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800 INDEPENDENCE
WASHINGTON, DC

AC NO: 90-48
DATE: 3/20/70

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

SUBJECT: PILOTS' ROLE IN COLLISION AVOIDANCE

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1. **PURPOSE.** This circular is issued to ALERT all pilots to the MIDAIR COLLISION and NEAR MIDAIR COLLISION HAZARD and to emphasize those basic problem areas of concern, as related to the human causal factors, where improvements in pilot education, operating practices, procedures and techniques are needed to reduce midair conflicts.

 2. **BACKGROUND.**
 - a. The FAA, in cooperation with the aviation industry, recently completed a special study of the 2,230 near midair collisions (NMACs) which were reported to the FAA during calendar year 1968. The classification and analysis of these incidents by a special FAA Study Group resulted in about one-half (1,128) of these reports being classified as hazardous to flight. The National Transportation Safety Board (NTSB) also recently completed a special study of the 38 midair collisions (MACs) in U. S. civil aviation which occurred during 1968.

 - b. A 20-point program of remedial actions to cope with the NMAC problem was recommended by the FAA Study Group in its "Near Midair Collision Report of 1968." The NTSB study "Midair Collisions in U. S. Civil Aviation - 1968" contains a number of recommendations toward the prevention of midair collision accidents addressed to pilots and other elements of the aviation community, as well as 14 additional recommended measures addressed to the FAA.

 - c. The FAA has in progress significant programs, related to many of the recommendations, designed to reducing the potential for mid-air and near midair collisions through improving various elements of the National Airspace System. Those recommendations pertaining to improvements needed on the part of pilots operating in the National Airspace System, to which this circular is directed,
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necessitates the cooperative effort of all pilots to recognize those basic human factors found during the studies as having caused or contributed to midair conflicts.

3. ACTION. The following areas warrant special attention and continuing action on the part of all pilots to avoid the possibility of their becoming involved in midair conflicts.

a. "See and be Seen" Concept.

- (1) The flight rules prescribed in Part 91 of the Federal Aviation Regulations set forth the concept of "See and be Seen." This concept requires that vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft when weather conditions permit REGARDLESS of whether an operation is conducted under Instrument Flight Rules (IFR) or Visual Flight Rules (VFR).
- (2) Pilots must always keep in mind their responsibility for continuously maintaining a vigilant lookout regardless of the type of aircraft being flown or whether operating on an IFR flight plan or under VFR flight rules. Remember that most MAC accidents and reported NMAC incidents occurred during good VFR weather conditions and during the hours of daylight.

b. Visual Scanning.

- (1) Pilots must look out in all directions and periodically scan the entire visual field. Remember that the performance capabilities of many aircraft, in both speed and rates of climb/descent, result in high closure rates limiting the time available for detection, decision and evasive action.
- (2) The most effective technique for daylight visual scanning is for the pilot to systematically sweep his eyes over the entire visible region and to increase his visual field by supporting head movements. Any intruder or movement will be readily detected in this way.
- (3) Visual search at night depends almost entirely on peripheral vision. In order to perceive a very dim light in a certain direction, the pilot must not look directly in this direction but scan the area adjacent to it. Short stops of a few seconds will help him to detect the light.
- (4) Lack of brightness and color contrast in daytime and conflicting ground lights at night increase the difficulty of detecting other aircraft.

c. Clearing Procedures.

- (1) In many instances, the pilot's view of the surrounding airspace is restricted by the inherent design and flight attitude of the aircraft. Use of clearing procedures to compensate for such restrictions will greatly enhance the safety of flight.
- (2) Pilots should:
 - (a) Prior to taxiing onto a runway or landing area for takeoff, scan the approach areas for possible landing traffic by maneuvering the aircraft to provide a clear view of such areas.
 - (b) During climbs and descents in flight conditions which permit visual detection of other traffic, execute gentle banks left and right at a frequency which permits continuous visual scanning of the airspace about them.
 - (c) When operating under visual flight rules during climb or descent, fly to the right side of the radial forming the airway in order to avoid IFR and VFR cruising traffic operating along the centerline of the airway radial.
 - (d) Execute appropriate clearing procedures preceding all turns, abnormal maneuvers or acrobatics.

d. Airspace, Flight Rules and Operational Environment.

