left hand and mainsheet in the right hand.

Once you get the hang of this technique, you can obviously speed the whole thing up, until it becomes one smooth manoeuvre and in fact what actually happens is that you start to turn in the initial stages of the sequence as you are moving the tiller extension over to the other side of the boat.

You now know all there is to know about sailing a Dart 18. All you need now is plenty of practice and a little bit of luck!!

***Robin Smith***

{ Reprinted from Dart new 1984 - Updated and edited in 1996} by ***Andy Weller***

## **1. WHAT TO WEAR FOR DART SAILING by *Brian Phipps***

### **FROM THE BOTTOM UP**

Years ago, 1980 I think, I took John Noakes of Blue Peter and his dog Shep, Dart sailing for the B.B.C. Viewing the footage of that event highlights to me how sailing clothing has changed in 16 years. Our standard issue of 5mm inflexible wetsuits, yellow wellies, basic trapeze harness and bubble pack buoyancy aids were the height of trendiness in the late 70's. Now they are history - unlike the Dart 18 which has neither aged or changed in that time - not a bad act to try and follow. The video has been banished to the Cat. Clinic archives as it is too old fashioned and out of date to use anymore!!

So what are our options? And what is trendy??

Personal clothing for Dart sailing is about personal choice. Developments made on the clothing front have largely been for comfort and convenience, we still need to keep warm - it just depends on how we do it.

### **BOOTS**

Good footwear is essential for getting around the boat and up and down the beach. On the beach, a good sole will be more comfortable to wear, especially when pulling your boat up a stoney beach. On the water, good support in the heel, toe and toe-strap pressure area is required. The rubber sole on some boots do not suit the slippery side of a Dart, so check it out for grip. Zips make easy access but have a habit of coming unzipped, so look for a boot with zip covers like the Typhoon Regattas.

## WETSUITS

The choice of suit, thickness and cut are vast, but there are a few key factors Dart sailors might consider. Depending on when you are going to sail, summer or winter, will affect your decision on the material thickness of the body and style of suit. On average, a winter suit will have 5mm body with 3mm arms and minimum opportunity for water ingress. Commonly known as "Steamers" the more you pay the warmer and higher specification your suit will be. During the summer, most people use a 3mm body and detachable arms as the best option. When selecting a suit, consider the main wear areas - backside and knee protection, flexibility of the suit and compression areas, under the arms and behind the knees etc. A leading brand name will cost you a little bit more but this is normally a reflection of their involvement in development research and the quality of the neoprene.

## DRYSUITS

Now a popular choice by sailors. Especially during the winter, the Drysuit {if it is dry} has come of age. Typhoon were the first to develop the product but there are many other brand options. Whether one or two piece is down to personal choice as is front or rear zips. Again protective areas on the backside and knees are important and internal braces are an advantage. The latex seals on the neck, wrists and feet are the biggest headache. Washing out, talcing and protecting from the suns U.V. helps, but it is a costly expense getting them replaced. You can do it yourself, but be prepared for a steep learning curve on your first few attempts. The stories of floating "feet up" due to not venting your suit may be a bit exaggerated - but certainly sailing with a damaged neck seal or other where the water can get in would be similar to swimming with welly boots on and not recommended in a capsized.

## GLOVES

"Turtle Doves" need to fit well and give you the protection you need. Full finger gloves offer good protection but are poor when it comes to undoing shackles or knots. So the cut back thumb and forefinger option is a good compromise. Reinforcement in the palm and fingers will help prevent excessive wear from ropes etc. Oh yes, also wash them out in fresh water regularly, as they start to stink after a while, - well mine certainly do!!!

## HEADWEAR

A hat can be as important in the summer as it is in the winter. A short peaked hat in the summer keeps the sun off and also allows you to watch your sails without getting a headache. In winter a woolly hat or balaclava will keep you warm and one made from polatec fleece will do so even when its wet. The neoprene skull caps are good { if you dare to wear one} but seem to affect your sense of feel for the wind and how

much can you hear? Whatever you wear tie it on with a line to your buoyancy aid, just in case it comes off.

## SPRAY - TOP & OVERSUITS

Spray tops and oversuits are ideal for offering added protection and warmth as they deflect the chill factor. Reinforcement on the backside and knees are again a good idea and internal braces also help. The down side is that oversuits can add to the lack of mobility and in preference a spray - top and a pair of chest - highs are a good balance.

## BUOYANCY AIDS

The new EEC regulations have tightened up on the minimum amount of buoyancy allowed for various sizes of aid. A large proportion of old buoyancy aids with deflated bubble pack buoyancy or perished foam are dangerous and it is worth testing your old buoyancy aid and seeing if it floats when you attach a few weights. When selecting a new buoyancy aid, make sure that you have ample room under the arm, it does not ride up around your chin and a belt and buckle that cannot get separated are a good start.

## TRAPEZE HARNESS

Modern trapeze harnesses with spreader bars, lumber supports, back pads and leg straps are all developments of the old style of trapeze harness. Trapeze harnesses are like ski boots, one style that suits one person may not suit another. Trying one on and sailing with it is the only way to find out but spreader bars, lumber supports and back pads that aim to stop the compression of the hips and back seem to be a good idea. The way the back and neck area is cut can also be important as it prevents the straps from sliding off your shoulders. The option to wear your buoyancy aid over or under your harness is personal, try it both ways and see.

## SUNGLASSES & PROTECTION CREAM

Sailing a Dart takes it out of your skin and out of your eyes given the right conditions. In Club racing, where you may only be sailing for a couple of hours, you may not notice any effect. Try a 6 day Championship, 5 - 6 hours a day on the water and it will definitely start to show, so a little protection can go a long way. Remember the Aussie slogan. "Slip, Slap, Slop"!!!!

## CONCLUSION

Dart sailing is about having **F U N** . If you are not comfortable and warm, having **F U N** is difficult to achieve. The modern sailing equipment is getting better all the time, so maybe now is the time to put your older gear in the archives, along with my video, and purchase some new "trendy" stuff for the coming season. By the way we sell it all.

One other thing that is worth considering, Insurance. More than likely your household policy will NOT cover you as sailing is not a sport that the insurance world seem to recognize {funny really when lacrosse is}. Also sailing gear is not usually covered as



clothing. Check your policy and if necessary it might be worth taking out an all risk policy for your gear as we all know that it is expensive to replace.

## **Brian Phipps 1996**

1.

### **2. SETTING UP THE DART 18 by Andy Weller**

As with all things in life, preparation is the key to success. Racing Dart 18's is no different in this respect. Before you start racing {or periodically once you have}, you should check that the boat is properly set up.

*Photo 2 :*

*Check the hull alignment by measuring between the centre of each stern and from bow to bow; they must be the same.*

The first thing to check is that the hulls are properly aligned. They **MUST** be parallel. To check this, with the boat on level ground, and with the mast removed, as any rig tension will "Toe In" the bows{ not a bad thing as it makes you point that little bit higher}. Measure between the centre of both bows and sterns. ***{Photos : 2 and 3}***. The distance should be the same. If it is not, you will have to either pack out or file off the main beam stops until it is right.

*Photo 3*

The beams should also be a nice snug fit in their housings, so that when you lift one bow the other bow should rise up at the same time. The less flexibility that you have here the better. If there is excessive movement here, your only recourse is to add a little glassfibre resin to the beam sockets to take up

the slack. On the rear beam, ensure that the adjustment clips are properly tightened up as a gap here will cause the hulls to come out of alignment when rig tension is applied.

Next thing to check is rudder alignment. Elevate the stern of the boat and attach the rudders in the down position. From behind look to see if they are vertical, if not you can adjust the pintles to achieve this.

*Photo 4:*

*Check that the rudders are vertical. If not adjust the pintles.*

Then measure the trailing edges and the leading edges to see if the rudders both point the same way. These measurements **MUST** be the same.

*Photo 5:*

*Measure between the rudders trailing edges, then between the leading edges. The measurement should be the same. If not adjust the tiller connecting bar.*

If not you will constantly have problems with steering at high speeds with the tendency of rudder stall much higher

You can correct any fault by adjusting the tiller connecting bar. You have to drill out the rivet in the end fitting and move it in or out a small amount before re-riveting.

Also check that the rudder blades are tight in the stocks. Any movement here is another no-no.

The last thing to check on the rudders is the profile of the leading edge of the blade. This can be lightly sanded with appropriate wet and dry sandpaper to produce an improved hydrodynamic shape, thus allowing improved water flow around the blade and helping to reduce the dreaded rudder stall at high speed.

Toe straps should be tight, as it is much more efficient and comfortable to sit out when they are. If you don't believe me try sitting out with slack toe straps and you will see what I mean.

All fittings and shackles should be regularly checked and maintained. They must all be working efficiently. They should be checked for tightness at regular intervals and the standing and running rigging should be checked for wear periodically.

One other important part often overlooked, is the rope strop between the forestay and the bridle wires shackle. **DO YOU EVER CHECK THIS FOR WEAR?** If you don't, **YOU SHOULD!** This little piece of rope is left exposed to the elements all the time. It is constantly being stressed and strained as the mast moves constantly, whilst left in the boat park and it is also attacked day in day out by U.V. Rays. Personally, I replace the strop with either Spectra or Dyneema rope for its negligible shrinkage and virtually zero stretch properties. Do not use Kevlar rope as Kevlar does not like being put through very tight corners. This can result in the sudden total failure of the aramid fibre core in kevlar rope, with the obvious disastrous result. I regularly check the strop for wear, replacing it about **TWICE** a season.. the cost is far less than the cost of a ruined jib if it should fail on a windy beat. {I know to my cost. "Once Bitten, Twice Shy"!! As they say}.

Boat work is "FUN", it should not be a chore, and done regularly, should be of more benefit than a major overhaul. Loosing a race through lack of maintenance, should never be an option or an excuse.

### **Andy Weller {1996}**

1.

## **2. BASIC TIPS ON TUNING THE RIG by Andy Weller**

With a Dart 18 one thing is certain, if you are to be successful, you must understand how to tune your rig. It is not as simple as just putting up the mast and hoping for the best. In the Introduction to this manual, I suggested that there are no firm figures or measurements of what is quick and what's not on a Dart 18. I still stand by that statement, but if you do not know how to take these measurements you will never know how to try them out.

### **MAST RAKE**

To make sure that we start off with a "level playing field" so to speak, I suggest that you firstly check your shroud lengths prior to raising your mast. They can be different

and the manufacturer can make mistakes. Also wire rigging does stretch slightly, so check the lengths periodically.

Understanding the effects of mast rake is crucial. In general terms, in light winds, a reasonably upright mast is best and as the wind increases the mast can be raked back to depower the sail. On dinghies "more mast rake equates to better pointing ability", whilst this is still true on a Dart, but to a lesser degree due to our slack and rotating mast. On a Dart "more rake helps to reduce the power from the mainsail".

Mast rake has a direct relationship to the combined weights of the helm and crew. Lighter weight = more rake required, Heavier all up weight = less mast rake.

You do need some initial settings and these are best obtained from someone of a comparable weight who is going fast. A chart of these figures is available later in this article. This means that you will need to have a method of measuring the mast rake. The easiest method that I know is as follows :-

- Disconnect a trapeze wire from its shockcord and adjust it to maximum length, {adding a suitable length of rope if it is too short}. The reason for this will be clear when you try it. You are using the trapeze system to measure with. It will probably not be long enough unless you extend it. *Photo 6: To set the mast rake initially, tension the opposite shroud, take the trapeze wire to the front chainplate and adjust its length as shown on the next page.*

Now turn the mast round with the spanner pointing along the beam to the opposite side of the Dart from which you have disconnected the trapeze. Lock it there by inserting the mast pin. {E.g. If you have disconnected the starboard trapeze wire, rotate the mast so the mast spanner is in line with the main beam on the port side}.

- You will now require a colleague, {that is just a posh name for your crew, but only when you are winning} to pull hard on the shroud. Again on the opposite side from the disconnected trapeze, in order to tension the rig.
- Take the extended trapeze wire and swing it forward so that it crosses the deck edge just where the aft edge of the bridle chainplate crosses the deck.
- With this length set, swing the trapeze wire aft until it once again bisects the deck, {somewhere near the rear beam}. Mark this point.
  
- *Adjust the length of the trapeze wire until the bottom of the metal ring just touches the chainplate {left} Then take the trapeze wire to the gunwhale near the stern and mark where it touches {centre} The distance from this mark to the stern is the measurement of mast rake {right} .*

You can now measure the distance from the transom to your mark. If the mark is up near the middle toe loop, you can assume that your mast is upright. The further aft the mark is the more rake you have. The majority of middleweights {approx 20 > 22 stones all up} have a rake position of around the rear beam socket. I know of one flyweight {approx 17 stones all up} who had a measurement of nearly 30cm **BEHIND** the **TRANSOM**, but this is very extreme. The measurement that you have taken we will call the "A" measurement.

Please remember only to use this method of measurement on level ground and with the trolley completely removed, or your measurements will be inaccurate.

To recap, more wind equates to more rake needed. The effect of increased rake is to move the centre of effort on the main back, hence reducing power, opening the leech a little and making the boat more manageable without loss of speed

## **RIG TENSION**

Rig tension is another important factor, but is totally linked to rake, and the lengths of the shrouds and forestay. Basically the shrouds dictate the rig tension and the forestay, the amount of rake. As a rule, the higher the wind strength the more rig tension is required. Rig tension is measured by one of two methods. The first, is to measure the deflection of the forestay at the bridle wires. To do this you first push the forestay away from the mast and measure to the mast foot . Then push the forestay towards the mast and again measure the distance to the mast foot.. Subtract the smaller distance from the larger distance and you have a measurement that we will call the "B" measurement.

*Photo 10: The other method is to push the shroud chainplate adjuster forward as hard as possible and then measure the vertical distance between the top of the adjuster and the deck.*

## **JIB FAIRLEADS**

Measure the position of the fairleads from the main beam to the front of the jib fairlead car. This is called the "C" measurement.

