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Friday, JUL 1893.

CAPTAIN H.S.H. PRINCE LOUIS OF BATTENBERG, G.C.B.,
in the Chair.

THE ADVISABILITY OF ADOPTING A MARINER'S COMPASS CARD MARKED IN DEGREES ONLY, IN PLACE OF THE ONE NOW IN USE.

By Lieutenant J. F. STUART, R.N.¹

IN advocating the introduction of a compass card marked in degrees only, as in the diagram before you, I am well aware that it is no new thing that I wish to bring forward, but that many navigators, though fully recognising the simplicity that would ultimately accrue to navigation by such a change, have been unwilling to bring before the public its advisability. They see, perhaps more clearly than I, the difficulty of inducing the seafaring public, proverbially conservative, to admit the necessity for it; and, even if this could be done, they probably consider that the labour and expense entailed by the change, and the temporary confusion that might arise during its process, would outbalance the good to be derived from it.

One need not be a very deep student of human nature to be alive to the difficulty of persuading the average run of mankind to admit that those institutions among which they have been brought up, and the method of conducting business to which they are accustomed, are not the very best.

Probably, without their being aware of it, one of the chief reasons which render people so conservative lies in the fact that a change almost always necessitates an effort; also, our old customs and institutions acquire from age a reverence which makes us unwilling to subject their practical utility and continuance to unsparing examination. The history of the division of the compass card into points is natural and simple.

Our bold Norse ancestors trusted themselves to the open sea with no compass at all.

The primitive compass used by their immediate successors was but a north-pointing needle. Then came the introduction of a compass card, marked at first with only the four cardinal points. As time went on, and the compass became a more trusted instrument, by a natural process of successive bisections, came the intercardinal and, finally, the complete 32 points.

By the time these 32 points had been arrived at, their nomenclature

¹ In the unavoidable absence of Lieutenant Stuart, his paper was read by the Secretary.

was already so complicated as to prevent special names being given to the half and quarter points into which, by the same process of evolution, the points were divided, and the result was a very prettily-marked card, with very clumsy and lengthy names attached to three-fourths of all the markings; names difficult to learn and difficult to retain; clumsy, because in naming such a point as north-east by north $\frac{1}{4}$ north it is necessary to make use of five distinct words and two figures, and mentally to travel to and fro between north and east.

It is a vexed question as to whether this point should not be more properly named north-north-east $\frac{1}{4}$ east. This is an improvement in brevity, but it cannot compare with such a designation as N.25E.

The difficulty of acquiring the naming of the points and quarter points, and the pride of those who had mastered what is considered to be a first and important step to a knowledge of seamanship, and which is dignified with the special appellative of "boxing the compass," will probably be sufficiently fresh in the memory of most seamen. I think navigators will agree with me that in a large ship's company, where turns at the wheel come few and far between, a bare quarter of the seamen (notwithstanding the time and trouble expended on their instruction) could be trusted to name confidently to the nearest quarter of a point the course on which a ship might be heading.

Imagine for a moment that the reading of the clock, barometer, thermometer, and other instruments in daily use could only be acquired with as much application as that of the compass, and consider what obstacles would be thus placed in the way of their comprehension. Surely, scientific accuracy must be founded on a nomenclature simple and accurate!

Let us now look at the finished article, and consider if it meets the requirement of its primary object, namely, to be an instrument by which a ship can be steered with precision in the open sea. Suppose I am crossing the Atlantic in a 20-knot ship: my position is fixed at noon, my proper course lies midway between two adjacent quarters of points. I tell the helmsman to steer on one or other of these quarters. On the following noon, as the result of this error of an eighth of a point in my course, I shall find myself nearly 12 miles from the position I wished to steer for.

Do you consider this 12 miles sufficiently near for practical navigation?

Suppose, to meet the difficulty, that I again split my quarters to points, I find myself using such a mouthful as north-west by west three-quarters west westerly, and the quartermaster has no definite mark on the card to steer by, and the redundancy of expression has effaced any definite conception from his mind.

I ask, Does this compass card meet the requirements of the present day?

Let us now look at the calculation that has to be gone through in order to give the quartermaster the compass course.

