Avionics requirements for State aircraft

EUROCONTROL has prepared a short summary offering an overview of a significant series of avionics requirements and their applicability to State aircraft.

Although this overview is mainly for information purposes only, it captures useful information that may increase awareness on how military aircraft are impacted by the introduction of specific capabilities.

It should also be noted that only National Aeronautical Information Publications (AIPs) and Aeronautical Information Circulars (AICs) contain formal and liable information concerning avionics requirements applicable to State aircraft.

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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).
# State aircraft – Communications requirements

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<thead>
<tr>
<th>Capability</th>
<th>Civil Requirements</th>
<th>Mandate Status</th>
<th>State Aircraft equivalent equipage</th>
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<tbody>
<tr>
<td><strong>25 kHz VHF Voice</strong></td>
<td>2 sets of VHF Transceivers with 25kHz channel spacing</td>
<td>Mandated for non-8.33kHz area, e.g. below FL 245</td>
<td>2 sets of 8.33 kHz VHF radios are mandated by JAR-OPS, JAA TGL7 for civil aircraft. It remains to be defined a similar backup policy for State aircraft when equipped with one 8.33 kHz VHF radio and UHF. EC regulation 1079/2012 (Article 9) contains arrangements for State aircraft. Above FL 195 non-transport type State aircraft when justified by procurement constraints are to equip by 31 December 2015 at the latest. All State aircraft entering into service (or suffering major mid-life upgrades) after 01 January 2014 to be equipped (Forward Fit). Retrofit all State aircraft by 31 December 2018. Transition Arrangements are possible due to technical, budgetary or procurement constraints with communication to the Commission by 30 June 2018 and equipage by 31 December 2020 at the latest. Exempted: All State aircraft that go out of service by 31 December 2025. ATS providers are to accommodate non-equipped State Aircraft on UHF or VHF 25 kHz, provided safety ensured. Publication in national aeronautical information publication (AIP) of applicable procedures is also required.</td>
</tr>
<tr>
<td><strong>8.33 kHz VHF Voice</strong></td>
<td>2 Sets of VHF Transceivers with 8,33 KHZ channel spacing</td>
<td>Mandatory carriage above FL195 from 15 March 2007. Carriage applicable also below FL195 from 17 November 2012. It applies to all State aircraft with transition arrangements for technical and procurement constraints including handling on VHF 25 kHz or UHF by ANSPs.</td>
<td>2 sets of 8.33 kHz VHF radios are mandated by JAR-OPS, JAA TGL7 for civil aircraft. It remains to be defined a similar backup policy for State aircraft when equipped with one 8.33 kHz VHF radio and UHF. EC regulation 1079/2012 (Article 9) contains arrangements for State aircraft. Above FL 195 non-transport type State aircraft when justified by procurement constraints are to equip by 31 December 2015 at the latest. All State aircraft entering into service (or suffering major mid-life upgrades) after 01 January 2014 to be equipped (Forward Fit). Retrofit all State aircraft by 31 December 2018. Transition Arrangements are possible due to technical, budgetary or procurement constraints with communication to the Commission by 30 June 2018 and equipage by 31 December 2020 at the latest. Exempted: All State aircraft that go out of service by 31 December 2025. ATS providers are to accommodate non-equipped State Aircraft on UHF or VHF 25 kHz, provided safety ensured. Publication in national aeronautical information publication (AIP) of applicable procedures is also required.</td>
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<td><strong>VHF FM Immunity</strong></td>
<td>ILS and VOR receivers to be protected against interference from VHF broadcast. FM immune VHF equipment is to be used.</td>
<td>Mandated for en-route and airports as specified in national AIPs</td>
<td>Exemptions for State a/c may still be negotiated on a bilateral basis. See national AIPs.</td>
</tr>
<tr>
<td><strong>Controller-Pilot Data Link Communications (CPDLC) ATN/VDL Mode 2</strong></td>
<td>CPDLC application over ATN/VDL Mode 2 (or other communication protocols). See equipage details above (civil aircraft)</td>
<td>EC regulation 29/2009 requires implementation by ATS providers of data link services for above FL285: all of EU: FEB 2018</td>
<td>The EC regulation 29/2009 includes provisions on State aircraft. Member States which decide to equip new transport type State aircraft entering into service from 01 January 2019 with data link capability relying upon standards which are not specific to military operational requirements, shall ensure that those aircraft have the capability to operate the data link services defined in the Regulation (with ATN/VDL Mode 2 data link or other communications protocol). Technical guidance: see EASA CS ACNS</td>
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### State Aircraft – Navigation Requirements

