

A Navigational Teach-in

THINKING OF GOING CROSS CHANNEL?

How about going to **Guernsey** as an example – read these notes with a **Cross Channel Chart**. Hopefully they will be helpful if not entirely comprehensive, an encouragement for the less experienced and also a reminder for the old hands.

1. FIRST TIME PERHAPS

(1) The Club runs escorted **flotilla** trips every year **Cross Channel** with great success and large fleets taking part. Highly recommended but sometimes weather thwarts the plan, or it doesn't coincide with your own holiday time. Maybe you could go some other time on your own or in company with one or two other boats.

(2) The Club has a **Skipper's briefing** before its **Official Cruises** which deals with basic intentions for itinerary, weather forecast, keeping in contact and other helpful procedures but as Dermot, our Cruising Secretary will confirm, it is the individual **Skippers' responsibility** to decide whether to go or not according to his ability and his boat. Bigger boats and more experienced crews can cope with more adverse conditions, so whether alone or in our company, it is helpful to ponder over the considerations arising before you go and prepare yourself, your crew, your vessel and your written Passage Plan accordingly.

2. PRELIMINARIES

(1) One has to presume you have sufficient sailing experience and basic **navigational** knowledge to handle your boat which is properly equipped as also is your crew – a subject of great import worthy of a separate article but covered in the basics of RYA books and courses and many other sources – so check yourself out on these and comply.

(2) Brief your crew on your intentions and keep them informed, find out if they suffer from any illnesses or disabilities and what to do. Show them how to start the engine, use the VHF, May-Day etc., tell them what is happening, especially changes of plan en route. Find out what food they can or cannot eat and warn them off heavy eating or drinking before setting off.

(3) Arrange for phone contacts before going, when arriving and leaving again to come back, plus, when you get back A.S.A.P. before worried relatives notify the Coastguard unnecessarily. Tell your contact of any change of plan which might arise in given circumstances.

(4) Don't forget to report by VHF to the **Coastguard** when you leave. He may ask you about your **Passage Plan** which is now a **LEGAL REQUIREMENT!** This is a spin-off from Health & Safety. The Club will have a recommended layout for a **Passage Plan** on its website so you can look that up. It is all pretty basic stuff designed to show that you have given proper consideration to your venture before going. Don't forget Customs Notices – the Channel Islands are **not part** of the EU.

3. PREPLANNING

(1) You will need a few sheets of tracing paper, your deviation table for your compass, Charts, Almanac, Pilot Book, information on Tides, Lights and Buoys including visual description. Maybe you will find it all in your Almanac or on your Charts. I like to use *The Admiralty List of Lights* and *Stanford's Tidal Atlas*.

(2) You need a Channel Chart for your crossing and a larger scale local Chart for your approach – say, a **Guernsey or Channel Islands and Adjacent Coast of France Chart**, but your Chart should give enough coverage to enable you to go to an alternative port if things go wrong, or if you miss the tide. (Don't forget the same applies to coming back – you may not end up in the Exe)!! **Portland to Start** coverage may be needed – Weymouth is a good harbour if you're driven east. Your Pilot Book for the area should have detailed information to get into most harbours. Mug it up – look up those possible alternatives – make notes for quick reference and put tabs on relevant pages for quick finding.

(3) Pre-work courses, bearings and marks on a progressive **Course Plan**, road-map style, as for the AA with **Pilotage Memos** and detailing features to see to port and starboard. You can put as many details on this as you wish but leave plenty of space. You will find at the end of this article a **sample Course Plan** with this type of detail shown. Leaving extra space will always give you room when you find extra bits you wish you had put in. Don't throw it away after you have done your trip as most of the information will be appropriate for a new trip or you can use it as a guide on another trip. I've done it for 50 years after adapting from a chain survey book when I was a trainee surveyor. Start at the bottom of the page and work up – it's easier to follow – if you are off course, amend the notes as you go in that extra space you left, for example going the wrong side of that Cardinal Buoy!! - but not the lighthouse I hope!!! All this will serve as a record for working up a new course if you are seriously off beam.

4. CONSIDERATIONS – The First Half of the Crossing

(1) Have a good look at your Chart – mull over and see what is likely to arise on your likely route. **The tides are weaker** this side (Lyme Bay mainly) but on the second half they are notoriously **stronger/faster** (and therefore **rougher** if wind strength increases, the more so with wind against tide) the nearer you get to the Channel Islands and France. Look at your **Tidal Atlas** or the tidal information on your Chart and see the figures which clearly show this. See how it changes by the hour from - 6 to + 6 from high water. Think about where you want to be and try to plan to be in more favourable tidal conditions, not just aiming for high water to get into your harbour. If this is your first time across, do try to do it on neap tides – it will be a lot easier for you.

