

Avionic Information for Communication, Navigation, & Surveillance.

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It is important to note the information contained in these pages relate, unless other stated, to the airspace or airworthiness requirements of the States of the European Civil Aviation Conference (ECAC). The intention is not to list all Avionic requirements but to list those recently coming into force.

In column marked " ECAC Airspace Requirement" a 'Mandated Requirement' confirms **all** aircraft flying in ECAC airspace must be compliant by the given date.

Where a system requirement is not mandated for operation in ECAC airspace the application is determined by the world wide ICAO Annex 6 standard. ICAO Annex 6 standards are adopted by JAA regulation and Operators registered in ECAC must be compliant. Each non-JAA Operator, therefore, has to be in accordance with its national legislation, which should in turn encompass the Annex 6 standards.

If a State elects to waive the ICAO Annex 6 standards, a 'Difference' must be notified to ICAO, which will be made known to the other States. It is up to each JAA Member State to accept, or not, a deviation from the ICAO Annex 6 standards.

For definitions of terms and acronyms view the EATM [glossary](#) of [terms](#).

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Users are reminded that States remain ultimately responsible for mandating the carriage of avionics equipment in their respective airspace. Users are therefore advised to continue to consult National Aeronautical Information Publications (AIPs) and Aeronautical Information Circulars (AICs).

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Avionic Information for Communication, Navigation, & Surveillance.

1 Communication

| Domain Programme Area | Equipment Requirement | ECAC Airspace Requirement | JAA Airworthiness or Operational Requirement | Remarks |
|---|--|---|--|---|
| VHF Comm. 25 KHZ spacing | 2 Sets of VHF Transceivers with 25 KHZ channel spacing | Mandatory Requirement Below FL245 and elsewhere not covered by 8.33 KHZ. | | |
| VHF Com 8.33 KHZ | 2 Sets of VHF Transceivers with 8,33 KHZ channel spacing | Mandatory above FL245 | For guidance on airworthiness and operational aspects se JAA TGL 7 Rev 1 | |
| VHF Com 8.33 KHZ | 2 Sets of VHF Transceivers with 8,33 KHZ channel spacing | Mandatory above FL195 from 15 March 2007 Decision for mandatory carriage below FL195 is expected in 2006. | For guidance on airworthiness and operational aspects se JAA TGL 7 Rev 1 | Given that further phases of vertical expansion below FL 195 are under consideration, it is recommended 'All Airspace Users' equip with 8.33 KHz capable equipment for new aircraft or where existing radios are replaced. See useful site below |
| VHF Com Immunity from FM radio broadcasts | All VHF Comm. equipment | | For guidance see JAA TGL16 | Some states may have exempted from the requirement, |
| ANT/VDL Mode 2 data link | VHR digital radio (VDR) and | Mandate expected from 2010 above FL 285 for following ANSPs Spain Austria Italy USC. Maastricht Portugal Switzerland | | Planned implementation dates 2010 for aircraft produced after 1 Jan 2008 2012 for aircraft produced before 1 Jan 2008 Additional information Link 2000 + Programme |