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<tr>
<td><strong>ILS</strong></td>
<td>ILS receiver</td>
<td></td>
<td>Available as part of Multi-Mode Receiver (MMR)</td>
</tr>
<tr>
<td><strong>MLS</strong></td>
<td>MLS receiver (EU OPS 1.865)</td>
<td></td>
<td>Available as part of Multi-Mode Receiver (MMR)</td>
</tr>
</tbody>
</table>
| **RNAV5 (or B-RNAV)** | RNAV systems capable of ± 5 NM accuracy.  
See EASA AMC 20–4 and FAA 90–96A | Mandatory all en-route airspace.                  | For ECAC airspace the primary sources of navigation information are VOR/DME, DME/DME and GPS. The availability and continuity of VOR and DME coverage have been calculated for most of Europe and they are considered to be capable of meeting the requirements of the en-route phase of operations.  
State aircraft are exempted from the B-RNAV mandatory requirement. Within TMAs, non B-RNAV State aircraft should be routed via non-RNAV-based SIDs and STARs. For en route, State aircraft should be routed via VOR/DME or TACAN-defined ATS routes or via conventional navigation aids. See national AIPs.|
| **RNAV1 (or P-RNAV)** | RNAV systems capable of ± 1 NM accuracy.  
See FAA 90-96 and JAA TGL10 - Revision 1  
OPS approval required to fly P-RNAV | Currently being introduced (whilst no ECAC-wide mandate for the carriage of P-RNAV is foreseen, some States may require P-RNAV certification for IFR operations in notified terminal airspace).  
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. | |
| **RVSM**         | ICAO Min. Aircraft System Performance Standard (MASPS)  
The RVSM MASPS include:  
(1) Two independent, cross-coupled altitude measurement systems;  
(2) One automatic altitude control system (±65’);  
(3) One altitude alert system (±300’/±50’);  
(4) One SSR altitude reporting transponder  
(5) RVSM compliant avionics configuration.  
See JAA TGL 6 Revision1 and EU OPS 1 Subpart L (1.872) | Mandated from FL290 to FL410  
State aircraft can be accommodated in RVSM airspace: 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.  
However, States are requested to adapt their State aircraft for RVSM approval, to the extent possible, and especially those aircraft used for General Air Traffic (GAT).  
There is no exemption for State aircraft to operate as GAT within RVSM airspace (FL 290 to FL 410) with a 1000 ft vertical separation minimum without an RVSM approval. The absence of such approval does not mean that State aircraft cannot access RVSM-designated airspace, but it does require a separation of 2000 ft to be observed. Non-approved State aircraft operating within RVSM airspace with a 2000 ft vertical separation requires the submission of a flight plan with "M" in field 10 and "STS/NONRVSM" in field 18.  
On September 2014 the Military ATM Board endorsed the EUROCONTROL Guidance Material for the Certification and Operation of State Aircraft in European RVSM Airspace V2.0.  
See additional details at: European Regional Monitoring Agency and Civil-military navigation interoperability. | |
## State aircraft – Navigation requirements

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<tr>
<td><strong>RNP APCH (flown to LNAV minima)</strong></td>
<td>Deployment status and plan available on the PBN Approach map (AMC 20-27).</td>
<td>Specific applicability to State aircraft not defined. May be considered in the context of PBN.</td>
<td></td>
</tr>
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| **RNP APCH flown to LNAV/VNAV minima)** also called APV Baro/VNAV | Deployment status and plan available on the PBN Approach map  
See AMC 20-27, FAA documents AC20-138, AC20-130A and 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. Specific applicability to State aircraft not defined. May be considered in the context of PBN. |                                                                                                  |
| **SBAS APV (flown to LPV minima)** | Requirements for SBAS receivers are contained in ICAO annex 10 Volume 1.  
Also see specification RTCA DO 229C and FAA TSO C145/146A. | Deployment status and plan available on the PBN Approach map. | SBAS supports RNAV Approach operations to LPV minima. Specific applicability to State aircraft not defined. May be considered in the context of PBN. |
| **RNP AR (Authorisation Required) APCH** | Under consideration at selected airport.  
Deployment status and plan available on the PBN Approach map.  
See AMC 20-26 | Specific applicability to State aircraft not defined. May be considered in the context of PBN. |                                                                                                  |
| **GBAS CAT I GBAS CAT II/III** | GBAS equipment is contained in aircraft multi-mode receiver (MMR). GBAS performance specification is contained in RTCA DO 253c LAAS receiver MOPS.  
In operation at selected airports (CAT I operations). CAT II/III operations in validation.  
Deployment status and plans available at flyGLS.net | GBAS SARPS for CAT I became applicable in Nov 2001 (refer to ICAO SARPS annex 10 volume 1).  
GBAS SARPS for CAT II/III published as baseline development standards. Specific applicability to State aircraft not defined. May be considered in the context of PBN taking due account of available MMR capability. |                                                                                                  |
### State aircraft – Surveillance requirements

