RESTRICTED

Number 6

Weather Service Bulletin

MILITARY AIR TRANSPORT SERVICE AIR WEATHER SERVICE

STEVENSON

RESTRICTED

WEATHER SERVICE BULLETIN, NO. 6, 25 FEBRUARY 1949

CONTENTS

Weather Service Message

1. RAOB ERRORS (U)

How can we eliminate the large and numerous errors which are today destroying the value of 14 percent of Air Weather Service rawinsonde observations?

This question must be satisfactorily answered to make possible necessary improvements in the quality of all types of weather forecasts and especially those forecasts for high-level flight operations. Rapid advances in the complexity of Air Force operations are placing requirements on the Air Weather Service which require continual improvements in our forecasting techniques. Improved methods cannot be developed except with the aid of consistently accurate upper-air observations.

The situation is one that demands prompt and effective correction. Fortunately this should not be difficult. I believe that, once it is called to the attention of the man who can do most about it, the man who actually makes a rawinsonde run, it will be corrected. I am confident the coming weeks will see Air Weather Service rawinsonde performance attain a standard of accuracy of which we can all be proud.

I sometimes feel that the men who make rawinsonde runs are not fully aware of the value of their work. I can assure every man in an "R" section that every single rawinsonde is important. It is important to the safety of the flight which may take off within the hour and it is important to operations which will take place next year and the year after that. The data from each rawinsonde form a definite and necessary portion of the picture out of which an accurate current forecast must come, and out of which improved forecasting techniques must develop.

Two things are of equal importance in this picture. One is completeness, the other, dependability. The former is assured by the making of all scheduled runs to the maximum possible height; the latter is contingent upon the accuracy of the observations that result from these runs.

Figures published elsewhere in this Bulletin show the Air Weather Service contribution to the completeness of the picture over several recent months. Over-all performance with respect to coverage has been good; in some respects, it has been excellent. I have been especially pleased to note September's figure of 99 percent for the completion of scheduled rawins.

With respect to accuracy, however, our performance has been poor. A recent study, based on station records, reveals that Air Weather Service rawinsonde observations contain, on the average, 262 errors per 100 observations. Fourteen percent of these errors are of such a degree and type that they nullify the entire observation. In arriving at these figures, errors in temperature of less than 1.5° C., in relative humidity of less than 15 percent, and of less than 65 feet in height were not scored as errors. It is my belief that this tolerance is too large. Acceptable observations should be exact to within 0.5° C. in temperature, 2.5 percent in relative humidity, and 10 feet in height. The same study reveals that U. S. Weather Bureau observations average only 9 errors per 100 observations.

There is no valid reason that I can see for this great disparity between Air Weather Service figures and U. S. Weather Bureau figures. It is a situation that can be easily and quickly corrected. Some of the problems which have confronted the Air Weather Service upper-air program in the past, and some which it still must solve, are primarily headquarters responsibilities. This error problem is not. Its solution rests with the man making a run. The exercise of just a little more care in computation, in assembling instruments, in preparing batteries, and in taking baseline checks will do the job. I urge every rawinsonde man to take this added care and to exert all possible effort to insure that each run on which he works is correct in every detail.

D. N. YATES
Brigadier General, USAF
Chief, Air Weather Service

Here's How

2. 2107TH WEATHER GROUP PREPARES STAFF STUDY ON ICE FOG FOR AIRPORT LOCATION IN ALASKA (R)

An interesting example of meteorology applied to USAF installations planning comes from the AWS Group in Alaska. The Alaskan Air Command requested assistance of its Staff Weather Officer, Col. C. W. Carlmark, in determining the most suitable location for the heat and power plant and quartermaster area on an Alaskan airbase ("Station Able") subject to ice fog. As is now well known (see WSB, No. 5, item 127, and article by Oliver in January issue of Bulletin of American Meteorological Society), ice fog in the interior of Alaska is greatly aggravated by local sources of combustion which introduce water vapor into the air. The problem was to minimize any ice-fog interruption of air operations at "Station Able." Special research weather stations were installed at "Station Able" to obtain data to answer the problem.

Colonel Carlmark submitted his analysis and conclusions in a restricted report, which is summarized below:

Facts Bearing on the Problem

Ice fog dense and persistent enough to become a serious problem to aircraft operations rarely occurs with temperatures above -20° F. With this fact in mind, temperature readings were recorded at 3 check stations at half-hourly intervals when the temperature was below -15° F. and hourly when it was above -15° F.

Ice fog does not form or maintain itself for more than a few hours at wind speeds greater than 3 m.p.h. Therefore, only calm conditions and wind speeds of 1 to 3 m.p.h. were taken into consideration for the purpose of this survey. The prevailing smoke drift of calm periods and with winds of 1 to 3 m.p.h. were analyzed by months and average percentages were calculated.

If calm conditions exist at the surface, as they did the greater percentage of time at "Station Able," ice fog will drift horizontally with the winds up to the gradient level (2,000 feet above the surface). Due to the features of the terrain, however, the 1,200-foot level was chosen as the representative wind which influenced the smoke drift at the surface. Observations were, therefore, made at the original heat and power plant site and data obtained every 4 hours for each 200-foot level to an average height of 2,800 feet.

The average temperatures for December and January at "Station Able" were 10° F. above the probable normal expectancy for the area, and these are the months when ice fog is most likely to occur. Even under favorable conditions (temperatures averaging -25° F. and wind speeds of less than 3 m.p.h.), only very slight formations of ice fog were observed. However, this does not mean that ice fog would not form at "Station Able" if increased atmospheric pollution and cold temperatures (below -20° F.) were to occur simultaneously.

By analysis of the wind data gathered at the proposed power plant site, it was found that calm conditions prevailed from 30 to 60 percent of the total hours each month and light winds (1-3 m.p.h.) from 13 to 21 percent of the time.

In arctic regions, air drainage is an important factor due to the long winter nights, which allow the air close to the ground to become much colder than the air above it.

"Station Able" lies almost in the center of the river flats with mountainous rises beginning 8 miles to the south. Unbroken terrain lies to the east and west of the airfield. Northeastward, the land slopes downward, dropping approximately 1 foot per 300 feet in that direction. Several miles to the northeast lies a large, flat, swampy area, the edge of which is only 2,000 feet from the east end of the runway. The west end of the proposed runway is going to be almost 21 feet higher than the east end which will further assist in air drainage. (See accompanying chart.)

Conclusions

Ice fog will form at "Station Able," Alaska. The most suitable nearby location for the heat and power plant to minimize ice fog on or near the runway is at least 3,300 feet in a northwest direction from the west end of the runway.

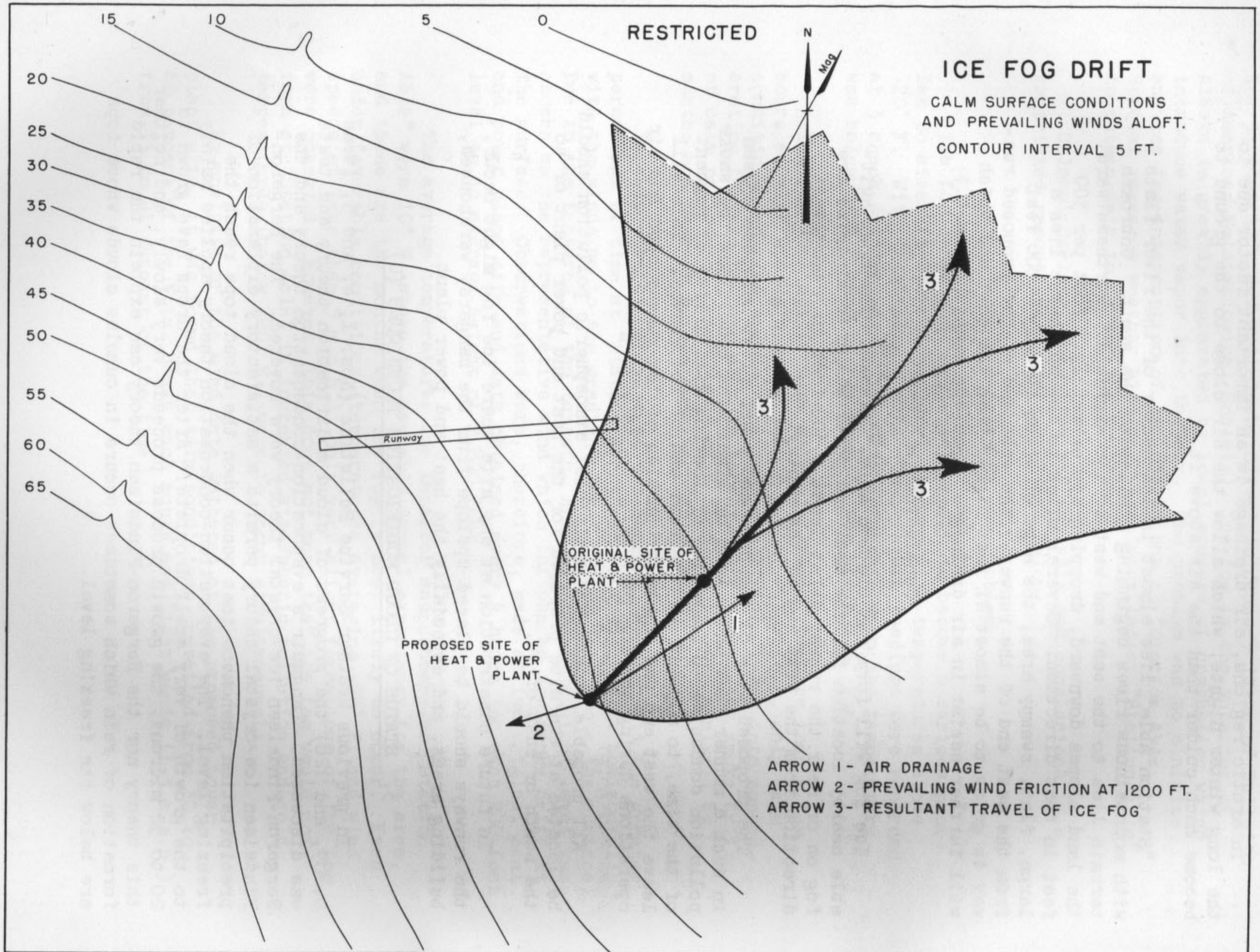
The proposed site of the heat and power plant has been chosen in such a manner that under calm or light wind conditions the smoke pollution conducive to formation of ice fog will drift, 83 percent of the time, to a point off the east end of the runway. This will leave the west end and the major portion of the runway open for air operations during ice-fog periods.

All probable sources of artificial atmospheric pollution should be located at the site proposed for the heat and power plant or to the south or east of it.

In future construction at any site where ice fog might occur, the runways should be placed upslope from the hangars, warehouses, building areas, and especially the heat and power plant.

3. STATUS OF CLOUD MODIFICATION TECHNIQUES (U)

In previous Weather Service Bulletins (Nos. 1, 4, and 5, items 9, 89, and 128) the progress of cloud modification theory and tests was discussed. Langmuir's evaporation-condensation theory and the Bergeron-Findeisen ice-crystal theory were covered. The Bergeron-Findeisen ice-crystal theory permits a satisfactory explanation of precipitation phenomena that occur when the cloud tops reach the freezing level. The evaporation-condensation theory applies mainly to the growth of very small droplets. After the drops have grown to 20 to 30 microns, the growth process proceeds very slowly, and neither this theory nor the Bergeron-Findeisen theory can explain the rapid formation of rain which sometimes occurs in cumulus clouds whose tops are below the freezing level.


RESTRICTED
ICE FOG DRIFT
CALM SURFACE CONDITIONS
AND PREVAILING WINDS ALOFT.
CONTOUR INTERVAL 5 FT.
N
Mag
0
5
10
15
20
25
30
35
40
45
50
55
60
65
Runway
ORIGINAL SITE OF HEAT & POWER PLANT
PROPOSED SITE OF HEAT & POWER PLANT
1
2
3
3
3
3
ARROW 1 - AIR DRAINAGE
ARROW 2 - PREVAILING WIND FRICTION AT 1200 FT.
ARROW 3 - RESULTANT TRAVEL OF ICE FOG

Langmuir has formulated a theory for the production of rain by a "chain reaction" in cumulus clouds at temperatures above freezing (1). This theory depends on the coalescence of droplets. For example, a larger than average drop might be formed and thus fall more rapidly than the surrounding smaller drops. On the way down it coalesces with drops that it overtakes and grows to a larger size. When a critical size is reached (2), the drops break into several medium drops and many small ones. The small drops are carried upward in the vertical current of the cumulus cloud and coalesce into larger drops on the way up until the maximum height for the drop of given weight is reached. Then it again falls and grows to break-up size. The number of raindrops thus increases very greatly in a short time and some will fall from the cloud. The theory depends on the presence of suitable vertical currents, water content, and drop size in the cloud.

According to the chain-reaction theory, the beginning of the reaction can be triggered by addition of water droplets or dry ice to the top of the cloud. Water supplies the necessary drops directly, but if dry ice is used, small droplets of water will first freeze on the surface of the dry ice pellet and then the whole or part of the particle will melt into drops. The passage of an airplane through the cloud tops, causing large water droplet run-off from the wings, can also trigger the reaction.

Operational tests of cloud seeding have been carried out by Project CIRRUS, under the technical direction (3) of General Electric Company (Langmuir and Schaefer), and by the Cloud Physics Project under the technical direction (4) of the Weather Bureau (Gunn & Coons). Also some tests have been made in Hawaii by Leopold and Halstead (5).

Results of the operational tests show a fair agreement with existing theory. The Cirrus and Cloud Physics Projects normally seeded dry ice into cumulus cloud tops reaching above the freezing level. The result was usually complete or partial dissipation of the cloud with occasional rain falling to the ground. In these cases the Bergeron-Findeisen theory applies; that is, the dry ice causes some supercooled water to form into ice crystals. These ice crystals grow into snowflakes at the expense of the water droplets because of the difference in vapor pressure, fall through the cloud, and melt to form the raindrops. This theory depends on a constant supply of ice crystals, which Langmuir postulates are formed continuously by breaking up of the snowflakes. The Cloud Physics Project has also used lead oxide crystals to cause partial dissipation of clouds. These crystals are similar to ice crystals and have the same effect.

The tests on supercooled stratiform clouds have been rather unsuccessful. Clear-cut cloud dissipation or precipitation was produced in very few cases, although frequently the appearance of the cloud top was changed along the seeded line. Apparently the water content and vertical currents in stratiform clouds are not conducive to initiating a chain reaction in the cloud. The case of supercooled fog is similar to that of supercooled stratiform clouds. No controlled tests have been run on fog, but some are planned for this winter. (See below.)

The tests in Hawaii by Leopold and Halstead were on cumulus clouds whose tops were below the freezing level. The clouds were dissipated by dry ice or water and occasionally precipitation reached the ground. The Langmuir chain reaction theory explains their results to a certain degree, but no quantitative limits are given to explain negative results.

None of the presently advanced theories apply to non-supercooled stratus clouds or fog. With the present seeding principles it is doubtful whether any success will be met when non-supercooled stratus clouds or fog are seeded. This is confirmed by the poor results already obtained with supercooled clouds.

The Joint Meteorological Committee (ref. WSB, No. 5, item 155), 21 December 1948, agreed:

a. That it would be premature to apply seeding techniques to present military operations.

b. That it is desirable that experiments with seeding of fog by ground and/or airborne equipment should be instigated as soon as convenient.

c. That the Weather Bureau, Navy, the Army, and Air Force should arrange, within their existing capabilities, for seeding experiments on fog at a few stations where facilities and manpower could be provided without undue cost.

A symposium on cloud physics was held 25-26 January 1949 as a part of the 101st National AMS Meeting. Members of the Cloud Physics Project, Cirrus Project, American Institute of Aerological Research, Australian Council for Scientific and Industrial Research, and Canadian National Research Council participated. The results were mainly along the line presented in this review, except that several agencies were more optimistic about the chances for increasing the normal amount of rainfall in certain areas. Specifically, the cloud seeding experiments made by the American Institute for Aerological Research (AIAR) in cooperation with the Arizona Weather Research Foundation over the watersheds of the Salt Verdo and Tonto Rivers in Arizona indicated that the seeding increased the natural rainfall from summer cumulus during periods when synoptic conditions were favorable for natural precipitation. Lacking favorable cloud structures, no precipitation could be produced. However, the number of experiments was felt to be rather small for specific conclusions. The members of the Cirrus Project were also more optimistic about the amount of precipitation that could be induced from cumulus clouds than were the members of the Cloud Physics Project. This may be the case partly because Cirrus Project seeding was carried out over a widespread area with resulting opportunity for picking more optimum situations, while "Cloud Physics" seedings were carried out over a small fixed net of ground rain gauge stations. The Cloud Physics Project was therefore a more controlled experiment, but the choice of cloud structure type was limited to what passed over the network.

REFERENCES

(1) Langmuir, J. Met., Vol. 5, No. 5, 1948.
(2) P. Lenard, Uber Regen, Meteor. Zts., Vol. 21, 1904.
(3) Quarterly Project Reports, Project Cirrus.
(4) a. Coons and Gunn, Bull. A.M.S., Vol. 29, No. 5, p. 266.
b. Coons and Gunn, Bull. A.M.S., Vol. 29, No. 10, p. 544.
(5) Leopold and Halstead, "First Trials of the Schaefer-Langmuir Dry Ice Technique in Hawaii," Bull. A.M.S., Vol. 29, No. 10.

On The Lighter Side

4. THE DAY BEFORE XMAS
OR
IT'S A RAW WIND SON
OR
THE WEATHER SERVICE ROLLS ALONG ON ITS FOUR CASTERS (U)

'Twas the day before Xmas and all through the Group,
Not a paper was stirring, not a troop dished out Poop.
The tree was sitting in decorous splendor
While the troops were all planning an egg-nog bender.

The Exec was busy, trying to learn
Who marked his present, "Note and Return,"
While the C.O. was wondering whether to mention
That when he walked into the room, the tree jumped to attention.

Then out in Base Weather, there rose such a clatter,
That S-3 jumped up to determine the matter.
The observers were out, peering up at the sky,
Observing the weather through four "fifths" of Rye.

The moonshine shone through the new-fallen rain,
And the thunder roared out through the sleet like a train,
While the forecasters swore, and tore at their hair,
They'd informed the Colonel 'twould be warmer and fair.

In came S-1, so lively and quick,
The seat of their pants worn shiny and slick,
More rapid than eagles with letters they came,
And whistled and shouted and called out by name.

"Now Yeater! Now Mitchell! Now Davy and Light!
We've quotas for Russia, you leave here tonight.
Now Pattinson, Riondet, Nims and Valentine!
We're shipping you out to a Siberian Mine!"

Then in a twinkle we heard a great roar,
"We're out of Scotch Tape," bellowed S-4,
And they stamped through the Building, angry and frisky,
"If we can't get Scotch Tape, we'll take some Scotch Whiskey."

"Ho, Ho!" said Inspection, "Do you want a reprieve?
Come to our lair and let us help you grieve,
Tell us your troubles, but first let us mention,
We can't give you a darn thing, but our attention."

Now see the Adjutant, with his big smile,
And the Group Sergeant-Major, peeping out of his file,
Yelling, "Hey, I can't find it, you're sure you're not tight?
Never heard of that subject, are you positive you're right?"

And we nod with a grin and say, "The subject is thus:
'Happy New Year to all, and a Merry Christ-mus'."
(2101st Air Weather Group)

What's Going On

5. RAWINSONDE CONFERENCE, 2059TH WEATHER WING (U)

A rawinsonde conference was held during the month of September 1948 at the headquarters of the 2059th Weather Wing at Tinker Air Force Base, Oklahoma. Representatives from the Continental group and squadron headquarters were present as well as representatives from Long Beach, Davis-Monthan, Wendover, White Sands, Sherman, Chanute, Selfridge, Griffiss, Steward, Eglin, Maxwell, Muroc, Briggs, and Carswell Air Force Bases.

The major topics of discussion were problems of supply, maintenance, and personnel and the various phases of the conference were conducted by the respective responsible staff officers of Wing Headquarters. During the course of the 4-day conference, a demonstration of the Weather Bureau type radiosonde, which is now in general use by continental upper-air stations of the Air Weather Service, was held and its operation was explained to the conference members.

The conference representatives were informed that an improvement in the operating efficiency of the rawinsonde sections was evidenced by increased percentage of scheduled runs made and completed and by the increase in average heights attained (ref. WSB, No. 5, item 137).

Captain J. H. Jack from Headquarters, Air Weather Service, discussed the new raob and rawinsonde code to become effective on 1 January 1949. (Hq., AWS)

6. UNIVERSITY TRAINING PROGRAM FOR WEATHER OFFICERS (U)

For the information of all personnel, the following summary of the number of Air Weather Service personnel who have entered civilian institutions for training since mid-1946 is published.

a. Graduate Training (See WSB, No. 5, item 153.)

(1) Regular AF Officers		
Under AF Ltr 50-21		41
Special Weather Officer Procurement Program		17
	Total	58
(2) Reserve Officers		
Under AF Ltr 50-21		37
Special Weather Officer Procurement Program		70
	Total	107

b. Undergraduate Training

(1) Regular AF Officers		
Under AF Ltr 50-71		33
Special Weather Officer Procurement Program		7*
	Total	40
(2) Reserve Officers		
Special Weather Officer Procurement Program		85*

*This group came from outside the Air Weather Service and the majority were recalled for such training.

c. Recapitulation

(1)	Total USAF and USAFR in graduate training	165
(2)	Total USAF and USAFR in undergraduate training	125
(3)	Total number of students who have entered civilian institutions	290

(Hq., AWS)

7. THREE-DIMENSIONAL WEATHER MAP DEVICE DESIGNED AT TINKER AFB (U)

Personnel at the Base Weather Station at Tinker AFB, Oklahoma, have designed and constructed a device which enables their forecasters to obtain a three-dimensional picture of weather conditions. The device consists of a framework constructed of aircraft channel which contains channels spaced approximately 2 inches apart for the horizontal insertion of sheets of transparent plexiglass 1/8 inch in thickness. The sheets of plexiglass are the same size as the present facsimile paper, and a map of the United States is etched on the back on exactly the same scale as the present WBAN transmitted map.

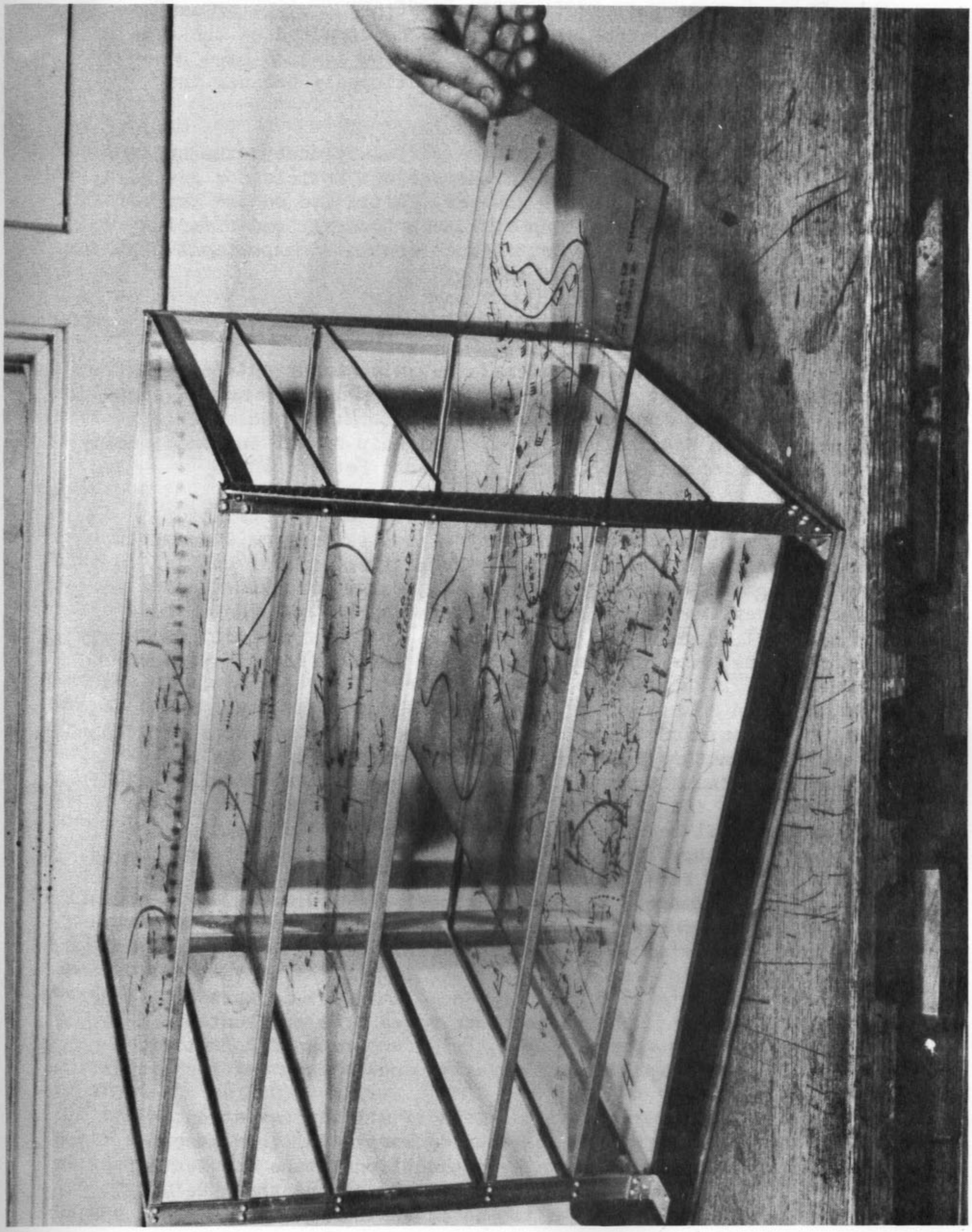
Upon receipt of the facsimile transmission of the surface analysis the plexiglass sheet is layed upon the map and the positions of fronts, highs, lows, and precipitation areas are drawn. The same procedure is followed on the 850-mb and 700-mb charts except in addition to the fronts and pressure centers, the moisture lines, zero-degree isotherm, and wind patterns are added. On the 500-mb, 300-mb, and 200-mb charts, trough and ridge lines are added. All drawing is done with wax pencils of the appropriate color. (See accompanying illustration.)

