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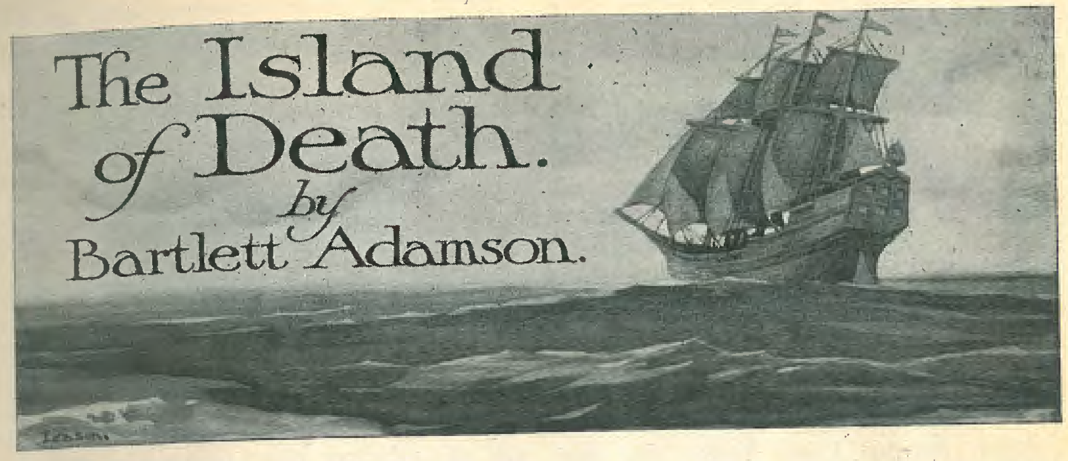
Sea-Land and Air



A CHEMIST'S shop is a dull place for a man who has an ambition to be a pirate. Jerome Cornelis found it so, even in the prosperous old city of Harlem, in the Netherlands, where there were many wealthy *burghers* on whom to practise the arts of the apothecary. That form of buccaneering was not exciting nor spectacular enough for his blood-and-thunder fancies.

It is hard to believe this of a Dutch tradesman, but three hundred years ago, when Jerome was dreaming his cut-throat dreams, Holland was not the land of starched-and-ironed gardens and slow canals and slower people that it is to-day. Instead, it was a nation of adventurers, challenging Britain for maritime supremacy and trading to outlandish corners of the globe. Its vessels had even visited Australia, of which Britain then had scarcely heard.

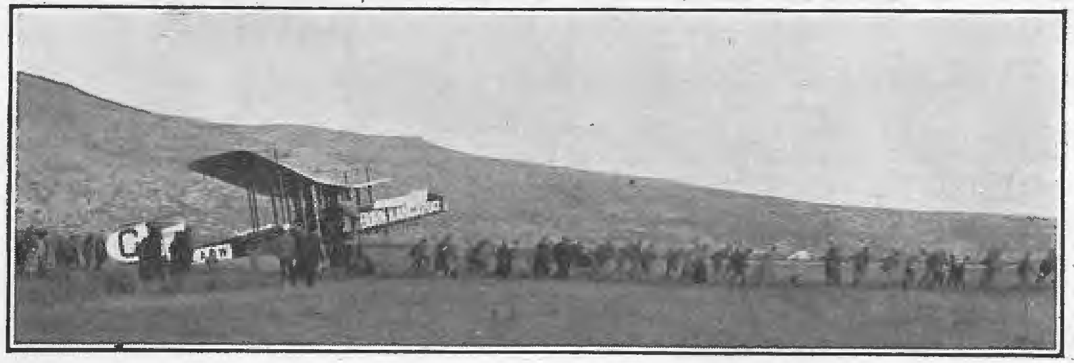
So it was that Cornelis chucked his job. He did not resign it. He chucked it. Pill-pounding was no good to him. He wanted to be pounding the sides of some rich merchantman. But he did not realise that there are right and wrong ways of doing everything—even buccaneering.

At that time fabulous tales of wealth in the Indies were beginning to circulate, and the Dutch East India Company's shareholders were feeling comfortable. Fortune was shining upon them out of the East, like a newly-discovered sunrise, and chilly Holland basked in its glow. General Pieter Carpentier's fleet of five ships reached the Netherlands from Java very richly laden, and all the old *burghers* were as excited as corpulence can ever hope to be. Within a year another fleet, of eleven vessels, was fitted out and ready to sail from Texel for the fabulous East.

One of the smallest among these was the *Batavia*, under Captain Francis Pelsart, with Adrian Jacobs as master. Jerome, lounging on the old stone quay, decided that her smallness was an advantage. She would not be so unhandy as a big ship should half his crew be slaughtered in odd fights from time to time. She was just the craft for a buccaneer. He thought she had fine lines and looked very saucy. Had he only waited a couple of centuries for a glance at the *Cutty Sark* or the *Thermopylæ* he would have known what a lofty, dumpy, stumpy sort of an ark the *Batavia* really was.

But he didn't wait. He got the job of supercargo aboard her, and as he cast a superintending eye on the stuff going into the hold he felt contented. Those bales of fine cloth and those embroideries of silver and gold would make excellent pirate costumes. Like all properly accredited pirates he loved gaudy dress. And those chests of silver would pay his cut-throat crew for many a day, and leave plenty of margin for long drinks for himself and presents for dark-eyed damsels in foreign tropic ports.

On the October 26, 1628, the fleet sailed. The *Batavia* had between two and three hundred people aboard—sailors, traders, a



Bulgarian Prisoners Freeing the Bogged Machine at Crete.

abandonment, he proved himself to be an expert pilot, very resourceful and extremely good at landing under the worst possible conditions. Both during the war and after the armistice, he had flown many types of machines, and so far as its first pilot was concerned, the party could not have been better served.

Piloting the machine in some of the weather we experienced was not an easy task. We had been told some stories of one or two extraordinary crashes resulting directly from the bumpy conditions existing over some of the Greek Islands. We were very sceptical about these, but on one occasion our scepticism nearly caused us a disaster. "Whatever you do," the Greeks had warned us, "keep well out to sea, clear of the steep cliffs. Pilots have experienced some extraordinary air conditions and report drops of several hundred feet, bringing them down dangerously close to the cliffs, and in some cases wrecking their machines on the cliffs." Heedless of this advice, we were sailing along comfortably, hugging the coast, about a couple of thousand feet up, when we found ourselves in a maelstrom which tossed us about like a cork, and put us into a dive, which brought us right down the face of the cliff before we could regain control. As a matter of fact, it was only the air pressure on the face of the cliff which kept us clear of the rocks. None of us had experienced a phenomenon of this sort before, and thereafter the 'bus was kept carefully clear of the shores when crossing these islands.

The End of the Venture.
With a seized engine, Lieutenant Rendle was forced to land down-wind, and the speed of the machine carried it over the embankment.

WIRELESS IN THE PACIFIC.

NEW STATION AT TONGA

BY
*D. CAMPBELL

My visit to Tonga was a strictly business affair. But Tonga is a South Pacific island with a rather casual, laughter-loving people and consequently this is not a strictly business record. In Tonga the waters of life do not rush past the pleasant places; they loiter by the way to share in a jest and to rest themselves for an idle hour in the warm, rich sunshine. And something of that spirit is bound to stroll, in its casual Tongan way, through one's tale of a business visit.

A Street in Tonga.

It was "wireless" which introduced me to the island. In September it was decided to erect a station at Nukualofa and the authorities wanted it to be at work in December. By November 10 we had wriggled through pelting rain and red tape at Suva and passed up the long channel which leads to Nukualofa and the Tongan quarantine laws. On this day our introductions to the community were brief, for when the steamer arrives the day is marked sacred to the God of Hurried Business. But we were introduced to at least one person of importance—our head boy "Veni"—a mountain of smiling Samoan brawn and muscle. Next day we extended our acquaintance and then settled down to work. Labour was our first stumbling block. The average Tongan doesn't often seek work, and when he does it is only of a temporary nature and to enable him to get the necessary "shillini" to buy some coveted article, probably for Mrs. Tongan, at the trading store. The Tongan is wise in his generation and is quite unimpressed by reference to "the dignity of labour." "Ho!" he laughs in reply, "works the white man only through fear of starvation," and so, when bounteous Nature makes continued labour unnecessary, why oppose the good Providence? However, "Veni" and Good Luck brought us six boys who answered the roll call as follow: — Afo, Finau, Trousers (the only one so equipped), Polisi (he had been employed in authority's weak moment as a policeman, but lacked staying-power), Noah, Walker (for obvious reasons).