(2) Note the **Separation Zone** east and west and the West Channel Marker Buoy (WCM - formerly the Channel Light Vessel). Finding this gives a comforting midway fix even if you are using the GPS! Watch out for that **change of tide direction – wind against tide** gives more **uncomfortable shorter steeper waves** – slamming and slowing your progress as well. Try to plan for wind over tide which will smooth it out (a bit anyway) especially for the second half.

(3) A useful reminder is that Guernsey has near enough the same High Water Time as the Exe. Another point to keep in the mind of your helmsman is that Guernsey is about 60 miles distant so EVERY ONE DEGREE OFF-COURSE IS ONE MILE ADRIFT THE OTHER SIDE! Don't worry too much about this; it's surprising how the course averages out – but do ask your helmsman to tell you what average he thinks he **has steered** during his trick on watch and you can adjust for it on your Chart Fix. It's no disgrace – everyone steers one side or the other of the course – blame the winds or the waves effects – the only disgrace is if you **do not** give him that information – perhaps not so important with GPS unless it's on the blink or a fuse blown and no spares – then you will need to know to keep up those hourly positions in the log.

(4) I assume that you have **swung your compass** and you have a **deviation table** and know how to use it. Remember you do **not** have a **fixed** deviation on your compass; it varies according to your heading all the way around the compass circle. Remember also to keep metal away from the compass – e.g. knives in pockets or any other item – not so much beer cans these days as they are now in aluminium. Just be alert to it.

(5) So, get your **Weather Forecast (WF)** and plan your trip to suit the wind if strong from mid-channel to Guernsey, then work back for the milder first half with your departure from the Exe and an ETA at the West Channel Buoy to suit, if at all possible. We used to enjoy a quick chat with the lonely keepers when the old Channel Light Vessel was manned – now he's just a lonely buoy (sorry)! Check that you can get out of the Exe with the changing shoals to cross and possible adverse wave conditions from strong winds. If not you may have to adjust your departure to suit or even if you have time get to Brixham or the Dart and make your run from there-good places to wait for conditions to improve and also gives a shakedown for any new crew.

(6) Remember when working tidal calculations that the shortest distance for the speed assumed made good is to allow for hourly tide offsets and calculate the straight course to steer through the water. **Do not keep changing course** by following the GPS bearing to a Waypoint. This relates solely to the land below the sea. If you do this, you will sail a lot further through the water and slow your time down.

(7) Always make sure that you are sailing in clear water and that allowing the tide to take you sideways does not put you near or over hazards. If so, you will have to factor in two or more legs in your course to avoid them.

(8) Use a piece of tracing paper over your Chart and instead of doing a single **Course to Steer (CTS)** calculation from the total of the sum of tidal offsets at the starting point, set out each leg hour by hour with the tide at the end of each hour i.e. as you would do when plotting an Estimated Position. This way you will see where you are likely to be over the ground (seabed) hour by hour. It may not otherwise be obvious that a strong tide will set you off near a danger. For example, going to Alderney would put you near the Casquettes. Don't forget that all important Deviation Table for your compass. There is an article on the Club website giving this subject food for thought. At the end of this article there is a **sample comparison** of course to steer calculation and projected course over the seabed related to the Alderney and Casquettes to emphasize the point and the need to set

your course in two separate legs to take account of it.

(9) You can use your GPS to confirm the accuracy of your tidal calculations from the XTE (Cross Track Error) as well as giving you a fix in Latitude and Longitude. Simply lay that piece of tracing paper on the Chart and put on your XTE east or west from your GPS direct course to your chosen Waypoint – this could be at the Western Buoy or your chosen approach to Guernsey. Remember the GPS course to the Waypoint is **over the land** and **not through the water** so you must allow for the tide and not slavishly follow a GPS course which **could take you over a hazard**. The GPS course must be clearly distinguished from your CTS which allows for the average of tidal offsets. Be prepared to adjust your course if progress made good is faster or slower than your original plan which is of course based on assumptions.

