FIFTH REPORT

ON

THE MARINE DEPARTMENT,

FOR YEAR 1869.

PRESENTED TO BOTH HOUSES OF THE GENERAL ASSEMBLY, BY COMMAND OF HIS EXCELLENCY.

WELLINGTON.

1869.

FIFTH REPORT

OF

THE MARINE DEPARTMENT, FOR THE YEAR 1869.

SIR,— General Post Office, Wellington, 21st June, 1869.

I have the honor to lay before your Excellency the Annual Report of the Colonial Marine Engineer for the year 1868-9, on the conduct of the business of his Department, including the administration of the Marine and Steam Navigation Acts.

A considerable amount of extra labour has been thrown upon the Marine Department during the past year by the preparation of the plans and designs for the lighthouses at Cape Campbell, the Nuggets, and Cape Farewell. These works are now in progress, and your Excellency will be glad to learn that Mr. Balfour anticipates that these important aids to the navigation of the New Zealand coast will be completed by the beginning of the year 1870.

The issue of an uniform set of Harbour and Quarantine Regulations for the whole Colony, and the introduction of one general code of danger signals for the whole of the New Zealand Coast, in lieu of the great variety of regulations and signals which were previously in use in different ports of the Colony, has been found a very great convenience to masters of vessels frequenting New Zealand ports.

The Report of the Marine Surveyor, which is appended to that of Mr. Balfour, shows at once the necessity for the resurvey of a considerable portion of the coast line, and also that an important part of this resurvey has been accomplished by Mr. Woods in a satisfactory manner. The funds provided by Parliament for this work are now exhausted, and its further progress must therefore depend upon the willingness of the Legislature to make further provision for the necessary outlay.

I have much pleasure in acknowledging the satisfactory manner in which the duties of Mr. Balfour's department have been conducted by him during the past year.

I have, &c.,
E. W. STAFFORD,
Postmaster-General.

To His Excellency Sir G. F. Bowen, K.M.G.,
Governor of New Zealand.

SIR,— Marine Department,
Wellington, 18th June, 1869.

I have the honor to forward herewith a Report on the working of the Marine Department for the year 1868-9.

I have, &c.,
JAMES M. BALFOUR, M.I.C.E.,
Colonial Marine Engineer.

The Hon. the Postmaster-General,
Wellington.

REPORT.

1. During the past year no change has been made in the organization of the Marine Department, and I am glad to be able to report that the present staff still continues to overtake the duties intrusted to it in a satisfactory manner; at the same time, it is only due to the officers under me to state that their time is, as a rule, most fully occupied, and that they are often required to work beyond the usual hours—and this is always most cheerfully done when any necessity for it arises. There being no draftsman attached to the Department, and my other duties leaving but little time for drawing, I have however required to employ a temporary draftsman on several occasions to make drawings to scale from my sketches and dimensions, as well as to make tracings of working drawings.

2. As the duties of the Department are all more or less directly connected with shipping, it would be convenient if the office were near the wharf, and I have consequently prepared a sketch plan, showing how suitable accommodation could be provided by building over the yard in which the telegraph material is stored. If some such design be carried out, the office will be in close proximity to the shipping, and it would include under the same roof a store for lighthouse supplies and similar goods; so that much time, now unavoidably lost in going to and fro between the office and the wharf for the purpose of surveying steamers and of superintending the landing and shipping of the oil, &c., for the lighthouses, would be economized.

3. "The Steam Navigation Act, 1866," as amended in 1867, continues to work satisfactorily, and in the meantime it seems unnecessary to suggest any further alterations in its provisions. Perhaps one of the most important clauses of the Act is that which stipulates that "in the case of sea-going vessels the declaration of the Inspector shall contain a statement that he is satisfied the compasses have been properly examined and adjusted by some person holding a license from the Postmaster-General to examine and adjust such compasses" ("The Steam Navigation Act Amendment Act, 1867," section 3); and I have consequently devoted much time during the past year to the collection of information on the subject of compass adjustment, and to the preparation of a code of "Instructions to Licensed Adjusters of Ships' Compasses," a copy of which I append (Appendix B). In framing these Instructions, which do not touch on the theory of compass errors, but explain as simply as possible the practical methods usually adopted for ascertaining and tabulating them, I have consulted the Admiralty Compass Manual, the writings of Staff-Captain Evans (Superintendent of the

Admiralty Compass Department), and other works, and have also enjoyed the great advantage of discussing the whole question very fully with several of the officers of Her Majesty's ships when in port, and I am in hopes that they will be found accurate and at the same time simple and intelligible. Loose copies of the Deviation "Diagram," in the form which I have adopted on account of its simplicity (a copy of which is appended to the Instructions), will be issued to all licensed Adjusters, and they will be required to forward to the Marine Office a filled up diagram for every compass they correct. These will afford me a ready means of ascertaining, almost at a glance, whether the work has been properly done, and, when collected and filed, will form a most valuable and reliable record of the magnetic condition of all the steamers in the Colony.

4. "The Marine Act, 1867," also continues to work well on the whole; and though a few minor improvements might certainly be suggested, it will probably be better to give the Act as it stands a more extended trial—especially as it will in all probability be considered necessary ere long to consolidate all the laws which refer to shipping, and to frame a Mercantile Marine Act, as suggested in my Report for 1867.

5. "The Inquiry into Wrecks Act, 1863," which was simply an adaptation of the provisions of the Imperial "Merchant Shipping Act, 1854," which referred to the same subject, having become incomplete, in so far as it did not include the provisions of more recent Imperial enactments in regard to such investigations, an amended "Inquiry into Wrecks Act" has been drafted, in accordance with the present state of the English law. When this amended Act has become law, the decisions of Courts of Inquiry into the causes of wrecks will be much less liable than they at present are to be informal, and consequently void. As many of these inquiries as now conducted are very incomplete, the evidence taken being insufficient to enable any one to arrive at a satisfactory conclusion as to the true cause of the accident, it has been considered advisable to prepare a set of Instructions for the guidance of officers conducting inquiries into wrecks. These Instructions, which are now under consideration in draft, will lay down general rules for the guidance of Officers of Customs, and explain, so far as practicable, the nature of the important duties devolving on the Nautical Assessor; they are based on the provisions of the Act, and in framing them the clauses of "The Queen's Regulations and the Admiralty Instructions for the Government of Her Majesty's Naval Service," which refer to similar investigations, have been closely followed.

6. The "Harbour and Quarantine Regulations for the Ports of New Zealand," which have been in force since the first of last September, are, I understand, giving satisfaction—especially to shipmasters, as they now, after visiting any one port in this Colony, know what rules they have to conform to at any port they may subsequently visit. The "General Signals," introduced by the Regulations, having necessitated an alteration on long-established local signals at several ports, were naturally at first received with some dissatisfaction; but now that their novelty has to a great extent worn off they are better appreciated, and the convenience of having but one simple code of danger signals for the whole Colony is every day becoming more obvious, and will, I think, be acknowledged to more than counterbalance the temporary annoyance caused by necessary changes on old and well-known systems of conveying information to people on shore.

7. The Lighthouse buildings throughout the Colony have continued in good order throughout the year, and the amount expended on repairs has been almost nominal. The only station where repairs have been required is Godley Head (which would seem to suffer more during gales than any other lighthouse), where a small outhouse has been twice unroofed—the repairs costing in all £10. The work is now, I believe, of a very substantial character (though I have not yet had an opportunity of examining it personally), and there seems little reason to fear that such an accident wil again occur. The dwelling-houses at Pencarrow are now much decayed; they may last one or two years longer with trifling repairs, but the time is fast approaching when it will be more truly economical to build new and more substantial houses rather than to attempt to patch up the old ones at a constantly increasing annual cost.

8. There have been no changes in the staff of Lightkeepers during the year, a fact which in itself shows that the service has been conducted in a satisfactory manner. At one station the keepers have not been on the best of terms with each other, and at another one of the keepers has had some disagreement with the officers of another branch of the public service; but I am in hopes that in each of these cases experience will convince all parties that mutual forbearance and a conciliatory disposition is the best policy, and that there will be more harmony in future, as in both instances the men are excellent lightkeepers. I am not aware that any of the lights have been extinguished during the year; and only one complaint, which could not however be sustained, has been made of the non-efficiency of any of them.

9. After considerable though unavoidable delay, tenders were advertised for for the erection of new Lighthouses on Farewell Spit, Cape Campbell, and Nugget Point, and of a Beacon on the Flat Rock, off Kawau. A satisfactory number of tenders were received, which were opened on the 9th of March last, and after due consideration the lowest tenders were accepted, as follows:—

	£	s.	d.
Farewell Spit—Samuel Brown, Wellington	2,496	0	0
Cape Campbell—H. Carter and Co., Wellington	1,960	0	0
Nugget Point—W. P. Pearce, Dunedin	2,577	5	10
Flat Rock Beacon—E. W. Mills, Wellington	390	0	0

All the tenderers for the lighthouse works have made considerable cash deposits, and have (with sureties) executed bonds for the due completion of their several contracts, which they are so far carrying on in an energetic and satisfactory manner; so that there seems good reason to expect that the work will be well done, and completed in good time. The apparatus and lantern for Nugget Point are in store at Dunedin; the lanterns for the other stations have arrived in Wellington, and I expect by next mail to be informed of the shipment of the optical apparatus. All the lights should be ready for permanent exhibition, and the Flat Rock beacon erected, early in 1870; and a preliminary Notice

to Mariners to that effect has been published and circulated through all parts of the world from which there is any trade to this Colony.

10. A small lantern and apparatus, intended to be erected on one of the beacons on the South Head at Manukau, has recently arrived, and has been placed in store in Wellington until arrangements can be made for its erection. When this light was first ordered, I thought (on insufficient information) that arrangements could be made for the signalman to take charge of it, assisted by one of the pilot boat's crew; but I have since learned that there is no accommodation for the boat's crew on the South Head, and that days often pass without their landing there at all. Under these circumstances, it would not be safe to intrust the light to the solitary signalman, as he could not possibly attend to it and also perform his day duty properly, and I should recommend, as upon the whole the best practicable arrangement, that the signalman's house should be enlarged, and an assistant appointed; if this were done, they could divide both the day and the night work between them, and thus ensure the more satisfactory and safe working of both services, to the manifest advantage of the harbour, as nearly all danger of a serious accident, such as might any day occur if the one signalman were suddenly taken ill, would then be removed.

11. When H.M.S. "Blanche" visited the Auckland Islands in March last, I was, at the request of the Government and by the courtesy of Commodore Lambert, granted a passage in her—the object being to examine the Snares, with a view to the possible erection of a lighthouse there. Unfortunately, the weather was so unfavourable that we did not even sight the group either in going or returning; and the only practical results of the trip, as regards the Lighthouse question, have been to render it more clear that, if a lighthouse is to be erected at all to the southward of Stewart Island, one of the Snares would be the best site, provided it be moderately easy (as all the information I possess would lead me to believe) to effect a landing on it; and that Enderby's Island (the most northerly of the Auckland group) would not be a good site for a lighthouse, as there are outlying dangers which would prevent any shipmaster from running for it with the confidence which such a light should always inspire.

12. The small beacon on Richmond Rock, Pelorus Sound, having been carried away some time in September last, another was prepared, and I took advantage of a recent favourable opportunity to erect it. It is well secured, and will, I have no doubt, last many years, unless knocked over by some small craft at high water—an accident which might easily occur in a dark night; indeed an examination of its remains proves beyond doubt that such was the fate of the original beacon. On the same trip, the beacon and buoy at French Pass were overhauled and painted; and I also examined Hapuka Reef, at the entrance to Astrolabe Roads—an awkward danger, which is barely awash at low-water neap tides, instead of at high-water spring tides as stated on the chart, and on which I have since been authorized to erect a small beacon (similar to that at French Pass) for the benefit of the coasting craft, by which Astrolabe Roads are frequented as a refuge harbour. The drawings for this beacon have been prepared. When the French Pass buoy-moorings were lifted, the chain was found to be so very much wasted as to make me hesitate to use it again; it was carefully cleaned and coated with coal tar by the Harbourmaster at Nelson, and I shifted it end for end in relaying it, and in this way I think it will be safe for another year. Next season, however, it will be absolutely necessary to provide new moorings. I should recommend that several sets of moorings be procured from the makers to the English Trinity House; and at the same time it would be well to order a number of iron buoys, *in segments*, so that they would cost comparatively little for freight. These segments would be sent out ready fitted and marked, and with all the rivet-holes punched, so that they could be easily put together at any time as required. If this suggestion be acted upon, the operation of overhauling and repairing existing buoys will be greatly facilitated, as a spare buoy and mooring would be laid down at once and the old ones carried into port and examined at leisure; and as there will always be a reserve in store, any newly discovered danger could be buoyed off without any loss of time.

13. I have had under consideration the possibility of erecting a beacon of some description on Cook's Rock—the greatest danger in the Strait; and have great hopes that some modification of the elegant and satisfactory design of the Provincial Engineer of Nelson for the French Pass Beacon (which is simply laid on the rock and moored in a most ingenious manner) might be made to answer. I shall prepare drawings, and take the first opportunity of examining the rock minutely,—should there seem a reasonable prospect of success, I should be glad to be permitted to attempt this difficult but most useful work.

14. I am glad to be able to report that the Wreck Record for the current year shows a much smaller number of casualties than that of last year. Up to the end of June, only thirty-three wrecks have been recorded, as against a total of fifty-five reported casualties in the year 1867-8. The above total of thirty-three includes, moreover, the "Thane of Fife," a schooner of 121 tons, which was wrecked at Fiji; the "Bittern," cutter, of 40 tons, wrecked in New Caledonia; and the "Florence," ketch, of 51 tons, stranded by the Hauhaus at the time they escaped from the Chatham Islands: thus, in effect, the number of casualties on the New Zealand Coasts is only thirty. Of the total recorded number of thirty-three, four casualties occurred in July, three in August, five in September, eight in October, one in November, two in December, five in February, one in March, three in May, and one in June; no accidents having been reported during the months of January or April. The gross tonnage injured during the year is 4,254; but eight vessels, of an aggregate of 518 tons, are known to have been recovered with comparatively slight damage; and deducting these, and also the "Thane of Fife," the "Bittern," and the "Florence," there remains a total of 3,524 tons register of shipping which have been totally destroyed during the year, whereas 5,514 tons of shipping were totally destroyed in 1867-8. The Wreck Record, unlike that of last year, does not prove the occurrence of any very remarkable gale; but when it is compared with the returns for former years, it would seem to point to the conclusion that westerly gales may be looked for in September, October, and November, and that easterly and south-easterly gales may be expected in February.

15. The number of lives lost, according to the Casualty Returns, is twenty-eight; of these, twenty perished in the "St. Vincent," when she went on shore in Palliser Bay.

16. I have the honor to forward herewith the Chief Marine Surveyor's Report. During the past year, the operations on the west coast of the Middle Island were confined to the determination of the true positions of a number of important headlands, and the connection of these with each other and with the Trigonometrical Stations established by the Westland Survey Staff, by angular observations. No actual traverse of the coast line was required or attempted, as the County surveys furnished all necessary information. Thus, the marine surveys and the district surveys have been carried forward together, to the manifest advantage of both; inasmuch as the marine surveys have on the one hand been advanced very much more rapidly than would otherwise have been possible, and the land surveys, on the other hand, are satisfactorily checked, and their accuracy is established by their coincidence with the points fixed by independent observations.

The disjunct survey of Otago Bar, and the examination of certain dangers in the Bay of Plenty and the vicinity of Auckland, which were undertaken at the instance of Commodore Lambert, form no unimportant part of the year's work; as they prove that not only do the bar harbours (even on the East Coast) require occasional resurvey, but also that the more permanent portions of the coast line are in many places inaccurately represented, in regard to details at least, and that many important dangers have entirely escaped the notice of the original surveyors. Indeed, proof is accumulating from all quarters, day by day, that the present Admiralty charts of New Zealand are far from being minutely accurate; and it is gradually becoming more clear that not one district only or two require examination, but that all the charts of the Colony ought to be checked and corrected. The favourable report of Commodore Lambert as to the quality of the Marine Surveyors' work can only be looked upon as highly satisfactory, and I am glad to bear witness to their energy and zeal.

The attempt to carry on the shore work of the survey without the aid of a steamer has been successful as regards economy up to a certain point, though it has exposed the surveyors to many hardships and dangers; but it must be obvious that only a portion of the work could possibly be done in that manner. As the cost of maintenance of a steam vessel is however a very heavy item, it is proposed to make use of a sailing craft in future if the surveys are to be continued. I have carefully calculated the saving which would result from the substitution of a schooner of from fifty to seventy tons for a steamer, and find that it cannot be less than £2,000 per annum. To carry on the surveys with the "St. Kilda," an expenditure of £5,500 to £6,000 per annum would have to be provided for; while if a sailing craft were procured, nearly the same amount of work would be done at an annual cost of £3,500 to £4,000 at most.

