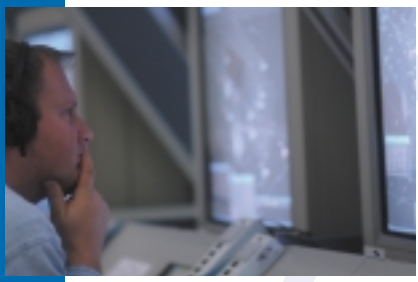
EUROCONTROL

Mode S
Programme
in Brief

European Air Traffic Management
EATM
Directorate ATM Programmes

One sky
for Europe



Mode S:

Mode S is a co-operative surveillance and communication system for ATC. It employs ground-based interrogators and airborne transponders. A principal feature of Mode S that differs from existing Monopluse Secondary Surveillance Radar is that each aircraft is assigned a unique 24-bit Aircraft Address. Using this unique address, interrogations can be directed selectively to a particular aircraft and replies unambiguously identified.

Mode S Key Benefits:

Improved Safety

- By providing higher Air Traffic Surveillance data integrity
- By reducing Radio Frequency congestion

Increased ATM capacity

- By overcoming the Mode-A shortage in the European High Traffic Density Area
- By reducing the controller workload

Increased ATM efficiency

- By providing controllers and ATM systems with additional aircraft derived data

Mode S is:

- Fully standardised in the ICAO SARPs (Standards and Recommended Practices)
- Fully compatible with existing (Monopulse) SSR therefore easing the transition
- Capable of supporting the concept of Enhanced Surveillance providing an improved Air Traffic Surveillance Service
- Fully supporting ACAS II - Airborne Collision Avoidance System

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Mode S Elementary Surveillance

- Selectively identifies each aircraft through its unique ICAO 24-bit address
- Reduces Radio Frequency congestion (FRUIT and Garbling)
- Resolves the Mode-A code shortage
- Is being implemented in the European High Traffic Density Area
- Calls for airborne equipment in March 2003 with a Transition Period up to March 2005

    - Fully compliant with ICAO Annex 10, Amendment 77
    - Support of Surveillance Identifier (SI) codes capability
    - Capable to Downlink the Aircraft ID (Call Sign or Tail Number)

Mode S Elementary Surveillance Transition Period

The introduction of transitional arrangements for the installation of airborne equipment aims to ease the burden on the aviation industry by setting a latest date for compliance with Mode S Elementary Surveillance.

IFR Airborne Implementation

All aircraft flying IFR as GAT in designated airspace are required to carry and operate Mode S Elementary Surveillance airborne equipment by 31 March 2003 with a Transition Period as follows:

- New production aircraft have to be compliant by 31 March 2004
- Completion of all aircraft retrofits by 31 March 2005

VFR Airborne Implementation

All aircraft flying VFR in designated airspace are required to carry and operate Mode S Elementary Surveillance airborne equipment by 31 March 2005 with a Transition Period as follows:

- New production aircraft to be compliant by 31 March 2005
- Completion of retrofits by 31 March 2008, subject to individual State agreements

Mode S Enhanced Surveillance

Safety Benefits

- Improvement in Controller situational awareness by :
  - provision of airborne derived data to the Controller
  - increased efficiency in tactically separating aircraft
  - predictability of aircraft intentions such as for the purpose of reducing the occurrence of level busts (defined as a vertical deviation of more than 300 ft from the ATC assigned level).

Capacity Benefits

- Reduced Controller workload by :
  - provision of additional information (i.e. Magnetic Heading, Air Speed, Vertical Rate and Selected Altitude) through datalink enabling a reduction in Controller/Pilot radio telephony (RT) workload.

Implementation of Enhanced Surveillance

The implementation of Enhanced Surveillance for IFR/GAT is foreseen in the period of 2005-2007 in the airspace subject to high traffic density.

Mode S ground stations development for Europe

- Co-ordination by EUROCONTROL
- Co-funded by European Union
- Production by European Industry
- Available for procurement

Mode S Programme Milestones

Mode S Elementary Surveillance

■ Strategy for the initial Implementation of Mode S Enhanced Surveillance (IIMSES)	1995
■ Cost Benefit Analysis	1996-2000
■ Mode S ground station development	1997-2002
■ Pre-operational Mode S evaluation	2000-2002
■ Aeronautical Information Circulair (AIC)	
▸ Elementary Surveillance specimen AIC	2000
▸ Transition Period specimen AIC	2002
■ Surveillance Data Processing and Distribution system available (ARTAS v6)	2001
■ Start of deployment of Operational Mode S sensors in the ECAC High Traffic Density Area	2002
■ Start of operational ATM deployment of Mode S Elementary Surveillance	2003

Mode S Enhanced Surveillance

■ Cost Benefit Analysis for Mode S Enhanced Surveillance	2000
■ Final decision on Mode S Enhanced Surveillance implementation	2002
■ Planned Operational implementation of Mode S Enhanced Surveillance	from 2005 onwards

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Mode S – Enabler of the EUROCONTROL ATM 2000+ Strategy
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EATM (European Air Traffic Management Programme) is a European-wide ATM enhancement programme managed by the EUROCONTROL Agency on behalf of EUROCONTROL Member States and other participating States. Its aim is to create a uniform EUROPEAN ATM environment, to ensure high levels of Safety and to enhance the Capacity as well as the overall performance of the European ATM system over time in the context of the EUROCONTROL ATM Strategy for the years 2000+