国 际 民 用 航 空 组 织

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工 作 文 件

第十三次空中航行会议

2018年10月9日至19日，加拿大蒙特利尔

委员会A

议程项目 5： 正在出现的问题

5.2： 1000英尺以下的运行

对未经授权的无人飞行器的侵入进行战术风险管理

（由阿拉伯联合酋长国提交）

执行摘要

本文件介绍了阿拉伯联合酋长国为管理未经授权的航空器如无人驾驶航空器系统（UAS）等进入受控空域的事件所采用的战术风险评估模型。战术风险评估能确保采取的行动与侵入者构成的风险相称，并避免造成与大规模改航和限制空域使用相关的额外风险。

行动：请会议：

a) 注意到本工作文件的内容；

b) 将该模型作为全球指导材料送交遥控驾驶航空器系统专家组(RPASP)、无人驾驶航空器系统咨询组（UAS-AG）和空中交通管理运行专家组（ATMOPSP）供其进一步审议；和

c) 考虑将这种模型纳入国家法规。

1. 引言

1.1 阿拉伯联合酋长国引领无人驾驶航空器系统（UAS）的开发和创新。由于目前正在对一些先进项目进行广泛的研究和开发，民航总局（GCAA）为支持增长和创新并同时维护安全，制定了一项灵活的基于风险的监管政策。

1.2 尽管如此，虽然对商用和实验运行维持一定程度的管制，但公众一直关注小型个人无人驾驶航空器系统（UAS）的扩散。小型无人驾驶航空器系统侵入受控空域，特别是邻近主要机场的空域，加上

空中交通管制（ATC）缺乏处理此类事件的经验，已造成多次大范围的空域限制或机场关闭，这本身就给这个系统带来了额外危险。

2. 讨论

2.1 未经授权的航空器在未获空中交通服务提供者事先许可的情况下进入受控空域可能会导致安全、效率、环境和安全等多方面风险。这类犯规行为：

a) 危及其他空域使用者，并可能立即导致驾驶员、空中交通管制人员（ATCOs）和监督人员的工作量大幅增加，例如需要进行协调、中断进近、改变航空器着陆顺序或采取其他应急措施等；

b) 会意外延长空中滞留时间、导致改航并可能造成燃料不足的紧急情况，从而增加其他航空器的运行安全风险；

c) 由于机场和空域的关闭或限制造成许多延误和改航，会给业界带来不可接受的成本；

d) 可对国家安全构成重大威胁，因为此类未经授权的飞行不会得到通常的通信和监视，或者由于对其他空中交通造成延误以致增加排放而对环境可能产生的不利影响。

2.2 因此，通过空中交通管理层、主管人员、空中交通管制人员和其他相关人员及利害攸关方之间的协作决策过程对风险进行战略分析和评估后，综合应急措施的制定和实施应将安全和安保风险维持在可接受的水平，并同时尽量减少未经授权的航空器对正常运行产生的影响。

2.3 2016 年 11 月，阿拉伯联合酋长国民航总局（GCAA）发布了第 2016-16 号安全决定，其中为空中航行服务提供者提供了监管框架和指导，说明如何对受控空域的侵入进行战术风险评估和采取缓解措施，同时确保这些措施与侵入所构成的风险相称并对系统造成最小的压力。2017 年 7 月再次审查了这项安全决定，以便根据空中航行服务提供者的要求，以国家模板的形式提供进一步指导。整个过程已经非常成功地减少了侵入航空器造成的不利影响，同时保持了适当的安全水平。