17. The accompanying Appendices C. to S. show the annual expenditure of the Department; the cost of the marine surveys; the cost of maintenance of existing lighthouses; the amounts already expended, the liabilities incurred, and the further estimated sum required to complete each of the new lighthouses; the amount of light dues, survey and other fees collected during the year; the pilotage collected at each port in the Colony; a return of the steamers surveyed during the year; an abstract of the Wreck Returns, &c.

The Returns are all brought up to the latest practicable date; and the tables of receipts and expenditure are completed, by estimate where necessary, to the close of the financial year.

JAMES M. BALFOUR,
Colonial Marine Engineer.

Appendix A.

REPORT by Mr. GEORGE AUSTIN WOODS.

SIR,— Marine Office, Wellington, June, 1869.

I have the honor to forward for your information the following Report on the progress of the Marine Survey during the present financial year.

The necessity for the strictest economy being observed in the service placed under my charge, caused me, in the latter paragraph of my last annual Report, to suggest the propriety of carrying on the geographical work for determining the true position of the principal headlands on the coast with a boat's crew only, instead of the steam sloop "St. Kilda;" and the Government having signified their approval, I proceeded at the latter end of July on this service.

Our first point of landing was in the neighbourhood of Point Arnott, on the West Coast of the Middle Island; and having carefully determined the latitude of this station, and obtained the true bearing to Jackson's Head, a position that we had previously fixed astronomically, we derived from these data our first base line, and erected a trigonometrical station for the major triangulation. We afterwards proceeded northwards to the point fixed upon for the end of the second base, and thus worked up the coast towards Cape Farewell, closing our out-door work at the end of December at Cape Foulwind.

At each station our observatory has been erected, and careful transit observations taken for determining the differences of meridian with Greenwich,—the transit blocks being left in the ground, and large trigonometrical stations erected over them, for the purpose of carrying out the major triangulation.

The survey boat's crew were discharged immediately after the close of the out-door operations, and the office work, viz., calculation and plotting, was proceeded with at the commencement of the year, and continued until the examination by Commodore Rowley Lambert, C.B., and the officers under his command, into the general system practised in carrying out the work, and its accuracy. This examination having satisfied the Commodore of the correctness of the system on which the surveys were conducted, and of the accuracy of the calculated results, a notification of the important errors which have been proved to exist on the Admiralty charts has, at his request, been published for general information.

Immediately after the approval of the work in progress, we proceeded, under instructions from the Government, to make a careful but partial survey of the entrance to Otago Harbour, returning

from that service on the 3rd April. Our office work was resumed until the 6th ultimo, when, on the request of the Commodore, I was directed by the Government to join H.M.S. "Blanche," for the purpose of examining certain parts of the coast in the Province of Auckland, and to have certain portions pointed out which the Commodore considered dangerously inaccurate and necessary to be resurveyed. This service has been performed with the assistance of Her Majesty's ships and boats; and I have the honor to report that the inaccuracies referred to are of serious importance, and that a resurvey of portions of the Hauraki Gulf, of D'Haussez's Group, and of the islands and shoals in the Bay of Plenty, is much required.

Having thus reported the outline of our duties during the year, I would draw your attention to the exact position of the work in progress on the West Coast, independent of the disjunct surveys, &c., on other portions of the coast line of the Colony: in the first place remarking upon the cordial co-operation and valuable assistance that we have received from Malcolm Fraser, Esq., the Chief Surveyor of the County of Westland, and the officers of his department, whose zeal and energy in carrying out the trigonometrical survey, for the purpose of checking our astronomical and coast line work, have assisted very materially in reducing our expenditure, and greatly facilitated our operations, enabling us to complete a far larger amount of work than we could reasonably have expected to overtake; and I would also report, that when we were associated in the work at Hokitika, notwithstanding these officers had their own duties during the day, they were always ready and did assist at all hours of the night in taking time when we were engaged upon lunar and stellar observations.

The geographical work on the West Coast, with the exception of an intermediate station at Perpendicular Point, is now completed from Jackson's Head to Cape Foulwind, a distance of 180 nautical miles; five true bases have also been obtained while the work was in progress, extending over a distance of 130 nautical miles; and I have to report that although the observations of moon culminating stars have been few, on account of the heavy gales and the bad weather experienced, yet the means of the longitudes obtained from them agree in all cases within a few seconds of arc with the longitudes obtained from the difference of latitude and true bearing: thus the two methods have checked each other in a very satisfactory manner.

The results, as I have stated previously, show considerable errors in the Admiralty charts: and in accordance with your instructions a reduced plan of the coast line, as shown by them and as recently surveyed, is herewith appended, in order that the Government may see at a glance the errors to which I allude.

The sea traverse for soundings was completed last year from Cascade Point to Otorokua Point, and we are now prepared to proceed with the same to the Grey River, should the Government so desire, before proceeding further with the geographical work. I would respectfully urge upon the consideration of the Government the propriety of my being allowed a small schooner in lieu of the "St. Kilda," on account of the great expense in working the latter vessel for surveying purposes: in illustration of which I would refer the Government to the printed Return of Expenditure for the Marine Survey, published in the Report of the Marine Department for the years 1867-8, from which it will be observed that her maintenance and coal consumption amounted together to £3,147, out of a total expenditure of £4,347.

I herewith append the usual return of survey.

I have, &c.,
G. A. Woods,
Colonial Marine Surveyor.

James M. Balfour, C.E., Colonial Marine Engineer,
Wellington.

Return of Survey, Coast of New Zealand, year ending 30th June, 1869.
Surveyor—George Austin Woods.
Assistant Surveyor—Charles G. Knight.

1. Nature and extent of coast line surveyed, whether open-sea coasts, friths, rivers, or harbours,	180 miles of coast line on ½-inch scale.
2. Was the triangulation executed by the surveyors?	Yes.
3. Has a series of tidal observations been made?	Yes, when engaged on disjunct surveys.
4. Number of officers employed in the survey.	Two.
5. State nature and amount of work by each officer engaged?	Equal share in work generally.
6. Date of beginning and ending of out-door work.	Commenced 26th July; ended 31st December.
7. Number of days prevented working abroad by rain, wind, and other unforeseen circumstances.	Fifty.
8. Nature of vessel and number of crew.	Six-oared whaleboat; six men, one boy.
9. Opinion as to the scale on which the surveys should be published, having reference to the general wants of navigation.	Ports, &c., 3 inches to the mile; coasts, ½ inch to the mile.
10. When will fair copy of work be lodged with the Government?	Fair copy of disjunct surveys already forwarded to the Hydrographer for the Admiralty; coast general survey in course of progress.
11. Are the sailing directions in course of preparation, and when will they be ready?	Yes; on completion of survey.

Appendix B.

Marine Department, New Zealand, 1869.

Instructions to the Licensed Adjusters of the Compasses of Steam Vessels.

1. By "The Steam Navigation Act, 1866," it is provided that "in the case of sea-going vessels

"the declaration of the Inspector shall contain a statement that he is satisfied the compasses have "been properly examined and adjusted by some person holding a license from the Postmaster-"General to examine and adjust such compasses." The power of issuing licenses having (with other powers) been delegated to the Colonial Marine Engineer, the following Instructions have been framed for the guidance of Licensed Compass Adjusters, and for the information of those who desire to become licensees.

2. The "adjustment" of compasses, as at present practised in New Zealand, generally consists merely in "swinging" vessels in a careful manner, in order to ascertain and tabulate the errors of their compasses, so that the navigator may allow for them when shaping courses. It is not usual to attempt to correct or diminish the errors in any way; should, however, any Licensed Adjuster find that the errors of any compass are excessive, especially if they are irregular, it will be his duty to call the attention of the master of the vessel to the facts in writing, and to recommend him to take steps to get the errors reduced to a more moderate amount, by the use of fixed correcting magnets or other approved means.

3. All vessels, even those in which the compass errors have been almost entirely removed by magnets or otherwise, are to be swung periodically; it being the opinion of the highest authorities that "no vessel can be said to have her compasses properly examined and adjusted unless she has been swung and her compass errors carefully ascertained."*

4. Previous to swinging any vessel, the compasses must be examined, the needles tested for magnetism,† the agates examined with a magnifier to see whether the hollow be smooth and in good condition, and the pivots tested with a file to see that they are of the proper hardness.‡

The Adjuster should sharpen the pivots to fine points on a hone before he swings any vessel, so as to increase the delicacy of the cards to be examined as much as possible. When the operation has been completed, the extreme points of the pivots should be slightly rounded, to increase their durability, and moderate the vibration of the compass cards in rough water.

The Adjuster should recommend the master to keep a spare pivot-point on board for each compass in the vessel, and the spare point may with advantage be made somewhat blunter than the other, and substituted for it in stormy weather. It is also a wise precaution to keep an extra heavy spare card on board for use in very rough water.

5. Should the compasses prove in any way defective when examined in the manner described in the last article, the Adjuster is to inform the master and to instruct him to get them put in order. On no account is the Adjuster to swing a vessel when her compasses are out of order.

6. All steamers with sea-going certificates should have at least two compasses fitted—a standard and a steering compass.

There may be cases, when the vessels are very small, in which it is impossible to find a proper place for fitting up a second compass; but such cases are rare, and even then there ought to be a spare compass on board, ready for use, in the event of any accident to the other.

7. Should the Adjuster find that the errors of any compass are very great, he should endeavour to ascertain whether they are not produced by some accidental and removable cause; and if it be a standard compass, he must alter its position till he finds the point where the local attractions of the vessel are reduced to a minimum.

It is impossible to give minute instructions for the guidance of Adjusters in altering the positions of compasses, but the following two general rules may always be acted on with advantage§:—

(*a.*) As much as possible avoid placing a compass near the ends of long vertical or horizontal masses of iron, such as the spindle of a capstan or of a steering wheel, iron masts or funnels, the stern-post or rudder-head. If, however, it be found impossible to place the compass at a proper distance from any such mass—fourteen feet is the distance specified in the "Admiralty Regulations," but very few of the steamers plying in New Zealand are large enough to allow of the compasses being kept so far from all vertical masses—it is of consequence to remember that by a judicious selection of a position, the action of the mass on the compass may sometimes be made corrective and beneficial instead of injurious.

(*b.*) When the standard (or any) compass is fitted on a bridge, it should not be near iron stanchions or rails, *especially if covered with brass*; and a compass in such a situation may often be rendered very greatly more accurate by simply substituting wooden (or brass) rails for any iron ones which may happen to be near it.

Should, however, it be impossible to find any site for the standard compass in which its deviations shall be regular and moderate in amount (certainly not exceeding three points as a maximum), or should the steering compass in any small vessel which cannot carry a standard, have excessive errors, the special attention of the master should be called to the facts in writing, and he should be recommended to endeavour to get the errors reduced to a more moderate amount in terms of Article 2.

When, notwithstanding every precaution, any compass does not give the same readings every time the vessel is headed in a given direction, whichever way she is swung, either the pivot or the cap must be faulty, or the needle must be deficient in directive force, and the compass should be sent to the instrument-maker for examination.

8. Adjusters are instructed in all cases to remind masters of vessels that the results obtained by

* *Vide* "Correspondence between the Royal Society, the Board of Trade, the Admiralty, and the Committee of Lloyd's Register, with respect to the Deviation of Compasses;" being a Return to an Order of the House of Commons, dated 6th March, 1866.

† A moderately well magnetized needle should have attractive force sufficient to suspend a piece of *soft* iron of the same size or weight as itself; a superior needle will do much more; but none should be passed unless they come nearly up to this standard.

‡ A file should barely scratch a pivot near the point. If it be rehardened, a pivot will be of the proper temper if brought back to a dark straw colour. (*Vide* "Correspondence" above quoted.)

§ *Vide* "The Queen's Regulations and the Admiralty Instructions for the Government of Her Majesty's Naval Service;" also the "Journal of the Royal United Service Institution," vol. 9.

swinging are not to be implicitly relied upon, and that the fact of a vessel having been swung cannot in any way relieve her officers from the responsibility they are under of ascertaining the absolute errors of her compasses by actual observation when at sea. It is well known that a compass often gives different readings in smooth water from those it gives when the vessel is in a sea-way; and it is also well known that in most vessels compass deviations vary more or less as the vessel heels over, so that she may require to be steered on a very different apparent course, in order to make the same true course, according as she is heeling to starboard or to port.*

Observations in harbour are the only means which can be adopted under Government supervision for ascertaining the compass errors of vessels, and the deviation cards so obtained are valuable, especially for new vessels or such as have undergone repairs, as showing approximately both the direction and amount of the compass errors; but it is the duty of every master to verify or correct his deviation cards by careful and repeated observations at sea.

9. Well-found vessels can when necessary be swung on their own moorings, with the aid of kedges and warps; but at all the larger ports it is proper to have permanent fittings for facilitating the operation. These fittings vary in detail, but all comprise efficient moorings or other arrangement for holding the vessel herself, and means for warping her head round in all directions and for steadying her at any desired point. For vessels of all sizes usually swung in New Zealand, a central dolphin, with five or six warping buoys disposed at equal distances apart on the circumference of a circle of about 600 feet in diameter, is the most convenient and easily-worked system which can be adopted; but where, owing to the depth of water or any other cause, it would be difficult or impossible to erect a dolphin, a strong chain on span moorings (or, better still, on a screw mooring) may be substituted for it. If the vessel be held by a chain, and especially if the chain be attached to an iron buoy (which however is not recommended—a small wooden buoy on a light chain shackled to the end of the mooring chain is much better), she should be swung twice at least—once with the chain on the starboard side, and once with the chain on the port side; and the mean of the results (if there be any difference) should be taken as the correct result. On no account should the buoy be taken inboard; the vessel should be made fast by a hawser secured to the chain as low down as possible, and the whole of the iron on board the vessel (such as chain cables, &c.) should be as nearly as possible in the usual sea-going positions. In the event, however, of extended experience proving that shifting the mooring chain from one side of the vessel to the other makes no appreciable difference in the results, vessels may be swung with the chain always on one side or other, as may be found most convenient; but they should still be taken twice round, though only four or eight principal points need be examined on one of the rounds, to make sure that the deviations are always the same.

Steamers have occasionally been swung with steam up, their engines being employed to bring them round. This is objectionable, as it exposes the dolphin or moorings to unnecessarily heavy strains, which are certain to be injurious in the long run. It must be distinctly understood that the operation of swinging can only be satisfactorily performed if done slowly and carefully, the vessel being thoroughly steadied by warps on each bearing observed. This must be explained to shipmasters, as they are too apt to endeavour to hurry the process by every means in their power.

10. The vessel being moored in any satisfactory manner, it is necessary to be able to ascertain with accuracy the direction of her head, in any position, in terms of a correct magnetic compass. This may be done by simultaneous reciprocal bearings from the ship and from the shore—a spot being selected on shore which is unaffected by local attraction; or the points of a correct magnetic compass may be staked out on shore in a few favourable situations where a perfectly land-locked basin is available for swinging purposes; or the direction of the ship's head may be referred to a near or distant mark, the correct magnetic bearing of which from the swinging place has been accurately ascertained. This last method, which is at least as accurate as any other, is generally the most convenient and expeditious.

When the vessel is fitted with a proper azimuth compass, it may be used as the standard of comparison; the difference of the bearing of the mark, as observed by the azimuth compass when the ship heads to any given point, from its known correct magnetic bearing, being recorded as the Deviation of the Compass for that point. The observations may be conveniently recorded in the following Form:—

Observations for determining the Deviations of the Standard Azimuth Compass of the ; the correct magnetic bearing of Peak A. from the ship being N.W. by N. ½ N., distant 11 miles.

When the Ship heads by her Standard Compass.	Peak A. bears by the same Compass.	And the Deviation of the same Compass is.
North	N.W. by N.¼N.	¼ point E.
N. by E.	N.W. by N.	½ point E.
N.N.E.	N.W.½N.	1 point E.
&c.	&c.	&c.

The deviations having been thus ascertained and tabulated, the deviation curve can be protracted with facility by the Graphic Method, a copy of which is appended.

* "As the amount of disturbance on heeling varies under the various conditions of direction of build, height of compass, and breadth of ship or distance of top-sides, added to the prevailing permanent or inductive magnetic condition of the latter and the deck beams, each ship must have an individual character, to be determined only by experiment at sea. There are, however, strong grounds for inferring that by a judicious position of the compass, so as to ensure small errors while on an even keel, the errors arising from the ship's keel will be so proportionally reduced as not practically to affect the navigation of the ship in the hands of a prudent seaman."—Report to the Hydrographer of the Admiralty, by

11. As, however, many vessels are not provided with a proper compass fitted with azimuth sights, it is a common practice to make use of a dumb compass as the standard of comparison—the card of the dumb compass being adjusted in reference to a well-defined mark, of which the correct bearing is known.

12. A distant mark—say not less than five or six miles off—is to be preferred for the standard of reference, provided it be distinct and well-defined; as in that case the parallax due to the change of position of the vessel while she is being swung may be safely neglected, as practically inappreciable, especially when she is made fast to a dolphin abreast of her standard compass; as in that case the amount of parallax will only be that due to the breadth of the vessel. If it be absolutely impossible to select a well-defined distant object, it will be necessary to erect a pair of near marks; but in that case, the vessel requires to be manœuvred by the head and stern lines, so as to keep the two marks always in one, as seen from the dumb compass—and this is troublesome and takes time.