All seven were present on Monday. My diary shows that next day Noah had returned to his ark. Walker had again justified his name. Trousers had lost the garments and—such are the drawbacks of civilisation—would not appear without them. Afo had gone on a visit to another island. Finau had casually strolled over to a new job and was loading copra. Polisi had gone home. He said he was sick and meant he was sick of work. We were down to our sheet-anchor Veni. On the Thursday Veni rounded up Afo; Trousers

* Equipment Officer of Amalgamated Wireless (Australasia) Ltd., to whom the Nukualofa contract was entrusted.

came back with another comedian, who stayed long enough to earn the wherewithal to buy three fish with which he took a smiling departure. Nevertheless, within a week of arrival we had rigged a temporary aerial between two trees, and by this means heard something of the outside world.

It was a curious and excited throng that listened to the first news bulletin. "Where has it come from?" ran the questions. "Fisi? Hamoa? Niuesile! But how? When did it leave? Last night! And here last night! Impossible! Even the steamer takes nearly a day to Haapai. One cannot go to Mua or Hamoa or Kologa so quickly. The *Papalangi* (white man) swears it comes so fast as that like touching one with the finger both feel at once. It is not to be believed!" All other wireless facts were merely ordinary "machini," but that anything could travel from one spot to another and not loiter by the way was, to a Tongan, inconceivable.

Meanwhile we progressed steadily with the work, and only once fell foul of the Law. That was through chopping firewood on the back verandah on Sunday, and the "polisi" called round to tell us it was "agin', the Law and the Government to make such week-day noises on Sunday."

By December 29 the station was sending traffic and we were free to visit the spots all visitors should see, such as the tombs of the ancient Tui Tonga, or Kings of Mua,

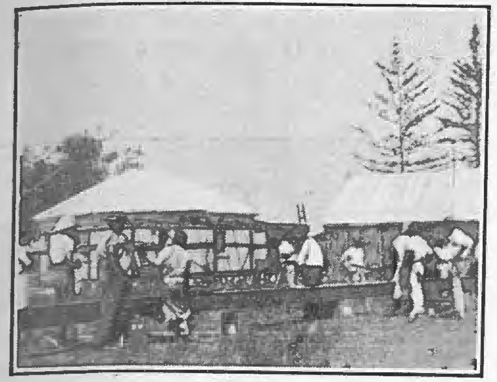
A Typical Native.

"Veni" as a Family Man.

and the blowholes at Homa. The tombs—called *langi*—are huge rectangular stone structures. It is a mystery how these gigantic blocks were cut from the solid rock and moved to their present positions. Many weigh over 20 tons. The town of Mua is the ancient capital of Tonga and residence of the Tui Tonga, temporal and spiritual heads of the nation. It stands near the entrance to a large lagoon where Captain Cook's vessel was beached. In the bay close inshore is a tiny island on which the food for the Tui Tonga was cooked. Close to the centre of the town is the mill-stone on which the wives of the dead Tui Tonga were dashed to death so that they might accompany their departed lords to the Spirit Land.

The blowholes at Homa are remarkable phenomena. For miles the low cliffs are honeycombed with small caves, into which the water is forced by each successive wave to be ejected high into the air through the many blowholes. When a heavy sea is running it is fascinating to watch these fountains of nature.

We spent two week-ends on the island of Motiutabu (Sacred Island), 12 miles from Nukualofa. It should be called the Island of Paradise. We lived the days swimming and idling, enjoying the cool breeze and heavenly climate, and at sundown lay on the soft turf listening to old Tongan war-songs. I know no more inspiring music



Preparing the Station.

than that of the Tongans singing their native melodies. They are wonderful vocalists, and I can imagine that a fleet of canoes packed with warriors singing their rousing war-songs to the beating of the *lalli,* would create an impression one would not forget.

I have referred to the Tongans as a casual people, but that applies only when measured by our standards. They are the undegenerated descendants of a shrewd, virile and warlike race of navigators and fighters who carried war into the camps of Fiji and Samoa and remained free and unconquered—the aristocrats of the Polynesians. They became a peaceful people at the coming of the white man, discarding their weapons of war and settling down to a life of ease—their problems of life solved by an indulgent Nature. The time that has elapsed since they lost the strenuous occupation of war has been too short to allow of a reaction to the modern ideas of trade and the feverish striving to gain and retain sustenance and power. Maybe this *will* happen. But now there is no need for the Tongan to hire his labour to the *Papalangi* —"The Men From the Clouds," as they poetically call the white man. A wise law forbids the bartering of land in Tonga. At 16 every Tongan can become holder of an *Abi* of bushland to the extent of $8\frac{3}{4}$ acres, and a town *Abi* for a home and garden.

Though a very happy people they are graver than the Samoans, but they are kindly, pleasant neighbours one leaves with regret. It was seldom that one passed man, woman or child without the salutation—*Maloi Lelei*—accompanied in the case of the older men by the graceful raising of the right hand, open palm to the front, which is a relic of the fighting days, showing that the person calling the greeting was unarmed and wished to be amicable. I have even met tiny children, in tears, who would stop their lamentations to lisp the salutation and pass on with a new burst of wailing.

Tonga has an ideal climate. Only for a short period is the heat uncomfortable, and tropical fevers are almost unknown. The land is remarkably fertile, but at present, owing to lack of shipping, the once-flourishing trade with New Zealand with bananas and oranges is dead. I imagine if the bush and undergrowth in the cocoanut plantations were cleared and replaced by grass, that the cattle would be considerably increased. Cows seem to do well judging from the quality of the milk supplied, and while on this subject, I must mention the only member of the Tongan community on whose head I prayed the seven plagues of Egypt to rest. He was a small imp who, at an unearthly hour, appeared at our door to deliver the daily supply. Nothing could induce him to tip the milk into the waiting basin. Morning after morning he hammered at the door post, and, unfortunately, I had selected that room in which to sleep. Wearily I would look through my mosquito net muttering maledictions in many languages, and occasionally glimpsing an impish brown face peeping round the door, but he would remain until I got up, and then smilingly tender the can and basin and graciously allow me to transfer the milk

Tongan Policeman (on left).

myself. On only one occasion did I escape this. One morning the necessary adjunct to the morning meal did not arrive until eight o'clock. When I asked the reason he explained: "Walk about too much the cow."

"Veni's" Home at Tofoa.

Ready to Erect the First Mast.

LAWRENCE HARGRAVE MEMORIAL FUND

The Trustees of the Lawrence Hargrave Memorial Fund have received the following letter from Professor David:—

Dear Sirs: Enclosed please find cheque for £3 3s. as my contribution to the Lawrence Hargrave Memorial Fund.

May I say how pleased I am to see that steps are being taken to provide a suitable memorial to this really great man who was, unfortunately, more or less a prophet without honour in his own country?

I well remember when Dr. Graham Bell, of telephone fame, visited us several years ago, and gave a fine address in the Great Hall at the University at Sydney. Lawrence Hargrave was present. Bell, speaking as an American, paid a splendid tribute to the pioneer work of Hargrave in the matter of evolving the box-kite, and inculcating the first principles of aerial navigation. I could see that Hargrave was deeply touched at this generous eulogy coming from such a quarter.

It is nice to feel, now, that his great work is not to be forgotten, and I sincerely hope that sufficient money will be raised to provide a memorial worthy of the man.

I am,
Yours faithfully,
T. W. EDGEWORTH DAVID.

The following donations are acknowledged with many thanks by the Trustees:—

THIRD LIST.

	£	s.	d.
Amount previously acknowledged ..	285	6	6
Mr. W. G. Blaxland	2	2	0
Mr. R. R. Dangar	5	0	0
Hon. A. W. Meeks	2	2	0
Professor T. W. Edgeworth David ..	3	3	0
Mr. Edward Hargrave	2	0	0
Family of the late Mr. John Sands ..	10	10	0
Messrs. John Sands Ltd.	2	2	0
Miss Melanie Laidley	1	1	0
Mrs. James Burns	5	5	0
Mr. K. A. Bennett	1	1	0
Mr. J. B. Dalley	2	2	0
Mr. J. O. Fairfax	50	0	0
Sir Thomas Hughes, M.L.C.	5	5	0
Captain E. Telford Simpson	5	0	0
Total	£381	19	6

Donations should be addressed to the Trustees, Lawrence Hargrave Memorial Fund, 99 Clarence Street, Sydney, and will be acknowledged in the issue of *Sea, Land and Air* immediately following receipt of same.