(10) Although it is not on a straight line from the Exe to Guernsey, the Western Channel Buoy could be used to do a tidal calculation separately of the first and second halves of your journey. I usually found I had to recalculate the second half as progress varied due to speed made good in conditions throwing the timing out on the hourly tides originally assumed. The GPS will show your progress by way of a fix and will give you a bearing and distance on your Waypoint on the Channel Buoy or other. This is a useful check and it really is a booster to morale to actually see it after six or more hours of having seen nothing other than a few monsters bearing down on you. Even these however show a rough progress position forward from the direction of the ships within their traffic lanes. The first ones you see will be going from east to west but remember there can be other shipping about before you get to the TRAFFIC LANES themselves, so don't assume you are there already. Both your Log and your GPS will give you an idea. Optimism being what it is, the first ship you see going in a westerly direction will draw you to the probably wrong assumption that you are at the Traffic Lanes.

(11) Do change course early if you think you may be on a collision course so that the other ship can see your intentions. There is nothing worse than changing course late and finding he has done so as well. What has been seen in slow motion suddenly becomes very proximate and happening at speed so keep those hand compass bearings going on him. If the angle is not changing you need to do something i.e. allow to go astern of him. Do not try to beat him by going across his bows. You may be west of the end of the actual Traffic Lane on your course, but be sensible – apply the same logic as if you were within the lane and try to STEER A COURSE if possible at 90 degrees to the flow. If your monster has just left the Traffic Zone, he will probably not have changed course to any great extent. Remember you have to steer a course at 90 degrees to the flow, not make good a course of 90 degrees. The monster's Captain will or should have taken account of tide effect on you, you hope. That is what the rule of the road says. You do therefore have to rely on him abiding by the rules, but if in doubt change course so that you can positively go astern of him.

5. CONE OR PARALLEL SAILING (see on-line Club article)

(1) Now that you have done all that work to calculate a CTS you also have to decide whether you can actually sail it! You may have seen that already from the weather forecast and tried to allow for it. If however the wind is generally heading you, your course may be way off what you would want as a near enough direct route. Is a

wind shift likely – and when? If so, you do not want to be caught **way downwind** when it does shift. You need to limit your wanderings or you will add hugely to time and distance involved or maybe even have to go somewhere else.

(2) Two methods are available to keep you within bounds. Basically, one is to set up a cone with the peak at your destination (end of leg or Waypoint). Tack within the cone and you will have shorter tacks as you get nearer your goal. The Club has another on-line article coming which goes into detail on these techniques. Weather forecasts tell of a wind shift but no more accurately than six to twelve hours (or more) in their predictions.

(3) A second alternative is to sail within parallel lines, say two or three miles apart, centered upon your target. Sail within these limits to avoid being never more than three to four miles off the direct course to the target. With these methods you can still use your GPS to stay within bearings on each side of your cone or parallel lines. Try it - it's well worth it. An appendix is attached to this article illustrating the basic concept of these methods.

6. **LOG KEEPING** - The Club will have a separate article on this coming on-line soon.

(1) You probably think I'm going on a bit and that GPS avoids the need for some of these procedures. All GPS sets carry instructions that they are an AID, not a SUBSTITUTION for proper navigation techniques so keep an Hourly Log and when GPS lets you down (or you enter the wrong figures for that Waypoint) you will have something to work from. With your hourly log, you will have plotted your position on your paper Chart, - won't you? - together with the Log Reading, so all you have to do is a bit of an update from your last fix no more than an hour ago.

7. **POSITIVE IDENTIFICATION**

(1) Remember imagination is wonderful coupled with hope or longing to be further ahead than you are. You can always convince yourself that what you see is what you have been waiting to see. I've done it time and again because I don't always practice what I preach and then suffer the consequences, especially when tired.

(2) If using a GPS put a Waypoint on the mark you think you are seeing. If the bearing to it from the GPS is not the same as your compass bearing on it, then that is not it – so look along the GPS bearing to find it or do that in the first place!

(3) If it is a buoy, sail close enough to read the name on it but make sure you are on the right side of it if it's a Cardinal. At night, you have also got light characteristics to use. Water towers and churches on Guernsey and the French Coast proliferate so you really do need to be sure you are looking at the right one.

(4) If you have no GPS take compass bearings on other marks or features to see whether they too fit from your position. But still be beware, the wrong markers can throw up relative bearings which will fit your estimated position when you are not there – because you wanted it to fit. Double check with your estimated position, distance run and depth and any other information which you can use to confirm your whereabouts.