When the situation is favourable and surrounded by easily distinguished objects, it is always convenient to ascertain the correct bearings of several from the swinging dolphin, so that a nearer or more distant mark may be selected as the standard of reference, according to the state of the atmosphere, &c.; and it is always well to erect a pair of near marks which may be reverted to in the event of the more distant objects being obscured by fog.

Compass Adjusters will, of course, understand that it is quite immaterial what the actual bearing of any object selected as a standard mark may be, provided it has been accurately ascertained; the mark being merely used to set the dumb compass by, so that it may always represent a correct magnetic compass card.

13. A dumb compass, adapted for swinging operations, should comprise the following essentials, though many differences of detail and style of finish will be found in the works of different makers:—A compass card or brass plate, not less than six inches diameter, accurately divided to points and quarters, or eighths, and truly centred, turning with moderate stiffness on a lower plate, on which a line (corresponding to the "lubber's" point of an ordinary compass) is cut in such a manner as to read the divided card with accuracy: the lower plate, which represents the ordinary compass box or binnacle, should turn on an axis on a stout tripod stand of convenient height, and must be fitted with a clamp for holding it firmly in any required position. A pair of sight-vanes, like those of an azimuth compass, must be fitted to the divided card or plate of the dumb compass; they may either be jointed to a bar revolving on the common centre and capable of being clamped to the card in any position so as to move along with it, or they may be separate, and made to screw into holes tapped for them in the plate at each end of the bearing lines to the several standard marks. The correct bearings of all marks which are intended to be used as standards of reference should be laid down on the divided plate, the name of each object being engraved on the proper line, and, when there are several bearing lines, it is useful to cut an arrow-head on each, to show the direction in which the sight should be taken. If the sight-vanes are made to screw, holes must be drilled and tapped to fit them at each end of every bearing line. Though not essential, it is very convenient to have a ball and socket-joint on the axis of the lower plate of the instrument, as it greatly facilitates the operation of levelling the dumb card.

14. A dumb compass somewhat as described being provided, it is to be set up near the principal compass to be tested, sufficiently on one side of the keel line to allow of an unobstructed view fore and aft, and properly levelled; and the sight-vanes are to be screwed into the holes at each end of the bearing line corresponding to the most distant swinging mark which can be distinctly seen in the existing state of the weather. Then, to set the "lubber's" point parallel to the keel line,—first, turn the dumb card till the "lubber's" point coincide with the bearing line to which the sights are adjusted, so as to make the line of sight coincide in direction with the "lubber's" line; then unclamp the lower plate and turn it (carrying the card and sights along with it) until the sights are in line with a boat-hook or pole, or similar object, which is to be held up (vertically) as far forward as possible, and exactly the same distance on the same side of the vessel from the centre or keel line as the centre of the dumb compass has been placed; when the pole is bisected, the centre of the dumb compass and its "lubber's" point, or reading line, must be parallel to the keel line of the vessel, and the lower plate is to be clamped, and must not be shifted till the operation of swinging is completed.

The instrument is then in adjustment, and its "lubber's" point will read the correct magnetic bearing of the ship's head in any position, so long as the sight-vanes of the dumb card are kept in line with the proper bearing mark.

15. The dumb compass having been adjusted as described, the vessel may have her compasses tested with ease and expedition on either of the following systems:—

(*a.*) The dumb card being set so that the "lubber's" point of the instrument exactly coincides with any point on the card, the vessel is to be warped round till the sight-vanes are in line with the proper swinging mark, and the actual reading of the compass or compasses under examination is to be noted after the vessel has been steadied on the proper line and the compass cards have come to rest; the dumb card being thus shifted a point or more, the vessel is to be again warped round, checked, and her compasses are to be read as before—and so on until the operation is completed. For the second series of observations the vessel should be warped round the reverse way, the operation being otherwise performed precisely as before; but only a few points need be examined on one of the rounds, as

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Fred. J. Evans, Esq., Staff Commander, R.N., Superintendent of the Compass Department of Her Majesty's Navy. Published in the "Philosophical Transactions," Part II., 1860.

NOTE.—The theory and practice of compass adjustment have been so greatly improved since 1860 that it is now possible to determine the heeling error from observations made with the ship upright, and such observations are now a regular part of the complete series of magnetic observations made in the principal iron ships of Her Majesty's navy. Her Majesty's ships, however, present peculiar facilities for such observations from their standard compasses being all of the same pattern, and it would, besides, be unreasonable to expect such high scientific attainments in the Compass Adjusters in the Colonies as are possessed by the officers of the Admiralty Compass Department. The above quotation is still practically correct as regards merchant vessels in New Zealand, if not in England also, especially as the heeling error is seldom excessive except in iron-clads.

explained in Article 9. The results should be recorded in the following form (Form A. of the Graphic Method):—

Record of Observations for determining the Deviations of the Compass of the
swung at on

Ship's Head by a correct Magnetic Compass.	Ship's Head by her —— Compass.	Ship's Head by a correct Magnetic Compass.	Ship's Head by her —— Compass.
North.	———	South.	———
N. by E.	———	S. by W.	———
N.N.E.	———	S.S.W.	———
&c.		&c.	

This system is the most convenient when it is desired to ascertain the deviations of more than one compass by a single operation.

(*b.*) The vessel may be warped round, and checked when she is heading to the several points of her own compass; the corresponding readings of the dumb compass, when its card has been turned till the sight-vanes are in line with the proper mark, being recorded as under (Form B. of the Graphic Method):—

Record of Observations for determining the Deviations of the Compass of the
swung at on

Ship's Head by her —— Compass.	Ship's Head by a correct Magnetic Compass.	Ship's Head by her —— Compass.	Ship's Head by a correct Magnetic Compass.
North.	———	South.	———
N. by E.	———	S. by W.	———
N.N.E.	———	S.S.W.	———
&c.		&c.	

This plan has advantages as being more certain of detecting the extreme deviations, which are generally at or near the N.E., S.E., S.W., and N.W. points of the vessel's own compass; and it is equally convenient with the first method when only one compass requires to be examined.

16. In wooden vessels, or iron vessels with very small deviations, it is not necessary to ascertain by observation the errors for every point of the compass. Where time is an object, the eight principal points may first be examined, and if the deviations prove slight (say not more than half a point anywhere), the steering courses, &c., for the intermediate points may be interpolated. When the deviations are larger, as is usually the case in iron vessels, at least every alternate point should be examined; and as a rule it is better to test every point.

17. When only a certain number of points are actually examined, and the steering courses, &c., for the intermediate points are interpolated, the deviation cards issued to the shipmaster must be filled up in such a manner as to show clearly the points which have actually been tested; the courses corresponding to all actually tested points being filled in in *black*, and the interpolated courses in *red.*

18. When the vessel has been swung and *check-swung* (Articles 7, 9, and 15) with satisfactory results, the deviation curve should be laid down on the diagram of the Graphic Method, in the manner explained in the notes (a copy of the Graphic Method is appended hereto, and Compass Adjusters will have a number supplied to them); and the Adjuster may then fill up the usual "Steering course" and "Deviation" cards to be issued to the shipmaster, in doing which he will find the curve a great assistance.

19. Since the navigator shapes his courses from charts on which a correct magnetic compass is shown, it is obvious that the steering-course card should have correct magnetic courses in the first column, and opposite to them the course that the vessel must be steered by her own compass, in order that she may actually make the required magnetic course. From this it follows, that when the vessel has been swung on the system A. (Article 15), the steering-course card will be a simple transcript of the Record of Observations, the courses for any points not actually observed being interpolated by measurement from the deviation curve; but when the vessel has been swung on the system B. (Article 15), all the steering courses must be measured from the curve.

20. As, however, "deviations" are of comparatively little practical use, except for the purpose of correcting bearings taken to headlands or other extraneous objects (for, though the steering courses may be worked out by applying the proper correction for deviation to the correct magnetic courses, it is not the usual practice to do so, as the steering-course card gives the same results directly), it must be obvious that the deviation card should be filled up with the deviations corresponding to the points of the vessel's own compass, and *not* with the deviations corresponding to the points of a correct magnetic compass.

When the vessel has been swung on the method B., and headed to every point of her own compass, the deviation card can be filled up directly from the Record of Observations, but not so where the method A. has been adopted; and in any case it is better to measure the deviations from the curve, as by so doing at least equal accuracy will be attained, and all possibility of error in filling in the *directions* of the deviations will be avoided.

21. Since Deviation Tables are always filled up with reference to the direction in which a vessel is *heading*, it cannot be too strongly impressed upon Shipmasters that where bearings are taken to any

objects *not right ahead*, it is essential to note at the same time the direction of the ship's head, as otherwise the correct bearings of the objects can never be properly ascertained: all such bearings requiring to be corrected for the deviation of the compass at the moment of observation, which is clearly the deviation due to the direction of the vessel's head. So important, indeed essential, is this precaution, that the fact of the deviation of the ship's head being noted may be considered as a very reliable proof that bearings are to be depended on; and, on the other hand, if any bearings are entered in a vessel's log without the corresponding direction of the vessel's head being noted, they must always be considered untrustworthy, and the officer in charge of the log will be exposed to suspicions of carelessness or of incompetency.

22. As it has in some instances been the custom in New Zealand (and elsewhere) to fill up the Deviation Table in terms of a theoretical or correct magnetic compass, instead of in terms of the vessel's own compass, as directed in Article 20, an example may be useful to show the errors which may result from so doing.

The following is a portion of an imaginary "Deviation and Steering Course" card of the old form:—

Deviation.	For Magnetic.	Steer.
½ W.	North.	N.½E.
1 W.	N. by E.	N.N.E.
2 W.	N.N.E.	N.E.
2½ W.	N.E. by N.	N.E. by E.½E.
&c.	&c.	&c.

Thus when the ship is heading North, correct magnetic, her compass has half a point of westerly deviation; and in order to make a course North, correct magnetic, she must be steered N.½E. by her compass: again, when she is heading N.N.E., correct magnetic, her compass has a deviation of two points westerly, and so on. This is perfectly true; but the information, in this form, is more likely to mislead than to be of service. For instance, if the master of the vessel, of which the above is supposed to represent the steering card, were to take any cross bearings when she was heading N.N.E. by her compass, and were to correct these bearings for two points of westerly deviation, as he would be most apt to do (especially if pressed for time) when provided with a card of the above form, his *corrected* bearings would be as far wrong as the original sights, but on the other side of the correct bearings. But an examination of the form will show that when the vessel is heading N.N.E. by her own compass, she is really heading N. by E., correct magnetic, and the deviation corresponding to that point is one point westerly; and 1 W. is the proper deviation to enter opposite N.N.E. for all practical purposes, as all bearings taken when the vessel is heading N.N.E. by her compass must be corrected for *one* point of westerly deviation, and not for two, as a glance at this form of card might lead one to suppose. The deviations corresponding to any point of the ship's compass may no doubt be ascertained more or less accurately, as above illustrated, even from cards filled up in this manner; but the operation frequently involves complex fractions of points, and takes time when time cannot well be spared. By filling up the deviation card in terms of the vessel's own compass, as prescribed in Article 20, this complication is avoided.

23. Every steamer which is allowed by Inspectors plying limits of such extent as to make a compass a necessary part of her equipments, is to be considered a sea-going vessel, in so far as regards the provisions of the Steam Navigation Act respecting the examination and adjustment of her compasses; and Inspectors are to satisfy themselves that every iron steamer is swung at least once a year, and also after undergoing any considerable repairs. Wooden vessels do not require to be swung so often, but even they should have their compasses examined after either the boiler or engines have undergone any extensive overhaul.

24. Every Licensed Adjuster is to forward to the Marine Department, Wellington, as soon as possible after he has swung any vessel, the following documents, in order that they may be examined and registered:—

(*a*) Copy of any letter he may have written to the master relative to the state of the vessel's compasses. (Articles 2 and 7.)
(*b*) The originals or copies of the rough "Records of Observations," to show how the deviations agree on the first and second operations.
(*c*) A deviation curve for each compass laid down on the diagram of the Graphic Method; all actually observed points being marked by small ink crosses, so that it may be seen at a glance how nearly the curve coincides with the observations.
(*d*) Copies of the steering-course and deviation cards actually issued to the shipmaster.

25. Any Adjuster who may be proved to perform his work in a careless manner, or who may omit to comply with the provisions of Article 24 or of any preceding article, will be liable to have his license withdrawn.

JAMES M. BALFOUR, M.I.C.E.,
Colonial Marine Engineer.

Wellington, June, 1869.

Appendix C

RETURN of the actual Cost of the Marine Department for the Financial Year 1868-9, including Maintenance of Lighthouses, Expenses of "St. Kilda" (so far as charged against the Department), but exclusive of all expenditure charged against Schedule B., Public Debts Act.

Vote 27. Item	Nature of Expenditure.	Details of Expenditure. £ s. d.	Amount Expended. £ s. d.	Amount Voted. £ s. d.	Remarks.
1	Marine Engineer... ...	...	700 0 0	700 0 0	
2	Inspector of Steamers and Nautical Assessor	...	375 0 0	375 0 0	
3	Inspector of Steamers and Engineer Surveyor	...	375 0 0	375 0 0	
4	Clerk and Bookkeeper ...	...	100 0 0	100 0 0	
5, 6, 7, 8, 9, 10, 11	Lightkeeper's salaries ...	...	2,430 0 0	2,430 0 0	
12, 13	Payments to and travelling expenses of non-salaried officers	325 8 2	...	...	Officers acting for the Department at outposts, who are only paid for a portion of their time, are termed Non-salaried Officers, to distinguish them from the full-paid Staff.
„	Repairs to lighthouses ...	10 0 0			
„	Oil and other stores from England, including carriage and all charges.	817 16 0	...	...	This item should be increased by about £45, being amounts due for freight, the accounts for which have not yet been rendered.
„	Tools and other more permanent lighthouse stores	61 17 7			
„	Lighthouse contingencies, including payment of temporary keepers, paint, fuel, freights, &c.	186 4 9	...	...	This item should be increased by about £77, being amounts due for freight in New Zealand, the accounts for which have not yet been rendered.
„	Departmental contingencies	120 14 10			
„	Departmental travelling expenses	460 9 4			The saving on Items 12 and 13 is due partly to the non-payment of certain freight accounts during the financial year, owing to the long passages of the vessels which brought the lighthouse oil from England; partly to the exceptionally small charges for lighthouse repairs during the year; and partly to the fact that the expenses of the "St. Kilda" have been borne by the Defence Department during the greater part of the year.
„	Repairs to "St. Kilda," and stores for ditto	643 18 5			
„	Expended on search for Hydra Rock, near Cape Saunders	38 10 0			
„	Beacon for Richmond Rock, Pelorus Sound	16 5 6			
			2,681 4 7	4,000 0 0	
	Totals expended and voted	...	6,661 4 7	7,980 0 0	

Note.—The Return includes all Accounts certified during the Financial Year, and also all sums believed to have been paid for stores in England. Some of the amounts may not have been actually paid before 30th June, or charged to the Financial Year in the Treasury Books.

Appendix D.

RETURN of Amounts expended by the Marine Department during 1868-9 charged against Schedule B., Public Debts Act.

Nature of Expenditure.	Amount. £ s. d.	Remarks.
Nugget Point Lighthouse	427 4 7	First progress payment to contractor on account of the works, and Inspector's salary to 30th June.
Cape Campbell Lighthouse	709 8 5½	Cost of lantern as delivered in Wellington, Inspectors salary to 30th June, advertising.
Farewell Spit Lighthouse	779 14 4	Cost of lantern, Inspector's salary, advertising.
Manukau Light	59 0 9	Cost of apparatus in England, also freight of ditto and of lantern to Wellington.
Flat Rock Beacon	19 0 6	Copies of drawings, advertising.
Cost of Marine Survey as detailed in Appendix F.	2,144 11 7	
Total	4,139 0 2½	

Appendix E.

RETURN showing COST of MAINTENANCE of the existing NEW ZEALAND LIGHTHOUSES during the Financial Year 1868-9.

Name of Lighthouse.	Spent on Repairs and Stores of a permanent nature.	Oil, Paint, and other Annual Supplies and Contingencies.	Keepers' Salaries.	Totals.	Totals during the Year 1867-8.	Remarks.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Tiri Tiri ...	40 3 6	151 9 7	340 0 0	531 13 1	582 7 3	The expenditure on repairs and permanent stores during 1868-9 is exceptionally small. As explained in Appendix C. there are certain sums for freight which ought to be included to show the true expenditure for the year: a debt of £16 5s. has also been incurred (in Auckland) for oil for Tiri Tiri, owing to the non-arrival of the "Moss Trooper." The true total cost of the Lighthouse establishment for the past year may be estimated at £3,650 to £3,700.
Nelson ...	1 2 6	48 19 1	180 0 0	230 1 7	334 0 9	
Mana ...	14 2 7	174 3 9½	340 0 0	528 6 4½	544 12 10	
Pencarrow ...	6 3 0	216 18 0	340 0 0	563 1 0	607 5 6	
Godley Head	10 6 0	111 3 7½	350 0 0	471 9 7½	582 10 0	
Tairoa Head...	...	75 5 4	350 0 0	425 5 4	539 18 2	
Dog Island ...	...	200 15 7	530 0 0	730 15 7	753 17 1	
TOTALS ...	71 17 7	978 15 0	2,430 0 0	3,480 12 7	4,456 14 6	
Totals for year 1867-8 ...	827 17 4	1,231 17 2	2,397 0 0	4,456 14 6	...	