END OF THE WORLD-FLIGHT

THE "VIMY" FLYERS AT ADELAIDE

Amid intense enthusiasm Sir Ross Smith and his colleagues ended their historic world-flight at Adelaide, capital of their native State, on March 23. For a while Adelaide was perturbed by the possibility that the *Vimy* crew would not be allowed to fly the machine to their home town. Vickers Ltd. had generously arranged for its presentation to the Australian Commonwealth and, so far as they were concerned, Melbourne was the terminal point of her flight. Accordingly, when Sir Ross Smith arrived at Melbourne and informed the Prime Minister that the aeroplane belonged to the Government, he, at the same time, asked permission to fly the remaining 500 miles to Adelaide. Actually there was no doubt that the Prime Minister would readily give his sanction, but so anxious was the whole of South Australia to see their flyers and the *Vimy* arrive together, that immediately it was

Mr. and Mrs. Andrew Smith Watching the Landing at Adelaide.
Sergeant Shiers' bride stands facing the camera.

WIRELESS INSTITUTE OF AUSTRALIA

NEW SOUTH WALES DIVISION

At the Sixth Annual General Meeting of the New South Wales Division of the Institute, held at Wireless House, Sydney, on April 16, the following office bearers were elected for the ensuing twelve months: President, Mr. E. T. Fisk; Vice-Presidents, Messrs. C. P. Bartholemew, C. D. Maclurcan, H. A. Stowe and B. Cooke; Councillors, Messrs. H. Curtis, E. R. Mawson, J. H. Pike, J. G. Reed, J. F. Wilson and W. Zech. Mr. Malcolm Perry and Mr. Phil Renshaw were re-elected as Honorary Secretary and Honorary Treasurer respectively.

In presenting the annual report, Mr. Fisk said:—"The period now completed has demanded much strenuous work from your Council, and very considerable patience from the main body of members. When, by the devoted energy of our Secretary (Mr. Perry), the loose ends of the Institute were drawn together after the war, the Institute faced difficulties in regard to licenses. No Government machinery appeared to exist for the issue of experimental licenses, and our initial inquiries seemed to point to the possibility that private experimental wireless stations were a thing of the past. Your Council regarded this question as of vital importance, and after correspondence with the Acting Minister for Navy and the Naval Department, the Naval Board arranged for the Acting Director of Radio-Service (Radio Commander F. G. Creswell, R.A.N.) to meet Council and discuss the question of experimental licenses. These discussions extended over two weeks and a scheme of experimental licenses was prepared which, on the one hand, Commander Creswell promised to recommend to the Naval Board and, on the other hand, your Council undertook to recommend to the several Divisions of the Wireless Institute of Australia. Since that time many points have been considered by your Council, and although the necessary licenses cannot be issued yet, temporary receiving permits are now being issued to all members of the Institute. These receiving permits are by no means a restoration of the pre-war status, and their limitations prevent experimenters from doing interesting and valuable work, but they are a step in the right direction, and the very fact of them being "temporary" strengthens your Council's expectation of a much fuller freedom for experimenters in the coming year, and justifies the continuation of our past efforts until full licenses are obtained.

"Before this can be achieved, however, it is necessary to slightly amend the existing Wireless Telegraphy regulations, but there are so many other matters pressing on the attention of Federal Ministers that it has been necessary for your Council to continue its efforts while restraining its impatience.

"The present is a very critical stage in the development of your affairs, and having a knowledge of the subject from the closest acquaintance, your Council considers it most necessary to ensure that nothing should be done by individual members which might endanger the possibility of full licenses being granted. For this reason alone, your Council, after full discussion at a duly constituted meeting, decided unanimously to recommend the introduction of a new rule which would enable the Council to see any proposed statements, in relation to experimental wireless, before they are published in the Press. This rule, of course, will not apply in the case of contributions to technical or semi-technical publications.

"There is much work to be done in the coming year—work which will open an unlimited field of interest for every member. Already some members have shown the splendid work which amateurs—in New South Wales, at any rate—can do, and I would like particularly to refer to the excellent work done by Messrs. Maclurcan, Cook, Reed and Pike in equipping their stations for experimental work, and in investigating many of the practical features of the magnifying valve.

"The greatest work of the year, however, although it carries the least glory and gives no compensation in scientific interest, has been performed by our Secretary, Mr. Malcolm Perry, while, next to Mr. Perry, our thanks are due to Mr. P. Renshaw, who has been Treasurer during the year, and accepted, as a member of the Council, the office of publicity officer."

WIRELESS IN WAR.

ITS VALUE TO THE AEROPLANE

BY

MAJOR T. VINCENT SMITH, M.C.

In the light of recent achievements, it is not easy to realise how profound was our ignorance of aircraft-wireless in August, 1914. It is only by knowing how insignificant was the amount of data at the outbreak of War that the details of its development assume a correct perspective.

It was obvious that observing for the artillery was one of the most important services that the Flying Corps could render, and for this purpose efficient communication was of primary importance. Only one machine of those which went out with the original Expeditionary Force was fitted with wireless, and though a few had been added by the time I went to France in February, 1915, I found a rather cumbersome signalling lamp the most popular means of communication between air and ground.

The earliest form of spark transmitter we used was of the simplest possible kind, using an accumulator battery and closed oscillating circuit, the inductance of which was common to closed and radiating circuit in the form of the well-known auto transformer. A wandering plug enabled the closed circuit to be tuned to the aerial, or the aerial could be brought into another somewhat similar set made by Leslie Miller, but having an inductive coupling; another squadron was using a French engine-driven set, having the auto transformer coupling and a multiple rotary spark gap. The power and weight of these three sets were respectively, 40 watts, 50lb.; 100 watts, 65lb.; and 150 watts, 78lb.

A few days after my arrival I was appointed wireless officer to No. 3 Squadron of the 1st Wing, which comprised in addition Nos. 2 and 16 Squadrons. Each squadron consisted of 12 machines divided up into three flights of four machines, of which one flight was wireless, the remaining two flights worked with signal lamps.

Lamp Method Obsolete.

There was considerable rivalry between the lamp and wireless as a means of signalling, but the latter soon made the lamp method obsolete, when owing to the success of the wireless flights, all machines in No. 3 Squadron were ordered to be fitted. The more the use of wireless extended the greater were the difficulties that arose, but in spite of annoying failures it was justifying itself, inasmuch as it would have been impossible to get through anything like the amount of work by other means.

One realised that the whole future of the application of wireless on a large scale in the Air Force in war depended upon the successful solution of the new problems which were constantly presenting themselves. To do this demanded the fullest possible knowledge of the nature of the work, the conditions under which it had to be carried out, the personnel who did it, and finally investigation into the causes of failures with a view to their elimination. This was done, as far as possible, by spending two days with each squadron, flying, keeping their machines in working order, and visiting the ground stations with the guns.

The first battle in which wireless became a serious factor was that of Festubert. Our preparations for this battle consisted of observing for the artillery whilst they registered their guns on the trenches and important points within the enemy's lines. It is also memorable as being the first occasion upon which ma-

* Paper given before the British Association at Bournemouth, England.

chines were specially detailed to observe the battle and to report progress by wireless. This work was done by No. 16 Squadron under Major Holt, and four of their machines fitted with transmitters kept watch successfully all day over the battle. As the attack did not develop there was nothing much to report, but the wireless worked quite successfully and the machines remained in touch with their stations throughout the operations. Foundations were thus laid which resulted in the development of that very important branch of aerial activity known as contact patrol for the purpose of reporting infantry movements.

The Problem of Jamming.

Another squadron, No. 10, had now been added to the wing, and apart from ordinary troubles, jamming or mutual interference steadily increased, but the experience gained by this time enabled one to begin reform and organisation in real earnest, and the first thing done was to standardise the apparatus.

Both, for its light weight and simplicity, I chose No. 1 transmitter and found immediate relief from jamming owing to the smaller power used by it. The effect of eliminating powerful signals was very marked and the simplification through having only one kind of transmitter materially added to reliability. So much was this the case that all machines in the wing, amounting to 48 in all, were ordered to be fitted.

I redistributed the wave-lengths on the following plan:—The three flights of the most northerly squadron were given 100 m., 180 m. and 260 m., the next squadron was given 140 m. to 220 m. and 300 m., and so on alternately down the line. The beneficial effect of this change was sufficient to meet the large increase in machines.

