



Automation Systems for Terminal and En Route Control

Automation Systems for Terminal and En Route Control (ASTECC) combines en route and terminal air traffic control, providing a broad range of radar data processing (RDP) and flight data processing (FDP) applications.

RDP provides single-sensor and multi-sensor mosaic-derived situation displays of air traffic data received from both primary and secondary radars and combines this with aircraft-generated position information (Automatic Dependent Surveillance or ADS). Controllers can view the traffic situation for any part of the adapted control area with all targets (radar and ADS) being projected onto a map using stereographic projection.

FDP provides ICAO-compliant flight plan processing, including route expansion and modeling of the trajectory. Flight data is presented at each operational position electronically and on flight progress strips before the aircraft enters the airspace assigned to the position.

ASTECC combines the full functionality of the FAA's En Route Advanced Radar Tracking System (EARTS) with open systems architecture and FDP, using commercial off-the-shelf hardware — a total system designed to meet any customer need.

For en route control, ASTECC monitors all low-altitude airways and high-altitude jet routes. As a terminal system, it provides approach and departure control to area airports. At an ATC facility, approach



and departure control positions, plus local or remote towers, operate simultaneously from one automation system. The system accepts radar input from long- and short-range sensors whose scan rates can range from 3 to 12 seconds and whose detection range may be from 40 to 250 nautical miles.

Flight progress is monitored against the flight plan route, and alerts are provided to the controller if lateral or vertical bounds are exceeded. If a track leaves the area of radar coverage, an ADS contract can be automatically initiated, in which case ADS position reports can replace or supplement radar information. If there are no track or ADS updates to an aircraft position for a parameter time, ASTECC automatically extrapolates and displays the position based on the filed route.

For all radar plots/tracks, the situation display provides a position symbol, corresponding history symbols indicating previous scan positions, and a data block based upon plot/track status and display filter selection. If flight data is available, the data block contains callsign, reported altitude, velocity and assigned altitude. For plots/tracks without associated flight data, the data block contains secondary surveillance radar beacon code, altitude and velocity. In addition, six groups of map data are displayed as requested by the controller.

ASTECC alerts controllers of aircraft that are dangerously close to terrain or other aircraft. The Minimum Safe Altitude Warning (MSAW) function monitors all controlled aircraft for safe clearance from terrain and obstructions. The Conflict Alert (CA) function monitors all controlled aircraft for potential conflict.

ASTECC RDP is based on Lockheed Martin's Micro-EARTS product, which is installed at Nellis AFB, Honolulu Combined En Route Radar Approach Control (CERAP), Anchorage Air Traffic Control Center, San Juan CERAP, Guam CERAP, Fort Polk Army Air Field, White Sands Missile Range, the FAA William J. Hughes Technical Center in Atlantic City, and the FAA Oklahoma City Training Academy. It also is installed in three sites in Taiwan and 11 sites in Germany.

ASTECC FDP is based on FAA specifications for the Advanced FDP functionality. It has been designed and implemented to form the basis for an eventual replacement of NAS flight data processing functions, both over-land and off-shore.

Hardware Features

- Scalable workstations/consoles
- High-resolution color monitors
- Dual FDDI or Ethernet 802.3 local area network
- Synchronous serial interface for primary and secondary radar data receipt
- Portability on multiple UNIX-based processors (IBM, HP, DEC, Sun)
- Redundant UNIX-based data processors

Software Features

- Radar input processing
- UDP/IP network protocol
- AFTN support for ICAO and OLDI message formats
- Flight plan activation from local, RPL (repetitive) and AFTN sources
- Automatic flight data distribution based on the route
- Automatic route conformance monitoring, position extrapolation, and plan activation
- Fully integrated ADS support, including contract management
- Automatic flight plan association
- Aircraft separation monitoring, CA and MSAW
- Restricted airspace monitoring
- GPS input time reference
- Intra/interfacility communication for flight data, flight plan, track position, and hand-off data transfer
- Search and rescue assistance
- Continuous data recording/playback for after-the-fact analysis
- Display of weather data received from radars
- Remote tower displays
- X-Windows/Motif display generation
- Integrated FDP/RDP HCI based on ODS Toolbox
- Commercial adaptation data analysis and billing report generation.

System Features

- Radar processing of over 3,000 plots or tracks
- High-speed or maneuvering aircraft tracker (dual trackers)
- System plane area 2048 x 2048 nm or larger for RDP, spherical system for FDP
- Dual/redundant subsystem components with automatic switching
- Emergency Bypass Radar Channel
- On-line full ATC radar training and simulation
- Real-time quality control, providing registration and sensor data monitoring

The full range of capabilities described on these pages can be demonstrated now, and is expected to be available in 1998.

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