Appendix F.

RETURN of AMOUNT expended on MARINE SURVEYS during the Financial Year 1868–9.

Nature of Expenditure.	Amount.	Remarks.
	£ s. d.	
Salary, Chief Surveyor	620 0 0	Including a bonus of £200, as explained in last report (Appendix D.)
,, Assistant Surveyor	350 0 0	
Wages of survey party	235 1 7	
Travelling allowances to officers and rations of men	338 1 1	
Purchase and repairs of instruments ...	73 0 0	
Steamer and other fares	160 4 0	
Repairs to boats, packing stores along the coast, and sundries	282 15 9	
Repairs to "St. Kilda"	85 9 2	
Total	2,144 11 7	Charged to Schedule B., Public Debts Act.
Total for Year 1867-8	4,747 5 10	
Total as above	2,144 11 7	
Travelling allowances	68 11 1	Expenditure in connection with the examination of Otago Bar, Hauraki Gulf, &c., charged against Marine Contingencies.
Steamer fares	3 4 0	
Sundries	6 12 8	
Total	£2,222 18 8	Total expended on Marine Surveys during 1868-9.

NOTE.—The travelling expenses and allowances incurred in connection with the disjunct survey of Otago Bar, and the examination of the Hauraki Gulf, &c., which were undertaken at the express request of Commodore Lambert, C.B., were defrayed from the vote for Marine Contingencies, and are separately entered below.

Appendix G.

COST of LIGHTHOUSES and other WORKS in PROGRESS, actual and estimated.

Nature of Expenditure.	Farewell Spit Lighthouse.	Cape Campbell Lighthouse.	Nugget Point Lighthouse.	Manukau Light.	Flat Rock Beacon.	TOTALS.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Price of apparatus and lantern as stored at Dunedin	...	...	2,296 19 9*	...	...	...
Balance price of apparatus, &c., paid in 1867-8	...	...	250 0 0	...	...	...
Clerical assistance, surveys, &c., paid in 1867-8	24 15 0	17 5 0	139 10 0	...	...	...
Cost of lanterns and apparatus in England...	2,311 17 7†	2,242 8 3†	...	132 11 5†	...	...
Contract price of buildings, &c.	2,496 0 0	1,960 0 0	2,577 5 10	...	390 0 0	...
Estimated cost of fitting up lanterns and apparatus and completing the works, including freight from England and to the sites, Inspector's salaries, and all contingencies ...	1,500 0 0	1,181 0 0	929 0 0	130 0 0‡	105 0 0	...
Approximate total cost	6,332 12 7	5,400 13 3	3,895 15 10§	262 11 5	495 0 0	16,386 13 1§
Amount of original estimates	6,500 0 0	5,500 0 0	4,000 0 0	250 0 0	500 0 0	16,750 0 0
Approximate amounts already disbursed ...	2,250 0 0	2,200 0 0	816 14 7	150 14 8	19 0 6	5,436 9 9‖
Approximate balances required during 1869-70	4,082 12 7	3,200 13 3	3,079 1 3	111 16 9	475 19 6	10,950 3 4¶

* This amount was paid (as a refund to the Provincial Government of Otago) in 1865. As it is not charged against Schedule B, Public Debts Act, it is kept separate from the other items.

† These amounts are partly estimated.

‡ The estimate for fitting up Manukau Light does not include any allowance for providing accommodation for a light-keeper.

§ By adding the price of the lantern and apparatus, £2,296 19s. 6d. (as stated in the first line), to £3,895 15s. 10d., it will be seen that the total cost of Nugget Point Lighthouse, complete, will be £6,192 15s. 4d.

‖ On the assumption that an amount of £4,000, which has been placed to credit of Lighthouses, has been disbursed.

¶ On the above assumption, that £4,000 has been paid in England already.

Appendix H.

STATEMENT of MONEYS received by salaried Officers of the Marine Department, during the Financial Year 1868-9.

Nature of Service.	Amount Received.	Remarks.
	£ s. d.	
Surveys of Steam Vessels	414 15 0	Paid into the Bank of New Zealand on Government Account in Auckland, Wellington, Nelson, Canterbury, Otago, and Westland.
Examinations of Masters and Engineers ...	12 12 0	
Pilotage Exemption Certificates	113 8 0	
Sale of Admiralty Charts, &c.	37 17 0	
TOTAL	578 12 0	
Total for 1867-8	532 0 2	

Appendix I.

STATEMENT of MONEYS received by non-salaried Officers of the Marine Department (*i.e.*, such Officers as are only paid for a portion of their time, and who have other occupations) during the Financial Year 1868-9.

Nature of Service.	Amount Received.	Remarks.
	£ s. d.	
Surveys of Steam Vessels	136 10 0	*Note.*—There are other unpaid officers in connection with the Department (such as licensed Examiners of Masters and Adjusters of Compasses), who retain the fees in payment of their services. Such fees do not appear in this Return.
Examinations of Engineers	9 9 0	
Pilotage Exemptions	26 5 0	
Sundries	4 5 0	Sale of charts. Sale of empty oil drums.
TOTAL	176 9 0	*Note.*—The total amount collected during the year, taking the totals in Appendices H. and I. together, is £755 1s., as against £720 1s. 8d. collected during 1867-8.
Total for 1867-8	188 1 6	

Appendix K.

RETURN of LIGHT DUES collected during the Financial Year 1868–9.

Port at which collected.	Amount.	Remarks.
	£ s. d.	
Auckland	1,310 2 9	
Russell	30 0 10	
Wellington	1,122 8 4	
Wanganui	22 2 1	
Nelson	585 17 0	
Westport	124 3 6	
Greymouth	38 10 1	
Hokitika	62 18 1	
Picton	44 1 3	
Havelock	7 13 11	
Lyttelton	958 15 0	
Akaroa	...	Returns incomplete; presumed to be *nil.* when not sent in.
Timaru	16 15 4	
Oamaru	...	
Dunedin	1,456 0 1	
Bluff	543 4 9	
Invercargill	10 11 4	
Riverton	6 16 9	
Total Light Dues for the Colony	6,340 1 1	
Total Light Dues collected during 1867-8 ...	6,117 0 4	

Appendix M.

RETURN of PILOTAGE and other CHARGES on SHIPPING (exclusive of Light Dues, Appendix K.), so far as they can be ascertained, collected at the under-mentioned Ports during the Financial Year 1868–9.

Province and Port.	Pilotage.	Port Dues.	Other Charges.	Totals.	Remarks.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Auckland—					
Auckland	1,411 5 2	427 0 4	183 16 2	2,022 1 8	No returns of wharfage and other local dues.
Onehunga... ...	133 9 7	93 10 9	...	227 0 4	
Russell	118 11 2	...	...	118 11 2	
Tauranga	54 15 8	...	...	54 15 8	Returns for Tauranga incomplete. Assumed to be nil for last quarter.
Kaipara	89 14 4	...	...	89 14 4	
Hokianga	50 0 0	...	...	50 0 0	
Mongonui... ...	37 5 6	...	...	37 5 6	Only one return received for Hokianga. The total is estimated.
TOTALS	1,895 1 5	520 11 1	183 16 2	2,599 8 8	
Taranaki—					
New Plymouth ...	72 18 0	...	...	72 18 0	Estimated. No returns for the last two quarters. No information as to local charges, if any.
Hawke's Bay—					
Napier	109 3 9	...	...	109 3 9	No return of local charges.
Wellington—					
Wellington ...	743 3 10	...	...	743 3 10	Wharf is leased. No return of local charges.
Wanganui ...	624 6 0	...	...	624 6 0	
TOTALS	1,367 9 10	...	...	1,367 9 10	
Nelson—					
Nelson	806 16 8	...	52 12 5	859 9 1	Wharf believed to be leased. No return of local charges.
Marlborough—	Nil.	...	...	...	
Canterbury—					
Lyttelton	1,186 15 8	...	121 18 3	1,308 13 11	No return of wharfage dues or other local charges.
Otago—					
Dunedin	2,958 10 5	...	72 9 0	3,030 19 5	No further returns.
Southland—					
Bluff	415 19 4	...	4 4 0	420 3 4	No further returns.
Invercargill ...	37 7 6	...	2 2 0	39 9 6	
Riverton	17 16 6	...	...	...	
TOTALS	471 3 4	...	6 6 0	477 9 4	
County of Westland—					
Hokitika	197 11 8	...	...	197 11 8	No further returns.
Okarita	1 16 0	...	...	1 16 0	
TOTALS	199 7 8	...	...	199 7 8	
TOTALS FOR NEW ZEALAND	9,067 6 9	520 11 1	437 1 10	10,024 19 8	
DITTO FOR YEAR 1867-8	9,126 6 3	404 11 9	310 19 5	9,841 17 5	

Appendix L.

RETURN showing the RATES of LIGHT DUES, PILOTAGE, PORT CHARGES, and other CHARGES on SHIPPING (with the exception of Wharfage Dues on Vessels, which are Charges of a purely local nature), at present levied or proposed to be levied in the several Ports of the Colony.

NOTE.—The majority of these Charges are at present levied, and all are in accordance with the wishes and approval of the local authorities. It is proposed to re-impose them in this tabular form to facilitate reference.

WHERE TO BE LEVIED.		LIGHT DUES.		PILOTAGE.		PORT CHARGES.		SHIFTING OR HARBOURMASTERS' FEES.		FEES FOR BOAT LICENSES.		FEES FOR LICENSES TO BOATMEN AND WATERMEN.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
AUCKLAND ...	Auckland ...	Sailing vessels from Ports beyond the Australian Colonies	6	Sailing vessels of and under 100 tons	6	Vessels or boats plying within the port, or employed in coasting only, quarterly ...	2	For each time the Harbourmaster or his deputy goes on board to appoint the place of anchorage of any vessel or to remove her from one place of anchorage to another	1	Watermen's boats	1 0 0	Watermen ...	1 0 0
		All steam vessels from ports out of the Colony, and sailing vessels from the Australian Colonies	4	Sailing vessels over 100 tons, first 100 tons ...	6					Water tank boats, cargo boats, ballast boats, per ton ...	0 2 6	Masters of water tank boats, cargo boats, ballast boats, each ...	1 10 0
		Steam and sailing vessels coastwise	1	Sailing vessels over 100 tons, every ton over 100	2	Vessels not plying within the port, or not employed in coasting only, on arrival	1						
		NOTE.—Vessels plying in that part of Hauraki Gulf south of Rangitoto and Waiheki Islands are exempt from light dues.		Steamers of and under 100 tons	4	Not to exceed sixpence per ton in any one half-year.							
				Steamers over 100 tons, first 100 tons ...	4								
				Steamers over 100 tons, every ton over 100 ...	1½								
				Into or out of any outer roadstead, all vessels to be charged half the above rates only.									
	Manukau ...	Nil.		Same as Auckland, except that the additional charge per ton for vessels over 100 tons is to be—		Vessels or boats plying within the port, or employed in coasting only, quarterly ...	3	Ditto	1	Watermen's boats	1 0 0	Watermen ...	1 0 0
				Sailing vessels ...	3	Vessels not plying within the port, or not employed in coasting only, on arrival	2						
				Steamers ...	2								
				Into or out of any anchorage below Puponga, half pilotage only to be charged.		Not to exceed sixpence per ton in any one half-year.							
	Kaipara ...	Nil.		Same as Manukau.		Same as Manukau.		Ditto	1	Nil.		Nil.	
	Hokianga ...	Nil.		Ditto.		Nil.		Ditto	1	Nil.		Nil.	
	Tauranga ...	Nil.		Same as Auckland.		Nil.		Ditto	1	Nil.		Nil.	
	Russell ...	Vessels from Ports beyond the Australian Colonies	3	Ditto.		Nil.		Ditto	1	Nil.		Nil.	
		All vessels from the Australian Colonies ...	2										
		Steam and sailing vessels coastwise	½										
		NOTE.—These dues are only leviable on vessels making use of or passing Tiri Tiri or other lights on the coasts of the Colony.											

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Watermen.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
Auckland—*continued.*	Mongonui ...	Nil.		Same as Auckland.		Same as Manukau.		Same as Auckland.	1	Nil.		Nil.	
Hawke's Bay	Napier ...	Nil.		Into or out of Inner Harbour,—		Vessels or boats plying within the harbour, or engaged in coasting only, quarterly...	3	Ditto	1	Water tank boats, per ton ...	0 1 0	Masters of water tank boats ...	2 2 0
				Sailing vessels ...	4					Cargo boats, per ton ...	0 1 0	Masters of ballast boats ...	2 2 0
				Steamers	3					Ballast boats, per ton ...	0 1 0	Masters of cargo boats ...	2 2 0
				To or from Roadstead,—		Vessels not plying within the harbour or not engaged in coasting only, on arrival	1			Watermen's boats	0 10 0	Watermen ...	1 0 0
				Sailing vessels over 100 tons, first 100 tons ...	6								
				Every ton over 100 ...	2								
				Steamers, first 100 tons...	3	Not to exceed sixpence per ton in any one half-year.							
				Every ton over 100 ...	1								
						Vessels from beyond the Australian Colonies, on arrival (including use of Government moorings)	6						
	Wairoa ...	Nil.		Same rates as for Inner Harbour, Napier.		Same as at Napier.		Ditto	1	Nil.		Nil.	
Taranaki ...	New Plymouth	Nil.		On vessels of all sizes (but not to exceed £3 each way in any case)	3	All vessels, per quarter (payable on the first trip of each quarter)	1	Ditto	1	Nil.		Nil.	
	Patea ...	Nil.		On all vessels piloted by signals only	0½	All vessels quarterly	3	Ditto	1	Nil.		Nil.	
	Waitara ...	Nil.		Same as Patea.		Same as at Patea.		Ditto	1	Nil.		Nil.	
Wellington	Wellington ...	Sailing vessels from ports beyond the Australian Colonies	6	Sailing vessels over 500 tons, first 500 tons ...	6	Vessels or boats plying within the port, or employed in coasting only, quarterly, in advance	3	Ditto	1	Cargo boats, ballast boats, water tank boats, per ton ...	0 2 0	Masters of cargo boats ...	0 10 0
		All steam vessels from ports out of New Zealand, and sailing vessels from the Australian Colonies ...	4	Sailing vessels for every ton over 500 tons ...	4							Masters of ballast boats ...	0 10 0
		Steam and sailing vessels coastwise	1	Sailing vessels of 500 tons and under	6	Vessels not plying within the port, or not employed in coasting only, on arrival	2			Watermen's boats	0 10 0	Masters of water tank boats ...	0 10 0
				Steamers of all sizes two-thirds of the rates for sailing vessels.		Not to exceed sixpence per ton in any one half-year.						Watermen ...	0 10 0
				Coasters under 50 tons to be exempt from pilotage unless they employ a pilot.									

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Waterman.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
Wellington—*continued.*	Wanganui ...	Vessels from ports beyond the Australian Colonies	3	All vessels when piloted by signals from the staff only	3	Nil.		Same as Auckland.	1	Same as Wellington.		Same as Wellington.	
		All vessels from the Australian Colonies ...	2	River pilotage	3								
		Steam and sailing vessels coastwise	0½										
		Note.—Light dues only to be levied at Wanganui on vessels arriving from the eastward.											
	Manawatu ...	Nil.		All vessels	6	Nil.		Ditto	1	Same as Wellington.		Same as Wellington.	
Nelson ...	Nelson ...	Sailing vessels from ports beyond the Australian Colonies	6	Sailing vessels from 50 to 250 tons	4	Nil.		Ditto, for vessels from 50 to 200 tons ...	1	Watermen's boats	0 10 0	Watermen, Masters of cargo boats, ballast boats, water tank boats, each ...	1 0 0
		All steam vessels from ports out of New Zealand, and sailing vessels from the Australian Colonies ...	4	Sailing vessels from 250 to 400 tons	5			Ditto, over 200 tons...	0½	Cargo boats ...	2 0 0		
		Steam and sailing vessels coastwise	1	Sailing vessels over 400 tons	6					Ballast boats ...	2 0 0		
				Vessels towed in or out by a steamer, half the above rates only.						Water tank boats	2 0 0		
				Steamers of and under 150 tons	4								
				Steamers from 150 to 250 tons, first 150 tons ...	4								
				For every ton over 150...	2½								
				Steamers from 250 to 400 tons, first 250 tons ...	3½								
				For every ton over 250...	2								
				Steamers over 400 tons, first 400 tons... ...	3								
				For every ton over 400...	1½								
				The above rates of pilotage for steamers are charged the first time of entering and leaving in each year; but for every time of entering and leaving after the first in each year, only half the above rates are charged.									