If you rake your mast backwards, this will alter your jib sheeting angle, in effect bringing it forwards, making the jib fuller and tightening the leech.

Before you move the mast, rig the Dart and sheet the main and jib in hard. Now using a long straight edge, extend the jib sheeting angle across the sail and make a small mark on the luff.

After moving the mast, repeat the exercise, but this time move the fairleads to once again line them up so that they are in line with the mark.

These measurements, {mast rake & rig tension} should be recorded so that once you have found the settings that best suit your

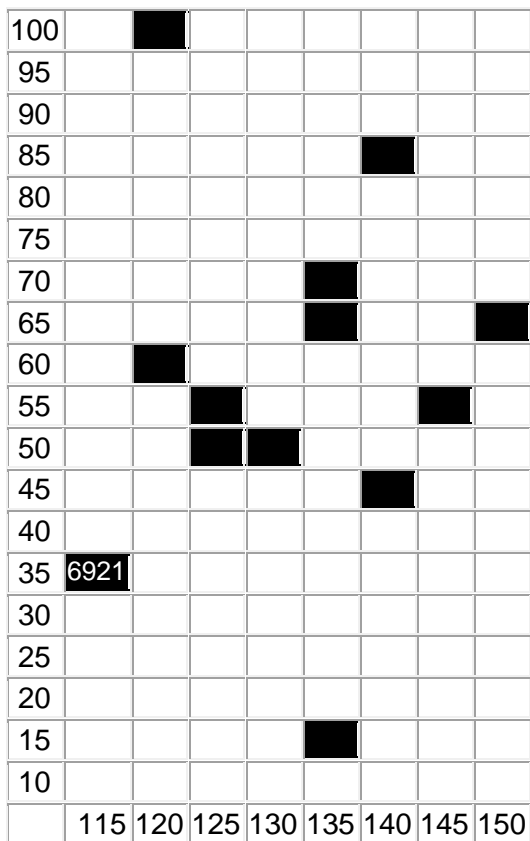
weight and sailing style, they can be reproduced easily time and time again.

At the recent National Championships at Abersoch {1996}, David Lloyd sneaked out one night and took the measurements of all the boats in the top 10 at the time, also he took measurements from a couple of other boats sailed by ultra lightweight all female teams. These are the results of his testing and would be a good starting point for your own rig set-up. Choose the set of figures that best relate to you and your crews own weights and try the set-up listed. REMEMBER, these are not measurements that are "cast in stone". Use them as a starting point and then experiment to come up with the set-up that works best for you.

Table of Helm and Crew Weights in Kilos Also the "A", "B" & "C"  
Measurements.

Sail No.	Helm	Crew	A'	B'	C'
	in kg	in kg	in cm	in cm	in cm
7310	73	63	90	44	88
146	76	57	53	55	86
7073	73	67	59	35	89
7283	73	56	60	70	90
2052	63	57	60	42	86
7166	73	62	15	63	71
7290	82	57	75	60	76
7068	67	54	104	46	94
7141	80	64	67	48	89
6935	80	57	66	54	84
1921	69	73	47	65	78
6921	60	57	33	50	100
7034	69	57	51	48	104
5303	64	57	65	59	70

### Mast Rake Graph



*Horizontal :- Total Crew Weight in Kg'.*

*Vertical :- Mast Rake "A" measurement*

-

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## TUNING TIPS!!

### DOWNHAUL

It is becoming increasingly more popular to adjust the downhaul during the race. We normally ease our by 1" > 2" inches for the broader reaches and runs. This helps to improve the airflow over the main and also increases the projected sail area more. The effects of this are to allow you to run slightly deeper.

*Photo 11:*

*Set up correctly, the existing downhaul fitting and line can easily be converted into a 3 to 1 purchase.*

These adjustments have necessitated two things. Firstly, that you have some "Datum Marks" on the mast {ie stick-on number scale or indelible marker pen lines}, so that you can replicate your settings quickly and accurately. Secondly, a need to increase the mechanical advantage of the downhaul system to make adjustment easier. Any advantage that you may have gained downwind by easing the downhaul, will surely be lost if you need to have the crew standing up by the mast, using their foot to put on the downhaul as you try to round the leeward mark properly.

In accordance with the class rules, you can increase the purchase from 2:1 to 3:1 using the same fitting and rope length. Normally, the rope is tied off to the becket at the bottom of the fitting, then runs down through the metal yoke on the mast and back around the pulley and finally out of the cleat, giving a 2:1 purchase.

If you remove the rope from the fitting and tie a stopper knot in one end of it. Then feed it up behind the halyard sheave box, so that the knot is at the bottom. Then you can feed the rope around the lower pulley {or becket on some older fittings}, down through the yoke on the mast and then back up and around the pulley and out through the cleat. This gives a 3:1 purchase and the increased mechanical advantage helps tremendously when trying to adjust the downhaul.

### TRAVELLER

I have noticed over the last couple of years when I have been scrutinizing boats at Championships, that people have been threading their traveller sheet up the trampoline and either around the trampoline satchel's Inglefield clip or around a piece of elastic tied between the two Inglefield clips. Whilst this method does work in stopping the sheets from being washed over the rear beam, it is actually not advisable and the extra elastic or rope is not class legal. It is also a potential danger in the event of a capsized with extra ropes etc, there for people to get tangled up in. If you have a problem with losing the sheets off of the back of the boat, try gathering them all up and place them in the helm's lap. They are then to hand and will not wash away.

To shorten the length of the traveller sheet, I firstly tie a bowline at one end and place this over the mast ball prior to erecting the mast. I then run it through under the shockcords and up through the traveller car on the rear beam. This takes up all the excess of sheet and also provides a good hand hold under the trampoline in the event of that unfortunate capsize.

Another worrying trend, is the placing of the trampoline satchel handle over the mast ball prior to erecting the mast. This practice negates the designed use of the satchel as an aid to capsize recovery and is in controvention of the class rules. The satchel was designed to be removed from the trampoline in the event of a capsize, {especially when single-handed for whatever reason}. If you fill the satchel with water and sling it over your shoulder, the increase in righting moment, will help to right the boat. If it is attached round the mast it cannot be used for this important purpose.

### **Andy Weller 1996**

## **1. RACE PREPARATION TO WIN !!! *by Ron Thomas***

Good race preparation is vital for turning in good race results, especially if competition is good. In fact, race preparation plays a major role in the magic formula for winning a regatta series.

Firstly, race preparation must become a form of habit not something you do occasionally. In other words, it should apply at all levels so that everything will flow naturally when it really counts.

Before the season gets underway, subject your boat to a very close inspection and renew or mend anything that is suspect. It is absolutely no good going onto the water with a split in your trampoline, frayed sheets, seized jib blocks or cleats or a sail in need of repair. They will let you down, so at all times keep your boat in A1 working order and condition.

Anticipate possible problem areas and sort them out. Competition today is too tough to allow for repairs whilst you are racing. Also pay special attention to your skeg and rudder blade profiles. They should always be fair. It is important to have a positive mental attitude towards your boat.

The psychological preparation is just as important as the boat preparation. ALWAYS, always, think positive. Negative thinking sailors are beaten before they start. If it's blowing hard and you carry little weight, think positive and say "We'll get them Downwind". If you make a mess of a beat and you're down the pan, think positive, you can get it back.

When racing away from home and in unknown waters, try to spend some time afloat before the regatta starts and take note of local wind and tide conditions. In this way you will feel more relaxed and acclimatized.

Get into the habit of leaving for the start area in plenty of time. You will find all the top people there first and the back of the fleet sailors are invariably the last off the beach. There must be something in this fact !!

When ready to go afloat, go through a mental check list. Tide, wind, all fittings working efficiently, jib luff, battens OK, watch, clothing - am I going to be too hot/cold ? Sailing instructions. Refreshments, both food and drink. Toilet. You may laugh, but you won't sail very well with your legs crossed !!

Once in the start area, sail away up the windward leg and check the whereabouts of the windward buoy and if possible take a land bearing or transit. Also try to establish whether one side of the course is more favoured than the other.

Then return to the starting area and stay near the Committee Boat to ensure you hear the warning gun. Check the start line for bias ( it will nearly always be biased one way or the other ) and stay out of trouble. If possible re -check the line again after the 5 minute gun in case of a shift in wind direction. Having made up your mind where you are going to start, plan your approach to hit the line on the gun sailing fast.

So there you have it. Think positive - good sailing.

***Ron Thomas*** Reprinted from *Dart News* 1984

1.

## **2. THE DART MAINSAIL**

*by Robert Garcka*

This is my understanding of how the Dart 18 mainsail works and the settings that I use.

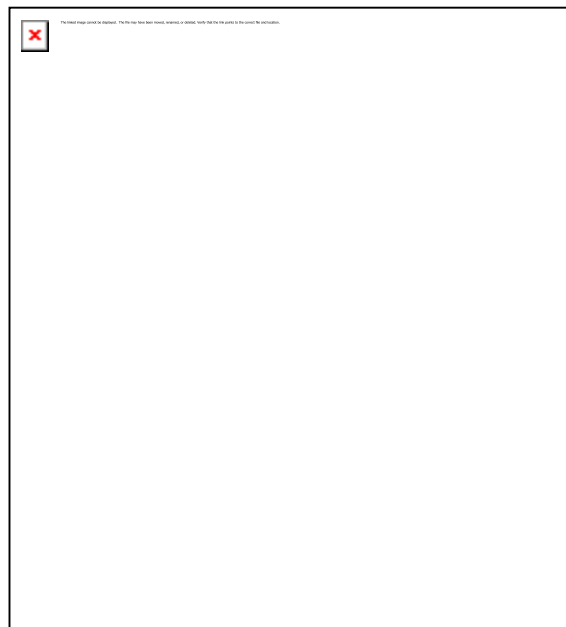


Figure 1,

*How an aircraft wing generates lift, with "A" being the wind direction and "B" the lift generated.*



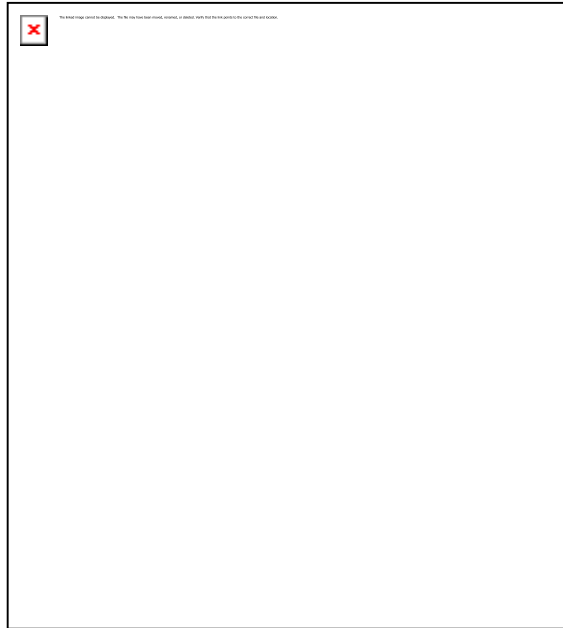


Figure 2,

*How a sail also generates lift in the same way. With "A" again being the wind and "B" the lift or Forward Drive.*

## THE THEORY

Very basically, as the wind is forced around the Windward side of the sail it slows producing high pressure, and as it is forced around the Leeward side it accelerates causing low pressure.

With high pressure on one side of the sail and low on the other, the sail is sucked towards the lower pressure producing forward motion.

### **Points to note:**

The low pressure has the most effect on your **BOATSPEED** {i.e. don't stall your mainsail by overshooting}. An increase of **twice** the wind speed will produce **four** times the power, but also **four** times the drag.

## RIGGING SETTINGS

The basic settings that Sandy and I used were determined by our all up weight of 21 stones. {Bob a lardy 12.5 stones and Sandy a sleek 8.5 stones}. You should vary the settings depending on your all up weight. The settings stay the same in all conditions except when it is VERY windy, and by that I mean force six and above.

**MAST RAKE:** {Measured from the Transom}

Raking the mast back creates weather helm and helps performance to windward. The leach will be looser in strong winds reducing power. **Our measurement is 16 inches.**

**JIB BLOCK POSITION:** {Measured from main beam to the front of the jib slide}

Moving the blocks back pulls the bottom of the jib in, leaving the leech looser. This will stop the slot {the gap between the mast and the jib} from choking, helping the flow of wind over the mainsail. It will also help you to point higher. **We set our jib blocks at 38.5 inches back from the main beam.**

### **RIG TENSION:**

Without a gauge it is difficult and accurate measurement, but you should be able to rotate the mast so that the spanner is pointing just forward of the main beam. This allows you to sail lower off wind because you can let your mainsail out further before it stalls. **Our rig tension is fairly loose.**

### **SPANNER LINE:**

If the spanner line is too short, the spanner {and mast} will not rotate enough down wind. It is not important up wind because sheeting in the mainsail will de-rotate the mast. {Do not use Pre-stretched rope, because it shrinks!!!} **Our spanner line is of maximum length and made from Dyneema or Spectra.**

### **BATTENS:**

In light to medium winds - tension the battens so that there is just enough to flick when popping the main through to the opposite side.

In strong winds - leave the top five battens fairly loose so that the leech blades off at the top, reducing power.

## **MAINSHEET MARKINGS**

### **LIGHT WINDS:**

Rig the boat on dry land and position it at about 45 degrees off the wind. With your crew sitting on the Windward hull and holding the mainsheet, stand aft of the boat, in the centre, looking directly at the mast. As the crew sheets in the mainsail you will see the leach of the sail go parallel with the Mast, then the top of the sail will start to obscure the mast. The sail is now hooking to windward, causing the leeward side to stall and create drag. Ease the mainsheet until the top of the leach just starts to fall to leeward of the mast. Mark the mainsheet just in front of the cleat and use that as your "GUIDE" for light winds.