8. SECOND HALF – Separation Zones to Guernsey & Timing

(1) Which end of Guernsey is it to be – Platte Fougere (PF) or Les Hanois (Les H)? You need to pre-consider and make Pilotage Notes for your approach to the Island and lay off courses to clear the dangers showing safe and danger bearings on for example the lighthouses. Again an article on **compass bearings, safe and danger lines** will be available and attached to this article is a sketch indicating such lines relative to approaches to Guernsey.

(2) Time to look at your tidal calculations again – was your intended approach via **PF or Les H?** Which one remains appropriate? When you actually get in proximity to the Island, you may be early or late depending on wind etc so you need to decide the best approach **not long after** leaving the Western Channel Buoy to achieve say a down tide run in the Little Russell Channel or at least to get in before needing to flog against the strongest tidal hours.

(3) If coming in from the Eastern Up channel end, it may be too rough a passage for wind against tide, the more so the stronger the wind and faster the tide. Look up your tidal rates for your revised expected times and compare with your likely speed through the water. Consider also the comfort factor. You will have to make a judgement. You can always slow down a bit to let the worst of the tide slacken off. The sea going in from PF can get very steep with wind against tide, particularly as there is a shallow bar towards the first buoy at Roustell. See detail shown on the Chart.

(4) Make that decision on **PF or Les H** as early as possible. It's a long way around two sides of a triangle if you want to switch from east to west and go around Les H if you leave it too late – also the bars may then be closed by the time you get into St. Peter Port!

(5) PF has deep water to round it close to but has rocks to starboard of your approach to it. You need to ensure you are not being set down towards them. Watch that you **do not allow** the bearing on PF to REDUCE; steer anti-clockwise up Channel (i.e. more to the north) if it does to bring you back on track.

(6) If you do approach by Les H you have the length of the Island to run along the south coast to Pte. St. Martins. Les H Lighthouse is set back on a rocky plateau, so you have to be sure of your distance off the unlit edge of the rocks. GPS will give you this – just maintain a course with distance off to the light as a Waypoint Alternatively, set up Waypoints on the courses you wish to steer to give this clearance and use the cross track errors to ensure you are not being set onto the plateau.

(7) If you have no GPS you need to be further clear for safety – you will have to make a judgement of say, one to two miles depending on wind direction and tide. Remember **leeway as well as tide** can set you towards the danger. Once past Les H and heading for P St. M the dangers are less but look at your Chart and keep half to one mile off. If you have radar, you can use it to identify **transponder beacons** which will show the position of the WCB, PF, Les H, Casquettes and other marks. You can identify these by the morse patterns which they transmit by day or night if the visibility is poor. On the radar they are represented by a ladder of thick and thin lines representing dashes and dots radiating TOWARDS you with the identification

letters from the mark. The furthest point of the signal is the position of the mark.

9. FUNK HOLES

(1) You may need an alternative destination to Guernsey - say Alderney, Jersey, the French Coast or even back to the UK!! Strange things can and do happen!! Mug up possible alternatives – approach data, identifications, tidal heights etc – make notes and if it's a drying harbour, make sure you anchor or moor from where you can get out again for your return home. Watch higher pressure and wind direction effects on water levels as well as predictive heights of tides or you could be stuck – sometimes for weeks or even a year if it is the highest tide of the year and you went in as far as you could on top of it. This happens on an Equinox so be aware of it.

(2) It's a good idea if possible to time your approach **AT DAWN**. This probably involves a **night passage** from the Exe so that you arrive before the lights go out. Not so important with GPS providing it's working, but nevertheless reassuring to see and identify the lighthouse etc. It is also easier to see the ships at sea as well as to identify their direction from their navigation and steaming lights. Mug up on those ships lights. There are very good books available which you should carry on board such as *The Seaman's Guide to the Rule of the Road* or flipcard packs which are available. It's all in the Almanac in any event. I had a crew when I was off-watch who nearly went across a tow-line between tug and tow which could have been nasty. Keep that Light Identification book handy and fully instruct your crew to get you up as soon as there is any shipping within sight. In the final analysis, the buck rests with you as Skipper.

10. FINAL APPROACH – PILOTAGE

(1) Use the **Pilotage/Course Memo** method as recommended again and which you have prepared at home for the final approach into the Channel to lead to your destination, in this case **The Little Russell**. You will find another sample drawing at the end of this article indicating the run in to St Peter Port from the north. Now you will know what a useful item this Course Memo is as your run in will be quite quick if the tide is under you. Having all the **marks prepared** with lights and shapes as well as distances apart and colours readily to hand will serve you well. Make sure you pass the marks on the correct side. They are quite distinct in all respects and if at night, have lights which are all shown on some of the local Charts.