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Watermen.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Cahrge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
Nelson—*continued.*	Westport ...	Sailing vessels from beyond the Colony, coming from any port to the eastward of New Zealand ...	6	Nil.		Nil.		Nil.		Watermen's boats, cargo boats, ballast boats, each	1 0 0	Watermen ...	1 0 0
		Steamers from beyond the Colony, coming from any port to the eastward of New Zealand ...	4										
		Steam or sailing vessels coastwise from any part of Stewart Island or Middle Island to the eastward of Solander Island on the South and Separation Point on the North, and from any part on the East Coast of the North Island between Kapiti on the South and Auckland on the North	1										
		These light dues are only chargeable at the first port on the West Coast at which any vessel liable thereto shall call on any voyage or trip.											
Westland ...	Greymouth ...	Same as at Westport, provided the vessel has not previously (on the same trip) called at any other port on the West Coast where these dues are levied.		Nil.		Nil.		Nil.		Cargo boats ...	1 1 0	Masters of cargo boats ...	1 1 0
										Watermen's boats	1 1 0	Watermen ...	1 1 0
										All boats plying for hire are classed either as cargo or watermen's boats.			
	Hokitika ...	Same as Greymouth.		Sailing vessels	3	Nil.		Nil.		Cargo boats ...	1 1 0	Masters of cargo boats ...	1 1 0
				Steamers	2					Watermen's boats	1 1 0	Watermen ...	1 1 0
										All boats plying for hire are classed either as cargo or watermen's boats.			

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Watermen.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
Westland—*continued.*	Okarita ...	Same as Greymouth.		Sailing vessels	3	Nil.		Nil.		Nil.		Nil.	
				Steamers	2								
Marlborough	Picton ...	Vessels from ports beyond the Australian Colonies	3	Nil.		Nil.		Nil.		Nil.		Nil.	
		All vessels from the Australian Colonies ...	2										
		Steam and sailing vessels coastwise	0½										
	Havelock ...	Same as Picton.		Nil.		Nil.		Nil.		Nil.		Nil.	
Canterbury	Lyttelton ...	Sailing vessels from ports beyond the Australian Colonies	6	Sailing vessels over 500 tons, for the first 500 tons	6	Vessels plying within the port, or employed in coasting only, per quarter, in advance	3	For each time the Harbourmaster or his deputy goes on board to appoint the place of anchorage of any vessel, or to remove her from one place of anchorage to another	1	Nil.		All masters of or persons in charge of any vessel or boat used or employed in landing or embarking cargo, luggage, passengers, ballast, or water, within the port ...	2 2 0
				Every ton over 500 ...	4								
		All steamers from ports beyond New Zealand, and sailing vessels from the Australian Colonies ...	4	Sailing vessels from ports beyond the Australian Colonies of 500 tons and under	6	Vessels not plying within the port, or not employed in coasting only, on arrival	2						
		Steam and sailing vessels coastwise	1	Colonial sailing vessels of 500 tons and under ...	4	Not to exceed sixpence per ton in any one half-year.							
				Steamers of all sizes two-thirds of the above rates for sailing vessels.									
	Akaroa ...	Vessels from beyond the Colony, not having paid light dues at any port in New Zealand previously (on the same voyage or trip), to be charged same rates as Lyttelton.		Nil.		Nil.		Nil.		Nil.		Nil.	
	Timaru ...	Same as Akaroa.		Nil.		Nil.		As at Lyttelton.	1	Nil.		Nil.	
Otago ...	Dunedin ...	Sailing vessels from ports beyond the Australian Colonies	6	Sailing vessels without a tug	4	All vessels or boats plying for hire within the port, half-yearly	3	For each time the Harbourmaster or his deputy goes on board to appoint the place of anchorage of any vessel or to remove her from one place of anchorage to another	1	Ballast and water tank boats to be charged half-yearly per registered or measured ton ...	3d.	Masters or persons in charge of all vessels or boats plying for hire within the port	2 2 0
		All steamers from ports beyond New Zealand, and sailing vessels from the Australian Colonies ...	4	Steamers	3	All vessels trading beyond the limits of the port and exempt from pilotage, half-yearly	6						
		Steam and sailing vessels coastwise	1	Sailing vessels with a tug	3								

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Watermen.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charged both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats to which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.				d.		d.		£ s. d.		£ s. d.
Otago — *continued.*	Dunedin ...	...		...		All vessels trading beyond the limits of the port, and exempt from pilotage, half-yearly	2	...		...		...	
	Oamaru ...	Vessels from beyond the Colony, not having paid light dues at any port in New Zealand previously (on the same voyage or trip), to be charged same rates as at Dunedin.		Nil.		All vessels, half-yearly	4	Same as Dunedin.	1	Nil.		Same as Dunedin	
	Moeraki ...	Same as Oamaru.		Nil.		Same as Oamaru.	4	Nil.		Nil.		Ditto.	
	Waikouaiti ...	Ditto.		Nil.		Ditto.	4	Nil.		Nil.		Ditto.	
	Molyneux ...	Ditto.		Nil.		Ditto.	4	Nil.		Nil.		Ditto.	
	Kakanui ...	Ditto.		Nil.		Ditto.	4	Nil.		Nil.		Ditto.	
Southland ...	Bluff Harbour	Sailing vessels from ports beyond the Australian Colonies	6	Sailing vessels	3	All vessels or boats under 50 tons, plying within the port, or engaged in coasting only, half-yearly	6	For each time the Harbourmaster or his deputy goes on board to appoint the place of anchorage of any vessel, or to remove her from one place of anchorage to another	1	Water tank boats	1 0 0	Masters of tank boats ...	1 0 0
		All steamers from ports beyond New Zealand, and sailing vessels from the Australian Colonies ...	4	Steamers	2					Ballast boats ...	2 2 0	Masters of ballast boats ...	1 0 0
		Steam and sailing vessels coastwise	1	Half the above rates only to be charged on vessels going no further than the "outer anchorage."						Cargo boats ...	2 2 0	Masters of cargo boats ...	1 0 0
				Vessels under 50 tons exempt.						Watermen's boats	1 0 0	Watermen's boats	0 10 0
						All vessels or boats under 50 tons not plying within the port, or not engaged in coasting only, on arrival	2						
						For each time a vessel makes fast to and lies at the Government moorings ...	1						
						None of the above charges, whether separately or together, to exceed sixpence per ton in any one half-year.							

Appendix L.—*continued.*

Where to be Levied.		Light Dues.		Pilotage.		Port Charges.		Shifting or Harbourmasters' Fees.		Fees for Boat Licenses.		Fees for Licenses to Boatmen and Watermen.	
Province or District.	Port.	Charged at each time of entering Inwards only.	Per Ton Register.	Charges both Inwards and Outwards.	Per Ton Register.	Classes of Vessels which pay Port Charges, and how levied.	Per Register or Measured Ton.	Services for which Shifting Fees are charged.	Per Register or Measured Ton.	Classes of Boats for which Licenses are Issued.	Annual Charge.	Classes to whom Licenses are Issued.	Annual Charge.
			d.		d.		d.		d.		£ s. d.		£ s. d.
Southland—*continued.*	Invercargill ...	Rates the same as at Bluff Harbour, but no vessel is to be charged light dues for Dog Island at more than one port on any one voyage or trip.		Sailing vessels ... ... 6 Steamers ... ... 4 Vessels under 50 tons exempt.		All vessels plying within the port, or engaged in coasting only, half-yearly, in advance ... ... 3 All vessels not plying within the port, or not engaged in coasting only, on arrival 1 Not to exceed sixpence per ton in any one half-year.		Same as at Bluff Harbour	1	Same as at Bluff Harbour.		Same as at Bluff Harbour.	
	Riverton ...	Rates the same as at Bluff Harbour, but no vessel is to be charged light dues for Dog Island at more than one port on any one voyage or trip.		Sailing vessels ... ... 6 Steamers ... ... 4 Vessels under 50 tons exempt.		Port charges to be the same as at Bluff Harbour.		Ditto	1	Ditto.		Ditto.	

Note.—No pilotage shall be charged for New River (Invercargill) unless the Pilot Establishment is in proper working order, or a Pilot is taken round from Bluff Harbour.

Notes.—1. In addition to the Pilotage rates in the above Schedule there is a charge of 15s. per day for the first three days, and 10s. per day after the first three, for any period that a Pilot may be detained on board any vessel, whether by stress of weather, quarantine, or otherwise. (See "Harbour and Quarantine Regulations for the Ports of New Zealand," Clause 13, in *New Zealand Gazette* for 1868, p. 279.)

2. Where Municipal Corporations have been established under "The Municipal Corporations Act, 1867," and have adopted section 3 of Part X. of the thirteenth Schedule to the said Act (referring to boats and boatmen) the provisions of the Harbour Regulations regarding boats and boatmen, and the foregoing scale of License Fees, are by the said Act superseded.

3. There are licensed Adjusters of Compasses at Otago, Lyttelton, Wellington, Nelson, and Auckland; and at Otago, Wellington, and Nelson, special conveniences for swinging vessels have been fitted. The authorized scale of fees is as follows:—

For vessels under 50 tons	...	...	£3 3s.
„ from 50 to 100 tons	...	...	£4 4s.
„ from 100 to 300 tons	...	...	£5 5s.
„ from 300 to 500 tons	...	...	£6 6s.
„ over 500 tons	...	...	£7 7s.

4. By the Harbour and Quarantine Regulations for New Zealand it is provided (Clause 21) that "vessels in distress, and whaling vessels, putting into any port through stress of weather, or for water or provisions, or to refit, are to be exempt from all port dues and from pilotage, except where the services of a pilot are actually made use of."

Appendix N.

APPROXIMATE RETURN of the Cost of the several Harbour and Pilot Establishments of the Colony during the Financial Year 1868-9.

Province or District.	Approximate Total Cost of Harbour and Pilot Establishments.	Remarks.
	£ s. d.	
Auckland	2,976 16 8	With the exception of Westland (the information as regards which was received from the Chairman of the County Council), these amounts are taken from the Appropriation Acts and published Estimates for the several Provinces; the necessary fractions being taken in order to bring the amounts as nearly as possible correct for the year commencing 1st July, 1868, and ending 30th June, 1869.
Taranaki	491 0 0	
Hawke's Bay	744 0 0	
Wellington	2,605 17 0	The amount for Wellington includes £341 5s. for maintenance of Somes Island Light, and £220 for the Beacon Hill and Mount Victoria Signal Stations.
Nelson	3,430 15 0	
Marlborough	305 0 0	
Canterbury	2,461 5 0	
Otago	4,473 13 6	The amount for Nelson includes £1,438 for the Gold Fields Harbours.
Southland	2,338 11 8	
Westland	2,300 0 0	
Approximate Total for the Colony	22,126 18 10	
Approximate Total in 1867-8 ...	22,656 12 6	

Appendix P.

RETURN of Local Pilotage Exemption Certificates issued during the Financial Year 1868-9.

Province.	Name of Master to whom Certificate has been issued.	Name of Vessel for which Certificate has been granted.	Ports included in the Certificate.	Date of Issue of Certificate.
Auckland ...	J. McDougall ...	Duke of Edinburgh...	Auckland	24 July, 1868
,, ...	Daniel Sellars ...	Tauranga	,, ...	27 July, 1868
,, ...	A. Farquhar ...	Royal Alfred ...	,, Manukau, Kaipara, Port Waikato ...	14 August, 1868
,, ...	Charles Watson ...	Prince Alfred ...	,, Manukau... ...	17 August, 1868
,, ...	J. C. Norton ...	Excelsior	,, ,, ...	28 August, 1868
,, ...	D. McKenzie ...	Huntress	,, Russell	31 August, 1868
,, ...	J. McKenzie ...	Duke of Edinburgh...	,, ...	7 September, 1868
,, ...	G. Short	Fiery Cross... ...	,, Russell	10 September, 1868
,, ...	Wm. Cooper ...	Kate	,, ...	16 September, 1868
,, ...	Wm. R. Stephenson	Tell	,, ...	18 September, 1868
,, ...	Hannibal Marks ...	Duke of Edinburgh...	,, ...	21 September, 1868
,, ...	J. McKenzie ...	Aurora	,, ...	17 October, 1868
,, ...	J. Logan	Hero	,, ...	20 October, 1868
,, ...	R. Martin	Isabella	,, Russell	26 October, 1868
,, ...	John Calder ...	Island City... ...	,, ...	12 December, 1868
,, ...	John Howard ...	Lion...	,, Hokianga... ...	7 January, 1869
,, ...	J. McKenzie ...	Herald	,, Manukau, Russell, and Tauranga ...	9 January, 1869
,, ...	J. McDonald ...	Golden Isle... ...	Auckland	25 January, 1869
,, ...	G. Davies	Little Fred... ...	,, Manukau, Kaipara...	27 January, 1869
,, ...	Wm. Harris ...	Huntress	,, Russell	15 February, 1869
,, ...	James Riddle ...	Eucalyptus... ...	,, ...	20 February, 1869
,, ...	A. Chambers ...	Huntress	,, ,, ...	3 June, 1869
,, ...	F. Ohlson	Duke of Edinburgh...	,, ...	7 June, 1869
,, ...	D. H. McKenzie ...	Flirt	,, ,, ...	17 June, 1869
,, ...	F. W. Fletcher ...	Success	,, ,, ...	29 June, 1869
Canterbury...	J. Chadwick ...	P.C.E.	Lyttelton	29 December, 1868
Otago ...	J. Malcolm... ...	Wallace	Dunedin	6 July, 1868
,, ...	C. Hodge	Indus	,, ...	10 July, 1868
,, ...	J. Falconer... ...	Jane Anderson ...	,, ...	18 August, 1868
,, ...	C. Osborn	Elizabeth Curle ...	,, ...	7 September, 1868
,, ...	H. Robinson ...	Free Trader ...	,, ...	22 September, 1868
,, ...	H. Henton	Indus	,, ...	29 October, 1868
,, ...	Wm. Walker ...	Onehunga	,, ...	3 November, 1868
,, ...	H. Patching ...	Omega	,, ...	18 December, 1868
,, ...	Wm. Simpson ...	Record	,, ...	21 December, 1868
,, ...	Wm. Best	Emulous	,, ...	19 February, 1869
,, ...	J. W. Cumming ...	Hydra	,, ...	3 March, 1869
,, ...	J. Jameson... ...	Bengal	,, ...	4 April, 1869
,, ...	R. M. Jackson ...	Indus	,, ...	17 May, 1869

Appendix O.

RETURN of GENERAL PILOTAGE EXEMPTIONS, for Ports of more than one Province, which have been issued during the Financial Year 1868–9.

Number of Certificate.	Names of Masters to whom Certificates have been issued.	Names of Vessels for which Certificates have been issued.	Ports included in Certificate.	Remarks.
37	William Bendall ...	Star of the South ...	Auckland, Tauranga, Napier, Wellington, Lyttelton, Akaroa, Timaru, and Bluff.	
38	W. Seymour ...	Storm Bird ...	Auckland, Tauranga, Wellington, Lyttelton, Akaroa, Timaru, Oamaru, Dunedin, Bluff, Taranaki, Manukau	Renewal on change of ship.
39	Charles Ifwersen ...	Cleopatra ...	Wellington, Lyttelton, Akaroa, Timaru.	
40	Daniel Brown ...	Annie Brown ...	Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
41	James Stewart ...	Dunedin	Auckland, Kaipara, Wellington, Lyttelton, Akaroa, Timaru, Dunedin, Okarita, Hokitika, and Greymouth.	
42	John Paterson ...	Queen of the Isles...	Dunedin, Okarita, Hokitika, Greymouth, Picton.	
43	W. H. Bax ...	Rangitoto ...	Wellington, Lyttelton, Otago.	
44	M. Carey... ...	John Penn ...	Auckland, Wellington, Dunedin, Okarita, Hokitika, Greymouth, Nelson, Manukau.	
45	W. R. Williams ...	Anne Melhuish ...	Auckland, Wellington, Dunedin.	
46	A. Martin ...	Lady Don ...	Auckland, Lyttelton, Akaroa, Timaru.	
47	William Black ...	Crest of the Wave ...	Wellington, Lyttelton, Timaru, Oamaru, Dunedin, Okarita, Hokitika, Greymouth, Picton.	
48	William Kiddey ...	Princess Alice ...	Auckland, Lyttelton.	
49	George Mundle ...	Go-ahead ...	Russell, Auckland, Wellington.	
50	John Paton ...	Summer Cloud ...	Auckland, Lyttelton, Akaroa, Timaru, Dunedin.	
51	William Johnston ...	Challenge ...	Nelson, Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
52	R. H. Ferguson ...	Tararua	Wellington, Lyttelton, Dunedin, Bluff.	
53	John Christian ...	Bruce	Auckland, Wellington, Lyttelton, Akaroa, Timaru, Dunedin, Okarita, Hokitika, Greymouth, Nelson, New Plymouth ...	Renewal on change of ship.
54	James Hagley ...	Rangitoto ...	Auckland, Wellington, Lyttelton, Dunedin, Bluff, Manukau	Ditto.
55	A. Black	Cantero	Wellington, Lyttelton, Dunedin.	
56	F. Hepburn ...	Beautiful Star ...	Wellington, Lyttelton, Akaroa, Timaru, Dunedin, Bluff, Hokitika, Nelson.	
57	James McKenzie ...	Herald	Russell, Auckland, Tauranga, Napier, Wellington, Lyttelton, Dunedin, Manukau.	
58	T. B. Greig ...	James Paxton ...	Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
59	James Leys ...	Wainui	Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
60	G. Exans... ...	Ben Nevis ...	Auckland, Lyttelton.	
61	A. D. McGilivray ...	Murray	Nelson, Westport, Greymouth, Hokitika, Okarita.	
62	George Calder ...	Omeo	Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
63	Hugh Mackie ...	Rangitoto ...	Wellington, Lyttelton, Port Chalmers, and Bluff	Renewal on change of vessel.
64	W. Meiklejohn ...	Twilight	Russell, Auckland, Lyttelton, Manukau, Kaipara.	
65	T. Linklater ...	Wanganui ...	Manukau, New Plymouth, Wellington.	
66	E. Griffiths ...	Rifleman	Wellington, Lyttelton, Akaroa, Timaru, Dunedin.	
67	J. Hagley ...	Tararua	Auckland, Wellington, Lyttelton, Dunedin, Bluff, Manukau	Ditto.
68	T. Morton ...	Lady Don ...	Lyttelton, Akaroa, Timaru, Okarita, Hokitika, Greymouth.	
69	F. Renner ...	Rangatira ...	Auckland, Tauranga, Wellington, Lyttelton, Dunedin, Bluff, Picton, Nelson, Taranaki, Manukau	Ditto.
70	John Christian ...	Beautiful Star ...	Auckland, Wellington, Lyttelton, Akaroa, Timaru, Dunedin, Hokitika, Greymouth, Nelson, New Plymouth	Ditto.
71	Charles Frazer ...	Crest of the Wave...	Dunedin, Bluff, New River, Riverton, Okarita, Hokitika, Greymouth.	
72	Robert Thomson ...	Southern Cross ...	Auckland, Lyttelton...	This Certificate has not been taken up.
73	W. R. Williams ...	Haversham ...	Auckland, Wellington, Dunedin... ...	Renewal on change of vessel.
74	F. Hepburn ...	Bruce	Wellington, Lyttelton, Akaroa, Timaru, Dunedin, Bluff, Okarita, Hokitika, Greymouth, Nelson	Ditto.
75	T. Chrisp ...	Comerang ...	Russell, Auckland, Wellington, Lyttelton, Akaroa, Timaru, Dunedin	Ditto.