I take the magnetic course from the chart, and wish to apply the correction for deviation, but, to the surprise of the uninitiated, it is

customary to use as the unit of error of the compass, not the point or quarter point in which it is graduated, but the degree; so that the magnetic course obtained from the chart must be turned into degrees, and the result turned back into the nearest quarter or eighth of a point. The alternative is to turn variation and deviation into unwieldy fractions to the nearest sixteenth of a point, if the result is not to be as much as an eighth in error.

This calculation takes an appreciable time, error is risked in the translation of degrees and points, probably also, some table for converting degrees into points has to be referred to, as few navigators keep in their heads the exact number of degrees corresponding to each quarter or eighth of a point.

If the answer to my previous question is in the affirmative, and we are told that the system of marking compasses in points is sufficiently accurate for purposes of modern navigation, should we not confine ourselves in all matters concerning the compass to points alone, and should we not use deviation and variation in terms of points or quarter points, and in no other terms; or can there be any good reason brought forward for using the two systems of points and degrees entangled as at present? Having pointed out some of the defects of the system of points, let us now examine the advantages of the system which it is proposed to substitute for it.

In matters connected with the science of navigation, the English notation and system of division of angles and arcs are almost universally accepted. To that system only I shall therefore allude.

Our unit of angular measurement is the right angle. This is divided into 90 equal parts called degrees.

The quadrant or quarter of a circle is likewise divided into 90°. Any possible bearing can, therefore, be expressed in the simplest and most intelligible manner by saying that it is so many degrees east or west of the north or south point of the compass.

We bring our compasses thus into conformity with all the other measurements of daily life and science. We remove all ambiguity. Azimuths, amplitudes, errors of compass, are all worked out, expressed, and adjusted by figures bearing the same meaning.

The necessary calculations in applying the variation and deviation would be shortened and the risk of making errors much diminished. Bearings could be more easily written down or more easily remembered, and so the fixing of a ship's position by bearings would be facilitated.

A child could read such a compass and a child could remember its markings. Our next step is to consider what things would be affected by the change.

These would chiefly be rough bearings, rough alterations of course, rough direction of the wind, sailing directions, charts, signal books, pilots' courses, and the compass card.

The look-out man in sighting an object might still, if he chose, denote its bearing from the bow, beam, or quarter, in points, the unassisted eye being unable to distinguish the difference of bearing to a few degrees. In rough alterations of course, for clearing ships and

newly discovered dangers, the officer of the watch would give the order to starboard or port 10 or 20 degrees, instead of one or two points, &c. The direction of the wind would also be spoken of in degrees.

The other objections to the alteration are not so easily disposed of.

In the matter of charts, the Hydrographer of the Navy has greatly facilitated the carrying out of the change by introducing into the charts a circle of degrees around the compasses, and in the course of time all Admiralty charts will be so issued. Until such time, the tissue paper compass diagrams printed in degrees, as sold by Messrs. Hughes & Son, of Fenchurch Street, might be pasted over the existing compasses on each chart, as it came into use.

In the signal book where points are referred to, the corresponding degree would have to be substituted, and the existing method of giving two flags to each quarter of a point could readily be extended to give two flags to each division of 2° .

The bearings given in charts and sailing directions would have to be altered into degrees, a matter of no light labour and expense.

Pilots would have to relearn all the many courses they are obliged to keep on the tips of their tongues.

The remaining alteration that would have to be made is that compass cards should be plainly marked in degrees in such a manner that the helmsman, in even a feeble light, could readily keep the ship's head on any course to the nearest degree. The compass card of which the diagram is before you, I think, meets this requirement.

I cannot leave the subject without alluding to the possibility of introducing compass cards carrying degrees right round the compass from 0° to 360° . This would have the effect of getting rid of the somewhat intricate rules for applying deviation and variation that are now necessary.

These rules require so much thought in application that navigators will, I think, agree with me that few people not constantly in the habit of converting magnetic and compass courses and bearings will do so correctly and without hesitation on the spur of the moment, and also that their wrong application is not an unfrequent source of error.

This latter proposition would, perhaps, be going too far ahead for the present, but the change under discussion would be a great step towards it.

And now, having had the privilege of reviewing the pros and cons of the case before this Institution, what answer is to be given to the question as to whether the proposed change should be made. Is the change desirable? If it is desirable, is it feasible? Are the difficulties in the way so great as to make it imprudent to tackle them; or is it seen that this great stride towards the simplification of navigation must come some day, that things are ripe for it now, and that England, the greatest of maritime nations, should lead?