- (1) Pilots must be aware of the type of airspace in which they intend to operate in order to comply with the flight rules applicable therein. Aeronautical information concerning the National Airspace System is disseminated by three methods. The primary method is aeronautical charts. The second method is the Airman's Information Manual (AIM), and the third is the National Notice to Airman System. The general operating and flight rules governing the operation of aircraft within the United States are contained in Part 91 of the Federal Aviation Regulations (FAR 91).
- (2) Pilots should:
 - (a) Use currently effective aeronautical charts for the route or area in which they intend to operate.
 - (b) Note and understand the aeronautical legend and chart symbols related to airspace information depicted on aeronautical charts.

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- (c) Develop a working knowledge of the various airspace segments, including the vertical and horizontal boundaries.
 - (d) Develop a working knowledge of the specific flight rules (FAR 91) governing operation of aircraft within the various airspace segments.
 - (e) Use the Airman's Information Manual (Part 1 describes the airspace segments and the basic pilot responsibilities for operating in such airspace).
 - (f) Contact the nearest FAA Flight Service Station for any pertinent NOTAMs pertaining to their area of operation.
- (3) Pilots should also be familiar with, and exercise caution in, those operational environments where they may expect to find a high volume of traffic or special types of aircraft operations. These environments include airport traffic patterns, particularly at airports without a control tower; airport traffic areas (below 2,000 feet above the surface within five statute miles of an airport with an operating control tower); control zones, including any extensions; Federal airways; vicinity of VORs; restricted areas; warning areas; alert areas; intensive student jet training areas; military low-level high-speed training routes; instrument approach areas; and areas of high density jet arrival/departure routings, especially in the vicinity of major terminals and military bases.
- e. Use of Communications Equipment and Air Traffic Advisory Services.
- (1) One of the major factors found, during the FAA NMAC study as contributing to the likelihood of an NMAC incident, was the mix of known arriving and departing aircraft with UNKNOWN traffic in terminal areas with an operating control tower. The known aircraft were in radio contact with some function of the tower (local, approach or departure control) and the other aircraft were not in two-way radio contact and unknown to the tower at the time of the NMAC. This precluded the tower from issuing traffic advisory information to either aircraft.
 - (2) The study further revealed that the most susceptible airspace of a terminal area with a control tower for an NMAC to occur is within a ten-mile radius of an airport, and at or below 3,500 feet above ground level (AGL). The second segment of terminal airspace where the same situation exists is between ten miles to 30 miles from the airport with the large majority occurring below 7,000 AGL. Nearly 50 percent of the terminal incidents within 30 miles of an airport with a control tower

involved at least one of the aircraft either approaching the airport in descent, or in a climb on departure, encountering the other aircraft in level flight.

- (3) In the majority of cases, there was no requirement for the UNKNOWN VFR aircraft to be in contact with any function of the tower. However, many NMACs occurred where VFR aircraft were operating en route through airport traffic areas (below 2,000 feet AGL within a five-mile radius of an airport with an operating control tower) without prior authorizations or communications with the tower as required by regulations.
- (4) Although pilots must adhere to the necessary communications requirements when operating VFR, they are also urged to take advantage of the air traffic advisory services available to VFR aircraft.
- (5) Pilots should:
 - (a) Use the Airman's Information Manual.
 - 1 Part 1 contains a section dealing with services available to pilots, including information on VFR advisory services, radar traffic information services for VFR pilots, and recommended traffic advisory practices at nontower airports.
 - 2 Part 3 (Airport/Facility Directory) contains a list of all major airports showing the services available to pilots and the applicable communication frequencies.
 - (b) Develop a working knowledge of those facilities providing traffic advisory services and the area in which they give these services.
 - (c) Initiate radio contact with the appropriate terminal radar or nonradar facility when operating within the perimeters of the advertised service areas or within 15 miles of the facility when no service area is specified.
 - (d) When it is not practical to initiate radio contact for traffic information, at least monitor the appropriate facility communication frequency, particularly when operating in or through arrival/departure routes and instrument approach areas.
 - (e) Remember that many factors, such as limitations of the radar, volume of traffic, controller workload and other traffic unknown to the controller, may prevent the

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controller from providing traffic advisory information service on possible conflicting traffic.

f. Airport Traffic Patterns.

