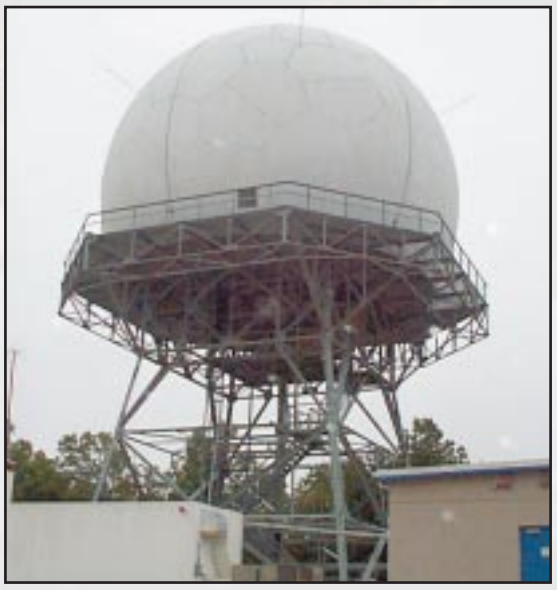
Mode Select Beacon (Mode S)

The Mode Select Beacon System (Mode S) is intended to provide aircraft surveillance and communications necessary to support air traffic control automation in the dense traffic environments expected in the near future.

The FAA needs a secondary surveillance platform that can support future requirements into the twenty-first century.

Air traffic control radar surveillance of aircraft by ground-based equipment will be required well into the next century. The air traffic control beacon interrogator (ATCBI) system provides aircraft position, altitude, and identification information to controllers to enhance surveillance capabilities. The existing ATCBI systems have exceeded their projected useful life. Logistics support is becoming difficult as evidenced by the requirement to remanufacture selected parts for existing beacon systems.

The Mode S Beacon System is a combined secondary surveillance radar (beacon) and ground-air-ground data link system designed to replace the aging Air Traffic Control Radar Beacon Systems (ATCRBS). Mode S is capable of common-channel interoperation with the current ATCRBS systems and thus has been phased in over an extended transition period. Mode S can operate stand-alone or in conjunction with terminal or digitized en route radars and provide radar-reinforced beacon reports. The first photo shows a Mode S (en route) antenna site. The second photo depicts an antenna array for ASR9 and Mode S terminal surveillance site.



Mode S provides more accurate positional information and minimizes interference. This is accomplished by discrete interrogation of each Mode S transponder-equipped aircraft and improved processing of aircraft replies. In addition, Mode S provides the medium for a digital data link which can be used to exchange information between aircraft and various air traffic control functions and weather databases. These systems will provide coverage down to the ground at 108 major airports and down to 12,500 feet above mean sea level in other areas. Mode S is designed to have remote maintenance monitor capabilities to reduce periodic maintenance workload. Existing radar beacon system antennas not capable of

improved azimuth resolution will be replaced and additional antennas procured where increased data rates are required. Multiple technologies such as Mode S, monopulse secondary surveillance radars, and global positioning system squitter are being considered to replace the remaining ATCBI-4/5 sites.

This project is in the final stage of deployment with the majority of the 147 total sensors delivered up in Mode S mode, while the remainder are currently in back mode (ATCBI).

Two major Preplanned Product Improvements (P^3I) are currently underway.

- Technology upgrades from 68020 to 68040 processors are currently in keysite test at Grand Junction, CO, in preparation for deployment to 25 en route sites.
- Traffic Information Service (TIS), a data link service that provides an affordable means to assist general aviation (GA) pilots in visual acquisition of surrounding air traffic by delivering automatic traffic advisories to the pilot, is currently in keysite test at Dulles and Andrews AFB in preparation for national deployment.

The development contractors are currently fielding en route upgrades (25 sites) and preparing for national upgrades of the remaining terminal sites on 68040 platforms with all Preplanned Product Improvements.

Future plans are to commission 25 Mode S en route sites by the end of 1998 and upgrade the remaining terminal sites by the end of 1999. A total of 147 Mode S sensors will be commissioned at that time.

To find out more information about the Mode S Surveillance Program, contact:

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System Efficiency