The CHAIRMAN: Before calling upon any gentlemen present to offer remarks on the paper, I should like, with your permission, for the Secretary to read a very important short paper addressed to me by the Hydrographer of the Navy, who

is unfortunately prevented from being present this afternoon, containing his remarks on the subject. Also some remarks by the Superintendent of Compasses at the Admiralty, Captain Creak; and, further, by the Captain Superintendent of the "Worcester" training ship, which I think will all be found valuable contributions to the discussion.

Captain W. J. L. WHARTON, R.N., F.R.S. (Hydrographer to the Admiralty):¹ I gather that Lieutenant Stuart wishes to abolish points altogether from the compass card. I have not seen his card, so that I am unable to judge of the advantage in point of clearness over Sir W. Thomson's card, but I am myself very well satisfied that the latter is for all practical purposes as clear, as regards the degrees into which the rim is divided, as can be desired, nor can I see how the omission of the points on an inner ring can make the degrees on the edge any plainer. The abolition of points on the compass card would entail the gradual extinction of the use of points altogether. But are we asked to give up talking of a N.E. wind and call it a N.45°S. wind? Such minuteness is out of place. I think Lieutenant Stuart has forgotten that both points and degrees have their own place in our professional language. Modern improvements, both in size and length of ships and in the efficiency of compasses, have made it possible and desirable to attempt to steer closer than to a quarter point, but many small vessels can in the oceans do nothing of the sort, and it is an attempt to do the impossible if tried in them. The navy is made up of all sorts and sizes of vessels, and we must provide for all, and not only that, but for all circumstances in which a bearing is involved. There are many in which language aiming at greater accuracy than a point is observed. I am introducing degrees into the compasses or charts in order to avoid the mistakes which inexperienced navigators must unavoidably make in translating the bearings they obtain with the azimuth compass into points and quarters before they lay them down on the chart, but I hope that no one will therefore assume that all charts are so accurate as to justify confidence to a degree. There are many charts, founded on old and imperfect surveys, in which bearing lines for clearing danger cannot be assumed to be more exact than to the quarter point. There is also the change of variation to be considered. In many parts of the world this is so rapid that a clearing mark given to degrees would soon be a degree in error. The quarter point to which they are given allows more to veer and haul upon, and more time before the chart and sailing directions must be altered. The difficulty of keeping the charts of the world correct in this particular is probably very little appreciated. Of course it could be obviated by adopting true bearings, but the universal consensus of experienced navigating officers, especially of those versed in fleets, is in favour of retaining magnetic bearings, which, now that compasses are correct to a degree or two, are more convenient than ever. If it could be abandoned without inconvenience to our fleet I should be the first to welcome the change and carry it out, as it would lighten the work of the Hydrographic Office immensely. To conclude, we must have points for many purposes, and so long as we have a compass card which gives us degrees plainly for accurate purposes when applicable, the points not only do no harm, but keep continually before us the connection between points and degrees. There is nothing whatever to prevent anyone who likes using degrees, either for directing or logging a course or bearings observed. So far as Lieutenant Stuart's remarks seem to assume that this is not so, I think he is beating the air.

Captain FRICK W. CREAK, R.N. (Superintendent of Compasses at the Admiralty):² The two principal points of the paper, as I take them to be, are (1) the advisability of adopting a card marked only to degrees; (2) to abolish the use of the existing points now engraved on the compass cards. Unfortunately I have not seen the compass card proposed for adoption by Lieutenant Stuart, so am therefore unable to offer any opinion as to its value. I think, however, that if the two

¹ In the unavoidable absence of Captain Wharton, these remarks were read by the Secretary.

² In the unavoidable absence of Captain Creak, these remarks were read by the Secretary.

