

How Weather Forecasting is Carried Out

By B. V. Pemberton, Assistant-Meteorologist

ONE of the impressive features of the "Southern Cross" flight was the revelation afforded of the value of weather forecasts and the accuracy with which that forecasting of the course of events was carried out. The fact that on both journeys the aviators suspended the take-off till the "meteorological man" was able to indicate the probability of satisfactory conditions carried its own lesson of the high degree of accuracy now attainable in such forecasting. Fore-knowledge of weather conditions is of the utmost value to many sections of the community—notably farmers, fruitgrowers, seamen, and many branches of commerce. In the following "talk," given from 2YA, Mr. B. V. Pemberton, assistant meteorologist, outlines the procedure which is followed to prepare the nightly forecast.

SUCCESSFUL weather forecasting is dependent almost entirely on the means at the disposal of the Meteorologist for constructing a weather map showing the pressure systems over a wide area on either side of the country he has to forecast for.

In the first place, it must be understood that a meteorological organisation has a widespread network of weather-reporting stations from which, at certain arranged times, observations are transmitted by telegraph to the central office, which, for New Zealand, is in Wellington.

There are about fifty observers in New Zealand living as far apart as Cape Maria Van Diemen in the extreme north and Puysegur Point in the south. Reports are received also from Chatham Island, Norfolk Island, from various places in Australia, and from ships within a radius of one thousand miles of New Zealand.

Wireless telegraphy has been a very notable aid to the forecaster, as it has enabled him to chart the adjacent oceans, and, in a narrow country like New Zealand, this is especially necessary.

The reports, which are dispatched twice daily, at 9 a.m. and 4 p.m., to Wellington, consists of:

- (1) Barometer reading, reduced to sea level.
- (2) Temperature.
- (3) Wind direction and force.

- (4) State of weather; and in the case of coastal stations
- (5) State of sea.

All the information is plotted on a map, which, when completed, is called a "Synoptic Chart."

Maps Are Essential.

NO meteorologist in these days would attempt to make a forecast of weather without reference to such a map. No other practical means has been found of making it possible to secure a mental grasp of the variation of the weather over a large area. It is possible for an intelligent observer frequently to get some idea of the probable run of the weather from observations of local conditions alone but the success which attends forecasting of this kind must be very limited because the general conditions can seldom be correctly estimated. The official meteorologist has to forecast for a wide area. Some of the places to which his forecast goes are far distant from him; some of them he has never visited. He has, therefore, to form a mental picture of what is going on over the region and to base his estimate for the future on established general principles. There is no doubt that an observant person can amplify the official forecast from his own local knowledge, but he must get his ideas as to general situation from the official message. He has to guess what the weather map looks like.

It is important that the synoptic chart should cover a very wide area, and the one prepared every day in Wellington not only includes the New Zealand area but takes in the whole of Australia as well.

So as to make it possible to take in at a glance the prevailing weather, the latter is indicated on the map by letters or symbols which were originally introduced by Admiral Beaufort. For instance, b represents blue sky, c cloudy, o overcast, a black dot rain, etc.

Winds are drawn in by means of arrows pointing in the direction to which the wind is blowing and their force is indicated by the number of feathers in the arrow, one for each number on the Beaufort Scale. An arrow with one feather, then, would indicate a light air, three feathers a gentle breeze, five feathers a fresh breeze, and so on up to eight or nine feathers which represent gale and strong gale respectively. A calm is shown by means of a small circle.

The Basis of Forecasting.

FORECASTS are based principally on the distribution of air pressure or the way in which the barometer reading varies from one place to another on the chart. To show this pressure distribution, the person who prepares the chart draws "isobars" or lines of equal pressure. It is usual here to draw isobars for every tenth of an inch. There is an isobar for 30.0 inches, one for 29.9 inches, one for 29.8 inches, and so on. The object of the chart-maker in drawing the isobar for 30.0 inches, for instance, is to make it pass through all places on the map at which the pressure is 30.0 inches. He has to estimate the run of the isobar from the actual barometer readings reported from the observing stations. At all places on one side of the isobar for 30.0 inches the pressure will be above 30.0 inches and on the other side below it. Isobars may, therefore, be likened to the contour lines on an ordinary map.

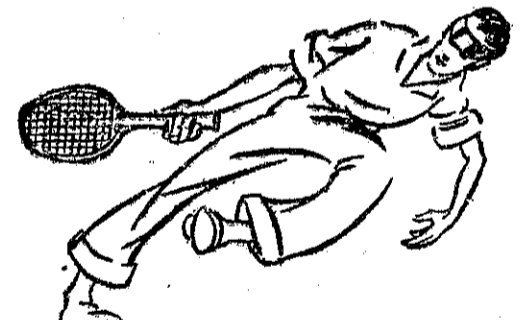
It is most important that the nature and use of isobars should be understood. Otherwise it will be impossible either to make a forecast for oneself or to appreciate fully the official forecast.

Isobars, then, are lines of equal pressure. It is this pressure distribution which determines the direction and force of the winds which we ex-

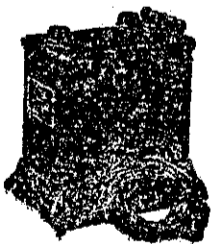
perience, and to the distribution of winds are related, to a great extent, the changes of temperature and weather.

What the Isobars Show.

HAVING drawn the isobars, it will be found that the lines assume certain shapes corresponding with well-defined pressure types or systems, and of these the two principal ones are the cyclone and the anti-cyclone. Both these systems are approximately circular or oval in shape. In the cyclone, the central or inner isobar marks the lowest pressure, while in the anti-cyclone pressure is highest in the centre and the outside rings or isobars represent lower pressures or barometer readings. A region where the barometers are low is called a depression or colloquially a "low," the



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