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ter of gravity facilitates braking and minimizes ground looping. The jet engine is of simple construction, it has only about 10 percent of the moving parts of the usual reciprocating engine, it has no ignition system, no carburetor, no automatic throttle control and since there is no propeller, there is no need for prop controls and instruments. No warm-up of the engine is needed, a highly desirable feature militarily.

Since that first P-59 many other jet planes have been projected, built, flown. So rapid has been our advance that the P-59 is today classed as a trainer. Information on our latest type of jet-propelled airplane will be made public as soon as the security considerations permit.

### ***Radar Developments***

Owing to the continued blackout of technical details and the tactical use of radar devices, it is impossible to do more at this time than to call attention to the fact that the AAF, in collaboration with other services, has made many important contributions to the development of this potent weapon which has done so much to increase our effectiveness on all fronts.

### ***Global Weather Forecasting***

To match strides with aviation, AAF weather forecasting has become global in coverage. The usefulness of such an analysis was apparent when the Weather Division was requested by the Commanding General of the Twentieth Air Force to forecast the weather for the movement of the B-29's from their United States bases to their operational bases in China, a flight of more than half the distance around the globe. Forecasts for this flight called for weather analysis over an area much greater than that covered by any single chart then in existence.

The Weather Division, probably having more raw weather reports than any other weather organization, began the preparation of a northern hemispheric analysis four times daily. To the best of our knowledge this is the first continuous and comprehensive analysis of current hemispheric weather ever attempted by any weather agency. Copies of these charts are now being furnished daily to the U. S. Weather Bureau and to the Navy. The analysis also is transmitted daily to the various war theaters throughout the world.

This extended forecast service, covering the entire globe, still did not completely fill AAF needs. This service, based on short-term requirements, did not furnish information concerning the probable weather conditions for future operations, a knowledge of which is essential in long-term planning. To answer these and similar questions, a new technique was necessary. After considerable research, the Weather Division evolved a new method in weather investigation—"synoptic climatology." This technique demanded the acquisition and handling of great quantities of past weather data, a problem which was solved by the use of International Business Machines. Once all of the available weather data had been "punched" on IBM cards, the establishment of any weather relationships demanded by military operations could be readily performed. At the end of 1944, the weather Division had in its files 35,000,000 cards (105 tons of them) representing weather observations for between 2,000 and 3,000 weather stations over the world.

### ***Mobile Weather Stations***

It is perhaps not generally known that mobile weather stations mounted on jeeps and trucks are now operating in Italy, France, and in the Pacific. These units go ashore with the first troops, since their operations are vital to tactical air operations, bombardment, and the like. One of the first mobile units landed at Salerno, when the going was rough, and was in operation soon enough to send back information for the timing of air operations from North Africa in support of this landing. These outfits supply information to the ground and naval forces as well.

In the Southwest Pacific the weather men go in, carrying their equipment on their backs, if necessary, through the jungles. Weather and communications men usually work together as a team. Each new landing strip we put down must have a weather station in operation at once to make missions effective. There are some problems in the Pacific which do not exist in Europe, such as large areas where no stations exist, great distances, longer missions which require longer forecasts, and the like. Weather stations in the Pacific are operating in jungles, on mountain tops of the Himalayas, and the plateau of central China. The weather men may enable an outfit to make 11 missions on the gas for 10, by using tailwinds. This can be of great importance to an outfit flying on the China side of the Hump.

### ***New Forecast Techniques***

These strides in weather forecasting on a global scale have been made possible by the use of electronics. Two of its principal applications are:

1. The utilization of high frequency radio in storm detection. This has resulted in the detection of storm types containing turbulence which is apt to be dangerous to airplanes in flight, or productive of hailstorms. These storms are picked up within the range of the equipment.

2. The determination of upper air winds by the reflecting principle. By utilizing a gas-filled balloon to carry a suitable reflector aloft, the direction and movement of upper air winds can be determined by tracking with ground equipment the reflector as it moves with the wind layers aloft. This principle enables the determination of upper winds under conditions which prevent the utilization of the visual methods heretofore used.

As an illustration of the mounting uses of its various information, the Weather Division recently demonstrated that the winds, density, and temperature of the atmosphere could be forecast to a sufficient degree of certainty for short periods of time so as to give greater accuracy in ground force artillery firing than that obtained by using the standard artillery ballistic tables. This test was carried out at Pine Camp, New York, with an officer from the Weather Division preparing the forecasts. This officer is now stationed in the European theater and is issuing daily forecasts for use in artillery firing.

### ***Rockets Used by Aircraft***

A number of new weapons have been developed during the past year. Following is a description of some of them:

Airborne rockets were first used in the Army Air Forces by the Fourteenth Air Force in China during March. These 4 1/2-inch