After all transmissions have been drawn up and inserted at the proper level in the device, a quick qualitative evaluation can be made of: 1) The moisture pattern, 2) wind shear lines, 3) frontal slopes, 4) position and slant of pressure centers. The forecaster can appraise areas of cloudiness, low ceilings, and turbulence, and then, utilizing hourly sequences, can check his appraisal.

The device was primarily designed as an aid to forecasters. It was felt that some forecasters are too often inclined to view each analyzed level independently without associating adjacent levels in the over-all appraisal of the synoptic situation.

Editor's Comment

A device of this type was first described by Zellon in the Bulletin of the American Meteorological Society for December 1935, pp. 295-296. It was tried before the War in various organizations



and found more or less impractical for routine use. Later many models of atmospheric cross sections were constructed on the same principle, using vertical glass plates. These devices have gone into disfavor in training organizations, allegedly because the picture is apt to confuse the students.

Headquarters, Air Weather Service seriously doubts the suitability of the device described in the subject article for general use by forecasters and pilots. However, initiative on the part of field personnel in experimenting with such forecast and briefing aids is highly commendable. Out of such continued experiment will come the better procedures of tomorrow.

8. AIR WEATHER SCIENTIFIC SERVICES (U)

Air Weather Service has recently taken an important forward step to insure keeping abreast of new requirements and new developments in the field of meteorology. A Directorate of Scientific Services has been created under the leadership of the internationally renowned Norwegian meteorologist, Dr. Sverre Petterssen.

Dr. Petterssen was formerly Chairman of the Department of Meteorology at M.I.T., whence he went on active duty as Colonel in the Norwegian Air Force assigned to the British weather central in London during the War. After the War he took a very active part in shaping the new weather procedures adopted by the International Meteorological Organization and ICAO. He left his position as Deputy Director of the Norwegian Weather Service to join the Air Weather Service.

As Director of Scientific Services, he will advise the Chief on all technical matters and represent the Weather Service in many technical coordination activities. Under him a staff of highly trained officers and civilian meteorologists is being assembled. Close contact will be maintained with all new developments in the field of meteorology by continuing liaison with the U. S. Weather Bureau, the U. S. Navy, all universities and other agencies doing meteorological research, the International Meteorological Organization, and the various foreign weather services. Also under Dr. Petterssen's supervision is the scientific staff which provides meteorological advice and special climatological services to all Air Force and Department of the Army activities. The Master Weather Analysis and Forecast Central has been moved from the Pentagon to Andrews AFB and is now operated in the Directorate of Scientific Services to provide world-wide forecasts and to test new techniques.

In these days of rapid advancement of military aviation, accurate weather information is becoming more vital than ever before. It is believed that this new addition to the Air Weather Service will strengthen the organization and assure that the U. S. Air Force continues to receive top-notch weather service. (Hq., AWS)

9. PROGRESS REPORT TO 17 AUGUST 1948 ON PROJECT FOR ELECTRICAL SURVEYS OVER THUNDERSTORMS (R)

Work for the summer of 1948 on this joint project (ref. WSB, No. 5, item 143) of the USAF and the Carnegie Institution of Washington was begun late in June. The B-29 that was equipped at Wright Field in 1947 for electrical surveys over the tops of thunderheads arrived at Clinton County Air Force Base, Wilmington, Ohio, on 29 June 1948. An earlier start was not possible because the craft and personnel were engaged on a special project of the USAF during the months of March, April, May, and part of June. An Air Weather Service RB-29 aircraft and crew from the 308th Reconnaissance Group were again assigned to this mission.

The operations from this base are administered by the All Weather Flying Division of the A.M.C., and most of the survey flights thus far have been vectored with the aid of the large V-Beam radar station located at Jamestown, Ohio. Cooperation on the part of the officers and personnel of the USAF who are concerned with this project has been generous and effective.

The condition of the craft and equipment was better at the beginning of this period than last year. This, together with the experience gained last year by the officers who were reassigned to the project, has been advantageous.

In addition to the electrical measurements (air conductivity, 2 meters; electric field, 2 meters; and vertical current, 1 meter) photographs of the thunderheads or other clouds are taken at high altitudes. The photography is done by the weather officer, using special cameras and filters issued for the purpose. Some interesting pictures have already been obtained. One, of a lenticular cap over a thunderhead, is of particular interest.

The weather during this period has not been favorable for the project. Only a few thunderstorms came within reach, but four survey flights and one test flight were made. During these flights six thunderheads were surveyed and attempts to fly over two others were unsuccessful because these extended to altitudes that could not be reached with this craft. The altitudes of the surveys varied from 44,000 feet to about 46,000 feet above sea level.

Two of the surveys showed no appreciable vertical electric current; four showed current in the right direction, but for two of these the current was less than one percent of that required on the average from each thunderstorm if the negative charge of the earth is to be supplied by thunderstorms. Preliminary examination of the results for the two thunderstorms last surveyed indicates that the current from these was of about the required magnitude as well as of the right sign.

It seems necessary for the problem in hand that surveys be made over thunderheads varying as to size, degree of electrical activity, and type. A considerable number of surveys will be required to satisfy this condition.

It is apparently feasible with the RB-29 to make surveys as far as 500 miles from the home base, or more if the plane can land at a base near the storm, whereas the V-Beam radar has a range of only half that radius. Such an extended range of operation should considerably increase the number of possible surveys. Recent experience with the radar equipment now installed on the RB-29 indicated that guidance from the V-Beam radar station, although helpful in definitely locating storms, is no longer indispensable. Accordingly, such independent flights seem advisable when there are good prospects of making more surveys. Other means of getting more surveys also have been considered. Night flights have been discussed, but experience last year showed that extra difficulties attend these. (Based on an interim report by Dr. O. H. Gish and Dr. G. R. Wait of Carnegie Institute. A final operation report by the 308th Reconnaissance Group will appear in a later Bulletin.)

10. AWS PARTICIPATION IN INTERNATIONAL AEROLOGICAL DAYS, NOVEMBER 1948 (U)

International Aerological Days were originated in the early 1900's. At that time synoptic meteorological communication networks, as known today, were non-existent, and the exchange of meteorological data was a slow process. Upper-air soundings were made at few places and only at odd times.

Prominent meteorologists of that period were aware of the necessity for coordinated reports from large areas to provide a basis for research. As a result of their efforts, International Aerological Days were born, and the participating nations endeavored to make as many meteorological observations as possible, at specified times, and to forward the data to a central agency where it was available to all interested meteorological agencies. The data collected during these early periods were an extremely important factor in the development of modern theory and the techniques of weather analysis presently in use.

International Aerological Days were necessarily interrupted during the late war. However, they were not forgotten. At the Conference of Directors of the International Meteorological Organization, held during October 1947 in Washington, D. C., it was agreed to resume the program. The agreement was that during 1948 and alternate years thereafter the program would be held in the spring and fall months. In the intervening years it will be held in the summer and winter months. Each period will be for 10 days and the exact dates will be chosen and announced by the President of the Aerological Commission of the International Meteorological Organization.

The rapid development of meteorological equipment during the war has made it possible to regularly obtain meteorological data at altitudes heretofore unattainable. Meteorological services have been greatly expanded and not only provide a denser network of sounding stations, but are making data available from areas from which little or no data were available prior to the war. The combination of these factors makes the resumption of International Aerological Days particularly significant in the furtherance and continuation of meteorological research.

Air Weather Service personnel may be justly proud of their contributions to the science of meteorology. A large percentage of the meteorological data, both surface and upper air, available from inaccessible and unknown areas is provided by Air Weather Service personnel in our far-flung outposts and by reconnaissance flights. The extent of Air Weather Service participation in the November 1948 program is shown in the following table. Lack of space prohibits showing the achievements of individual stations. The cooperation of all stations is greatly appreciated and particular credit is due those stations which took observations above and beyond the routine schedule. A few of the outstanding examples in this latter category are Central AFB, Iwo Jima; Yokota AFB, Japan; Kimpo AFB, Korea; and Nanking, China.

Upper-Air Soundings: RAOB, RAWIN, PIBAL, RAREP

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
			2059TH AIR WEATHER WING					
9th	2	Raob	80	79	0	54950	43576	Davis-Monthan AFB
	2	Rawin	80	73	0	55200	40874	Long Beach AFB
	3	Pibal	120	118	0	46800	14688	Williams AFB
	3	Rarep	240	203	0			
	*2	Rawin	52	20	26	45000	31065	Westmorland, Calif.
		*Operated by Strategic Air Command.						
10th	*2	Raob	20	21	0	59047	39486	Muroc AFB
	1	Rawin	20	16	0	45920	27060	Hill AFB
	*1	Rabal	0	4	0	40000	38500	Muroc AFB
	*7	Pibal	220	165	0	49500	15306	Hamilton AFB
	1	Rarep	80	80	1			

*Includes Muroc AFB observations which are made as and when required.

Upper-Air Soundings: RAOB, RAWIN, PIBAL, RAREP (cont.)

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
				2059TH AIR WEATHER WING (cont.)				
12th	3	Raob	120	110	0	63566	37900	Stewart AFB
	3	Rawin	120	114	0	48216	46139	Selfridge AFB
	a10	Pibal	400	b275	46	59670	c12236	Langley AFB
	5	Rarep	370	297	1			

a - Phillips Field and Lockbourne AFB unreported.
b - No. of pibals at Langley AFB unreported.
c - Average pibal height at Greater Pittsburgh unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
16th	2	Raob	80	77	0	68552	40353	Chanute AFB
	2	Rawin	80	77	0	68552	33560	Chanute AFB
	*2	Pibal	80	50	0	55740	10370	Scott AFB
	1	Rarep	80	72	10			

*Godman AFB and Wright-Patterson AFB unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
19th	4	Raob	140	126	3	88265	41598	Holloman AFB
	4	Rawin	140	122	3	67568	38031	Holloman AFB
	1	Rarep	80	80	0			

Smoky Hill AFB and Topeka AFB pibals unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
24th	1	Raob	40	34	0	80130	39373	Carswell AFB
	1	Rawin	40	34	0	38048	26896	Carswell AFB
	*7	Pibal	250	176	0	60600	14141	Marshall AFB
	1	Rarep	80	80	0			

*Bergstrom AFB, Topeka AFB, and Post Field unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
25th	a1	Raob	40	a36	0	54514	42050	Eglin AFB
	2	Rawin	64	60	0	55774	40984	Robins AFB
	1	Rabal	40	36		54514	43135	Eglin AFB
	b5	Pibal	136	96	26	42640	11652	Robins AFB
	3	Rarep	240	239	1			

a - Robins AFB "R" Section activated 15 November. Raobs unreported.
b - Greenville AFB, Marietta AFB, Pope AFB, Turner AFB, and Tyndall AFB pibals unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
			2059TH AIR WEATHER WING (cont.)					
26th	2	Raob	80	79	0	61040	43948	Barksdale AFB
	2	Rawin	80	79	0	61040	33672	Barksdale AFB
	2	Pibal	80	70	0	24900	7400	Craig AFB
	4	Rarep	300	261	67			
2060th	1	Raob	20	20	22	81160	41594	White Sands
	1	Rawin	20	20	22	91840	42623	White Sands

Raob and rawin observations at Robins AFB, Carswell AFB, and Lowry AFB were taken by personnel of the 2060th.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
			43D AIR WEATHER WING					
15th	2	Rawin	80	80	0	60000	39362	Kadena AFB
	*1	Pibal	20	18	20	25000	9500	Tai-Chiao Field, Nanking

Raobs at Clark AFB and Kadena AFB unreported.
*Operated by the Chinese and supplemented by personnel of the 15th Weather Squadron to provide the 20 extra observations for Aerological Days.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
20th	4	Raob	160	158	2	66306	40884	Itazuke AFB
	4	Rawin	160	159	4	61762	33586	Misawa AFB
	6	Pibal	170	136	51	50850	9526	Johnson AFB
	1	Rarep	120	120	120			
30th	2	Raob	60	46	12	63104	40857	Harmon AFB
	2	Rawin	80	69	0	65100	41202	Harmon AFB
	1	Pibal	0	2		10000	7900	Harmon AFB
31st	3	Raob	90	76	0	72110	50536	Henderson AFB
	3	Rawin	100	98	0	69536	49348	Henderson AFB
			2107TH AIR WEATHER GROUP					
11th	5	Raob	200	188	0	94651		Shemya AFB
	5	Rawin	200	181	0	67141		Thornbrough AFB

No reports on pibals received.

Upper-Air Soundings: RAOB, RAWIN, PIBAL, RAREP (cont.)

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
			2108TH AIR WEATHER GROUP					
6th	a2	Raob	80	78	0	59047	35396	Albrook AFB
	b5	Rawin	200	187	0	68000	39521	Beane AFB
	4	Pibal	120	94	4	44000	12000	Verman AFB
	1	Rarep	130	99	104			
	2	Sferics	160	125	0			

a - Beane AFB, Coolidge AFB, Managua, Barranquilla, and Verman AFB raobs unreported.
b - Albrook AFB and Verman AFB rawins unreported.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
8th	a7	Raob	220	197	0	70192	38514	Ernest Harmon AFB
	b6	Rawin	180	164	0	70192	32681	Ernest Harmon AFB

a - Upper Frobisher inoperative. Raobs at Narsarssuak unreported.
b - Rawins at Fort Chimo and Narsarssuak unreported.
No reports on pibal operations.

Squadron	No. Stas. Rptg.	Type Ob.	No. Obs. Sched.	No. Obs. Taken	Extra Obs.	Max. Alt.	Ave. Alt.	Station Taking Highest Ob.
			18TH WEATHER SQUADRON					
18th	4	Raob	160	160	0	67174	44944	Weisbaden AFB
	4	Rawin	160	144	0	57984	33324	Neubiberg AFB
	5	Pibal	200	84	0	67530	10768	Wheelus AFB

Weather Reconnaissance Observations: FLIGHTS, SOUNDINGS

Squadron	No. Sched. Flights	Sched. Flights Completed	Unsched. Flights Completed	No. of Soundings
373d	20	9	1	9
374th	10	1		1
375th	15	8		8
514th	12	12	7	16

FAMOUS LAST WORDS

"Only scattered thunderstorms, let's go!"

"Only 'Junior Birdmen' go around again!"

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11. THE DIRECTORATE OF GEOPHYSICAL RESEARCH OF AIR MATERIEL COMMAND (U)

The Geophysical Research Division, formerly located at Watson Laboratories, Red Bank, New Jersey, has completed its move to Cambridge Field Station, Cambridge, Mass , and has been redesignated the Directorate for Geophysical Research. This change in location is one of a series of actions designed to strengthen and emphasize the role of the geophysical sciences in the Air Force.

It will be remembered from a previous article in the Weather Service Bulletin that the responsibility for meteorological research and development (exclusive of materiel) was transferred from the Air Weather Service to the Air Materiel Command in 1947. This transfer was in line with the USAF policy of vesting its major research interests in a single command. In the fall of 1947 the AMC established the Atmospheric Laboratory at its Watson Laboratories, and the Laboratory was reorganized as the Geophysical Research Division in February 1948. The recent relocation of the organization at Cambridge Field Station is particularly desirable in view of the fact that the Station is primarily responsible for geophysical studies and instrumentation associated with rocket soundings of the stratosphere, and the pooling of research effort and know-how will be mutually beneficial.

The Directorate for Geophysical Research, as its name implies, performs basic and applied researches in the broad field of the geophysical sciences, and is organized around five laboratories. The Atmospheric Physics Laboratory is concerned with theoretical and applied studies in physical and chemical composition, atmospheric probing, motion, energy exchanges, and atmospheric electricity. The Electromagnetic Propagation Laboratory studies the influence of atmospheric state on, and the inference of that state by electromagnetic transmission of all wavelengths. The Terrestrial Sciences Laboratory devotes its attention to problems on the state and variations of the lithosphere, including the use of seismological methods applied to atmospheric probing. The Upper-Air Laboratory conducts special researches on the very high-level atmosphere. The Atmospheric Analysis Laboratory, of prime interest to practicing meteorologists, embraces the following fields: analytical techniques, circulation analysis, dynamic analysis, synoptic analysis, objective forecasting, and specialized forecasting.

Air Weather Service personnel will be interested to know that Colonel M. Duffy is the commanding officer of Cambridge Field Station. Major Joseph Fletcher is on Colonel Duffy's staff as his assistant, and Captain A. C. Trakowski is Director of Geophysical Research. About 70 civilian scientists and supporting technicians are now with the Directorate, and this group will be augmented significantly during the next few months.

Although much of the research effort by the Directorate for Geophysical Research is now conducted contractually with universities, foundations, and non-profit organizations, it is planned that eventually these activities will be divided evenly, with the Directorate carrying half of the program "within the house."

The Air Weather Service, which has key operational responsibilities for furnishing geophysical services to the Air Force, furnishes a large portion of the research requirements upon which the Directorate for Geophysical Research bases its program. These requirements are determined within the Air Weather Service's Directorate of Scientific Services, under the guidance of Dr. Sverre Petterssen. Next these requirements are passed to Headquarters, USAF, for review and planning, which is done in the Research and Development Directorate's Geophysical Sciences Branch, headed by Col. B. G. Holzman. In this office, the Air Weather Service requirements are merged with the geophysical requirements of other USAF agencies, and are passed to the Air Materiel Command, which assists Cambridge Field Station in planning and budgeting an appropriate research program.

Since field personnel of the Air Weather Service will be interested in the nature and scope of the meteorological portion of this research program, another article on this subject will be presented in a future issue of the "Bulletin." (Hq., USAF)

12. RAWINSONDE PERFORMANCE FOR JUNE-OCTOBER 1948 (U)

On the following pages are charts and tables which present a picture of AWS rawinsonde performance during the period June-October 1948. An excellent basis for comparison of the records of the individual stations is available in this survey, as the figures are based on operations over a period of five months. The compilations also serve to indicate the effectiveness of the rawinsonde program within the AWS.

A description of the system used in obtaining the relative performance of each station was published in Weather Service Bulletin, No. 5, item 137.

It is realized that the system of ranking does not account for many factors that may seem extremely important to the man in the field, such as differences in climate, supply, personnel strength of individual stations, weather at time of ascent, and varying types of equipment. However, it is believed that it is as equitable a system as can be devised without making the rating system extremely complex. However, this system has not been permanently adopted, and suggestions for improvement are invited from the field.

An analysis of the radiosonde figures shows no very significant trend in any of the elements listed except for a slight but steady decrease in the average heights of runs from July to October. Two items worthy of careful note are the sharp drop in height attained of the average highest run from September to October, and the decrease, in the same period, from 8 to 2, of stations averaging a height greater than 50,000 feet.

In the listings of the 10 highest stations, the one fact that stands out is the lack of consistency in station standings. During the 5-month period, 29 different stations appear on the list. The best performances are those of Albrook AFB, Canal Zone, and Cape AFB, Umnak, Alaska, each of which appear 4 times. Chanute, Eglin, Itazuke, and Tempelhof show up 3 times each and 16 stations are listed only once.

In the lists of the 10 lowest ranking stations, the same pattern is evident. Twenty-seven different stations appear on this list. Atkinson, Goose Bay, and Kadena are on the list the entire period, while Mingan shows up 4 times and Central, Coolidge, and Vernam appear 3 times each. Eighteen stations appear once each and 7 stations appear on both the highest and lowest lists at various times during the period.

Albrook and Cape AFB's have the best records in the completion of scheduled runs. Both sections completed all scheduled runs in 4 months out of the 5.

The rawin figures show several interesting trends. A constant decrease in the average height attained by all runs is evident over the 5-month period with an average decrease of 1,000 feet per month. This is an alarming trend in view of the fact that these figures cover some of the supposedly best months of the year for rawin observations. It is also in sharp contrast to other important phases of operation which show commendable improvement. It is hoped that this regrettable trend can be reversed. The percentage figure of 94 percent of scheduled runs completed for the 4-month period beginning with July is excellent. September's figure of 99 percent is indicative of superior work on the part of all field personnel. A definite improvement can also be noted in the number of stations making 4 runs per day and in the number of those completing all scheduled runs.

Albrook is the most consistent of all the rawin stations and shows up among the 10 highest ranking stations during each of the 5 months considered in this survey. Cape AFB, Chanute, Henderson, Johnston, and Kwajalein make the select list four times each. Kwajalein was twice rated first and twice rated second and Johnston placed first one month, second another month, and third in each of two other months. In all, 24 different stations appear on the list.

Twenty-four different stations also appear on the list of the 10 lowest ranking stations. Goose Bay is listed 5 times; Amchitka, Mingan, and Wiesbaden, 4 times each; and River Clyde, Stewart, and Thornbrough appear 3 times each.

The best records for completing all scheduled rawin runs were achieved by the following stations: Albrook, Cape, Itami, Johnston, and Kwajalein. Each of these stations scored 100 percent during 4 of the 5 months for which this survey was made. (Hq., AWS)

RADIOSONDE

	JUN	JUL	AUG	SEP	OCT
Average Highest Run (ft.)	69,231	70,297	70,013	72,080	66,741
Average Height of All Runs (ft.)	43,916	44,324	44,015	43,880	42,968
Total Number of Scheduled Runs	4,333	4,638	4,507	4,459	4,947
Total Number of Completed Runs	3,547	3,494	3,579	3,525	3,887
Percent of Scheduled Runs Completed	82%	75%	79%	79%	79%
Stations Average Height > 50,000 ft.	5	9	8	8	2
Stations Average Height > 40,000 ft.	37	38	39	37	36
Stations Average Height < 40,000 ft.	10	13	8	10	11
Stations Highest Run > 70,000 ft.	16	23	22	20	17
Stations Completing 2/Day or 3/Day	31	25	29	31	31
Stations Completing 4/Day	1	0	1	0	0
Stations Completing All Scheduled Runs	6	4	8	3	4

RAWIN

	JUN	JUL	AUG	SEP	OCT
Average Height of All Runs (ft.)	43,976	41,389	40,383	39,725	38,945
Total Number of Scheduled Runs	3,948	4,915	4,912	4,673	4,947
Total Number of Completed Runs	3,323	4,560	4,447	4,605	4,641
Percent of Scheduled Runs Completed	84%	93%	91%	99%	94%
Stations Average Height > 50,000 ft.	8	4	4	2	3
Stations Average Height > 40,000 ft.	30	30	30	26	21
Stations Average Height < 40,000 ft.	12	22	19	22	26
Stations Completing 2/Day or 3/Day	26	30	33	36	32
Stations Completing 4/Day	3	6	5	7	7
Stations Completing All Scheduled Runs	6	12	13	12	14

FAMOUS LAST WORDS

"What did he say the altimeter setting was?"