The transmitter was now taken in hand and a lot of useless connections removed, and the radiating circuit altered by disconnecting the aerial from the top of the inductance and attaching it to a wandering plug, thus enabling the aerial to be loosely or tightly coupled as required. The component parts were assembled in a neat gas-tight box and the inductance calibrated in wave lengths, thus reducing the weight of the whole set to 26lb. including all fittings, and its bulk by one half. A further addition of 24 machines was made to our wing. These naturally brought more trouble in their wake, as we now had 72 machines fitted. To relieve the severe pressure I received permission to recommend four of my most suitable operators for commissions to take charge of their respective squadrons. This resulted in considerable diminution of failures, but the jamming trouble was again to the fore.

In reviewing the situation, and in the light of past experience, I determined to try the effect of reducing still more the power of the No. 1 transmitter, which was done with almost startling results.

The battery was cut down to three cells and the adjustment of the spark-gap and primary make and break very carefully attended to, with the result that the rasping guttural splutter gave place to a pleasing flute-like note. The effect was truly magical and gratifying, as not only were the operators delighted at the change, but jamming lost many of its terrors. In addition to which, owing to the power being reduced to 20 watts, the trembler and spark-gap remained clean and in adjustment for a longer time and the weight of the battery was also reduced.

It was found that the trembler could be made to vary its note within small limits by careful adjustment. This was of great assistance to the operators, and the soundness of these principles in the prevention of jamming was amply proved later, when their development enabled the number of machines capable of working without mutual interference to be greatly increased.

Evidence of the success of our work was shown unmistakably by the attempt on the part of the enemy to jam us—a sure sign of their technical inferiority, more particularly as they entirely failed in their object.

About this time another very important detail was added to our organisation in the establishment of a squadron wireless control station, situated between the guns and the squadron. It was connected to squadron and batteries by telephone and its primary duty was to listen to the machines working with their batteries and to record as much as possible. These records formed an invaluable means of locating causes of failure,

as the assertion on the part of the pilot that he had sent a certain signal, of the operator at the battery that signals were weak and unreadable, received from the control station definite proof of their truth or otherwise. Another duty was to lay out a signal on the ground indicating to a machine on its way from the squadron to the lines, the quality of its signals. By this means a fruitless journey was saved to a machine whose apparatus was not functioning properly.

Owing to its situation, the control station was naturally freer from jamming than a battery station; consequently it was possible, owing to their being connected by telephone, to accept signals from a machine and 'phone them to a battery that was for some reason not getting its signals. The first of these stations was started at Vielle Chapelle in May, 1915, though its full uses were not developed until later on.

The Thermionic Valve.

In July, the first introduction of the thermionic valve took place, and one was brought out to demonstrate its powers of amplification. It was a Round valve, of the soft type associated with the Round magnifying circuit, and was very delicate in action, requiring considerable training on the part of the operator; but it obviously possessed great possibilities and was reported accordingly.

Preparations for the Loos offensive in September were now in full swing, and registration of the guns was the order of the day. Over 600 targets were registered by the machines of the 1st Wing during the week preceding the offensive. The battle took place and was a great opportunity for proving the use of wireless on a large scale, and it emerged triumphant. In spite of there being about 20 machines always working in the salient to about 60 ground stations with the guns, no serious failure took place. Lord French's despatch on the battle said:—"The R.F.C. is becoming more and more an indispensable factor in combined operations. In co-operation with the artillery in particular, there has been continuous improvement both in the methods and in the technical material employed. The ingenuity and technical skill displayed by the officers of the R.F.C. in effecting this improvement have been most marked."

The war now settled down again to trench warfare.

About this time another small but effective improvement was made. I found that large capacity accumulators were conducive to failures owing to the mechanics forgetting when they were last charged. By substituting accumulators of sufficient capacity for only one spell, they had of necessity to be recharged after every flight. Not only did this eliminate failures due to exhausted accumulators, but the weight of the battery was reduced by 25 per cent., and the whole transmitting set, including all fittings, to 18¾lb.

Testing in War Conditions.

Another matter arose demanding earnest attention, and that was danger from fire. Obviously the close association of the electric spark and petrol required that every possible precaution should be taken. A machine may crash when landing or by engine failure when trying to get off. In either case the petrol tank invariably bursts, to the imminent danger of the pilot and observer. As a switch might easily be moved in the case of a crash, I decided that the only really certain remedy was a complete disconnection of the accumulators from the wireless apparatus by means of a plug. This fitting was made compulsory throughout the R.F.C., and orders issued that no machine was to leave the ground or land again with its battery connected. So far as I am aware no fire caused by wireless occurred after this.

In February, 1916, I was ordered to organise the wireless repair section of No. 1 Aircraft Depôt at St. Omer. One of the most important things undertaken by this section was the fitting of all the machines as they arrived from England, in the safest and most efficient manner, instead of leaving it to squadrons to carry out. When it is remembered that only 20 watts were being used by the transmitters, the greatest care had to be taken to avoid leakage by conduction and induction.

The transmitter and its battery were mounted on a tray which slid into a little cupboard on the fuselage. In the early days officers were taught to adjust and tune in the air; but experience showed that it was much safer and better to leave all that sort of thing to be done by the trained mechanics on the ground. The whole set was entirely overhauled after each flight, and they were responsible that everything was in perfect order before the machine left the ground. These precautions practically ensured the apparatus against breakdown, and it was only natural that the pilots came to have implicit trust in the reliability of their wireless.

The confidence of the pilots was a very important factor in the success of wireless, and to gain this one had had to participate in and appreciate as far as possible some of their difficulties and dangers. This knowledge profoundly modifies the design of any apparatus that can be used in war successfully. To call upon a pilot to make even one adjustment may easily add 20 per cent. to the failures, and it was found by experience to be far better to sacrifice a certain amount of electrical efficiency and to provide apparatus which was able to do the work required, and could be used by as many thousands of pilots as operations in all theatres of war might demand. I feel called upon to make these remarks in defence of the No. 1 transmitter, and in answer to the criticism by wireless engineers who had no opportunity of appreciating the conditions under which this work was carried out on the Western Front.

Early this year Major Prince brought out a valve transmitter with telephony attachment of his own design. This was successfully demonstrated to the late Lord Kitchener, who was visiting France at the time. He was able to hear every word from a machine flying 40 miles away, and was much impressed.

I mentioned at the beginning of my remarks the absence of data from which we suffered, and an interesting fact developed in ascertaining the correct length of aerial for a definite length of wave. Whilst this relation is well known for different kinds of aerials on the ground, I found the ratio in the air differed with each type of machine, and presumably depended upon their different electrical capacities. The ratio of 1ft. of aerial for a wave of 1 metre was true only within small limits, and after about 150ft. of aerial for a 150 metre wave, different makes of machines required anything from 240ft. to 320ft. for a 250 metre wave.

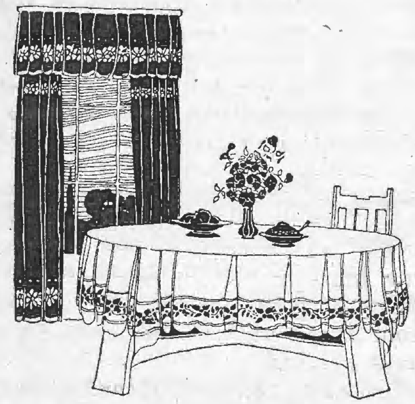
Hundred-Mile Transmitter.

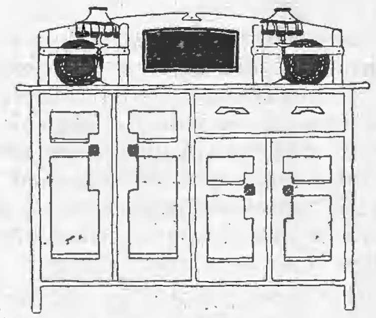
Amongst the requirements for the following year the need for a 100-mile transmitter was felt. Major Whiddington's spark transmitter having proved its capability, was adapted provisionally until valves were sufficiently developed for this work, which occured the following year.

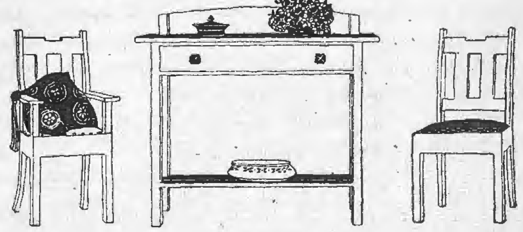
Although the continual increase of the R.F.C. showed that the general principles already in use in wireless were sound, it was clear that an extension of the range of notes, as distinct from wave-lengths, was desirable. Accordingly the wireless repair section set to work and produced a simple, but very effective little device which was easy to fit to the trembler of the primary of the transmitter. By a simple adjustment the note could be varied over a range of about six whole tones, thus giving a very great variety. Our little workshop made them, and a flight in every squadron on the whole front was fitted in a month and proved a great success.