Thomson cards which I have sent for inspection are examined, it will be found that the question of the adoption of a compass card efficiently marked to degrees is fully met, and this has been the case for several years past. I have conversed with numerous officers, both of the Royal and mercantile navies, and the general consensus of opinion is that the size and clearness of the degrees on the Thomson 10-in. card are very satisfactory. It is true that I have met some officers who advocated a larger card in order to obtain larger degrees. I think, however, that the desire for large degrees has overshadowed the consequences of making very large cards. In the first place it is important that the quadrantal deviation of the compass, which can at the standard and upper deck steering positions be once for all corrected or totally annulled, should be so corrected always. The larger the cards are made, the larger must be the quadrantal correctors, until the correction becomes almost an impossibility. For even with the present 10-in. Thomson cards there are many places between the decks of our armour-plated ships where large quadrantal deviations must be left uncorrected on account of the great size of the sphere necessary for a complete correction. How much more would this difficulty be increased with very large cards! Long experience has further shown that in the Thomson 10-in. card the best limit of size has been reached, as increase of diameter brings with it mechanical difficulties and insufficient action, which largely outweigh any small advantage gained by the increased size of the degree. I should say that the number of officers who steer their ships by points instead of degrees is very small, and they must have their own reasons for doing so when they have degrees quite ready to hand. From my own experience of some years past I may say that neither quartermasters, nor the ordinary helmsman, nor other seaman noting a compass, ever give one a direction of the ship's head in anything but degrees, and they are fully accustomed to their use. With regard to the second point, the abolition of the existing points, I would propose to utilize the degree as given on all modern compass cards to the fullest extent, but would let the existing points remain for the rougher bearings, such as direction of the wind or the bearings of objects given by the look-out man. The four cardinal points and the four principal intercardinal points are also very useful in compass correction. If I may be permitted to so far criticise this paper, I should say that in some respects it is rather behind its date of appearance. I would ask its author if he can name any 20-knot ship crossing the Atlantic which does not steer to degrees by compass, and how many there are with a compass card larger than 10 in. in diameter? I should further be glad of information as to the construction of very large cards which are as certain in their action as those of about 10 in.

Captain D. W. BARKER (Captain-Superintendent, Thames Nautical Training College):¹ I entirely agree with the tenour of Lieutenant Stuart's paper. The question of steering to quarter points has long been discontinued in the majority of merchant vessels, and in my own experience I have always seen the course set in degrees. I think it would be quite possible to retain the present points, so that any difficulty with giving rough bearings from the look-outs might not be affected. There can be no question that the compass should be marked from 0° to 360° (my own little surveying compass is so marked); all matters concerning the compass error would then be easily dealt with, and many other mistakes which happen in setting courses avoided. I am quite sure that Lieutenant Stuart's paper will considerably help in this very needful reform in the marking of compasses.

Captain MAYES, R.N.: The object of this paper is to advocate the abolition of the point division of the compass card. I must premise my remarks by reading, with the Chairman's permission, a paragraph from "Raper's Navigation" on this subject. He says: "Dividing the circumference of the card, by successive halving, into points, half-points, and quarter-points, was well adapted to the time, not very distant, when many helmsmen were unable to read. The quarter-point was also considered the smallest division a man sometimes under the blinding influences of wind, rain, and spray could well distinguish. Now, however, the cards of steering

¹ In the unavoidable absence of Captain Barker, these remarks were read by the Secretary.