Appendix Q.

RETURN of MASTERS and ENGINEERS to whom CERTIFICATES of COMPETENCY have been issued during the Financial Year 1868-9.

Name.	Name and Position of Examining Officer.	Nature of Examination.	Class of Certificate.	Vessel for which Certificate has been issued.	Date of Issue of Certificate.	No. of Certificate.	Remarks.
Joseph Ellis ...	Captain Richards, Licensed Examiner, Auckland...	For Master...	Extended river	Clyde ...	July 8, 1868	148	
Coleman Phillips ...	" " " ...	"	River	Blue Nose ...	"	149	
Henry Worsp ...	Captain Johnson, Marine Department, Wellington	"	Sea-going	Lord Ashley ...	"	150	
H. B. Macmeikan ...	Not again examined	"	Extended river	Lioness ...	July 23, 1868	151	Issued without charge in lieu of No. 61.
William Lindsay ...	Captain Richards	"	River	Enterprise No. 1...	Aug. 3, 1868	152	
Andrew Cunningham	"	"	Extended river	Lady Bowen ...	"	153	
Peter Morris ...	Not again examined	"	"	Woodpecker ...	Aug. 13, 1868	154	Issued free in lieu of No. 144. Captain Morris is qualified to receive a Coasting Certificate without further examination.
Alexander Farquhar ...	"	"	Coasting	Royal Alfred ...	Aug. 28, 1868	155	Issued free in lieu of No. 59. Captain Farquhar is qualified for a Sea-going Certificate.
George Mundle ...	Captain Johnson	"	Sea-going	Go-ahead ...	Aug. 31, 1868	156	
Charles Philpot ...	Not again examined	"	River	Gemini ...	Sept. 22, 1868	157	Issued in lieu of No. 83.
James Ferguson ...	Captain Thomson, Harbour Master and Licensed Examiner, Otago	"	"	Lady of the Lake	Oct. 3, 1868	158	
Abraham Palmer ...	Not again examined	"	Coasting	Charles Edward ...	Oct. 27, 1868	159	Free, in lieu of No. 133.
William N. Thom ...	Captain Thomson	"	"	Rob Roy ...	Jan. 6, 1869	160	
George Wilson ...	Not again examined	"	"	Lioness ...	"	161	Free, in lieu of No. 97.
William D. Hargreaves	Captain Johnson	"	"	Lady Bowen ...	Jan. 13, 1869	162	
Francis Hepburn ...	Not again examined	"	"	Beautiful Star ...	Jan. 27, 1869	163	Free, in lieu of No. 145.
William Farquhar ...	Captain Richards	"	River	Maori Chief ...	Jan. 30, 1869	164	
John Christian ...	Captain Thomson	"	Coasting	Bruce ...	"	165	
Hannibal Marks ...	Not again examined	"	Extended river	Duke of Edinburgh	Feb. 5, 1869	166	Free, in lieu of No. 45.
Gordon McKinnon ...	Captain Thomson	"	River	Tuapeka ...	June 11, 1869	167	
John Christian ...	Not again examined	"	Coasting	Beautiful Star ...	June 12, 1869	168	
John Cameron ...	Captain Gibson, Harbour Master and Licensed Examiner, Lyttelton	"	River	Mullough ...	June 15, 1869	169	
William Cameron ...	" " " ...	"	"	Novelty ...	"	170	
Thomas Chrisp ...	Not again examined	"	Coasting	Comerang ...	June 29, 1869	171	Free, in lieu of No. 117.
Frederick Ohlson ...	Captain Richards	"	Extended river	Duke of Edinburgh	"	172	
Francis Hepburn ...	Not again examined	"	Coasting	Bruce ...	"	173	Free, in lieu of No. 163.
John Darling ...	"	For Engineer	Condensing engines, river service ...	Geelong ...	July 4, 1868	153	Issued free, in lieu of No. 40.
William Sharpe ...	James Stewart, Engineer Surveyor, Auckland ...	"	Non-condensing engines, extended river service	Enterprise No. 2...	July 31, 1868	154	
Hamilton McBride ...	J. Nancarrow, Engineer Surveyor for the Colony...	"	Condensing engines, coasting service	Lyttelton ...	"	155	
R. J. Smythe ...	" " " ...	"	Condensing, river	Favorite ...	"	156	
Samuel McCoskie ...	James Stewart	"	Condensing, extended river ...	Duke of Edinburgh	Aug. 3, 1868	157	
John Morton ...	Not again examined	"	Condensing, coasting	Star of the South	Aug. 15, 1868	158	Free, in lieu of No. 130.
Daniel Smith ...	"	"	" "	Wallace ...	Aug. 18, 1868	159	Free, in lieu of No. 103.

Appendix Q.

RETURN of MASTERS and ENGINEERS to whom CERTIFICATES of COMPETENCY have been issued during the Financial Year 1868-9—*continued.*

Name.	Name and Position of Examining Officer.	Nature of Examination.	Class of Certificate.	Vessel for which Certificate has been issued.	Date of Issue of Certificate.	No. of Certificate.	Remarks.
William Brown ...	Not again examined	For Engineer	Non-condensing, extended river ...	Woodpecker ...	Aug. 18, 1868	160	Free, in lieu of No. 88. Qualified for a Condensing Coasting Certificate.
Archibald Donald ...	,, ...	,,	Condensing, coasting	Royal Alfred ...	Aug. 28, 1868	161	Free, in lieu of No. 82.
Frederick Snowling ...	James Stewart	,,	Non-condensing, river	Maori Chief ...	,,	162	
Samuel Erdis ...	Not again examined	,,	Non-condensing, coasting ...	Go-ahead ...	Aug. 31, 1868	163	Free, in lieu of No. 74.
J. D. Beith ...	James Stewart	,,	Non-condensing, extended river ...	Lalla Rookh ...	Nov. 3, 1868	164	
Henry McGregor ...	J. Nancarrow	,,	Condensing, extended river ...	Moa ...	Jan. 14, 1869	165	
Thomas Ryan ...	,, ...	,,	Condensing, coasting	Wanganui ...	,,	166	
William Dean ...	James Stewart	,,	Condensing, extended river ...	Lady Bowen ...	Jan. 30, 1869	167	
Edward Williams ...	,, ...	,,	Non-condensing, extended river ...	Lalla Rookh ...	,,	168	
Alfred Bach ...	Not again examined	,,	Non-condensing, river	Gemini ...	Feb. 5, 1869	169	Free, in lieu of No. 124. Qualified for a Condensing Coasting Certificate.
Henry Ballans ...	,, ...	,,	,, ,, ...	Enterprise No. 1...	,,	170	Free, in lieu of No. 144. Qualified for a Non-condensing Extended River Certificate.
John Coppell ...	,, ...	,,	Condensing, coasting	Tauranga ...	,,	171	Free, in lieu of No. 54.
John Lamburn ...	J. Nancarrow	,,	Condensing, sea-going	John Penn ...	Feb. 8, 1869	172	
A. Cameron ...	,, ...	,,	Non-condensing, river	Alexandra ...	April 8, 1869	173	
J. Casley	J. Stewart	,,	,, ,, ...	Enterprise No. 1...	,,	174	
William Butler ...	J. Nancarrow	,,	Non-condensing, extended river ...	Yarra ...	May 31, 1869	175	
David G. Donald ...	Not again examined	,,	Non-condensing, coasting ...	Go-ahead ...	June 16, 1869	176	Free, in lieu of No. 109. Qualified for a Condensing Coasting Certificate.

Appendix R.

RETURN of STEAM VESSELS to which CERTIFICATES have been issued in New Zealand during the Financial Year 1868-9.

Name of Vessel.	Register Tonnage.	Horse-power of Engines.	Nature of Propeller.	Class of Certificate.	Nature of Engines.	Statutory No. of Surveys.	Actual No. of Surveys.	Trade in which Vessel is engaged, and General Remarks.
Enterprise No. 1	22	10	Paddle	River	Non-condensing	4	4	Plies in Auckland Harbour.
Enterprise No. 2	43	32	,,	Extended river	,,	4	4	Auckland to Thames.
Blue Nose ...	42	30	,,	River	,,	4	3	Waikato River. Laid up part of year.
Waipa	30	25	,,	,,	,,	4	2	Waikato River. Laid up at Manukau.
Maori Chief ...	15	26	,,	,,	,,	4	4	Tender to larger vessels at Shortland.
Gemini... ...	10	7	Twin screw	,,	,,	4	4	Auckland Harbour.
Clyde	27	32	Paddle	Extended river	,,	4	3	Auckland to ports in Hauraki Gulf. Part of the year laid up.
Tauranga ...	67	40	Twin screw	Sea-going	Condensing	2	2	Auckland, Russell, and Tauranga trade.
Midge	56	24	Screw	,,	,,	2	1	Has been altered to a sailing vessel.
Favorite ...	38	45	Paddle	Extended river	,,	2	2	Not plying. At present engaged in shifting buoys in Manukau Harbour.
Lady Bowen ...	26	34	,,	,,	,,	2	2	Auckland to Shortland. Has recently been classed as a high-pressure boat, and will be surveyed four times a year in future.
Duke of Edinburgh ...	51	35	,,	,,	,,	2	2	Auckland to Shortland.
Royal Alfred ...	89	60	,,	Sea-going	,,	2	2	Auckland to Shortland.
Lalla Rookh ...	23	14	,,	Extended river	Non-condensing	4	3	New vessel. Auckland to Shortland.
Go-ahead ...	70	30	Twin screw	Sea-going	,,	4	4	Auckland and Russell trade most of the year. At present laid up.
John Penn ...	122	50	,,	,,	Condensing	2	2	Formerly in West Coast trade; now Auckland to Shortland.
Star of the South	147	40	Screw	,,	,,	2	2	Coasting trade, mainly between Auckland, Russell, and Napier.
Comerang ...	152	60	Paddle	,,	,,	2	2	At present in the Auckland local trade.
Rangariri ...	about 48	20	Stern wheel	River	Non-condensing	4	2	Waikato boat. Laid up.
Wellington ...	261	80	Screw	Sea-going	Condensing	2	2	Coasting trade.
Lady Bird ...	220	70	,,	River	,,	2	1	Long laid up. Until thoroughly repaired is only allowed a River Certificate.
Rangatira ...	144	50	,,	Sea-going	,,	2	2	Coasting trade.
Storm Bird ...	67	30	,,	,,	,,	2	2	,, ,,
Ahuriri ...	130	50	,,	,,	,,	2	2	,, ,,
Phœbe	417	120	,,	,,	,,	2	2	,, ,,
Airedale ...	286	60	,,	,,	,,	2	2	,, ,,
Lord Ashley ...	296	80	,,	,,	,,	2	1	Coasting trade. Surveyed once in Sydney.
Wanganui ...	164	50	,,	,,	,,	2	1	Coasting trade. Surveyed once in Sydney.
Halcyon ...	24	25	Twin screw	Extended river	Non-condensing	4	4	Recently removed from Auckland to Lyttelton.
Betsy Douglas...	14	18	Paddle	River	,,	4	4	Lyttelton and Pigeon Bay. Now laid up.
Novelty ...	42	30	,,	,,	,,	4	4	Steam lighter, Lyttelton.
Mullough ...	41	15	Screw	,,	,,	4	4	,, ,,
Gazelle ...	47	30	,,	Extended river	,,	4	4	Lyttelton local trade.
Moa	47	25	,,	,,	Condensing	2	2	,, ,,
Maid of the Avon	12	10	Paddle	River	Non-condensing	4	2	Lyttelton Harbour. Has been dismantled.
Beautiful Star...	125	30	Screw	Sea-going	Condensing	2	2	Coasting, Dunedin and West Coast trade principally.
Wainui ...	87	25	,,	,,	,,	2	2	Coasting: Dunedin, Lyttelton, and intermediate ports.
Keera	146	50	,,	,,	,,	2	2	Coasting. Recently laid on between Wanganui and Manukau.
Wallace ...	56	40	Paddle	,,	,,	2	2	Coasting: Dunedin and Oamaru.
Tairoa	51	30	Screw	,,	Non-condensing	4	4	Coasting: Dunedin and neighbouring ports.
Geelong ...	137	70	Paddle	,,	Condensing	2	2	Employed as a tug in Otago Harbour.
Golden Age ...	78	60	,,	River	Non-condensing	4	4	Plies in Otago Harbour.
Peninsula ...	24	20	,,	,,	,,	4	4	,, ,,

Appendix R.—*continued.*

RETURN of STEAM VESSELS to which CERTIFICATES have been issued in New Zealand during the Financial Year 1868-9—*continued.*

Name of Vessel.	Register Tonnage.	Horse-power of Engines.	Nature of Propeller.	Class of Certificate.	Nature of Engines.	Statutory No. of Surveys.	Actual No. of Surveys.	Trade in which Vessel is engaged, and General Remarks.
Lady of the Lake	56	25	Paddle	River	Non-condensing	4	4	Plies in Otago Harbour, steam lighter.
Tuapeka ...	24	60	Stern wheel	,,	,,	4	4	Plies on Clutha River.
Antrim ...	6	30	Paddle	,,	,,	4	1	Lake Wakatip. Official Surveyor inspects once a year.
Expert ...	7	8	Screw	,,	,,	4	1	Lake Wakatip. Official Surveyor inspects once a year.
Lioness ...	60	60	Paddle	Sea-going	Condensing	2	2	Hokitika and West Coast Ports. Mainly employed as a tug.
Yarra	32	35	,,	River	Non-condensing	4	4	Hokitika. Tug and steam lighter.
Persevere ...	27	25	,,	,,	,,	4	4	,, ,, ,,
Bruce... ...	83	40	,,	Sea-going	Condensing	2	2	Hokitika and West Coast trade.
Dispatch ...	38	40	,,	,,	,,	2	2	Grey River. Tug and steam lighter.
Waipara ...	47	30	Twin screw	,,	Non-condensing	4	4	West Coast trade.
Wallabi ...	100	25	Screw	,,	Condensing	2	2	Buller and general West Coast trade.
Lyttelton ...	49	25	Paddle	Sea-going	,,	2	2	Nelson to Blenheim, and general coasting.
Lady Barkly ...	30	25	,,	Extended river	,,	2	2	Nelson and Blind Bay, and Massacre Bay.
Charles Edward	89	60	,,	Sea-going	,,	2	2	Nelson and West Coast.
Murray ...	57	25	Screw	,,	,,	2	2	,, ,,
Kennedy ...	110	36	Twin screw	,,	,,	2	2	,, ,,
Moutoa ...	60	16	Paddle	River	Non-condensing	4	1	Laid up at Nelson.
Woodpecker ...	24	8	,,	,,	,,	4	2	Wrecked at Patea.
Rob Roy ..	199	50	Screw	Sea-going	Condensing	2	1	General coasting. Only a short time in the Colony.

