

MR. E. A. SHRIMPTON
NEW ZEALAND'S CHIEF TELEGRAPH ENGINEER
A BIOGRAPHICAL NOTE.



Mr. E. A. Shrimpton, M.I.E.E., Chief Telegraph Engineer, Wellington, N.Z.

Born at Timaru, New Zealand, in 1869, Mr. Shrimpton commenced duty with the Post and Telegraph Department in his native town in 1882. His connection with the Engineering Branch of the New Zealand Post and Telegraph Department dates from 1899, since when he has successively filled various engineering positions including those of Assistant Electrician and Assistant Telegraph Engineer, Christchurch and at Auckland; and District Telegraph Engineer, Wellington. He is now head of the New Zealand Telegraph service.

New Zealand controls three high power wireless stations and four low power coast stations. One of the former is situated at Apia, in the Samoan group, having been captured from the Germans in 1914 by

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the first New Zealand Expeditionary Force. Two of the latter are isolated stations, one being at Chatham Islands and another at Raratonga in the Cook group. New Zealand holds a mandate over a number of small islands in the Pacific, and it is part of the Department's programme that these should ultimately be connected by wireless with the centres of civilisation.

Mr. Shrimpton was the first man in New Zealand to receive a wireless message from the sea. That was as far back as 1904 when Mr. H. M. Dowsett, of the Marconi Company, was conducting demonstrations at the Christchurch Exhibition. As a telegraph engineer he was keenly interested in the (then) new method of telegraphy and, while experimenting with the apparatus, was astonished to receive signals which obviously did not come from the corresponding Exhibition station. After replying and asking where the signals came from he was told they were from H.M.S. *Pegasus*, away out at sea, about 80 miles. The operator in the *Pegasus* was equally astonished at finding another wireless station so far from home. In those days the sending apparatus consisted of the well-known ten-inch induction coil and the receiving apparatus of the coherer and Morse printer.

Mr. Shrimpton left New Zealand last month on a visit to the United Kingdom and America where, amongst other duties, he will investigate the latest developments in wireless telegraphy and telephony.

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High power wireless stations erected in New Zealand on the *Telefunken* system during the year 1914, are now being equipped with a new type of condenser especially designed and built in Sydney by Amalgamated Wireless (Australasia) Limited. Those familiar with the old system will know that a characteristic feature

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is the Leyden jar condenser which, in high power stations, has a capacity of from 10,000 to 12,000 *centimètres*.

The peculiar type of glass used for these was exclusively a product of Austria, and although in Great Britain and the United States some attempt was made to reproduce it, the demand apparently was not sufficient to warrant the expenditure. Apart from the very high cost and their extreme fragility the general adoption of this type of condenser was handicapped by

the difficulty of replacements. In the New Zealand stations all these obstacles will be removed by the use of the Australian-made article, which is of plate glass and especially constructed to handle large amounts of power. The only replacements which will be required from time to time are glass plates costing not more than one or two shillings each. The glass is of selected quality and each plate is tested under a potential of several thousand volts.

"WIRELESS HOUSE" SOCIAL FUNCTIONS

A growing feature of Sydney's "social-commercial" life is the Wireless House monthly ball, the second of which took place in St. James' Hall on July 3, and proved an even stronger attraction than the inaugural event. On such occasions the purely "business" element entirely disappears and one encounters all manner of pleasant surprises.

The girl from the telephone switch who, earlier in the day, has practically bitten off one's head for daring to ask for the same number twice, is now ready to nestle into one's arms and guide her partner's clumsy feet through the intricacies of the two-step. The managing director may be seen gaily pirouetting with some self-reliant young lady from the Accounts Department, what time the assistant manager, camouflaging his lack of terpsichorean *technique* beneath a mask of reckless enthusiasm, scampers wildly around with the girl who manipulates the adding machine.

Here, immaculately groomed, is the senior wireless officer from some big Frisco liner, demonstrating the latest jazz-step picked up during shore-leave in the Californian capital; in the next couple may be recognised the Company's much be-lettered accountant, gyrating, with professional dignity, in the embrace of the factory superintendent's steno.

Usually the dance numbers are interspersed with vocal and elocutionary items, and conclude with a buffet supper.

To the casual onlooker it would seem that these informal functions go far towards promoting happier relations between the various departments, cementing those which may already exist and developing

that "team" spirit which is the cornerstone of all successful business enterprise.

The success of these *soirées* has led to the inauguration of a monthly dinner at some popular city restaurant, the first being held on July 16, when some thirty or forty male members of the staff met at the Pekin Café for a sort of round-table conference presided over by the managing director, Mr. E. T. Fisk. In the after-dinner proceedings a distinct innovation was provided, the head of each of the various departments being called upon to deliver an impromptu address concerning his own particular job. A musical programme followed.

Not to be overshadowed by mere males, the lady members of the staff are now planning a series of afternoon-tea parties at the Hotel Australia. The first of these will be held on July 31, under the chaperonage of Mrs. Fisk.

The Royal Society of New South Wales

The Section of Industry of the Royal Society of New South Wales has elected as its chairman, Mr. Ernest T. Fisk (M. Inst. Radio Engineers).

In a lecture recently delivered before that body Mr. Fisk stated that wireless might now be used over distances of thousands of miles, and could be connected with the ordinary land network. It would thus be practicable to conduct a wireless telephone service between Australia and New Zealand. Australia's need for direct communication with England was strongly emphasised; such communication must not be dependent upon relays. There was, he concluded, no practical difficulty to face; these had already been overcome and, at his experimental station at Wahroonga, messages were being received daily from England, France and the United States.



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During the last few days two instances of the practical value of wireless have impressed themselves upon the casual news paper reader, both cases being vessels in distress in Australian waters. Apparently the man in the street never fully appreciates the utility of any one particular branch of science until some more or less dramatic incident on the high seas—the Crippen case for instance—arouses him from apparent indifference to a staunch propagandist. Hence, in a sense, the lessons of the disabled oil steamer *Havre* and the tug boat *Champion* are welcomed as highly educative factors.



The "Havre's" Wireless Officer, Mr. Arnold Egerton Lawrance.

So wide has been the publicity accorded these two matters and so recent their sequel that one is content merely to point a moral, *i.e.*, what *might* have happened had wireless not been introduced into our everyday affairs.

