

R E S T R I C T E D

WEATHER FLYING IN THE TROPICS

F O R E W O R D

This is the "Good Weather" route.

The statements and suggestions made in this paper pertain specifically to weather conditions and weather aids and facilities along the Air Transport Command route from Florida through Puerto Rico, Trinidad, the Guianas and Northern Brazil to Natal. It is written to give a pilot flying this route for the first time, a general preview of the weather which he may encounter along this route. It will be divided into three sections. 1) A general description of Caribbean and Tropical weather and how it is similar to and in what respects it differs from the weather already familiar to the pilot. It will describe weather normally encountered and will also describe the infrequent occasions when the weather is more active than normal. 2) A few general rules that may be followed to make flying in the tropics the safest and easiest flying, so far as weather is concerned, in the world. 3) A description of the weather facilities which are available and how they may be used to greatest advantage.

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SECTION I

CARIBBEAN AND NORTHERN SOUTH AMERICAN WEATHER:

Average Weather

Cumulus is the "theme" in cloud types in the Caribbean Area. All cloud types are present at various times, but Cumulus is nearly always the predominating, if not the only type seen on a given flight. These clouds are similar in appearance and are formed in the same manner as the summertime cumulus in the States - the Texas and Florida cumulus. Normally, over the water, these clouds are scattered to broken in extent or bands of these clouds may be interspersed with perfectly clear areas. Bases are usually 2000 to 3000 ft and tops generally vary thru an average 6-7000 ft to occasionally 8-10,000 ft or more. In the Caribbean area and normally in the Northern part of South America, whenever cumulus clouds extend above 8000 ft they are isolated cumulus or cumulo-nimbus clouds and may be avoided by a very slight deviation from the flight path.

The activity and turbulence in these cumulus clouds is considerably less than that of a similar appearing cumulus build up in the States. For example, unnecessarily flying thru isolated cumulus clouds is certainly not recommended, but actual flight thru typical Caribbean cumulus clouds (tops under 10,000 ft) usually gives only bumpiness or light turbulence.

The air in the tropics, of course, is quite moist from its long path over warm water. It seems "easy" for clouds to form. The trade winds rising over the mountains of the islands cause clouds to form. In the daytime, heating of the ground by the sun adds to this effect, causes convective air currents to start, clouds to form and often, by early afternoon, scattered showers to occur over the island. Afternoon scattered shower activity is a very typical tropical weather characteristic.

In the Guianas-Amazon area, the foregoing principles apply, and in addition, stratus forms of clouds are more frequently seen. Very frequently for a few of the early morning hours a low stratus cloud forms and seems to hang over the jungle tree tops. This lifts and disappears with daytime heating.

The daily heating effect becomes a very important one in these regions and the amount and height of the clouds varies with the time of day. Time and again, reports from Airlines and Army pilots show a complete absence of clouds over a given area at night and over the same area the following day broken cumulus buildups with scattered tops to 10-12000 ft or higher. Even in the day time, however, these cloud tops are nearly always avoidable at normal flight altitudes around 9-11000 ft.

In the Guianas-Amazon area, there are often considerable areas of stratiform clouds at various altitudes and sometimes a good portion of the sky is covered with clouds of one type or another. Usually under these conditions pilots who have flown the area several times will not attempt to dodge each

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cloud area, but will go on instruments for short periods avoiding any large, towering individual cumulus which are easily discernable.

East of the Guianas-Amazon area, the amount of cloudiness normally falls off again toward Natal and scattered shower and isolated cumulonimbus areas become the prevailing weather type. Toward Natal, the weather becomes a little more seasonal in character and except for a short rainy season is a very dry and an exceptionally good flying weather area.

Non-Average Weather

Many times the weather is less than the average picture described previously. There are no scattered showers along the route or at the terminals. Even in the Guianas-Amazon area the afternoon showers may be very light and widely scattered.

On very rare occasions, however, the weather may be worse than that described above. A cold front may pass from the States into the area between Florida and Puerto Rico. These fronts usually dissipate rapidly in passing over Florida and into the Caribbean. They may kick up a line of broken to nearly solid cumulus up to 10-12000 ft. Usually it is less. Rarely it is higher. In the daytime or on moonlit nights breaks may usually be found in this line of clouds and rarely more than 20-30 minutes of instrument flying is necessary. Fronts moving into this area are watched closely and the amount and height of cloudiness are foretold accurately.

In the Guianas-Amazon area, on rare occasions, cloudiness may become quite general and solid over a given area. When such an exceptional condition does prevail, cloud tops may go very high, the area may be widespread to the extent it cannot be avoided by altering course and it may produce moderate to heavy rain. The amount of turbulence when flying instruments in such conditions is slight bumpiness to occasionally mild or moderate. Reported cases of severe turbulence in heavy rain or solid cloud areas (in contrast to avoidable, individual towering cumulus) are very few. Airlines pilots with several years of experience in that area, flying at altitudes varying from 1000-11,000 ft. report at most, moderate turbulence.

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SECTION II

FLYING THE WEATHER:

Really, for 95% of the time, a discussion of how to fly the weather in the tropics is superfluous. It is as good weather as you have ever flown in - if you don't mind seeing a few harmless cumulus floating around under you. To prepare you for any possible circumstance, a few suggestions are given.

