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Federal Aviation Agency

ADVISORY CIRCULAR

AC NO: 90-19
AIR TRAFFIC CONTROL AND GENERAL OPERATIONS
EFFECTIVE: 10/29/64

SUBJECT: USE OF RADAR FOR THE PROVISION OF AIR TRAFFIC CONTROL SERVICES

1. PURPOSE. To advise the aviation community of the Agency's practice in the use of radar information to provide air traffic control services.

2. DISCUSSION.

   a. Presently, air traffic service is being provided through two basic radar systems.

      (1) Primary Radar is that radar system used to provide service wherein no cooperative radar equipment, i.e., radar beacon or transponder, is required aboard the aircraft. Coverage is limited by power, antennae design and pulse rate of the ground equipment and aircraft returns vary with distance and size or reflective characteristics of the aircraft. These radar displays are nonselective in that all primary radar returns received are displayed with no means of identification except through correlation of aircraft position or through maneuvers requested by a controller. Complete dependence on recognizable reflective targets from aircraft limits the usable range of primary radars. This is particularly true in the high altitude environment with the smaller jet aircraft which normally offer poor radar reflective surfaces. On the other hand, it has the advantage of not requiring special equipment aboard the aircraft and can be utilized within its limitations by any pilot having two-way radio aboard the aircraft.

      (2) The Air Traffic Control Radar Beacon System, commonly referred to as the radar beacon system, is a secondary surveillance system which has been installed in conjunction with the primary radar system. This system, where installed, may be operated independently of the primary radar, or in conjunction with it.

It requires that the aircraft be equipped with a "transponder" which is triggered by the ground equipment and replies on a selected aircraft code. The advantages of the radar beacon system are that usable radar range is greater, radar reflectivity of the aircraft does not affect the return, and by use of selected codes or "ident" feature of the aircraft radar beacon, more positive radar identification can be made and followed.

b. The FAA has been working with various combinations of primary radar and radar beacon (in areas where both systems are available to the controller) to develop the best combination to suit the circumstances. The controller's radar display may be adjusted to show the primary radar returns only, certain radar beacon code returns only, or a combination thereof. With the introduction of area positive control, where aircraft are required by regulation to be equipped with a functioning transponder, air traffic control service is normally provided by the radar beacon system alone. The controller by properly assigning radar beacon codes to aircraft under his jurisdiction and then selecting these codes for display, can see only those returns from aircraft under his control. The confusion resulting from the many aircraft returns not involved in his control situation is thereby eliminated. On the other hand, however, aircraft which are not transponder equipped (or where the transponder has malfunctioned) provide no return on a "radar beacon only display" before the controller, nor do aircraft transmitting beacon codes other than those selected by the controller. In addition, information on weather, which is desirable in some circumstances to provide some additional services, is not available through this system.

c. Outside of the area positive control environment the desirability of providing radar traffic information and other additional services, leads us to the use of primary radar as the basic tool, supplemented to varying degrees by the radar beacon system. In terminal areas particularly, the use of radar beacon is often minimal since radar handoffs and stronger reflective targets from the closer in aircraft minimize the requirement for the identification feature and target reinforcement. At the same time, the beacon returns are often excessively large and the number of aircraft in a smaller area are greater with the resulting target clutter often requiring more selective use of radar beacon. Therefore, in the terminal area environment, pilots are frequently requested to change their beacon to low power or standby, particularly in congested areas.

3. POLICY. It is the practice of the Federal Aviation Agency to provide air traffic control services, in accordance with published procedures, using information obtained from primary and/or radar beacon systems in areas of radar coverage as follows:

   a. Within area positive control airspace, wherein the carriage of transponders is mandatory, ATC service is normally provided using radar beacon returns only. Primary radar returns from aircraft not equipped with functioning ATC radar beacon, as well as returns from weather, chaff drops or permanent echoes will, in such cases, not be seen on the controller's radar display. Primary radar will normally be available, however, to be used by the controller to supplement his basic radar beacon picture (to the extent it does not derogate that display) when he needs it to provide weather data, information regarding chaff drops, and as a standby for failure of his radar beacon system.

   b. Outside area positive control airspace, ATC service is normally provided utilizing primary radar information. Radar beacon data, when available, is used to supplement the primary radar picture for target reinforcement and an aid in identification to the extent that the radar beacon returns do not derogate the primary radar picture. Radar beacon may also be used by the controller to follow aircraft targets in areas outside the primary radar coverage, as well as a backup to the nonradar control system when failure occurs to the primary radar system.

   c. In any case, pilots will be advised when the radar system normally used for provision of ATC service is unusable due to malfunction. Pilots will not normally be kept advised as to which source of radar data (in a or b above) is, or is not being used, when both systems are operating normally, inasmuch as this will only affect the provision of "additional services" which are optional with the controller, dependent on circumstances, and will not affect the provision of radar separation or radar assistance in navigation.

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