The *Havre*, unable to indicate her position or call for assistance, might quite conceivably have drifted on the high seas until such time as (powerless to steer and keep head-on) she would be caught beam-on in the trough of a wave and capsized. Even remaining afloat, there would, sooner or later, be the grim terrors of hunger, thirst and cold. Fortunately this vessel, although of only small tonnage and manned by a

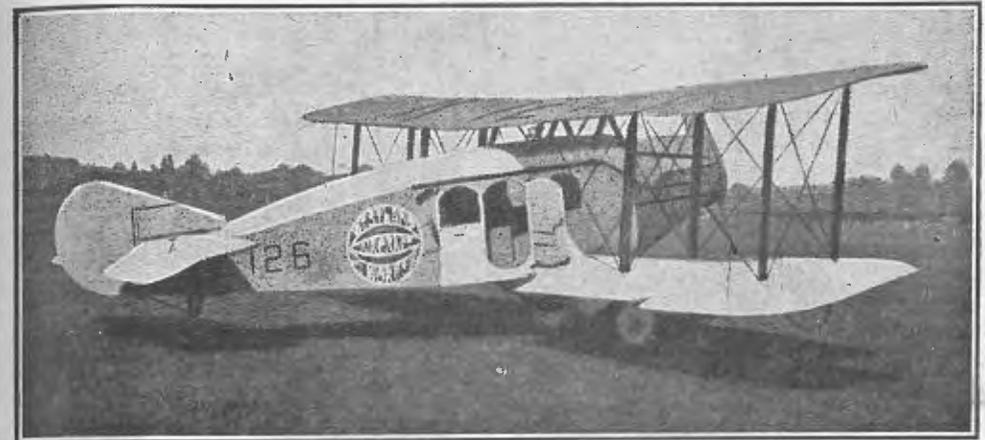
few hands, carried a Marconi equipment and was thus able to instantaneously notify her plight to wireless stations on shore.

Immediately on receipt of her call, arrangements were made to send relief from Sydney by the tug boat *Champion*. In connection a noteworthy engineering feat was performed by Mr. P. Moore Farmer and other members of the staff of Amalgamated Wireless Ltd., in equipping the tug boat with a complete installation in some eight or nine hours. To make certain of maintaining communication in so small a vessel, Mr. Farmer personally manned the *Champion's* wireless station and, from the time she left Sydney, kept in daily touch with shore stations and was thus informed from time to time as to the position of the distressed ship. She was also in frequent communication with the *Havre*, but as the latter was obliged to conserve her electric power for the purpose of reporting her position to Sydney the conversation between herself and the tug boat was, of course, slightly one-sided. The *Havre's* messages to Sydney were, however, easily relayed to the *Champion*.

Even with the aid of wireless communication the extreme difficulty of picking up a disabled vessel on the high seas was demonstrated by the fact that the tug boat was out for several days before actually taking the *Havre* in tow. This is, of course, in no way attributable to the inefficiency of wireless, but to the difficulty of navigating a small boat in the open sea and steering her to a certain position of latitude and longitude. Could the *Champion's* departure from Sydney have been delayed a little longer she would have carried a wireless compass and thus ascertained the direction from which the *Havre's* messages were originating, instead of having recourse to the usual methods of observing by sun, stars and magnetic compass.

A further emergency call was made on the same Company on June 10, when the tug boat *Heroic* was equipped to go to the *Champion's* assistance. By the splendid efforts of the Company's Equipment Superintendent, Mr. D. Campbell, the *Heroic* was fitted up in record time and one of its most experienced operators, Mr. W. J. Washbourne volunteered to take charge of her station.

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REMOVAL OF WIRELESS RESTRICTIONS

HOW AMENDED ACT AFFECTS THE EXPERIMENTER

The Wireless Institute of Australia has more than justified its existence. Due very largely to the persistent efforts of its Council, the Commonwealth Parliament has at least passed an Amendment of the W/T Regulations, and to-day sees the removal of nearly all the impediments to and restrictions in the use of wireless apparatus for experimental and instructional purposes which existed during the war.

These regulations, the text of which is printed on another page, provide that any natural born British subject, male or female, residing in Australia may obtain a licence to use wireless telegraph and wireless telephone apparatus for the purposes above named.

This freedom of the ether is given to a type of enthusiast who has existed in large numbers in the past and will be considerably augmented in the future.

Before the war there were about one thousand people in Australia using wireless apparatus for experimental purposes. The scope and possibilities of the science have extended so widely during the past five years that it will attract a much larger section than before. Clearly the new amendment is not intended to impose any undue restrictions on the individual, thus proving that those responsible for drafting the amendment now realise that the ether is a common highway, and that all have equal rights to its use.

Fortunately for the future of wireless development, the antiquated idea that universal ether could be fenced off, labelled and ticketed by some particular section of the community, or by some department of the Government accustomed to enjoying unchallenged monopolies, has largely disappeared. At last the truth is realised, that the supposititious ether fills all space and permeates all matter and is infinite in itself—that this thing must not and cannot be hamstrung by a limited conception of what it really is. Moreover, the possibilities of the science itself are almost as unlimited as its extent, because in only a few years we have developed from the comparatively old systems of telegraphing across a few hundred miles, to the greatly

superior methods of the present day which enable us to listen to Melba at a distance of over 1,000 miles, or to pick up messages across the whole circumference of the world.

And yet it is in its infancy.

The Government, therefore, has at last recognised that one cannot make any hard and fast rule to control the ether, and has acted accordingly.

There are still limits, and many people consider that the existing limits are greater than are necessary, but so long as they are broadly interpreted by the Department or authority which has to administer the regulations, it is generally thought that no serious difficulty will arise—provided that as the knowledge and application of the art advance the Government will reopen the question and broaden the scope.

Now having this freedom, how is it to be best applied? In Australia there are already six Associations of wireless experimental enthusiasts banded together as The Wireless Institute of Australia, each State having its own individual division. Investigation of wireless phenomena, the construction of amateur wireless apparatus and general experimental work, appeal to a very large section of people of all grades and ages. There is the purely scientific individual, who finds his recreation in straight-out research: he will be occupied apparently with investigating some of the more recondite phenomena, particularly the fascinating subject of the Electronic Theory. Then, in greater numbers, there will be the experimenter who, while content to accept the results of the pure scientist, wishes to experiment with their practical applications—in that field alone, the possibilities for intellectual enjoyment, pleasant recreation and so forth, are very great.

Then again there is the man of the more mechanical tendencies who will employ himself very largely with the design and construction of parts of apparatus, taking a pride in his workmanship and finish, introducing novelties and improvements in that apparatus, so that it can be used for the practical work of the experimenter, as ap-

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plied to the fundamental laws discovered by the scientist. In addition to those, but including many of them, is the even greater section which will find in this class of pastime, educational occupation introductory to the many branches of Physics.

Undoubtedly this new army of semi-unrestricted experimenters will be large, and the advantage will come chiefly from the educational side; while enjoying pleasant recreation they will at the same time be adding to the advances of the valuable art and, what is even more important, increasing that debt which the wireless scientist of to-day owes to the unrestricted experimenter of the past.

The New South Wales Division of the Wireless Institute in Australia, rejoicing in its new freedom, and realising its possibilities, has decided to organise the work of all its members along definite lines. For that purpose it has drawn up a complete scheme, dividing the State into areas so that all existing members and all future members will be able either to experiment

AMENDMENT OF WIRELESS TELEGRAPHY REGULATIONS.

(Statutory Rules 1916, No. 212, as amended by Statutory Rules 1917, No. 136, 1918, Nos. 17 and 164, and 1919, No. 134.)

1. Regulation 3 is repealed.

Licences.

2. Regulation 4 is repealed and the following inserted in its stead:—

"4. (i.) Licences under section 5 of the Act may be (a) ship licences or (b) experimental and instructional licences. Licences shall be in accordance with the forms prescribed at the end of these Regulations.