"I just ran out of altitude."

RADIOSONDE - 10 HIGHEST RANKING STATIONS

JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1. Davis	1. Eglin	1. Wiesbaden	1. Wiesbaden	1. Thornbrough
2. Itazuke	2. Holloman	2. Eglin	2. Sondrestromfjord	2. Itazuke
3. Davis-Monthan	3. Sondrestromfjord	3. Wendover	3. Cape (Alaska)	3. Shemya
4. Cape (Alaska)	4. Sherman	4. Cape (Alaska)	4. Itazuke	4. Chanute
5. Tempelhof	5. Cape (Alaska)	5. Tempelhof	5. Kwajalein	5. Henderson
6. Itami	6. Davis-Monthan	6. Barksdale	6. Albrook	6. Vernam
7. Albrook	7. Munich	7. Albrook	7. Tempelhof	7. Eglin
8. Marrak Point	8. Albrook	8. Chanute	8. Griffiss	8. Amchitka
9. Beane	9. Chanute	9. Munich	9. Maxwell	9. Managua
10. Kindley	10. Yakutat	10. Managua	10. Holloman	10. Kwajalein

RADIOSONDE - 10 LOWEST RANKING STATIONS

JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
37. Johnston	41. Managua	38. Henderson	38. Itami	38. Goose Bay
38. Atkinson	42. Goose Bay	39. Central	39. Kimpo	39. Munich
39. Ernest Harmon	43. Clinton County	40. Mingan	40. Central	40. Stewart
40. Misawa	44. Kadena	41. Long Beach	41. Beane	41. Albrook
41. Goose Bay	45. Barranquilla	42. Fort Chimo	42. Atkinson	42. Kindley
42. Wiesbaden	46. Vernam	43. Goose Bay	43. Vernam	43. Atkinson
43. Vernam	47. Kimpo	44. Kadena	44. Mingan	44. Clark
44. Mingan	48. Atkinson	45. Atkinson	45. Goose Bay	45. Mingan
45. Selfridge	49. Coolidge	46. Marrak Point	46. Coolidge	46. Central
46. Kadena	50. Clark	47. Coolidge	47. Kadena	47. Kadena

RAWIN - 10 HIGHEST RANKING STATIONS

JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1. Maxwell	1. Johnston	1. Kwajalein	1. Albrook	1. Kwajalein
2. Albrook	2. Kwajalein	2. Johnston	2. Kwajalein	2. Clark
3. Davis	3. Vernam	3. Henderson	3. Johnston	3. Johnston
4. Davis-Monthan	4. Eglin	4. Eglin	4. Atkinson	4. Henderson
5. Cape (Alaska)	5. Albrook	5. Cape (Alaska)	5. Managua	5. Tempelhof
6. Harmon	6. Itami	6. Albrook	6. Henderson	6. Itami
7. Tempelhof	7. Cape (Alaska)	7. Barksdale	7. Kimpo	7. Thornbrough
8. Misawa	8. Chanute	8. Misawa	8. Chanute	8. Chanute
9. Lagens	9. Davis-Monthan	9. Chanute	9. Eglin	9. Harmon
10. Yakutat	10. Henderson	10. Beane	10. Cape (Alaska)	10. Albrook

RAWIN - 10 LOWEST RANKING STATIONS

JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
33. Stewart	42. Shemya	39. Tulln	39. Stewart	38. Central
34. Wendover	43. Amchitka	40. Long Beach	40. Ernest Harmon	39. Kimpo
35. Ernest Harmon	44. Upper Frobisher	41. BW-1	41. Fort Chimo	40. Stewart
36. Selfridge	45. Tulln	42. Thornbrough	42. Thornbrough	41. Narsarssuak
37. Goose Bay	46. Thornbrough	43. Kimpo	43. Kindley	42. Goose Bay
38. Upper Frobisher	47. River Clyde	44. Goose Bay	44. Amchitka	43. Davis
39. Mingan	48. Goose Bay	45. Amchitka	45. Mingan	44. Amchitka
40. Wiesbaden	49. Mingan	46. Sherman	46. Wiesbaden	45. Kindley
41. River Clyde	50. Narsarssuak	47. Wiesbaden	47. Goose Bay	46. Mingan
42. Henderson	51. Wiesbaden	48. River Clyde	48. Marrak Point	47. Fort Chimo

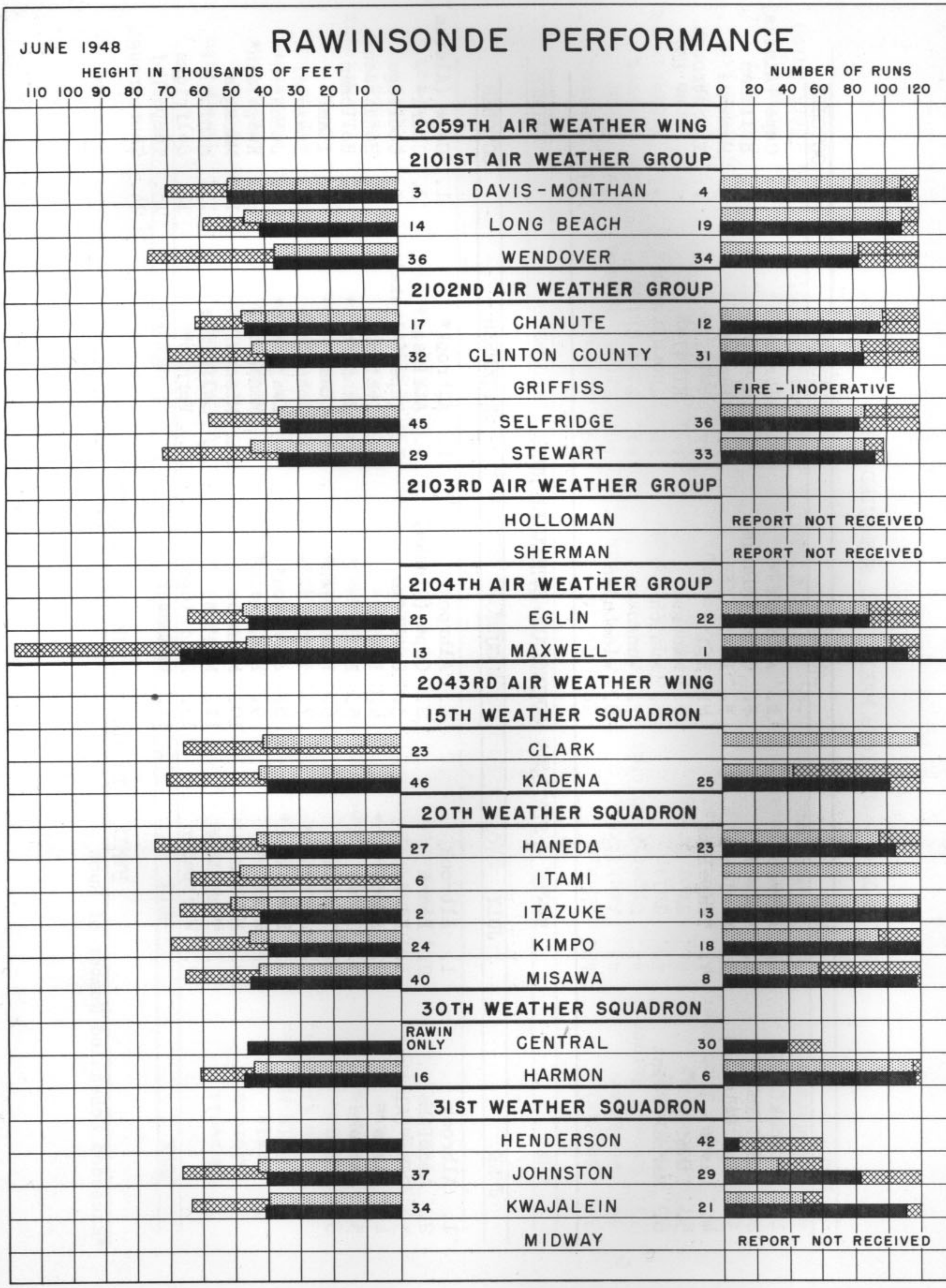
RADIOSONDE - STATIONS MAKING ALL SCHEDULED RUNS

JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1. Albrook	1. Albrook	1. Albrook	1. Albrook	1. Cape (Alaska)
2. Amchitka	2. Harmon	2. Cape (Alaska)	2. Cape (Alaska)	2. Holloman
3. Cape (Alaska)	3. Munich	3. Davis	3. Wiesbaden	3. Managua
4. Davis	4. Tempelhof	4. Eglin		4. Thornbrough
5. Itami		5. Managua		
6. Marrak Point		6. Munich		
		7. Wendover		
		8. Wiesbaden		

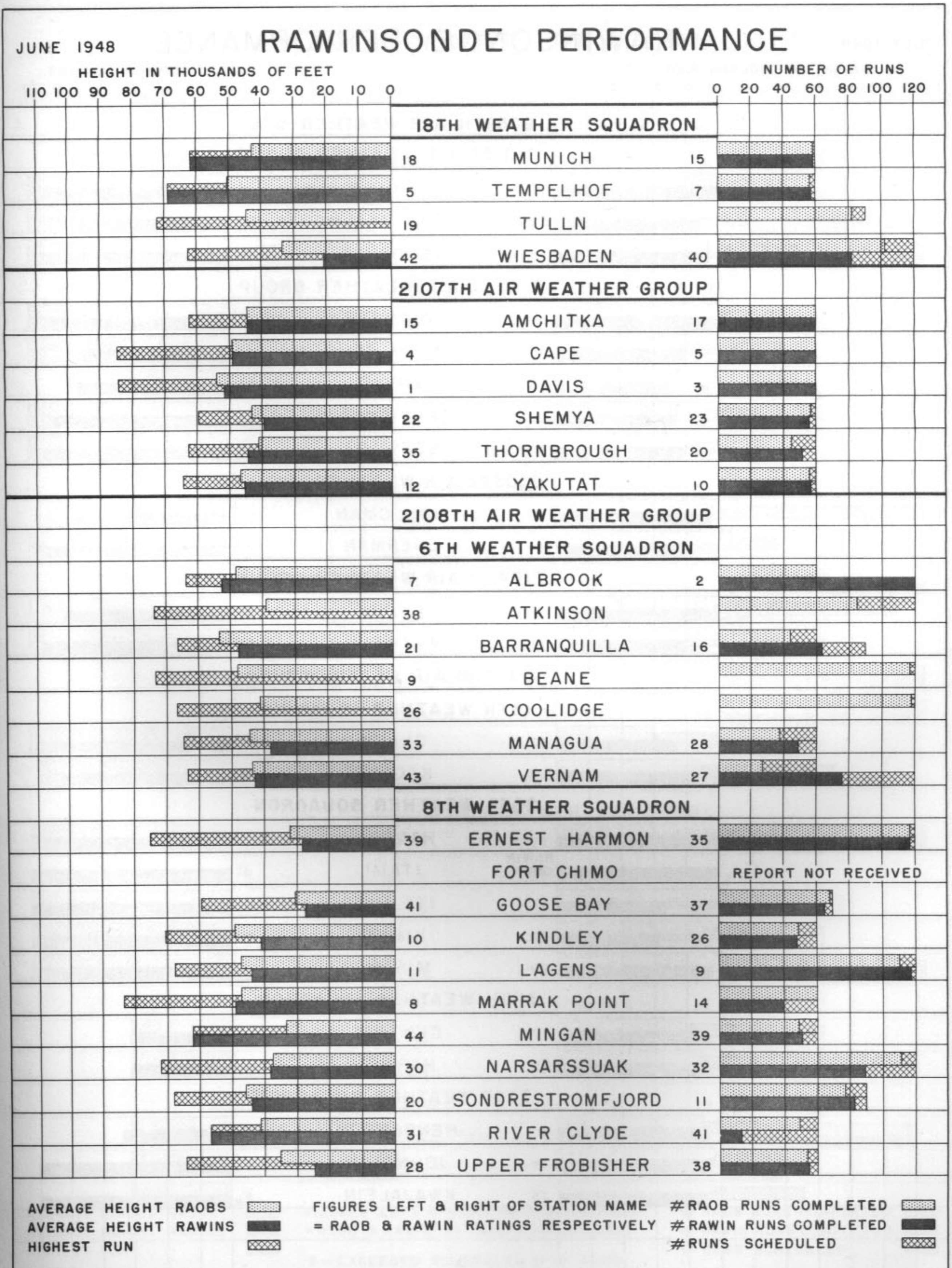
RAWIN - STATIONS MAKING ALL SCHEDULED RUNS

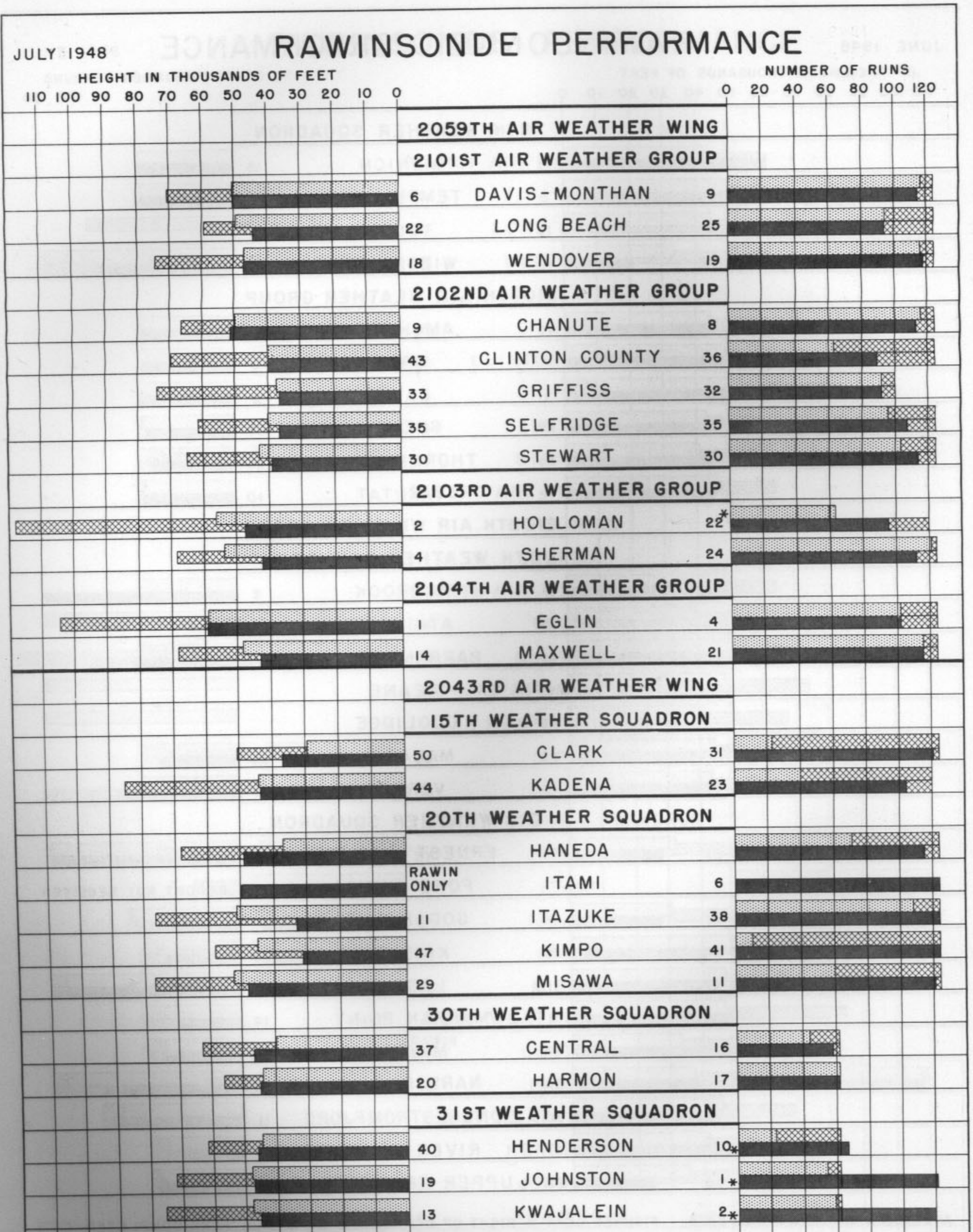
JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1. Albrook	1. Albrook	1. Albrook	1. Albrook*	1. Cape (Alaska)
2. Amchitka	2. Beane	2. Cape (Alaska)	2. Atkinson*	2. Clark*
3. Cape (Alaska)	3. Harmon	3. Coolidge	3. Cape (Alaska)	3. Coolidge
4. Davis	4. Henderson*	4. Davis	4. Central*	4. Henderson*
5. Itazuke	5. Itami	5. Eglin	5. Henderson*	5. Holloman
6. Kimpo	6. Itazuke	6. Henderson*	6. Itami	6. Itami
	7. Johnston*	7. Itami	7. Johnston*	7. Itazuke
	8. Kwajalein*	8. Johnston*	8. Kwajalein*	8. Johnston*
	9. Kimpo	9. Kwajalein*	9. Managua*	9. Kwajalein*
	10. Munich	10. Managua	10. Misawa	10. Managua
	11. Tempelhof	11. Munich	11. Selfridge	11. Munich
	12. Wiesbaden	12. Selfridge	12. Vernam*	12. Selfridge
		13. Wendover		13. Tempelhof
				14. Thornbrough

*Exceeded Scheduled Number of Runs

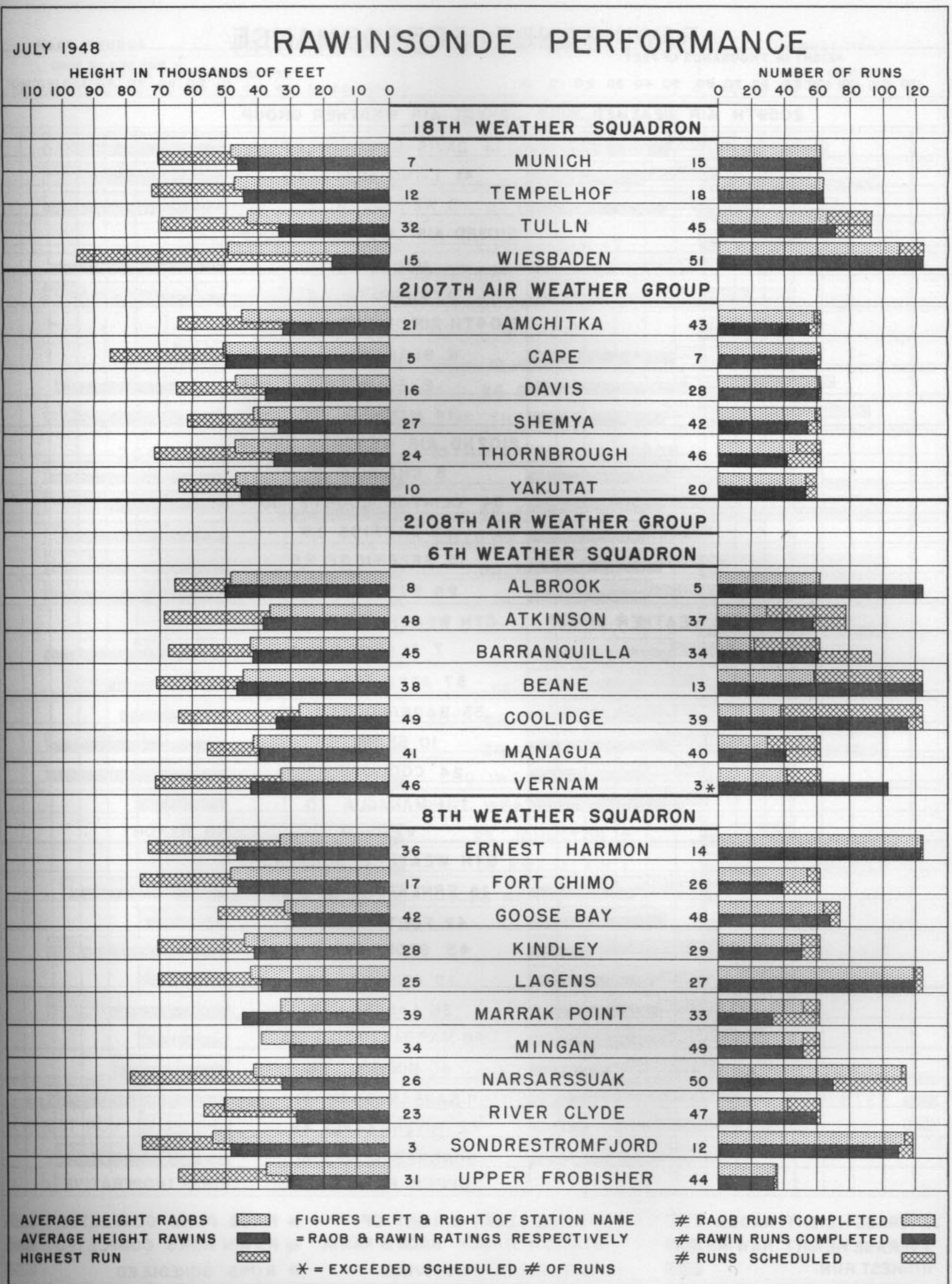


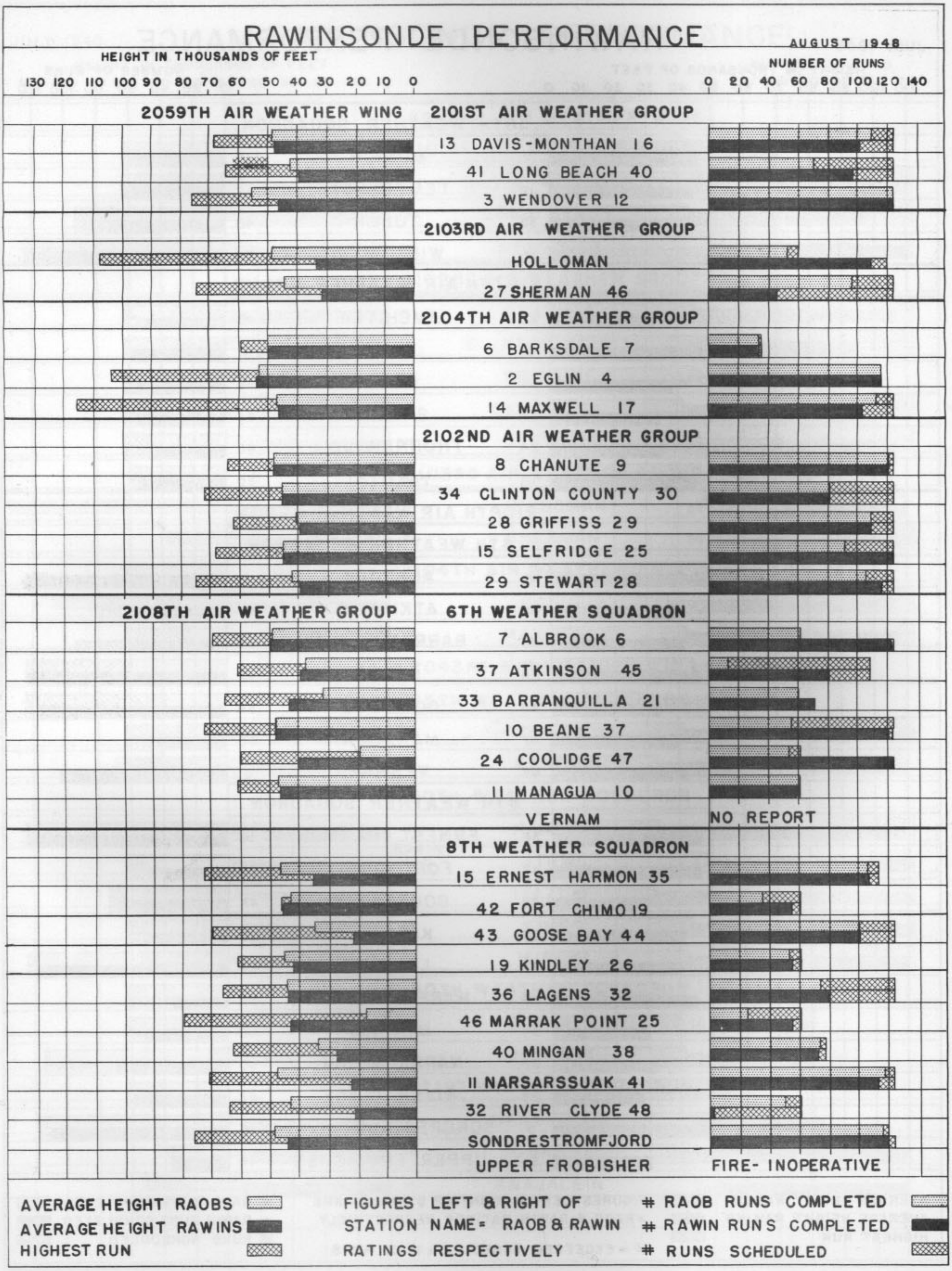
JUNE 1948
RAWINSONDE PERFORMANCE
HEIGHT IN THOUSANDS OF FEET
110 100 90 80 70 60 50 40 30 20 10 0
NUMBER OF RUNS
0 20 40 60 80 100 120
2059TH AIR WEATHER WING
2101ST AIR WEATHER GROUP
3 DAVIS-MONTHAN 4
14 LONG BEACH 19
36 WENDOVER 34
2102ND AIR WEATHER GROUP
17 CHANUTE 12
32 CLINTON COUNTY 31
GRIFFISS
FIRE - INOPERATIVE
45 SELFRIDGE 36
29 STEWART 33
2103RD AIR WEATHER GROUP
HOLLOMAN
REPORT NOT RECEIVED
SHERMAN
REPORT NOT RECEIVED
2104TH AIR WEATHER GROUP
25 EGLIN 22
13 MAXWELL 1
2043RD AIR WEATHER WING
15TH WEATHER SQUADRON
23 CLARK
46 KADENA 25
20TH WEATHER SQUADRON
27 HANEDA 23
6 ITAMI
2 ITAZUKE 13
24 KIMPO 18
40 MISAWA 8
30TH WEATHER SQUADRON
RAWIN ONLY
CENTRAL 30
16 HARMON 6
31ST WEATHER SQUADRON
HENDERSON 42
37 JOHNSTON 29
34 KWAJALEIN 21
MIDWAY
REPORT NOT RECEIVED