2.4 这项进程可总结如下：

2.4.1 空中交通服务单位（ATSUs）须制定、建立、实施和维护一个安全管理系统（SMS），以确保：

a) 积极进行危险识别，防止未经授权的航空器（例如，无人飞行器（UAV））进入空域；

b) 有效执行风险缓解活动，确保提供的服务能持续安全和相配，并在情况必要时，部署应急计划，其中包括空域存在未经授权的航空器时启动战术风险评估程序。应急计划应及时启动或取消；和

c) 在执行上述 a）和 b）规定的活动时，酌情与相关机场、周围地区和附近的空中交通服务单位（ATSUs）以及地方相关机关进行适当和有效的协调。

2.4.2 对战术风险评估应加以记录和实施，以确定空域遭到侵犯的情况下应采取何种适当行动，其中应包括以下各项规定：

a) 从各种来源获取尽可能多的有关造成的危害的信息；

b) 发送必要的交通情报警告其他航空器所处的险情；和

c) 在获知或察觉空域遭到侵犯后，决定应否对空域、航空公司或机场施加任何限制。

2.4.3 空中航行服务提供者须向主管人员和空中交通管制员提供：

a) 民航总局（GCAA）颁布的有关轻型休闲航空器和无人驾驶航空器系统运行的联邦法规要求；和

b) 给予他们适当指导，确保他们能够：

1) 将影响其空域的无人驾驶航空器系统的运行请求转给民航总局；

2) 不让任何无人驾驶航空器系统进入其空域，除非运行无人驾驶航空器系统的个人或机构可以提供民航总局的批准文件副本。民航总局之外的其他航空当局制定的监管规定和/或准许文件均无效用；

3) 参考民航总局出版的无人驾驶航空器系统飞行区地图（参见www.gcaa.gov.ae）。根据1991年第20号联邦法案民航法第20条，使用未经民航总局公布的任何无人驾驶航空器系统飞行区地图或出版物都是非法的；和

4) 通过战术风险评估和管理其空域内未经授权的航空器的运行，并进行充足的培训、指示和指导，以识别非法干扰航空器的行为。

2.4.4 此类程序、说明和指导应确保所有危害、风险和缓解措施得到适当和策略性的评估。作出的决定可包括涉及机场和空域限制的任何安全和安保措施，以及有警察、军队和其他安全当局的适当参与。

2.4.5 当空中交通服务单位（ATSUs）发现其空域内有未经授权的航空器时，应立即：

a) 开始向其他航空器提供有关未经授权的航空器造成的危险的交通情报，不论知道的信息多么少。这一重要交通情报的提供应持续不少于60分钟，除非在这一时间之前能确定未经授权的航空器已离开空域；

b) 确保其空中交通服务（ATS）人员已作出战术风险评估，其目的是确定是否需要建立一个危险区来保护其他空中交通；

c) 一旦确定了危险区域的范围后，使用当时可用的所有情报分析对其他航空器运行的威胁，以确定适当的缓解措施。这些缓解措施可包括但不限于：

1) （酌情）通过发送重要的交通情报通知在未经授权的航空器附近运行的航空器，并建议该航空器在必要时采取闪避行动；

2) 允许使用中的跑道继续运行：

— 在仔细分析所有可用的信息后采取缓解措施并谨慎应对，即使未经授权的航空器可能已离使用中的跑道足够远；和

— 如果收到的信息可以合理保证未经授权的航空器不会对其他航空器构成威胁；

3) 考虑对设定的危险区进行清理，但其任务是拦截或压制未知或不明航空器的警察或军用航空器除外；和

4) 如果未经授权的航空器对离场爬升区、到港最后进近区或机场附近的其他交通产生影响，考虑改变跑道方向或限制跑道运行；

d) 按照当地商定的程序，通知有关当局，包括警察、军队和其他安保部门；和

e) 努力通过以下方式查明航空器：

1) 试图与相关航空器建立双向通信或从该地区的其他航空器获取信息；和

2) 就涉事航空器询问飞行情报区（FIR）内的其他空中交通服务单位（ATSUs）或向相邻飞行情报区提供服务的空中交通服务单位，请求它们协助与该航空器建立双向通信。

— 完 —

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

SAFETY DECISION 2016-16

Issue 02
Date of Initial issue: 15th June 2016
Date of this Issue: 05th July 2017

