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DATE: 6/18/76



# ADVISORY CIRCULAR

## DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

**SUBJECT:** SEVERE WEATHER AVOIDANCE

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1. **PURPOSE.** This Advisory Circular (1) warns all pilots concerning flight in the vicinity of known or forecasted severe weather such as thunderstorm activity, severe turbulence and hail and (2) advises all pilots that air traffic control facilities (air route traffic control centers, control towers, approach control facilities, etc.), even though equipped with radar, might not always have the capability nor be in a position to provide assistance for circumnavigation of areas of severe weather.
2. **CANCELLATION.** This Advisory Circular cancels and supercedes Advisory Circular 90-12A dated 21 February 1973.
3. **DISCUSSION.** The need for exercising prudent judgment with regard to flight through areas of known or forecast severe weather is well recognized by experienced airmen. Flight through severe weather activity should be avoided if possible.

Present procedures provide for controllers assisting pilots, particularly when operating on IFR flight plans, in avoiding areas of known severe weather. It is important, however, that all parties concerned with aircraft flight operations be fully aware that there are, at times, limitations to an air traffic controller's capability to provide such assistance. There are several reasons for this. First, it should be recognized that the controller's primary responsibility is the provision of safe separation between aircraft. No additional services can be provided which will derogate performance of a controller's primary responsibility. Secondly, limitations of ATC radar equipment, communications congestion, other air traffic, etc., may also reduce the controller's capability to provide any additional services.

To a large degree, the assistance that might be rendered by ATC will depend upon the weather information available to controllers or the request by pilots desiring to avoid severe weather areas. Due to the

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extremely transitory nature of severe weather situations, information available to controllers might be of only limited value unless frequently updated by pilot reports or radar weather information. In-flight reports from pilots in direct communications with controllers giving specific information as to area affected, altitudes, intensity and nature of severe weather can be of considerable value. Such reports, when received by controllers, should be relayed to other aircraft as appropriate.

Should a pilot desire to avoid a severe weather situation along his route, he should request such deviation from route/altitude as far in advance as possible, including information as to the extent of deviation desired.

Obtaining IFR clearance to circumnavigate severe weather can often be accommodated more readily in the enroute areas away from terminals because there is usually less congestion and, therefore, greater freedom of action. In terminal areas, the problem is more acute because of traffic density, ATC coordination requirements, complex departure and arrival routes, adjacent airports, etc. As a consequence, controllers are less likely to be able to accommodate all requests for weather detours in a terminal area or be in a position to volunteer such routes to the pilot. Nevertheless, pilots should not hesitate to advise controllers of any observed severe weather and should specifically advise controllers if they desire circumnavigation of observed weather.

4. WEATHER PHENOMENON AS OBSERVED ON RADAR. It must be recognized that those weather echoes observed on radar (airborne or ground) are a direct result of precipitation. **RADAR DOES NOT DISPLAY TURBULENCE.** It is acknowledged that turbulence is generally associated with heavy areas of precipitation; however, the radar used for air traffic control purposes are not capable of equally displaying precipitation information. Under certain conditions, in the past, echoes received from precipitation rendered ATC radar unusable. To avoid such disruption to radar service, modifications designed to considerably reduce precipitation clutter were added to ATC radar systems. This feature, known as Circular Polarization (CP), eliminates all but the heaviest areas of precipitation. Terminal radar systems use this feature as necessary to reduce precipitation clutter during moderate to heavy rain or snow. Moderate to heavy precipitation areas appear on the radar scope as white areas - something like "snow" on your TV, only brighter.

Centers normally use CP only when the radar data processing computer is inoperative. When this occurs, a secondary radar system (Air Traffic Radar Beacon System) is used along with primary surveillance radar. This combination is normally used at the lower altitudes where positive control

airspace is not applicable. Aircraft operating in positive control airspace are required to be equipped with operating radar beacon transponders and controllers handling such traffic normally utilize only the secondary radar system. These secondary ATC radar systems receive only those signals emitted by airborne radar beacon transponders and do not display weather echoes. Additionally, this permits filtering out non-pertinent traffic operating below the positive control areas. Though controllers using only secondary radar will not observe weather on their scopes, they can if alerted, often turn on the normal radar to observe weather, provided this will not result in weather clutter rendering the scope unusable for traffic control.

Air Route Traffic Control Centers normally operate in the radar data processing mode. In this configuration, the computers process radar returns and display them on the controller's scope as symbols or alphanumeric characters. This computer also analyzes radar returns from precipitation areas in degrees of intensity. It then displays the area of precipitation on the radar scope as a series of parallel or slightly diverging lines if the precipitation is light or as a series of the capital letter H if it is heavy. For this function, light precipitation has been classified as a precipitation fall of less than 5 but more than 1 inch per hour. Heavy precipitation is classified as 5 or more inches per hour. This system capability enables the controller to recognize variations in the intensity of precipitation without rendering the ATC radar unusable.

In accordance with current procedures, controllers will provide information concerning severe weather echoes observed on their radar when deemed advisable and will, upon pilot request, suggest vectors for avoidance whenever circumstances will permit. However, for the reasons outlined above, it is emphasized that pilots should not completely rely on air traffic controllers to provide this service at all times, particularly in terminal areas or in holding patterns. Pilots should also recognize that the controller's data are often far from complete due to the design of the radar and its location relative to the weather observed.

5. RECOMMENDED ACTIONS FOR PILOTS.

- a. Avoidance of Known Severe Weather -- Recent research has proven beyond any doubt that all thunderstorms are potentially dangerous and should be avoided if possible or penetrated only when the pilot has no other choice.
- b. Forward reports to ATC of any severe weather encountered giving nature, location, route, altitude and intensity. Pilots are also reminded to review Federal Air Regulation 91.125 pertaining to pilot reports.

6/18/76

- c. Initiate requests to avoid severe weather activity as soon as possible being specific concerning route and altitude desired. Pilots are reminded to review the Airman's Information Manual pertaining to "Detouring Thunderstorms" and "Weather."
- d. Adjust speed as necessary to maintain adequate control of aircraft in turbulent air and advise ATC as soon as possible.
- e. Do not rely completely on air traffic controllers to provide information or to initiate radar vectors to aircraft for avoidance of severe weather, particularly when arriving and departing terminals or in holding patterns.
- f. Plan ahead to anticipate the need for avoiding areas of known severe weather. If necessary, delay take-off or landing, as applicable.

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