JUNE 1948
RAWINSONDE PERFORMANCE
HEIGHT IN THOUSANDS OF FEET
110 100 90 80 70 60 50 40 30 20 10 0
NUMBER OF RUNS
0 20 40 60 80 100 120
18TH WEATHER SQUADRON
18 MUNICH 15
5 TEMPELHOF 7
19 TULLN
42 WIESBADEN 40
2107TH AIR WEATHER GROUP
15 AMCHITKA 17
4 CAPE 5
1 DAVIS 3
22 SHEMYA 23
35 THORNBROUGH 20
12 YAKUTAT 10
2108TH AIR WEATHER GROUP
6TH WEATHER SQUADRON
7 ALBROOK 2
38 ATKINSON
21 BARRANQUILLA 16
9 BEANE
26 COOLIDGE
33 MANAGUA 28
43 VERNAM 27
8TH WEATHER SQUADRON
39 ERNEST HARMON 35
FORT CHIMO
REPORT NOT RECEIVED
41 GOOSE BAY 37
10 KINDLEY 26
11 LAGENS 9
8 MARRAK POINT 14
44 MINGAN 39
30 NARSARSSUAK 32
20 SONDRESTROMFJORD 11
31 RIVER CLYDE 41
28 UPPER FROBISHER 38
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
FIGURES LEFT & RIGHT OF STATION NAME
= RAOB & RAWIN RATINGS RESPECTIVELY
#RAOB RUNS COMPLETED
#RAWIN RUNS COMPLETED
#RUNS SCHEDULED



JULY 1948
RAWINSONDE PERFORMANCE
HEIGHT IN THOUSANDS OF FEET
110 100 90 80 70 60 50 40 30 20 10 0
NUMBER OF RUNS
0 20 40 60 80 100 120
2059TH AIR WEATHER WING
2101ST AIR WEATHER GROUP
6 DAVIS-MONTHAN 9
22 LONG BEACH 25
18 WENDOVER 19
2102ND AIR WEATHER GROUP
9 CHANUTE 8
43 CLINTON COUNTY 36
33 GRIFFISS 32
35 SELFRIDGE 35
30 STEWART 30
2103RD AIR WEATHER GROUP
2 HOLLOMAN 22*
4 SHERMAN 24
2104TH AIR WEATHER GROUP
1 EGLIN 4
14 MAXWELL 21
2043RD AIR WEATHER WING
15TH WEATHER SQUADRON
50 CLARK 31
44 KADENA 23
20TH WEATHER SQUADRON
HANEDA
RAWIN ONLY ITAMI 6
11 ITAZUKE 38
47 KIMPO 41
29 MISAWA 11
30TH WEATHER SQUADRON
37 CENTRAL 16
20 HARMON 17
31ST WEATHER SQUADRON
40 HENDERSON 10*
19 JOHNSTON 1*
13 KWAJALEIN 2*


JULY 1948
RAWINSONDE PERFORMANCE
HEIGHT IN THOUSANDS OF FEET
110 100 90 80 70 60 50 40 30 20 10 0
NUMBER OF RUNS
0 20 40 60 80 100 120
18TH WEATHER SQUADRON
7 MUNICH 15
12 TEMPELHOF 18
32 TULLN 45
15 WIESBADEN 51
2107TH AIR WEATHER GROUP
21 AMCHITKA 43
5 CAPE 7
16 DAVIS 28
27 SHEMYA 42
24 THORNBROUGH 46
10 YAKUTAT 20
2108TH AIR WEATHER GROUP
6TH WEATHER SQUADRON
8 ALBROOK 5
48 ATKINSON 37
45 BARRANQUILLA 34
38 BEANE 13
49 COOLIDGE 39
41 MANAGUA 40
46 VERNAM 3*
8TH WEATHER SQUADRON
36 ERNEST HARMON 14
17 FORT CHIMO 26
42 GOOSE BAY 48
28 KINDLEY 29
25 LAGENS 27
39 MARRAK POINT 33
34 MINGAN 49
26 NARSARSSUAK 50
23 RIVER CLYDE 47
3 SONDRESTROMFJORD 12
31 UPPER FROBISHER 44
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
FIGURES LEFT & RIGHT OF STATION NAME
= RAOB & RAWIN RATINGS RESPECTIVELY
* = EXCEEDED SCHEDULED # OF RUNS
# RAOB RUNS COMPLETED
# RAWIN RUNS COMPLETED
# RUNS SCHEDULED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NUMBER OF RUNS
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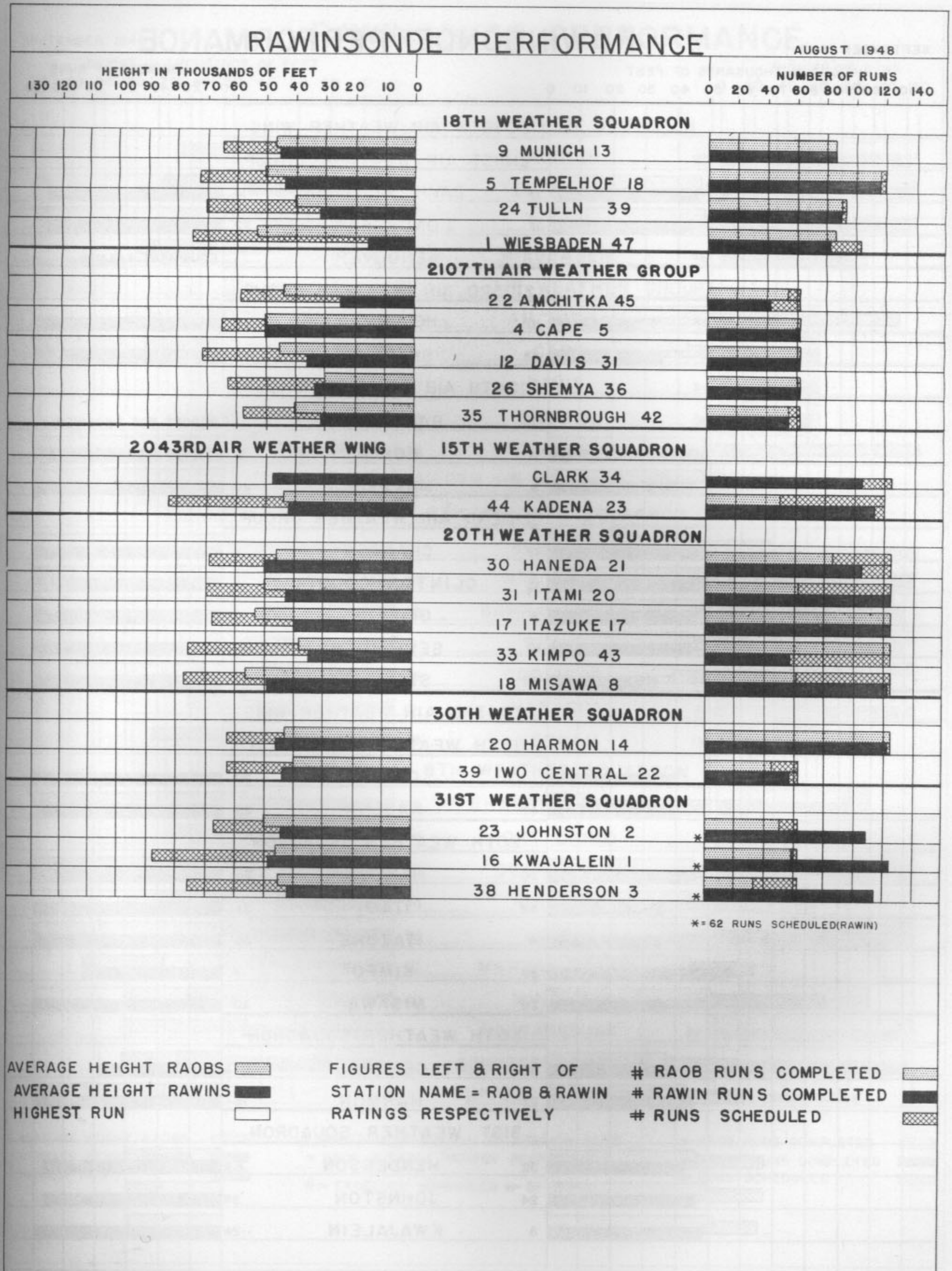
2101ST AIR WEATHER GROUP
13 DAVIS-MONTHAN 16
41 LONG BEACH 40
3 WENDOVER 12
2103RD AIR WEATHER GROUP
HOLLOMAN
27 SHERMAN 46
2104TH AIR WEATHER GROUP
6 BARKSDALE 7
2 EGLIN 4
14 MAXWELL 17
2102ND AIR WEATHER GROUP
8 CHANUTE 9
34 CLINTON COUNTY 30
28 GRIFFISS 29
15 SELFRIDGE 25
29 STEWART 28
2108TH AIR WEATHER GROUP
6TH WEATHER SQUADRON
7 ALBROOK 6
37 ATKINSON 45
33 BARRANQUILLA 21
10 BEANE 37
24 COOLIDGE 47
11 MANAGUA 10
VERNAM
NO REPORT
8TH WEATHER SQUADRON
15 ERNEST HARMON 35
42 FORT CHIMO 19
43 GOOSE BAY 44
19 KINDLEY 26
36 LAGENS 32
46 MARRAK POINT 25
40 MINGAN 38
11 NARSARSSUAK 41
32 RIVER CLYDE 48
SONDRESTROMFJORD
UPPER FROBISHER
FIRE- INOPERATIVE
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
FIGURES LEFT & RIGHT OF STATION NAME = RAOB & RAWIN RATINGS RESPECTIVELY
RAOB RUNS COMPLETED
RAWIN RUNS COMPLETED
RUNS SCHEDULED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AUGUST 1948
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NUMBER OF RUNS
0 20 40 60 80 100 120 140
18TH WEATHER SQUADRON
9 MUNICH 13
5 TEMPELHOF 18
24 TULLN 39
1 WIESBADEN 47
2107TH AIR WEATHER GROUP
22 AMCHITKA 45
4 CAPE 5
12 DAVIS 31
26 SHEMYA 36
35 THORNBROUGH 42
2043RD AIR WEATHER WING
15TH WEATHER SQUADRON
CLARK 34
44 KADENA 23
20TH WEATHER SQUADRON
30 HANEDA 21
31 ITAMI 20
17 ITAZUKE 17
33 KIMPO 43
18 MISAWA 8
30TH WEATHER SQUADRON
20 HARMON 14
39 IWO CENTRAL 22
31ST WEATHER SQUADRON
23 JOHNSTON 2
16 KWAJALEIN 1
38 HENDERSON 3
*=62 RUNS SCHEDULED(RAWIN)
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
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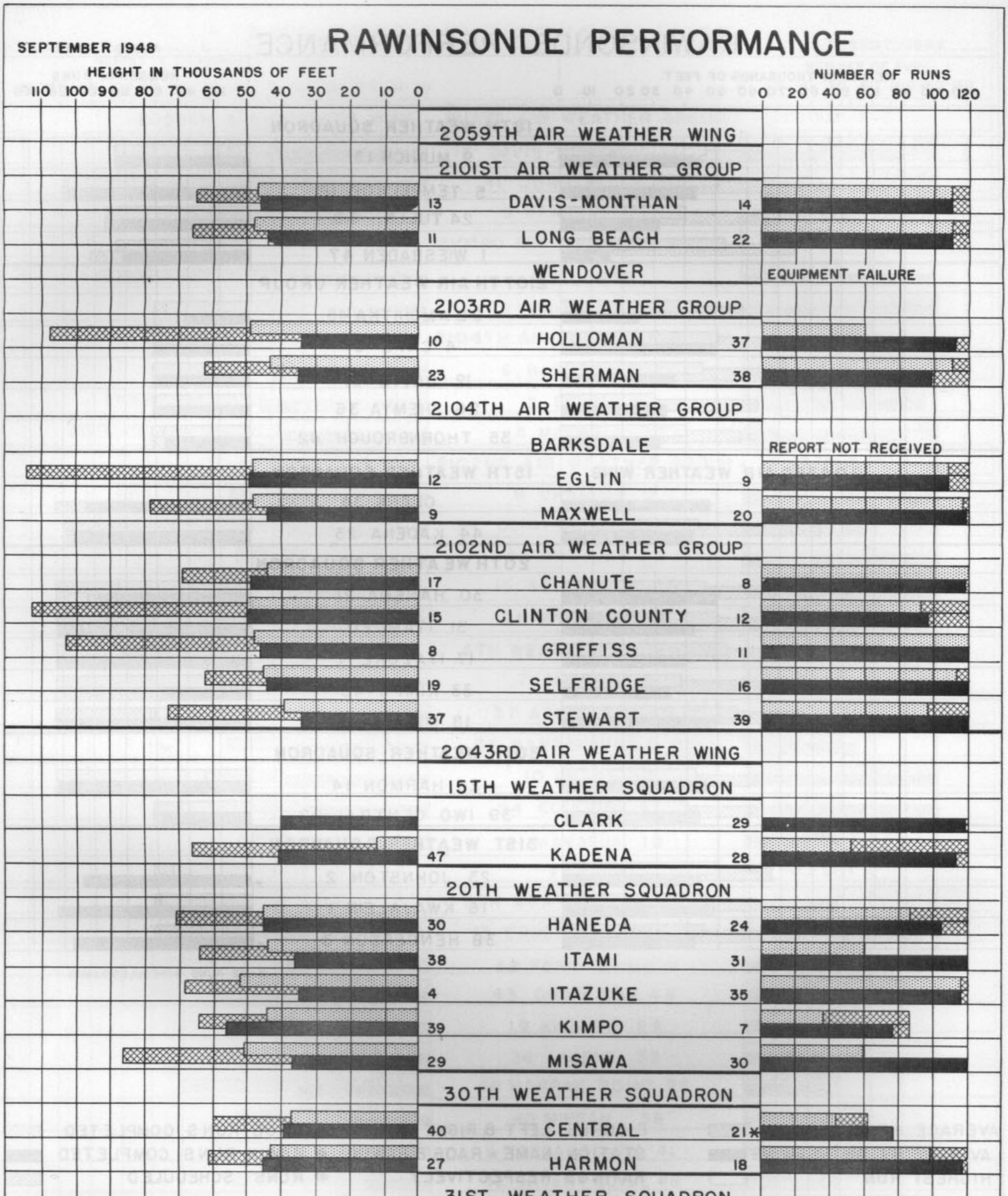
RAOB RUNS COMPLETED
RAWIN RUNS COMPLETED
RUNS SCHEDULED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NUMBER OF RUNS
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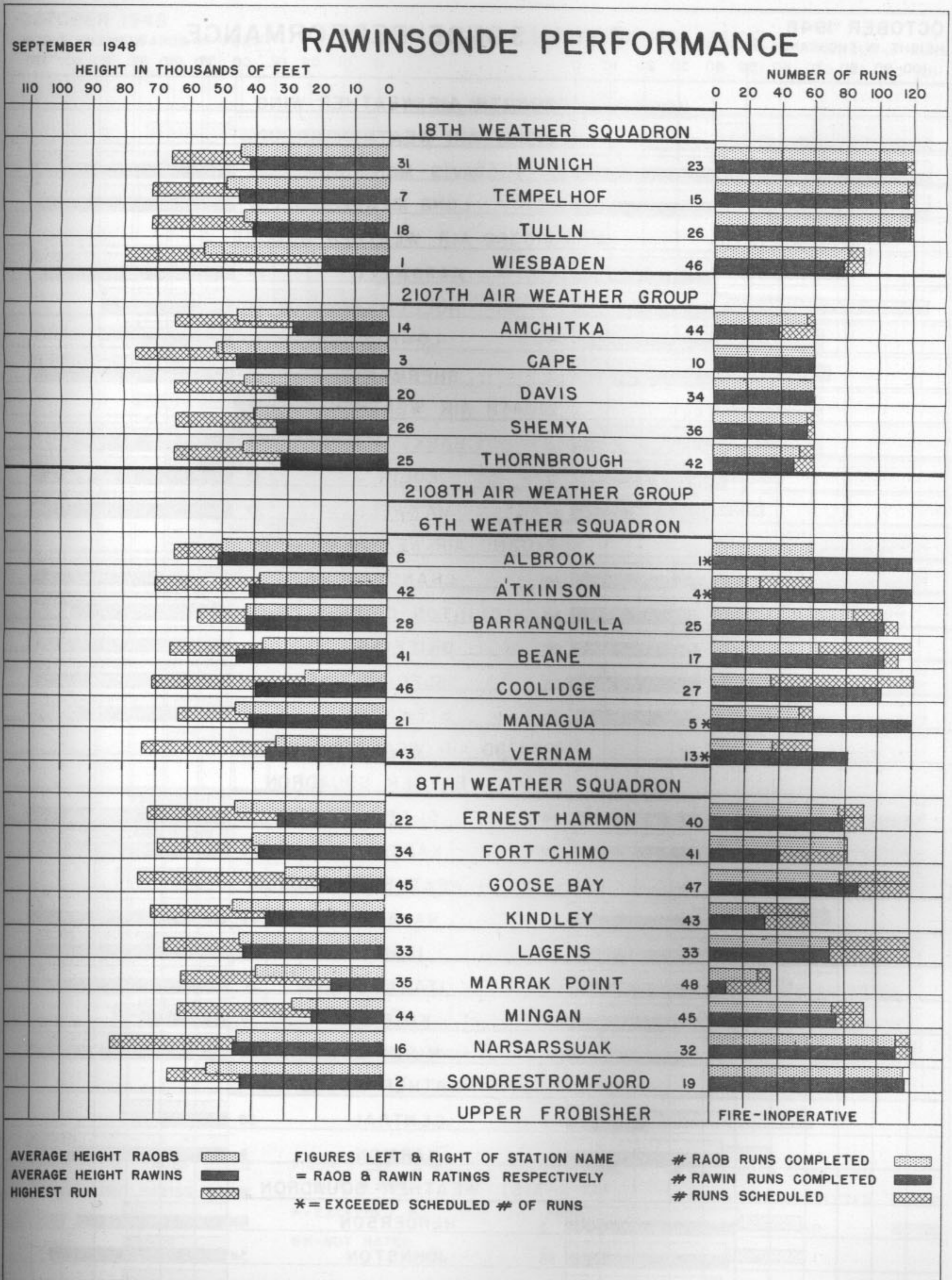
2059TH AIR WEATHER WING
2101ST AIR WEATHER GROUP
13 DAVIS-MONTHAN 14
11 LONG BEACH 22
WENDOVER
EQUIPMENT FAILURE
2103RD AIR WEATHER GROUP
10 HOLLOMAN 37
23 SHERMAN 38
2104TH AIR WEATHER GROUP
BARKSDALE
REPORT NOT RECEIVED
12 EGLIN 9
9 MAXWELL 20
2102ND AIR WEATHER GROUP
17 CHANUTE 8
15 CLINTON COUNTY 12
8 GRIFFISS 11
19 SELFRIDGE 16
37 STEWART 39
2043RD AIR WEATHER WING
15TH WEATHER SQUADRON
CLARK 29
47 KADENA 28
20TH WEATHER SQUADRON
30 HANEDA 24
38 ITAMI 31
4 ITAZUKE 35
39 KIMPO 7
29 MISAWA 30
30TH WEATHER SQUADRON
40 CENTRAL 21*
27 HARMON 18
31ST WEATHER SQUADRON
32 HENDERSON 6*
24 JOHNSTON 3*
5 KWAJALEIN 2*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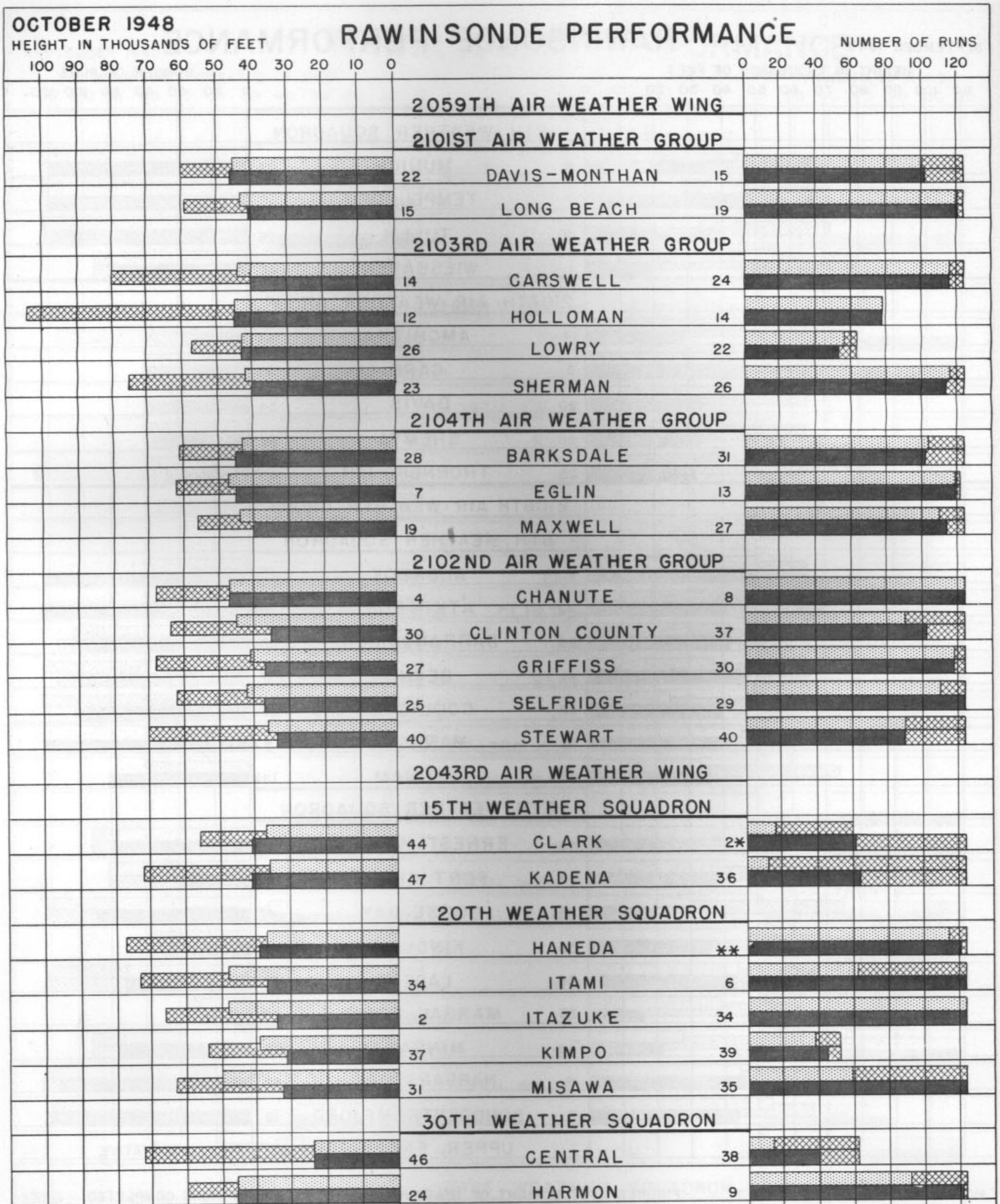
NUMBER OF RUNS
0 20 40 60 80 100 120
18TH WEATHER SQUADRON
31 MUNICH 23
7 TEMPELHOF 15
18 TULLN 26
1 WIESBADEN 46
2107TH AIR WEATHER GROUP
14 AMCHITKA 44
3 CAPE 10
20 DAVIS 34
26 SHEMYA 36
25 THORNBROUGH 42
2108TH AIR WEATHER GROUP
6TH WEATHER SQUADRON
6 ALBROOK 1*
42 ATKINSON 4*
28 BARRANQUILLA 25
41 BEANE 17
46 COOLIDGE 27
21 MANAGUA 5*
43 VERNAM 13*
8TH WEATHER SQUADRON
22 ERNEST HARMON 40
34 FORT CHIMO 41
45 GOOSE BAY 47
36 KINDLEY 43
33 LAGENS 33
35 MARRAK POINT 48
44 MINGAN 45
16 NARSARSSUAK 32
2 SONDRESTROMFJORD 19
UPPER FROBISHER
FIRE-INOPERATIVE
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
FIGURES LEFT & RIGHT OF STATION NAME = RAOB & RAWIN RATINGS RESPECTIVELY
* = EXCEEDED SCHEDULED # OF RUNS
# RAOB RUNS COMPLETED
# RAWIN RUNS COMPLETED
# RUNS SCHEDULED