I was appointed officer in charge of wireless at R.F.C. headquarters in March, 1916. It became necessary to turn our attention seriously to the reception of signals in aeroplanes. The instruments hitherto sent out for trial had not proved satisfactory, and a G.H.Q. intelligence report, that the enemy was using such a device, put our little wireless section on its mettle. With the assistance of Col. Blandy, of wireless H.Q. signals, three days later we were able to give a demonstration of the reception of signals from a standard army station by an aeroplane at 20 miles range. We used three valves associated with fixed coupled circuits designed for one wave-length only. This made for extreme simplicity, as the apparatus only required to be switched on to function without further adjustment.

The whole front was by now standardised and organised on the lines which had been found so successful in the 1st Wing, and preparations for the Somme offensive were put in hand. A school was started at St. Omer to train opera-







tors in the latest methods and codes. This included an important development of arrangements for a moving battle, and methods for putting the guns on to fleeting targets. A part of H.Q. moved to an advanced position and an enormous concentration of all forces took place. As the time for the attack approached, the rôle of air co-operation became more and more important in neutralising the enemy's artillery fire and hampering his movements generally, and in ensuring the barbed wire in front of his trenches was effectively cut. As the Somme operations took place during July, August and September, when the days were very long, the strain on the operators of listening in from dawn to dusk was immense, especially as there were over 600 ground stations in the battle area with only one operator at each.

The arrangements for putting the guns on to fleeting targets worked splendidly. Co-operation with the infantry also proved successful, and similar arrangements had been made to work with the cavalry had they got through.

The Wireless Personnel.

The work of the officers was not less strenuous than that of the operators; but we felt amply rewarded when at the close of operations the following special order of the day was published:—"The General Officer Commanding wishes to express his great appreciation of the work done by the wireless personnel of the R.F.C. during the present operations. They have very responsible duties, and the way they have carried them out, in spite of long hours and under fire, has contributed in no small measure to the success achieved by our artillery. Wireless officers are requested to bring this order to the notice of all operators."

At the end of 1916 I was appointed to the Air Ministry, and when I left France the total wireless personnel numbered 200 officers and 2,000 operators and mechanics, or more than the total personnel of the R.F.C. at the outbreak of war. The serious work of organisation, of training, supply, research and policy for all theatres of war was undertaken, also Home Defence, which became a necessity at this time.

It was probably in training that the greatest effort was made, inasmuch as by the policy of intensive culture by instructors drawn from the Front, the personnel were sent to France ready to take up their work on landing, which led to the closing of the School of Instruction at St. Omer. Specialisation was carried to the extreme, and with standardised apparatus and methods the system proved itself fully justified, and an ever-increasing stream of officers and men poured out to France, all highly trained in their own particular branch of wireless, whilst periodical visits were paid to the front by us all in order to keep thoroughly up to date.

Extremely good wireless work was done at the battles of Arras and Vimy Ridge. In the latter operation the following figures are eloquent, and were officially reported as the work of the 2nd Wing working with 38 H.A. groups, 55 divisional artillery and 187 heavy and siege battery stations:—

256 hostile batteries destroyed.
86 gun pits destroyed and 240 hit.
103 explosions caused.
229 destructive trench shoots.
117 successful registration shoots.
2,843 fleeting target calls received at battery station.
406 artillery observation flights.

Wireless failures nil, working with 30 machines simultaneously on a 7 mile front.

Wireless Telephony.

During the year continuous-wave transmission and wireless telephony were developed to the point of standardisation and use at the Front. In the latter case, intercommunication between the fighting machines in the air was leading to important results, and a range of 5 to 10 miles was achieved. The visual reception of signals in aeroplanes utilising valves to work a relay was developed and demonstrated successfully in France by Captain Murphy, but was not employed.

By the end of this year (1917) the following apparatus had been evolved, and was in use in the field:—

Short and medium range air to ground spark transmitter.

Aircraft receiver for Morse and telephony.

Aircraft and ground telephony and C.W. transmitter.

Ground spark tonic train and C.W. transmitters; C.W. and spark receivers, and directional receiving for aircraft was in an advanced experimental stage.

The total wireless personnel now numbered 300 officers and 3760 operators and mechanics.

The figures for the month of September, 1918, which represented the full development of our last great offensive, which resulted in the final defeat of the enemy:—

2,120 shoots to destruction.
2,575 flash patrols.
74,201 fleeting target calls from the patrol machines.
11 wireless failures.

At the signing of the Armistice complete ground wireless communications had been established between all units. Between 400 and 500 machines were fitted with wireless, and the guns were provided with nearly 2,000 wireless stations. The whole personnel amounted to 520 officers and 6,200 other ranks.

It must, I think, be judged satisfactory that we were able to beat the enemy so thoroughly in a science in which at the outbreak of war he excelled so conspicuously. Of the truth of this assertion he has given us ample corroboration in a document captured by us, and of which I will give a translation in conclusion:—

XI. Army Corps Staff. Corps H.Q.
South of the Somme. 1-6-18.
I./C. Wing Commanders No. 12358/1466.
Relating to Salvage of Aeroplanes.

1. The salvage of aeroplanes must be pursued with still greater vigour. Valuable technical improvements, which have apparently been extensively applied by the enemy, have been lost to us hitherto. Labour and money spent at home on trials might have been saved by earlier information.

2. The enemy has secured a distinct advantage in his successful use in aeroplanes of continuous-wave wireless apparatus, which possesses great superiority over the spark apparatus.

It is of the greatest importance to us to salve further enemy wireless apparatus of this description. In this way millions of money will be saved, as we have not so far been successful in constructing a continuous-wave wireless apparatus for aeroplanes which can work without certain disadvantages.

It is therefore the duty of all authorities to ensure the most indefatigable and careful salvage of wireless apparatus of enemy aeroplanes. Every particle is to be salved and collected if it is in any way possible. The ordinary men cannot recognise what value and meaning a single piece can have to an expert. As by unskilled removal this very delicate apparatus can easily be destroyed, the work of salvage is to be entrusted to Flying Corps or wireless personnel.

Having regard to the great importance of the apparatus for our own wireless telegraphy, the recovery and salvage premiums are correspondingly high. They belong to the formation which, by informing the Flying Corps, permits of assistance and appropriate measures being taken for salving the object undamaged; therefore such premiums will not belong to the Flying Corps unit.

WIRELESS INSTITUTE OF AUSTRALIA.

SOUTH AUSTRALIAN DIVISION.

The seventh general meeting of the South Australian Division was held at Adelaide on March 3. Mr. J. W. Wilkin was elected to the Council in place of Mr. Cook, who resigned. Mr. Brian Hooker gave an address on the Brown Telephone Receiver. A paper on the Standard Telefunken Ship Set was read by Mr. D. H. Smith.

The eighth general meeting was held on April 7, Mr. Hambly Clark presiding. The Secretary was instructed to communicate with all Divisions on the advisability of negotiating for the issue of transmitting licenses. A paper was read by Mr. B. M. Dunstone on the history of Wireless Telegraphy, beginning from Clark Maxwell's discovery of the theory of Electromagnetic and light waves, giving Hertz's discoveries, and also explaining the inventions of many scientists, leading up to the experiments of Marconi and a review of his work from the early days to the present time.

OUR QUESTION BOX

"Anxious Experimenter" (Mosman). — The anxiety should rightly rest with your friends and relatives.

R. Browne (Toowong).—1 (*a*) Yes. (*b*) It is the universal practice in commercial radiotelegraphy to calibrate the secondary circuit of receivers so that adjustments for pre-determined wave-lengths may be made. The calibration also permits the measurement of all incoming waves within the range of the circuit. The adjustments for measurement of wavelength should be made with a minimum coupling, otherwise the mutual inductance of the two coupling coils will introduce an appreciable error.