### **MEDIUM WINDS:**

Rig the boat and take to the water. Sail upwind and sheet in the mainsail until the leeward telltales start to flutter and the sail is stalled. Ease the mainsheet until the telltales just start to flow again. Mark the mainsheet just in front of the cleat and use that as your "GUIDE" for medium winds.

### **HEAVY WINDS:**

Follow the same procedure for heavy winds as for medium winds and you should have three basic markings from which to work.

### **Point to Note**

The marks are not definitive because you must play the mainsheet as the wind fluctuates and your course changes.

## SAIL CONTROL SETTINGS

### LIGHT WINDS: {force 1 - 2}

#### UPWIND

##### TRAVELLER: OFF 2 - 4 INCHES

To stop the leach hooking.

##### DOWNHAUL: TIGHT

Again, to stop the leach from hooking.

##### MAINSAIL:

Sheet in until the top LEEWARD telltale just starts to flutter and stall, then ease it slightly. Be sure the mainsail is not hooking {lean over the front beam and sight backwards towards the stern and up the mast.} If the top of the leach is hooking ease the mainsheet slightly. If the middle of the leach is hooking ease the traveller and or ease the batten tension slightly.

##### *Point to note*

Concentrate Very hard on keeping the boat moving at all times and not letting the mainsail; luff or stall.

#### REACHING

##### TRAVELLER: TIGHT

##### DOWNHAUL: OFF 1 INCH

##### MAINSAIL:

Sheet in harder as you build up speed {e.g. When riding a wave}, and ease it as you slow down and the telltales start to flutter {e.g. When climbing a wave}, until they start to flow again.

#### DOWNWIND

##### TRAVELLER: RIGHT OUT

##### DOWNHAUL: OFF 2 INCHES

##### MAINSAIL:

Keep the mainsail against the shroud either with your foot on the spanner or the crew holding the spanner line from down to leeward. This keeps the mainsail out an extra few degrees and allows you to sail a few degrees lower.

### **MEDIUM WINDS: {force 3 - 4}**

#### **UPWIND**

**TRAVELLER: CENTERED**

**DOWNHAUL: TIGHT**

**MAINSAIL:**

Sheeted in so the top Leeward telltale is about to stall.

#### **Point to note**

If it is hull flying weather, keep the windward hull just skimming the water surface.

#### **REACHING**

**TRAVELLER: CENTERED**

**DOWNHAUL: TIGHT**

**MAINSAIL:**

Sheeted in so that the top Leeward telltale is about to stall.

#### **DOWNWIND**

**TRAVELLER: RIGHT OUT**

**DOWNHAUL: OFF 1 - 2 INCHES**

**MAINSAIL:**

Let the mainsail out as far as you can, but not allowing the battens to "S"-bend around the shroud.

### **HEAVY WINDS {force 5+}**

#### **UPWIND**

**TRAVELLER: OFF 6 - 12 INCHES**

**DOWNHAUL: VERY TIGHT**

{Sheet the mainsail in tight to allow you to get maximum downhaul}. This will flatten, and help blade off the top of the mainsail.

### **MAINSAIL:**

Sheet the main as tight as you can, but not allowing the windward hull to fly to high, as this will slow the boat down.

### **REACHING**

#### **TRAVELLER: CENTERED**

#### **DOWNHAUL: VERY TIGHT**

### **MAINSAIL:**

Sheeted out so that the top blades off and the bottom of the sail drives the boat. This makes the boat more stable on the reach and stops the top of the sail from driving the bows down, and the boat cart-wheeling.

#### **Point to note**

If the reach is broad the traveller will have to be eased. Try to keep the boat flat because if the hull flies to high the boat will slow down. You will then have to sheet out to get the hull down and sheet in to get going again, losing valuable time and speed.

### **DOWNWIND**

#### **TRAVELLER: FULLY OUT**

#### **DOWNHAUL: VERY TIGHT**

### **MAINSAIL:**

Sheet the mainsail in to stop the battens "S"-bending around the shroud.

#### **Point to note**

If the mainsail produces too much power, bear off to stall the sail, reducing power.

### **Robert Garcka {1996}**

1.

## **2. THE DART MAST *by Terry Pearce***

The mast manufacturer has to reconcile several conflicting requirements when designing a mast for a particular boat. From an aerodynamic point of view, the mast should be as small as is possible and be shaped so that it blends with the mainsail to give the most efficient aerofoil shape. The mast must also have enough strength and stiffness to transmit from the sail, forces to the hull, without breaking or adversely distorting the sail-shape and ideally, it should weigh nothing. Most sailors realize the advantages of a light mast in reducing the heeling moment when the boat is sailing at an angle. Just as important, particularly for the Dart, is the inertia or energy effect which the mast develops when the boat is pitching, rolling or turning. A heavy mast

requires a great deal of energy to swing it through the air and this energy can only be derived from the hull at the expense of forward speed. A light mast, with a low centre of gravity, enables the hull to lift easily over the waves without excessive bow burying which causes loss of speed. Anyone who doubts the magnitude of these inertia forces, should run with a dinghy mast held upright in front of him and then try to stop or change direction quickly. Or put a Dart mast on your shoulder and then walk along and try to turn a corner quickly.

In addition, the original Dart specification called for a very large mast buoyancy to assist self righting from an inverted capsize, with a further requirement that there should be no secondary rigging such as spreaders or diamonds to create storage or trailing problems.

The compromise solution for the Dart is the use of a relatively large section to give the required buoyancy and stiffness, a thin wall thickness to keep the weights within acceptable limits and a cross sectional shape that when rotated to blend with the sail creates a very efficient aerofoil shape.

End of problem ? Unfortunately not !! It still remains that the owner uses the mast within the original design limits, otherwise he risks breaking it. Most people associate the loads on a mast with the sail area and the strength of the wind. Common sense indicates that the larger the sail area and the stronger the wind, the greater will be the forces on the mast and the rigging. This is in fact only half of the story.

Let us put the Dart rig on a paddling canoe or kayak. It is doubtful whether the combination would stay upright in anything other than a zephyr of wind. The resulting loads on the mast are low because the instability of the canoe acts as a safety valve and prevents the sails generating the maximum force from the wind. Conversely, if we charter the QE 2 and mount our Dart rig atop her superstructure, no matter how hard the wind blows, the force from the sails alone would never be sufficient to cause a capsize, so the loads on the mast would be enormous and would ultimately break it. The technical term for the ability of a hull to resist the capsizing effect of its sails is known as its "RIGHTING MOMENT". In general terms, although the wind pressure on the sails creates the loads, the maximum load on the mast is controlled by the amount of righting moment available.

The Dart, in common with all modern lightweight catamarans and dinghies, derives the greatest part of its righting moment from the correct positioning of the crews' weight . The Dart is primarily designed as a two - up racing and general purpose boat, and so calculations for righting moment are based on this fact. If you sail with three or more people, particularly if they all sit out or the trapeze is used, the righting moment is increased significantly. If the wind is light to moderate, say just above a force 3, the sail plan cannot develop enough force to break the mast and no harm is done. However, carry on sailing in winds of force 6 and above and the mast will almost certainly break through overload, because with the extra righting moment available the crew do not have to spill the wind out of the sails as would be the case with only two on board.

The sea condition is a further factor influencing the righting moment. Smooth water allows the boat to sail with its displacement spread along the full length of the hull, whereas a rough sea will not only throw the boat about, making it difficult for the crew to control, but also constantly shifts the centre of buoyancy and reduces the righting moment to below the optimum.

If we know return to the Dart, we can summarize by saying that if you sail with a maximum of two people on board it is very unlikely that you will ever break the mast by wind forces alone, because the maximum righting moment available is not sufficient to exceed the design loads. This assumes of course that all the rigging and equipment is correctly set up and used, and that the two people are not both grossly overweight. If you sail free or more up in anything stronger than picnic weather, you must limit the forces on the rig. This can be done either by sailing with the main eased so that there is a lot of twist in the sail, and / or better still by placing some of the crew directly on the leeward hull where their contribution to the righting moment will be zero or very small.

Do remember this point if you ever have to rescue other competitors or people from the water on a strong - wind day. Their natural inclination is to huddle on the windward side of the boat, next to the bodily and spiritual warmth of their rescuers. Try to get them to leeward or at least to the centre of the trampoline, and sail the boat gently back to the security of the beach or harbour with the sails eased to spill the wind off the upper part of the sail.

However, do keep enough load on the mainsheet to keep the mast from de-rotating. Never in any circumstances, light or heavy wind, sail with the mast rotated the wrong way round, as all the bending loads will be across the weakest axis of the mast, with the risk of permanently bending or breaking it.

Finally a word about reefing. It is possible to reduce the loads on the mast and rig by reducing the area of the sail exposed to the wind. However, if the wind is blowing strongly enough to lift the windward hull and crew out of the water, the maximum load on the mast will again be directly proportional to the righting moment available. Two people will be OK, but three will risk the mast falling.

The only way a Dart can be reefed, is to remove the jib. Do not reef the mainsail for two reasons. In the first place the addition of reefing points or eyes will put the mainsail out of class, as those are not permitted under the class rules. Secondly, and more importantly, the mast is not designed to take the different distribution of loads and stresses which arise when the mainsail headboard is lowered below the mast top position.

So if you want to go out for a real 100mph screamer when racing has been cancelled because of high winds, then only ever sail two up. If you don't think you can cope, then never, ever take a third person, (no dear, he is not the third party mentioned in our insurance policy !). Instead, sail two - up but leave the jib ashore, and you will still have a "Tornado Eater" in your hands.

***Terry Pearce***

Reprinted from *Dart News* 1984.

Just about everything done wrong here !! Three - up and still trapezing and towing a -  
DINGHY !!

1.

**2. HEAVYWEIGHTS IN LIGHT AIRS *by Andy Weller***

Once having put to sea to go racing, the weight of the crew is one aspect which you can do nothing about. As this is the case simply don't think about it. You must have a positive mental attitude and totally ignore your weight penalty, "Think Light" and try to never allow your extra weight to increase your frustrations at not being able to go quite as fast as perhaps a "Lightweight Stick- Insect of an opponent" Another point to remember is that once you have the boat up to speed your additional weight can be an advantage as your higher weight will give higher momentum through the very light patches. It probably doesn't, but with a positive mental attitude you can think it does and that is just as much good !! The important thing is to try to maximize the momentum and I will try to explain how that can be achieved.

## WEIGHT DISTRIBUTION

The single most important aspect is to ensure that the boat sails level on the water at all times. This is most important in the fore and aft plane but also in the windward/leeward plane. This means that the waterlines in the gel - coat should be parallel to the surface of the water. They may be 6 inches below the surface, but they can still be parallel ! In very light airs, when beating, this means that both the helm and crew should be very close to the main beam virtually wrapped round the mast. I have never, ever understood why crews lie on the foredeck of the leeward hull, and this habit can be even more damaging the heavier you are. You will actually push the leeward hull deeper into the water, resulting in an increase in wetted surface area, which is the very thing that you are trying to lessen by sitting forward and lifting the transoms. If there is a sudden gust of wind, at best, you are not in the right position to take advantage of the gust , at worst the crew will end up losing balance and falling into the water. Not a good recipe for speed. There is also a tendency when the crew is on the leeward foredeck for the helm to have to sit well to windward and this is also not helpful when trying to keep windage to a minimum.

*Photo 12 :*

*Good light airs technique. Mainsail is well eased to free the leech - crew right up by the mast to make their weight as negative as possible.*

## MOVEMENT

The way that the helm and crew move about the boat when tacking and gybing is also probably one of the most important aspects of light airs sailing. Movement should be kept to an absolute minimum. If you really have to move, to tack for instance, all your movements must be very slow and deliberate, as any sudden movements will totally kill all that boat speed that you have worked so hard to achieve. Exactly the same applies to movement of the rudders. Remember that rudders are brakes and should be used as little as possible. When we tack, we move to the rear of the trampoline, so as to lift the bows and move the centre of effort over the skegs and we also stay on the windward side until the bows are well past the eye of the wind and in effect try to roll-tack the boat. Once tacked we then move our body weight back to the new positions on the new tack.

## SAIL FREE

One thing that can be initially frustrating for a heavyweight team is the fact that you will never be able to sail as close to the wind on a beat as the lightweights. OK, just accept it !! Lightweights are able to pinch up to windward and you can't, but you can



sail faster if you don't try to follow them and SAIL FREE. I always try to sail about 3 or 4 degrees lower than these flyweights' course, I ease the sails if necessary, to maximize our speed through the water. With this in mind, it is very easy for heavyweights to oversheet the main and jib, remember not to use your extra weight to tighten everything in so that the boat does not have a chance to realize its full potential . Just remember that speed through the water is vital and it doesn't necessarily matter if you have to travel further. Also make sure that the rig is loose enough to allow the mast to fully rotate, therefore ensuring a good airflow over the back of the mainsail. You will need all the power you can get from your sails, so allow them to breath, don't choke the slot, basically let everything "Hang Loose".

## FITNESS AND WEIGHT

One thing that all heavyweights can do in the long term is to reduce weight. If you are racing seriously and carrying a lot of extra weight, then it is probably a good idea to perhaps work on this aspect of your sailing during the winter months. ( **Do as I say, and not what I do, comes to mind ! Ed!! Or get a Feather-weight at the front end.**) Fitness is also an important aspect of "Weight Watching" and since fitness is demanded in all aspects of sailing, I think that it is a good idea to work on both at the same time, fitness counts every bit as much in light weather sailing as in heavy weather, because it enables you to concentrate that much more and you can be more aware of everything that is going on around you during the race.

## SUMMARY

Remember , all the time to concentrate very hard on minimizing your weight disadvantage during the race. Have your crew constantly informing you of any dark patches of wind on the water. It sometimes pays to sail another couple of degrees lower so as to sail into a bit more wind pressure and it is your crew that has to tell you where they are as your eyes should not be leaving the tell tales on your sails. With a bit of luck halfway through the race the wind will fill in and you will be in a much better position to give a good account of yourselves in the closing stages of the race, which is of course the most important part of the race anyway. I find whistling helps !! Then you can sail over the top of all those "Lightweight Stick-Insects" with a smile on your face.