"(ii.) A ship licence shall be granted only in respect of a ship station on an Australian ship.

"(iii.) An experimental and instructional licence may be granted to technical schools and similar institutions and to persons for instructional purposes or scientific investigation of wireless telephony phenomena, subject to the applicant producing satisfactory proof of his competency to conduct experiments scientifically.

"(iv.) A licence shall be for a period of one year from the date thereof and may be renewed from time to time."

Fee for Licences.

3. Regulation 5 is repealed and the following inserted in its stead:—

"(5) (i.) The fee for a ship licence shall be one pound and shall be paid in advance.

"(ii.) The fee for an experimental and instructional licence shall be two pounds and shall be paid in advance."

Applications for Licences.

4. Regulation 6 is repealed and the following inserted in its stead:—

"6. (i.) An application for a ship licence

on their own lines, or take part in the collective work of the Institute. It is expected that this will result in giving a valuable and most interesting training to a large number of people, in facilitating the collection of very valuable data relating to conditions of wireless communication throughout the State, while it will build up a splendid reserve of men, all of whom will have a very sound acquaintance with the prospects of wireless communication and who will be available for service in this valuable art of warfare.

Men who have been experimenters for one or two years, can be trained in a couple of weeks to a state of efficiency, and so build up a reserve of trained men whose services can be called upon at any time.

The value of wireless in the next war will be infinitely greater than that of the last, because past operations were hampered by a dearth of trained men, and our wireless squadrons consisted largely of young men who were put into the field after the very shortest periods of training as wireless operators.

must be in writing, and must set out the following particulars:—

(a) the name of the ship in respect of which the licence is applied for;

(b) the port in Australia at which the ship is registered;

(c) the system of wireless telegraphy to be used on the ship.

(ii.) Before granting the licence the Minister may require the applicant to furnish such additional particulars as he thinks necessary.

"(iii.) Experimental and instructional licences shall only be granted to applicants who are natural-born British subjects, and who reside in Australia.

"(iv.) An application for an experimental and instructional licence must be in writing and must set out the following particulars:

(a) Name in full, age, residence, previous training and present occupation, nationality, and parents' nationality;

(b) The scientific, technical, practical or other grounds upon which it is desired to obtain a licence;

(c) Complete diagram of connection and description of the apparatus it is intended to use."

5. Regulation 8 is repealed and the following inserted in its stead:—

"8. (1.) Every ship licence shall be made out in triplicate. Two parts shall be issued to the licensee and the other retained in the Department of the Navy.

"(ii.) Before the licence is issued to the applicant he shall execute the part of the licence to be retained in the Department."

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6. Regulation 11 is amended by inserting after the word "ship" the words "or land."

7. Regulation 24 is repealed.

Prescribed Form of Experimental Licence.
No.

Dated 19

COMMONWEALTH OF AUSTRALIA.

Licence to use Wireless Telegraphy or Telephony for experimental and instructional purposes.

To all to whom these presents shall come, I, the Honourable the Minister or Member of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-19*, send greeting:

Whereas of the State of (hereinafter called "the licensee"), is desirous of establishing, erecting, maintaining, and using a system of wireless telegraphy or telephony as defined in section 2 of the *Wireless Telegraphy Act 1905-1919*, with the sole object of conducting demonstrations or experiments in wireless telegraphy or telephony: And whereas by reason of the provisions of the *Post and Telegraph Act 1901-1916* and of the *Wireless Telegraphy Act 1905-1919* it is unlawful to establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy or telephony except under and in accordance with a licence granted in that behalf by the Minister or member of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-1919*, and it is also unlawful, save as in the said Acts provided, to transmit telegrams or other communications by telegraph within the Commonwealth of Australia.

And where as the licensee has made application for this licence:

Now I, the Minister or Member of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-1919* aforesaid, in pursuance of the *Wireless Telegraphy Act 1905-1919*, and in exercise of all powers and authorities enabling me in this behalf, do hereby grant to the licensee from the date of these presents until these presents are determined as hereinafter provided, licence and permission—

- (i.) To establish, erect, maintain, and use at the station specified in the first and second schedules hereto appliances for the purpose of transmitting and receiving messages by means of wireless telegraphy or telephony (hereinafter called "the licensed appliances"), provided that the appliances installed at the station shall be of the character specified in the said first and second schedules, and operated in accordance with the conditions specified.

Provided that the licensed appliances shall be worked and the messages shall be transmitted and received solely for the purpose of conducting demonstrations in wireless telegraphy or telephony at public lectures or conducting experiments in wireless telegraphy or telephony for the advancement of science and for no other purpose whatever.

And I do hereby declare that the said licence and permission is granted on and subject to the

following conditions and provisions, which may be altered, added to, or modified hereafter to meet public interests or requirements or emergencies.

Interpretation Clause.

1. In these presents (and in the schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction (that is to say):—

- (1) The expression "wireless telegraphy" has the same meaning as in the *Wireless Telegraphy Act 1905-1919*.
- (2) The terms "telegraph" and "telegraph line" have the same meaning as in the *Post and Telegraph Act 1901-1916*.
- (3) The expression "naval signalling" means signalling by means of any system of wireless telegraphy or telephony between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph or telephone station, whether on shore or on any ship.
- (4) The expression "His Majesty's Navy" or "His Majesty's ships" includes ships being part of the Naval Forces of any part of His Majesty's Dominions.
- (5) The expression "Australia" includes the territorial waters of the Commonwealth of Australia and of any territory of the Commonwealth of Australia.
- (6) The expression "military signalling" by means of any system of wireless telegraphy or telephony between two or more sets of appliances for wireless telegraphy or telephony operated by or on behalf of the Military Forces of the Commonwealth of Australia, or between one such set of appliances and any other wireless telegraph or telephone station.
- (7) The expression "Minister" means the Minister or Member of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-1919*.

Restrictions on use of Apparatus.

2. The licensed appliances shall not be used by the licensee or any other person either on behalf or by permission of the licensee for the transmission or receipt of messages except messages authorised by this licence.

Licensee to Observe Regulations as to Wireless Telegraphy.

3. The licensee shall observe the provisions of any regulations from time to time made under the *Wireless Telegraphy Act 1905-1919* so far as the same are applicable to the licensee.

As to Interference.

4. (a) The licensed appliances shall be so worked as not to interfere with the working of any wireless telegraph or telephone station established in Australia by or for the purposes of the Minister for the Navy or any Department of the Commonwealth of Australia, or for commercial purposes, and in particular with the transmission or receipt of any messages between or at wireless telegraph or telephone stations established as aforesaid on land and wireless telegraph or telephone stations established on



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ships at sea. On no account shall His Majesty's ships be called by means of the licensed appliances.

(b) With a view to preventing such interference as aforesaid the licensee and every person acting on his behalf or by his permission shall comply with all directions which shall be given to the licensee by the Minister or prescribed by the Minister with respect to avoiding interference between one wireless telegraph or telephone station and another.

(c) The licensed appliances shall not without permission, in writing, from the Minister, or an officer thereunto authorised by him, be altered in respect of any of the particulars mentioned in the first and second schedules hereto.