Useful sites <http://www.eurocontrol.int/vhf833/public/faq/FAQ.html>

http://www.eurocontrol.int/vhf833/public/subsite_homepage/homepage.html

2 Navigation

| Domain Programme Area | Equipment Requirement | ECAC Airspace Requirement | JAA Airworthiness or Operational Requirement | Remarks |
|-----------------------|---|--|--|--|
| ILS | 2 ILS Nav Receivers | | | Terminal aid available at most airports. |
| MLS | 2 MLS receivers | | | Terminal aid to be made available at London Heathrow. Under consideration at other airports |
| B-RNAV | RNAV systems capable of + - 5 NM accuracy | Mandatory all en - route airspace. | See JAA TGL 2 No 2 Rev 1 and FAA 90-96 | A single B-NAV system is acceptable provided there are conventional Navaids available on the route being flown to be used in the event of B-RNAV aircraft equipment failure. |
| P-RNAV | RNAV systems capable of + - 1 NM accuracy | | See JAA TGL10 | Not expected to be mandated before 2010. Planned for introduction for aircraft operating RNAV in Terminal Airspace by Nov 2005 |
| APV/Baro VNAV | | Under consideration at selected airports | A draft JAA TGL is in preparation See also FAA documents AC20-138, AC20-130A AC20-129 | APV is to be introduced as a replacement for NPA and therefore a means to reduce CFIT incidents by providing aircraft a stabilised approach. |
| RNP-RNAV | | Under consideration | A draft JAA TGL is in preparation | |
| SBAS APV I /II | Requirements for SBAS receivers is contained in ICAO annex 10 Volume 1 Also see specification RTCA DO 229C and FAA TSO C145/146A | Under consideration at selected airports Implementation not before 2006. | | Currently SBAS will not be capable to provide CAT 1 precision approach but may provide lower minima than APV/Baro VNAV. |
| 4D RNAV | | Under consideration | | Long term objective |
| GBAS Cat 1 | GBAS equipment is contained in aircraft multi mode receiver (MMR). GBAS performance specification is contained in RTCA DO 253a LAAS receiver MOPS | Under consideration at selected airport. Implementation not before 2008 | Need a reference to JAA doc | GBAS SARPS for Cat 1 became applicable in Nov 2001 refer to ICAO SARPS annex 10 volume 1 Also see specification RTCA DO 229C and FAA TSO C145/146RTCA DO- |
| RVSM | ICAO Min. Aircraft System Performance Standard (MASPS) | Mandated From FL 290 to FL410 | JAA TGL 6 Revision1 JAR OPS 1.700 1.705 1.710 1.727 | See RVSM web page |

P-RNAV Useful sites <http://www.ecacnav.com/p-rnav/>
RVSM <http://www.ecacnav.com/RVSM/overview.htm>

3 Surveillance

| Domain Programme Area | Equipment Requirement | ECAC Airspace Requirement | JAA Airworthiness or Operational Requirement | Remarks |
|--|--|---|--|--|
| SSR Mode A +C (Surveillance with Altitude reporting) | ICAO Annex 10 Annexe 10 Volume IV Chapter 2 | Mandated | | The requirement within each National Airspace can vary therefore refer to National AIP's |
| SSR mode S Discrete aircraft addressing plus Elementary Surveillance | ICAO Annex 10 Annexe 10 Volume iv. Amendment 77 | Mandated in designated ECAC airspace. Forms for compliance registration and/or exemptions contact "Exemption co-ordination cell" | JAA TGL13 Revision 1 | To permit aircraft Operators sufficient time to complete transponder retrofits a transition period has been agreed as follows. 1) All new aircraft in production shall be equipped by 31 March 2004. 2) all aircraft operating IFR/GAT shall be equipped by 31 March 2007. 3) all aircraft operating VFR shall be equipped by 31 March 2008. |
| SSR mode S Discrete addressing plus Enhanced Surveillance | ICAO Annex 10 Annexe 10 Volume iv. Amendment 77 | Mandate under consid eration | JAA NPA 20-12a | |
| ADS -B Automatic Dependant Surveillance Broadcast | ICAO Annex 10 Volume iv | Under Consideration | | ADS-B is being considered to meet operational requirements needed in the period 2020. FAA and Eurocontrol are co operating for a common approach to implementation and timescales. |
| Emergency Locator / ELT | MANDATED 1/1/2002 ICAO SARPS Annex 6 Part 1, para 6.17 See also JAR.OPS 1.820 | | See JAR.OPS 1.820 | ICAO Worldwide aircraft requirement. All aircraft with a C of A after 1/1/2002 shall be equipped with an automatic ELT capable of transmitting on 121.5 MHz and 406MHz. Aeroplanes with a C of A before 1/1/2002 must have any type of ELT capable of transmitting on 121.5MHz and 406MHz. An Operator shall ensure that all ELTs that are capable of transmitting on 406 Mhz shall be coded in accordance of ICAO Annex 10 and registered with the national agency responsible for initiating a search & rescue service. |