2. (*a* and *b*) There are many formulae for calculation of inductance. If the one you quote is taken from an authoritative source it will hold good for any gauge of wire. It is obvious that the quantity n varies directly as the gauge of the wire, and that L varies as $\sqrt{n}$, therefore a coil of 28-gauge wire will have a much greater inductance than a similar coil wound with 20-gauge. Much useful information on the calculation of inductances, capacities, etc., is given in "Standard Tables and Equations in Radiotelegraphy," by Bertram Hoyle. Also "Calculation and Measurements of Inductance and Capacity," by W. H. Nottage. Both books are obtainable from The Wireless Press, 99 Clarence Street, Sydney. The price of the former being 12s. 6d., and the latter 5s. 6d. (post-free 12s. 10d. and 5s. 10d. respectively).

3. (*a* and *b*) Correct formulae are:—

$\lambda = 1884.9 \sqrt{ZC}$,

λ is wavelengths in *metres*,
L is inductance in microhenries,
C is capacity in microfarads,

or—

$\lambda = 2 \pi \sqrt{LC}$.

Where λ is wavelength in *centimetres*,
L is inductance in *centimetres*,
C is capacity in *centimetres*.

F. T. Butler, Rose Bank, S.A.:—The formal institution of the Royal Air Force was recorded in the *London Gazette* of March 15, 1918, as under:—

"GEORGE THE FIFTH, by the Grace of God, of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, King, Defender of the Faith, to all to whom these Presents shall come.

"Greeting!

"Whereas by the Air Force (Constitution) Act, 1917, it is enacted that it shall be lawful for Us to raise and maintain a Force, to be called the Air Force consisting of such numbers of officers, warrant officers, non-commissioned officers, and men as may from time to time be provided by Parliament.

"Now know ye that it is Our Will and Pleasure that the Air Force to be established pursuant to the said Act shall be styled the Royal Air Force.

"Given at the Court at Saint James', the 7th day of March, 1918, in the Eighth Year of Our Reign.

"By His Majesty's Command,

"ROTHERMERE."

AERIAL ROUTE MAPS.

Note from Mr. Hector Sleeman on the work of Aerial Transport Limited.

"We have finished the surveys, completed our route maps and lent one to Sir Ross Smith for his Melbourne-Adelaide flight. The average length of the route is 430 miles, drawn to scale four miles to the inch. It shows, by colours, the types of country and permanent landmarks, such as waterways, main roads, railroads, leased landing grounds, good landing country, hilly country, timbered country, swamps and water. The map also gives, to an enlarged scale in the margin, a complete detailed plan of the leased landing grounds, and gives an outline of the towns over which the route passes. In the margin also is shown a compass course from one landing ground to the next, and in the opposite margin the altitude along the whole route is shown graphically as well as in figures; the distance between towns and the total distance travelled are also given. We have full information regarding mails and the various amounts and types of cargo available for aerial transport. The results are extremely satisfactory. The prospectus of the new company was filed with the Registrar-General, Victoria, on February 14. Efforts, which are meeting with very successful results, are being made to underwrite a considerable portion of the capital privately. Whilst in England I shall confer with the Chief Engineer (Major Lee Murray) and submit recommendations to the Board of Directors on the type of engine and machine to be used. The type of machine used will be approximately 8-passenger capacity, or 2,200 lbs. for 600 miles radius."

FOR THE WIRELESS EXPERIMENTER

CONSTRUCTION OF A SIMPLE RECEIVER

BY

RAYMOND EVANS.

The simple receiver is intended to receive from both ship and shore stations at distances of a thousand miles and even more. The essentials of this receiver are shown in Figure 2, in which L^1 is the aerial inductance, and consists of a small single-layered coil of wire, the number of turns of which is variable. Next comes the tuning transformer, which utilises two variable coils, L^2 and L^3, one within the other, and the relation of which, one to the other, can be varied. The primary tuning condenser C^1 and the secondary tuning condenser C^2 are generally of the rotary-vane type. A medium value of capacity is generally used for C^1, while C^2 calls for only a small value. The receiver will operate without these condensers, but I would recommend their use, as far better results will be obtained with them. The condenser C^3 is of the "block" type (Figure 5), and is generally called the telephone condenser, on account of its function in the circuit.

The telephone receivers are of the high-resistance type, preferably 2,000 *ohms* or over, and of reliable make.

The detector in this set is the crystal pattern, though of course a "valve" would give better results, but in the hands of a novice many difficulties would be encountered in its use.

Referring to Figure 2, it will be seen that there are two main circuits, that comprising the aerial, aerial inductance L^1, primary coil L^2, primary condenser C^1 and earth, being the open or aerial circuit, and that comprising the secondary coil L^3, secondary condenser C^2, telephone condenser C^3, detector *D*, and telephones, the closed or secondary circuit. For long distance reception, an aerial of fairly large capacity is necessary. It must be of fair length and can be composed of one or more wires. The height is not so important, provided there is good clearance around the location of the station.

A good receiving aerial (Figure 9) can be built as follows—Get about 500 feet of 14-gauge bare copper wire, hard drawn, or bare copper cable known as 7/20. Make the main aerial 200 feet long, and the feeders 50 feet long. The best method is to cut the 500 feet length in two and make each aerial and feeder of the one length by seizing around a porcelain insulator as shown in Figure 11. About 26 of these insulators will be required. They can be either of white porcelain or brownware, and of the reel or bobbin shape, as in Figure 10.

Two spreaders of stout bamboo or oregon about 8 feet long, must next be made, and stout rope bridles secured to the ends of each, as shown in Figure 11. Both hauling ropes must be of sufficient strength to support the aerial in rough weather. These also should be insulated by inserting two porcelain insulators in series near the bridle. The lower ends of the feeders must be cut to a suitable length and anchored by means of a string of insulators to some convenient but rigid position, when they can be twisted together and brought through an open window or a properly insulated fitting in the wall or roof of the radio room. The aerial should be at least 30 feet high at one end for reasonably good results, though 50 feet would be recommended. The open end of the aerial can be secured to a small 20 foot mast. If masts are to be erected to support an aerial, all guy wires must be insulated by the insertion of porcelain insulators about 10 feet apart. This precaution is necessary in order to avoid losses due to absorbtion of the received currents. A good earth-connection for receiving purposes can be made by utilising the nearest waterpipe. Secure a heavy copper wire to this pipe by a standard earthing clip.

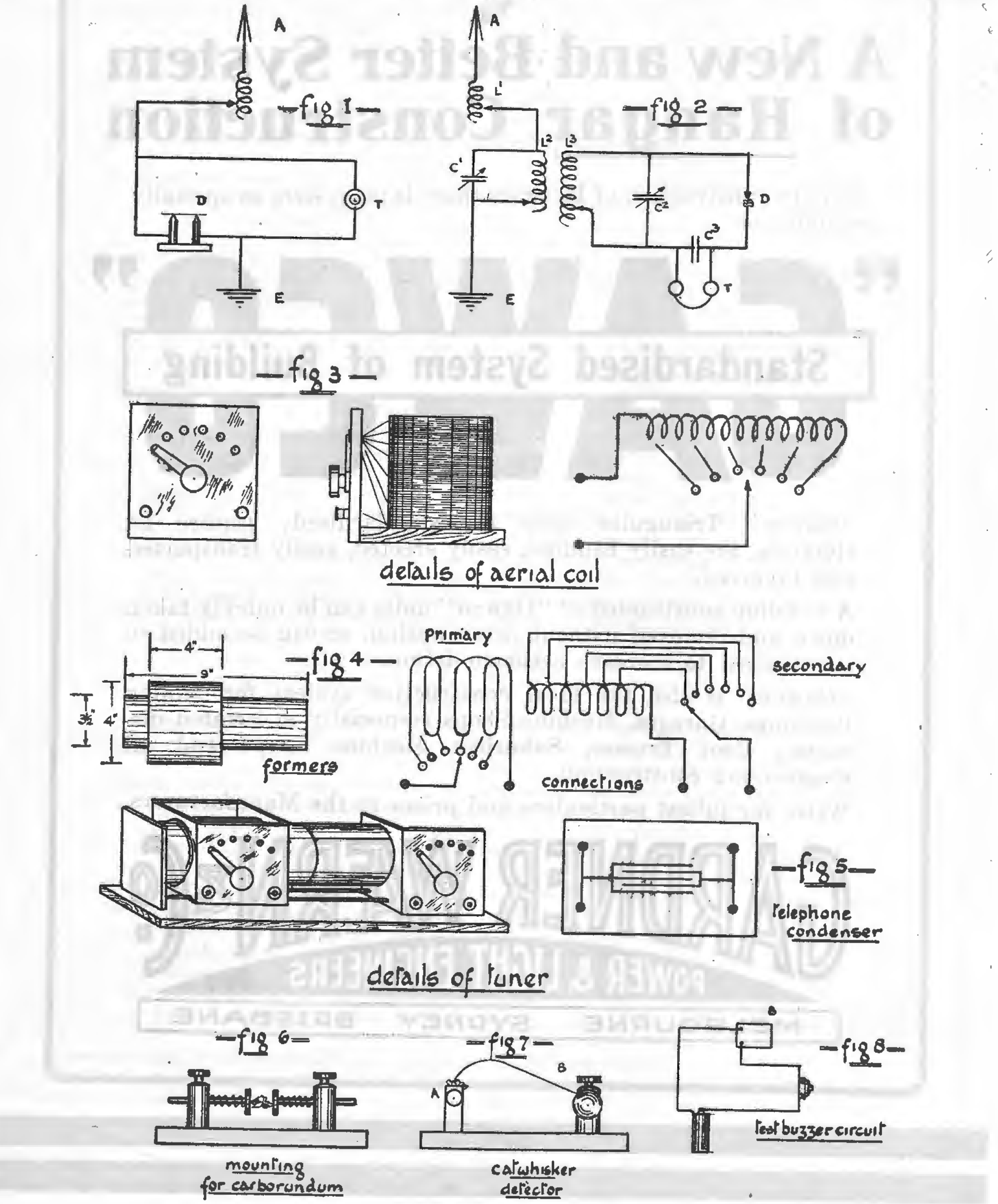
THE INSTRUMENTS.