***Andy Weller 1996***

Currently 14 Stone & rising, but trying desperately to lose a lot of it.

1.

## **2. LIGHTWEIGHTS IN A BLOW *by Stuart Snell***

## BIBLIOGRAPHY

The material for this article has come from my own experience of 10 years racing with light crews, together with information I have gathered from other Dart sailors, most notably Kim Stephens.

## PSYCHOLOGY - TO RACE, OR NOT TO RACE ???

To do well in heavy weather, it is essential that you ENJOY the sailing. This will only happen if you build up your confidence, by gradually increasing the wind strength you sail in. Remember, the elements must be treated with respect, however there's no harm in leaving the beach with a little trepidation.

*Photo 13 :*

*Sometimes all you can do is let it all go - hang on - and HOPE !!!*

Whenever you are unsure just how rough the conditions are, and whether it is safe for you to go out, I recommend that you ask your club's heavy weather expert (that's not the one who talks about it, but the one who always goes sailing when it's really blowing!). Listen to his advice, and once you've decided it's safe for you to go, stay away from all of the others who are still deciding. Their discussions will only make you more nervous, and undermine your confidence. Instead, spend some time with your crew watching the first boats leaving the shore, to see how it's done. You don't need a crisis before you start!

If you want to sail, but the conditions are just too much, consider leaving the jib behind. This reduces the tasks to be carried out, and the noise of the jib flogging (which can be quite distracting), and generally makes the boat more manageable.

## RIGGING FOR HEAVY WEATHER

- First adjust the mast rake. I put the shrouds on the bottom hole of the chain plate, and tighten the forestay just enough to allow the mast to rotate through 90° from the forward position (test this by pushing the mast spanner).
- Ensure that the trampoline is as tight as you can get it, along with the toe-straps and hatch covers.
- Slacken the top 4 battens in the mainsail, but don't leave them so loose that they come out of the batten pockets.
- Move the jib blocks to approx. 120cm from the main beam. If you have an old/second jib then use it (for a big event, check that the racing rules allow a change of jib). Slightly over tighten the jib luff.
- Just before, or immediately after, going afloat, put as much downhaul on the mainsail luff as possible. Be careful with the new 3 to 1 downhaul, as it is possible to permanently stretch the sail. Note: Always remember to release the downhaul before you come back to the beach.

## SAILING UPWIND

For lightweights in heavy weather, it is important to keep the mainsail as flat as possible. To achieve this, the traveller should be eased from its central position. The exact amount will depend on your particular crew weight and the wind strength, the lighter your weight and stronger the wind, the more you will need to ease. As a guide, you should just be able to bring the mainsheet right in during the lulls, with the boat fully powered up, with the windward hull just out of the water.

With the traveller out, you will also need to ease the jib. Ease it so that a 25cm (10inch) strip down the leading edge collapses (i.e. the sail becomes 'S' shaped). Don't worry if the jib appears not to be fully powered up.

I have found that the best system for controlling the sheets is for the crew to work the mainsheet, adjusting it in the gusts and lulls to keep the windward hull just out of the water. This is a constant process, and can be very tiring. I have no easy answers for this one, except get fitter!

*Photo 14 :*

*With practice and good technique, good "Little-uns" can almost beat good "Big-uns" in a breeze, Almost - but not quite.*

As the waves get bigger, so does the angle of heel required to keep just one hull driving through the water (it can vary from 15° to 40°). As the waves and wind increase, you will also need to move the crew weight progressively further aft, to keep the bow out of the waves, and avoid weather-helm.

In really heavy weather, the helm should ease the jib in the biggest gusts. As well as depowering the rig, this also helps the boat to luff slightly without any rudder movement. Once the worst of the gust has passed, re-sheet the jib to help the boat return to its proper upwind direction.

## SAILING UPWIND ON FLAT WATER

One of the effects of raking the mast back is to make the boat more sensitive to fore and aft weight distribution, which means you will experience weather-helm if your weight is too far forward. In waves, you can move the crew weight back to counter this problem, with no detrimental effect on speed. On flat water, however, you may find this lifts the bows too high out of the water. The only solution to this is to bring the mast more upright. Move it up by one hole on the chainplates, and tighten the forestay as described before.

## SAILING THE REACH

Lightweights should be able to match the speed of the heavyweights on the reach, albeit they will have to work harder! On a fine reach the sails should be adjusted together, with the crew working the main, and the helm working the jib, similar to sailing upwind.

On a broad reach, the helm should sit as far aft as possible (i.e. on the rear beam case), and the crew should trapeze using the aft toe-loops, clipped onto the reaching line (lengthen the trapeze wire if necessary). From here the crew can keep the jib in one hand, and steer with the other, leaving the helm with both hands free to make the large adjustments necessary to the mainsheet. I leave the traveller unjammed, so that in large gusts the main and traveller can be eased together. This depowers the mainsail very quickly, without putting too much twist in the sail. The big advantage with the crew steering, is that, being higher and having less spray in their face, the crew can see the wave patterns more easily, and can therefore use the waves to optimize boat speed.

## SAILING THE RUN

This is where you have the advantage over the heavyweights, as you will be able to match their speed, and sail lower, if you can stay upright! Again, the helm should sit as far aft as possible, this time with the crew beside them. The crew can then reach

around behind the helm, and hold onto the rear toe-loop. This stops you sliding forward, and helps avoid pitch-poling. The crew must also be ready to ease large quantities of jib sheet, to prevent the bow of the leeward hull from going under the water.

Keep the mainsheet cleated, and sheet in enough to keep the sail flat. Excessive twist in the sail seems to make the boat more prone to pitch-poling, so don't be tempted to ease the main in the gusts, instead BEAR AWAY! The boat should be steered in a series of large 'S' shapes, bearing away in the gusts, and luffing as the speed starts to drop.

When you gybe in very strong winds, make sure you are sailing dead downwind (i.e. with the jib flapping and the wind indicator streaming straight ahead). You can now gybe the mainsail by hand, without having to use the rudder. Don't try to gybe from broad reach to broad reach, unless you're good swimmers!

### RACING TIPS !!!

- Get a good start, be moving on the line with no heavyweights below you.
- Don't try to follow the heavyweights upwind, they will sail higher and faster than you can. Instead try to sail your own course, maximizing your speed.
- Remember that any advantage that heavyweights might have in boatspeed and pointing ability upwind, you can more than make up for with better boat handling, and going faster downwind. (Two good tacks on the windward leg, and your overall time to the windward mark will be much the same as anybody's.)

*Photo 15:*

*Just imagine this, tomorrow has dawned and there is just enough pressure for you to be fully powered up as you*

*Blast -Off the start line into clear air , whilst all the heavyweights are still sitting cuddling the mast.*

*"OH WHAT BLISS !!!*

You can't expect to beat the best of the heavyweights in a blow, but with a little practice, and a lot of teamwork, you'll be able to beat most of them. And remember, if you're racing a series or a championship, it's consistency that counts, so aim for a reasonable result when it's windy, and enjoy the sail, without necessarily trying to win. It could be a force 2-3 tomorrow...

**Stuart Snell {1996}**

- 1.
- 2. CREWING - MANAGEMENT OF THE FRONT HALF OF THE BOAT** *by Mark Howell*

Crewing is often seen as the easy bit when it comes to sailing a boat. When you read the write-ups in the sailing magazines it's usually the helm that gets the mention while the poor crew is left as the invisible partner in the victory. However, let it be officially stated that from now on the Dart fleet shall recognize that it takes two people

to make the boat go fast and the glib remark that the crew is just moveable ballast is completely unjust and wrong. Look at the top helms that have achieved National and International success:- Reg White, Rob White, Ian Frazer, Rodney Patterson, Phil Crebbin, Lawrie Smith, Kim Furness, Randy Smyth and Mitch Booth. Whether they came from home or abroad there is one thing that they all had in common. They all had excellent crews who contributed to their success as part of a TEAM. The Dart is a two man/woman boat, so you, the crew have to realize you make a difference and by getting better at the front of the boat, the team performance will improve.

So how do you go about doing this? Well, the art of crewing takes time and effort to get right and you need to break down the actual process into key areas. People have written whole books about crewing, so in this short article I cannot go into too much detail but I will highlight what I have learnt personally and been told are the key topics.

## INFORMATION

### THE EYES OF THE BOAT

One thing that is very important is that you are the eyes of the boat. The helm may be blinded by spray and unable to see under the mainsail at times so you have the vital role of letting the helm know, who is where and if there is any need to avoid someone. Remember, two feet away from a collision is too late for two reasons :-

- You will need shares in a Gel-coat company.
- Your race strategy will be affected by a panic decision {remember it sometimes pays to wave someone through, even if they have no rights, because it pays to go to one side of the course}.

As well as being the eyes of the boat, you are also the information service. It is your job to tell the helm what is going on around the course while he/she concentrates on boatspeed. This information relates to things such as what the wind is like on another part of the course, how other boats are heading on different tacks and also encouragement. Be careful how you impart the information - remember upward and downward spirals because sailing is as much in the head as anywhere else. Saying "I think we should tack now and get clear air because the other side of the course looks clearer" is better than shouting "Oh my god!! Here we go again, they're all sailing over the top of us and we're going down the pan again". It's a matter of making the other half of the team aware, without ruining their confidence.

Laylines are another area that the crew can help with. You have the time and ability to assess more easily if boats that have already tacked for the mark are making it or not and you can choose the moment to tell the helm if he/she is on the right line. Remember that from the trapeze you have a more comfortable and higher position from where to look around the course. Practice calling the shots in a Club race and be prepared to make mistakes. Everyone does and even the top crews still do, but it's funny how the more you practice the luckier you get at calling the right time to tack and gybe.

## LIGHT WINDS

## WATCHING, WEIGHTING AND BEING SMOOTH

In light airs the crew has to be alert to shifts and puffs as the wind plays games across the race course. Crews also have to look at the trim of the boat and try not to do an impersonation of a herd of elephants during tacks and gybes.

**WATCHING** :- relates to the sails and how you trim them. Remember to be gentle with the jib. Many seasoned sailors talk about letting the sails breath in light winds and this is a good train of thought to follow. Pulling the jib bone tight does no good at all. You have to sheet in gradually and let the speed of the boat build up after tacks and gybes. Downwind you will probably hold the jib out by hand, so if you feel pressure in the sail, don't pull it in hard and tight - simply resist the pull and sheet in gently. Staying with any gust because you have reacted well is much more satisfying than watching everyone sail past because you've yanked the sails in hard as the gust hit and stalled the rig.

Upwind you must ensure that the sail has some shape in it and after a tack sheet it in slowly to let the boat accelerate.

Weight distribution is vital. Keep as far forward as you can, either right up by the main beam or on the leeward hull in an effort to unstick the transoms. They drag terribly and upwind or downwind, make an effort to release them. As well as watching and keeping the trim of the boat good you must be smooth about the boat. There you are sailing away from the fleet because you have two parts of the equation right and then you jump about like a lunatic when you tack or gybe. The boat loses momentum, the stern digs in, the sails stall and you stand still while the smiling faces sail up to and past you. Sometimes it pays to only change sides once the boat is off on its new tack or gybe and even then you have to be gentle. Think before you jump.

## MEDIUM WINDS

### REACTING, TRIMMING & CHANGING GEARS

These conditions are probably the most frustrating in a Dart. How many times have you heard someone say, "I've got no chance today, because all the flyweights will be trapezing while I'm sitting in". I've got news for them - RUBBISH!!! In 1995 at the Worlds in Travemunde, I watched Gareth Owen and Will Thompson sailing upwind in marginal trapezing conditions at the same speed as the leading lightweights and faster than most. Gareth and Will weren't trapezing, they were sitting out while all around were on the wire. This was an example of all three of the above. They were reacting to the conditions relative to them, they had their weight close together to stop pitching and they were accelerating by getting the windward hull to fly, reducing drag and therefore going faster. Reacting to the conditions as a crew is vital. You have to be aware when to go out and when to stay off the trapeze. Reacting to the conditions compliments trim in that what you are trying to do is maximize power whilst reducing drag. As the pressure comes into the sails you need to sheet gradually harder. As you do this the speed gradually goes up and by getting your weight into the right place you can fly the hull and go faster still with less drag. Practice getting onto the wire in marginal trapezing conditions and see if you think you really need to be there. It looks good, but is it fast? I personally liked to set the trapeze at its highest setting in marginal conditions and if I thought I needed to be on the wire I'd push off gently and hang along the side of the hull, watching all the time to see that the skeg was just touching the water. If I needed to extend fully, I could,

but if not then I was ready and because I was already hooked on, the transition to full trapezing was both simple and smooth. But, I'd only extend fully if we were flying more than we needed to. After a while you develop a feel for these conditions, so practice sitting out before you jump out on to the wire.

Again, as for light winds, you will need to keep your weight forward and trim the bows slightly down. "Changing gears" can be achieved by gust reaction in marginal conditions. The puffs will be stronger than in the light stuff but all the same, sheet the jib in gradually after tacks and upwind, don't kill the airflow. Offwind there are huge gains to be made in both speed and depth. If you can react to pressure in the sail by pulling against it and sheeting in more as the boat accelerates you will make the most of the apparent wind. {Basically, the wind created by the forward motion of the boat}. This comes from further forward than true wind, hence you have to sheet in more, the faster you go. This will help your helm foot off and go deeper downwind. As the boat slows when the puff dies, ease the jib again as you slow and get ready for another gust.

## HEAVY WINDS

### FUN, PLAN & GO FOR IT

Many crews get worried waiting on the beach when the wind is "blowing the dogs off their leads". This is the time when you as a crew can have the ride of your lifetime and get the most from sailing a Dart. Remember one simple thing about the Dart - It is fantastic in a blow, the boat might seem slightly under canvassed in the light to medium stuff against other cats, but in full on trapezing conditions it's great. I once raced another class of cat during a winter series a few years ago and on one particularly windy day, when all around international sailors were hanging on, one of the Worthing Dart sailors beat everyone to the windward mark. It took three weeks for that smile to disappear from his face. Enjoy it!!