It is quite possible that a shower may be in progress at your terminal at time of arrival. If such is the case, contact the tower for advice. Normally you will circle for a few minutes (seldom over 20) and make a contact landing. In the shower reduced visibility, ceiling and probability of a shower crosswind are hazards. Where feasible, circle upwind (usually east) of the field and follow the shower as it moves off to the west.

Individual broken cumulus projecting above your flight path may be avoided or flown through. Avoid any large, individual towering cumulus, but don't alter your course for more than 10 minutes in an attempt to go around. Many airlines pilots do not bother to avoid each little cloud top, conceivably of a reluctance to relieve "Iron Mike" of the job he's doing. Many times cloud top "clipping" or "hedge-hopping" can be avoided by going up 2000 ft. to the next higher flight altitude.

If, instead of individual broken cumulus, you should encounter an area of solid buildup which you see you cannot readily avoid by changing altitude or circumnavigating, here are some "don'ts" and "do's" to follow:

1) Don't change your altitude upward. If you can't get over it at 11,000 ft or 13,000 ft, it is a dollar to a dime you can't get over it at 20,000 ft and you would find more turbulence there than at your original flight altitude.

2) Don't try to go around it. At the very most, don't go more than 10 minutes, maximum, in either direction to try to find a hole.

3) Don't let an area of clouds - that an airlines pilot wouldn't blink at and you wouldn't either on your second trip - get you upset.

4) Do plan a course of action.

5) You may -

go through on instruments, on course, at your normal flight altitude. Not much can go wrong. If you encounter heavy rain, watch your cylinder head temperatures. Be on the lookout for possible carburetor icing. Relax. You'll be enjoying a good Brazilian cigar in an hour or two!

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6) You may -

If you know the terrain permits, descend to a low, safe (know your terrain) altitude. At 1000 or 3000 ft. you will not encounter more than mild turbulence. Again, in heavy rain watch cylinder head temperature and possibility of carburetor ice.

7) You may -

If, in your judgment, the situation warrants, return to the nearest or most desirable alternate airport. Nearly always a safe maneuver.

In summary, don't climb, stick to your course and you can't go wrong.

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SECTION III

THE WEATHER SERVICE AND FACILITIES YOU HAVE AVAILABLE IN THIS AREA:

You might as well know about these before you start. You will be provided with the highest quality forecasts obtainable.

When you leave Florida you will be able to receive the following weather reports at scheduled times:

a. In-the-clear voice reports on 4220 Kcs and on radio range frequencies which you can hear on your command set, also your radio operator can hear these on his liaison set.

b. Coded CW broadcasts between Waller Field, Trinidad and Natal, Brazil which your radio operator only can hear on his liaison set.

(These scheduled weather reports will obviate, in all cases except emergency, the necessity of requesting weather by CW).

On 4220 Kcs, your position reporting frequency, you can hear in-the-clear weather reports for all important air fields along the route to your destination.

The success of the voice weather broadcasts, since they are given on 4220, depends on non-interference at the times of the broadcasts, which are :10 to :17 after the hour (1 minute for each report). Therefore, it is requested that each pilot exercise special care not to make position reports during the period :10 to :17 after the hour. Your use of 4220 (and forcing the ground station to use it for reply) will surely cut some pilot out of just the weather he was trying to get. By anticipating check points a few minutes before :10 after or by waiting until :17 after, a good weather broadcast will result. On radio range frequency you can hear in-the-clear weather reports by tuning in to the desired radio range station which at :05 and :35 minutes after the hour will send its own and an alternate field's weather in the clear.

The times of the different weather broadcasts are staggered so that if you miss reports by one means you can usually get them by another.

It is recommended that each pilot try to copy on his command set as many of the weather broadcasts as possible - to get his ear tuned to the sequence of the broadcast as well as to keep tab on weather at alternates along the route. Similarly, the radio operator, who has not a lot to do most of the time, should be requested to copy as many CW broadcasts as possible as well as help you get in-the-clear voice 4220 and radio range reports on his liaison set which has long range reception due to his long trailing antenna. On the first hop, besides providing the terminal weather, it will get him accustomed to the form of the broadcast, for future use in copying weather on subsequent legs of your trip.

A fourth method of obtaining weather (from Waller Field south) is by direct contact with two weather ships. You will get detailed information

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on how to contact these ships at your next stop. Briefly, it is often possible for your radio operator to get first hand reports of the weather you will be flying a few minutes later and in some cases it will be possible for you to talk directly over your command set to the pilot of the airlines ship. He will give you a first hand, informal account of the weather and answer any questions. Weather forecasters are aboard both the airlines and the regular weather ships.

✓ One of the mainstays of weather forecasting in this area, where surface reports are few and far between, is the three dimensional weather report of the pilot. The forecast you receive will be based, in addition to the surface and synoptic map, on pilot's reports.

✓ In turn, you may help following pilots to have the most accurate possible weather picture by taking careful observations aboard your plane. You will be provided with a form for this purpose. What the weather people want is the same thing you want as a pilot. Just give a complete accurate picture of the weather you see. If you wish, instead of the form, you may sketch in the weather on the surface map or on the vertical cross section. Tell in your own words what you see. Particularly of value are AMOUNT, estimated BASES and TOPS of clouds; cloudiness over land compared to that over water; heights of haze layers and sharpness; shower areas; visibility; instrument time and turbulence. These reports will be appreciated by the forecaster at your destination and he will immediately distribute them to all interested weather offices.

Army Weather wishes you Cumulus Humilis (clouds of fair weather), a good trip and the best of luck!

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