compasses are frequently divided to degrees, in addition and external to the point divisions. In cards of 9 or 10 in. in diameter, the degrees are sufficiently large to be distinguished by men of ordinary sight. The degrees are always marked from north or south, towards the east or west; the courses, therefore, are read from left to right, and *vice versa*, in alternate quadrants. This is apt to cause mistakes in steering. For this reason, and for precision and brevity in speaking, writing, and signalling, there is much to be said in favour of marking the card from zero to 360°, round by the right. Small compasses for shore work are thus marked generally." The lack of education among seamen can no longer be given as a reason for retaining the point division of the compass card, and, from their gunnery instruction, men of the Royal Navy at least are quite familiar with expressing angles by degrees. Thus there are three distinct methods of marking compass cards: the point divisions, the degree divisions reckoning from 0° to 90° in each quadrant, and the degree divisions reckoned from 0° to 360° round the circumference by the right. The point division alone is inadequate for the purposes of navigation, and we are now working with the point division combined with the degree division in each quadrant. There is some danger in working on these two systems, as was shown in the inquiry into the sad loss of the "Rounania" on the coast of Portugal. Lieutenant Rooke, of the Bombay Cavalry, was one of the two Europeans saved from that wreck. He went into the wheel house the day before the ship was lost and saw chalked up "S.2W." He asked the quartermaster what it meant, and the reply was, "south two points west." Lieutenant Rooke was cool enough to notice after the ship had struck and the sea was breaking over her that "S.2W." was still chalked up. Therefore, it is certain that "S.2W.," whatever it meant, was the course steered. If any sailor had gone into the wheel house and seen "S.2W." marked up, he would not have asked any question, but would at once have assumed that the ship was steering south two degrees west, as no sailor would think of writing south two points west other than S.S.W. It is probable that the answer given by the quartermaster was one that he thought quite near enough for a passenger. At any rate, working on the point system and the degree system vitiated the only evidence forthcoming as to the course the ship was steering, and which led to the loss of so many lives. If we admit the necessity of working on one system, are the cards to be divided into quadrants or to be marked from 0° to 360°? Much as I like the simplicity of the latter, I don't think we ought to lose touch with the cardinal points in the mariner's compass. Therefore my opinion is in favour of the abolition of all points on the compass card, except the cardinal points marking the degrees from N. and S. to 90° E. and W. The 10° division is sufficient for all what may be called colloquial purposes. If the course given at the standard compass is an exact degree or an exact quarter-point, it will nearly always be a fraction of some kind at the steering compass, they will rarely agree, and the helmsman may have to split the degree, even as he frequently has to split the quarter-point. I have never found helmsmen make any difficulty about it, nor can I conceive the quarter-point division being such a hindrance to exact navigation as in the supposed case given in the paper. But I am not aware of any law in the Royal Navy forbidding to give the course in degrees, and it is commonly so given in the mercantile navy. The author of the paper speaks of dividing the compasses on charts into degrees. I am of opinion that there is no simpler way of working on a chart than with a protractor scale showing the angle between any line of direction and the meridian, and that compasses on charts, and the parallel rulers commonly used therewith, may be dispensed with. With respect to the diagram of the compass card before us, I think the black triangular patches, introduced, I presume, to maintain a resemblance to the point divisions, quite unnecessary. The usual degree divisions at the circumference, with such modifications as may be desirable on the smaller cards, are all that is required. The card may then be lightened by removing the central part, and thus approximated to the ideal card, that is, one having the least possible weight with the greatest possible magnetic power.

Colonel BAYLIS, Q.C.: It seems a pity that this interesting subject should flag for want of discussion. You will therefore excuse me for making a few remarks. I observe that the proposal is to do away with the intermediate points of the

compass and preserve only the cardinal points. I see that the proposed compass card before me is marked N., S., E., W., without the other intermediate points. In the inner circle the degrees are enumerated, as well as on the outer circle. I think, as far as my present observation of it has extended, this is the essential difference between the present and the proposed cards. I have heard the remarks which have just been read, and it occurs to me in this, as in other matters, that if a thing has done very well, let it alone: if it is bad, change it. Nothing leads to confusion so much as unnecessary changes for supposed improvements. Underwriters at Lloyd's prefer to continue the old form of policies long in use, because the language is well known and understood. So with sailors it is better to adhere to terms in common use and with which they are familiar, such as "points of the compass," than "degrees," and follow the maxim, "*Stare super antiquas vias*," than change for the sake of change. I remember that a thesis was set when I was at Oxford, *Μεταβολή ἀριστον ἀπαντῶν*, "Change is the best of all things," which, it was said, meant "a change for the worse is better than no change at all." I quite agree that there is a danger, as was expressed in one of the papers read to-day, in working the two systems, viz., points and degrees. I venture, having had some experience in nautical matters as a Judge of an Admiralty Court in Liverpool, to make these few observations.

