

# Reliable Radar Detection for the German Air Force



## Radar Data Processing and Display for Airport Surveillance System

Developed by order of EADS Germany GmbH



The requirements of radar and surveillance systems in air traffic control are rising dramatically. ATC authorities both military and civil are facing the problem that their radar systems are antiquated. The European Aeronautic Defence and Space Company (EADS) has developed a new approach control system which enhances the performance of the control radars and provides the operators with all relevant information at the right time.

### Radar data processing components from Barco

Barco has been successfully working in air traffic control software technology for more than fifteen years. Subcontracted by EADS Barco supplied basic software components for the display system (i.e. the radar data processing unit) as well as display hardware.

**BARCO**

Visibly yours

# The approach control radar ASR-E

The most advanced approach surveillance system

ASR-E (Airport Surveillance Radar), originally created for the German Air Force, provides sophisticated features based on advanced technologies.

The system offers outstanding, reliable radar detection performance, even under adverse conditions. Targets are identified by means of a Primary Surveillance Radar (PSR) and a Mode S Monopulse Secondary Surveillance

Radar (MSSR) both designed for unattended operation and controlled from remote locations.

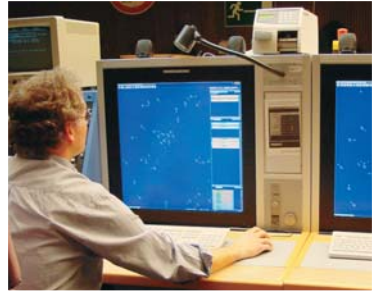
Special attention was paid to easy maintainability, advanced self-test capabilities and modular design. ASR-E fits into an integrated flight control system and minimizes life-cycle cost by using Commercial-Off-The-Shelf (COTS) equipment and software to the maximum.

The ASR-E system meets all current FAA, ICAO and Eurocontrol standards and ensures interoperability via standardized interfaces and datalinks. The system is expandable and can easily be adapted to individual needs. ASR-E enables the operator to be in the picture at all time and to turn information into an immediate advantage in safety and efficiency for all involved airport users.



# Display and processing software for tower and approach

Sophisticated components for a high-end system



## Radar data and display unit

The Unix based data processing and display unit allows a view on tracks from different radar sources, map switching, and automatic label de-conflicting. It represents radar weather and enables the controller to execute track interactions including label input for callsign, cleared flight level, and wake turbulence category.

## Electronic flight strips

ASR-E makes Air Traffic Control more efficient by replacing traditional paper flight strips with electronic flight strips. Very convenient for the controller, the current flight plan status is discernable at a glance, thanks to the sorting of flight data. Flight strips, which are generated by the tower or approach controller, are distributed to the other working positions (spanned sorting). The strips can also be printed. Barco has combined the advantages of paper strips with the advantages of an electronic system. The result is very convincing: Electronic flight strips enable the controller to reduce phone calls and facilitate the workflow. The administration and archiving of strips is handled by ASR-E.

## User role management

Barco's display software also offers the option to define access rights for different user groups, such as radar controller, technician, or administrator. Each user may be assigned to one or several

of these so-called roles. This feature's advantage is that every controller can access his user-specific functions. It is possible to restrict individually the rights of access, which are tied up the role of a user. Particular user functions, which include a certain security risk, can be defined as password protected functions.

## Recording and replay

ASR-E provides recording, archiving, and replay functionality. It distinguishes between data and legal recording & replay. Data recording & replay provides the possibility to reproduce air situations based on recorded ASTERIX data. During replay, interaction with the user interface is possible.

For legal recording & replay all events and interactions on the screens of the controller working positions are recorded, so any situation can be exactly reconstructed. Radar data is recorded centrally to reduce storage space. Synchronization with voice recording is possible.

## Access server

The Access Server acts as a gateway for the whole system. It receives radar data, flight plan data, and text messages from external sources. These data types are filtered by different criteria and forwarded internally to dedicated receivers. Furthermore, the Access Server is able to provide radar data for other ASR-E systems. If applicable, the information leaving a system is filtered too.

## System Monitoring, Control and Failover (SMCF)

For accurate fault detection, the sensor and the processing unit are permanently monitored. Anomalies and crashes

are reported. If possible, processes and peripherals are automatically restarted or replaced and reassigned by "cold-" or "hot-standby" backup processes or devices. Components of the sensor and the processing unit may be controlled directly by the user.

All critical subsystems are redundant. The SMCF Front End gives a complete overview of the component's status and of all messages generated by the different working positions. By selecting a position, the Front End provides an easy way to browse within these messages. SMCF allows the integration of user specific hardware or processes by a sub-monitor concept.