OCTOBER 1948
HEIGHT IN THOUSANDS OF FEET
RAWINSONDE PERFORMANCE
NUMBER OF RUNS
100 90 80 70 60 50 40 30 20 10 0
0 20 40 60 80 100 120
2059TH AIR WEATHER WING
2101ST AIR WEATHER GROUP
22 DAVIS-MONTHAN 15
15 LONG BEACH 19
2103RD AIR WEATHER GROUP
14 CARSWELL 24
12 HOLLOMAN 14
26 LOWRY 22
23 SHERMAN 26
2104TH AIR WEATHER GROUP
28 BARKSDALE 31
7 EGLIN 13
19 MAXWELL 27
2102ND AIR WEATHER GROUP
4 CHANUTE 8
30 CLINTON COUNTY 37
27 GRIFFISS 30
25 SELFRIDGE 29
40 STEWART 40
2043RD AIR WEATHER WING
15TH WEATHER SQUADRON
44 CLARK 2*
47 KADENA 36
20TH WEATHER SQUADRON
HANEDA **
34 ITAMI 6
2 ITAZUKE 34
37 KIMPO 39
31 MISAWA 35
30TH WEATHER SQUADRON
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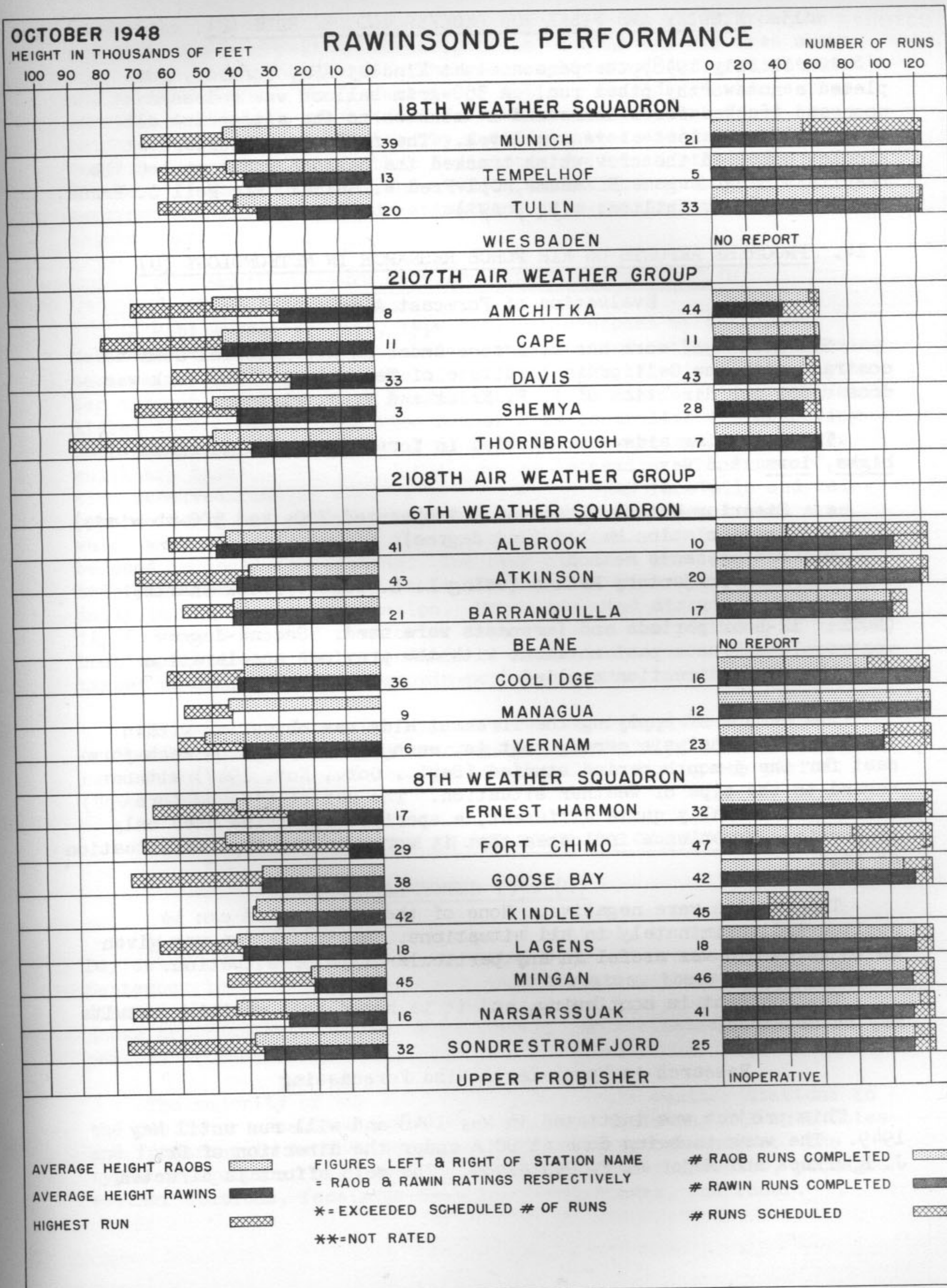
24 HARMON 9
31ST WEATHER SQUADRON
5 HENDERSON 4*
35 JOHNSTON 3*
10 KWAJALEIN 1*


OCTOBER 1948
HEIGHT IN THOUSANDS OF FEET
RAWINSONDE PERFORMANCE
NUMBER OF RUNS
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0 20 40 60 80 100 120
18TH WEATHER SQUADRON
39 MUNICH 21
13 TEMPELHOF 5
20 TULLN 33
WIESBADEN NO REPORT
2107TH AIR WEATHER GROUP
8 AMCHITKA 44
11 CAPE 11
33 DAVIS 43
3 SHEMYA 28
1 THORNBROUGH 7
2108TH AIR WEATHER GROUP
6TH WEATHER SQUADRON
41 ALBROOK 10
43 ATKINSON 20
21 BARRANQUILLA 17
BEANE NO REPORT
36 COOLIDGE 16
9 MANAGUA 12
6 VERNAM 23
8TH WEATHER SQUADRON
17 ERNEST HARMON 32
29 FORT CHIMO 47
38 GOOSE BAY 42
42 KINDLEY 45
18 LAGENS 18
45 MINGAN 46
16 NARSARSSUAK 41
32 SONDRESTROMFJORD 25
UPPER FROBISHER INOPERATIVE
AVERAGE HEIGHT RAOBS
AVERAGE HEIGHT RAWINS
HIGHEST RUN
FIGURES LEFT & RIGHT OF STATION NAME = RAOB & RAWIN RATINGS RESPECTIVELY
*= EXCEEDED SCHEDULED # OF RUNS
**=NOT RATED
RAOB RUNS COMPLETED
RAWIN RUNS COMPLETED
RUNS SCHEDULED

13. KINDLEY AFB PIBAL RUN EXCEEDS 100,000 FEET (U)

On 11 July 1948, the personnel at Kindley AFB, Bermuda, completed a noteworthy pibal run. A 350-gram balloon was released at noon and tracked for 2 hours and 14 minutes to the astounding altitude of 123,375 feet above sea level. The following observers at Kindley composed the crew which tracked the balloon and computed the results: S/Sgt Eugene H. Adams, Cpl Fred W. Shamel, Pfc Neil G. Bruno, and Pfc Royse D. Chilton. (Hq., AWS)

14. PROGRESS REPORTS ON AIR FORCE RESEARCH IN METEOROLOGY (U)

Evaluation of Forecast Aids

Six months of work has been done under an Air Materiel Command contract with the California Institute of Technology. The work was done under the direction of I. P. Krick and R. B. Elliot.

The following aids were studied in forecasting the movement of highs, lows, and wave crests:

a. Steering Method (gradient and observed 700- and 500-mb winds)
b. Extrapolation Method (2nd degree)
c. Petterssen's Method
d. Mean-Trajectory Method (using L. L. Weiss' Track Charts)

(NOTE: 12-hour periods and forecasts were used. Second-degree extrapolation uses past movement with the previous acceleration and change in direction applied.)

The method of applying the forecast aids was objective within the limits of analysis error; that is, each aid was used on each forecast for the 3-month period studied (Sept., Oct., Nov. 1947) without regard to the type of weather situation. The use of aids by forecasters is normally quite different, a specific aid being used only if previous experience indicates that it works in the type of situation at hand.

The results were negative. None of the aids tested can be applied indiscriminately in all situations. No indication was given as to which aid was useful in any particular type of situation.

The contract is continuing, and it is hoped that positive results may be obtained.

Research in Upper-Level Wind Forecasting

This project was initiated in May 1948 and will run until May 1949. The work is being done at UCLA under the direction of Dr. J. Bjerknes and Major A. F. Gustafson. The main effort is directed toward the improvement of upper-level wind determination from the pressure field. Previous investigations at UCLA and MIT have shown some large deviations between the geostrophic wind (or gradient wind) and the true wind. The equations of motion, considered when a pressure-field model is substituted for the actual-pressure field, are being subjected to integration by a differential analyzer. The results thus far indicate that deviations are of an oscillatory nature. If the conditions under which deviations occur can be analyzed and forecast, wind estimations from the pressure field should improve.

15. MOBILE WEATHER UNIT AT OPERATION "COMBINE" (U)

A Mobile Weather Unit, Type "E", was assigned by the 2060th Mobile Weather Squadron to provide complete forecasting and observing service for Operation Combine III at Eglin AFB, Florida, from September through the first week in November. A "master" section was established at Eglin auxiliary base number 2 to centralize the observing and forecasting in the area; four subsections were set up at other auxiliary bases to provide local forecasting only. The "master" section received routine weather data from the WBAN facsimile and teletype networks and prepared synoptic charts of the operational area which were disseminated by facsimile to the outlying subsections to be used in local forecasting. The over-all unit provided weather briefings for the crews of about 500 tactical aircraft participating daily in the training operation. Upper-air wind direction and velocity forecasts were of particular importance in the planning of target bombing missions. The attendance of student observers close by to the target areas required almost pin-point precision bombing.

Valuable hurricane warning services were provided by the unit to Operation Combine III by tracing the movements of the several hurricanes that attacked the Florida coastline during the period. (Hq., AWS)

16. AWS PARTICIPATION IN AIR FORCE DAY CELEBRATION,

18 SEPTEMBER 1948 (U)

Eighty-one AWS units participated actively in the Air Force Day celebration within the continental U.S. and overseas on 18 September 1948. Because of their tenant status, these units coordinated their displays of AWS activities and equipment with Open House programs of local Air Force bases. An estimated 1,300,000 persons attended these programs.

The majority of the AWS units opened their weather stations to the public or assembled stationary displays depicting AWS activities and functions in exhibit areas selected by base commanders. The types of equipment displayed included mobile weather units, packaged weather stations, facsimile machines, rawinsondes, and radar.

One of the most notable of the AWS exhibits was a joint project of Weather Detachment 10-4L and the 124th AACS Squadron at Fairfield-Suisun AFB, California, which consisted of assembling and operating a complete weather station in a display window of a prominent San Francisco department store, the "Emporium," for a period of 6 days prior to Air Force Day. Microphones and a public address system were installed to permit an exchange of questions and answers between the sidewalk audience and the personnel operating the station. It was estimated that 140,000 persons witnessed this display.

In almost every case the personnel conducting the display programs were agreeably surprised to find that they had underestimated the general public interest in the science of weather. (Hq., AWS)

17. OFFUTT WEATHER STATION PERSONNEL ON THE "AIR" (U)

By arrangement of the Base PIO, weather personnel at Offutt AFB, Omaha, Nebraska, recently appeared on a local radio station (KOAD-FM, 5000 watts) and presented an interview-type, 15-minute program. The station weather officer, Captain Osborn, and forecaster, Sgt. Barber, by answering questions posed by the announcer, described the functions of their weather station, service provided various Air Force agencies, modern equipment used, the need for weather analysis in tactical air operations, and other matters of interest to the public. This radio appearance represented one of a series of public information programs designed to enable the local community to "Know Your Air Force Better." (Hq., AWS)

18. F-80 FLIGHT ACROSS THE NORTH ATLANTIC AND RETURN (U)

(The following is a narrative report on the F-80 flight made by 16 fighters of the 56th Fighter Group stationed at Selfridge Air Force Base, Michigan, across the Atlantic Ocean via the Northern Route, and return. The report is written with emphasis on the weather conditions encountered and the system used by the B-29 weather reconnaissance ship.)

It was agreed during the planning of the mission that the B-29 weather reconnaissance ship would go out ahead of the F-80's on each leg of the flight, make a complete check of the weather conditions along the route and at the terminal, then send this information back to the F-80 flight commander. If, in the opinion of the flight weather officer, the conditions were suitable at the terminal and along the route for the fighters to come ahead, a message would be sent by CW from the B-29, or by means of land communication, and from the information received, the F-80 flight commanders could complete their flight planning. This system worked perfectly for the flight to Germany and return.

Observations taken along the route at various points included the bases and tops of all clouds, amount of cloud coverage, weather, and the wind speed and direction at the flight altitude. This was sent back to the fighter flight commander in the form of the regular international weather code.

On the first day out, the B-29 took off in advance of the F-80's, surveyed the weather to Bangor, Maine, sent back the information, then continued on to Goose Bay, Labrador. The route to Goose Bay was also surveyed and the information sent back to Bangor for the use of the fighters. There was a solid undercast all along the route except at the terminal, which was broken. A message was sent by the flight weather officer for the fighters to take off.

At Goose Bay, the flight was instructed to wait until a flight of British Vampires arrived from England, so an advantage of good weather was lost. During the delay, a low-pressure center with an occlusion moved into Davis Strait, and consequently the weather was too bad for the first over-water hop. A survey flight was made during this time by the B-29. After a delay of 5 days, the weather at Bluie West One became clear, so the flight was again on its way. The weather reconnaissance B-29 took off, flew to BW-1, found the weather suitable for the Jets, and sent the "come ahead" message to the Flight Commander. The B-29 then returned one-third of the distance back along the route, and orbited so the fighters could use the beam on the ship for homing. Shortly after the fighters gained their cruising altitude, radio contact was established with the B-29, and any weather information obtained could be transmitted directly to them. This was a very good morale factor. The E-80 flight to BW-1 was without incident, so when they arrived at BW-1, the B-29 continued to Meeks Field, Iceland.

The F-80's had a short delay at BW-1 due to unsuitable weather at Iceland, but on the second day the weather became good with only scattered clouds. A "come ahead" message was sent, and the B-29 took off and went out one-third of the way to meet the fighters. There were low stratus clouds at BW-1 the first part of the morning, but they were broken enough for the Jets to get off. The route was completely undercast, but the clouds broke and became scattered just a few miles off the coast of Iceland. The flight was without incident.

The next morning the weather looked suitable, so the B-29 took off for Stornoway, Scotland, for the survey flight. The sky over the island on which Stornoway is located was overcast to broken, with a few rain showers, but was clear just off the coast to the northwest. The base of the clouds was 2,500 feet, which was plenty good. Again the "come ahead" message was sent and the fighters took off. No difficulty was encountered except that the wind information was inaccurate and the fighters were blown south off course, but they got in to Stornoway in good shape. After working the fighters into Stornoway, the B-29 proceeded on to Odiham RAF Base without landing. The following day the F-80's came on into Odiham.

After a 4-day stay in England, the flight proceeded to Furstenfeldbruck, Germany, the destination. This flight was made without difficulty, the sky condition being broken along the entire route.

The return trip was started on 13 August. As before, the B-29 took off first for Odiham, England, and found that the weather at the terminal point was unsuitable for the Jets, so a message was sent for them to wait. The next day the fighters made the trip. There was some difficulty in getting out of Furstenfeldbruck. A front had moved in so they had to climb through 20,000 feet of clouds. Three flights of four made in all right, but one flight lost all instruments except the compass and the air speed indicator. The flight broke up, but two of the ships got on top without much trouble, and the flight leader was on what instruments he had from 3,000 to 35,000 feet. The other ship got on top all right, but his radios went out. He was alone, so instead of trying to reach England, he oriented himself with the radio compass and landed at Wiesbaden. All of the ships landed safely at Odiham, but not all together.

There was a 3-day delay at Odiham due to bad weather at Stornoway. A low-pressure system was oriented directly over northern Scotland with resulting bad weather. On the third day, the weather looked good, so the B-29 took off and made the usual check, then orbited till the fighters arrived. The B-29 then proceeded to Iceland.

The fighters were held at Stornoway for 3 more days due to a stationary front directly over Meeks Field, Iceland. Then on the third day the weather broke, and a "come ahead" message was sent. On this day the F-80's made all three of the over-water hops. The total elapsed time from Stornoway, Scotland, to Goose Bay, Labrador, was 12 hours and 32 minutes. They covered a distance of 2,180 miles in 4 hours and 52 minutes, an average ground speed of 445 miles per hour. To make this possible, there was a perfect synoptic situation. A deep low-pressure system was located approximately 400 miles south-southwest of Iceland, which insured good tail winds all the way and good circulation from the northwest at both Meeks Field and BW-1 insured clear conditions.

On this day, the B-29 took off from Iceland as soon as the Jets arrived, reported on the weather at BW-1, and then continued on to Goose Bay. A "come ahead" message was sent to the fighter flight at BW-1, and they arrived at Goose Bay without any difficulty.

The next day, the flights from Goose Bay to Bangor and from Bangor to Selfridge were made without incident.

Weather service supplied by the various agencies along the route was exceedingly good. Flight folders were prepared for each hop, and the cooperation received left nothing to be expected. The British Weather Service supplied exceptionally good service. A special forecaster with years of experience was put on duty at Odiham RAF station with the primary purpose of supplying the jet aircraft with any weather information necessary. This forecaster was also in direct contact with the most experienced weather personnel in England to receive any pertinent information.

Supporting aircraft consisted of: two C-54's for transport of spare parts, equipment, and personnel; one C-47 for equipment and advanced party personnel; one boat-carrying B-17 rescue ship; and one B-29 Air Weather Service reconnaissance ship.

The Air Weather Service B-29 played a most important part in the successful accomplishment of this mission. It flew ahead on each lap of the trip and mapped out the weather for the fighters. Also, the Flight Weather Officer (the author) was a qualified F-80 pilot, so all decisions were made through the eyes of a Jet pilot. Fuel and range is such a critical factor in the operation of the F-80 that the weather conditions at the terminal points must be suitable for them to come in. This is what the B-29 did: It assured the F-80 flight commanders that suitable conditions did exist. If at any time in the future another such flight is planned, it is considered absolutely necessary that a weather reconnaissance ship be included on the flight to perform the function outlined in this report.

The performance of duty of the B-29 crew of the 373d Reconnaissance Squadron was superior in every respect. At all times they were ready and eager to offer help and suggestion to smooth out the operation on this mission. Captain Martins, Captain Thompson, Lt. Carden, Lt. Ketcham, Lt. Matt, and all the airmen on the crew should be highly commended for their fine work on this mission. (Maj. L. J. Pickett, 12th Wea. Sq.)

19. WEATHER SERVICE FOR THE AIRLIFT TASK FORCE (U)

Climatologically, an area to leeward of an ocean at latitude 50° has weather adverse to aircraft operation a large percentage of the time. In just such an area, the U. S. Air Force and the British RAF have taken on the job of transporting the essential freight that normally would travel by rail, canal, and highway into a large city. To accomplish the Berlin Airlift with the limited terminal facilities at Berlin requires almost continuous operation. Under these conditions, efficiency and safety of the operation are greatly increased by good weather service, but such good weather service is attained only through the use of augmented facilities and special procedures. The following paragraphs briefly outline the weather facilities serving the USAF part of the Combined Airlift Task Force and the special procedures used in this service.

USAF operation on the Airlift began from Wiesbaden and Rhein/Main Air Bases to Tempelhof at Berlin, but it was soon found that additional bases were needed. Fassberg and Celle in the British Zone and Tegel in the French Sector of Berlin were opened to provide these additional bases. Each required an entirely new weather observing and forecasting station. Weather stations at the older USAF bases were inadequate to handle the great increase in traffic resulting from the Airlift. In general, weather stations at Airlift bases required augmentation equivalent to a "B" type station to meet the increased need for weather service.

The Airlift Task Force established a traffic control station to integrate the Airlift operation in the Bipartite Headquarters Building at Frankfurt, adjacent to the USAFE Flight Service Center and Radio Station AFK-5. A "B" type weather station was in operation at this location but the Traffic Control required that this station be augmented considerably. This station is now operating with the personnel and equipment of a 3B station. The primary purpose of the station is to keep a continual and close check on the weather affecting the Airlift and to coordinate the forecasting at all Airlift stations, assuring that all forecasts pertaining to particular places and times are the same. The station furnishes controllers with frequent and comprehensive briefings and up-to-the-minute weather information on all Airlift bases and alternates. The Frankfurt station has a system of direct telephone lines to each weather station at an Airlift base, which enables conversation with these stations individually or collectively. Forecast conferences with all stations are held 3 times a day. In the event of a forecast error and when a station finds it necessary to materially modify its terminal forecast groups, the change in forecast is coordinated with the Frankfurt station prior to issuance. As an additional function, the system of direct telephone lines backs up the teletype circuit for collecting and disseminating weather data. Garbled or missing reports from an Airlift base are obtained at once by means of the telephone.

Headquarters of the Airlift Task Force in Wiesbaden maintains close contact with its operations. Since the weather and weather service is such a large factor, the need for a staff weather officer in this headquarters became apparent and a member of the 18th Weather Squadron was detailed for this duty. In addition to his staff duties this officer supervises the maintenance of an up-to-the-minute picture of weather affecting the Airlift in the operations section of the Airlift Task Force Headquarters.

