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Содержание: вопросы спектра, связанные с использованием частоты 1090 МГц и надлежащим распределением 24-битных адресов воздушных судов применительно к беспилотным воздушным судам, выполняющим полеты только на очень малых высотах

Требуемые действия: как указано в п. 3

1. Имею честь обратить ваше внимание на текущие инициативы ИКАО по обеспечению продолжения безопасной и надежной работы систем авиационного наблюдения, в том числе вторичного обзорного радиолокатора (ВОРЛ), системы радиовещательного автоматического зависимого наблюдения (ADS-B) и бортовой системы предупреждения столкновений (БСПС).

2. Один из основных способов обеспечения безопасной работы вышеупомянутых систем наблюдения заключается в надлежащем и эффективном использовании имеющейся ширины полосы и пропускной способности на частоте 1090 МГц. В ходе исследований, проведенных группами экспертов ИКАО, был выявлен ряд вопросов и потенциальных технических проблем, которые могут возникать во время эксплуатации этих систем наблюдения в условиях присутствия большого числа беспилотных воздушных судов (БПВС), оборудованных передатчиком ADS-B OUT с рабочей частотой 1090 МГц и выполняющих полеты на очень малых высотах. С учетом связанных с такими БПВС проблем, которые могут неблагоприятно сказат ься на безопасности полетов всех воздушных судов в соответствующем районе, ИКАО разработала прилагаемый инструктивный материал для оказания помощи государствам в области валидации использования частоты 1090 МГц, в котором также рекомендуется воздерживаться от присвоения БПВС 24-битных адресов воздушных судов, если не соблюдены определенные критерии.

3. В целях обеспечения того, чтобы вышеупомянутые системы наблюдения обладали достаточными возможностями для обслуживания воздушного движения, хотела бы призвать ваше государство использовать прилагаемый к настоящему письму инструктивный материал, а также любые другие соответствующие положения. ИКАО выражает готовность содействовать во внедрении правил и инструктивного материала и способствовать обмену передовой практикой.

Примите заверения в моем самом высоком уважении.

Фан Лю
Генеральный секретарь

Приложение:
Неотредактированный вариант инструктивного материала по вопросам спектра, связанным с использованием частоты 1090 МГц и надлежащим распределением 24-битных адресов воздушных судов применительно к беспилотным воздушным судам (БПВС) (только на английском языке).

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ATTACHMENT to State letter SP 44/2-19/77

GUIDANCE ON 1 090 MHZ SPECTRUM ISSUES AND PROPER MANAGEMENT OF 24-BIT AIRCRAFT ADDRESSES ASSOCIATED WITH UNMANNED AIRCRAFT (UA)

Note.— This document is an unedited advance version of an ICAO publication as approved in principle, by the Secretary General, which is made available for convenience. The final edited version will be included in the next amendment to the Aeronautical Surveillance Manual (Doc 9924), which will be published in due course.

1. Background

1.1 The frequencies 1 030 and 1 090 MHz, acting as a frequency pair, support several aeronautical surveillance systems including secondary surveillance radar (SSR), multilateration (MLAT), airborne collision avoidance systems (ACAS) and automatic dependent surveillance-broadcast (ADS-B). Aircraft are interrogated by ground SSR/MLAT (or other aircraft, in the case of ACAS) on 1 030 MHz and reply (or broadcast) on 1 090 MHz with information such as their position, altitude and velocity vector.

1.2 The increasing density of ground-based and on-board surveillance systems using the 1 030/1 090 MHz frequencies is currently raising concerns, especially in dense airspaces. Ultimately it may result in a reduction to the overall performance of ACAS as well as the SSR/MLAT and ADS-B systems. In addition, the increased usage of ADS-B OUT applications for safety of life services and potential future evolution of those applications, such as space-based ADS-B, have raised serious concerns of potential congestion at 1 090 MHz. To ensure continued safe operation for all aircraft, proper and efficient utilization of available bandwidth at 1 090 MHz is required. This may include, when necessary, limiting access to 1 090 MHz by certain users.

1.3 Furthermore, it is important to note that those aeronautical surveillance systems rely on a limited capacity 24-bit aircraft address scheme. The allocation of a 24-bit aircraft address and its correct configuration in aircraft is a key element for safe operation of aircraft and associated protocols used to support communication and surveillance systems.

1.4 As defined in Annex 10 — *Aeronautical Telecommunications*, Volume III — *Communication Systems*, aircraft addresses are allocated in blocks by ICAO to the State of Registry or to the common mark registering authority. Using its allocated block of addresses, the State of Registry or the common mark registering authority assigns an individual aircraft address to each suitably equipped aircraft entered on a national or international register.