(2) A useful point to bear in mind when approaching any strange harbour or coast is not to be confused by the sheer number of lights ahead of you. Try to identify the major lights or stick with a few that you have identified. Do not try to identify all the lights as some will be cars manoeuvring on the land and others will not be relevant to the major passage you wish to make. Don't intimidate your crew but do try to restrain them from bombarding you with superfluous information on lots of minor marks leading elsewhere or marking dangers well off your route. You do need to discuss these matters with your crew and settle on no more than half a dozen lights in sequence as quickly as possible. Don't ignore them however as they may see something you have not, like another boat coming towards you, which is a light not on your Chart, but which you certainly need to observe!

(3) Coming back home and going north up The Little Russell, it is easy to follow by mistake the inner mark lights which are closer into the coast to port of your course.

Look at your Chart and identify these and note the characteristics and put them on your Pilotage Memo. You certainly need to keep clear of these. If you steer your courses on any of these it will put you on or over reefs of rock which extend from the shore, so get your bearings as soon as you clear the harbour and as quickly as possible identify the correct marks on the bearing of the course you should be steering. If for some reason you are set to port, these inner marks may well line up on your bearing which should be parallel to them but further out to starboard. Make sure you put these marks on your **Course Memo** showing them clearly outside your track and make sure your crew are well instructed on these as well as the principal marks. Remember also to put your **reciprocal courses** on your memo. A quick way to calculate these, **working from true**, is to either add 200 and then deduct 20 or deduct 200 and then add 20. Then make your adjustment for variation, deviation and leeway as appropriate. If you are using the same memo for the return trip, you can put your reciprocal course on and avoid confusing it with the incoming courses by putting a circle around it and an arrowhead for the direction in which you will be travelling.

11. ENTERING THE HARBOUR

(1) Watch out for exiting vessels – don't cut the corner on the entrance. Stand off a bit to give you a **clear sight line** inside. Not all boats come out keeping to their starboard side. Apply the basic rule of the road, i.e. leave the other vessel to port of you and remember to **look behind you** – the high speed ferries come up on you very fast, so you don't want to suddenly alter course across their bows. Watch the Harbour Office signals and mug up what they mean from your Pilot Book or Almanac. They are not always obeyed as locals in small boats tend to stand clear and enter or leave against the signals but keeping to the sides out of the way. You might well be entering keeping to starboard and find one of them coming out head on to you on the wrong side of the entrance!

(2) Call up the Harbour Master on VHF and make your report in (vessel name from Exmouth UK). Be prepared to use the International Alphabet to spell your strange boat name. You have now made your official report in as it will/should(!) have been logged. Enter the time of this call in your own log as well as proof that you did it.

12. GETTING A BERTH & CUSTOMS

(1) You will probably be approached by a **marina dory** who will tell you where to go. Otherwise call up the marina on Channel 9. You will be directed either to buoys in the outer harbour, a holding pontoon to await marina entry when the sill has enough water over it or whatever. The sill has a **depth board** so you can judge when it is deep enough for you to enter. Do not just follow the first boats to go in – they may well be shoal draught or have lifting keels or rudders.

(2) Now that you are tied up temporarily or otherwise, you can **ring home** by mobile phone or go ashore in the dinghy and call those anxious mortals at home before they call out the Coastguard search parties. The shore delights are now before you but remember all the advice in this article – particularly overdoing the food and drink before your return. Believe me you will end up **short-handed** if your crew **over indulge**.

(3) Before any of you go ashore you have to fill in a Customs Entry Form. Observe

the reporting procedure. Call up on VHF or mobile phone. They may well say don't wait for them and just post the forms in a post box you will find at the head of the ramp up from the pontoons. The Customs Form for filling in will normally be given to you by the harbour patrolled dory when they come out to meet you and they will tell you the procedure.

13. RETURN TO THE EXE

(1) You may have a tight timetable, in which case you may have done your tidal homework at home already. If not, now is the time to plan that passage and prepare your **Updated Passage Plan** using all the criteria given in this article in reverse. Watch that arithmetic converting those reciprocal courses, particularly with a thick head whether sober or from suffering!! Don't forget you need another written **Passage Plan** for the record.