The Airlift operation deals with groups of aircraft called "Blocks." This results in air crews going on duty and arriving in operations offices in groups. The pilots are briefed collectively, including weather briefings, on all phases of the day's operation prior to departure on their initial flight for the day. A supplementary briefing is conducted before each additional flight and pilots are privileged to visit the weather station at all bases for individual weather briefings. To assist in this briefing all stations maintain up-to-the-minute cross sections of weather conditions on the route into and out of Berlin. At Tempelhof in Berlin aircraft normally depart for Rhein/Main or Wiesbaden as soon as they are unloaded, a flight of over 300 nautical miles. Weather briefing for these flights is conducted by a forecaster in a mobile briefing office on the line, wherever the aircraft may be parked.

During recent months, the Airlift terminals have been subjected to considerable fog, and the Airlift continued operation with the aid of GCA as long as visibility was one-half mile or more. Visibility in the fog varies considerably and the prevailing visibility, normally a part of weather observations, does not completely describe conditions; consequently, the practice of reporting runway visibility at the approach end of the runway whenever the prevailing visibility at Airlift bases dropped to below one mile was inaugurated. This practice enables the Airlift to keep operating when the visibility goes below minima in the building area of a base but is sufficient along the runway, and eliminates attempted landings under conditions when visibility is below minima along the runway even though the prevailing visibility at the weather station measures a half mile or more. Observation of runway visibility required the procurement of field telephones and jeeps as well as the use of additional observer personnel.

Much of the weather affecting the operation area of the Airlift Task Force develops in the Atlantic, south and west of the British Isles, and the North Sea, an area which has insufficient coverage of surface and upper-air reports to permit accurate weather analyses. To furnish data for the blank portions on the weather charts for these areas, Flight "A" of the 374th Weather Reconnaissance Squadron was moved to Waddington RAF Base in the British Isles for operation. During December, this flight operated on a 2,200 nautical mile track southwest of England, with a mission scheduled every other day. The first of January the track was shifted to the North Sea, where it is currently being operated.

An extensive program of pilot reports was inaugurated for the Airlift operations. Five of the aircraft departing each base each hour are furnished a special cross section form on which a crew member is to enter the weather encountered during the flight to or from Berlin. These forms are turned in to the weather station and are the bases for post flight reports which are disseminated to all stations. The Airlift Task Force has set up a traffic control squadron of 6 aircraft. These aircraft fly the routes to and from Berlin at altitudes other than those at which the Airlift normally operates to scout flight weather conditions. During daylight hours a trained aerial weather observer is aboard these aircraft and makes and reports regular aerial weather observations. Pilot reports are received from the rest of the flights. Each Airlift base maintains a map of the operational area on which is plotted the time and position of current aerial weather reports and pilot reports. The actual information received from these reports is portrayed on the cross sections and has its bearing on the weather analysis and briefing of all stations. In addition, the control tower operates continually to obtain the height of the base of the clouds and visibility from pilots after take-off and the approach visibility from pilots after landing, reporting such information to the weather station. This supplementary cloud height and visibility is incorporated in the remarks of airways reports.

Work is under way to install a ceilometer at each Airlift base. Three are in operation. Three of the ceilometer instruments required had to be removed from stations in the Z.I. The result of the project will be better ceiling observations.

The Airlift requirement for weather service involves detailed observations and detailed forecasts. A large part of the Air Weather Service in Europe is engaged on Operation Vittles in fulfilling this requirement, but success depends on the intelligence, alertness, and initiative of the individual observer and forecaster.

20. AWS IN THE NEWS (U)

As a result of action taken through MATS directive, dated 4 November 1948, AWS Letter 15-17, dated 12 May 1948, providing for Monthly Public Information Activities Report, was rescinded, effective with the reporting period for October 1948. A revised reporting procedure is currently being developed by MATS and will be disseminated to the field at an early date. For this reason, detailed reports from the field have not been forthcoming since September, and information as to local activities is not available for analysis in this issue of the Bulletin.

In recent months several objective articles have appeared in magazines and newspapers covering aerial reconnaissance in both the Arctic and the Caribbean. Among them are: "Arctic Air Force," by Maurice Roddy, in Flying, September 1948; "Hurricane Fighter," by Robert H. Simpson and Douglas J. Ingells, in Coronet, September 1948; "Hunting a Hurricane - and Finding It," by Geoffrey W. Fielding, Baltimore Sunday Sun, 10 October 1948; "North Pole Weather Run," by Aubrey O. Cookman, Jr., Popular Mechanics, November 1948; and "North Pole Storm Chasers," by C. B. Colby, Air Trails Pictorial, November 1948. These writers visited the operating bases involved and obtained first-hand background information, in some cases actually flying the mission.

An article on hurricane reconnaissance, titled "Giant of the West Indies," written by Clarence Owens, PIO, Hq., AWS, appeared in the January 1949 issue of Air Force magazine. A digest of the article as submitted to the Magazine Section, USAF/PR, was carried in a monthly bulletin going to a selected list of magazines, and to date 4 additional requests for the hurricane story have been received from the following: Aviation News and Views; Travel magazine; National Aeronautics; and Zack Mosely, publisher of the cartoon strip, "Smiling Jack."

In addition to various stationary weather exhibits in connection with Air Force Day, referred to elsewhere in this issue of the Bulletin (item 16), similar exhibits have recently been provided for several important civic and other events in different parts of the country. Of particular interest was the display arranged for the Armed Forces exhibit held during Inaugural Week, 16-22 January 1949, on the Monument Grounds in Washington. One hundred and seventy-five thousand persons are reported to have visited this weather display during the week. A Mobile Weather Unit display was also provided for the New England States Exposition, held at Springfield, Mass., 19-25 September 1948, and at the Civic Air Show in Philadelphia, 8-13 November 1948, sponsored by the Air Force Association.

In connection with the inaugural display, as with the Air Force Day exhibit at Bolling AFB, the recruiting aspect was emphasized. PIO arranged for a color chart of the proposed new Airman Program (WSB, No. 5, item 150) and also a descriptive text showing the revised career ladders that may be followed in pursuing technical training in the AWS. Approximately 2,000 copies of the text were distributed on the 2 occasions.

PIO has collaborated in several Air Force sponsored radio shows in recent months: On 10 October 1948, Capt. Lester R. Ferriss of the 375th Reconnaissance Squadron, Ladd AFB, Alaska, described Arctic Weather Reconnaissance on the CBS network, "Skyway to the Stars," radio show; on 16 January 1949, Capt. William Conant of the 373d Reconnaissance Squadron, Kindley AFB, Bermuda, appeared on the same program to give an account of hurricane reconnaissance activities in the South Atlantic; previously, on 19 December 1948, a skit covering life in a remote arctic weather station was presented over "Skyway to the Stars." PIO collaborated with the National Broadcasting Company in setting up a special feature in connection with NBC Christmas News Roundup, broadcast over the network at 1930 EST, Christmas Eve; a 2-minute script was telephoned to Ladd AFB, Alaska, by NBC, and wire recording made of conversation between 2 members of the crew while flying over the Pole was flown back to New York by commercial aircraft for the broadcast.

21. INTERNATIONAL METEOROLOGICAL ORGANIZATION (U)

The recent introduction of new forms of meteorological codes has produced many queries which indicate that a review of the processes by which such codes are adopted for international use may be of interest to Air Weather Service personnel.

Representatives of the meteorological services of the world form the International Meteorological Organization, with headquarters at Lausanne, Switzerland. Six geographic subdivisions, each represented by a Regional Commission, constitute the IMO regions as follows:

Region I	Africa
Region II	Asia
Region III	South America
Region IV	North and Central America
Region V	Southwest Pacific
Region VI	Europe

Periodically, the Directors of the various meteorological services convene, the latest meeting being that held in Washington in 1947. Committees present to this body resolutions on meteorological matters which are considered by the Conference of Directors. At Washington, 200 resolutions were approved, among which were those concerning the code forms adopted as of 1 January 1949.

The Conference of Directors establishes a basic code form for a given type of meteorological report. Due to varying requirements, observational methods, and dimensional units in use in the different IMO regions, the basic code form is not completely delineated, or rigidly prescribed. Certain elements and groups are left to regional agreement in order that the needs of specific regions can be met.

The precise content of these optional elements and groups is then determined by each Regional Commission. For example, the basic IMO Synoptic Code Form contains the group 6japp where j is an optional element. The commission for Region V (CRV) assigned D_L, direction of low clouds to this element; Regional Commission VI assigned E, state of ground, and a_x, detailed characteristic of barograph trace, to the same element (depending on the time of observation).

When the code form for a region has been thus established, meteorological services in that region are obligated to use that form. As a matter of policy, Air Weather Service organizations have been instructed to comply, wherever possible, with the code forms of the region in which they are operating.

When codes have been established by the International Meteorological Organization, their basic form is more or less static. Channels for proposing alterations do exist, but the processes of coordinating such changes within the IMO structure are time-consuming and may, under certain circumstances, require one or two years.

Changes in the optional regional elements or groups may be handled through the individual regional commission, and will generally require less time than a change in the basic IMO form.

It is apparent that immediate action on proposed code changes will be relatively rare. Suggestions from field units of AWS are evaluated and consolidated by this headquarters, and are presented in final form to the appropriate authorities for action.

22. AIR WEATHER SERVICE IN SPORTS (U)

A long-standing bowling rivalry between Headquarters, AWS, and Headquarters, MATS, once again resolved itself in favor of the AWS team, in a match at Bethesda (Md.) Bowling Alleys on 7 January 1949. AWS turned in its highest team set of the year to accomplish this victory. The teams have been matched twice during the current season in the Greater Washington Ten Pin Bowling League, and in each meeting of these closely-matched teams, AWS has been able to come out on top.

In November the 373d Hurricane Hunters Softball Team added another trophy to the growing list of athletic laurels won by the Squadron. In winning the Bermuda championship, the Hurricane Hunters chalked up a string of 14 straight wins behind the hurling of Garland and Danhuser, and topped their season's record off with a win over the 8th Weather Squadron at Westover AFB, champions of that base. The 10th week of competition in the Airmen Bowling League at Kindley AFB was completed early in January, with only 4 weeks remaining to "hit the wood." The Hurricane Hunters have held No. 1 position most of the way, and now lead with 34 wins against 6 losses.

Having won the championship in the Intra-Mural Softball League at Westover AFB, the 2108th Group entered 3 teams in the Bowling League, and at the close of 1948 the No. 1 team was holding top position with W/O Lesher showing the way with an average of 159.

Led by S/Sgt. Joe Poszwa, with 562 points, the Airmen of the 2143d Air Weather Wing downed the FEAF Flight Line Keglers in a 3-game series early in January at the War Ministry Alleys. This placed the weathermen in 3rd position in the FEAF Base Bowling League, having won 8 games and lost 1 in 3 matches.

The 514th Reconnaissance Squadron, Guam, reported in October that the North Field Bombers were establishing an enviable record in the basketball league. Undefeated in their first 7 games, this winning combination was well on its way to copping the championship of the "Sweat Bowl League."

France AFB basketball team of the 6th Weather Squadron has had an enviable record -- won last game with Albrook, played at Howard, and after a week's recuperation went on to Ramey AFB for 2 games, winning both, making them the champs of the CAirC. The baseball team is well underway. At Beane softball is the prime attraction; 2 play-off games to go, with AWS-AACS combined team in second place -- anything can happen.

Ladd AFB reports that weathermen are actively participating in current Officers' and Airmen's Bowling Leagues; also in the base basketball tournament. In the Officers' League, as of 21 December 1948, the end of the 1st half, 375th Reconnaissance stood third, with Ferris having won the second high single and triple score. Three weathermen, Sgt. Willis R. Keelin, Sgt. George R. Androskaut, and Pfc. Carroll D. Carter, represented the 375th Squadron on the Ladd AFB football team, which competed against the University of Alaska in the first annual Ice Bowl game, on New Year's Day. The game, played at Ladd AFB, ended in a tie score, 0-0.

Reports from the 18th Weather Squadron indicate that the "Rainmakers" and the "Cloudbusters" have lost some ground in the 16-team City Bowling League standings during the past two months. In November the "Cloudbusters" led the league with the "Rainmakers" following behind in 8th place. Current standings show that the "Rainmakers" have moved to 5th place, while the "Cloudbusters" have skidded to 10th place. The "Cloudbusters," sparked by the passing and running of Cpl. Joe Kelly, whipped the 32d SCU Officer-Civilian 7, 24-14, in the City League touch football play-off game in October at Camp Lindsey.

The 19-man weather station detachment at Camp Detrick, Md., participated in the Interdepartmental Softball League at Camp Detrick last summer, winning the second-half tournament and finishing second in the season's finals.

The 9th Weather Squadron, March AFB, California, basketball team composed of men from both the squadron and Detachment 9/8L with 7 wins and no losses was showing the way for the other fifteen teams in the Intra-Mural League at the close of the first half on 10 January 1949. (PIO, AWS)

FAMOUS LAST WORDS

"It's over in that direction somewhere!"

What's Planned

23. THE AIR WEATHER SERVICE RESERVE PROGRAM (U)

As a result of increased emphasis on the Reserve Program by Headquarters, USAF, the Air Weather Service has assigned over 2,000 of its inactive reserve officers with wartime experience to various units throughout its command. In addition, two reserve T/O&E squadrons, the 13th in New York and the 22d in Los Angeles, have been activated and filled with officer personnel. Inactive duty training has commenced, and at each of the 106 weather detachments throughout the country it is not uncommon to have active and inactive personnel working side by side at forecasting duties. Commissioned reservists, so assigned, outnumber active duty officer personnel 2 to 1 and may well meet mobilization requirements of the Air Weather Service.

Assignment of Specialists

During the early part of 1949, consideration will be given to making assignments to specialists within the Air Weather Service. In these positions will be placed personnel qualified for duties in electronics, hydrology, oceanography, research, and training. Each officer will be fitted into the position for which he is best qualified and for which the Air Weather Service has a requirement. Action has been started to seek out and assign to the various weather detachments throughout the country many members of the enlisted reserve who possess weather qualifications. Specialists in this category are encouraged to contact the local weather detachment in their area and become part of the program. Individual consideration will be given in making assignments so that each man has the duty for which he is suited.

Organizational Plans

It is anticipated that early in 1949 the following reserve T/O&E units will be activated: One wing, 4 groups, 8 squadrons, 1 mobile squadron, and a detachment corresponding to each active detachment within the continental limits of the United States. Such a reserve organization will duplicate the Air Weather Service unit for unit and man for man. Each active officer will have a reserve replacement being trained for his duty assignment and will thereby be eligible for immediate duty elsewhere if the requirement arises. Reservists being selected to fill these T/O&E vacancies will be taken from among those who have received mobilization assignments. Those who have been most active and have shown the most interest in the over-all reserve program will be given priority for assignments to these T/O&E units.

Air Weather Service Training Advantages

The Air Weather Service has a definite advantage over other organizations in conducting an inactive duty training program. Its units and detachments are so well distributed geographically throughout the country that more than 90 percent of its assigned personnel live within reasonable commuting distance of the station to which they are assigned. Those few who are not so fortunate need only request their weather squadrons for a training attachment to some regular Air Force, Air Reserve, or Air National Guard unit more conveniently located. Since the majority of stations are operated 24 hours a day, 7 days a week, scheduling of inactive duty training is of no problem. This fact places the Air Weather Service in a most favorable position and indicates why it is most anxious to proceed with the task of administering, operating, and training its reserve specialists.

Active Duty Training

Quotas obtained by the Air Weather Service for active duty training have been disappointing. Thus far, for the fiscal year of 1949, funds have been sub-allocated to train only 175 reservists. This is totally inadequate to meet our training requirement since it is visualized that at least half of those so-assigned desire a 15-day training tour. Steps have been taken to correct this deficiency. All reservists will be informed when additional funds are available for active duty training.

Meteorological Publications

Information will be distributed at regular intervals to all reservists participating in the program. Addressograph plates have been made up at Headquarters, Air Weather Service, and many publications such as the Air Weather Service Bulletin, technical and scientific manuals, and daily meteorological maps will be forwarded. A correspondence refresher course for meteorologists is in process of preparation and should be ready for use during the latter part of 1949.

Any qualified and interested reservist not yet notified that he has been selected for a mobilization assignment to an Air Weather Service unit should write for details to the Reserve Section, Headquarters, Air Weather Service, Andrews Air Force Base, Washington 25, D. C.

<u>FAMOUS LAST WORDS</u>

"I can make it, just lean it all the way back."

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24. 20TH SQUADRON GETS ITS FIRST AN/APQ-13 (U)

The first ground-installed AN/APQ-13 radar set in the Pacific-East Asia area utilized exclusively for storm detection was put into operation at Haneda, Japan, on 16 October 1948. The weather central located at Haneda is the first 20th Squadron detachment to complete such an installation. It is planned to install this equipment at other 20th Squadron detachments in the near future.

When completed, the radar storm-detection project will include a chain of installations throughout the territory covered by the 20th Weather Squadron. During the summer months, it will be especially helpful in the detection of severe storms and the charting of their course and intensity, which is a source of constant concern to pilots and forecasters alike.

Installation was under the technical supervision of Lt. William Wells, Weather Engineering and Survey Officer of the 20th Weather Squadron.

The installation of these sets represents another step forward in the Air Weather Service's program to provide complete forecasting service to military aviation through the world.

25. RECENT DEVELOPMENTS IN AIRBORNE METEOROLOGICAL EQUIPMENT (R)

Since the activation of the Weather Reconnaissance Program in the B-29 type aircraft, the equipment developed for the pressurized aircraft has been found to have definite limitations. The Psychrometer ML-313/AM is capable of measurement to an accuracy of ±.5° C. This accuracy can only be realized for wet- and dry-bulb temperatures measured in an unpressurized aircraft and at temperatures above freezing. At lower temperatures, the removal of the thermometers from the duct causes the out-rushing humid air in the cabin to coat the duct with frost. There is under development, at the present time, interim airborne temperature-humidity equipment, including a dewpoint hygrometer that will be capable of operation in pressurized aircraft to temperatures of -60° C. and even lower. The equipment will be of the dial-indicating type. Service-test models are expected to be available by December 1949.

The present design of Aerograph AN/AMQ-2 is extremely delicate and needs adequately trained technicians to keep the equipment operable. Though modifications were brought forth, the basic complexity and fragility of the equipment prevented any appreciable increase in in-commission time.

A new Aerograph project is under way, designed to provide true and directly read observations. Service-test models of this equipment are not expected to be available prior to December 1951.

The Signal Corps is engaged in the development of a method of measuring winds at 2,000-foot intervals from the flight level of the aircraft down to the surface. Initial development will concentrate on the gathering of wind data from the first 10,000-foot segment below the flight level of aircraft. Assuming the system now being tried proves satisfactory, a laboratory demonstration model will be available in about 3 months. Commercial procurement of this system ought to take about a year. Additional systems will require about 2 years of investigation before any commercial procurement may be initiated.

There is in service test, at the Air Proving Ground Command, a Cloud Height Indicator with which an observer can measure, by optical means, the elevation of cloud heights above and below an airplane. This is an interim development until an accurate piece of electronic equipment can be completed. It requires a definite target point on a cloud that can be tracked for a minute or two. On fairly smooth stratus clouds, however, the lack of such a target precludes the use of this equipment.

The 2078th Reconnaissance Squadron is, at present, working out techniques and procedures for the Radiosonde AN/AMT-3 ("Dropsonde") for use in the reconnaissance program. Since the "Dropsonde" development program is a continuing one, more refined models are continually being tested for the Signal Corps by the AMC Flight Facility at Olmstead AFB.

The Air Materiel Command has developed an Icing Rate Meter that is now installed in a 2078th Squadron aircraft for operational-suitability tests. This meter collects ice on a continuously rotating disk and gives the rate of the build-up on a remote synchro-indicator dial, which will be calibrated in millimeters per minute over the range 0 to 25. It is expected that this type of equipment, should the test results be favorable, will be installed on reconnaissance aircraft in time for the 1949-1950 winter season.

During the 1948 hurricane season, the National Advisory Committee for Aeronautics (NACA) completed engineering tests of an airborne turbulence indicator with the cooperation of the 373d Reconnaissance Squadron at Bermuda. The NACA is now analyzing the results of these tests and will submit a report in the near future.

During the past year the Air Weather Service has evaluated various available airborne radars to determine which would be the most desirable for the Reconnaissance Program. A classified search radar has been found that technically conforms with our present requirements, and USAF has approved our request for one model to be installed in one of our aircraft by the Air Materiel Command, in order that we may more fully determine the potential flight value of this equipment.

In addition to the above equipments under development. more accurate radio altimeters, longer-range search radars, and extremely accurate long-range navigational sets that will automatically and continuously position the aircraft are continually being investigated to meet the fundamental requirements of the Weather Reconnaissance Program. (Hq., AWS)

The Policy

26. PROSELYTING STUDENTS FOR WEATHER OFFICER COURSE (U)

If 50 weather officers at 50 weather stations in the ZI can each proselyte one student for the weather officer course beginning 23 March 1949, Training Command will continue to supply the Weather Service with trained meteorologists. The recall orders of the 50 officers scheduled to fill the quota for the March class have been cancelled like all other recalls of officers for duty in the Air Force. Future classes will have to be filled from among officers on active duty.

The educational requirements for the course will not be changed. There are officers on active duty with proper requisites. If they can be informed about the school and about the Weather Service, it is believed that this class quota can be filled and then some.

There is not sufficient time to publicize, through Air Force channels, the need for applications from volunteers for the course. It is hoped that the Weather Service can do its own recruiting for at least this one class. Students are expected to have a year of general college physics and two years of mathematics, including integral and differential calculus. The length of the course is now 43 weeks. Interested officers may make application for the training in accordance with Air Force Letter 50-2. (Hq., AWS)

27. OFFICER CAREER REVIEW BOARD (U)

This headquarters has received and forwarded to the Air Force Institute of Technology, Wright Air Force Base, 122 applications for university study. Applications for graduate study totaled 67, of which 42 were for study in meteorology, climatology, oceanography, or seismology. Applications for undergraduate study totaled 55. Although the final authority for approving applications for university study under Air Force Letters 50-21, 50-22, and 50-71 has been delegated to the Air Force Institute of Technology, it is believed that Air

Weather Service can best serve itself and its officers by reviewing applications critically in terms of Air Weather Service requirements and with a view toward career guidance of career meteorologists.

Applications were considered individually at a special session of a recently formed Officer Career Review Board composed of the following members:

Chief, Air Weather Service
Deputy Commanding Officer for Geophysical Research, Cambridge Field Station, Air Materiel Command
Commanding Officer, 2059th Weather Wing
Director of Personnel, Hq., Air Weather Service
Director of Scientific Services, Hq., Air Weather Service
Chief, Career Development Branch, Hq., Air Weather Service
Chief, Training Division, Hq., Air Weather Service

The Officer Career Review Board agreed in its initial session that the policy of Air Weather Service should: 1) Encourage applications from both regular and reserve officers for graduate study in meteorology, oceanography, climatology, and seismology; 2) give next priority to applications from regular Air Force officers for graduate or undergraduate study fields which meet a special Air Weather Service requirement; 3) discourage applications from professed career meteorologists in Air Weather Service who apply for study in a field unrelated to research and development in the area of geophysics.

The Officer Career Review Board was organized to do just what its title implies. As well as considering applications for training in civilian institutions, the Board has assumed the responsibility for monitoring the assignment of graduates of university training courses and the monitoring of research projects conducted by officers in a university. The Board will meet this spring to review certain projects undertaken by officers now engaged in graduate study and consider assignment of officers due to graduate in June. It is planned that the Board will consider individually the research plans of officers accepted for university graduate study beginning next September. (Hq., AWS)

28. <u>CURRENT LIMITATIONS ON EXTENDED FORECASTING FOR AIR FORCE ACTIVITIES (U)</u>

Standard methods of short-range forecasting depend upon an analysis of the current state of the atmosphere and an extrapolation of current trends into the near future, using known physical laws and climatological observations as guides. Such methods are of proved value for forecasts covering a limited period of time. However, for periods greater than 72 hours (more or less), these methods (as practiced up to the present) are inadequate.

It was recognized early in the prosecution of World War II that forecasts of meteorological elements of even slight reliability for periods of 3 to 30 days would be of considerable strategic and tactical value, and that long-range forecasts of accuracy comparable to that of 24-hour forecasts would be of tremendous value in planning and executing various phases of the war. The Air Forces wanted such forecasts for planning large scale operations, the Army for the same purpose and for dispersion and movement of troops and supplies. The combined forces needed such forecasts for successful coordination of effort in jointly supported operations. For many resulting operations it is desirable, and almost necessary, that the future weather conditions be known more than 3 days in advance.