- (1) Special emphasis must be given toward reducing the relatively large numbers of MACs and NMACs which occur in airport traffic patterns. During 1968, more than 50 percent of the MAC accidents occurred in the traffic pattern with the large majority at airports without a control tower. Eighty-four percent of the hazardous NMACs at nontower airports occurred in the traffic pattern and 30 percent of the 621 hazardous NMACs at airports with a tower occurred in the traffic pattern. Both MACs and NMACs occurred in all components of the traffic pattern, including arriving and departing the pattern. However, most occurred beginning on the downwind leg and progressing in numbers from the base leg and final approach up to the point of flareout for landing.
- (2) Pilots should:
 - (a) When operating at tower-controlled airports, maintain two-way radio contact with the tower within the airport traffic area. Make every effort to see and properly avoid any aircraft pointed out by the tower or any other aircraft which may be in the area and unknown to the tower.
 - (b) When entering a known traffic pattern at a nontower airport, keep a sharp lookout for other aircraft in the pattern. Enter the pattern in level flight and allow plenty of spacing to avoid overtaking or cutting any aircraft out of the pattern.
 - (c) When approaching an unfamiliar airport fly over or circle the airport at least 500 feet above traffic pattern altitude (usually at 2,000 feet or more above the surface), to observe the airport layout, any local traffic in the area, and the wind and traffic direction indicators. Never descend into the traffic pattern from above.
 - (d) Be particularly alert before turning to the base leg, final approach course and during the final approach to landing. At nontower airports, avoid entering the traffic pattern on the base leg or from a straight-in approach to the landing runway.
 - (e) Compensate for blind spots due to aircraft design and flight attitude by moving head and maneuvering the aircraft.

g. Flying in Pairs or in Formation.

- (1) Generally, the midair collisions that occurred away from an airport during 1968, involved two aircraft on the same mission with each pilot aware of the others presence, yet they flew into each other. Examples of these were: A pair of ferry pilots, a pair herding horses, a pair spotting fish, a pair of aerial applicators spraying, a pair endeavoring to fly formation beyond their skill and a pair flying formation while under the influence of alcohol.
- (2) Pilots who are required by the nature of their operations to fly in pairs or in formation are cautioned to:
 - (a) Recognize the high statistical probability of their involvement in midair collisions.
 - (b) Make sure that adequate preflight preparations are made and the procedures to be followed are understood by all pilots intending to participate in the mission.
 - (c) Always keep the other aircraft in sight despite possible distraction and preoccupation with other mission requirements.
 - (d) Avoid attempting formation flight without having obtained instruction and attained the skill necessary for conducting such operations.

h. Flight Instructors and Pilot Examiners.

- (1) The role played by flight instructors in preparing pilot applicants for any certificate or rating to conduct flight operations in today's increasing air traffic environment with maximum attention to collision avoidance cannot be overemphasized.
- (2) Flight instructors must set an example in carefully observing all regulations and recognized safety practices since their students will consciously or unconsciously imitate the flying habits of their instructors.
- (3) Flight instructors should:
 - (a) Guard against preoccupation during flight instruction to the exclusion of maintaining a constant vigilance for other traffic. Remember that 50 percent of the midair collisions at or near airports during 1968 involved a flight instructor.

- (b) Place special training emphasis on those basic problem areas of concern mentioned in this circular where improvements in pilot education, operating practices, procedures and techniques are needed to reduce midair conflicts.
 - (c) Notify the control tower operator at airports where a tower is manned regarding student first solo flights.
 - (d) Explain the availability of and encourage use of EXPANDED RADAR SERVICES for arriving and departing aircraft at terminal airports where this service is available, as well as radar traffic advisory services for transiting terminal areas or between en route points (refer to AIM, Parts 1, 3 and 4).
 - (e) Understand and explain the limitations of radar that frequently may limit or prevent the issuance of radar advisories by air traffic controllers (refer to AIM, Part 1).
- (4) Pilot examiners should:
- (a) During any flight test, direct attention to the applicant's vigilance for other air traffic and his adequate clearance of the area before performing any flight maneuver.
 - (b) Direct attention to the applicant's knowledge of the airspace, available FAA air traffic services and facilities, essential rules, good operating practices, procedures and techniques that are necessary to achieve high standards of air safety.


acting Director
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