Use a cardboard ribbon-spool of about 2 or 3 inches in diameter (the exact size doesn't matter), shellac well and wind on 100 turns of No. 28 SSC copper wire, looping out tappings every 20 turns. Secure each loop well by twisting tightly, and when complete give two coats of shellac varnish. Mount the coil on a wooden base, as shown in Figure 3, and lead off the tappings, as shown, to the six points of a switch mounted on an ebonite panel. This is secured in turn to the wooden base by two small brass screws. Two terminals are also fitted to this ebonite panel, one to be connected to the beginning of the coil and the other to the centre of the switch. We now have an inductance coil, the value of which can be varied 20 turns at a time.

For the tuning transformer, two cardboard tubes must be obtained, one of such a size as to fit within the other, leaving an intervening space of not more than half an inch. Use the larger tube for the primary, and the smaller or inner one for the secondary. An approximate idea of the sizes required for the tubes is given in Figure 4. Shellac both tubes well and wind the secondary coil first, beginning one inch from the end.

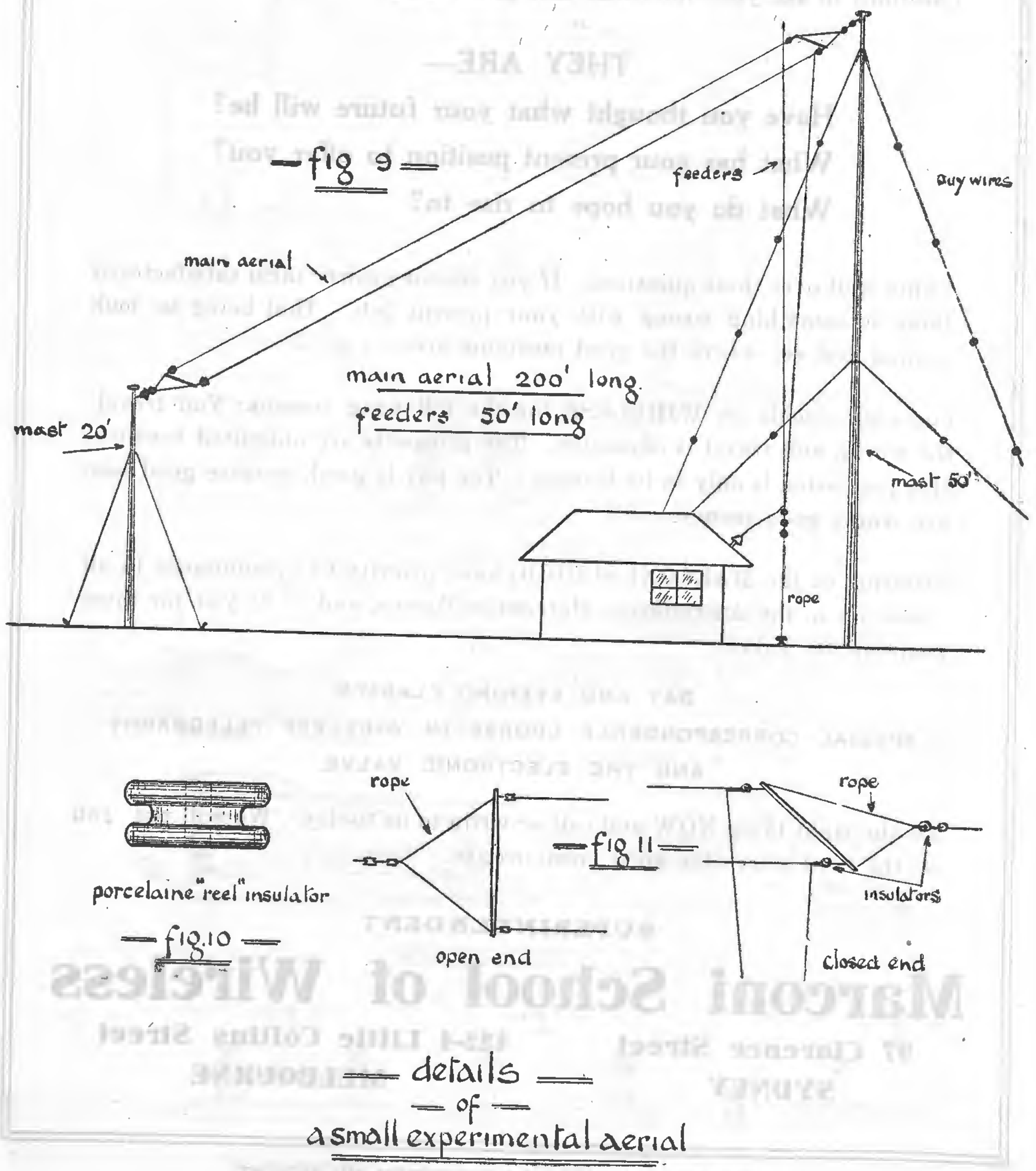
Put on 300 turns of 32 gauge SSC copper wire and loop off tappings at the 20th, 50th, 90th, 135th, 200th and 300th turn. It will be found that on completion of this coil there is still a great length of the tube without any winding. This is quite correct, and is provided for in the design.

Next take the large tube and, after shellacing, wind with 100 turns of 28 gauge SSC copper wire, with tappings looped out at the 7th, 12th, 20th, 35th, 65th and 100th turn. Give both coils two good coats of shellac varnish and set aside to dry. Take the primary coil and cut off the unwound portion of tube, leaving a margin of half an inch at each end of winding, and glue into two cheeks of wood in which have been cut suitable openings to receive tubes. Next cut a panel from ¼ inch ebonite sheet to such a size as to allow securing to the edges of these wooden cheeks with small screws, and a six point switch as shown in Figure 4. Two small terminals must also be provided, and the necessary connections made from the coil to the switch by soldering the wires to the back of contact studs. Then mount the wooden cheeks on the secondary former, these must be about half an inch taller than those of the primary coil. An ebonite panel of suitable dimensions, six point switch and terminals must be provided for this coil also, and secured as shown to the right of the drawing of the complete instrument in Figure 4. Before finally fixing the cheeks on this coil two ¼ inch brass rods are fitted for the primary coil to move upon, two small grooves being filed in the bottom of the wooden cheeks for this purpose. Secure coils to a suitable wooden base, give a coat of shellac, and the tuning transformer is complete. Actually, the construction of a tuning transformer entails merely the making of two single-layer coils, the turns of which



can be varied, and that one can be drawn within the other, or *vice versâ*.

The requirements of a good crystal detector are very simple. Clean crystals of iron pyrites give excellent results, silicon, galena and carborundum are also reliable, though the sensitiveness of two or more pieces may vary somewhat. A crystal-holder which would be suitable for all but carborundum is shown in Figure 7, where "A" is a brass clamp for holding crystal, and "B" a piece of springy brass wire of small gauge, arranged so that the pressure upon the crystal can be varied. Instead of clamping, crystals are sometimes bedded in some easily fusible solder or Wood's metal, in a small brass cup, but this method would not be recommended for the novice, as good crystals may be very easily spoiled by inexperience. Carborundum crystals require a different mounting. The holder shown in Figure 6 is one generally adopted as it permits of a much heavier contact than could be obtained with the Catwhisker type already described. Some crystals function better when provided with a small value E.M.F. from a local battery, and carborundum comes under this heading. It must be admitted, however, that although carborundum is not quite so sensitive as the other crystals mentioned, it retains its adjustment far better. Galena is a most sensitive crystal,



but is so easily knocked out of adjustment that many experimenters have discarded it. Iron pyrites or silicon are, in my opinion, the best for beginners.