(2) Don't forget to **ring home** telling them your departure time, your ETA and where. You might prefer to go into Brixham and sort the approach of the Exe shoals out later in a daylight approach. Finally, check your exhaust water, steering and prop before casting off. You may have picked up a rope or plastic bag. Check your fuel, water etc and that you have enough other general stores for the return passage.

(3) Well there it is – it's **your decision and responsibility** on all aspects. I hope I haven't put anyone off. It's a lot, though could be a great deal more if all the basic matters were included but it is mostly straightforward and includes some of the basic techniques which you may or may not have learned yet. The object is to lay it on the line so you can go with full knowledge and confidence. It also applies in principle to other destinations so you can use this Article as a general guide.

(4) With experience and practice, many of the somewhat longwinded procedures become unnecessary but a start as in this Article should imprint the factors to bear in mind.

Enjoy the Island and leave a drink at the bar of the C.I.Y.C. for me! Don't forget you have to report in through **Customs** on your **return**. Should you need any further information or if any of the articles referred to as addenda or available on the Club website are not yet to hand, please feel free to give me a ring at home and I will endeavour to put you on the right lines. My phone number is: 01626 890398. If I am not about, just leave a message with your number on my answer phone. Be patient if you don't get an immediate reply. You can also of course ask Dermot, Paddy or any of the other stalwarts.

CLIVE BASTONE

Please read on for Deviation Addendum

DEVIATION

(and it's not just about the Main Compass
or positioning the auto-pilot's Course Sensor)

1. VARIATION

- (1) Let us just recap for a moment on what exactly **VARIATION** is. As you will already know from your studies **Magnetic** North and South does not correspond with **Geographical** North and South. The earth spins about its north and south geographical axes, with a bit of a wobble, but the Magnetic north being offset to one side gives an anomaly on compass bearings which are expressed as **variation** east or west. You will have seen this on your charts and will also have noticed the fact that the amount of variation to apply varies by a small amount as you progress across the chart. It also varies on timescale.
- (2) Basically the core of the earth is molten and with the earth's rotation the magnetic element tends to wander. This is predicted and that is reflected in the figures on the chart. The amount of variation at any point on the earth can be measured and charts are available which show the lines of equal variation, similar to contours on an ordnance survey sheet. These lines are not regular in the way that latitude and longitude are but are most irregular arising from natural causes rather than a man-made artificial grid.
- (3) Some anomalies arise. These are shown on charts and indicate that magnetic disturbance can be found in certain areas. This is usually where there is a large rock which has magnetic qualities such as high iron content and in those areas the compass is deflected. It's OK if you are sailing in daylight and can keep an eye on your course to pass these but it is as well to keep clear and not use the auto-pilot in close proximity for obvious reasons. I know of one such anomaly which is located north of Lorient in the Bay of Biscay en route to Etel.

2. DEVIATION

- (1) Wherever you are on your boat there will be varying degrees of **deviation** brought about by the metallic elements of the engine and other factors on board such as stored anchors, batteries, chain, electronics and general wiring. The rigging itself also can create a magnetic field. For accurate steering you have to take account of these factors. Unfortunately the compass cannot be situated where the deviation effect is least as it has to be conveniently placed for the helmsman, unless of course you have an electronic compass which can be sited in the best possible place, but even that will have some deviation effect.
- (2) To provide for accurate steering you must have a **Deviation Table** to tell you what account to take of the deviation according to the course you are steering. Think of the magnetic effects of your vessel as having an average position such as the engine block which is usually the major culprit and as you steer around the clock so the **DEVIATION** pull varies according to the alignment of your compass the block and magnetic north.
This is normally expressed as a deviation East or West adjustment.

(3) DEVIATION TABLE

- (1) You need a Table on board to be able to refer to this to adjust your calculated Magnetic Course to Steer to take account of the deviation. Firstly there is no such thing as a fixed deviation on any vessel. As already stated it varies around the clock according to the heading of your vessel i.e. the course you are steering. This is expressed as a Table running from 0°- 360°. If the maximum deviation is high, say 5°-15°, or even more on steel vessels, then it is necessary to have the compass

corrected. This is normally done by a professional who places magnets around the perimeter of the compass in order to cancel out the worst of the deviation. He is unlikely to be able to eliminate all deviation hence the need for your Table.