Plan your tacks and gybes as a crew and things will be smoother and easier. When about to tack, take up the slack on the lazy {windward} sheet prior to the tack. This does two things:-

- Stops the sheet wrapping itself around the spanner.
- Means there is less to pull in on the new tack.

Trapeze as low as is comfortable and remember that if there are waves you will have to pull yourself up a little to stop[ getting knocked off. If there is a wave the size of the one in the Poseidon story, then lift your forward shoulder to it. This will mean that the wave lifts you as it hits you and hopefully doesn't take you with it. Trapezing with your legs too far apart makes you more prone to getting knocked off. It is not as stable as you might think in spite of the fact that it appears to be. By having your legs closer together you lift your backside up and this means less of you hitting the water. If your feet are pretty close together and with a little tension on the jib sheet, you can anchor yourself on the side of the boat. It takes practice but in reality how many times do you see top crews looking as if they are about to do the splits on the side of the boat - they can't all be wrong.

On the gybes you may need to get across the boat a little before the helm and there is nothing wrong with grabbing a toe strap for stability, after all god didn't put suction pads on our hands and feet. Again free the sheet before you change direction. Keep

the weight well back when going downwind and if necessary hold onto a toe loop as this anchors you and also the helm behind you.

Upwind you will have to move back a little from medium wind trapezing positions, to counteract weather helm and to help your helm steer.

On the reach get back onto the reaching hook if you need to. The secret to this is speed. When you approach the windward mark, lower yourself a little on the trapeze because as you move back towards the stern it has the effect of making you higher on the wire. Start to move back before you round the mark and take hold of the reaching line. As you go round clip on and if you need to, put your back foot into the rear toe loop. The quicker you do this the better, as I think that the period between moving back and getting anchored in position and settled is the tricky one, where life can get a bit hectic.

Please try NOT TO HOLD the REACHING HOOK. Personally, I think that if you don't need to HOOK ONTO IT you don't need to HOLD ONTO IT. It worries me that hands are a good deal softer than metal - if your picturing what I'm thinking of as I write this then I don't need to explain the danger.

Be ready to ease the jib big time on the reach as it can easily take you into cartwheel mode - keep aware. By the way, on the run and on the reach, you can put the Dart's bows in past the main beam and it will still come back if you stay back and hold on. I talk from experience. Quite often the crew sliding forward is what does the trick, so hang on back there!!

Most of all have fun 'cos it's a great feeling to blast around a course.

Before I put down a few last bullet points there is one more important thing. Make sure your trapeze harness and sailing kit fits well and does the job. Make sure that you're warm because you always sail better when you are. As for the trapeze harness, make sure that it's both strong and comfortable. At the Dart Worlds in 1991, I took my usual ultra lightweight backless harness with me, the one that I used for club and open meeting races. The courses at the worlds were a lot bigger than club/open meeting venues put on and the muscles in my back were not impressed with two and half hours of hard work without support. Needless to say, I borrowed a harness with much more support and learnt a lesson never to be forgotten. It's no good improving your technique and then have your kit let you down. So buy good, reliable and warm kit and check it regularly.

## HIT - LIST

- Feed information to the helm and be positive.
- Check the boat over before you go afloat.
- Try different positions {sailing} on the boat depending on the weather and be aware of trim. Bows slightly in unless it's blowing.
- Be aware of pressure in the sails in light/medium stuff and sheet sympathetically to the conditions. Let the boat build speed after tacks and gybes by sheeting gradually.
- Try to keep you feet close together when you trapeze.
- Prepare for tacks and gybes to avoid tangles.
- Remember - it's better to look good at the front of the fleet than look good on the wire at the back. Be aware of the boats need to pop a hull and change gears.



- Practice - the more you practice the luckier you get.
- Debrief after racing, and practice and don't take criticism personally.
- Check your kit is right for the purpose, ensure you're warm and comfortable.
- Have fun in the sun.

### **Mark Howell {1996}**

1.

## **2. THE QUICK WAY TO SAIL A DART UPWIND IN A BLOW by Gareth Owen**

Dart sailing in a blow is not only very exciting, but an area where there are large speed differentials between boats. Which in turn means big gains to be made around the course particularly upwind. Over many years of Dart sailing, I think I've developed a formula for good pace upwind, so sheet in - hike out and here we go.....

### **WHAT IS A BLOW ?**

Most sailors tend to exaggerate wind strength, particularly in the bar after the race. What I mean by a blow is force four, 11 - 16 knots wind speed and upwards when the helm and crew have to extend themselves. This is the time to up your work rate, resulting in increased speed.

### **CREW WEIGHT**

All up weight is not as crucial as many sailors think. It's important that lightweights don't get psyched out. Remember the old sailing adage; Good little'uns will always beat good big'uns.

With good technique the light and lean will go as fast as the big and mean. I used to sail with an all up weight of 26 stone. I now have 22.5 stone on board and still consider we are as fast in windy conditions being much quicker downwind. It's how you use the weight that counts.

### **TRIM**

Keep the boat flat, crew weight together thus reducing hobby horsing. Don't have the weight too far forward as this will stall the boat, tending to bury the leeward hull. The general rule is the harder it blows the further aft on the gunwale we move together. The crew should have his/her leading leg aft of the shroud chainplate in these conditions. Fore and aft trim is crucial, I like to think of my crew as a ballet dancer, constantly moving up and down the side deck, with me shuffling fore and aft with him. The tell tale sign of poor trim, usually too much weight forward, is felt by the helm through the rudders, the cat develops weather helm and feels heavy to steer. If this occurs move aft until the helm feels neutral. However, be aware of stern drag ! This is a real speed killer!

### **BALANCE**

Forget all those shots of Cats flying a hull ! This looks good for the camera or on "Wish You Were Here", but is a definite No - No for us. Keep the boat flat with the windward hull just kissing the wave tops. Physical fitness is a key element here. The

better condition you are in the harder and longer you will be able to hike/trapeze. On occasions, I've taken Champion dinghy sailors out for a sail in a Dart with me crewing. They have been surprised how much hard effort it is to work the mainsheet. This is the all important power control. Remember - Hard work equals speed. A common fault of Dart helms is that every time they sheet in, they look at the mainsheet instead of looking ahead. At the same time luffing into wind and slowing the boat. I sail with the old mainsheet system. Although not as mechanically efficient as the ball race blocks, I feel that I have more control on the mainsail in windy conditions. It is interesting that we were the only boat at the 1995 Worlds equipped with the old blocks. If helms find the mainsheet hard work, try tucking the tiller extension under your aft arm and get both arms working the sheet. Another solution would be to let the crew work the mainsheet from out on the wire where he/she can exert more power. However the crew must know HOW to play the sheet.

### SAIL SETTING

For every small alteration in course we should be trimming our sails. In order to bear away, we need to ease both main and jib together, and conversely as we head up we sheet in together. So for a gust which usually lifts or heads us there should be trimming of BOTH sails. Where a lot of Dart sailors loose out in windy conditions is that they do not react quickly enough to changes in wind and wave conditions. We've all been caught by gusts that nearly blow us flat. By the time power's been dumped out of the sails, the boat's headed up to the wind, followed by the windward hull crashing down seriously cutting down our speed. A few of these episodes on a windy beat will see us waving bye bye to other crews who control their boats in these gusts. Try to keep the boat flat at all costs, as energy lost heeling will be converted into forward drive. If the boat seems to stall, a common fault is that the jib is sheeted to tight. The crew should be aware of oversheeting the jib. If it's really honking, then crack the traveller off a couple of inches from the centre line. It's only in very windy conditions that I do this. Keep an eye on the mast and watch for de-rotation. This is when the section bends alarmingly out of control. To remedy this, crack the jib off immediately, letting it fly. If the mast is still de-rotated, ease the mainsheet, it should then rotate correctly. Sheet in and away we go again.

### WAVES, FLAT WATER & SHIFTING GEARS !!

Every venue that we sail at will produce differing conditions whether it be on the sea or on a lake. Those of us who went to the European Championships in 1993, experienced the difficult IJsselmeer short chop. Not surprisingly, the Championship was won by a local Dutch crew. What was interesting was the way that they worked the boat over every wave. When it's windy, I like to sail fast and free upwind. Think of the sometimes enormous speed differentials between Cats as we race upwind. You'll find that it's the "footers" who are going faster. Remember, pinching is the enemy of speed. Think of your Cat as a racehorse. We've all heard the expression of "giving a horse his head", well this is exactly what I do. Crack

the main and jib sheets off, bear away a few degrees and go for it, keeping the boat flat. As your speed increases, the boat will naturally feather itself into the wind. Now sheet in, as the apparent wind goes forward, still maintaining boat speed. You will find yourself sailing as high on the wind as the boats around you, but hopefully faster. I call this shifting gears, with the mainsheet being the gearshift. This works particularly well on flat water conditions. In waves I head up the face of the wave, sheeting in as I do so with my crew bending his/her legs and then I bear off down the

back of the wave, cracking off the mainsheet with the crew extending flat on the wire to power down the wave. DO THIS FOR EVERY WAVE !!

*Photo 16 :*

*This helm hiking in a good position for fast upwind sailing. Fully extended and straight legged. You have to be fit to maintain this position for any length of time.*

Both helm and crew should be watching the approaching waves for any rouses, which may try and wash the crew off of the gunwale. When it's time to tack, look ahead and try to pick out a flat piece of water, even if it means standing on some distance. Try to tack on the crest of the wave, as a skier would turn on a bump.

## TACTICS

Get a good start !! This goes without saying. If you didn't get a good start, don't despair ! If your techniques right then these are the conditions where ground can be made up, especially on the beat. Sail free and fast. Go up the middle of the course. If there is a boat immediately ahead, crack off and sail through his lee. Always overlay the windward buoy slightly, unless tidal conditions dictate otherwise, as to underlay the buoy will cost you dearly.

To summarize, the message is; Get Fit, develop Arm and Shoulder Strength in order to sustain prolonged work. The Mainsheet is your Gearshift. Sail Fast and Free, don't Pinch. Keep the Cat Flat. Work the Waves. Control the boat, as opposed to the boat being in charge.

ABOVE ALL ENJOY YOURSELVES !!

### **Gareth Owen {1996}**

1.

#### **2. HOW TO SAIL A SERIES by Barney Sandeman**

People often say that to win a regatta, you DO NOT do it just by winning races, but in my experience, it certainly helps!! - A first place, can, added to a string of fairly mediocre results, make for an almost acceptable overall result. However, if you study top sailors results at Championships, you will almost always find that the crew making the speech at the end of the regatta, did it with sheer CONSISTENCY - top 5 results, and probably never even sliding outside of the top 10.

How the hell can I do that?? You may ask! A top 10 result in just one race and I would be ecstatic. Obviously, you have to be realistic, but all the same things apply, whether you're trying to take the National title or just trying to finish in the top half of the fleet.

That magical consistency, mentioned above, can only be achieved if we take a few things for granted. The first thing being that we have a boat that will get us through the series. {I have learnt the hard way - with gear failing at vital moments in a race - an occurrence for which normally there is no excuse and can actually rate alongside being late for the start - just lack of preparation}. Another factor that I think we'll find out is that consistency is in our state of mind. The only way I can sail a series, is if I believe I can win it. Sport is one of the few places a sort of hidden arrogance seems

to pay off and a positive state of mind, even, almost to the extent of being "gung-ho" seems to pay off.

So we must at least have a boat that is as good as the best and also a positive mental attitude.

It is all too easy when things are going great, you made a perfect start, you picked the right shift on the beat and it put you in the top 10 around the windward buoy. You know that you will be dragged around at the front of the fleet, even if you loose a few, or today's conditions are you favourite and for once you have the pace. OK, now for the flip side, stuffed at the start, missed that enormous windshift that everyone else didn't, and now you are right down the pan. The consistent sailor is ready for this. Rather than kissing the race and probably the series good-bye, we must keep our heads. Sailing, and I would say Catamaran sailing in particular, is one of the few sports where huge losses can be reversed. Mr. Consistency will be ducking transoms after his bad start, still rushing to the correct side of the race course, not dwelling on what went before, or making the most of the bad shift on the next leg of the course.

To obtain a top result in a series, we can not afford to take our eyes off the big picture. Those all important 7 or so races that make up the Championship. The chances are that with so many races being sailed, even with our positive mental attitude and a bullet proof boat, Lady Luck can still dessert us - You have all seen it, the race was yours, a massive windshift and Joe -six-pack, who was bringing up the rear, is given the race on a plate. Again, it is all too easy to give up; the wind might swing back, but in the worst case it does not, we must stay racing, even if we end up with a race that we later discard. Retiring should never be an option, even if boats that have never beaten you are now ahead, and your pride is at stake - we are racing for the series and one or two places, even at the back of the fleet, could effect our overall position.

I personally know of an Olympic sailor, who will remain nameless, who actually did retire from a race where the positions were reversed after a major windshift, only to see the running order reverse back on the TV monitors back in the dinghy park. He does not like to talk about this, but the story goes that staying in the race would have probably given him a top 5 result, and an Olympic medal at the end of the regatta. Proof again that we must try and keep our head, whilst all those around us are losing theirs!!

It can often be overheard in the bar after a race, "Did you see so and so back with us? And he was going the same speed!" funny but, there the conversation often ends because, "so and so", alias Mr. Consistency, dug himself out of trouble, probably not achieving the impossible and winning, but seizing every opportunity, and learning from his mistakes, and pulling back a few places. As for the comment about "going the same speed as us" it is probably very true, even the guys with boat speed to burn, once back in dirty air loose most of the advantage, but will pull places back by not being phased by it and generally keeping their heads.