## Simulation Virtual Airway (VAW)

The VAW is a graphical environment to simulate air traffic. It allows to generate detailed and complex scenarios for radar data of ASTERIX Cat. 34/48 and 62. The VAW may be used for training and testing purposes. While a predefined scenario is running, flights can be controlled interactively or the flight behavior can be changed by means of autopilot functionality.

## Mode S

ASR-E is also able to process Mode S data. For Mode S targets it displays the Callsign-in-Flight, the flight's status and alarms. Enhanced Mode S data is displayed optionally at the track or in the track label.



# Technical specifications

## Platform

- PC & workstations

## Operating system

- UNIX based

## Display

- Barco ISIS 2kx2k main display, 28"
- Barco TCD 251/B, tower control display, 20.1"
- any standard display supported

## Processed ASTERIX formats

- Track data: Cat. 1/2, Cat. 34/48, Cat. 62
- Weather data: Cat. 8

## Redundancy

- Dual network architecture
- < 1 second switch for redundant radar channel
- < 20 seconds switch for redundant flight plan management

## Radar display

- Mono and multi sensor tracks, plots at each controller working position
- Radar data from up to 12 radar sources may be processed
- Presentation of air situation near real time

## Electronic flight strips

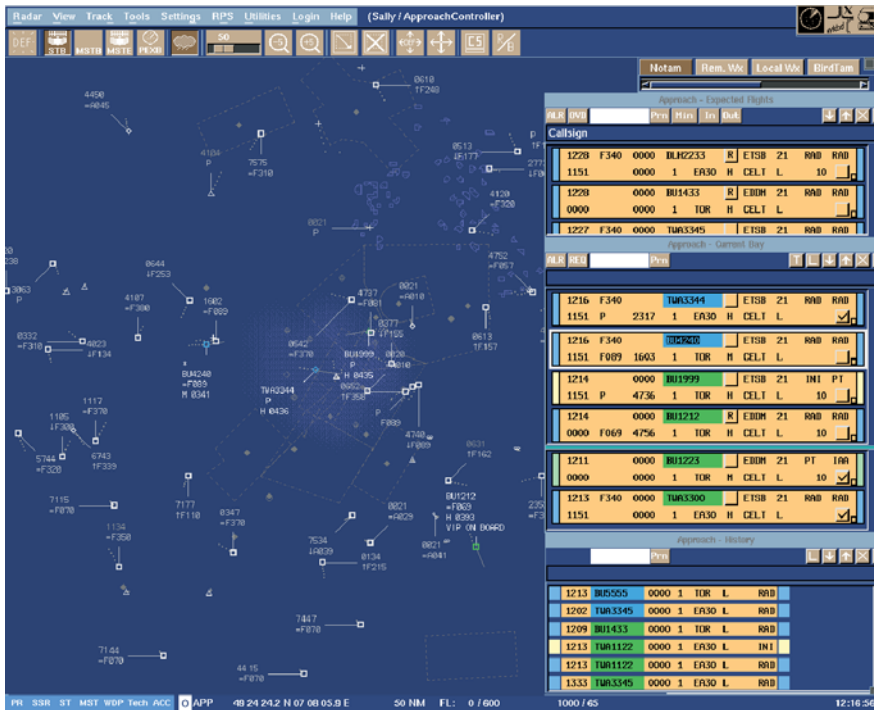
- Acceptance of flight plans from flight plan server
- Automated time-driven visualization of flight strips for expected traffic
- Track/flight plan association
- Distribution of flight strip input to all working positions
- Access to already processed flight strips in history
- Handling of formation flights
- Support of different flight scenarios with dedicated strip handling

## User role management

- Sophisticated configurable user/role concept
- Different maintenance levels (based on user/role concept)

## Access server

- Area filtering to restrict track processing to areas of interest
- Filtering of military information
- Conversion of ASTERIX Cat. 1/2 to ASTERIX Cat. 34/48



Screenshot of ASR-E radar display

All software components of ASR-E are based on **OPScenter™**, a product suite of Barco, comprising standardized components for OPS rooms.

Cover picture courtesy of JaboG 33, Büchel  
Pictures courtesy of EADS.

Ref. T-C-OPSA-0105

Technical information is subject to change without prior notice

**Barco Orthogon AG**  
Hastedter Osterdeich 222 D-28207 Bremen, Germany  
Phone: +49 421 20 12 20 Fax: +49 421 20 12 29 99  
info.orthogon@barco.com

**Barco Orthogon LLC**  
29 South New York Road, Suite 400 Smithville, NJ 08205, USA  
Phone: +1 609 404 1111 Fax: +1 609 404 0007

**BarcoView**  
President Kennedypark 35 B-8500 Kortrijk, Belgium  
Phone: +32 56 233 413 Fax: +32 56 233 462