(d) The licensee shall at all times indemnify the Commonwealth of Australia and the Minister against all actions, claims, and demands which may be brought or made by any corporation, company, or person in respect of any injury arising from any act licensed or permitted by these presents.

Protection of Naval and Military Signalling.

5. (a) The licensee shall not (either by himself or by any person acting on his behalf or by his permission), by the transmission of any message by means of the licensed appliances or otherwise by the use of the licensed appliances, interfere with naval or military signalling.

(b) Whenever the operators of the said station of the licensee perceive, through the medium of the appliances used by them, that naval or military signalling is proceeding, they shall refrain from using the licensed appliances until all indication that naval or military signalling is proceeding shall have ceased.

(c) These provisions for the protection of naval or military signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

Provision as to Secrecy.

6. Neither the licensee nor any person acting on his behalf or by his permission shall divulge to any person (other than properly authorised officials of the Commonwealth of Australia or a competent legal tribunal), or make any use whatever of any message coming to the knowledge of the licensee or any such person as aforesaid, and transmitted by naval or military signalling or by any system of wireless telegraphy or telephony provided or maintained by or for the purposes of the Minister for Navy or any Department of the Commonwealth of Australia or by any licensee of the Minister other than the licensee.

Power of Minister to Inspect Appliances.

7. Officers of the Royal Australian Naval Radio Service and persons thereunto authorised by the Minister may from time to time and at all reasonable times enter upon the station or other premises in the possession or occupation of the licensee, for the purpose of inspecting, and may inspect any appliances fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy or telephony and all other telegraphic or telephonic instruments and appliances fixed or being in such stations respectively and the working and the user of such appliances and telegraphic or telephonic instruments respectively.

Interference with Telegraph Lines of the Postmaster-General.

8. (a) All appliances used or intended to be used under the licence shall be so established, erected, maintained, and used as not either directly, or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working, or user of any telegraph line of the Postmaster-General which may from time to time exist, or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or use thereof.

(b) In case any telegraph line of the Postmaster-General shall be damaged or the efficient working or use thereof shall be wholly or partially interrupted or otherwise interfered with, and the Chief Electrical Engineer for the time being of the Postmaster-General's Department shall certify in writing under his hand that such damage, interruption, or interference has been caused directly or indirectly by any appliances used under this licence, or by anything done by or on behalf or with the permission of the licensee in relation thereto, the licensee shall on demand pay to the Postmaster-General all costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraph lines so as to restore the same to efficient working order, and in adding thereto or substituting therefor either temporarily or permanently any other telegraph line, if the said Chief Electrical Engineer shall certify that such addition or substitution is reasonably required.

(c) For the purpose of this article, the expression "telegraph line" has the same meaning as in the *Post and Telegraph Act 1901-1916*, and the expression "telegraph line of the Postmaster-General" includes a telegraph or telephone line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Commonwealth of Australia or other body or person.

Licence not to be Assigned.

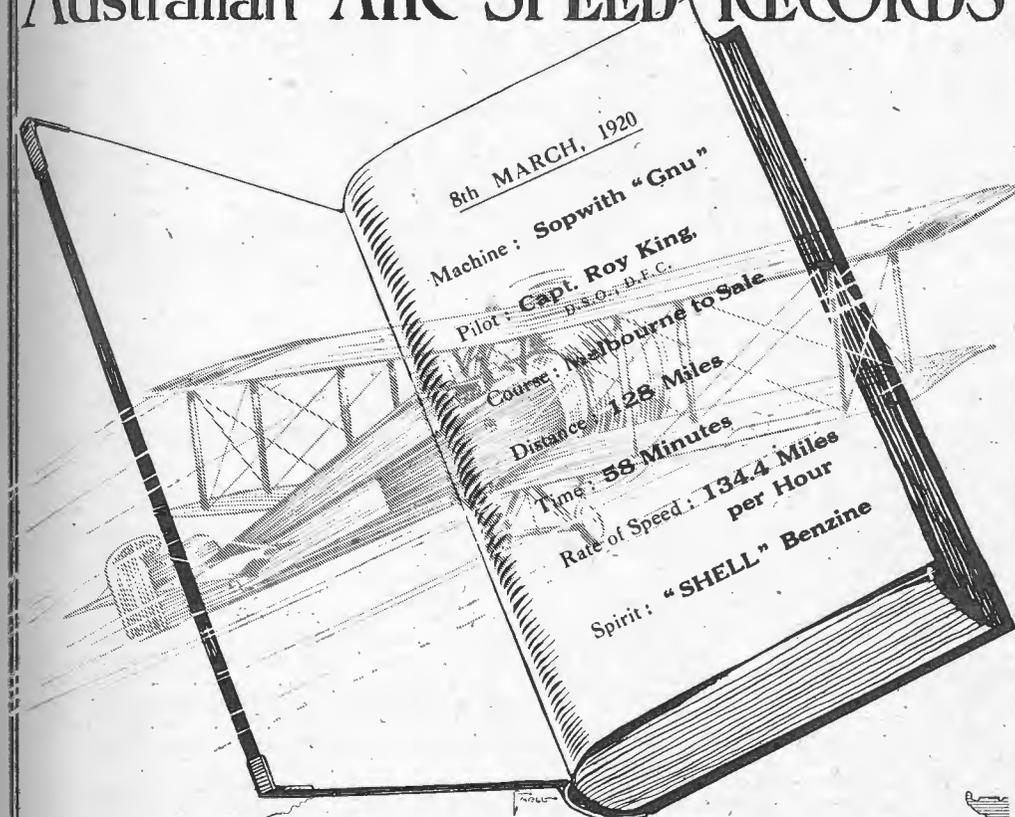
9. Except with the consent in writing of the Minister the licensee shall not assign, underlet, or otherwise dispose of or admit any other person or body to participate in the benefits of the licences, powers, or authorities hereby granted or any of such licences, powers, or authorities.

Power to Take Possession of or Control Appliances Upon Emergency.

10. (a) If and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient that His Majesty the King shall have control over the transmission and receipt of messages by the licensed appliances, it shall be lawful for the Minister to call upon the licensee to hand over to him on behalf of His Majesty the King so much of the licensed appliances as is within Australia, or any part thereof, and if the said licensee shall comply with the demand the Minister or any person authorised by him may enter upon and take possession of the station specified in the first and second schedules and use the same together with all appliances and instruments thereon.

(b) The Minister shall, during the period the possession and use of the said station, appliances, and instruments are retained on behalf of His Majesty the King, reimburse to the

THE FIRST PAGE in the History of Australian AIR-SPEED RECORDS



MELBOURNE TO SALE

at 134.4 Miles per Hour

SHELL

THE SPIRIT OF AVIATION

licensee all wages and salaries paid by the licensee to persons employed in connection with the said station, provided that the employment of such persons is necessary for the proper upkeep of the said station, and provided further that such wages or salaries are at the same rates as previously paid by the licensee for similar services.

(c) In the event of the licensee refusing to hand over the said station and appliances on demand, the Minister may immediately thereupon cancel this licence without prejudice to any steps the Governor-General in Council may think fit to take to obtain possession of the said station and appliances.