Your tactical decisions will change and narrow down during the course of a regatta, once you know which boats you have to cover and which ones you have to catch. On the first day you don't know who is good and who is bad and where you fit in on this scale. So basically you should sail your own race, but by the second day {which in most cases is the last day} you should know where you stand and you know what you have to do. This is where it can become interesting and a bit of a numbers game.

One of the most basic rules of offensive tactics is to do the opposite of what the boats ahead of you are doing. This is not always true though, in fact, this type of thinking can be dangerous, leading people to go off on flyers. Often risking far more than they need. Basically, you have to play a percentages game, if the boats that you need to beat are lying not too far ahead of you, and they are heading off to the correct side of the course, you would be foolish to do anything too radical. In this case you should tack out of the parade, go to the middle of the course and tack back with clear air. If you get lifted, you will gain and if you get headed you will probably not be any worse off than if you had just followed on. If on the other hand you find yourself better placed than your rivals, then you are better off playing safe, and at the most clearing your air and going for small gains, and of course at worst small losses.

**Barney Sandeman {1996}**

1.

**2. DART SAILING SINGLE - HANDED by Ian Frazer**

One of the original design specifications when we commissioned the design of the Dart was that it should have the capability of being sailed by one person and at the same time compete on the race course with a Dart sailing two-up. The result, as everybody knows, is that you can race the Dart single-handed provided that you don't use the jib. Several of us have been sailing single-handed now for three years and during that time we have certainly proved conclusively to ourselves that you can win races and major regattas by sailing single-handed, but you do have to be well practiced in the art of trapezing and doing most things for yourself. The fact that the Dart has few adjustment lines and centerboards to worry about makes the single-handed task even easier.

*Photo 17 :*

*Single-handed the Dart can still be competitive up to about Force 5, although this sailor would benefit from a longer tiller extension.*

There is no doubt in my mind that sailing single-handed you have a distinct advantage upwind in conditions up to about force 5. This advantage is offset by a loss of performance on the reaches compared with a two-man boat use crew is trapezing. Down wind there is nothing to chose between the two, although the lightness of the single-handed boat does enable you to sail deeper and hence nearer the leeward mark.

**BEATING TO WINDWARD**

This is probably the most satisfying point of sailing when single-handed, as it provides the majority of the excitement, especially when you are trapezing. Trapezing is the one thing you have to master before you can achieve and performance upwind in a breeze. It just takes practice and more practice. When trapezing a Dart 18 single-handed it is imperative that a long tiller extension is used. Otherwise you will not be able to move far enough forward and as a result the fore and aft trim will be adversely affected. Everyone has their own technique of trapezing, whether they are a crew or a helmsman and it is a matter of learning to balance, as when learning to ride a bike or sail a windsurfer. One thing to remember through, is that because you tend to stand further aft to balance the boat, the trapeze wire tends to drag you forwards and off balance. For this reason it is most important to face the mast when you are first learning to trapeze whilst helming. You must be able to swing out onto

the wire from the sitting position with the mainsheet in one hand and the tiller in the other and not to touch either the sides of the boat or the trapeze handle. This is not as difficult as it sounds, and with some practice it can be done quite easily.

The most important thing on all points of sailing is that you never let the airflow over the sails stall, since it is extremely difficult to achieve uniform flow over the sail again without the aid of the jib. For this reason, the tell-tales on the main are extremely important and should be the helm's main guide as to whether he has set the mainsail correctly or not. Without the benefit of a jib luff to guide him as to whether he is pointing too high into the wind, the wind indicators on the mainsail will tell him the same information.

Up-wind, these tell-tales must be streaming fore and aft at all times, and it will be necessary, especially in moderate wind conditions, to adjust the mainsheet tension all the time. If you are trapezing and the wind is too strong for you to hold the boat flat, then you will obviously have to ease the sheet and allow the top of the sail to twist off and the sail to stall. It is extremely important to keep the boat moving through the water, even more so when sailing single-handed. With this in mind, in moderate conditions it pays to keep the boat "footing off" and not to "pinch" too much. Keep the boat level fore and aft, and if necessary, move your weight well forward to stop the transoms dragging in the water. By keeping the boat moving, tacking the boat will be a lot easier. This manoeuvre should be accomplished in exactly the same way as usual, but this time you do not have a crew or a jib to assist you. Be very positive with the rudders and make sure that on no account do you let them centralize during the tack. The other important thing to remember is that when trapezing you must start to put the helm down when you are still on the trapeze to ensure a good tack every time. It has to be in one smooth movement, swinging inboard and initiating the tack in one movement. You can tack by coming inboard first, but the loss of speed is such that it can cause problems if you are sailing in any waves.

## REACHING

Reaching is mainly a matter of using as much power as you can handle at all times. This again means constant sheet adjustments. Where a two-handed Dart scores is in the fact that the jib is providing the mainsail with a fairly constant airflow over the mainsail. It will be quickly noticeable that the single-sailed boat is much more sensitive to the varying apparent wind direction on a reach, and if the mainsail is to be prevented from stalling, then constant adjustment is necessary. Again, keep those tell-tales streaming on both sides of the sail; it will be found that extreme measures have to be taken to achieve this. Once the sail has been stalled and there is no jib to aid the airflow over the back of the main, then a great deal of mainsheet has to be eased to get the boat moving again. If the conditions warrant trapezing, I find that because there is so much mainsheet work to be done that it is far better to sit on the side of the boat and not bother to use the trapeze. You will be surprised by how little the two-up boats pull away from you, and there is little danger of cartwheeling as you are in full control. It's my opinion that the marginal amount that you gain in stability by trapezing is more than offset by the fact that you have more than your hands full and are sailing on a "knife - edge" virtually all the time.

## DOWNWIND SAILING

There are two things to remember when sailing downwind, and that is to allow much more twist in the mainsail than you would normally, and to ensure that your weight is not too far forward so that the bows dip too quickly when hit by a gust. Again the

mainsail has to be constantly watched to see that it is set at the correct angle to the wind. The helm must be adjusted accordingly to ensure this. If the sail does stall and the boat stops, then drastic action is needed to get it going again and you will find that you must harden up to nearly a broad reach course to gather boat speed once more. Once this has been done then you can bear off once again and resume your proper course to the leeward buoy. You will notice in anything of a breeze that the boat is a lot more twitchy than when sailing two-up. With this in mind make sure that you are sitting in a position from which you can move quickly backwards to compensate for the tendency of the bows to dig its bows in to deep and the resulting pitchpole.

## IN CONCLUSION

I suggest that there are three main areas on which to concentrate to develop maximum benefit from single-handed sailing:-

- Concentrate hard on keeping the boat moving at all times.
- Constantly adjust the mainsheet to keep the tell-tales streaming fore and aft at all times.
- Having mastered the first two, then you must concentrate on developing them to advantage by using your weight efficiently and quickly when trapezing up-wind.

I think that it is good practice for all helms to occasionally sail single-handed. It sharpens you up and makes you much more aware of the airflow over the sails when you have the jib up for normal two - up sailing. You also appreciate fore and aft trim to a higher degree and also after trying to trapeze a reach single-handed in anything of a breeze, you will learn to appreciate your crew a little more as well. You will also look pretty stupid if you are sailing round the course shouting at yourself for the little mistakes that we all make, so it will also teach you to be a little more tolerant towards your crew.

*Ian Frazer*

Reprinted from *Dart News* 1984 with additional material by *Andy Weller 1996*

1.

## **2. THE DART 18 CLASS RULES *by Ian Frazer***

As one of the original architects of the Dart 18 Class Rules, I have been asked to write this article to explain some of the fundamental concepts behind them. I must stress from the beginning that the comments contained in this article are entirely personal observations from someone who has been involved with the Rules from the very beginning. Interpretation of the Class Rules is entirely in the Hands of the Dart 18 Rules Committee and they would judge Rule infringements on their individual merits.

Until the advent of the Dart catamaran, most well organized National and International Class racing boats drafted their Class Rules rather like legal documents which resorted to descriptions of the various items which go to make up the boat and described measurements which should be made to ensure that the craft retained its original image. As Classes became more International this caused lots of problems, since a lot of the interpretations of Class rules depended on the particular meaning of

descriptions. Translation very often changed the meaning of Class Rules and caused variations in the boat design within a Class. Any manufacturer which hopes to produce more than one article of a particular design uses a universal system of drawings to enable him to communicate within his company so that, regardless of changes of staff producing the article, the end product will change little within laid down limits. This, of course, applies to boat building and all the manufactured items are built to a standard using drawings.

Most Class Associations then produce a completely new set of instructions with which to control the size and shape of their boats based on these original drawings. We felt that if the builder and the owner possessed the same drawings then there would be less of a communication problem between one another and we would not need translation to understand.

We realized that to produce large and expensive items such as beams and masts would require detailed and comprehensive engineering drawings closely toleranced. If the same rule were applied to simple items such as shackles and rope then it would put un-necessary burdens on the customer when shopping at his local chandlers for a replacement part.

We split the drawings for the Class Rules into two parts. One set of drawings would be to the European Drawing Standards and would contain all dimensions and tolerances necessary to produce the article in a workshop. A second set of drawings was produced for all the items that might be replaced from a local chandlers and whose dimensions were not so critical as to effect the performance of the boat. This second set of drawings is dispatched with every boat and enables the owner to change or replace an item simply and quickly within what we call a "box" of tolerances shown on that particular drawing.

The first set of drawings contained all the details to manufacture the parts which are supplied by a single manufacturer. Too many times Classes in the past allowed any manufacturer to supply masts, sails, etc., which encourages the supplier to develop his product and make it go faster and thus have an edge on his competitors. Since the item can't be mass produced, it means inevitably that costs escalate and items go out of fashion, thus decreasing the second-hand value of the boat or requiring that an

up-dated part be bought for the boat which may be a substantial percentage of the overall price of the boat anyway.

These drawings are restricted to the possession of the I.Y.R.U., the builders and the Dart 18 Class Rules Committee.

The overall control of the Dart 18 Class Rules is entrusted to "Three Wise Men". One member is provided by the licensed builders, one person by the Class Association, who is the Chairman of the International Association, and the third person by the I.Y.R.U. When the rules were originally accepted by all parties, they were committed to engineering drawings and accepted as the basis of the Dart 18's International status. To alter any part of these Class Rules, the unanimous support of the Dart 18 Rules Committee is required. Each member has the power to veto, which means that all have to agree on a particular rule change before that change takes place.



Armed with a set of drawings that are provided with each Dart 18, every owner should be able to settle the inevitable disputes which arise over all aspects of rigging the Dart 18 and the specification of the items that go to make up the boat.

Dart 18 Class Rule 6A is the Rule that covers most eventualities and Rule 6C states that the equipment on board the boat should be assembled as the drawing specifies. Any departure from these drawings obviously must be specific and it is usually fairly obvious whether this is so and the boat subject to protest.

It has been interesting to observe that in the six years since the Dart 18 gained International recognition there has been virtually no controversy over the Class Rules and owners energies have been devoted to the racing and enjoyment of the boat, which was the main aim of the craft in the first place.

**Ian Frazer** { reprinted from Dart News} 1984

IN THE PREVIOUS TECHNICAL MANUAL A FULL SET OF THE INTERNATIONAL DART 18 RULES, BOTH WRITTEN AND ALL THE DRAWINGS WERE INCLUDED. TOGETHER WITH THE PARTS DRAWINGS AND THE CONSTITUTION OF THE INTERNATIONAL DART ASSOCIATION. WE HAVE DECIDED THAT IN THE INTERESTS OF THE AMAZON RAIN FORESTS AND OUR OWN ECONOMY NOT TO RE-PUBLISH THIS SECTION. ALL OF THE ABOVE ARE AVAILABLE FROM THE LASER CENTRE AND IN FACT THEY COME FREE OF CHARGE WITH EVERY NEW DART 18.

1.

## **2. KEEPING YOUR CAT IN THE BAG**

*by Tim Dieu de Bellefontaine*

Some notes for you to help you to look after your boat in the boat park and elsewhere.

Firstly leaving your hulls in contact with wet grass could cause problems eventually, it's far better to put the skegs on old tyres and the bows on the launching trolley up near the bridle chainplate.

If you intend to leave your boat for more than say 3 weeks, then dropping the mast takes only a few minutes, and removing the trampoline takes away a large sail that the wind can catch. It also protects the tramp from the ravages of U.V. light, i.e.. Sunlight. Please note that an aluminium mast is an excellent conductor of electricity. ALWAYS look up before you lower your mast for overhead power cables.

When tying your boat down, remember to use a good quality rope. Holding down up to £6,000 worth of Dart with 20p of sisal always seems a stupid anomaly.

For a temporary anchor, half a dozen dog tethers in firm ground seem to do the job O.K.

These look like giant corkscrews and can be bought from pet shops/garden centres for about £5 each.

On the field where I keep my boat I have knocked in, at an angle of about 30 degrees from vertical, 2 pieces of 2" angle iron, both 4 feet long with a 6mm stainless wire attached about 1 foot from the bottom end. This allows the posts to be knocked completely below the surface so as to avoid mishaps with the skegs. It also makes the posts a lot harder to remove. I then tie one wire round the front beam and the other one round the rear beam. Obviously this system only has a limited life span; I am guessing at a couple of seasons. Another method is to sink concrete blocks into the soil. Mix the concrete in a large bucket lined with polythene and place a steel rod horizontally into the middle of the concrete mix. Again attach a length of 6mm stainless wire onto the rod first. When the mix has hardened it can be turned out and sunk into the ground. Make sure that you have at least 2 foot of well tamped down soil over the top.

If you are one of the unfortunate ones to have to make do with a boat park where you cannot possibly put in stakes or blocks, then an old car tyre full of concrete, with a loop inserted is a possible alternative. A word of caution though, this need to be very heavy, {during the famous hurricane of a few years ago I saw a boat that had 3cwt attached to it in this manner, which had pole-vaulted through a 8ft fence.}. I also saw a boat that was well tied down to its road trailer at an open. The mast was up and the cover was on. The boat complete with trailer still attached cleared the 6ft high gates at Worthing Yacht Club's compound and landed in a bit of a mess although the gates were untouched. Obviously, these are extreme examples, but food for thought anyway.