Appendix S.

RETURN of WRECKS on which INQUIRIES have been held under "The Inquiry into Wrecks Act, 1863," or which have been reported between 1st July, 1868, and 30th June, 1869.

Date of Casualty,	Name of Vessel, also Age and Class, when known.	Rig.	Register Tonnage.	Number of Crew.	Number of Passengers.	Nature of Cargo.	Nature of Casualty.	Number of Lives lost.	Wind.		Place where Accident occurred.	Finding of Court of Inquiry.	Remarks.
									Direction.	Force.			
1868. July 2	Florence ...	Ketch ...	51	4	...	General...	Stranded	...	On shore	Fresh ...	Waitangi Beach, Chatham Islands	That the vessel had been taken possession of and run on shore by the Hauhau prisoners.	She was afterwards repaired, but before she was ready for launching, a heavy sea carried her off the ways, and she became a total wreck.
„ 15	Pat the Rover, 7 years, not classed	Brig ...	79	6	1	Colonial produce	Stranded	...	Westerly	Fresh and squally	North Beach, entrance to Grey River	The accident was caused by the tow-line slipping; how, there is no evidence to show. No blame attached to the master or any one on board.	The vessel broke up.
„ 19	Bittern, 3 years	Cutter ...	40	5	...	Ballast ...	Stranded	...	Not	stated	Noumea, New Caledonia	Wreck caused by stress of weather, and vessel missing stays.	Believed to have become a total wreck.
„ 23	Daniel Watson, 7 years, not classed	Brig ...	143	10	...	Ballast ...	Dragged her anchors, drove on shore, and became a wreck.	...	N.E. ...	Gale ...	Shag Reef, within Lyttelton Harbour	Wreck caused by stress of weather. The mate in charge committed an error of judgment in not letting go the second anchor earlier than he did.	Total wreck.
Aug. 11	Annie, 1½ year	Schooner	16	2	...	General...	Foundered	...	N.W. ...	Strong ...	Off Cape Kidnappers, Hawke's Bay	An accident of the sea. No grounds for attributing blame or suspicion to any one.	Foundered in deep water. In rounding Cape Kidnappers she was kept rather near the shore, and struck the end of the reef.
„ 19	Taranaki, 3 years, A1	S.S. ...	298	32	84	General...	Ran on Boat Rock and afterwards foundered in deep water in Worser's Bay.	...	Baffling...	Light ...	Tory Channel, Cook Strait	The wreck must have been caused by an unusual eddy tide. Master and crew exonerated from all blame.	Measures are now (July, 1869) being taken by the purchasers of this wreck with a view to her recovery. She lies in about 17 fathoms. The Nautical Assessor was of opinion that the true cause of this wreck was not clearly brought out at the inquiry.
„ 22	Jane Elkin ...	Ketch ...	28	4	...	Partly laden, general	Ran on shore.	...	S.W. ...	Moderate ...	North Spit, entrance to Grey River	Wreck caused by the master attempting to sail across the Grey bar when it was impassable. The master exonerated, as he was compelled to run in, from there being neither water nor provisions on board.	The vessel is believed to have become a total wreck.
Sept. 5	Mary Cumming, 7 years	Brigantine	106	7	...	General...	Stranded	...	...	Light ...	Hokitika Bar ...	Accidental. No blame attached to the master.	The vessel was got off but slightly damaged.
„ 6	Clyde, 10 years	Cutter ...	14	2	...	General...	Collision	...	...	Light ...	Alongside Auckland Wharf	Accident due to an error of judgment on the part of the master of the schooner "Morea," in mooring outside of so small a craft as the "Clyde." The master of the "Clyde" not blamed.	Total wreck. The accident mainly due to some misunderstanding of the orders of the Harbour Master. The "Clyde" had a berth at the wharf, and the "Morea" claimed it, and hauled alongside but outside the "Clyde." When the tide ebbed, the "Morea" grounded and fell over on the "Clyde."

Appendix S.—*continued.*

Date of Casualty.	Name of Vessel, also Age and Class, when known.	Rig.	Register Tonnage.	Number of Crew.	Number of Passengers.	Nature of Cargo.	Nature of Casualty.	Number of Lives lost.	Wind.		Place where Accident occurred.	Finding of Court of Inquiry.	Remarks.
									Direction.	Force.			
1868. Sept. 7	Zephyr, 2 years	Brigantine	134	7	...	General...	Stranded	...	From eastward, and off the land	Moderate ...	Hokitika Bar ...	The accident resulted from the bad state of the bar.	After being discharged she was got off, only slightly damaged.
„ 18	Thane of Fyfe	Schooner	121	8	2	General...	Stranded on a sunken reef	...	N.E. ...	Strong ...	Lanthala Island, Fiji, bore N.E. by E., distant 6 miles from place of accident	No report.	Total wreck. Not sufficient evidence as to the causes of the accident.
„ 27	Alice, 2½ years	Schooner	22	4	...	General...	Drove ashore from her anchors	...	S.E. ...	Gale ...	Moeraki Bay ...	Accident caused by stress of weather. Master exonerated from all blame.	Was afterwards got off and taken round to Port Chalmers.
Oct. 8	Folly, 8 years ...	Ketch ...	17	2	...	General...	Stranded	...	N.N.W...	Strong ...	Boulder Bank, near entrance to Nelson Harbour	Casualty due to stress of weather, and the vessel not answering her helm. Master exonerated from blame.	Believed to have been recovered. The evidence goes to show that the weather was not so bad as represented, and that the vessel could not have been well handled.
„ 12	Nelson, 5 years	P.S. ...	88	15	11	General...	Stranded and became a total wreck	...	N.W. ...	Moderate ...	Entrance to West Wanganui	Wreck attributed to accident. Master and crew appear to have done all they could to save the vessel.	Total wreck. The evidence would lead to the inference that she was somewhat overladen. The proximate cause of the casualty was the fouling of the paddle shaft by a hawser which was washed out of the fore part of the ship by a heavy sea which broke on board.
„ 12	Fancy	Schooner	28	5	...	Colonial produce	Total wreck	4	N.W. ...	Heavy gale ...	Rocks at entrance to Greville Harbour, D'Urville's Island	The wreck was accidental, and caused by stress of weather.	Broke up. Only one man succeeded in getting on shore. After seven days' exposure he was rescued by Captain John Falconer, of the schooner "Jane Anderson," whose kindness deserves the highest approbation.
„ 15	Elizabeth, 3 years	Cutter ...	33	3	...	General...	Stranded	...	Westerly	Heavy gale ...	One mile to the northward of Totara River, West Coast, Middle Island	The wreck was unavoidable, and caused by stress of weather.	This vessel had lost her (apparently only) anchor and cable off Hokitika on October 2nd, and the master beat about the roadstead waiting for a chance to enter the river till the 15th, when some of her sails being blown away in a heavy gale, she became unmanageable and drove ashore. She became a total wreck.
„ 16	Satellite, 1 year	Cutter ...	27	3	...	Colonial produce	Stranded	...	N.W. ...	Strong and squally	Half a mile north of Totara River	The wreck was caused by stress of weather. There was no want of care on the part of the master.	She became a total wreck. Had the master used the lead from time to time, he would have found that he was much nearer a lee-shore than he imagined, and he might, perhaps, have been able to work her off.

Appendix S.—*continued.*

Date of Casualty.	Name of Vessel, also Age and Class, when known.	Rig.	Register Tonnage.	Number of Crew.	Number of Passengers.	Nature of Cargo.	Nature of Casualty.	Number of Lives lost.	Wind.		Place where Accident occurred.	Finding of Court of Inquiry.	Remarks.
									Direction.	Force.			
1868. Oct. 16	Isabella, 3 years	Brigantine	82	6	...	General...	Stranded	...	N.W. ...	Strong and squally	Three miles north of Hokitika	Casualty unavoidable, and not caused by neglect of master and crew.	This vessel was employed to lighter ocean steamers. Her moorings parted during the gale; she lost some sails, and could not keep to sea. Apparently she was not sufficiently well found in ground tackle for her peculiar work. She became a total wreck.
„ 24	Ceres, 5 years...	Brigantine	91	7	1	Ballast ...	Stranded	...	S.W. ...	Moderate ...	Buller Bar ...	The accident was caused by the parting of the tow-line, mainly through the bad handling of the towing steamer. The master of the "Ceres" was blamed for not anchoring when the tow-line parted. The master of the towing steamer was censured for continuing his voyage without rendering so much assistance to the "Ceres" as he might have done.	She was recovered and repaired.
„ 27	Crest ...	Ketch ...	22	3	1	Telegraph poles	Total wreck	2	...	Light ...	Near Akaroa Heads	The wreck can only be accounted for by supposing that the steersman, the only person on deck, had fallen asleep, and that the vessel drove before the wind on to the rocks.	Vessel broke up. In consequence of J. B. Barker, a seaman and part owner of the craft, having run away with the only boat, the master and the passenger lost their lives. An attempt was afterwards made to rescue them, but the sea had increased so much that nothing could be done.
Nov. 19	Yarra, 4 years	P.S. ...	32	6	18	...	Stranded and abandoned	...	N.W. ...	Moderate ...	Hokitika Bar ...	Accident caused by the vessel attempting to enter the river rather late on the tide. Master exonerated from blame.	She was abandoned and sold, but has since been repaired, and is now running.
Dec. 6	Tyne, 18 years	Schooner	33	4	...	Wool ...	Total wreck	...	N.W. ...	Strong ...	Within the entrance to Wellington Harbour	The vessel was lost through her missing stays when too near the lee-shore to wear round or anchor. The Court could not agree with the Nautical Assessor as to whether the master was or was not to blame.	The vessel broke up in a few days. She had no flags on board for making the usual signals of distress.
„ 8	Clarendon, 21 years	Brig ...	157	8	3	Ballast ...	Stranded	...	S.W. ...	Strong ...	Six miles north of Hokitika	She sprang a leak, and was necessarily run on shore to save life.	Believed to have become a total wreck.
1869. Feb. 14	St. Vincent, 4 years, A1	Ship ...	834	21	1	Ballast ...	Stranded	20	S.E. ...	Gale ...	Palliser Bay, Cook Strait	Wreck due to an error in judgment on the part of the master, in attempting to work to windward against a southerly gale, instead of either standing into Cloudy Bay or running back to Wellington.	Had the master, who was quite unacquainted with the coast, taken refuge in Cloudy Bay, this lamentable wreck would in all probability have been avoided.
„ 27	Ida Zeigler, 14 years, 3-3 in French Lloyd's	Ship ...	878	29	...	Wool three-fourths loaded	Stranded	...	Easterly	Gale ...	Meanee Spit, Hawke's Bay	Wreck due to the vessel being supplied with inferior cables, and to an error of judgment on the part of the Harbour Master.	The "Ida Zeigler" had her own starboard cable shackled to the Government mooring. Her cable parted, and she drove on shore and became a total wreck.

Appendix S.—*continued.*

Date of Casualty.	Name of Vessel, also Age and Class, when known.	Rig.	Register Tonnage.	Number of Crew.	Number of Passengers.	Nature of Cargo.	Nature of Casualty.	Number of Lives lost.	Wind.		Place where Accident occurred.	Finding of Court of Inquiry.	Remarks.
									Direction.	Force.			
1869. Feb. 27	Fiery Cross, 1 year	Schooner	72	6	...	Timber ...	Stranded	...	West ...	Strong ...	Within Mangrove River, Mercury Bay	She drove from her anchors through stress of weather. No blame attaches to the master.	Not known whether she was recovered. It may be inferred from the whole evidence that she was insufficiently found in ground tackle.
„ 28	Little Fred, 21 years	Schooner	131	7	...	Partially laden, general merchandise	Stranded	...	S.W. ...	Gale ...	Five miles north of Kaipara Harbour	The loss was caused by stress of weather. No blame attaches to the master.	Became a total wreck.
„ 28	Woodpecker, 2 years	P.S. ...	24	4	...	...	Stranded	...	Westerly	Strong ...	Mouth of Patea River	During a heavy freshet a drift log caught the vessel on the bow and caused her anchor to come home. No blame attached to the master.	Total wreck. Seeing that drift wood was coming down the river, the master would have shown more judgment had he taken extra precautions to secure the vessel, instead of trusting to a single anchor.
March 26	Black Hawk, 3 years	Schooner	44	4	...	Ballast ...	Capsized	...	W.N.W.	Fresh and squally	Oyster Bay, Tory Channel	An accident. Judging from the evidence, every ordinary care and precaution was taken by the master, and all on board are exonerated from all blame.	She was probably under-ballasted. She was afterwards recovered.
May 14	Necromancer, 17 years	Schooner	16	2	...	Coals ...	Sprang a leak, and was run on shore	...	N.N.W.	Fresh ...	Farewell Spit ...	The accident was unavoidable, and the master was justified in beaching the vessel to save life.	Broke up. She was old, and perhaps rather heavily laden.
„ 24	Susan Jane ...	Barque ...	180	10	...	Timber ...	Drove on shore from her anchors	...	...	Calm ...	Timaru Heads ...	A casualty of the sea. No one to blame.	Believed to have broken up. A heavy swell was rolling into the roadstead, and there was not wind enough to work the vessel.
„ 24	Collingwood, 20 years	Barque ...	400	12	...	Wheat ...	Drove on shore from her anchors	...	...	Calm ...	Timaru Heads ...	Ditto.	Ditto.
June 19	Grayling, 5 years	Cutter ...	13	2	...	Stores ...	Supposed to have foundered	2	S.E. ...	Gale ...	About four miles south of Wairoa River, Hawke's Bay	Supposed to have foundered.	The bodies of the drowned men, and portions of the wreck and cargo were washed up on the beach.

NEW ZEALAND
MIDDLE ISLAND

CASCADE POINT TO GREY RIVER

REDUCTION TO SHEW THE ERRORS IN THE ADMIRALTY CHARTS
DETECTED BY THE RECENT SURVEYS

Coast line from Admiralty surveys colored ——
recent surveys —·— ——

SCALE
(Approximate)
NAUTIC MILES
2 4 6 8 10 20 30

G. H. Wells
Colonial Marine Surveyor

171 E Long.
170° 30′ E
42° 30′ S Lat
170° E
43° S
169° 30′ E
169° E
43° 30′ S
168° 30′ E

GREY R.
TEREMAKAU R.
HOKITIKA R.
WANGANUI R.
ABUT Hd
OKARITO
WAIAU R
COOK
BOLD Hd.
JACKSON'S Hd

TABLE OF ERRORS

	HOKITIKA		ABUT HEAD		YELLOWCLIFFS	
	LAT. SOUTH	LONG. EAST	LAT. SOUTH	LONG. EAST	LAT. SOUTH	LONG. EAST
Position on Charts	42° 49′ 55″	170° 54′	43° 12′ 45″	170° 9′	43° 26′ 10″	169° 50′ 40″
Position by Survey	42° 42′ 52″	170° 58′ 51″	43° 6′ 5″	170° 16′ 59″	43° 24′ 50″	169° 49′ 46″
Difference being error in Charts	+ 7′ 23″	+ 4′ 51″	+ 6′ 40″	+ 7′ 59″	+ 1′ 20″	+ 54″
Value of error in nautic miles	7.8		8.86		1.5	

Note. The abovementioned positions are the most important of those as yet finally reduced

MARINE DEPARTMENT, NEW ZEALAND.

GRAPHIC METHOD,

OF EXHIBITING THE DIRECTION AND AMOUNT OF THE DEVIATIONS OF SHIPS' COMPASSES

Being an adaptation and combination of the Graphic Methods introduced by J.R. Napier, Esq.r and Admiral Ryder.

James Mc Balfour
Colonial Marine Engineer
Wellington N.Z. June 1869

FORM A.

Record of Observations for determining the Deviations of the Binnacle compass of the s.s. "Ahuriri" swung at Port Chalmers, 30th May 1869

SHIP'S HEAD by the CORRECT MAGNETIC COMPASS	SHIP'S HEAD by the Steering COMPASS	SHIP'S HEAD by the CORRECT MAGNETIC COMPASS	SHIP'S HEAD by the Steering COMPASS
NORTH	N ½ E	SOUTH	S by E
N by E	N by E ½ E	S by W	S ½ W
NNE	NNE	SSW	SSW ½ W
NE by N	NE by N ½ N	SW by S	SW by S ½ S
NE	NE	SW	SW ½ W
NE by E	NE by E	SW by W	SW by W ½ W
ENE	ENE	WSW	WSW
E by N	E by N ½ N	W by S	W by S ½ S
EAST	EAST	WEST	WEST
E by S	E by S ½ S	W by N	W by N ½ N
ESE	ESE	WNW	WNW
SE by E	SE by E ½ E	NW by W	NW by W ½ W
SE	SE	NW	NW
SE by S	SE by S ½ S	NW by N	NW by N ½ N
SSE	SSE	NNW	NNW
S by E	S by E ½ E	N by W	N by W ½ W

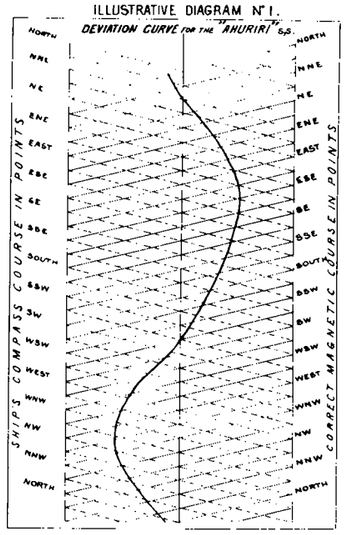
FORM B.