SUBJECT:
CONTINGENCY MEASURES FOR UNAUTHORISED AIRCRAFT[1] WITHIN CONTROLLED AIRSPACE

REFERENCE PUBLICATIONS:
CAR PART II, Chapter 10
CAR PART II, Chapter 11
CAR Part IV (UAS)
CAR Part VIII, Subpart 4
CAR Part VIII, Subpart 10
GM-03 CONTINGENCY PLANNING FOR AIR TRAFFIC SERVICES

REASON:
The purpose of this Safety Decision is to:

- ensure civil aviation regulations are adhered to when unauthorised aircraft, either reported or observed, affect aircraft safety, security and efficiency in controlled airspace, and
- provide decisions, recommendations and guidance on contingency measures to be implemented by ATS Units to tactically manage the risk to safety to an acceptable level, while limiting restrictions to other air traffic.

In the context of this document, the term 'unauthorised aircraft' will be used as a generic term to encompass unknown or unidentified aircraft in controlled airspace, whether manned or unmanned, remotely piloted or autonomous.

The penetration by an unauthorised aircraft into a portion of controlled airspace without prior permission from the air traffic services provider may result in multiple safety, efficiency, environmental and security risk concerns. Such infringements:

- are hazardous to other airspace users;
- may immediately result in a significant increase in Pilot's, ATCO's and Supervisor's workload such as, coordination, the need to break-off an approach, change aircraft sequence for landing or implement other contingency measures, etc.;

[1] This term *encompasses unknown or unidentified aircraft in controlled airspace, whether manned or unmanned, remotely piloted or autonomous.*

- may increase the risk to operational safety of other aircraft through unexpected extended airborne delays, diversions and increased likelihood of fuel emergencies;
- may cause an unacceptable cost to industry, due to numerous delays and diversions incurred through closures of or restrictions placed on airports and airspace;
- may pose a significant threat to national security since such unauthorised flights will not be under normal communications and surveillance;
- may have adverse environmental impacts through increased emissions caused by resultant delays to other air traffic.

Consequently, the development and implementation of comprehensive contingency measures, where the risk is tactically analysed and assessed through collaborative decision-making processes between ATC Management, SUPs, ATCOs and other relevant personnel and stakeholders, should manage the safety and security risks to an acceptable level, while minimising the impact on normal operations by unauthorised aircraft.

Any deviation from GCAA regulatory requirements is considered a violation of UAE Civil Aviation Law and UAE National Civil Aviation Regulation with direct safety and security risk implications.

The reason of this issue 02 is to incorporate guidance material which has been developed in consultation with Air Navigation Service Providers (ANSPs). The guidance material is hereafter attached as Appendix A

REQUIREMENTS:

REQUIREMENT No. SD 2016-16(01):

ATSUs shall develop, establish, implement and maintain an SMS to ensure:

a) hazard identification is pro-actively conducted to prevent from airspace penetration by an unauthorised aircraft (e.g. UAS); and

*b) risk mitigation activities are effectively performed to assure safe continuity and adaptability of service provisions with, if the situation deems it necessary, the deployment of the contingency plan that includes a **tactical risk assessment process** when the airspace is in the presence of unauthorised aircraft. The contingency plan shall be activated or de-activated in a timely manner.*

c) appropriate and effective coordination with associated Aerodrome(s), surrounding and adjacent ATSUs and local appropriate authorities, as applicable while carrying out activities specified in a) and b) above.

REQUIREMENT No. SD 2016-16(02):

*The **tactical risk assessment process** required by paragraph 1)b) above shall be documented and implemented to determine the appropriate actions to be taken in the event of airspace infringement which shall include the following requirements:*

a) obtain as much information as possible of the induced hazard from any source;

b) warn other aircraft of the induced hazard through the passing of essential traffic information; and
c) determine if any restrictions are necessary within the airspace, airways or aerodromes following the report or observation of the airspace infringement.

