

owing to the weak nature of the signal received, whereas two stages of screen grid amplification provides a signal of such intensity as to render the tuning in of short waves a matter of extreme simplicity. Owing to the very high frequencies involved, however, great care in receiver design is essential if the full amplification from two radio frequency stages is to be obtained. Certain factors in the design of shielding for instance, which are unimportant in longwave receivers, become essential when such high shortwave amplification is involved.

The best of apparatus should be utilised throughout, as nothing tends to ruin results more than condensers of poor quality and poor insulation generally, when high frequencies are involved.

The modern receiver should be capable of the reception of both long and short waves at maximum efficiency. This is the ideal combination and one that is becoming more and more in demand as the utilisation of short waves becomes more and more general. There are receivers on the market in New Zealand at the present time which fulfil both these requirements to a degree hitherto unobtainable.

Latest circuit developments have done away with any sacrifice of efficiency on long waves in order that short waves should be received. In fact, greatly improved results on both wave bands are to be had. The time is arriving when the purchaser of a radio set will demand that his receiver should operate on all waves.

He will realise that unless this is the case he is missing much of the radio entertainment available to him. The range of his set without short waves is cramped to a radius of a thousand miles or so instead of the whole world.

Stations May be Heard in Daylight.

UNLIKE long waves, short waves are capable of travelling great distances during daylight hours. The shorter the wavelength the more does this become true. Thus wavelengths of about 80 metres will provide good reception all over New Zealand in broad daylight, when long waves are unsatisfactory. Except when high power is used, however, the limit of the daylight range for 80 metres is about 800 miles, unless unusually good conditions exist. This refers to daylight at both ends.

If one end is in darkness, the range is increased considerably.

On the other hand, wavelengths, in the neighbourhood of 40 metres have an average daylight range of from 3000 to 4000 miles, whereas wavelengths below this value have a correspondingly greater range by day. The fact is noticeable when listening in New Zealand for United States short wave stations on late afternoons. The first stations picked up are those operating on the lower wave bands, about 30 metres or below. Those operating on about 50 metres do not come through with great strength till evening approaches.

The reason for this is that during our afternoon in New Zealand the twilight band is sweeping gradually across the Pacific Ocean, so that the amount of darkness between New Zealand and the United States increases till finally there is darkness all the way between ourselves and the American station.

As a matter of interest, it has been ascertained quite recently that wavelengths below 10 metres will not travel more than a few miles in darkness, although when there is daylight at both ends, the range often is thousands of miles. The use of these very short waves, however, has several disadvantages for purposes of broadcasting, which as yet have not been surmounted, although a recent cable from London indicates that some Frenchmen have perfected a system of telephony which operates on ultra-short waves.

Seasonal Effects.

GENERALLY speaking, although the change of season from summer to winter and vice versa affects short wave reception only in as much as it constitutes a change in the daylight conditions, there are several points in connection with seasonal effects which should prove of interest to owners of short wave receivers.

For instance, the best time of day for reception from Europe changes very markedly with the season. During the winter months, from March till August or September, station G5SW in England may be heard in New Zealand strongly during daylight hours from about 6 a.m. till noon, but about midnight, reception from this station generally is not so clear. On the other hand, during our summer, reception conditions are reversed, G5SW being heard more clearly about midnight than at the above times. This effect refers not only

to G5SW, but also to other northern European stations, such as PCJ in Holland. Reception from stations situated in the south of Europe, such as 3RO, Rome, are affected less than those in the north. The reason for this seasonal effect is made apparent by reference to a globe of the world. During New Zealand's winter, the earth is tilted at an angle with respect to the sun such that the shortest path in greatest darkness between England and New Zealand occurs during our daylight on a great circle running south from England.

During our summer, however, it will be seen by referring to the globe that the shortest path in greatest darkness



ROBERT MCKNIGHT,
who will render concertina items at
1YA on April 24.
—S. P. Andrew, photo.

is during our night on a great circle running north from England.

As the average shortwave length prefers darkness, although travelling in daylight also, as explained previously, the best times as regards day and night for reception from England and Europe generally are as stated above. Reception from these places during twilight hours generally is at a peak, independent of the season, for then darkness covers almost the entire distance for a short period.

Antipodal Effects—Ideal Position of New Zealand.

OWING to the fact that our earth is approximately a sphere, and also to the fact that New Zealand is very close to being situated at an opposite or antipodal position from England and Western Europe, there is quite a marked concentration in and about New Zealand of waves transmitted from stations in these places. This means that European signals are heard here with greater strength and clarity than is the case in countries considerably closer to Europe.

Proof of this concentration effect at opposite points on the earth is had in several cases. For instance, Hawaii is one of the best places in the world for reception from South Africa, these being places situated at almost antipodal points on the earth.

From the point of view of shortwave radio, then, New Zealand is in the fortunate position of being situated as far as possible from Europe, resulting in improved reception here. There are other reasons why New Zealand is for-

tunate in this respect, one of which being its insular position. The less land that radio waves, both long and short, have to travel over the less absorption takes place during their passage. This absorption is due to irregularities in the Heaviside layer existing over large land masses and continents.

Experiences in the Antarctic.

DURING three months of last year, when the writer was connected with the shortwave radio equipment of the Byrd Antarctic Expedition, some very interesting experiences were encountered. Although radio behaves very much as usual in the Antarctic, there are a number of instances when it does not do so. While travelling to the Bay of Whales, the City of New York, the supply ship, passed south and to the eastward of the South Magnetic Pole, where strange fading effects were noticed. During this period, there was no darkness and no night, as it was summer time, although during night time in New Zealand, darkness or twilight existed to the north of our position.

Just to the north of the Magnetic Pole reception on long waves from New Zealand was extremely good on one "evening" in particular. 2YA, Wellington, was received at great strength, and was quite as loud as it would be in most parts of New Zealand. However, 24 hours later the ship had passed the latitude of the Magnetic Pole, and 2YA, as well as all the other New Zealand stations, were quite impossible to receive. All that could be heard of 2YA was a very weak carrier wave.

A similar effect was noticed on another occasion when the Japanese stations were heard at abnormal strength, and 24 hours later were not audible. Results with shortwaves were very erratic at this same period.

Shortwave telephony was accompanied by very rapid fading, as many as ten fading periods in one second being noticed, giving an amusing though peculiar shivering effect as though the signals were affected by the low temperature prevailing. During these times it was almost impossible to read shortwave morse signals owing to their broken nature.

When the City of New York approached the Bay of Whales reception returned to normal, excellent results being obtained. The all-wave receiver used during these experiments was one of a well-known local make which gave splendid results. These phenomena point to the probability of reflection and screening of short and long wave signals in the neighbourhood of the Magnetic Pole. They also indicate the probable reason why shortwave signals do not pass freely over either the North or South Magnetic Pole as is instanced by poor reception in New Zealand from South Africa and vice versa, and between England and Alaska, where similar poor results are obtained.

Probably auroral effects are largely responsible for these results. Incidentally, this Expedition provided but another example of the ever-growing uses to which shortwave radio may be put. Without it the Expedition would have been cut off from the rest of the world, as were the Shackleton and Scott Expeditions before the days of radio; whereas, with it, not only was every movement of the Expedition known immediately in New York, but the members were able to hear actually the voices of their relatives speaking distinctly to them from America, 10,000 miles away, and were able to send replies!

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