Useful site Mode S http://www.eurocontrol.int/mode_s/

4 Safety Assurance

| Domain Programme Area | Equipment Requirement | ECAC Airspace Requirement | JAA Airworthiness or Operational Requirement | Remarks |
|------------------------|---|---|--|--|
| ACAS II | TCAS II Software Version 7 ICAO Annex 2, Annex 6, Annex 10, Annex 11, PANS OPS Doc 8168. PANS ATM Doc 4444. EUR Regional Supplementary Procedures Doc 7030 | Mandated 1 January 2000. All civil fixed wing turbine engine aircraft Max certificated Take Off Mass exceeding 15,000 kg or max certificated seating configuration of more than 30. Mandated 1 January 2005. All civil fixed wing turbine engine aircraft Max. certificated Take Off Mass exceeding 5,700 kg or max. certificated seating configuration of more than 19. | JAR-OPS 1.668 1.398 For certification JAA TGL 8 Revision 2 For pilot training JAA TGL11. Pans Ops Doc. 8168 MMEL JAA TGL 26 | |
| EGPWS/TAWS | ICAO ANNEX 6 part 1 | | JAA OPS 1.665 JAA TGL12 1Jan 2003 EGPWS required for Aircraft with Max Take-off Mass more than 5700 kg or max approved seating of more than 30. 1Jan 2007 EGPWS required for Aircraft with Max Take-off Mass more than 5700 kg or max approved seating of more than 9 and C&A issued after 1 Jan 2001 | Note ICAO world wide mandate EGPWS is an JAA airworthiness requirement further guidance refer to your state regulator. |
| Flight Data Monitoring | | | Awaiting JAA adoption Planned 2005 | Proposal is for aircraft > 27,000kg to be equipped with a suitable electronic flight data recorder or quick access recorder where flight data can be regularly replayed for purposes of crew monitoring. |

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5 Military Requirements

| | Capability | Requirements | Status | State Aircraft |
|-----------------------|--|---|--|---|
| COMMUNICATIONS | 25 kHz VHF Voice | 2 sets of VHF Transceivers with 25kHz channel spacing Details: www.eurocontrol.int/vhf833 | Mandated for non-8.33kHz area, eg below FL 245 | |
| | 8.33 kHz VHF Voice | 2 sets of VHF Transceivers with 8.33kHz channel spacing Details: www.eurocontrol.int/vhf833 | Mandated for 8.33kHz area, above FL 245 and planned for above FL 195 from 2006/2007 | “UHF-equipped State aircraft not equipped with an 8.33 kHz channel spacing capable radio will be allowed to operate in the airspace designated for 8.33 kHz channel spacing operations” ^[1] . Such exemption policy will soon be reviewed. |
| | VHF FM Immunity | ILS and VOR receivers to be protected against interference from VHF broadcast. FM immune VHF equipment is to be used Details: http://www.eurocontrol.int/eatmp/mil/EMEU/fmimmunity.html | Mandated for en-route and airports as specified in national AIPs | Exemptions for State a/c may still be negotiated on a bilateral basis. See national AIPs. |
| | Link 2000+ Controller-Pilot Data Link Communications (CPDLC) | ATN/VDL Mode 2 data link ACARS/FANS 1/A for initial set of applications Details: LINK 2000+ Programme | Planned mandate for above FL 285 from 31 March 2009 (ACCs and new civil a/c) and 31 March 2014 (older civil a/c) | The Link 2000+ Mandate Rule for the provision and use of air-ground data link CPDLC services shall not be applicable to State aircraft ^[2] . Civil a/c are considered “new” are those with certificate of airworthiness issued after 01JAN08. |
| NAVIGATION | B-RNAV | RNAV systems for +/- 5NM accuracy. Single B-RNAV system is acceptable if backup of conventional NavAids is available Details: http://www.ecacnav.com/ | Mandated for en-route airspace | “State a/c are exempted from the B-RNAV mandatory requirement” ^[3] . Within TMAs, non B-RNAV State a/c should be routed via non-RNAV-based SIDs and STARs. For en route State a/c should be routed via VOR/DME-defined ATS routes or via conventional navigation aids. |
| | P-RNAV | RNAV systems capable of +/-1NM accuracy. Details: http://www.ecacnav.com/ | Planned for aircraft operating in Terminal Airspace by end 2004/2005 | For certain TMAs for aircraft that are not approved for P-RNAV operations conventional procedures may continue to be available as stated in national AIPs |
| | RNP-1 RNAV | RNAV systems capable of +/-1NM accuracy. Details: http://www.ecacnav.com/ | Under consideration RNP-1 RNAV for en-route by 2010 | Some military GAT operations may still require conventional infrastructure support beyond 2010. On a national basis, authorities may decide to continue the provision of conventional services for military use. |
| | 4D-RNAV | RNP TBD with additional timing function Details: http://www.ecacnav.com/ | Under consideration 4D RNAV for gate-to-gate by 2015 | To be defined |
| | RVSM | The RVSM MASPS include: (1) Two independent, cross-coupled altitude measurement systems; (2) One automatic altitude control system ($\pm 65'$); (3) One altitude alert system ($\pm 300'/\pm 50'$); (4) One SSR altitude reporting transponder (5) RVSM compliant avionics configuration Details: http://www.ecacnav.com/rvsm/overview.htm#area | Mandated in EUR RVSM Airspace | State a/c benefit from RVSM exemption ^[1] . Military aircraft operating as GAT which are non MASPS RVSM compliant are allowed in RVSM airspace but are subject to 2000ft vertical separation from all other aircraft. |