Condensers.

The telephone condenser, C^3, can be readily made by interleaving sheets of tinfoil with clear mica sheet .001 inch thick. Cut the mica to $1\frac{3}{4}$in. by $1\frac{1}{2}$ in. and the tinfoil 2in. by 1in.; in all there will be required 20 pieces of mica and 19 tinfoils. In assembling use thin shellac varnish as a cement, and be careful to place alternate sheets of foil with the lugs opposite as shown in the March issue of this journal. When assembled there should be nine lugs on one side of the condenser and ten on the other, each foil having a sheet of mica between itself and its neighbour. Mount on a piece of ebonite sheet of suitable dimensions and secure two terminals at each end as shown in Figure 5. If the work has been carried out properly, the current from a dry cell should not be able to pass through the condenser. This test can be carried out by connecting a buzzer and battery in series with the condenser, the operating of the buzzer indicating that the condenser is "shorted" and will require to be remade, as a short circuited telephone condenser will cut out all signals.

Buzzer Test.

This is merely a buzzer of the ordinary pattern, together with a couple of dry cells and a push button, connected in series and placed in close proximity to the receiver. When testing and adjusting crystals, no actual connections need be made from the test buzzer to the receiver. For best results the buzzer armature should be adjusted to make the minimum of sound.

Receiver Connections.

Connect up all the instruments of the receiver as shown in the circuit diagram, Figure 2, using lamp-flex for the purpose. Keep all leads as short as possible and don't coil them up into spirals. No conductors must touch any wooden parts of the instruments, ebonite insulation being provided as a safeguard against leakage. Test all coils to locate bad connections or broken wires by the buzzer and battery.

Adjustment and Operation.

Having made sure that all connections are OK, place on the telephone headset and test the crystal in the holder by pressing the buzzer push button, and at the same time moving the fine detector-wire over the face of the crystal until the note of the buzzer can be heard in the telephone receivers. If, after repeated tests, no sound can be heard in the receivers, try a new piece of crystal and if still no response is obtained, it is an indication that a fault exists somewhere else in the circuit. Once a good clear buzzer signal is obtained in the receivers, adjust the various inductances and condensers to a fairly low value and vary same until the characteristic "crackling" sound of atmospherics can be heard.

Aerial View of Invermay (suburb of Launceston, Tasmania) and River Tamar, photographed from Lieut. A. L. Long's Boulton and Paul biplane.

WIRELESS OFFICERS ATTACHED TO VESSELS OF THE AUSTRALASIAN MERCANTILE MARINE.

Revised to April 16, 1920.

SHIP.	OPERATOR.
Apolda	J. W. McKay
Arawatta	V. Blight
Arahura	W. C. Brown
Aramac	N. H. Brown
Australbrook	J. F. McGinley
Australcrag	V. E. Stanley
Australford	T. W. Bearup
Australglen	J. R. Gilligan
Australmead	G. Pow
Australmount	A. R. Catford
Australpeak	R. H. Alexander
Australplain	S. R. Dixon
Australpool	K. J. Dines
Australport	A. H. Jeremy
Australrange	C. Black
Atua	L. N. Callaghan
Bingera	H. L. Miller
Bombala	—
Bundarra	H. K. Burbury
Canberra	—
Changsha	S. J. McVeigh
Charon	J. E. Cleary
Coolgardie	R. S. Taylor
Cooma	J. H. Hawkins
Dimboola	A. F. Vipan
Eastern	P. C. Gillon
Indarra	H. Firth (s) A. G. Ross (j)
Kaiapoi	A. E. Sheppherd
Kaitangata	R. W. Barnes
Kaituna	G. Illingworth
Kaiwarra	L. H. Jones
Kanowna	—
Karori	S. G. Jones
Karoola	R. R. Pilmore
Katoa	B. Boni
Katoomba	T. A. Jones
Kauri	N. W. G. Scott
Koromiko	W. C. Smith
Kowarra	H. Fullerton
Kurow	D. C. Lane
Levuka	S. A. Ludlow
Loongana	H. G. Reilly
Macedon	N. W. Marshall
Mackarra	A. R. D. Davis
Maheno	C. F. Griffiths
Makambo	C. H. A. Kidman
Makura	D. N. Quinn (s) E. A. Hunter (j)
Manuka	J. A. Heavey
Maori	—
Mararoa	H. A. Bloxham
Marsina	W. H. Richardson
Mataram	C. Williamson
Maunganui	—
Mawatta	H. W. Barnfield
Melusia	C. F. Green
Minderoo	J. G. C. Higgins
Mindini	A. Stuart
Moana	J. F. Hutton (s) E. N. Williams (j)
Moeraki	H. M. Lamb
Monowai	G. Donnelly
Mokoia	L. V. B. Sutton
Montoro	L. G. Devenport
Morialta	E. F. Hayes
Morinda	F. C. Davies
Navau	H. Speed
Ngakuta	H. Bargrove
Niagara	W. J. Martin (s) M. A. Prudence (j)
Ooma	E. A. Miller
Oonah	R. M. Firminger
Paloona	C. F. G. Taylor
Paringa	H. A. de Dassel
Pateena	J. H. Bennett
Rakanoa	V. M. Simpson
Riverina	H. Tuson
Rotomahana	W. E. C. Sawyer
Rupara	G. Cook
South Africa	E. J. Giles
St. Albans	W. H. Harris
Suva	L. S. Lane
Taiyuan	—
Tahiti	E. M. Bain (s) G. M. Whiteside (j)
Talune	H. F. Harman
Tarawera	G. H. Hugman
Tofua	W. A. Hawkins (s) J. G. Campion (j)
Ulimaroa	A. L. Dixon
Victoria	F. A. Hunter
Wahine	F. E. Duggan
Waihemo	F. A. Cook
Waihora	V. M. Brooker
Waikawa	F. L. Scott
Waimarino	K. L. Freeman (s) J. A. Guy (j)
Waipori	T. H. McWilliams
Wairuna	A. Cuthill (s) L. R. Dickson (j)
Waitemata	H. F. Hartley (s) C. H. Hart (j)
Waitomo	A. S. Dening
Wanaka	R. R. Robinson
Wandilla	M. Sedgers
Westralia	M. A. H. Ryan
Whangape	A. O. Sutherland
Wodonga	J. Welch
Wyandra	T. Bannister
Wyreema	W. J. Washbourne
Zealandia	L. J. Glyde
Zealandic	E. A. Burbury

On Home Port Leave.

H. E. Young	A. H. Beard
F. N. Davidson	T. Chalmers

IN THE SOUTHERN SEAS

"MANDATE TOUR" BY NEW ZEALAND PARLIAMENTARY PARTY

BY

C. L. V. SUTTON

IN granting New Zealand a mandate over the Samoan group of islands in the Western Pacific, the Peace Conference entrusted to the Dominion the responsibility of solving all problems arising from their administration. In order to acquaint themselves with local conditions and requirements, Members of the newly elected Parliament of New Zealand were invited, as a practical measure, to visit the Dominion's new territory, and following upon this invitation, the New Zealand Government chartered the Union Company's steamer *Mokoia*, a popular vessel engaged in the East Coast trade, to make the island tour. Coaled and refitted at Port Chalmers, she proceeded to Wellington and embarked the Parliamentary party.

Although primarily intended as a visit to Samoa, the tour was subsequently extended to include islands of the Cook Group and Nuie, now under New Zealand administration. Calls were also made, by invitation, at the island of Tutuila, in American Samoa, the Vavau group, Tonga and, finally, Fiji.

On March 17, the party, seventy-two in number, led by Sir James Allen, Minister for External Affairs, embarked at Wellington. At 4 p.m. the *Mokoia* left the wharf, anchored in the bay for medical inspection and, a couple of hours later, steamed out through the Heads, on her 6,000-mile tour of the South Seas; her first objective being the Cook group in Eastern Pacific waters, which lie some seven days distant from Wellington.

The New Zealand Parliamentary Party Aboard the s.s. "Mokoia."