- (2) You will find a diagram at the end of this article which shows how a Deviation Table is expressed and you will see that there are two maximum points and two zeros where the Table crosses the median line. The two zeros are always 180° apart and the maximum figures are also 180° apart as the curve when the deviation figures are plotted are symmetrical East and West. They do not, however, start from 0 or 360. The zero points could be anywhere on the 0 – 360 line. Your particular deviation on *your* vessel is of equal extent to East and West varying from 0 to a maximum in each direction.
- (3) It is important to remember that the Deviation Table is purely for the Steering Compass. If you have any other fixed compass on board you will need another Deviation Table for this, as for example, if you have steering below as well as on deck. However if you have an electronic compass then of course the read out dials will have the same correction on them as they stem from a common sensor. Remember also that you cannot use your deviation table for a Hand bearing compass. More about this later.

3. CALCULATION

- (1) Remember that the Deviation adjustment you require to your Magnetic Course is based on the ship's heading on your Compass. That is fine when working back to Magnetic and True from the Compass course being steered. Just add or subtract the deviation East or West to give the Magnetic Course achieved

An anomaly, however, arises when working out a Course to Steer starting from Magnetic. You have to start with your Magnetic Course to see what the Deviation is on your Table. If your deviation maximum is high then if you are going to steer a course which is near the maximum deviation you could be making an adjustment of up to, say, 10° which will become the new ship's heading – but the Deviation on that heading on your Table may be different by a substantial amount so you now need to substitute your new calculated heading and see what the deviation is on that. You now need to substitute the new deviation reading for that with which you first started. The extent of difference will depend on the steepness of the graph curve and could well produce a difference of several degrees East or West.

4. RUNNING CHECKS

- (1) Remember that your boat can take up a changed situation of magnetism according to where you keep it. If you keep it on a swinging mooring then you are unlikely to take up a different aspect of magnetism between North and South polarisation of your metallic elements on board as the vessel will be swinging to the wind and the tide and will be constantly varying its angle towards North

If, however, you are ashore for a long length of time or on a fore and aft or alternatively on an alongside mooring on a Marina creating a fixed position then the longer you stay in that position the more likely your vessel is to adopt an altered North/South profile. There will probably not be a great deal of difference simply on an overwinter lay-up but if you were laid up for several years there would be a distinct change.

- (2) It is highly advisable to make running checks while you are afloat which can be undertaken quite simply. Take the opportunity to confirm a bearing over the compass on transit marks which you can identify on your chart. You can choose any two objects which can be identified on the chart, measure the bearing between them and convert this to magnetic. You can steer towards these marks and note your ship's heading on your compass. The difference is deviation on that heading

Alternatively if your compass is fairly high up you can maintain your course and sight over the

compass on the transit as you pass it. Again you can compare the bearing off the chart with the bearing over your compass but remember this will now be for the course you were steering.

Leading marks into a harbour are also a useful check as that will give you the actual bearing on the leading marks and you can compare this directly with your compass when you are on the line. Don't forget to adjust the Chart's bearing which is always given in True to Magnetic plus the date movement shown on the Compass Rose.

Try to remember to make these checks and do not always do them on the same marks as the deviation could be different on other points i.e. the whole curve could have distorted. Try to find marks to check the whole range of your curve one side or the other.

5. STEERING

- (1) All this may seem to be a bit pedantic playing around with a few degrees of difference only but bear in mind - advice elsewhere – that 1° steered off course is 1 mile adrift on every 60 miles run. If you don't start with accurate figures then the accumulative effect becomes greater when more than one error is on the same side.
- (2) It is difficult enough to maintain steerage within 5° for many helmsmen but if you are rock-hopping through narrow passages you do need to know your average CTS and there is probably not much tolerance on either side. You have to try harder for these usually short, but critical, corridors. It may not necessarily be you on the helm at these times. It may be more important for you to be doing the checking on progress on your pilotage plan through these short passages.

It is often better to put your best helmsman at the helm while you undertake the overall check of position and any course alterations necessary on doglegs etc. Remember to watch that tidal set and leeway adjustment necessary and to maintain the bearing over the ground

It is no good just keeping the ships head on the CTS you have calculated if the sideways effects are putting you nearer the sides of the passage. Try to judge the effect and give your helmsman a Course to Maintain on any mark that may be available. If none then you need accurate assessment of set and drift

If it is that difficult perhaps you should not be attempting to make a passage through such a situation. Obviously GPS Plotter or Radar can play a part in the decision on this but if your instrumentation is below you need enough crew to both steer and keep an eye on the instruments.