Obviously these last two methods are far from perfect and you should make sure these weights are secured in the middle of the beams or anchored well away from the hulls as the effect of the wind "worrying" at your boat can cause appreciable damage to the sides of the hull.

Checking shrouds, bridles, chainplates, shackles and split rings is all too obvious to mention - so why do we all forget ? Sail repairs are laughably cheap, so there really is no excuse for not having the bolt rope sorted out at the end of the season. If the sailmakers complain of a heavy work-load, then great, they can store them for you. Make sure that you get a receipt though.

I stay on top of little dings in the skegs with Plastic Padding Gel-coat Filler. This dries quickly enough to be done at the start of the weekend, and I dry the area first with acetone or cellulose thinners. The filler can be fine filed to shape with little sanding necessary. On the bottom of the boat, only you know it's there, so polishing is a little pedantic.

When moving the boat around, the easiest way I have found, is to push it backwards. One hand can easily keep the skegs clear of the ground, and if more "grunt" is needed, pushing the bridle wire does not strain the front chainplate against its intended direction.

Silicon floor polish is normally OK for easing the sail up the mast, as is a little candle wax rubbed onto the bolt rope, but you would be surprised at the number of people who complain that their sails are hard to pull up, but they are not facing the boat into the wind.

Silicon polish on fibreglass is really bad news. Not only does the polish affect the fibreglass in the long term, but if you ever have to effect a repair and the boat has a covering of polish, you will find that all the polish has to be removed, no easy task,

before you can get any key on the area for the repair. Products like Boat Life or some other fibreglass speciality products are silicon - free and help to protect those pretty colours from UV fading for a little longer. I also find that the effect of sunlight on trampolines, means that tramp covers save far more than they cost.

Keeping the trampoline tight is an obvious tuning tip, as it helps to stop the boat flexing. In fact you cannot really overtighten the trampoline and I have seen all sorts of ingenious methods to achieve this, and save the pain factor in the fingers. Changing battens when broken is also routine, I save my old ones for moving up the sail, after I have re-shaped the ends. I reckon that hatch covers are best removed and taken home; if anyone is going to play Frisbee with them, it's me, and it also allows the air into the hulls to dry them out.

The rear beam housings have breather holes in them to stop problems caused by the hulls flexing and panting when sailing, making pressure variations in the hulls; make sure that they are clear, they are important and a small ingress of water will and should always happen.

When approaching obstructions too fast, I have found that slewing the tillers from side to side makes for great brakes, but obviously strains the transoms enormously. Another method is for the helm to shove his rear leg over the rear beam or if more drastic action is required for the crew to hang from the trapeze in the water, doing this you slow down real quick.

## A FEW WORDS ABOUT INSURANCE

Remember, that just because you have an insurance policy, you are not relieved from the responsibility of treating your equipment as if you are not insured.

A boat blowing over that is not securely tied down is no basis for a claim from your insurance policy. "Mysterious" dis-appearances from the boat, especially if the boat park is accessible to the public, this is another area where you might have an unpleasant shock at claim time.

Sails - A word about leaving them on the boat, DON'T, not even in a sail bag.

If you wish to leave the rest of the paraphernalia on the boat, then one solution is to put it under the trampoline cover and run a 2mm stainless wire (old trapeze wires are ideal) through everything, including blocks, rudders, tillers, downhaul and then padlock it. Another answer is to build yourself a box, 8ft long by 2ft wide and 1ft high is just the right size, as everything fits into it and it still fits under the boat in the boat compound. Remember to padlock it as well though.

DO NOT leave rudders mounted on the boat, this is only asking for trouble, especially if people walk past and accidentally walk into them, not only will they be annoyed, but it also will eventually damage the transoms.

I have often heard expressed the opinions that insurance companies charge so much for their services that individuals make sure that they claim for at least the amount of their premiums each year.

To clarify this situation, just ask yourself why these people bother buying insurance at all? The answer is that if they have a big loss, they want someone else to foot the bill.

How can insurance companies foot the bill if they have nothing left over after everyone has "Clawed back" their premiums? Charity? Unlikely, for insurance companies which pay out more than they bring in go bust; so the rates increase, and the cycle gets worse. Insurance companies which charge high premiums get little or no business, and go bust for a variety of reasons. It is well known in insurance circles that dinghy business generally loses money. High - performance catamarans, especially in the past, have been linked to very high - loss ratios.

I believe that we can establish ourselves as a class with a good reputation ( I think that we have now. Ed!! ) and hope you will do everything to help that goal. If we consistently manage this, make no mistake, in real terms your premiums will go down !! Sermon over, see you on the start lines and please be lenient and let me off with only verbal abuse if I am on port, as a ding in the side is a bit too severe a reminder for what is after all, supposed to be fun !!

**Tim Dieu de Bellefontaine**

Reprinted from *Dart News* 1988 with additional material by **Andy Weller {1996}**

1.

**2. ROUTINE MAINTENANCE by "Team Sid "**

It seems to me that no "Spring" issue of *Dart News* would be complete without a rundown on a few repair tips, if only for the new members of U.K.I.D.A. who have bought second-hand boats over the winter.

**HULLS**

The only part of the hulls that may need repair are the skegs and the keel line. First clean up the edges of any holes with a file, and any other loose material on the skegs in a similar way. Holes deeper than about 3mm should be filled just below surface level with something like "Plastic Padding".

The next stage is to bring the surface back level with gel-coat. If you have a white boat you can buy gel-coat from most chandlers, but if you have a coloured boat, then you need to obtain the correct coloured gel-coat from the Laser Centre. If you look inside your hatch covers you will find the Hull numbers marked on the inside of the hulls. The Laser Centre can match the numbers to the correct colour batch so that you can obtain a good colour match.

Most gel-coat repair kits are of the airless drying type, which means when applied to a mould only the surface of the gel-coat in contact with the mould will dry hard, the other side stays tacky, ready to accept layers of fibreglass mat and resin.

For this reason it is usually necessary to either cover the newly applied gel-coat with cling film or to add a few drops of paraffin wax in styrene to the gel-coat before application to make it go-off hard. You can build up a repair in this way, covering each time until you are satisfied the repair is high enough above the original surface to be rubbed back level with 400 grade wet-and-dry sandpaper, progressing through finer grades, until you finish off by burnishing the repair with "T-Cut" or "Autosol" chrome cleaner.

I have found that it pays to protect the surrounding gel-coat by covering with PVC tape during the initial rubbing down process.

The problem with covering gel-coat with cling film etc., especially on the curved surfaces like the bottom of the rudder blades, is that the gel-coat sticks to the cling film and produces air bubbles underneath, which only become apparent when rubbing down later.

This is where "wax in Styrene" comes into its own. A couple of drops, about 2% in each mix, will not only make the gel-coat air-cure hard, but also shorten the drying time.

When repairing rudder blade tips or even skegs, you can now hang the blade or hull the right way up and simply paint the gel-coat on in layers, allowing the excess to run to the bottom, where it can be filed off when hard to reproduce the original shape before finishing with wet-and-dry paper.

### TOE LOOPS

The toe loops on the side of the hull can easily be replaced in a few minutes. Drill the top off the old rivet, retaining the white moulding. Pull off the old pipe, leaving the rivets sticking up, then get hold of each rivet with mole grips and twist to loosen them in the hole. They can then be punched down through the deck fairly easily with a suitable punch and hammer.

The new plastic pipe can be obtained from most garages, particularly commercial garages, and there are also specialist firms that supply all types of hose. We have found that coloured pipe of exactly the same type stays softer in cold weather than the clear pipe and lasts much longer {Washing machine hose does the job a treat}. The long rivets are obtainable from the Laser Centre.

When riveting the new toe loop into place, squeeze one rivet half down, then squeeze the other one down until the stem breaks off before finishing the first one. If the hole in the deck has become too large or distorted to accept a new rivet, you can repair it by obtaining some 3/8" chipboard "plasplugs" from a DIY store. Run the correct size drill through the old hole so that the plug can be Araldited into the deck flush with the top. When the glue has set drill the centre of the plug to accept the new rivet.

### GENERAL HULL CARE

Old hulls can be brought back to as-new condition by cleaning with a fine grade of rubbing compound "T-Cut", usually obtainable from car accessories shops.

### TRAMPOLINE

The next item to look at is the Trampoline. Usually it is a stitch - in - time that saves

RIP - SPLASH. The sun's ultra violet rays are the cause of the trouble usually, although the Dart trampoline seems more resistant than some. I would recommend throwing an old cover or ground sheet over the trampoline when the boat is left in the dinghy park, to keep the sun off. You could also always buy a trampoline or full cover from the Laser Centre.

However, if the stitching along the bolt ropes or across the seams is greying or broken, take it to your friendly sailmaker to renew, unless you have access to one of those expensive sewing machines and/or a very understanding wife.

The only other thing that I suggest you check at this level are the jib fairlead patches. It is surprising how many boats have one or both patches ripped. This is about the quickest way to ruin a trampoline and they are easily replaced by a sailmaker. Whilst checking the patches it is also sensible to check that the fittings are both in the same place. You would be amazed at how many boats I have seen with one fairlead several inches further forward than the other. It all helps the "my boat always seems to go better on one tack than the other" syndrome.

### SAILS

These should obviously come in for some close inspection. If you haven't sailed since last season, I hope that you at least intentioned your battens. Better still, take them out and examine them for breakages or delamination. A defective batten doesn't always make itself readily known.

Examine the plastic batten pocket ends, checking that the screws are tight - you may find that some of them are opening up, allowing the battens to push through. If so, tighten the screws; if the threads are suspect, fit slightly larger gauge self-tappers, which will completely cure the problem of course, any defective stitching on the sails should be remedied by a good sailmaker.

### RIGGING

The only thing left now is ***standing*** and ***running rigging***. All wires should be checked for broken strands; replacement is the only answer if you find any. The rigging of a Dart seems more than adequate for the loads imposed, and I have not personally heard of any failures {other than fatigue of the wires themselves}. Trapeze wires are the most likely causes of any problems. I would however make a habit of renewing all the wires every two seasons anyway. They usually fail where the wire enters the brass talurit splice, so an inspection here is worth while.

Apart from a quick spraying with WD40 oil to clean up your clam cleats, if you will excuse the expression, all should now be well, and you should be set for a season's trouble free sailing, until your trailer wheel falls off!!!!!!...

**"Team Sid"**. Reprinted from *Dart News* {1983}

1.

## **2. DART SURGERY - NOT A MAJOR OPERATION**

by ***Keith Jones***

Following my return from a five year stint in Canada I had the opportunity to re-acquire my old Dart 18, {1253} now 15 years old. With the assistance of plastic padding I managed to get through the 1993 season, but had to put up with sponging about two gallons of water from the starboard hull at the end of each race. The source of the water was a five foot crack running along the keel line. This was impossible to repair from the outside and therefore necessitated the removal of the deck.

At the end of the season I contemplated the repair, spoke with various boat - builders, who muttered about old fibreglass being brittle and likely to break and initially decided that I wasn't up to the job. After getting estimates, {up to £300 per hull} I changed my mind and decided I may as well give it a go, at worst, I could always take the bits to a boat - builder to complete the repair.

The first task was the removal of all the deck fittings { the easy bit }. Now the deck removal!! I started with the inside of the main deck between the two beams, as an error in this area is less likely to be seen when the trampoline track is replaced. To remove the decks I used a putty knife. This I gently hammered through the deck/hull joint. It is important to try and keep the knife parallel with the deck curvature and not angle it down as you can easily dig into the flange on the hull. Having got the putty knife through the seam I then tapped it along the length of the hull in both directions up to the beam tubes. This was repeated on the other side, the deck still being held by a flange on the beam tubes. These were also separated using the putty knife by tapping into the joint from the side. I couldn't reach the middle but found that having attacked both sides, that this could be pulled up by hand. Amazingly the middle deck was off and in one piece.

Until this point I had assumed that I would be able to reach into the front of the hull and complete the repair without removing the foredeck. Unfortunately for me, there is a bulkhead under the main beam tube with only a small opening in the bottom to allow water to pass through. The foredeck therefore had to be removed and this was achieved in exactly the same way as the main deck.

This may sound like a lot of work, but in total took less than half an hour. Once again I learnt something about the construction of Darts. Having removed the foredeck I was presented by a layer of foam three inches thick about six inches below the deck line from the bulkhead, under the main beam up to the bow. This had to be removed in order to get to the crack at the bottom. Underneath I found another 3 inch layer of foam about three inches below that. There is no way that the front end of a Dart will sink no matter how big a hole you get. As well as providing buoyancy this also provides a lot of stiffness, the hull being very flexible when both the deck and the foam are removed. The foam is very difficult to remove without damage. A replacement pre - shaped bow buoyancy set is available from the Laser Centre at a reasonable cost. This saves a lot of work.

Once all the foam had been removed the fibreglass in the bottom was replaced using a 5 inch angle grinder. This is a very dusty operation. I then laid 2.5 inch wide strips of 2 oz matt end to end along the whole length of the hull. In the area of the crack I reinforced this with a 5 inch wide strip. This was achieved by firstly painting a layer of resin along the hull. The 2.5 inch matt was then laid into the resin. More resin was then soaked into the matt by further application using the brush in a stipple fashion. Its important to make sure the matt is completely soaked and that there are no air bubbles trapped underneath. {I had to grind out and re - do one small section}. For those who have no previous experience with fibreglass as I hadn't before undertaking this job, it is better to find someone in Yellow Pages who works in fibreglass and buy the materials from them than buy the normal pre - packed kits. Its much cheaper and you only buy what you need. Most of these suppliers like you to bring your own containers which they fill from stock. 2 litre plastic orange juice bottles work well but a small glass bottle is needed for the hardener. In addition helpful bits of advice are willingly given.