Since the end of the war, the stated requirements (by both Air Force and Army) for long-range forecasts have diminished; however, the need for such forecasts in training operations remains. In the event of another conflict we can be sure that there will again be urgent pressure for extended forecasts for maximum accuracy and maximum possible period. Our responsibility for being prepared for such a situation is obvious.

The following varieties of methods have been proposed and studied in connection with long-range forecasting:

1. Method of Means. The broad features of atmospheric circulation are obtained by taking averages over several days; also space averages are used for inferring the general characteristics of the circulation at any one time. The forecast is made in terms of these mean values, and then is interpreted in terms of actual daily weather.

2. Method of Types. Each of the synoptic situations which occur over a given large area is regarded as falling within one of several types. These types are construed as lasting for several days, running through successive phases. The forecast is based upon a recognition of the current type, upon extrapolating the successive phases of this type and upon a prediction of the type to follow.

3. Method of Analogues. Referring to a file of past weather situations, one attempts to find a day (or series of days) which corresponds in some sense to the present. The forecast is then made by emulating the succeeding days of the analogue series. This method has been used mainly in conjunction with some other method (such as methods 2 or 5, herein).

4. Method of Rhythm. Basic rhythms in certain aspects of the circulation (based upon past records) are discovered and rules are established for the behavior of these rhythms. The forecast is made by tying the present and the past into the first half of a rhythmic process and extrapolating the last half in accordance with the rules of the process.

5. Methods of Statistical Parameters. Certain variables are chosen to represent the state of the atmosphere, and the historical behavior of these variables is subjected to statistical analysis. Usually this takes the form of linear prediction formulas based upon multiple lag correlations.

These wartime efforts resulted in very little improvement in our ability to forecast the weather 5 days or more in advance. It was found that various climatological refinements could be used to advantage, and it was also found that under certain recognizable circumstances it was possible to issue a fairly reliable long-range forecast -- these circumstances occurring, however, rather infrequently. In general, no definitive method of long-range forecasting was established. However, requirements for research in long-range forecasting have been maintained at a consistently high priority since the end of the War (Ref. WSB, No. 1, item 23).

On an operational basis, it should be observed that the Extended Forecast Group of the U. S. Weather Bureau is actively pursuing these problems in the course of their regular extended forecast service. Furthermore, the Electronic Computer Project at the Institute for Advanced Study may contribute tremendously to the long-range forecast problem at some time in the future.

Because the Air Force and Army require limited extended forecasts for current operations, the Master Weather Analysis Unit has maintained a small section for this work. Favorable consideration has been given to merging the extended forecast activity of the Master Weather Analysis Unit with that of the Extended Forecast Section, U. S. Weather Bureau, where ample facilities are available for continued development toward improving extended forecasts.

A quotation from the introduction of the recently published report, "Extended Forecasting by Mean Circulation Methods," by Jerome Namias, Chief, Extended Forecast Section, U. S. Weather Bureau, will outline briefly the history of that unit:

"With the help of Bankhead-Jones funds from the Department of Agriculture, research on the problem of long-range forecasting was carried on from 1935-40 at the Massachusetts Institute of Technology in cooperation with the U. S. Weather Bureau and Bureau of Agricultural Economics. The results of this work have been published in numerous reports, and a large part of the work is discussed in or referred to in supplement 39, Monthly Weather Review, and in Volume VIII, Number 3, and Volume IX, Number 1, of Papers in Physical Oceanography and Meteorology published by MIT and Woods Hole Oceanographic Institution. The methods developed through this research were incorporated into a practically operating extended forecasting unit set up at Cambridge, Mass., in August 1940, by the U. S. Weather Bureau in cooperation with the Massachusetts Institute of Technology and the U. S. Department of Agriculture. In May 1941, this unit was transferred to the Central Office of the U. S. Weather Bureau in Washington, where its functions have been to prepare extended forecasts for periods roughly 6 days in advance, and to carry on research designed to improve these forecasts. The Army and Navy have assisted with funds and collaborators." (1)

The average station weather officer in the field is not familiar with extended forecasting methods. A short article, "Remarks on Long-Range Forecasting," (2) will prove of interest to weather officers who are not required to prepare or reissue extended forecasts, but it is suggested that Namias' report be studied by station weather officers who intend using extended forecasts to improve their short-range forecasts or to reissue such extended forecasts for some local activity. "Extended Forecasting by Mean Circulation Methods" clearly outlines techniques and their application not only to extended forecasts but also to short-range forecasts. It must be realized that scientifically-based extended forecasts are still in the research and development stage.

The primary object of the mean circulation method is to obtain an accurate prognosis of the next week's 5-day mean circulation at the surface and at 700 mb. With these mean prognostic charts showing the dominant features of the circulation, the general weather conditions associated with such large-scale features can be forecast. In very simple terms it is easy to see that cloudiness and precipitation are associated with mean troughs and good weather is associated with mean ridges. It should be understood that in making up the mean picture as represented on the prognostic mean charts a region dominated by a trough does not necessarily imply cloudiness and precipitation during all the forecast period; it is more likely that several individual storms will be present in the region during the period, each contributing to the mean picture. On the other hand, for mean ridge conditions, it should be implied that a minimum of cyclonic activity is expected, but not necessarily none at all. Another way of expressing the idea of composite day-to-day weather occurrences that are associated with the mean prognosis is to note the observed and very useful fact that migratory cyclones and troughs will intensify in regions of mean troughs and decrease in intensity in regions of mean ridges; the converse of this effect is observed for migratory ridges and anticyclones.

The final extended forecast product consists of the following charts:

1. Prognostic Mean Sea-Level Pressure for the Forecast Period.
2. Prognostic Mean 700-Mb. Contours for the Forecast Period.
3. Prognostic Daily Surface Charts for Six Days (1230Z map for each day).

These charts cover most of the Northern Hemisphere. The forecast period is 5 days for the mean charts.

4. Prognostic Mean Temperature Departure from Normal (for the U.S. only) for the Forecast Period.
5. Prognostic Total Precipitation (for the U.S. only) for the Forecast Period.

In addition to the mean prognosis already discussed, it should be noted that a series of observed mean charts may be used to detect large-scale trends. Such trends may be used as a guide in preparing short-range forecasts in addition to extended forecasts. The problem of interpretation of mean charts is not always so simple as has been outlined above, "but the point worth emphasizing is that regardless of how it is made up (i.e., whatever the series of daily maps which compose it), the mean chart appears to have a physical interpretation in terms of weather anomalies." (1)

Interpretation of the prognostic temperature and precipitation charts (charts 4 and 5 above) requires a knowledge of the class limits set up for these charts. "The forecasts of temperature are made in terms of above and below normal, near normal, and much above and much below normal. The numerical limits which define these ranges of temperature, called class limits, are based on statistical analysis of past records through which is determined the normal frequency of occurrence of temperatures at various times of the year for different locations. The classes above, below, and near normal are so defined that they each normally occur one-fourth of the time; and the classes much above and much below normal, one-eighth of the time. For precipitation, the terms used in forecasting are light, moderate, and heavy, each class normally occurring one-third of the time and thereby having equal probability of occurrence. Obviously, the class limits vary from month to month and from place to place." (1) These class limits can be interpreted in terms of actual temperature and precipitation amounts for any given station on any given month. For some areas where precipitation is rare, the forecasts issued are only for rain or no rain. The severe limitations on forecasting exact temperatures and precipitation amounts on a day-to-day basis even for 1 or 2 days in advance can well be appreciated by most meteorologists. It must be noted therefore that -- "At the present stage in the development of methods of extended forecasting, we are unable to forecast 'spotty' areas of concentrated precipitation which sometimes make the observed precipitation chart appear broken up. Our current methods enable us to forecast only the broad-scale features of the precipitation patterns and not the small-scale refinements. Fortunately, during the cooler seasons at least, the observed 5-day totals of precipitation do group themselves into fairly clear-cut large-scale patterns." (1)

Probably of greatest interest to the synoptic meteorologist are the prognostic daily surface charts for 6 days in advance. "It has been assumed that, once the state of the atmospheric circulation is defined, the general nature of the weather and weather processes over the period become fairly well known to the experienced synoptic meteorologist. However, this does not imply that the entire weather picture is known, or that an accurate play-by-play description of the weather at any point can be given. Before this accuracy is possible, a great deal of research must be done. But it is maintained that the prevailing state of the weather for periods of a week or so can be quite well foretold if one has a correct picture of the circulation at sea level and aloft." (1)

The first map in the series of 6 daily prognostic charts is a 24-hour prognostic chart constructed from the last map available on the day that the extended forecast is prepared. "Obviously, they (the extended forecasters) are 'tied down' by the latest observed map so that the 6 maps must represent a logical and continuous development starting with the first 24-hour prognostic chart. Unfortunately, the number of apparently logical developments from any given synoptic daily chart are many, and, for this reason, long-range forecasts based solely on the last day's weather map are apt to have little success. The second criterion to which the day-to-day forecaster must adhere is that the sum total of the last 5 daily maps must average into a pattern resembling the official mean sea-level prognosis. The day-to-day forecaster has this in mind continuously, so that it has been found unnecessary to incorporate a mechanical check on this consistency. Thirdly, the day-to-day forecaster must make use of the empiric relationship that the daily map bearing the greatest similarity to the mean is that at the middle of the 5-day period. Thus, the fourth map in the series of 6 must have features which correspond to the mean prognostic sea-level chart." (1)

The day-to-day prognostic charts must of course be used with some discretion. Occasionally, the charts will start out of phase -- that is, the first prognostic chart will have poor timing and the rest of the charts are then "thrown off" in the same direction. Other small differences between the latest observed daily map and the prognostic chart can often be reconciled, so that the general features of the situation are preserved and continue to be of forecasting value.

Recently the extended forecasts issued by the Master Weather Analysis Unit have been modified by incorporating the mean circulation method and are now making available to field stations the various charts discussed above in addition to the 6 daily prognostic charts and the special forecasts that have been issued in the past. The time of distribution of extended forecast information and prognoses has been changed so that the various charts and forecasts are now made available each Tuesday and Friday morning. Thus, all forecasts are for 6 days in advance and issued twice weekly. It is expected that extended forecasts will be used more widely by Air Force field stations than they are at present. Greater use of and familiarity with extended forecast information should give the individual weather officer a broader outlook on the weather by extending his horizon into time and space; such an outlook has proven helpful even in short-range forecasting. This broader outlook will be even more important in carrying out the mission of the Air Weather Service with respect to Air Force operations of a global nature. (Capt. A. R. Crisi, MWAU)

REFERENCES

1. Jerome Namias: "Extended Forecasting by Mean Circulation Methods," a report published by the Weather Bureau, U. S. Department of Commerce, Washington, D. C., February 1947. This report is available from the Forms & Publications Section, U. S. Weather Bureau, Washington, D. C.
2. Jerome Namias: "Remarks on Long-Range Weather Forecasting," published in Weatherwise, Vol. 1, No. 2, April 1948.

Who's Who

29. BRIGADIER GENERAL WALLACE G. SMITH (U)

Belated congratulations are extended to Brigadier General Wallace G. Smith, on his recent appointment to his present grade.

General Smith was recently named commanding general of the Airways and Air Communications Service with headquarters at Andrews Air Force Base. He assumed command of the world-wide communications system 10 September. General Smith succeeded Major General H. M. McClelland who was appointed Deputy Commander, Services, of MATS, 1 June 1948.

Enlisting in World War I as a private first class in the Aviation Section of the Signal Corps, General Smith earned both his commission and pilot's rating in July 1918. These twin interests led him into communications, with which field he has been closely associated ever since.

After serving as post communications officer at Langley Field, he continued his communications studies at Yale University. Thereafter, he served in Hawaii, with the 23d Bombardment Squadron at Chanute Field, Ill., and in supervisory communications capacity throughout the U. S.

When World War II began, General Smith was appointed Deputy Director of the Directorate of Communications in January 1942, which position he held until March 1943. From 29 March 1943 until November 1943, he was either Air Communications Officer or Acting Communications Officer in Hq., AAF. Leaving Washington in November 1943, he became Chief of Communications Division of the AAF Board in Orlando, Fla. In October 1944 he returned to the Air Communications Office, Hq., AAF, as Chief of the Operations Division where he served until November 1945, when he was appointed Commanding Officer of the 7th AACS Wing in Manila, later transferred to Tokyo. He continued in that capacity until assuming his present assignment last fall.

Among General Smith's decorations are the Legion of Merit and the Most Excellent Order of the British Empire.

30. COLONEL THOMAS S. MOORMAN, JR. (U)

Colonel Moorman was born in Monterey, California, on 11 July 1910. He attended the U. S. Military Academy at West Point and was a member of the graduating class of June 1933. Upon his graduation from West Point, Colonel Moorman entered pilot training school and received his wings on 22 October 1934. Three years later he entered upon his career as a meteorologist and attended California Institute of Technology from July 1937 to July 1938 and Massachusetts Institute of Technology from October 1940 to May 1941. Colonel (then Major) Moorman became Assistant Director of Weather, Hq., AAF, in 1941 and Air Weather Officer, Hq., AAF, in 1946. He is presently serving as Commanding Officer of the 2143d Air Weather Wing, Tokyo, Japan.

During the war, Colonel Moorman served as Staff Weather Officer of the 9th Air Force from August 1943 to August 1945. He holds the Legion of Merit, Air Medal, Bronze Star Medal, Army Commendation Medal, and several foreign decorations. He is rated as a command pilot and had over 3,000 hours of flying time by 1945.

31. COLONEL N. H. CHAVASSE (U)

Readers of the story in this Bulletin (item 19) about AWS support to Operation Vittles will appreciate that when Colonel "Nick" Chavasse left his quiet position as Air Inspector in Hq., AWS, to become Deputy Commanding Officer of the 18th Weather Squadron last May, he was jumping into a real "hot seat." In June he took over the Commanding Officer's job from Colonel Maschmeyer, who is now assigned to Hq., 10th Air Force. In January the 2105th Weather Group was organized to operate the Air Weather Service squadrons in Europe, and Colonel Chavasse moved up to become Group Commanding Officer. He is, at the same time, Staff Weather Officer to the Commanding General of U. S. Air Forces in Europe, who was hard-hitting General LeMay until General Cannon recently replaced him.

Colonel Chavasse has had an unusual variety of experience during his military career, beginning 1932 as an enlisted man in a medical regiment before he went to West Point in 1934. After "capturing" a single-engine rating at Randolph and Kelly Fields, he was to be found (1939-1941) instructing in the Ground School at Randolph and, thereafter, as Director of the Weather Department there. Colonel Chavasse took the "Met Course" at UCLA in 1942. He ran the Base Weather School at Tampa prior to assignment as Chief of the Weather Training Division in Air Corps Hq., 1942-1944. He will probably never forget those hectic days of mass procurement of meteorological cadets. After an interlude in the General Staff Course at Fort Leavenworth, his turn came to get back into the airplane business, this time as Commanding Officer of the 55th Long Range Weather Reconnaissance Squadron (B-24's) which he trained in the ZI and took to Guam for support of General LeMay's bombing offensive against Japan. He personally led 20 missions, the squadron flying 508 missions, totalling in all over 5,000 hours, including target, route, synoptic, and hurricane weather reconnaissance (see Bull. Amer. Met. Soc., Nov. 1946, pp. 510-518). For his valuable reconnaissance work in the Pacific theater, the Distinguished Service Medal, Air Medal, and Distinguished Unit Citation were awarded him. In January 1946, Colonel Chavasse returned to the States to staff positions in Weather Reconnaissance Headquarters and, later, in Air Weather Service Headquarters, A-3 (and briefly Air Inspector). He was a 1st Lieutenant when the war broke, a Lt. Colonel by 1942, permanent Lt. Colonel, USAF, July 1948, and was promoted to temporary Colonel, USAF, in November 1948. Colonel Chavasse, who comes from Henderson, N. Car., is known to a host of weather men as a very gentlemanly officer, one with whom it is a great pleasure to be associated. He is very much a family man (he says, "now we are six"), a devotee of farming, camping, riding, and the children.

32. LT. COLONEL LAWRENCE A. ATWELL (U)

Colonel Atwell was born 26 August 1913 at Wakefield, Mass. He graduated from Brown University in 1939 with a pre-law degree and took a position as professor of English and mathematics at Williston Academy, East Hampton, Mass. He entered the Air Force in 1940 and was sent to Massachusetts Institute of Technology for training in meteorology. In February 1941 he was commissioned a 2d Lieutenant. Colonel Atwell went to England in November 1942 and remained there until late in 1945. While in Europe, Colonel Atwell served as Staff Weather Officer of the 91st Bomb Group and later as Staff Weather Officer of the 1st Allied Airborne Army. He was separated from the service in early 1946 and entered the field of civil aviation.

Colonel Atwell was employed as a flight controller with American Overseas Airlines during most of 1946 and the first half of 1947.

In June 1947, Colonel Atwell received notice of his appointment as a 1st Lieutenant, Regular Army, and was recalled to active duty. Upon his return to active service, Colonel Atwell became Deputy Commanding Officer and later Commanding Officer of the 2103d Weather Group, Kelly AFB, Texas, and is presently serving in that capacity.

Colonel Atwell is a good athlete and takes an active interest in golf, tennis, and football. He has served on the football coaching staff at Princeton University.

33. LT. COLONEL MARTIN F. C. SEBODE (U)

Colonel Sebode was born 10 December 1902 in Germany. He graduated from the University of Goettingen, Hanover, Germany, with a degree in chemistry in 1926. From July 1926 to August 1928 Colonel Sebode worked as a research chemist in Dresden, Germany. In 1929, Colonel Sebode came to the United States and enlisted in the Regular Army. Colonel Sebode started his weather training as an enlisted man in 1933, when he became a weather observer and in 1935 he attended the Weather Forecaster Course at the Signal Corps School at Fort Monmouth. He served as a forecaster from 1935 to 1940, when he became a Weather Service Inspector. He was appointed as a Warrant Officer (JG) in May 1942, and by January 1945 had risen to the rank of Lt. Colonel.

During the war, he served in the Marianas area as Assistant Director of the Weather Service and helped to organize a Weather Central in the Western Pacific. Among his decorations is the Bronze Star Medal with Oak Leaf Cluster.

Colonel Sebode was integrated into the Regular Army as a Major in June 1947. He is currently serving as Commanding Officer of the 2101st Air Weather Group, McClelland AFB, California.

34. OFFICERS INTEGRATED IN REGULAR AIR FORCE (U)

The following is a list of Air Weather Service officers integrated into the Regular Air Force since the beginning of the integration program. The list is broken down into two sections. Part I lists those officers currently serving with the AWS and Part II lists weather officers serving with other commands. The grades shown are temporary grades, although in some instances the permanent grades are the same. (WSB, No. 1, item 2.)

PART I

Atwell, Lawrence A.	Lt. Col.
Budd, Hyme A.	Lt. Col.
Cole, Frederick O.	Lt. Col.
Crawford, William	Lt. Col.

David, Robert G.	Lt. Col.
Dvorak, Edward A., Jr.	Lt. Col.
Feeley, John M., Jr.	Lt. Col.
Hass, John A.	Lt. Col.
Jackson, Howard E.	Lt. Col.
King, Norman E.	Lt. Col.
Pryber, Jerome A.	Lt. Col.
Sebode, Martin F. C.	Lt. Col.
Shtogren, Anthony T.	Lt. Col.
Sustrick, Edward F.	Lt. Col.
West, Willard A.	Lt. Col.
Wigman, Edward W.	Lt. Col.
Willis, Milton D.	Lt. Col.
Ainsworth, James H.	Major
Anderson, Arvid W.	Major
Anderson, Arthur W.	Major
Arbogast, Thomas J.	Major
Arietta, Frank	Major
Barker, Darold K.	Major
Barney, Wm. S.	Major
Bertoni, Louis	Major
Bigelow, Edgar D.	Major
Blackledge, R. B.	Major
Bonnot, Carlos D.	Major
Bounds, R. G., Jr.	Major
Brown, Mark J., Jr.	Major
Cartwright, E. J.	Major
Chambers, Dale R.	Major
Cometh, Lawrence	Major
Conrad, John H.	Major
Crary, Gerald D.	Major
Curtis, Ferd J.	Major
Dawson, William S.	Major
Delmissier, Bruno C.	Major
Derr, Roger T.	Major
Desper, Dale D.	Major
Dickinson, Jacob M.	Major
Dole, Charles R.	Major
Easley, Samuel J.	Major
Fackler, Paul H.	Major
Fahey, James M.	Major
Farnell, L. B., Jr.	Major
Fava, James A.	Major
Fischer, Irvin A.	Major
Foley, Robert L.	Major
Forster, Bernard F.	Major
Friley, Kenneth O.	Major
Fuerst, Robert E.	Major
Gavares, Nicholas J.	Major
Gazzaniga, Louis A.	Major

Genez, Victor M.	Major
Giegel, John S.	Major
Giuliano, Albert .	Major
Godfrey, Stephen M.	Major
Gosewisch, Guy N.	Major
Hall, Claude N.	Major
Hall, William J.	Major
Hannah, Raymond C.	Major
Hause, Milton M.	Major
Hoke, Dealbert S., Jr.	Major
Hulen, William P.	Major
Hull, Arnold R.	Major
Hunt, Robert F., Jr.	Major
Hutchinson, L. H.	Major
Irish, Lynn T.	Major
Kiley, Leo A., Jr.	Major
Kissick, Luther C.	Major
Kyzer, David A.	Major
Lewis, Glen, Jr.	Major
Maas, Charles F.	Major
Marshall, Prevost	Major
Mead, Henry L.	Major
Meyer, Charles R.	Major
Miller, Ernest R.	Major
Mitchell, Samuel A.	Major
Monfort, Harry N.	Major
Morales, Carl H.	Major
Neely, Russell W.	Major
Norton, William J.	Major
Oder, Frederic C. E.	Major
Palmer, Raymond A.	Major
Pickett, Lawrence J.	Major
Pournaras, S. W.	Major
Richardson, H. W.	Major
Riley, Lewis R.	Major
Roache, C. E., Jr.	Major
Robinson, Leo H.	Major
Ross, Robert C.	Major
Sandifer, Virgil E.	Major
Savage, Frank S.	Major
Schuknecht, L. A.	Major
Scott, John J.	Major
Sickels, G. H., Jr.	Major
Slusher, John T.	Major
Smith, Harvey N.	Major
Somers, Ross A.	Major
Stephens, Donald A.	Major
Stevenson, Roger A.	Major
Stinson, F. A.	Major
Stoddard, Richard W.	Major
Stratton, Max M.	Major

Suehr, Richard C.	Major
Suggs, Ralph G.	Major
Sutin, Nathan	Major
Taylor, Aubrey D.	Major
Taylor, Robert A.	Major
Turton, John S.	Major
Wagner, Harry A.	Major
Walsh, George H.	Major
Williams, Donald G.	Major
Wood, Griffin H.	Major
Wyatt, William H.	Major
Acebedo, Bruce H.	Capt.
Alber, George D.	Capt.
Anderson, John R.	Capt.
Angley, Clyde C.	Capt.
Badgett, William R.	Capt.
Banning, R. E.	Capt.
Barrow, David C.	Capt.
Bergman, Harold O.	Capt.
Best, W. H., Jr.	Capt.
Bird, Sidney A.	Capt.
Blatt, Seymour	Capt.
Bogard, Wayne C.	Capt.
Bolen, Robert J.	Capt.
Boyd, Edwin I.	Capt.
Bruns, Roy H.	Capt.
Clair, William A.	Capt.
Clark, Buford T.	Capt.
Cloud, Carl E.	Capt.
Cole, Benjamin H.	Capt.
Cole, Louis B.	Capt.
Cooper, Harold D.	Capt.
Cowan, Leslie W.	Capt.
Crisi, Alfred R.	Capt.
Crozier, R. L., Jr.	Capt.
Curran, John H.	Capt.
Dacko, William	Capt.
Delanoy, Charles W.	Capt.
Denning, Kemp H., Jr.	Capt.
Dick, Wagner W.	Capt.
Dolezel, Edward J.	Capt.
Doran, Brendan J.	Capt.
Duffield, Albert V.	Capt.
Durston, Glyn	Capt.
Dusenberry, R. K.	Capt.
Easley, Charles D.	Capt.
Easters, Robert D.	Capt.
Edwards, William H.	Capt.
Ellsaesser, Hugh W.	Capt.
Erickson, Arthur	Capt.

