

# Overseas Radio Telephone Service

## Details of the Equipment



PARTICULARLY interesting and instructive lecture was delivered recently before the Victoria University College Mathematical and Physical Society, when Messrs. S. J. Rubenstein, A.M.I.R.E., and D. M. Burns, of the Laboratory staff (radio section) of the Post and Telegraph Engineering Division, gave an illustrated description of the recently-opened Sydney to Wellington radio telephone service.

Mr. Burns gave an account of the early difficulties encountered in the experimental work, and then described a portion of the apparatus as it was finally evolved by the department's engineers.

The equipment consists of three main groups: The transmitter (ZLW) on Mount Etako, Tinakori Hills; the receiver on Mount Crawford, Watts Peninsula; and the terminal equipment at the Central Telephone Exchange, Wellington. It is necessary to have the transmitter and receiver separate to avoid interference.

Both the receiving and transmitting

aerial arrays have been designed on scientific principles. The receiving array consists of two similar sections, a front portion and a rear, or "reflecting," system, at a distance of quarter of a wave-length behind the first. By suitably arranging and connecting the networks it is found that this system will receive signals arriving at all angles, with the vertical, from the point of transmission (Sydney), effectively eliminating interference from the opposite direction, whilst another design for the transmitting aerial array enables a very narrow vertical ray to be sent out.

The frequencies used in this service vary from approximately 6000 to 15,000 kilocycles, the value used depending on the season of the year, a compromise being made for the effect of the time of the day.

### Huge Transmitter.

SOME idea of the magnitude of the transmitter may be gained from the fact that the filament current of the second and third amplifiers for the output of the master oscillator (the

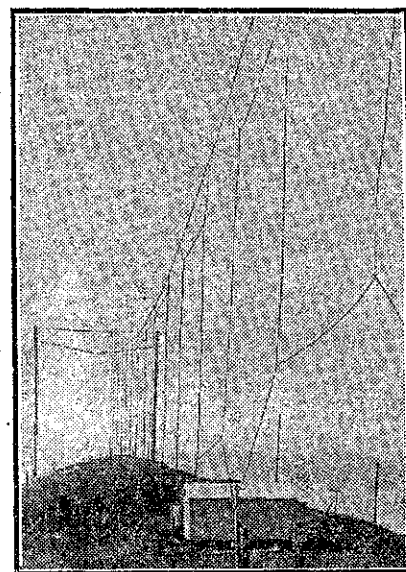
third amplifier being a push-pull stage, using 1500 watt valves), is 45 amperes; grid bias batteries of 120 and 300 volts are employed. The ordinary valve in a home receiving set takes a filament current of from .06 to 1.5 amperes, and has a grid bias varying from 4 to 50 volts. The amplifier for the speech section uses an oil-cooled valve rated at 5 kilowatts, taking a filament current of 48 amperes, and having a grid bias of 1350 volts.

The receiver is built up in four vertical bays or sections, and the various units are arranged on these sections. A separate panel is used for the power supply.

Screened-grid valves are used extensively, and very frequent recourse is made to the push-pull method of coupling.

### Switching Devices.

SOME means must be provided for rapidly changing from a listening position to a speaking position. When a person is speaking the disturbance due to the voice must go via ZLW, on Tinakori Hills, and when listening he



The receiving station at Mt. Crawford, Wellington, showing the directional array.

must be connected through to the receiving station on Mount Crawford. With one pair of wires both these positions cannot be simultaneously connected to the telephone subscriber. It is equally impossible to have a manual or mechanical switching device, for these would not be rapid or flexible enough.

The difficulty was overcome by use of thermionic valve-controlled apparatus. This apparatus, which, according to Mr. Rubenstein, hides its identity under such symbols as V.O.D., V.O.D.A., and V.O.D.A.S., the last of which really means voice operated device amplifier suppressor, is one of the most interesting features of the whole equipment.

The ingenious pieces of apparatus enable the change-over to be made in a time which is of the order of 3 milliseconds. Special precautions had to be taken, however, to guard against over-rapid operation, and to prevent extraneous noises from causing the various devices to function.

