Federal Aviation Agency

ADVISORY CIRCULAR

AC NO: 90-28	
AIR TRAFFIC AND GENERAL OPERATIONS	
EFFECTIVE: 9/2/65	

Cancelled 90-2N

SUBJECT: COURSE CHANGES WHILE OPERATING UNDER INSTRUMENT FLIGHT RULES BELOW 18,000 FEET MEAN SEA LEVEL

---

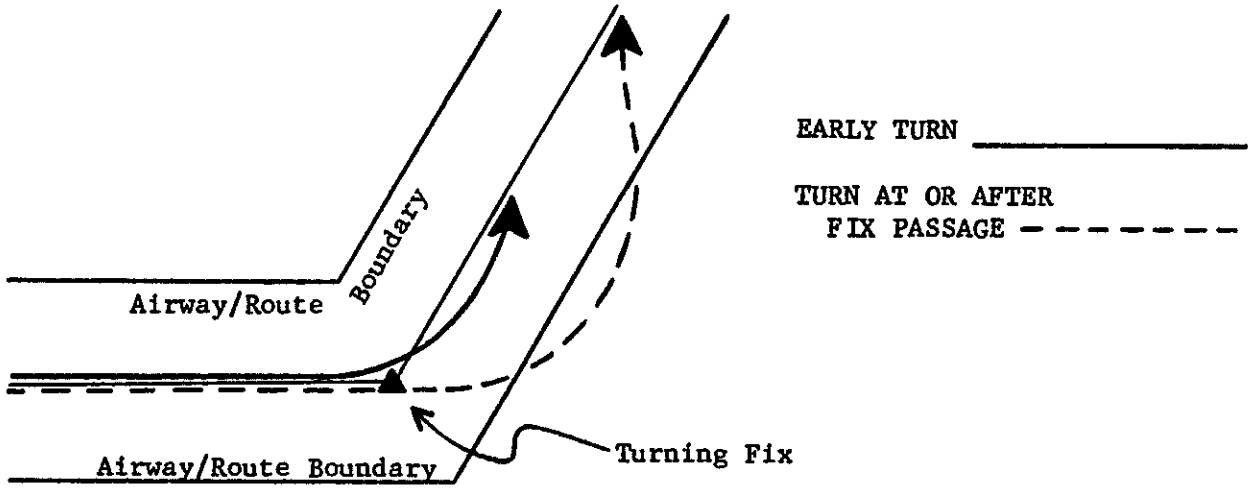
1. PURPOSE. This circular reminds pilots making course changes that routings prescribed in air traffic control clearances must be adhered to as closely as possible in order that flight paths will remain within airway/route boundaries during en route and terminal flight operations.

2. BACKGROUND. In the development of the two-level airspace structure which became effective September 17, 1964, the Federal Aviation Agency (FAA) considered the probability of an aircraft exceeding the airway/route boundaries while making course changes at different speeds. The normal navigational aid spacing for airways/routes below 18,000 feet MSL is 80 nautical miles and the airspace area to be protected has a total width of 8 nautical miles, 4 nautical miles each side of centerline, within 51 nautical miles of the facility. Beyond 51 nautical miles the 4.5 degree accuracy factor determines the width of the airways/routes (approx. 2 miles in total width every 13 miles). It was evident that aircraft operating in excess of 290 knots true airspeed (TAS) could exceed the normal airway/route boundaries depending on the amount of course change required, wind direction and velocity, the character of the turning fix (distance measuring equipment, overhead navigation aid, or intersection), and the pilot's technique in making a course change. For example, a flight operating at 17,000 feet MSL with a TAS of 400 knots, a 25 degree bank, and a course change of more than 40 degrees would exceed the width of the airway/route; i.e., 4 nautical miles each side of centerline. As a result, the FAA: (1) took action to assure proper obstruction clearances for all known turning operations, and (2) provided additional instrument flight rules (IFR) separation protection for turns.

3. DISCUSSION. In the airspace at and above 18,000 feet MSL additional IFR separation protection is provided for turns. However, in the airspace below 18,000 feet MSL, where operations in excess of 290 knots TAS are less prevalent, the provision of additional IFR separation in all course change situations for the occasional aircraft making a turn in excess of 290 knots TAS creates an unacceptable waste of

airspace and imposes a penalty upon the preponderance of traffic which operate at low speeds. Pilots of aircraft are required to adhere to airways/routes being flown. Special attention must be given to this requirement during course changes. Each course change consists of variables that make the technique applicable in each case a matter only the pilot can resolve. Some variables which must be considered are turn radii, wind effect, airspeed, degree of turn, and cockpit instrumentation. The use of any available cockpit instrumentation such as distance measuring equipment may be utilized by the pilot to lead his turn when making course changes. This is consistent with the intent of FAR 91.123 which requires pilots to operate along the centerline of an airway and along the direct course between navigational aids or fixes.

4. PROBLEM. Turns which begin at or after fix passage may exceed airway/route boundaries. The following illustration contains an example flight track depicting this, together with an example of an early turn.



5. ACTION. Pilots are reminded that special attention must be given to the matter of making course changes so as to adhere as closely as possible to the airway/route being flown.

Archie W. League

Archie W. League, Director
Air Traffic Service

66-3542