

City Firm's Computer Aids Weather Study

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A computer made by a Minneapolis company is playing a key role in a project aimed at taking some of the guesswork out of weather forecasting.

The project is being carried out by a 30-man navy team known as the numerical weather problems (NANWEP) group, based at the navy postgraduate school in Monterey, Calif.

One of the group's basic tools is a Model 1604 computer manufactured by Control Data Corp., Minneapolis.

What the group is doing is to take weather observations made at thousands of stations scattered over the northern hemisphere, feed them into the computer and come up with predictions of weather conditions in the next 24 to 48 hours.

COMPARED WITH present prediction methods—which employ observation, experience and educated guesswork—numerical weather forecasting does the job faster and with much less room for human error, proponents say. It also is expected to produce other useful forecasts as by-products, and it may some day help man in his efforts to control the weather.

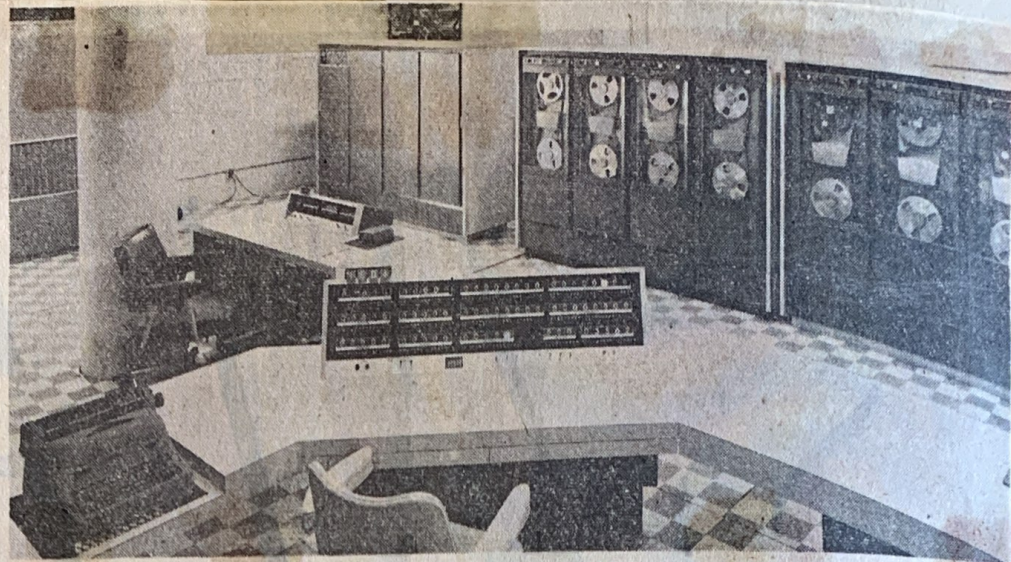
No one claims that the method will immediately remove the element of chance from weather forecasting. It will take a long time before man has enough measurements of existing weather to make absolute predictions of future weather.

But constant refining of the process will produce better weather forecasts in the years ahead than are available today, according to Commander Paul M. Wolff, NANWEP chief.

Began several years ago, the navy numerical weather forecasting project is now in the test stage, furnishing data for the Pacific missile range. Next month it will become a full-fledged separate navy activity, producing forecasts for the fleet and other naval activities on an experimental basis.

THE IDEA BEHIND numerical weather forecasting is simple, backers say. It is explained this way in the Ampex Data Products Co. magazine.

Weather is caused by air movement and variations in atmospheric pressure over a given area. If you know what these variables were yesterday and what they are



CONTROL DATA CORP. COMPUTERS USED IN WEATHER FORECASTING PROJECT
Navy employs Models 160 and 1601 to eliminate some guesswork from predictions

today, the application of certain mathematical equations will tell you what they will be tomorrow.

Precipitation and temperatures are the result of pressure conditions. If the computer can predict tomorrow's pressure conditions, then it is possible for a meteorologist to figure out the temperature and precipitation that will result.

THIS IS HOW the system works:

Weather observations that provide the raw material for the computer flow in over six teletype circuits from several thousand observation stations scattered around the northern hemisphere.

These teletype reports are fed to a Control Data 160 satellite computer and transferred onto magnetic tape.

Once the data has been edited and processed, the 1604 computer automatically produces a printed map of existing weather conditions, showing the atmospheric pressure at various grid intersections.

THE COMPUTER then uses mathematical equations to predict changes in pressure at each intersection in the next hour. From this figure it projects further changes, finally reaching the desired period of the forecast, usually 24 or 48 hours.

The finished map indicates pressure patterns, and a meteorologist can trace the lines showing the areas of equal pressure, then make his interpretations.

In the process of making this chart, the computer performs about 300,000,000 computations. It takes only 40 minutes to make a complete forecast, from incoming to outgoing teletype data.

OTHER PRODUCTS besides weather forecasts are expected from the new system.

For example, since the computer can predict what the surface pressure pattern will be on any ocean in the northern hemisphere, it can also predict wind direction and velocity.

Because these factors in turn determine the height of ocean waves, the system can be used to select the best route for a ship to travel on a given voyage.

In addition, the system may some day be useful in aiding man's efforts to control weather. For instance, after it has been refined through years of forecasts, the system might be able to predict if measures to divert a hurricane are feasible or would produce effects more dangerous than the original storm.

NUMERICAL weather forecasting is a development of the last two decades. The stage for it was set in 1939 when a mathematician, C. G. Rossby, reduced six long-known equations for describing the behavior of fluids to a single one.

A group of mathematicians and meteorologists, working at the Institute for Advanced Study at Princeton, N. J., took the next step in 1950, developing the mathematics which made it possible to apply Rossby's equation to the atmosphere.

In 1954, three government agencies—the weather bureau, naval weather service and air weather service—joined forces to make use of the Princeton research. Armed with a computer, they soon were turning out acceptable forecasts, and the navy then decided to set up its own numerical weather program.