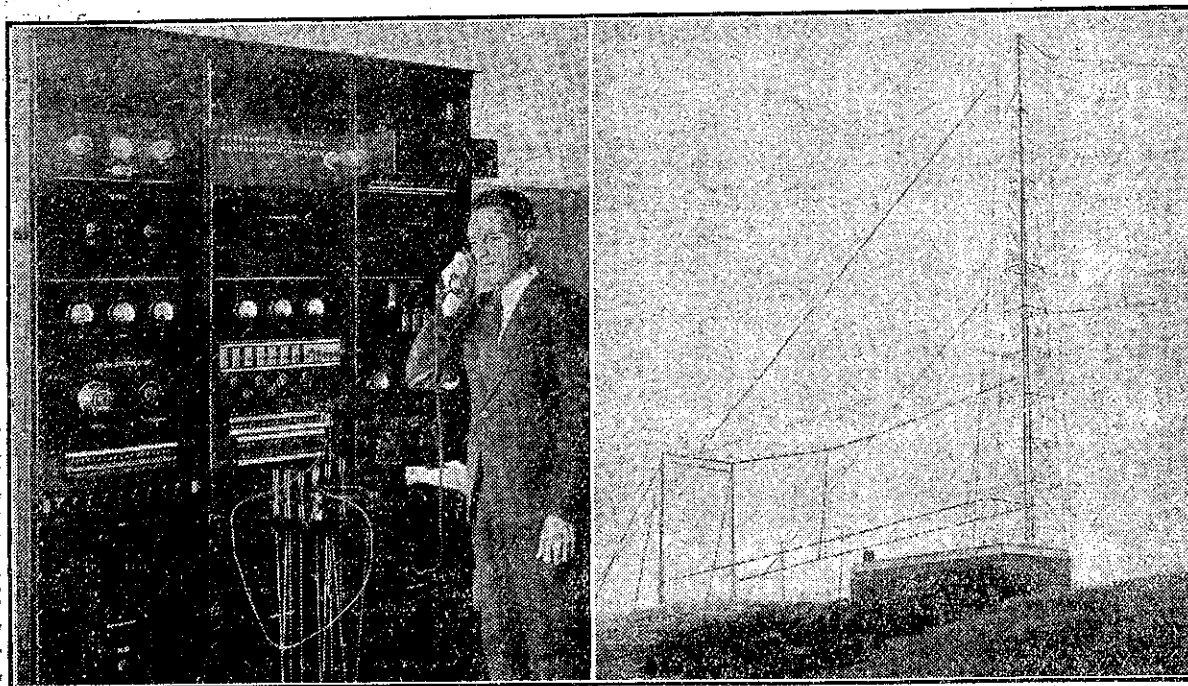
### New Zealand with England.

TESTS are now being carried out with a view to linking New Zealand up with England, and it is confidently predicted that ere long a regular commercial service will be in operation between the two countries. The value of such a service as this cannot be over-estimated, for not only would it be of primary importance in event of a national crisis, but also it will show that New Zealand is not lagging behind where the scientific advances of the age are concerned.

### Reasonable Charges.

THE charges are extremely reasonable. It costs only £1 per minute for conversation with Australia, and the charges for a call to England, Scotland, or Wales will be about £2/5/- per minute. The proposed charges for connection to Germany, France, Sweden, Czechoslovakia, Spain, and Italy vary from £2/10/- to £2/14/- per minute.

All the calls have a minimum charge as for three minutes. Each subscriber's line is tested before use, and every call is monitored up to a certain constant level. Further, should any interruption due to circumstances beyond the control of the technical operator occur during the call, only the effective portion of the whole is charged for.



Left: Technical operator's position at the Telephone Exchange, Stout Street, Wellington. Right: Transmitting Station, Mt. Etako, Tinakori Hills, Wellington, showing the transmitting array.

—All photographs by courtesy of "The N.Z. Post & Telegraph Journal."