



"BRAIN" AT WORK—A giant electronic computer, such as the ORACLE shown here, will be helping weather forecasters make predictions on a trial run within a year. J. C. Chu of Argonne National Laboratory is shown here illuminated by the light of the computer's 2,000 electronic tubes.

METEOROLOGY

Weather by Giant "Brain"

Plans now made for daily use of electronic computer as an aid in predicting weather. Wind charts drawn with its data will be sent experimentally to local forecasters.

► A GIANT electronic "brain" will be making daily wind predictions to be used for local weather forecasts, on an experimental basis, within a year, according to plans of the nation's top weather experts in Washington.

Official announcement of plans for the first day-by-day use of an electronic computer in a trial run on weather forecasting is expected in 1954. The experimental program, planned eventually to give more accurate weather forecasts, will be jointly run by the Navy, Air Force and Weather Bureau.

Using electronic computers is a revolutionary method in numerical weather prediction, pioneered at the Institute for Advanced Study, Princeton, N. J. The system is so new that there are comparatively few experts on it in the world. Yet it is so promising that government weather officials have completed plans for its trial, and need only the necessary funds to start the program.

During its operations, the computer will be fed information on air pressures at several levels in the atmosphere, from near the

ground to about 30,000 feet. It will then perform mathematical calculations on this information and come up, within an hour, with the figures from which nation-wide upper wind charts can be drawn.

These wind charts, needed in predicting weather patterns over the entire country, will be sent to local forecasters. With this nation-wide picture as a background, the weathermen will then apply their specialized knowledge of local weather conditions to make their 24-hour prediction.

In making forecasts at the present time, weathermen rely heavily on the skill and knowledge they have acquired, during years of practice, to make their predictions as accurate as possible. With a picture of today's weather, they have to jump immediately from that to their own estimation of what to expect in 24 hours, or five or 30 days. Thus, essentially, weather prediction is an art, based on certain physical principles, but varying with the forecaster's personal judgment resulting from his experience.

In the trial run with an electronic computer for making the wind charts, most, if

not all, of the forecaster's subjective judgments concerning winds will be eliminated, although he will still have to make subjective decisions to go from the wind charts to actual weather forecasts.

One numerical forecasting expert now foresees that high speed "brains" will eventually eliminate most of the forecaster's personal opinions from his predictions. The techniques needed to record automatically the required weather data, to send such information to a giant computer, and to retransmit a finished weather map to local forecasters are now available, or are expected to result within several years from such programs as the one now being launched.

At present, numerical forecasting works like this: Information on current weather conditions across the country is fed into the computer. Stored in the computer's "memory" are certain mathematical formulas describing the motions of great air masses. Using these formulas, the "brain" computes the winds one hour in the "future." Then, working in one-hour jumps, these forecasts are repeated until, finally, a picture of the winds 24 hours in advance of the "present" is obtained.

One computer can now perform the millions of steps necessary to make such a 24-hour prediction in somewhat less than an hour.

With the use of formulas not yet completely worked out, which would take into account such energy sources as variations in the heat received from the sun and those resulting from water evaporation and condensation, meteorologists hope eventually to be able to use computing machines to make numerical weather forecasts for five or 30 days, or perhaps even farther into the future. Such long-range predictions, however, are not expected very soon.

Experts in numerical forecasting believe this system has two advantages over present methods:

1. The computer can use and store in its "memory" many hundred times the information a human forecaster can possibly keep in his head.

2. A human forecaster cannot use a precise, step-by-step, hour-by-hour method and stay ahead of the weather. He has to jump directly to the desired future time by subjective methods. Step-like predictions are more accurate than such relatively long-time jumps.

Which of the electronic computers now operating in the country would be the most satisfactory for numerical forecasting purposes is a question representatives of the Weather Bureau, Air Force and Navy still have to settle.

With this question answered, and with the necessary funds made available, the program will be put in operation. Then top meteorologists throughout the world will watch with high interest to see how weather predictions, made with the aid of computers, compare with the actual sunny or stormy conditions that mean either blue skies or rubbers.

Science News Letter, November 14, 1953