1.5 It is essential for States to recognize that their allocated block of 24-bit aircraft addresses is a finite and valuable asset. There are only 16 777 214 aircraft addresses in total and many of those have already been allocated to States of Registry or common mark registering authorities. Aircraft traffic growth has been forecast to double in the next 15 years and to manage these addresses in a sustainable manner, States need to validate whether new aircraft address allocation requests by aircraft operators fit the conditions defined in Annex 10, Volume III.

2. Issues identified in relation to operation of unmanned aircraft

2.1 As described above, concerns are being raised about congestion of the 1 090 MHz frequency and shortage of 24-bit aircraft addresses. The rapid growth in the number of UA is making those concerns more severe.

2.2 *Exponential increase of the safety risk due to 1 090 MHz congestion*

2.2.1 A recent study indicates that large numbers of UA (one UA per 2 square kilometres) operating at low level (less than 500 feet above ground level) in a typical high-density terminal airspace (760 ADS B-equipped aircraft operating within a 200 NM radius and from ground level to FL180) can

interfere with ADS-B ground station reception of ADS-B reports when the transmit power of each UA is 1 watt or higher.

Note.— Some other studies indicate that even a low power (0.1W) transmission from large numbers of UA can reduce the coverage range of ADS-B.

2.2.2 All studies reviewed conclude that the operation of ADS-B OUT by a large number of UA raises a serious concern for the safety of other aircraft in the same airspace.

2.3 *Future depletion of 24-bit aircraft addresses*

2.3.1 The 24-bit aircraft address scheme was not designed for a very large number of aircraft. Some studies predict that based on the present growth of UA, there will be over a million such vehicles by 2025. Based on these current projections, it will be impossible to accommodate all UA in the current scheme.

2.3.2 In some situations UA may require a 24-bit aircraft address, for instance if the UA fly in controlled airspace or in proximity to traditional manned aircraft. States will need to evaluate such situations on a case-by-case basis when receiving a new aircraft address application from the UA community.

Note.— As described in the Manual on Remotely Piloted Aircraft Systems (RPAS) (Doc 10019), an aircraft which is intended to be operated with no pilot on board is classified as unmanned and an unmanned aircraft which is piloted from a remote pilot station is a remotely piloted aircraft (RPA) (refer to the following figure).

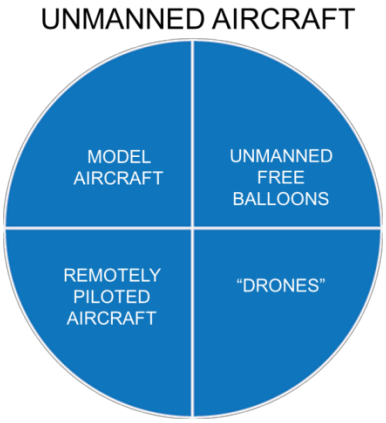


Figure 1-1 Unmanned aircraft

3. **Procedure to ensure proper utilization of 1 090 MHz and for non-allocation of (24-bit) aircraft address for UA**

3.1 There is increasing pressure to use 1 090 MHz Mode S or ADS-B OUT applications by UA. Given the large forecasted increase of UA and the fact that transmissions from their transponders or ADS-B OUT devices will impact the already congested use of 1 090 MHz by existing aeronautical surveillance and collision avoidance systems, States are urged to:

1) perform radio frequency spectrum analysis to analyse the degree of congestion of 1 090 MHz and, based on the outcome of this analysis, consider how 1 090 MHz ADS-B UA operations might impact the performance of the air navigation service provider (ANSP)-operated surveillance

systems in airspace of interest as well as the automatic collision avoidance systems on board aircraft operating in that airspace;

2) formulate the circumstances and define procedures to determine the potential requirement for 1 090 MHz ADS-B OUT equipage on UA in order to allow or prohibit such equipage as appropriate. During this process, States should consider:

   - the degree to which individual UA may or may not require air traffic services. For example, a UA operating in uncontrolled airspace may not be required to use ICAO-compliant aeronautical surveillance systems; and

   - the degree to which the operation of individual UA may or may not interoperate in the airspace with traditional manned aircraft. For example, if UA are not operating in proximity to traditional manned aircraft, then the use of ICAO-compliant aeronautical surveillance equipment by UA may not be justified.

3) in cases where UA are not required to equip with ICAO-compliant aeronautical surveillance equipment**,** States should not allocate 24-bit aircraft addresses.

Note.— 24-bit aircraft address allocation should be a part of the UA registration or operator approval process. For guidance material on reliable usage of 24-bit aircraft addresses, refer to Annex 10, Volume III and Doc 9924.

— КОНЕЦ —