Mr. PENNY (Trinity Pilot): When I accepted the invitation to attend this meeting, I was told that I should learn something about compasses. I had not the privilege of reading this paper until I came into the room. I have noticed the two compass cards in front of me, and I also notice two gentlemen present at this meeting. I had the opportunity of sitting under one of them some years ago, and he taught me a very great deal about the compass, and I think he would advise Lieutenant Stuart not to change old things into new. I am afraid when Lieutenant Stuart wrote his paper he wrote it for the benefit of the navy alone, and could not have had the mercantile marine in view. Many of these papers—it matters not whether the subject is ships or compasses—are written with a view of improving the system and style in the navy. I have the honour of being a Trinity House pilot for the Port of London, and am frequently called upon to pilot some of the largest steamers afloat. It has also been my privilege to work with sailing vessels; but it is very seldom you go on board the large steamers of the present day without finding that grand compass card of Sir William Thomson's; it is one of the finest cards I have ever been afloat with. That card, as Captain Wharton said in his paper, is marked with degrees. There are also other compass cards of equal value marked with degrees, and it is a very rare thing that you go on board any large ship but what you find the course is steered to degrees. In my position as a pilot, I often want bearings. I say, "Give me the bearings of so and so." "Right, Sir." "What is it?" "So many degrees." I say, "Hang degrees! I want it in points." For why? I have been educated to it. I cannot for the moment convert degrees into points, but if they give me the bearing asked for in points, I know exactly what I am doing; but I have found it necessary to have a card printed in degrees for every quarter-point of the compass, both magnetic and true, on a 17° line of variation, with a space for marking the course to be steered. I have found this of great assistance in ships on which the courses are set to degrees. I can assure you I do not stand alone in this, and I say, without fear of contradiction as far as the pilot is concerned, if you alter the compass card from points into marks and degrees, you will make a very great error, and you will not only make a mistake by so doing, but it may be the means of causing many shipwrecks. I do not hesitate to say so. When you come to sailing ships, tell me what sailing ship steers by degrees? Is there one ship in fifty that steers by degrees? Could they steer by degrees? Captain Mayes will bear me out when I say there is not one sailing ship that sails the water that could be steered to a degree. Then why put a card before a seaman that he will not be able to use? Now I come back to the old style of taking 4-point bearings, which you will be unable to do if you take away the points. Many of our old coasters have a compass card painted on their companion hatch or skylight, in order that they may take bearings, their steering compass being in such an out-of-the-way place. You must cater for the sailing ship as well as for the 20-knot steamer; if

you do not, things will go badly, and the compass card, instead of being useful to all, will cause confusion and disaster that may be beyond recall. You may introduce a new card marked with marks and degrees which may be used by the 20-knot steamers, but you will never be able to do away with the good old-fashioned card with its 32 points, so much used by all classes of vessels. If you alter the compass card, as Captain Wharton says in his paper, you will have to alter a very great deal in the Sailing Directions. In every sailing direction I know of, the bearings are given in points, and every examination that a pilot undergoes is given in points and quarter-points. I would just like to let Lieutenant Stuart try to pass a pilot's examination in degrees: I can assure you it is bad enough in points. Captain Mayes spoke about the protractor as a very useful way of working. I assure you there are thousands of captains going to sea that work our coasting boats that could not go and set off a true course by a protractor, as they are only used to magnetic charts. Then why give them a thing that they know nothing about? I speak practically, and I say, Let us keep what we have got: let us keep the compass with the 32 points, and the half-points and the quarter-points in between them. Those who like to steer by degrees can do it, and those who have been brought up to steer by points, half-, and quarter-points, let them have the privilege of doing so: in other words, let well alone. I am not in the habit of speaking publicly, but I was unable to sit and listen to the paper as read without offering my protest against the proposed alteration, and by doing so I trust I have only been doing my duty to my brother seamen.

Mr. ARSTON (Master Mariner): I should like to say a few words on this subject. First, as regards steamships, in these days of great competition, when to make passages it is necessary to cut as many corners as possible, to do so with safety, the exact distance you are off the various headlands must be known before (*via* the 26½° and other methods) as well as when they are abeam. To find your position accurately, a compass card plainly marked with degrees is indispensable for taking correct bearings; also to make a direct course between two distant places you must steer by degrees. Second, regarding sailing ships, as they do not hug the land unless compelled to do so, and cannot steer by degrees, the ordinary compass card divided to quarter-points will, in nearly every case, be found sufficient.

The CHAIRMAN: I am sorry the temperature outside and the reaction after yesterday's festivities seem to have prevented a larger attendance. It now devolves upon me to sum up the criticisms generally. Notwithstanding the thinness of the attendance, I think we have had more pungent criticism than customary, thanks to the kindness of officers who have sent us their thoughts on paper when they were not able to be present. I venture to submit that if the Service were called upon generally to give an opinion it would say, "Let us have the old points which we know from our childhood, and let us have the circle marked in degrees so that we can use it if we want it." It appears to me that Mr. Stuart has started with an excellent idea, but then he seems determined to make everything else subservient to this idea. I should like to point out (this is merely in parenthesis) to those who have had the printed paper, that the passage in which the lecturer proposes to call the division of 10° a "mark" has been erased by him, and was, therefore, not read by the Secretary.¹ That removes the chief objection to the proposals; in fact, the moment that is done away with, the arrangement of numbers on the inner circle appears to me to fall to the ground, and we simply come back to this king of compasses, in my humble opinion, Sir William Thomson's, where the diameter is sufficiently large to enable the degrees to be used for all practical purposes on board ship, as well as giving the old points singularly clearly, making it in every way superior to the Admiralty card. It has been pointed out by the Hydrographer that Mr. Stuart speaks as if people were prevented by some law from using degrees and steering by degrees. That is exactly what struck me when I read the paper. As captain of a ship, I have made it a point in my night orders to leave the course for the officer of the watch always in degrees and not according to the compass