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<tr>
<td></td>
<td></td>
<td>However note Mode S requirement below</td>
<td>However, the requirement within each State’s jurisdiction can vary. Therefore you have to refer to National AICs and AIPs.</td>
</tr>
</tbody>
</table>
| SSR Mode S Elementary Surveillance (ELS) | "Basic Functionality” required:  
Automatic reporting of Aircraft Identity  
Transponder capability report  
Altitude reporting in 25 ft intervals  
Flight status  
SI Code capability  
See EASA CS-ACNS.  | Commission Implementing Rule (IR) (EU) No 1207/2011 (laying down requirements for the performance and the interoperability of surveillance for the single European sky) amended by EU1028/2014 specifies the airborne equipage requirements for Mode S ELS in State aircraft.  
The respective overall deadline to equip all State Aircraft is 7 December 2017.  
For State aircraft that can’t be equipped in due time the IR mandates Member States to communicate to the Commission by 1 July 2016 a list of State aircraft that can’t be equipped.  
At the same time it mandates ANSPs to accommodate Non–equipped state aircraft within the safety limits of their system. These limits have to be justified annually to their Member State.  
|                                 |                                                                                     |                                                                                  | Mode S ELS is already in operational use within MUAC airspace, and the designated airspace of a number of States including DE, NL, and FR, CH, AT, IT, CZ, HU, and RO. In some States the requirement is also applicable for flights conducted as VFR. |
|                                 |                                                                                     |                                                                                  | ELS operations will extend to all of the airspace defined in Article 1(3) of Regulation (EC) No 551/2004 of the European Parliament and of the Council, by not later than 02 January 2020. |
|                                 |                                                                                     |                                                                                  | Non-compliant State aircraft: All State aircraft not yet compliant with Mode S ELS requirements need a dispensation for flights in ELS and EHS notified airspace. |
|                                 |                                                                                     |                                                                                  | See also Aircraft Equipage Requirements in the European Commission IRs for further details regarding the dates by which the requirements detailed in the Implementing Regulations come in to effect. |
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<td>SSR Mode S Enhanced Surveillance (EHS)</td>
<td>Commission Implementing Rule (IR) EU 1207/2011 (laying down requirements for the performance and the interoperability of surveillance for the single European sky) amended by EU1028/2014 specifies the airborne equipage requirements for Mode S EHS in transport type State aircraft. The respective deadline is 7 June 2020. For State aircraft that can’t be equipped in due time the IR mandates Member States to communicate to the Commission by 1 July 2018 a list of State aircraft that can’t be equipped. At the same time it mandates ANSPs to accommodate Non-equipped state aircraft within the safety limits of their system. These limits have to be justified annually to their Member State. EHS is e.g. currently mandated in designated airspace of DE, FR and GB Also mandated above FL 245 in the airspace of BE and the NL (within airspace delegated to MUAC). The EASA Certification Specification for Airborne Communications, Navigation and Surveillance (CS-ACNS), published December 2013, provides the avionics certification documentation in line with Commission Implementing Rule EU1207/2011.</td>
<td>EHS equipment is only required for &quot;transport type&quot; State aircraft. &quot;Transport type&quot; State aircraft are liable for EHS equipage when flying IFR/GAT in EHS designated airspace, all DAPs are available, MTOM is 5700 kg or more and maximum cruising true airspeed is in excess of 250 kts. Non-compliant State aircraft: Transport-type State aircraft assessed to be EHS capable but not yet compliant with EHS requirements need a dispensation for flights in EHS notified airspace. Transport-type State aircraft assessed to be non-EHS capable do NOT need a dispensation for flights in EHS notified airspace. They must as a minimum however, be compliant with Mode S ELS requirements. For more details: consult (IR) (EU) No 1207/2011, EU1028/2014, Civil-military CNS coordination and Aircraft Equipage Requirements in the European Commission IRs for further details regarding the dates by which the requirements detailed in the Implementing Regulations come in to effect.</td>
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</tr>
<tr>
<td>ADS-B</td>
<td>ADS-B Out Transmit System: EASA ETSO C166b EUROCAE ED-102A RTCA DO-260B ICAO Annex 10 Doc. 9871 Ed.2 ADS-B Out Horizontal Position Source: EASA ETSO C129a (plus specific EASA CS ACNS qualifications)</td>
<td>Commission Implementing Rule (IR) (EU) No 1207/2011 (laying down requirements for the performance and the interoperability of surveillance for the single European sky) amended by EU1028/2014 specifies the airborne equipage requirements for &quot;ADS-B Out&quot; in transport type State aircraft. The respective deadline is 7 June 2020. For State aircraft that can’t be equipped in due time the IR mandates Member States to communicate to the Commission by 1 July 2018 a list of State aircraft that can’t be equipped. At the same time it mandates ANSPs to accommodate Non-equipped state aircraft within the safety limits of their system. These limits have to be justified annually to their Member State. The EASA Certification Specification for Airborne Communications, Navigation and Surveillance (CS-ACNS), published December 2013, provides the avionics certification documentation in line with Commission Implementing Rule EU1207/2011.</td>
<td>For more details: consult (IR) (EU) No 1207/2011, EU1028/2014 and Civil-military CNS coordination and Aircraft Equipage Requirements in the European Commission IRs EASA Certification Specification for Airborne Communications, Navigation and Surveillance (CS-ACNS), published December 2013, providing the avionics certification documentation in line with regulation EU. Following the standard EASA NPA consultation process, it is expected to include requirements and acceptable means of compliance for Mode A/C only surveillance. The EASA CS-ACNS is compliant with Commission Implementing Rule (IR) EU No 1207/2011 amended by EU1028/2014 EASA AMC 20-24 remains applicable for initial implementations of &quot;ADS-B Out&quot; in a non-radar environment.</td>
</tr>
</tbody>
</table>
## State aircraft – Safety Assurance requirements