Schedules.

11. The technical details of the herein licensed station are contained in the first schedule hereto; and the complete scheme of connections authorised to be employed is shown in the second schedule hereto.

Licence Fee.

12. (1) The licensee shall pay to the Minister for and in respect of the licence hereby granted a fee of two pounds (£2) for each year or part of a year the licence is in force in respect of the station at which the licensed apparatus is installed.

(2) The fee shall be payable to the Minister annually in advance.

Provision for Revocation of Licence.

13. The Minister may at any time in his absolute discretion by notice in writing revoke and determine these presents and cancel the licence or permission hereby given at the end of twenty-four hours from the time of service of such notice, and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly, but without prejudice to any remedy of the Minister under any covenant or provision herein contained on the part of the licensee to be observed and performed.

Proviso as to Compensation.

14. In the event of these presents and the licence or permission hereby given being revoked and determined by the Minister under the power hereinbefore contained or any other power thereunto enabling him, the licensee shall not be entitled to any compensation or damages by reason of the determination.

Licence not to Affect Commonwealth Rights.

15. Nothing in these presents contained shall prejudice or affect the right of the Commonwealth of Australia from time to time to establish, erect, extend, maintain, and use any system or systems of telegraphic or telephonic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as it shall in its discretion think fit, neither shall anything herein contained prejudice or affect the right of the Commonwealth of Australia from time to time to enter into agreements for or to grant licences relative to the working and user (sic) of telegraphs or telephones (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of Australia by means of wireless telegraphy or telephony or by any other means with or to any person or persons whomsoever, upon such terms as it shall in its discretion think fit, and (save as in this licence

expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the *Post and Telegraph Act 1901-1916* or by the Minister by or under the *Wireless Telegraphy Act 1905-1919*.

Notices, &c.

16. Any notice, request, or consent (whether expressed to be in writing or not) to be given or made by or for the Minister under these presents may be under the hand of the Secretary for the time being of the Department being administered by the Minister, and may be served by sending the same by registered letter addressed to the licensee at the usual or last-known place of residence or business of the licensee, and in such case the time of service shall be deemed to mean the time when in the ordinary course of post it would have been delivered to the licensee at such place; and any notice to be given by the licensee under these presents may be served by sending the same by registered letter addressed to such secretary at his official address within the Commonwealth of Australia.

17. The licensee may communicate with any experimental radio-telegraph station provisionally authorised or fully licensed by the Minister for experimental purposes, providing that such communication does not interfere with the conduct of W/T signalling.

In witness whereof the Minister of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-1919* has hereunto set his hand and seal the day and year first hereinbefore written.

Schedule One.

CHARACTER OF APPLIANCES.

1. Name of Licensee and Address of Station.....
2. Description of Transmitting Appliances.....
3. Description of Receiving Appliances.....
4. Wave Length to be Employed in Transmitter.....
5. Maximum Watt energy permitted to be employed in Transmitter.....
- Type of aerial, height, construction.....
- Nature and voltage of primary power.....
- Transformer; ratio of windings.....
- Spark gap.....
- Particulars of transmitting oscillator.....
- Condenser—Capacity of.....
- Form of coupling.....
- Details of earth connections.....

Schedule Two.

Complete scheme of connections and aerial system authorised to be employed in the herein licensed station.

This drawing, purely diagrammatic, shows the circuits authorised to be employed in both the transmitter and receiver.

Signed, sealed, and delivered by the Minister or Member of the Executive Council for the time being administering the *Wireless Telegraphy Act 1905-1919* in the presence of—.....

This licence is accepted by me under the provisions and terms and on the conditions set out.

Signed, sealed and delivered by the said licensee in the presence of—.....

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FOR THE WIRELESS EXPERIMENTER

EARTH SYSTEMS

A SIMPLE METHOD OF INCREASING THE APPROXIMATE RESISTANCE

BY
GEORGE APPERLEY.

The vital importance of a good earth in conjunction with the aerial for radio work is well known and emphasised in all standard works on the subject, but how many experimental stations equipped with high grade and modern apparatus are rendered more or less inefficient by superfluous resistance in this section of the system? In many stations the earth wire can be traced to the water tap. This method of securing an earth connection does give results, but how much better will the station work if a better earth connection is secured? Probably the most perfect earth possible is that obtained by the hull of an iron vessel afloat in sea water, but even this possesses a certain amount of resistance. The aim of the experimenter should be to secure contact with the earth with as little resistance as possible and in such a manner as to ensure its value remaining unaltered. Provided an earth system is composed of three similar sections its approximate resistance may be measured and thus some idea obtained of its efficiency. Moreover, this measurement may be made from time to time to determine whether the resistance is constant.

When putting down an "earth" the initial cost and durability call for first consideration. Probably the cheapest form consists of galvanised iron wires and plates, but the more durable, of copper. The latter metal is, of course, very much superior to iron as regards conductivity, but its high price makes its use almost prohibitive. The plates should be buried edge-wise concentrically about the foot of the antenna. Usually three plates about three feet square will suffice, but it is preferable to increase this number, especially if the resistance indicated by the following test exceeds 2 ohms.

From each plate a wire should be led underground to a central point convenient

for leading into the instrument room. Each wire must make secure metallic contact with its respective plate. In addition to the plates a number of wires should be buried directly beneath the aerial system and extending slightly beyond, the central ends of the wires being connected to the common junction for leading into the room. The plates and wires must be buried at such a depth and in such a position as to be permanently damp, and in order to eliminate corrosion due to galvanic action the whole system must be constructed with similar metal. When the earth system is complete divide the plates and additional wires into three equal groups at the common junction and apply the following test for approximate resistance.

Call the three sections *A*, *B* and *C* respectively, and let these letters denote their separate resistances. Connect a 2 or 4 volt accumulator in series with a hot wire ammeter between *A* and *B*. Note the reading in *Ampères*.

Then make the same test with *B* and *C*, also *A* and *C*. These readings should be made rapidly with frequent reversals of battery current.

$$\text{By Ohm's Law } \frac{E}{C} = R,$$

Where *E* = Electromotive Force in Volts,
C = Current in *ampères*,
and *R* = Resistance in *Ohms*.

Since the current has to flow from one plate to earth and back through the second plate—

$$\begin{aligned} R \text{ in first test} &= A + B. \\ R \text{ in second test} &= B + C. \\ R \text{ in third test} &= A + C. \end{aligned}$$

By substituting values the working is followed with ease. Using a battery of say



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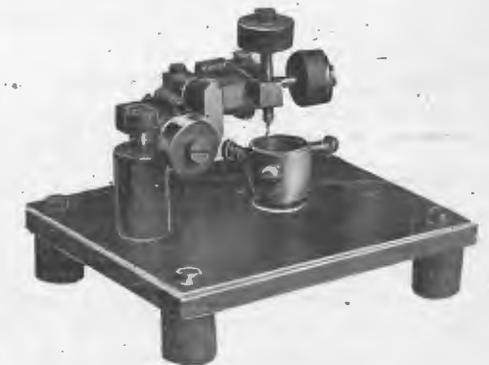
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Spring Contact Switch Arms As Illustrated 4/6 each Studs to suit from 2d each



No. 18 Royal Arcade (Opp. Q.V. Markets) SYDNEY

4 volts we will assume the current to equal—

In the first test .. 1½ amp.,
 in the second test .. 1 "
 and in the third test .. % "

$$\frac{4}{1} = 3 \text{ Ohms} \dots \dots \dots (1)$$

$$B + C = \frac{4}{1} = 4 \text{ Ohms} \dots \dots \dots (2)$$

$$\text{and } A + C = \frac{4}{1} = 5 \text{ Ohms} \dots \dots \dots (3)$$

Adding (1) and (3) we get $2A + B + C = 3 + 5$,
 and subtracting (2) $2A = 3 + 5 - 4 = 4$,
 and $A = \frac{4}{2} = 2 \text{ Ohms}$.