¹ I was obliged to mention this, as the *written* criticisms we had just listened to were based on the paper as it stood before this passage was expunged.—L. B.

points, unless it happened to be one of the cardinal points. We were in the habit of steering by Sir William Thomson's compass, and the navigating officer and myself found it saved us a good deal of trouble. On the other hand, Lieutenant Stuart tells us the custom is to express the variation and deviation in degrees and the courses in points. I am not aware of any law which compels you to do either one thing or another. Surely you can please yourself in the matter. It is quite evident when we come to what have been called the colloquial uses of the compass points that this degree system breaks down altogether. It is ridiculous to talk of an N. 45° E. wind. It is simpler to give the rough bearing of an object as "two points before the beam" than to say "20°." In fact, it is perfectly easy to combine the existing system with the innovations which it is proposed to introduce. I should like to ask Captain Mayes a question as to a point in the paper which he read: Was the "Roumania's" course S. 2° W. or S. S. W.?

Captain MAYES: Nobody knew.

The CHAIRMAN: Were not you able to clear up the point by working out the reckoning afterwards?

Captain MAYES: She was ashore. It looked as though it might have been either. S. S. W. was the safe course, and she went ashore; the other one was the unsafe one. That is rather assuming she steered the unsafe course, but there is no evidence.

The CHAIRMAN: I should like to express to Mr. Penny our satisfaction at his having attended here and having given us his most practical speech. It is very valuable to us to get men of his stamp, who are closely connected with the merchant service, to give us their views. I do not think, however, he is quite fair; I do think we try to keep in view the requirements of the sea service generally. I do not think we draw the line between what is good for one service more than the other. But it is immensely important to have the opinion of a seaman like Mr. Penny on a paper of this sort before one gives any opinion at all, because it is clear that this is not a Royal Naval business or a mercantile naval business; it is one which affects all seamen. As Captain Mayes, I think, has pointed out, there are not many ships that cross the Atlantic at 20 knots, and they are most distinctly in the minority. As regards the signal books: I should be glad if we could devise some means of giving a course by degrees; at present we cannot, we are reduced to quarter-points still for practical purposes if we are sailing in a fleet and the Admiral gives the course: for one thing you do not steam very fast, and for another you have a great many people to check the reckoning, so you are not likely to make many mistakes. I should like to ask Mr. Penny a question as to compass cards. He has had varied experience, doubtless, of the merchant service: has he ever come across a card in the merchant steamer or sailing ship not marked in degrees?

Mr. PENNY: No.

The CHAIRMAN: Is the Admiralty card much in use in the merchant service?

Mr. PENNY: I do not know what the Admiralty compass card is.

The CHAIRMAN: This diagram shows practically what it is.

Mr. PENNY: Yes, they use that style of card, unless it is on board an old foreigner; you then get a cheap card without degrees.

The CHAIRMAN: It struck me, if you look at the old mariner's compass, perhaps one of the oldest institutions in the world, the subdivisions are even numbers. If you look at the proposed card, you will find that there are nine of these groups or subdivisions. That is an awkward number. Reference has been made to the "4-point bearing," which is much used in navigation; you would have to call it the "45-degree bearing" or "4½-mark bearing"; and there are many other little things which have occurred to me in the practical work afloat in which it is distinctly convenient to have even numbers. To sum up shortly: the verdict of this meeting appears to be against the proposal as it stands. But the point to be remembered is that there is no compulsion about the thing, one way or another. I have done it myself, and the steering by degrees is, I should say, now the rule and not the exception in the Naval Service. It only remains for me now to give our best thanks to the lecturer and to express our regret that he is not present to reply, as it would, no doubt, have given additional zest to this extremely interesting and instructive discussion. No doubt it will cause a good deal of discussion in the Service generally when the paper is printed and circulated.