Again for those unfamiliar with fibreglass, there are four basic components.

- 1} Resin.
- 2} Gelcoat.
- 3} Hardener {peroxide - Poisonous}
- 4} Colour pigment.

Both the resin and the gelcoat are mixed with the hardener {the hardener should be 2 - 3%}. Colour pigment can be added to both gelcoat and resin. Depending upon temperature it takes between 8 and 24 hours to dry. It is best not to attempt fibreglass work below about 12 degrees C or in damp conditions. If gelcoat is used to repair the outside of the hull {as opposed to being laid up inside a mould} the fibreglass supplier will add paraffin wax in styrene to the gelcoat. This stops the gelcoat drying with a tacky surface, desirable to aid release from a mould but also excellent at clogging sandpaper.

Having completed the internal repair, it's now time to install the new buoyancy foam. The recommended adhesive is Bostik 2003 - a two pack adhesive. Call Bostik's customer services department to find the supplier near you. It is very easy to use, but messy as you have to spread it around the edge of the foam buoyancy before inserting it into the hull. I put on quite a thick layer on the basis I wanted good contact with the hull and could always remove the excess afterwards. I installed the foam one layer at a time. The working time for Bostik 2003 is in excess of 1 hour and it takes 12 to 24 hours to cure. The hull must be squeezed onto the foam whilst the adhesive cures. This was achieved by cutting an old main halyard into various lengths that could be tied around the hull at about 15 inch intervals. Pieces of wood were inserted between the rope and the hull to achieve the desired pressure. This process was repeated for the upper layer of foam.

Fitting the foredeck came next. This was probably the most difficult task because everything had to be in place before the resin started to go off. Keep the hardener ratio towards 2% to maximize the working time. Preparation is the key, and enlist a helper. Both the flange on the hull and its contact point on the underside of the deck should be filed and sanded to remove all loose material and provide a good key for the resin. To make a good joint a layer of 1 inch wide, 1 to 1.5 oz tape needs to be laid into the tape to take up imperfections. This should be prepared and cut to length before mixing the resin. A "dry run" is worthwhile. Having got everything prepared and a helper standing by mix the resin and hardener. The resin should be coloured to match the gelcoat otherwise a light brown joint will show {I have a light brown joint}. Spread the resin onto the hull flange. Take care not to drip the resin onto the foam buoyancy as it immediately makes holes. You can cover the foam with newspaper, **but remember** to remove it before putting the deck in place. Lay the tape onto the resin coated flange and then add more resin to the tape to make sure that it is thoroughly soaked. Paint resin onto the foredeck joint and then position the foredeck onto the hull. This needs to be weighted and tied down to ensure a good joint. I used a combination of rope, tape, bags of sand and heavy objects, all of which I had organized and to hand prior to mixing the resin. All this has to be done very quickly {20 minutes}. Don't worry about squeezing material out of the joint as this is easily cleaned up afterwards. Allow to set for 24 hours.

Having removed all the rope etc. any indentations in the joint can be filled with gelcoat. When dry the gelcoat can be filed off to leave a relatively smooth joint. This can then be sanded using progressively finer grades of wet and dry sandpaper used



wet. You should finish with 400 or 600 grade. This whole process is repeated for the main and rear decks. It's a good feeling {relief} to have the boat back in one piece.

You can now set to work on the skegs from the outside, knowing that underneath there is a good solid surface. It is important to remove all damaged material. In my case, with a long crack, water had been working in the crack for some time, which left a sizable gouge by the time that I had cut back to good material. The holes were filled with Plastic Padding Marine Epoxy to a level about one sixteenth of an inch below the finished level. This is expensive, but strong and it retains some flexibility when dry. Car type body fillers are too rigid for a boat as flexible as a Dart. The remaining hole was filled with colour matched gelcoat. With filing and sanding I had difficulty getting an even finish on the gelcoat to prevent the coloured fillers from showing through. Against recommendations I decided to paint the keel-line, about three inches down each side using a two pack polyurethane paint. Two coats were applied. The edge joint between the paint and the gelcoat was then sanded using 400 wet and dry paper until it could no longer be felt. I very lightly sanded the remainder of the paint to remove the gloss. Having tried the paint method I would definitely do it again. Finally the boat was WHOLE, WATERPROOF and the CORRECT SHAPE.

I now polished the boat using fine grade rubbing compound to bring back the colour and remove the final evidence of sanding. This was obtained from a car paint supplier {cheaper than equivalent fibreglass products and seems to work just as well}. This part is very satisfying but the quality of the end result is directly proportional to the effort put in. If you can borrow or hire a polishing machine it speeds the whole process up.

The fittings can now be replaced. I also replaced the chainplates whilst I had the decks off, as it didn't matter if the nuts fell off when undone. Ironically they didn't, but I'm sure they would have if I'd done it with the decks on.

I weighed the hull before and after the repair. Total weight gain was 2.5 pounds. I probably went overboard with the strength of the repair and being more careful it could have been kept to 1 to 1.5 pounds. Compared to a couple of pounds of water this is a good trade off. Confidence in the boat has definitely increased. It will be good to concentrate on the sailing and hopefully not filling and sanding every Sunday morning. To experts and boatbuilders, I am sure I have broken many rules but the effort was enjoyable as well as educational.

I have to thank my wife a great deal for her patience, as most of the above took place in our LOUNGE.

**Keith Jones** *{Runswick Bay S.C.}*

1.

## **2. TRAILER MAINTENANCE** by *Tim Johnson & Andy Weller*

Whilst you are thinking about sunny weekends with a warm wind blowing, spare a thought for that poor old road trailer. It did so much sterling work last season but its been left out in the wind, rain, frost and maybe floods, going nowhere all winter. Of course, as good citizens, we all tow at no more than 60 miles per hour, towing at speeds in excess of 60 mph would be illegal and we would not want to do that would we. It will also show up defects in the running gear a lot quicker.

To keep most of the gremlins that afflict our trailers at bay, why not give it a good service, it could save you from a lot of heartache this summer.

## TYRES

Trailer tyres don't wear out at the same sort of rate as the tyres on a car, however, if they have been on the trailer for a few years they may well be showing signs of their age, e.g. the sidewalls may be cracking. This is a weakness in the tyre and can cause blowouts. If your trailer tyres are cracked; get them changed!!

The tyre may have developed a flat spot, where it has been standing over the winter. It is worth moving the trailer, it only has to be a few inches each week/month to reduce the problem.

Trailer wheels are not normally very large in diameter. This means that at any given speed they are turning a lot faster than the tyres on your car. I would strongly recommend that you should, if possible replace the wheels and tyres, with those that came from a Mini i.e. 10 inch rims and not 8 inch. You can get the wheels from you local scrap yard and the tyres are normally cheaper than normal trailer tyres.

## WHEEL BEARINGS

It is recommended that they should be checked every 1000 miles, or if you do an average season's travelling, say approx. 2000 miles, twice a season. How many of us really do that sort of servicing? Not many, I bet!!! They might get looked at before the long haul to the Europeans, if they are lucky, maybe not. Also most caravan publications recommend that you check the wheel nuts for tightness before you set out each and every time. When was the last time that you checked the ones on your trailer? It may be when the last tyre punctured on the way to an open meeting for the reasons given above, or never, probably because the above hasn't happened to you yet!!!!

## THE BALL HITCH

As with all things, these can wear in a couple of seasons. This is accelerated if you get sand into it or you don't grease it regularly,

{I know that you get into trouble because someone gets grease on her jeans} but I have had a trailer depart from my car because of a worn hitch and its no fun, even at 20 miles an hour. So check it and if in doubt, get a new one. The easiest way to check it is to hitch the trailer to the car and try to lift the hitch without unlocking it. If there is any movement either the ball or the hitch or both are worn. Both are dangerous, once again if in doubt, change them.

## LIGHTING BOARDS

If you have ever had the misfortune to unhitch your trailer without first removing the lighting plug I sympathize with you. There is nothing worse after an open meeting to have to sit down and try to re-wire either the plug or socket so that you can drive home. After this happened to me a couple of times I resolved to carry a simple wiring diagram with me in the car telling me which one of the seven coloured wires went into which of the seven numbered holes. It is so much quicker than trying to do this by trial and error. Take it from me.

## THE FRAME

I am sure that most people will wash their boat down after sailing or at least in preparation for the new season. So why not do the same for the trailer. Salt can still damage the galvanizing or paint.

*Photo 18 :*

*If your Ball or Hitch is worn, beware !!! This could happen to you. The Author, was, to say the least, slightly suprised when his trailer, complete with two Darts overtook him on the French Motorway. The trailer carried on for a good distance before finally coming to rest in the ARMCO !!*

## MUD GUARDS

Mud guards are a legal requirement, also if you don't have them fitted you can do serious damage to your boat from road debris thrown up at the hulls.

## STRAPS

It always amazes me when I see people tying their pride a joy onto the trailer with old bits

of rope. If you replaced the main/jib sheet because it was worn out, why use it to tie the boat to the trailer? You can buy webbing straps, either the ratchet type or the cam type, quite cheaply and also they are kinder to your pride and joy as they are wider.

## IN CONCLUSION

Remember, your trailer is the ONLY thing between your BOAT and the ROAD, so look after it!!!

**Tim Johnson**

*Reprinted from Dart News 1994 with additional material from **Andy Weller 1996***

1.

### **2. THE U.K. INTERNATIONAL DART 18 COMMITTEE AND THEIR JOB DESCRIPTIONS**

This section is included for the benefit of the members, so that if they should have a question or query, they can contact the right committee member for the answer. The current committee members names and addresses are printed in ***Art of Dart*** and they are all available for contact. If you have any problems, please contact Lin Wilson, the Association Secretary and she will point you in the right direction.

## CHAIRMAN

- To chair and manage committee meetings.
- To ensure direction of UKIDA is structured and represents the membership.
- To stimulate thought and shape for the future.

- To ensure common communication through committee members.
- To ensure that when key issues have to be decided upon outside committee meetings, all members have the opportunity to voice their thoughts - contact can be made with Jane Stokes {Secretary} who will be able to liaise with the Chairman.

### **HONORARY SECRETARY**

- Chairman's representative.
- After Lin Wilson {Secretary}, contact point for outside organizations.
- Co-ordination and contact point for International Dart Associations.
- Supporting U.K. National Championship representative
- Responsible for the preparation of agenda and issuing notice of meetings, for Committee, A.G.M. and E.G.M.

### **TREASURER**

- Responsible for all financial transactions for UKIDA and its members.
- Responsible for annual budgets and event budgets.
- Prepare monthly accounts and final year-end accounts.
- Liaise with auditors and bank.
- Responsible for all investment and UKIDA's assets.

### **DART NEWS EDITOR**

- Responsible for producing Art of Dart, a news letter consisting of membership and outside contributions including reports, adverts, UKIDA and International events, rule changes and anything else of interest to Dart sailors.
- Liaisons with advertisers, both directly and indirectly {through Lin Wilson (Secretary)}.
- Informing Lin Wilson of advertising and invoices required.
- Liaisons with printers, directly and indirectly {through Lin Wilson}
- Chasing copy and advertising contributions
- Identifying new copy potential.
- Editing copy to ensure understanding, correct grammar and acceptable reading for a wide variety of ages and tastes.

### **FIXTURES SECRETARY**

- To arrange venues on an annual basis for the UKIDA T.T. Circuit.
- Liaise with non - T.T. Circuit open events and ensure that they are included in the Annual Diary.
- To appoint and guide UKIDA representatives for their T.T. duties.
- Work closely with the National Secretary.
- Be responsible for all Clubs holding T.T. events and open meetings of the current guidelines and requirements of UKIDA.

### **TECHNICAL SECRETARY**

- To advise the committee on all Technical aspects.
- To advise prospective purchasers of the product, as to the suitability of the Dart 18 for them.

- To liaise with the manufacturer on all technical aspects of the product, and act in the best interests of the membership.
- To constantly monitor the quality of the product and liaise with the manufacturer.
- To inform the committee and membership on all manufacturer's changes to the product.
- To test or organize testing of all manufacturer's changes prior to acceptance.
- .To advise the membership of any rule changes, be they manufacturer's changes or changes sanctioned by the I.D.A.
- To produce an up-to-date technical manual that is available to the membership.
- To organize and oversee the scrutinizing of competitors at National events and at other times as seems necessary.
- To co-ordinate all action arising from disputes over scrutinizing, as laid down in the Class Rules.

### **NATIONALS SECRETARY**

- Take responsibility for first selection of forthcoming Nationals venues.
- Ensure final selection of National venues satisfies the UKIDA requirements and has a balanced approach by the committee.
- All liaison with forthcoming Nationals venue committees in conjunction with UKIDA secretary.
- Set agendas and duties for committee at National events in order that UKIDA members are supported.
- Issue the required guide line to hosting clubs and ensure standards are maintained.

### **PUBLICITY OFFICER**

- To promote UKIDA, it's membership and maintain awareness at Dart clubs around the Country.
- To develop UKIDA's membership and diversify the structure.
- To produce open meeting reports for Yachting Press for T.T. events.
- To ensure media coverage is obtained at Regional, National and International level for UKIDA and it's membership.
- Develop UKIDA's International outlook.

### **INSURANCE LIAISON SECRETARY**

- To ensure that the Class as a whole, has the ability through several sources to insure their craft. This ensures that the membership can insure their craft at a reasonable cost, and stop them being attracted by other classes who do not share our ease.
- To assist individual members when they are experiencing difficulty with their insurance intermediary or company in settlement of a legitimate insurance claim, through the use of professional expertise and influence.

### **TRAINING**

#### **CO-ORDINATOR**

- To look after training matters for UKIDA.

- To specifically organize such events as required by the committee.
- Liaise with the R.Y.A. on Instructional Techniques and Methods.
- To provide for UKIDA a coach of a level and experience for the training of other instructors for the membership.

## **1. UKIDA CONTACTS**

2.

### **DART 18 SECRETARY**

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