The values for *B* and *C* may now be found by subtracting *A* from (1) and (2) thus—

$$B = 3 - 2 = 1, \text{ and } C = 5 - 2 = 3.$$

When bunched together and joined in circuit with the aerial system each section provides a path to earth in parallel with the other two, and since the joint resistance of conductors joined in parallel is equal to the reciprocal of the sum of the reciprocals of the separate resistances the total or joint resistance of the earth system will be—

$$\frac{1}{\frac{1}{A} + \frac{1}{B} + \frac{1}{C}} = \frac{1}{\frac{1}{2} + \frac{1}{1} + \frac{1}{3}} = \frac{6}{11} \text{ Ohms.}$$

It must be remembered that the value obtained by this test is not a true measure of the resistance of the earth system, since the internal resistance of the accumulator battery and the resistance of the connecting wires and ammeter are not taken into consideration. Moreover, the resistance with which we are more concerned is that offered by the system to high frequency currents and which will be of a smaller value than that determined by the above method. But the test will at once indicate whether the earth is good, bad or variable, the maximum value never to exceed 1 to 2 ohms.

The current measurements in the above test may be made equally well with a moving iron or moving coil type of ammeter, but if the instrument is to be purchased the hot wire type should be decided upon. In addition to the fact that it registers irrespective of the direction of current, it is one of the very few instruments suitable for measuring and indicating high frequency currents. Instruments of this type are at present very difficult to secure, but the writer recently inspected a sample instrument of the well-known "Expense" type, which is shortly to be put on the Australasian market.

**AUSTRALIAN AERO CLUB
 NEW SOUTH WALES SECTION.**

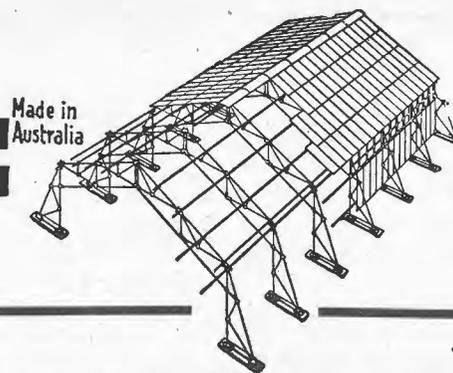
The Committee met in Sydney on June 28 when ten new members were elected, and again on July 12 when the membership was further increased by four, including Mr. James Chalmers, managing director of Farmer & Co., Ltd., Sydney; his fellow enthusiast, Mr. Charles Lloyd Jones, managing director of David Jones Ltd., was one of the earliest members of the Club.

Among the decisions arrived at was the formation of an Entertainment Committee and the opening of an official book for the purpose of recording noteworthy flights and other data of a similar nature.

To welcome the return of Captain G. C. Matthews, A.F.C., and his mechanic, Sergeant T. D. Kay (heroes of the Sopwith *Wallaby* flight from England), a dinner was tendered at Loosen's Café, on June 15, when a happy reunion of old Service comrades was held. Colonel Watt, who presided, spoke enthusiastically of Captain Matthews' remarkable war services while under his command in No. 2 Squadron, A.F.C., and expressed regret that he had never previously been associated with Sergeant Kay, the reason being that the latter could not be induced to leave France until long after the close of hostilities.

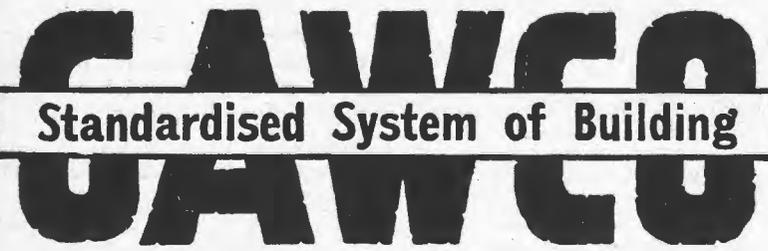
In the toast of "Our Guests," the President was supported by the Second Naval Member, Captain C. E. Hardy, who was present in Sydney in connection with the naval welcome to H.R.H. the Prince of Wales.

To welcome the return of the Club's first President, Mr. H. C. Macfie, a ball was given at the Voluntary Workers' Café, on July 14, and was largely attended by members and their friends.



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LETTERS TO THE EDITOR

To the Editor, *Sea, Land and Air*,

Dear Sir,—With reference to your specification for cheap high tension battery suitable for vacuum valve detector, as published in a recent issue of your journal, I wish to thank you for the clear details, and to inform you that we have just completed construction of a 49 cell set. The materials for the whole outfit cost only 12s. We were disappointed on connecting to find the voltage could not be measured with usual volt meter, but test carried out with a standard laboratory potentiometer, showed a single cell to register 1.14 volts, the maximum for the type.

I would suggest that plenty of magnesium sulphate solution should be used and the sawdust made quite sloppy, also that about 10 per cent. excess cells should be installed to make up for any high resistance cells in the battery.

Battery is now in use and the valve oscillating.

We have been watching your paper for an elementary article on the use and the troubles of three electrode valve.

Yours faithfully,
Town Hall, Sydney, L. & W. RILEY.
July 12, 1920.

To the Editor, *Sea, Land and Air*,

Dear Sir,—You will be interested to know that our first machine arrived in Bathurst last Friday, after a successful trip from Melbourne.

Two records were created, namely Melbourne to Albury 1 hour 55 minutes, and Melbourne to Bathurst 4 hours 55 minutes. This record has been achieved on the first machine of six which we intend employing in our services.

We hope to fly another machine from Melbourne to (probably) Sydney within the next few weeks.

The Company was registered on the 28th May last, and for your information we enclose herewith a prospectus.

Our Sydney aerodrome will for the time being be situated at Manly, and it is hoped to have the ground which we have acquired ready for use within two weeks from date.

Bathurst will be our Western centre and we propose to start a regular service between that town and Sydney as soon as we purchase our next machine.

It is intended to invite the Aero Club to

inspect our machines, and to generally invite them to make any investigations which they may require.

We should be obliged if you could spare the space in your valuable paper to make known these facts.

Yours faithfully,
AVIATION SERVICE Co., LTD.
N. SIDAWAY,
[For Manager and Secretary.]
2 Castlereagh Street, Sydney,
20th July, 1920.