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| **ACAS II** | European Union Airspace: TCAS II version 7.1:  
- all (civil) aircraft with a maximum certified take-off mass exceeding 5,700 kg or authorised to carry more 19 passengers from 1 March 2012;  
- with the exception of aircraft with an individual certificate of airworthiness issued before 1 March 2012 that must be equipped as of 1 December 2015;  
- Aircraft not referred above but which will be equipped on a voluntary basis with ACAS II, must be equipped with version 7.1.  
ECAC (outside EU airspace): All civil fixed-wing turbine-engine aircraft with a maximum take-off mass over 5,700 kg, or capable of carrying more than 19 passengers, must be equipped with TCAS II version 7.0. | Mandated for EUR Region (including FIR Canarias) by ICAO  
European Commission Implementing Rule 1332/2011 in EU airspace | ACAS mandate applies only to civil aircraft. Military authorities voluntarily committed to equip transport-type aircraft. In Germany, carriage and operation of ACAS II (i.e. version 7.0 or 7.1) by military transport aircraft is mandatory, see AIC IFR 13 20 MAR 03.  
Regulation 1332/2011 of 16/12/2011 mandated TCAS version 7.1 making reference to EASA Basic Regulation (216/2008) in respect to its applicability where military aircraft are excluded.  
The adoption of TCAS version 7.1 for transport type State aircraft may not have been seen as mandatory, in regulatory terms, but it is strongly encouraged for safety reasons.  
For more details consult:  
ACAS policy  
ACAS II dossier | |
| **Enhanced Ground Proximity Warning System (EGPWS) / Terrain Awareness Warning system (TAWS)** | Applicable to aircraft with:  
(1) MCTM>5700kg or a more than 30 seats 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 01 JAN 2005 and if  
MCTM>5700kg or passengers > 9 the date is 01 JAN 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 |