5 Military Requirement continued

| | Capability | Requirements | Status | State Aircraft |
|-------------------------|--|---|--|--|
| SURVEILLANCE | SSR Mode A+C | Mode A/C airborne transponder | Mandated for IFR/GAT, and for VFR/OAT in 'designated airspace' | |
| | SSR Mode S Elementary Surveillance (ELS) | Mode S airborne transponder SI and Level 2 capable as a minimum according to implementing States' AICs Details: http://www.eurocontrol.int/mode_s/ | Mandated from MAR 2003 with transition period till MAR 2007. In Mode S designated airspace of NL, F, B, L, D, CH, and UK | Transition arrangements for <i>State</i> aircraft concerning Mode S foresee: <ul style="list-style-type: none"> The final date for compliance for the carriage and operation of Mode S ELS and Enhanced Surveillance airborne equipment is 31 March 2009 for State a/c. ELS equipment is required for all State aircraft flying IFR or VFR, as OAT or GAT in Mode S designated airspace. EHS equipment is only required for "transport type" State aircraft liable for EHS equipage. "Transport type" State aircraft are liable for EHS equipage when flying more than 30 hrs/annum/airframe, DAP is available and MTOM of 5700 kg and cruising airspeed is in excess of 250 kts. |
| | SSR Mode S Enhanced Surveillance (EHS) | The same as for ELS with full Download Airborne Parameters (DAPs) capability Details: http://www.eurocontrol.int/mode_s/ | Mandate under consideration, transition period from MAR 2005 upto MAR 2009. In Mode S enhanced surveillance designated airspace of UK, D, and F | |
| | ADS-B | Data Link and avionics required to transmit Aircraft Derived Data Details: http://www.eurocontrol.int/cascade/ | Under consideration within CASCADE for ECAC airspace | No military position/impacts yet determined |
| SAFETY ASSURANCE | ACAS II | TCAS II, version 7 required s from 01JAN 2000 for civil a/c above MTOM of 15,000 kg, or more than 30 seats. From 1JAN 2005 MTOM is 5.700 kg and passenger seat 19 Details: http://www.eurocontrol.int/acas/ | Mandated for EUR Region (including FIR Canarias) | ICAO doc 7030 states that ACAS mandate is only applicable for civil a/c ^[1] . Military a/c may equip on a voluntary basis. [In Germany the 01JAN 2005 mandate includes "military transport aircraft" as determined by AIC IFR 13 20MAR03]. |
| | Enhanced Ground Proximity Warning System (EGPWS) / Terrain Awareness Warning system (TAWS) | Applicable to aircraft with: (1) MCTM>5700kg or a more than 30seats and a C of A issued after 1/1/2001; (2) same MTCM and if 9 seats or more and C of A issued after 1/1/2004; (3) same MCTM and 9 seats or more and already equipped with GPWS – no TAWS required | Mandated from JAN 2003 Note: If MCTM>15000kg or passengers >30 the date is 01JAN 2005 and if MCTM>5700kg or passengers > 9 the date is 01JAN 2007 | Applicability to State a/c not defined. This is not an ATM/CNS Requirement as stated in ICAO Annex 6 Part 1. Paras 6.15.5 to 6.15.7 |

Useful Sites

- P-RNAV <http://www.ecacnav.com/p-rnav/>
 RVSM <http://www.ecacnav.com/RVSM/overview.htm>
 Mode S http://www.eurocontrol.int/mode_s/

Sources of statements on State a/c applicability:

- [1] ICAO SUPPS – Doc 7030/4 EUR/RAC-7
 [2] Link 2000+ Draft Mandate and Initial Draft Rule for the Provision and Use of Data Link Services
 [3] Navigation Strategy for ECAC, Edition 2.1, 15Mar1999 (para 5.7) and ICAO Doc 7030/4