[The machine above referred to is a Sopwith Dove, purchased from the Larkin-Sopwith Co. (Australasia), Ltd.—Ed.]

To the Editor, *Sea, Land and Air*,

Dear Sir,—I noticed in the March issue of your magazine, that the Sydney Grammar School had successfully formed a Radio Club at the school.

Being an "old boy" myself I wish to congratulate them on this enterprise, and trust that they will be successful in their endeavours.

Theirs, however, is not the first such organisation of its kind to be formed in Sydney.

At Waverley (N.S.W.) in December 1918, a club, under the name of The Waverley Amateur Radio Club, was formed, among the officers elected being myself as president.

This club has now over twenty members (including two operators from the Marconi School), and has a first-class club and operating room.

Among the features of this club is a library of approximately 200 volumes, including the ten volumes of Hawkins' Electrical Guides, a printed monthly journal, whilst the instruments in the operating room mostly bear the Marconi stamp.

I understand from correspondence between the secretary of the club and the Navy Office, Melbourne, that a licence is to be granted to the club for transmitting and receiving radio signals.

In conclusion I should like to hear of any other such organisation in the city and suburbs with which this club could communicate and, very shortly, exchange radio signals.

Yours truly,
REGINALD D. CHARLESWORTH.
"Kelvin," 173 Parramatta Rd., Haberfield,
June 21, 1920.

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Revised to July 22, 1920.

SHIP.	OPERATOR.	SHIP.	OPERATOR.
Apolda	J. W. McKay	Macedon	N. W. Marshall
Araluen	H. H. Black	Mackarra	A. R. D. Davis
Arawatta	N. W. G. Scott	Macumba	F. L. Dawes
Arahura	W. C. Brown	Maheno	C. F. Griffiths
Aramac	N. H. Brown	Makambo	L. J. Glyde
Australbrook	J. F. McGinley	Makura	{ E. A. Hunter (s) M. Webb-Watts (j)
Australcrag	V. E. Stanley	Manuka	J. A. Heavey
Australford	T. W. Bearup	Maori	H. A. Bloxham
Australglen	W. H. Richardson	Marama	_____
Australmead	G. Pow	Mararua	_____
Australmount	A. R. Catford	Mararoa	_____
Australpeak	R. H. Alexander	Marstina	H. A. de Dassel
Australplain	A. Stuart	Matarara	C. Williamson
Australpool	K. J. Dines	Mawanganui	_____
Australport	A. H. Jeremy	Mawatta	H. W. Barnfield
Australrange	J. H. Hawkins	Melusia	S. F. Stafford
Atua	L. N. Callaghan	Minderoo	J. G. C. Higgins
Baldina	_____	Mindini	_____
Bakara	C. W. Donne	Moana	{ J. F. Hutton (s) E. N. Williams (j)
Barambah	M. L. Robertson	Moeraki	H. M. Lamb
Bingera	H. L. Miller	Monowai	G. Donnelly
Bombala	I. B. Gibson	Mokoia	L. V. B. Sutton
Boonah	A. W. Watt	Montoro	L. G. Devenport
Booral	G. Maxwell	Morinda	F. C. Davies
Boorara	R. Jordan	Navua	D. C. Lane
Bulla	T. Alexander	Ngakuta	H. Bargrove
Bundarra	J. B. Ponsonby	Niagara	{ W. J. Martin (s) V. P. Nevins (j)
Cahulu	F. Exon	Ooma	E. A. Miller
Canberra	T. Bannister	Oonah	R. M. Firminger
Carina	W. Hall	Paloona	R. P. Ginders
Changsha	G. H. Hugman	Paringa	S. L. Filer
Charon	J. E. Cleary	Pateena	C. F. G. Taylor
Cooce	P. D. Hodges	Rakanoa	V. M. Simpson
Cooma	J. H. Hawkins	Riverina	F. Ouvrier
Delungra	F. G. Lewis	Rotomahana	A. S. Dening
Dilga	J. H. Pullan	South Africa	E. J. Giles
Dimboola	J. Doggett	St. Albans	W. H. Harris
Dinoga	N. Leeder	Suva	L. S. Lane
Dongarra	H. J. Byrne	Taiyuan	M. Sedgers
Dromana	F. Stevens	Tahiti	{ E. M. Bain (s) G. M. Whiteside (j)
Dumosa	H. Bickett	Talune	H. F. Harman
Dundula	J. A. Cooper	Tarawera	H. O. Preshaw
Eureka	_____	Tofua	{ W. A. Hawkins (s) J. G. Camplon (j)
Eastern	G. H. A. Kidman	Ulmaroa	A. Stuart
Indarra	{ H. Firth (s) A. G. Ross (j)	Victoria	F. A. Hunter
Gilgai	D. H. George	Wahine	F. E. Duggan
Kaipoi	A. E. Sheppherd	Waihemo	F. A. Cook
Kaitangata	R. W. Barnes	Waihora	V. M. Brooker
Kaituna	G. Illingworth	Waikawa	F. L. Scott
Kaiwarra	L. H. Jones	Waimarino	{ K. L. Freeman (s) J. A. Guy (j)
Kanowna	_____	Waipori	T. H. McWilliams
Karori	S. G. Jones	Wairuna	{ A. Cuthill (s) L. R. Dickson (j)
Karoola	R. R. Pilmore	Waitemata	H. F. Hartley
Katoa	B. Boni	_____	_____
Katoomba	T. A. Jones	_____	_____
Kauri	H. G. Reilly	_____	_____
Koromiko	R. Stephen	_____	_____
Kowarra	H. Fullerton	_____	_____
Kurou	F. N. Davidson	_____	_____
Levuka	D. N. Quinn	_____	_____
Loongana	N. W. G. Scott	_____	_____

(Continued on page 278.)

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SERVICE
COMPANY LIMITED**

Aerodrome MANDY
Registered Office
Castlereagh House
2 Castlereagh Street

Sydney 21st July 1920

Cyril L. Westcott, Esq.,
Manager,
C. C. Wakefield & Co., Ltd.,
SYDNEY.

Dear Sir,

You will be interested to know that our first machine arrived in Bathurst last Friday after a successful trip from Melbourne.

Two records were created, namely, Melbourne to Albury 1 hour 55 minutes and Melbourne to Bathurst 4 hours 55 minutes. This record has been achieved on the first machine of six, which we intend employing in our service.

Our knowledge of "Castrol" as a lubricant in the Royal Flying Corps is such that we have determined to use "Castrol" only for our services from the point of view of economy and safety.

It therefore goes without saying that Wakefield "Castrol" was used in achieving the above records.

Yours faithfully
C. C. Wakefield
MANAGER AND SECRETARY.

[Wireless Officers of the Australasian Merchant Service—continued from page 276.]

Waitomo	S. J. McVeigh
Wanaka	R. R. Robinson
Wandilla	E. A. Burbury
Westralia	M. A. H. Ryan
Whangape	A. O. Sutherland
Wodongd	J. Welch
Wyandra	H. Tuson
Wyreema	
Zealandia	M. A. Prudence

Amalgamated Wireless Operators Temporarily Employed on M.I.M.C.C. Ships.