Ferriss, L. R., Jr.	Capt.
Flannigan, W. C.	Capt.
Floyd, Percy M., Jr.	Capt.
Ford, Oscar C.	Capt.
French, Joseph E.	Capt.
Fulcher, Kenneth M.	Capt.
Galligar, Newton R.	Capt.
Gamage, Leonard A.	Capt.
Garvin, Loyd C.	Capt.
Gervase, Edward M.	Capt.
Gonske, Walter F.	Capt.
Grisham, Leon M.	Capt.
Hamill, Estill	Capt.
Hendricks, Clyde J.	Capt.
Highley, John N.	Capt.
Hilliard, Ray L.	Capt.
Hoffman, Robert M.	Capt.
Hogan, Walton L.	Capt.
Hoglund, Glen A.	Capt.
Hull, Carl V., Jr.	Capt.
Istvan, Edwin J.	Capt.
Jackson, William C.	Capt.
Janssen, Jan W.	Capt.
Johnston, George H.	Capt.
Kaufman, Richard H.	Capt.
Keish, Frederick	Capt.
King, John R.	Capt.
Lame, Roland C.	Capt.
Lee, Harold G.	Capt.
Leenerts, Gordon J.	Capt.
Lindgren, John R.	Capt.
Lohman, Eugene A., Jr.	Capt.
Lutz, George W.	Capt.
Marr, Frederick W.	Capt.
Masters, Elmer L.	Capt.
Mays, John B., Jr.	Capt.
Mc Ausland, D. G.	Capt.
Mc Grew, Russell G.	Capt.
Mc Manmon, Leo J.	Capt.
McAndrews, Francis	Capt.
McKenny, Donald C.	Capt.
Miller, Jesse W.	Capt.
Minner, Elsworth S.	Capt.
Mitchell, Daniel B.	Capt.
Moncado, Valdo V. J.	Capt.
Moore, Donald F.	Capt.
Moran, Frederick A.	Capt.
Mortensen, Fred N.	Capt.
Nawrocki, Joseph	Capt.
Nesley, William L.	Capt.

Newton, Everette C.	Capt.
Norwood, James P.	Capt.
O'Connor, Virgil J.	Capt.
O'Neale, Malcolm L.	Capt.
Odom, Felton H.	Capt.
Papania, Ralph, Jr.	Capt.
Petersen, Nelson L.	Capt.
Planey, John A.	Capt.
Pope, Fred W.	Capt.
Porter, Vernon D.	Capt.
Powers, John F., Jr.	Capt.
Quinn, William H.	Capt.
Rankin, William H.	Capt.
Rider, William B.	Capt.
Rogers, James M.	Capt.
Rose, Bernard M.	Capt.
Sawhill, Edgar L.	Capt.
Schaffer, Louis	Capt.
Scott, George W.	Capt.
Seaman, Clarence O.	Capt.
Shay, Michael	Capt.
Shoemate, Foy L.	Capt.
Simmons, James N.	Capt.
Slater, Herschel H.	Capt.
Small, Richard D., Jr.	Capt.
Smith, David G.	Capt.
Smith, John R.	Capt.
Spohn, Clifford A.	Capt.
Steele, Ralph J.	Capt.
Steigner, John M.	Capt.
Stewart, Ronald P.	Capt.
Sullivan, Robert F.	Capt.
Suttle, Dale D.	Capt.
Svoboda, Milton J.	Capt.
Thompson, Dillard N.	Capt.
Tibbets, Oscar J.	Capt.
Titsworth, J. H., Jr.	Capt.
Tolle, Carroll K.	Capt.
Troutman, B. L., Jr.	Capt.
Walker, Templeton S.	Capt.
Wallace, Eugene D.	Capt.
Watkins, Loy E.	Capt.
Williams, Bert	Capt.
Williamson, G. A.	Capt.
Woodall, Merle P.	Capt.
Young, William B.	Capt.
Zelenka, Raymond E.	Capt.
Adams, Howard R.	1st Lt.
Aldrich, Thomas A.	1st Lt.
Anselin, Frank B.	1st Lt.

Argersinger, J. B.	1st Lt.
Bachmann, F. E., Jr.	1st Lt.
Barclay, Errol D.	1st Lt.
Barnett, James W.	1st Lt.
Barzee, Kenneth G.	1st Lt.
Brewer, Lonnie C.	1st Lt.
Brouns, Robert C.	1st Lt.
Brown, Donald	1st Lt.
Bulli, Dante E.	1st Lt.
Campbell, Norman M.	1st Lt.
Campbell, James M.	1st Lt.
Carey, George F., Jr	1st Lt.
Chiarella, James S.	1st Lt.
Collins, Richard V.	1st Lt.
Connolly, John W.	1st Lt.
Connell, Royal W.	1st Lt.
Courtney, Clyde W.	1st Lt.
Crumley, Paul M.	1st Lt.
Dill, Alvin W.	1st Lt.
Dockstader, D. B.	1st Lt.
Dodge, William L.	1st Lt.
Driskell, Claude T.	1st Lt.
Duckett, Wayne G.	1st Lt.
Dunphy, Earl F.	1st Lt.
Duval, Joseph E.	1st Lt.
Eckmann, F. C.	1st Lt.
Erbe, Robert F.	1st Lt.
Falzgraf, Bryan G.	1st Lt.
Farmer, Marion L.	1st Lt.
Ferris, Paul V., Jr.	1st Lt.
Fleischman, G. W., Jr.	1st Lt.
Foster, Clifton C.	1st Lt.
Fountain, Carl B.	1st Lt.
Gifford, William E.	1st Lt.
Gommel, William R.	1st Lt.
Goodmanson, Murel M.	1st Lt.
Green, James W.	1st Lt.
Gutekunst, C. J.	1st Lt.
Hamilton, W. M.	1st Lt.
Hardy, Claude M.	1st Lt.
Hardin, Clarence C.	1st Lt.
Hayes, Harold C.	1st Lt.
Heringlake, Charles	1st Lt.
Holley, James B.	1st Lt.
Horn, John	1st Lt.
Hovey, Harold G.	1st Lt.
Hoyle, Charles R., Jr.	1st Lt.
Hughes, Lloyd C.	1st Lt.
Hummel, Richard E.	1st Lt.
Hurt, Charles C.	1st Lt.
Jackson, Ralph F.	1st Lt.

Jackson, Frank R.	1st Lt.
Jacobsen, Raymond G.	1st Lt.
Jenkins, Woodrow W.	1st Lt.
Jerman, Charles E.	1st Lt.
Johnsen, Ralph S.	1st Lt.
Jones, James B.	1st Lt.
Kane, Robert L.	1st Lt.
Keith, Jack B.	1st Lt.
Kessler, John, Jr.	1st Lt.
Lewis, William	1st Lt.
Lutz, Reed W.	1st Lt.
Lynde, Glyndon L.	1st Lt.
Mc Glothlin W. C., Jr.	1st Lt.
McKibban, Robert V.	1st Lt.
Menzie, William R.	1st Lt.
Mikell, Emory A.	1st Lt.
Millikin, Eugene J.	1st Lt.
Mims, Hayden P.	1st Lt.
Monasee, Theodore L.	1st Lt.
Moon, Paul E.	1st Lt.
Moyle, Bennett O.	1st Lt.
Murphy, R. M., Jr.	Capt.
O'Neal, Maston A., Jr.	1st Lt.
Obryen, Kenny D.	1st Lt.
Ostman, Byron R.	1st Lt.
Pedigo, William E.	1st Lt.
Provancha, Earl D.	1st Lt.
Purdy, Douglas C.	1st Lt.
Robertson, Harold E.	1st Lt.
Rogers, Roland	1st Lt.
Saffell, John A., Jr.	1st Lt.
Schwaderer, W. E.	1st Lt.
Seaver, Owen L.	1st Lt.
Sheehan, Douglas M.	1st Lt.
Simons, John W.	1st Lt.
Simon, Bernard R.	1st Lt.
Smith, Wayne E., Jr.	1st Lt.
Stonis, Peter C.	1st Lt.
Stout, Robert A.	1st Lt.
Taylor, Frank R.	1st Lt.
Thompson, M. P., Jr.	1st Lt.
Townsend, James G.	1st Lt.
Weil, Frank P.	1st Lt.
Wells, Jack A.	1st Lt.
Wiedenmann, Neal L.	1st Lt.
Williams, James A.	1st Lt.
Wolfe, Donald J.	1st Lt.
Griffith, Robert B.	2d Lt.
Leech, Charles K.	2d Lt.
Scoville, Winston O.	2d Lt.
Weaver, Douglas C.	2d Lt.
Cuskey, Harry J.	CWO

PART II

Pilot Training, Randolph AFB

Augsburger, E. R.	1st Lt.
Bueher, G. H.	1st Lt.
Horner, Duhe C.	1st Lt.
Kehrli, Gerald V.	2d Lt.
Leach, Wayne	1st Lt.

In Graduate or Undergraduate Training

Alexander, William G.	Capt.
Bell, Jack A.	1st Lt.
Bourne, Evan F.	Lt. Col.
Bruce, Sidney C.	Major
Buck, Alvin B.	Capt.
Bundgaard, R. C.	Major
Burgner, Newton M.	Capt.
Clary, Ralph L.	Major
Comer, Hubert W.	Capt.
Cowart, Robert B.	1st Lt.
Degiacomo, Gene M.	Capt.
Dereskevitch, A. S.	Capt.
Dorsey, H. E., Jr.	Capt.
Dotson, Verl D.	Capt.
Downie, Currie S.	Capt.
Drubeck, Gene E.	Capt.
Ebelke, William H.	Capt.
Eldridge, Arthur C.	1st Lt.
Flinton, James R.	Major
Gessner, Harlan W.	Capt.
Gray, Rex M.	1st Lt.
Hemans, John G.	Major
Hill, Preston L.	Lt. Col.
Hobaugh, John H.	Major
Jamison, Marshall	Major
Johnson, George W. S.	1st Lt.
Jones, John J.	Major
Kent, Glen A.	Major
Krug, Frederick C.	1st Lt.
Loftus, Joseph F	Major
Lulejian, Norair M.	Capt.
McDaniel, H. B., Jr.	Capt.
McGiverin, Francis	Capt.
McKown, Robert E.	Capt.
Milch, Lawrence J.	Major
Miller, Forrest R.	1st Lt.
Njus, Olav	Major
Perry, Lucius A., Jr.	Major

Plattner, Milton	1st Lt.
Roberts, Donald W.	Major
Robertson, B. E.	1st Lt.
Scanlon, Thomas S.	Capt.
Seargeant, Billy M.	Capt.
Smith, James S., Jr.	1st Lt.
Templeton, H. A.	Capt.
Thaler, David	Capt.
Vann, James O.	Capt.
Wagner, Carl E.	Major
Weidler, Roy C., Jr.	Capt.
Wright, Russell E.	Capt.

Students in Service Schools

Blackledge, Roscoe B.	Major
Bogard, Wayne C.	Capt.
Clark, Buford T.	Capt.
Conrad, John J.	Major
Curtis, Ferd J.	Major
Follmer, Jacob	Major
Guiliano, Albert	Major
Hunt, Robert F., Jr.	Major
Jackson, William C.	Capt.
Lash, Robert L.	Major
Robinson, Leo H.	Major
Smith, John R.	Capt.
Spencer, Gordon A.	Capt.
Yater, Moss	Lt. Col.

Instructors in Service Schools

Bartling, W. B.	Major
Carroll, J. V.	1st Lt.
Clark, C. A., Jr.	Capt.
Clendenin, R. A.	Major
Collins, R. V.	1st Lt.
Harvey, Hubert E.	1st Lt.
Heiser, S. W.	Capt.
Houghten, R. A.	1st Lt.
Iverson, L. C.	Capt.
Jones, Dean A.	1st Lt.
Mack, Rex C.	Capt.
Martin, Fred A.	Capt.
McKenzie, Arnold	Major
Owens, T. R.	1st Lt.
Paulson, W. D.	Major
Rea, William R.	Capt.
Rhoads, D. C.	Capt.
Scales, John C.	Capt.

Shaffner, D. O.	Capt.
Taylor, Roland H.	1st Lt.
Terry, Charles M.	1st Lt.
Weigand, Fred E.	Capt.

Weather Officers Assigned to Other Commands

Aldrich, Thomas A.	1st Lt.
Browne, Charles I.	Capt.
Crowson, Delmar L.	Major
Dice, Howard G.	Capt.
Doty, Edward A.	Capt.
Easley, Samuel J.	Major
Fletcher, Joseph O.	Major
Harrison, Morgan R.	Major
Hendricks, Clyde V.	Capt.
Herring, Wilber G.	Capt.
Holzman, Benjamin G.	Col.
Kodis, John W.	Major
Laney, Dewey R.	1st Lt.
Hart, Malcolm D.	Capt.
McFall, Silver R.	Major
Newton, Dalton F.	Capt.
Neyland, Lewis J.	1st Lt.
Quinn, William H.	Capt.
Sorey, Robert L.	Major
Sykes, Robert B., Jr.	Major
Thompson, Philip D.	1st Lt.
Trakowski, Albert C.	2d Lt.
Troutman, Baldwin L.	Capt.
Tucker, John M.	Lt. Col.
Walk, William E.	Major
Worthman, Paul E.	Major

On Liaison Duty

Pope, Fred W.	Capt.
Smith, John R.	Capt.

On Foreign Missions

Ashton, Thurlo M.	Major
Roman, Maxwell W.	Lt. Col.

FAMOUS LAST WORDS

"Damn the check list, let's go!"

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35. REGULAR WARRANT OFFICER APPOINTMENTS (U)

A study of the list of officers and airmen selected for appointment to the permanent grade of Warrant Officer (JG) revealed that 238 or 11% of the total were weather forecasters. Since the Air Weather Service represents only 2.1% of the Air Force in personnel strength, it obtained over 5 times as many Warrants as could have been expected on the basis of relative strength. The relatively high qualifications of weather personnel can be drawn from the foregoing figures.

The names of those individuals selected on 15 November, 1 December, and 30 December 1948 for appointment as permanent Warrant Officers in the Weather Forecaster Career Warrant field are shown below. There were additional Warrants, in other fields, tendered to personnel assigned to the Air Weather Service, but only those appointed as weather forecasters are shown. The 238 Forecaster Warrants were distributed as follows:

Officers	123
Warrant Officers	37
Airmen	78
	238

Abrahamson, Karl A.	M/Sgt
Accola, Jacob P.	Capt.
Adelman, Frederick J.	1st Lt.
Alexander, Harold S.	1st Lt.
Anderson, Charles K.	Capt.
Anderson, H. B., Jr.	M/Sgt
Anderson, John B.	T/Sgt
Angus, Frank C.	Major
Asplund, Stanley E.	Capt.
Bagwell, Cline J.	T/Sgt
Bailey, Felix R.	Capt.
Beck, Robert E.	1st Lt.
Bennett, Wayne E.	1st Lt.
Benton, Orien	WOJG
Bernstein, Harold F.	M/Sgt
Bingham, George F.	1st Lt.
Bird, Joseph M.	Major
Blain, John S., Jr.	Capt.
Boucher, Philip T.	M/Sgt
Bowers, Warren J.	CWO
Breske, Charles	M/Sgt
Brown, James W.	Capt.
Buckley, Edward A.	WOJG
Buckley, Raynor L.	CWO
Buntyn, James R.	Major
Burkhart, James M.	1st Lt.
Buss, Elmer L.	Capt.

Byrn, John S.	1st Lt.
Calvesbert, R. J.	Capt.
Cappelletti, A. J.	Capt.
Carney, John W.	M/Sgt
Castle, Walter D.	Capt.
Caukin, Emory J.	M/Sgt
Chapman, Hugh C.	2d Lt.
Cody, Thomas P.	Capt.
Coleman, James K.	M/Sgt
Cores, Homer P.	M/Sgt
Cox, Norman C.	1st Lt.
Craig, Robert P	1st Lt.
Crews, John P.	CWO
Crowder, Max L.	M/Sgt
Cuddeback, T. A.	M/Sgt
Cummings, S. C.	1st Lt.
Cushman, Charles S.	WOJG
Daleke, Clarence G.	Capt.
Daniel, Orville H.	1st Lt.
Davis, Herbert W.	Major
De Lorenzo, Claude A.	Capt.
Dean, Gernard D.	1st Lt.
Descamps, V. J.	Capt.
Dickson, Robert A.	Major
Doeker, Robert B.	Capt.
Duker, Orlo F.	Capt.
Durbin, Robert F.	Capt.
Eckrem, Sofus P.	1st Lt.
Eddleman, David J.	Capt.
Eichelberger, R. E.	M/Sgt
Emerson, Robert L.	M/Sgt
Englander, Daniel L.	1st Lt.
Evans, Raymond F.	T/Sgt
Everson, Clarence E.	Capt.
Fagan, Edward T.	T/Sgt
Fager, Howard L.	M/Sgt
Farr, Robert E.	WOJG
Fife, Isaac C., Jr.	M/Sgt
Fine, W. E., Jr.	WOJG
Finley, William A.	1st Lt.
Finnicum, F. P.	CWO
Fisher, Robert L.	CWO
Foard, Jack D.	1st Lt.
Foote, Richard H.	1st Lt.
Frohman, Atwell C.	2d Lt.
Gallier, Frank W.	T/Sgt
Gamble, Joseph G.	Capt.
Garrison, William H.	M/Sgt
Gates, Leslie C.	Capt.
Gatrell, Albert S.	M/Sgt
Gay, Earl M.	CWO

Gayikian, Nyko	CWO
Glasgow, John C.	Capt.
Goodale, Earl S.	T/Sgt
Grenard, Harold E.	2d Lt.
Grisham, David H.	1st Lt.
Guidry, Willie P.	S/Sgt
Gustafson, Donald H.	M/Sgt
Guth, Harold F.	CWO
Guy, George A., Jr.	Capt.
Hahn, Vernon H.	1st Lt.
Hall, Benny B.	1st Lt.
Hambleton, John S.	M/Sgt
Harding, Warren G.	Capt.
Harris, Richard W.	1st Lt.
Harris, Russell G.	WOJG
Harrison, Charles H.	Capt.
Havens, John W.	M/Sgt
Hayes, Jimmy P.	M/Sgt
Hays, Ralph M.	1st Lt.
Hebel, George J.	Capt.
Heckroth, Lewis C.	1st Lt.
Hershberger, M. L.	M/Sgt
Hess, Neal A.	Major
Hilgeford, C. F.	Capt.
Hilmo, Arthur B.	Major
Hoeltzle, Martin E.	T/Sgt
Hoffman, Harry H.	T/Sgt
Hofmann, Bernard C.	M/Sgt
Holt, Elmer J.	S/Sgt
Holtzscheiter, E. W.	1st Lt.
Hoover, Embert J.	M/Sgt
Houston, Ben H.	WOJG
Howes, Lewis L.	1st Lt.
Hulse, Dennis E.	1st Lt.
Hunt, William J.	M/Sgt
Hurst, Vern W.	M/Sgt
Hybskmann, H. E.	M/Sgt
Jack, James H.	Capt.
Jackson, Charles G.	Capt.
Jafferis, Ted C.	M/Sgt
Jenkins, Victor	M/Sgt
Jennings, Thad F.	T/Sgt
Jenrette, James P.	M/Sgt
Jensen, Clayton E.	Capt.
Jess, Edward O.	Capt.
Johnston, Robert D.	Major
Jones, Morgan V.	WOJG
Jones, Murray O.	1st Lt.
Justen, Eugene, Jr.	1st Lt.
Kapral, John A.	1st Lt.

Keast, Dale T.	WOJG
Kimball, Stanley J.	1st Lt.
Krones, Frank J.	M/Sgt
Kunz, William E.	Major
Kutz, Herman A., Jr.	CWO
Lake, Robert J.	1st Lt.
Lees, William H.	M/Sgt
Leichel, Fred H. J.	Capt.
Lindhe, Robert A.	WOJG
Livingston, N. B., Jr.	M/Sgt
Long, James D.	M/Sgt
Love, John O. U., Jr.	2d Lt.
Lucas, Willus M.	M/Sgt
Magilavy, David	CWO
Markham, Charles G.	1st Lt.
Marks, Frank P.	WOJG
Marsh, William A.	2d Lt.
Maugans, William R.	1st Lt.
McAnally, Paul E.	Capt.
McClaren, James L.	S/Sgt
McCorkle, Robert A.	M/Sgt
McCreedy, James E.	M/Sgt
McFarland, Archie M.	Major
McFee, Grant H.	M/Sgt
McGaughey, D. K.	1st Lt.
McIntyre, Harry D.	Capt.
McNeil, Howard G.	S/Sgt
McWhorter, Clyde C.	CWO
Meserve, Joseph M.	T/Sgt
Miller, Richard H.	CWO
Miller, Walter E.	1st Lt.
Miloglav, N. P.	1st Lt.
Mleziva, Matt L.	WOJG
Momberg, Clifton K.	M/Sgt
Morgan, David A.	M/Sgt
Morgan, De Witt N.	Major
Moss, Glenn M.	WOJG
Moxon, George W.	Major
Moyer, Daryl B.	Capt.
Muffley, Oscar L.	1st Lt.
Neeley, Robert F.	Capt.
Nibeck, Richard L.	T/Sgt
Nolte, Glen G.	1st Lt.
Norman, Frederick J.	1st Lt.
Palmero, Gabriel	1st Lt.
Pedersen, Harry P.	Capt.
Pennypacker, W. H.	CWO
Perkins, W. S., Jr.	M/Sgt
Petersen, Harold C.	WOJG
Pfeiffer, Edward G.	1st Lt.
Pitruzzello, Lewis A.	Capt.

Platz, Gerhardt H.	Capt.
Poole, Frank M.	M/Sgt
Porter, Bruce L.	M/Sgt
Pritz, Stephen J.	M/Sgt
Putnam, Edgar W.	Capt.
Radcliffe, John B., Jr.	1st Lt.
Rauktis, Dominic, Jr.	WOJG
Riedel, Robert K.	T/Sgt
Ritter, Alfred D.	1st Lt.
Robb, James W.	T/Sgt
Rogers, Dan T.	1st Lt.
Rose, Franklin D.	CWO
Rushing, Alford L.	WOJG
Sanders, Walter W.	1st Lt.
Savage, Irval E., Jr.	M/Sgt
Sayre, Leo V.	1st Lt.
Schaeffer, James R.	M/Sgt
Scheppe, Leonard R.	T/Sgt
Scott, Keil B.	1st Lt.
Seekins, Ross C.	Capt.
Seger, Raymond A.	M/Sgt
Serowski, Richard	M/Sgt
Silk, Henry W., Jr.	Capt.
Smail, Paul M.	Capt.
Smith, Burtis D.	T/Sgt
Smith, Joseph B.	Major
Smith, Kenneth W.	Capt.
Smith, Lloyd D.	2d Lt.
Smith, Robert E.	1st Lt.
Snider, Arlin	M/Sgt
Stanley, Richard H.	M/Sgt
Stella, Angelo C.	1st Lt.
Stempson, Leo J.	WOJG
Sunderland, W. E.	T/Sgt
Talbot, C. P., Jr.	Capt.
Thrasher, Dennis D.	M/Sgt
Townsend, Elbert T.	S/Sgt
Toyli, Matthew	M/Sgt
Treat, Jay T.	Major
Vanderman, Lloyd W.	Capt.
Vaughn, Charles G.	Major
Venable, Benton R.	M/Sgt
Vetter, Arthur F.	Capt.
Vivino, Arthur R.	Capt.
Voss, Julian M.	WOJG
Wallace, Ralph G.	1st Lt.
Walker, James W.	Capt.
Ward, Raymond H.	CWO
Wayland, Wilfred L.	CWO
Welker, Kenneth P.	M/Sgt
Weston, Andrew W.	WOJG

Wheeler, Rodney S.	1st Lt.
Williams, Scott L.	M/Sgt
Willis, Harold R.	2d Lt.
Wilson, Ernest W.	M/Sgt
Wise, Charles W.	CWO
Wood, John P.	CWO
Woodworth, W. C.	Capt.
Zapinski, Leonard E.	M/Sgt