Record of Observations for determining the Deviations of the ship's compass of the s.s. "Jane" Swung at Auckland 11th Feby 1869

SHIP'S HEAD by the Steering COMPASS	SHIP'S HEAD by the CORRECT MAGNETIC COMPASS	SHIP'S HEAD by the Steering COMPASS	SHIP'S HEAD by the CORRECT MAGNETIC COMPASS
NORTH	North	SOUTH	S by E ½ East
N by E	N by E ½ E	S by W	S ½ W
NNE	NNE ½ E	SSW	S ½ W ½ W
NE by N	NE ½ N	SW by S	SW ½ S
NE	NE by E ½ E	SW	SW by W ½ W
NE by E	NE ½ E	SW by W	SW ½ W
ENE	E by N ½ N	W SW	W by S ½ S
E by N	E ½ N	W by S	W ½ S
EAST	E by S ½ S	WEST	WNW ½ W
E by S	E ½ S	W by N	W ½ N
ESE	ESE	WNW	WNW
SE by E	SE by E	NW by W	NW by W
SE	SE ½ E	NW	NW ½ W
SE by S	SE by S ½ S	NW by N	NW
SSE	SSE	NNW	NNW ½ W
S by E	S by E ½ E	N by W	N ½ W

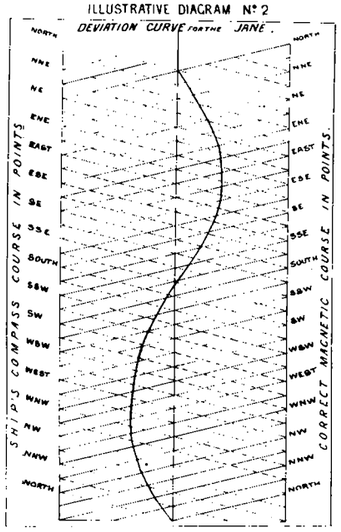
ILLUSTRATIVE DIAGRAM N° 1.

DEVIATION CURVE FOR THE "AHURIRI" S.S.



ILLUSTRATIVE DIAGRAM N° 2.

DEVIATION CURVE FOR THE "JANE".



FORM C.

TABLE OF CORRECTED COURSES

for the steering compass, on board the s.s. "Jane" Captain Thwaites as ascertained by swinging at Auckland on 11th Febry 1869

TO MAKE A COURSE by MAGNETIC	STEER BY THE Steering COMPASS	TO MAKE A COURSE by MAGNETIC	STEER BY THE Steering COMPASS
NORTH	North	SOUTH	S ½ E
N by E	N ½ E by E	S by W	S by E ½ E
NNE	NNE ½ E	SSW	S by E ½ E
NE by N	NE by E ½ E	SW by S	SW by S ½ S
NE	NE by E	SW	SW by W ½ W
NE by E	NE ½ E	SW by W	SW ½ W
ENE	ENE	WSW	WSW ½ W
E by N	E by N ½ N	W by S	W by S ½ S
EAST	EAST ½ N	WEST	WEST ½ W
E by S	E by N ½ N	W by N	W by N ½ N
ESE	ESE ½ E	WNW	WNW
SE by E	SE by E ½ E	NW by W	NW by W ½ W
SE	SE by E	NW	NW by W
SE by S	SE ½ E	NW by N	NW ½ W
SSE	SSE ½ E	NNW	NNW ½ W
S by E	S by E ½ E	N by W	N by W ½ W

Signature of Operator

Licensed Adjuster.

NOTE. For Deviations see other side.

FORM D.

TABLE of DEVIATIONS for every Point of the Compass for which the Steering COURSES are given on the other side, to facilitate the ascertaining of the correct bearings of objects from the Vessel

NOTE. When a Bearing is taken & any object not right ahead the deviation of the SHIP'S HEAD must be read & the correction for the object corrected by the Deviation corresponding to the direction of her head.

OBSERVE. When the Deviation is EASTERLY it must be added towards the South in Bearings on the EAST half (that is towards the RIGHT in all cases) — WESTERLY Bearings to be added towards the South on the WEST half and towards the North on the EAST half (that is towards the LEFT in all cases)

SHIP'S HEAD by COMPASS	DEVIATION	DIRECTION of DEVIATION	SHIP'S HEAD by COMPASS	DEVIATION	DIRECTION of DEVIATION
NORTH	½ E	W	SOUTH	¾ W	E
N by E	½	W	S by W	¾ East	
NNE	1		SSW	¾ East	
NE by N	1½	E	SW by S	1	
NE	1½ East	+	SW	¾	W
NE by E	1¾	+	SW by W	½	+
ENE	1¾	+	WSW	1¼ East	+
E by N	2	+	W by S	1½ East	+
EAST	2	+	WEST	2	+
E by S	2 Less	+	W by N	2½ Less	+
ESE	1½	+	WNW	2½	+
SE by E	1¼	+	NW by W	2¾	+
SE	1¼ Less	+	NW	2½	+
SE by S	1¾	+	NW by N	2	+
SSE	1½ Less	+	NNW	1¾ Less	+
S by E	1	+	N by W	1½ East	+

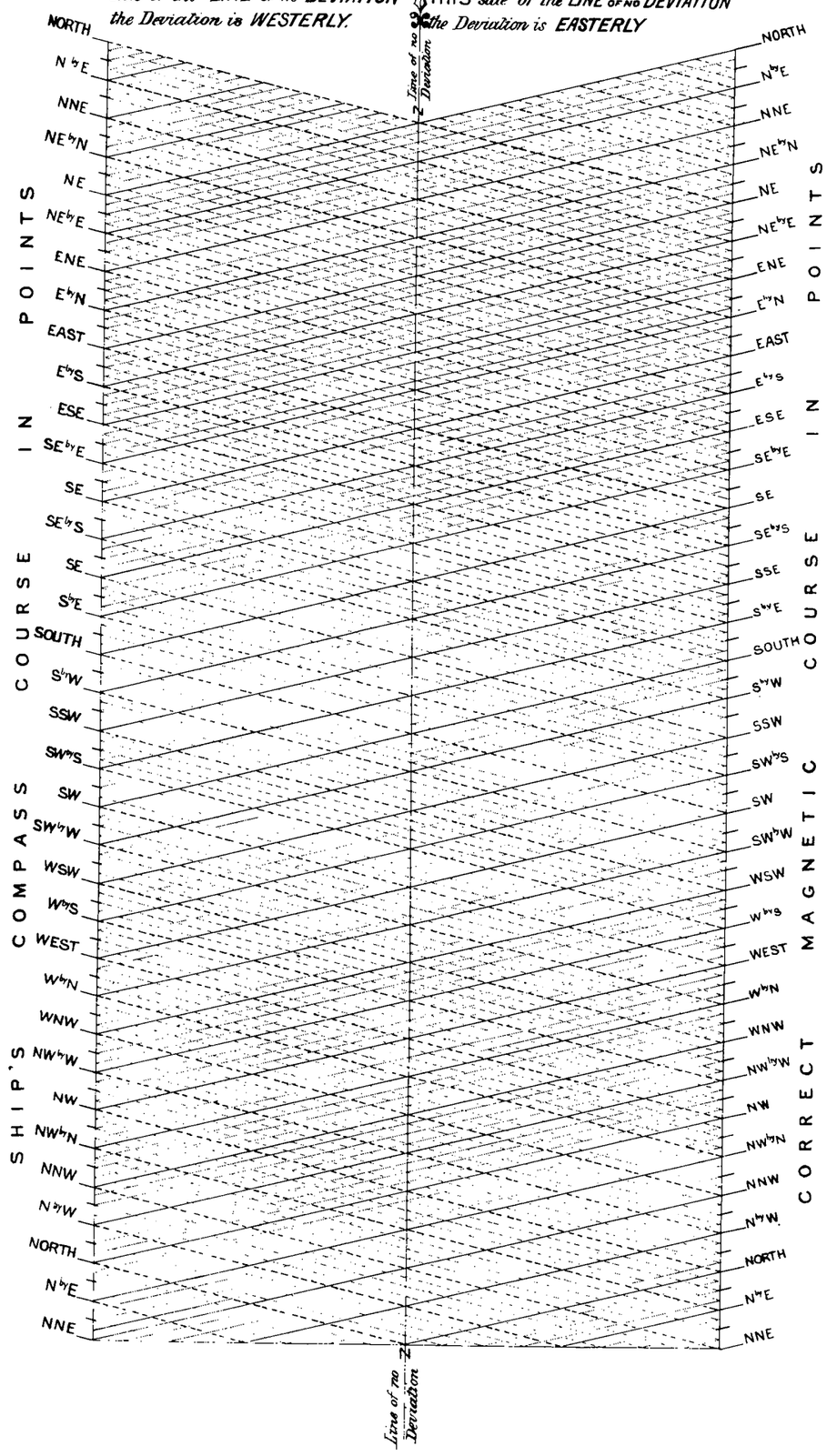
Signed

Licensed Adjuster of Compasses.

DIAGRAM.

Note. When the Deviation curve is on THIS side of the LINE OF NO DEVIATION the Deviation is WESTERLY.

Note. When the Deviation curve is on THIS side of the LINE OF NO DEVIATION the Deviation is EASTERLY



General Remarks.

In order properly to ascertain the amount and direction of the local deviation of the compasses of any vessel, she should be moored in such a manner that, by means of hawsers, she can be swung completely round and checked on any desired azimuth. Means must be provided for ascertaining the correct magnetic bearing of any azimuth, and the corresponding reading of the compass or compasses under examination must be carefully noted. When the vessel is checked or steadied with her head towards the points of a correct magnetic compass, Form A is the most convenient for recording the observations; when she is steadied on the points of her own compass, the result should be recorded on Form B. (These forms are filled up as examples, with the actual results obtained in swinging the "Ahuriri" and the "Jane" respectively, for compass examination.)

Explanation of the Diagram.

The centre line of the diagram, or "line of no deviation," is a straight line, divided into one hundred and twenty-eight equal parts, representing points and quarter-points; it is, in short, the development of the edge of a compass card. Through these divisions, continuous lines are drawn inclining downwards towards the left, and dotted lines inclining downwards towards the right: the continuous lines are taken to represent the divisions of a correct magnetic compass, and are lettered as such on the *right* of the diagram; while the dotted lines, which are to represent the divisions of the actual compass card of any vessel, are lettered on the *left* of the diagram.

As will be seen by inspection, the continuous lines and the dotted lines of the same name intersect on the centre line, or "*line of no deviation*;" but owing to the inclination of the lines, any deviation of four points or less, either to the east or west, can be represented on the diagram by the intersections of the continuous and dotted lines.

To draw the Deviation Curve.

RULE.—Mark on the diagram by a pencil arcos the point of intersection of the continuous line representing any point (or fraction) of a correct magnetic compass and the dotted line representing the corresponding point (or fraction) of the ship's own compass, as found in the "Record of Observations" (Form A or B). Repeat this process for every point observed, and through the points so marked draw a pencil curve with a free hand. This curve should be baked in when finally adjusted to the satisfaction of the operator.

It should be noted that when the vessel has been swung to the points of a correct compass, and the results recorded in the Form A, all the intersections must be on the *thick continuous lines* representing *points* of a *correct compass*; and all fractional readings must be on (or between if the card have been read to 8ths) the dotted lines.

When, however, the results have been recorded in the Form B, all the intersections must be on the *thick dotted lines* representing *points of the ship's compass*; and the fractional readings must be on or between the continuous lines.

EXAMPLE.—To construct the curve for the binnacle compass of the "Ahuriri" (illust. Diagram No. 1): Trace the thick continuous line from "North" on the right side of the diagram downwards towards the left, and trace the dotted line from N.E. on the left side of the diagram downwards towards the right, until their point of intersection is found, which mark with a cross.

Trace the thick continuous line from N. by E. on the right of the diagram downwards towards the left, and the dotted line from N. by E. ½ E. on the left of the diagram downwards towards the right, till their intersection is found; mark as before, and so on.

When a reading is given to 8ths, the intersection will fall half-way between two of the dotted lines. Thus, in constructing the "Ahuriri's" curve, the pencil mark must be made on the continuous line representing correct mag. N.E. by N., half-way between the dotted line representing ship's compasses N.E. by N. ¼ N. and the dotted line representing ship's compasses N.E. by N. ¼ N.

On the full-sized diagram, the distance between any two lines can easily be bisected by the eye.

Uses of the Curve.

In order to avoid unnecessary complication, no allusion has been made to "Deviation" in the above directions for drawing the curve: when the curve has been laid down, the deviations for a correct compass or for the vessel's own compass can be measured from the diagram with ample accuracy, and their *directions* ascertained with *certainty* by simple inspection.

The curve is also available for finding the corresponding correct and ship's compass courses for any point or fraction which has not been actually tested; it will even give a good approximation to the deviations and courses at any part of the card from observations on a comparatively small number of points. Should, however, the vessel not be swung to every point, it is essential that the N.E., S.E., S.W., and N.W. points of her own compass should be examined; and, after these, the cardinal points are next in importance.

The curve may be used by the master for finding his proper steering courses, though it is generally more convenient to supply them to him in a tabular form, any blanks in the observations being filled up by measurements from the curve.

Examples.

1. To find the deviation for any point.

RULE.—On the dotted line representing the point if it be a ship's compass point, or if it be a correct compass point on the continuous line, measure the distance from the intersection of the curve to the centre line or line of no deviation, or simply count the number of quarter-point lines which cross the given line between the centre line and the curve (making allowance for any fraction), and the sum will be the deviation—*westerly*, if the curve be to the *right* of the centre line, *westerly*, if it be to the *left* of it.

EXAMPLE I.—What is the deviation of the "Ahuriri's" compass when she is heading N.E. on a correct compass? (See Diagram No. 1.)

The curve crosses the continuous line representing N.E. correct mag. three-fourths of the distance between the *dotted* line of N.E. and the dotted line of N.E. by N., and the curve is on the right of the centre line; the answer consequently is ¾ E.

EXAMPLE II.—What is the deviation of the "Ahuriri's" compass when she is heading N.E. *by her own compass?*

In this case the curve is on the right of the centre line, and it intersects the dotted line representing N.E. on the ship's compass on the line of N.E. by E. correct magnetic, or one point from the centre. The answer is 1 point E.

EXAMPLE III.—What is the deviation of the compass when the "Jane" is heading W. *by her own compass?* (See Diagram No. 2.)

Here the curve is to the *left* of the centre line, and it intersects the dotted line representing West on the ship's compass 1¼ point (or six quarters) from the centre line. The answer consequently is 1¼ point W.

2. To find the corresponding correct compass and ship's compass courses for any non-observed point.

RULE—The points which *intersect* in the curve are *always* corresponding points.

EXAMPLE IV.—Suppose only every second point to have been observed for the "Jane's" compass (i.e., the points lettered to the left of Diagram No. 2), when the "Jane" is being steered E. by N. by her own compass, how is her head by a true compass?

The curve intersects the dotted line of E. by N. ¼ths of a point to the South of the continuous line of East: the answer therefore is E. ¼S.

EXAMPLE V.—I want to make a course W. correct magnetic, how must the "Jane" be steered?

The curve intersects the continuous line of W. correct magnetic halfway between the dotted lines of W. by N. and W.N.W., and the answer is W. by N. ¼N.

Form C, which is the same as Form A but differently headed, is the steering-course card, and Form D is the deviation card used in New Zealand. As courses are usually taken from a chart on which correct magnetic courses are shown, it is convenient to have correct magnetic courses in the first column of the Steering Table; but inasmuch as *deviations* are seldom used except to correct the observed bearings of objects, it is proper to have the *ship's own compass courses* in the first column of the Deviation Table.

When the vessel has been swung by a correct compass and the results recorded in Form A, the steering-course card is a simple copy of the original observations (any omitted points being filled in with the aid of the curve). When she has been headed to the points of her own compass, and the results recorded on Form B, the whole of the steering courses must be taken from the curve in the manner of Example V.

When the observations have been recorded in the Form A, the Deviation Table can only be filled up by measurement from the diagram in the manner of Example III. When the Form B is adopted, the deviations can be got from it directly, but there is much less risk of error in noting the direction of the deviation if the diagram is used.

Observe.—The Deviation Table, Form D, is *always* to be filled up from measurements on the *dotted lines*, as in Example III.

Note.—In correcting bearings of objects for deviation, it is the deviation due to the direction of the vessel's head which must be applied, not the deviation corresponding to the actual bearing.

Mariners should consequently observe that it is *essential* to note the direction of the ship's head at the time that the bearing of any object is taken, and both should be recorded in the log.