Havre	A. E. Lawrence
Morialta	E. F. Hayes
Rupara	G. Cook
Zealandic	J. Elmore

On Home Port Leave.

C. H. A. Kidman	S. A. Ludlow
-----------------	--------------

WIRELESS CALL LETTERS.

The following additions and cancellations have been made to the list of land and ship stations printed in our May issue:—

Additions.	
Call Signal.	Ship.
CGR	Biloela
VXN	Bundarra
Cancellations.	
CGO	Carawa
VHJ	Coolgardie

THE WIRELESS INSTITUTE OF AUSTRALIA

SOUTH AUSTRALIAN DIVISION.

The eleventh General Meeting was held in Adelaide on July 7, Mr. Hambly Clark presiding.

The following rule was adopted:—

Any member of the Council who misses three meetings in succession without sending a written excuse to the Hon. Secretary, shall automatically cease to be a member of the Council.

In accordance with the above rule the office of Honorary Treasurer lately held by Mr. R. O. C. Matthews was declared vacant, and has now been filled by Mr. R. M. Dunstone.

Mr. J. N. Bald was elected Vice-president, the vacancy on the Council being filled by Mr. J. M. Honner.

A Valve Club has been formed by the Division to enable members to purchase (on the instalment system) valves and other apparatus which they may require. The fee is fixed at 1s. per week per share, and members may acquire an unlimited number of shares. Periodical ballots will be taken and successful members will be entitled to obtain apparatus up to a certain fixed value.

In view of the high cost of apparatus

many experimenters are unable to pay cash for their experimental outfit, and for this reason the club should become very popular.

OUR QUESTION BOX

J. B. Tennent, Coogee.—Wireless waves cannot possibly affect pigeons, because birds have no organism or sense which can be affected by the ether. Like all birds and animals the pigeon lives in the atmosphere, while wireless waves travel only in ether, which is quite independent of all materials, whether solid, fluid, or gases.

"V.I.B.," Brisbane.—The earliest age at which the study of W/T is recommended is from 16 to 17. No student can sit for his examination before his 18th birthday.

C. L. Russell, Kalgoorlie.—The ribbon of the Distinguished Flying Cross is 1½ in. in width, violet and white alternate diagonal stripes, each ½ in. in width, running at an angle of 45°. The same particulars apply to the Air Force Cross, except that instead of violet the colour is red.

Distinguished Flying Medal.—The same as that for the D.F.C., except that the diagonal stripes are one-sixteenth of an inch in width.

Air Force Medal.—The same as that for the A.F.C., except that the diagonal stripes are one-sixteenth of an inch in width.

Instructions as to the wearing of these decorations were issued by the Air Ministry on August 28, 1919, and are as follow:—

The ribbon will be worn ½ in. in depth, the diagonal stripes running downward from the centre of the tunic towards the left, and will be so arranged that:—

- (i.) Distinguished Flying Cross or Air Force Cross ribbon will show at the top corner nearest to the left arm, and at the bottom corner nearest to the centre of the tunic, triangles of equal dimensions of violet or red, as the case may be.
- (ii.) Distinguished Flying Medal and the Air Force Medal ribbon will show at the top corner nearest to the left arm a triangle of white, and at the bottom corner nearest to the centre of the tunic a triangle of equal dimensions of violet or red, as the case may be.
- (iii.) The order of precedence will be the same as at present. The new ribbons should be worn as soon as practicably by all officers and airmen awarded these decorations. The ribbons are now available, and a free issue will be made to those awarded these decorations. In the case of demobilised officers and airmen, application for the ribbon should be made to:— (1) Officers: The Secretary, Air Ministry, Kingsway, London, W.C. 2. Airmen: The Officer in Charge Records, Royal Air Force, Blandford, Dorset, England.

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MURUA (OR WOODLARK ISLAND)

BY

E. O'SULLIVAN.

ON the imaginary line of the sixth degree of latitude, within the Territory of Papua, and just off the edge of the late German sphere of influence, is the island of Murua, more commonly known as Woodlark Island. The "Woodlark" designation is said to have come to it through a visit paid to the island in the early 'forties by the ship *Woodlark*, and the Murua natives will tell you of a *dim dim* (white man) in gold trimmings, evidently an officer from a gunboat, who landed, sword in hand, with a boat's crew, on the northern side of the island, long, long ago.

As one of the ports of call for the Burns, Philp steamers on their Papuan round trip, Murua sees a good few of the tourist brand of person for a couple of days every few weeks, and the ordinary traveller sees just so much of Murua as is within easy walking distance of the landing place at Bonagai. The waters about this part of the map are very uncertain, and it takes the skipper of the regular steamer all he knows to dodge the treacherous reefs which lie so thick hereabouts and so close to the surface. At low tide, set in waters of palest green, clear as crystal, the reef is exposed, with its gorgeous colourings of coral—pink, white, blue and red—and all the other marine treasures that abound in tropic seas.

The shallowness of the harbour at Buoi Buoi makes it necessary for the steamer to anchor a few miles from the place of landing. A launch takes the passengers as far as tide and mud will permit, when they are then transferred to the Customs boat, with its crew of dusky warriors, who, in turn, hop over the side and push the whale boat through the muddy water to the very primitive landing stage at Bonagai, at the mouth of a creek where alligators most do congregate when things are quiet. But if the water is uninviting, the mangroves about and the dark foliage so thick on the slopes make a good background for a couple of native canoes tied up alongside the Customs boat house, their sides painted

in queer designs and ornamented with strings of shells.

The walk up to the settlement of Kulumadau, on top of a ridge 500 feet above sea level, is along a narrow, coral-paved path, cleared on both sides and planted with vari-coloured croton shrubs and coconut palms. Further on it opens out to a wider clearing, until, at the end of 2½ miles, the final effort is made up a couple of hundred rather primitive steps, leading to the settlement proper. All luggage has to be carried slung on poles by the native carriers, who do not seem to be affected by its weight, the heat, or the steepness of the climb. The day is hot, but not any hotter than a good summer's day "down south."

The future of Murua seems to be bound up in coco-nuts, about 70,000 acres being already in process of clearing and planting—and the island is only about 40 miles by 16. Plenty of gold is obtainable, but the cost of working in proportion to results is considerable. Karavakoom, a rich bit of country about twelve miles from Kulumadau, is looked to for good results, and a syndicate has been formed to extend the workings. The Kulumadau mine was for many years a big asset, but it would seem to have petered out.

With the exception of the Government buildings, which are of wood, the houses of the settlement are of corrugated iron, which rather spoils the appearance of the place. On the outskirts are a few native houses of sago palm and native gardens of yams, taro, bananas and sugar-cane. The white population is under 100, and the principal official, the Resident Magistrate, whose Residency, of the bungalow type, surrounded by croton-bordered paths, and owning a tennis court, looks out upon the harbour of Kuaipan Bay below and the ocean beyond for about 20 or 30 miles. An Assistant Resident Magistrate divides the official duties of the island with his senior officer. Other Government buildings are the Customs House, Post Office and Savings Bank, a fine school house (since converted into quarters for the wireless staff),