

fighter will be more difficult to see on primary radar than a large commercial jet or military bomber. Here again, the use of transponder or ADS-B equipment is invaluable. In addition, all FAA ATC facilities display automatically reported altitude information to the controller from appropriately equipped aircraft.

(f) At some locations within the ATC en route environment, secondary-radar-only (no primary radar) gap filler radar systems are used to give lower altitude radar coverage between two larger radar systems, each of which provides both primary and secondary radar coverage. ADS-B serves this same role, supplementing both primary and secondary radar. In those geographical areas served by secondary radar only or ADS-B, aircraft without either transponders or ADS-B equipment cannot be provided with radar service. Additionally, transponder or ADS-B equipped aircraft cannot be provided with radar advisories concerning primary targets and ATC radar-derived weather.

**REFERENCE-**

*Pilot/Controller Glossary Term- Radar.*

(g) The controller's ability to advise a pilot flying on instruments or in visual conditions of the aircraft's proximity to another aircraft will be limited if the unknown aircraft is not observed on radar, if no flight plan information is available, or if the volume of traffic and workload prevent issuing traffic information. The controller's first priority is given to establishing vertical, lateral, or longitudinal separation between aircraft flying IFR under the control of ATC.

c. FAA radar units operate continuously at the locations shown in the Chart Supplement U.S., and their services are available to all pilots, both civil and military. Contact the associated FAA control tower or ARTCC on any frequency guarded for initial instructions, or in an emergency, any FAA facility for information on the nearest radar service.

#### **4-5-2. Air Traffic Control Radar Beacon System (ATCRBS)**

a. The ATCRBS, sometimes referred to as secondary surveillance radar, consists of three main components:

**1. Interrogator.** Primary radar relies on a signal being transmitted from the radar antenna site and for this signal to be reflected or "bounced back"

from an object (such as an aircraft). This reflected signal is then displayed as a "target" on the controller's radarscope. In the ATCRBS, the Interrogator, a ground based radar beacon transmitter-receiver, scans in synchronism with the primary radar and transmits discrete radio signals which repetitiously request all transponders, on the mode being used, to reply. The replies received are then mixed with the primary returns and both are displayed on the same radarscope.

**2. Transponder.** This airborne radar beacon transmitter-receiver automatically receives the signals from the interrogator and selectively replies with a specific pulse group (code) only to those interrogations being received on the mode to which it is set. These replies are independent of, and much stronger than a primary radar return.

**3. Radarscope.** The radarscope used by the controller displays returns from both the primary radar system and the ATCRBS. These returns, called targets, are what the controller refers to in the control and separation of traffic.

b. The job of identifying and maintaining identification of primary radar targets is a long and tedious task for the controller. Some of the advantages of ATCRBS over primary radar are:

1. Reinforcement of radar targets.
2. Rapid target identification.
3. Unique display of selected codes.

c. A part of the ATCRBS ground equipment is the decoder. This equipment enables a controller to assign discrete transponder codes to each aircraft under his/her control. Normally only one code will be assigned for the entire flight. Assignments are made by the ARTCC computer on the basis of the National Beacon Code Allocation Plan. The equipment is also designed to receive Mode C altitude information from the aircraft.

**NOTE-**

*Refer to figures with explanatory legends for an illustration of the target symbology depicted on radar scopes in the NAS Stage A (en route), the ARTS III (terminal) Systems, and other nonautomated (broadband) radar systems. (See FIG 4-5-2 and FIG 4-5-3.)*

d. It should be emphasized that aircraft transponders greatly improve the effectiveness of radar systems.

**REFERENCE-**

*AIM, Paragraph 4-1-20, Transponder and ADS-B Out Operation*