- (3) Bear in mind also that your helmsman must have a norm for his Course to Steer so it does need to be as accurate as possible. At the end of his trick on the helm he must tell you what he thinks he has averaged as his Course Steered. If he is unable to hold the course you have given him he also needs to tell you there and then so that you can decide what can be steered and alter your tactics to suit.
- (4) Bear in mind that you need to be personally and physically eyeballing the situation above decks rather than attempting to navigate solely from below. If you have enough crew banish one of them to watch the plotter and report back X cross track error etc. It all depends on circumstances- longer wider passages or sharp short narrow with or without course changes involved and of course the pre-planning of pilotage notes – you may not have time when in the thick of it.
- (5) Another point to bear in mind if you happen to be chartering a vessel is that some of the bigger vessels often have dual steering wheels in the cockpit with twin compasses. Separate Deviation Tables are needed for each compass. I found this out to my cost on a Mediterranean charter boat. The other vessel with us always steered a different and better course. My boat did not have a Deviation Table at all.

6. HAND BEARING COMPASSES

- (1) You will be surprised how much Deviation varies around your vessel. I used to take bearings with a hand-bearing compass through the window beside the chart table until I anchored one day in Alderney and told my crew to practise logging their position by two-point bearings on shore marks. The result was so patently wrong. We were at least 400 yards from where we truly were so we started taking bearings from different positions on board.

These varied from right forward to right aft and at various positions along the side of the decks. The differences were unbelievable. The rigging itself created a field as well as the other metallic objects on board. The message is to find a transit ashore from your boat from marks shown on your chart so you can measure a true bearing and convert to Magnetic for where you are. The difference on your compass is your deviation with the ship pointing in the particular direction at the time. If there is such a transit you will of course have a position line that you can in any event plot. So you then only need one more bearing on a mark for your position.

- (2) Now you have to go around the vessel and find the best reading place for the nearest comparison with the ship's compass. Keep trying until you find a near zero norm and don't stand beside any obvious metallic objects. You may well find that the stern is often the most accurate point from which to take these bearings but be careful taking them from there when under way !!
- (3) Unfortunately when you have established the best place for using the hand-bearing compass you will probably find that this still varies if the ship is on a different heading so keep trying until you find your best average position but don't rely on it too much. Remember once again the ship's Deviation table for the steering compass is not appropriate to the hand compass.

7. METHODS

- (1) There are a number of methods of making a Deviation Table. The easiest is to engage a professional who will adjust the compass as necessary with magnets to reduce the scale of deviation experienced. He will then have to sail courses on a known transit to prepare a table of the residual deviation. You can of course prepare this Table yourself.
- (2) The most accurate way is to use the *pelorus* but I will not explain this method as it is worthy of a separate article. I do have copies of this which could be made available to you if you really want it.
- (3) You can use transits on shore which can either be known transits where you can take the bearing off the chart or alternatively any two items which you can line up and then average out the results at the end of the exercise. Again a description of how to do this can be made available on request.
- (4) The final method is to tow a dinghy astern. This can probably be sufficiently accurate if you take some care. Steer your vessel on different headings around the clock while towing the dinghy. Your man in the dinghy, with the hand-bearing compass, has to take bearings along the centre line of the vessel e.g. the mast and centre line of the transom. If you have a ketch or yawl simply line up the masts.

He calls out the hand-bearing reading on the ship's centreline for each heading that you steer. You have to make sure that you are writing down both the heading you are steering and his compass reading simultaneously. There should be no outboard motor or other metallic object in the dinghy!!

- (5) Make up your Table of readings in graph form as shown on the last page of Diagrams. It will probably be sufficient to take readings at 20° intervals all around the 360° circle. With the dinghy some distance astern of the vessel it should not be affected by any of the ship's magnetism. You can take the hand-bearing compass reading as the Magnetic bearing each time and the difference between that and your ship's compass is the Deviation. You can designate this East or West according to the jingle Deviation West – Compass Best Deviation East – Compass least.

- (6) You will see from the diagrams attached the layout of the graph. When you plot your readings to draw the Deviation Curve you have to take the average line between the points you have plotted. You may well find that a few of your marks are a little adrift but draw the best line you can achieve through those marks and you should have your curve symmetrical on both sides East and West of your North/South median.

Don't worry if a few of the readings seem to be a bit adrift -just take the average line. If you are concerned you can always put your crew back in the dinghy and take those particular readings again to correspond to the headings relevant. Check that your zero and maximum E/W deviations in relation to the North/South line fall 180° apart. You may be surprised how good your graph is in this respect.

An example illustration of preparation of a Deviation Table is attached.

DEVIATION TABLE