GUIDANCE TO REQUIREMENT No. SD 2016-16(02)a):

The following "aide-memoire" may facilitate the collection of such information:
a) An accurate position/location of the reported unauthorised aircraft is provided;
b) Was the unauthorised aircraft stationary or moving? If moving, what was the observed direction and if possible provide an approximate speed?
c) At what altitude was the unauthorised aircraft operating? Was it maintaining level flight, or climbing/descending?
d) What is the type of aircraft? Is it manned, unmanned, fixed wing, quad copter, gyrocopter, etc.
e) For an Unnamed Aircraft System (UAS), was the location of the UAS operator observed by the reporting source?
f) Any other question relevant to the situation at that time, which may assist in assessing the risk to safety and or security.

REQUIREMENT No. SD 2016-16(03):

Compliance with paragraphs 1) a) and 1) b) shall, in particular, require ATSUs to provide SUPs and ATCOs with:
a) solid knowledge of the federal regulatory requirements for Light Sport Aircraft and Unmanned Aircraft System (UAS) operations promulgated by the GCAA;
b) adequate instructions to ensure they can:
  1) direct requests for intended UAS operations affecting their airspace to the GCAA;
  2) deny access to their airspace to any UAS operation unless the individual or organisation operating the UAS can provide a copy of the approval issued by the GCAA. Regulatory requirements and/or approvals established by other aviation authorities than GCAA are insufficient; and
  3) reference UAS flying zone maps published by GCAA (refer www.gcaa.gov.ae). The use of any UAS flying zone maps or publications not published by the GCAA is illegal according to Civil Aviation Law Article 20 of the Federal Act 20 of 1991; and
c) adequate training, instructions and guidance for the recognition of unlawful interference with an aircraft through a tactical risk assessment and the management of unauthorised aircraft operations in their airspace.

GUIDANCE TO REQUIREMENT No SD 2016-16(03)c):

Such procedures, instructions and guidance should ensure that all hazards, risks and mitigations will be appropriately and tactically assessed. Decision may include any safety and security measures involving

aerodrome and airspace restrictions, and appropriate involvement with police, military and other security authorities.

REQUIREMENT No. SD 2016-16(04):

When ATSUs become aware of an unauthorised aircraft in their airspace, they shall immediately:

a) *commence providing traffic information to other aircraft about the hazard posed by the unauthorised aircraft irrespective of how little information may be known (CAR VIII Subpart 4, 4.2.7.(b).8 refers). This essential traffic information shall continue for a period of no less than 60 minutes, unless it can be confirmed the unauthorised aircraft has vacated the airspace before this time;*
b) *ensure that its ATS personnel has executed a tactical risk assessment with the aim to determine if a hazardous area needs to be established to protect other traffic;*
c) *once the extent of the hazardous area has been determined, analyse the threat to other aircraft operations using all information available at that point in time in order to determine appropriate mitigations. Such mitigations may include but are not limited to:*

    1) *Advise aircraft in the vicinity of the unauthorised aircraft operation by passing essential traffic information (as appropriate) and advise aircraft to take avoiding action if necessary.*
    2) *Allow operation of active runways to continue:*
        i) *with mitigation and caution after careful analysis of all available information even if the position of the unauthorised aircraft may be deemed sufficiently far from the active runway.*
        ii) *If information received provides reasonable assurance that the unauthorised aircraft is not a threat to other aircraft;*
    3) *Consider sterilising the identified hazardous area, with the exception of the police or military aircraft which are tasked with intercepting or shadowing the unknown or unidentified aircraft.*
    4) *Consider changing runway direction, or restricting runway operations if the unauthorised aircraft affects the departure climb-out area, final approach for arrivals or other traffic in the vicinity of the aerodrome;*
    5) *Alert aircraft operating in Class G airspace if appropriate.*

d) *inform the appropriate authorities including police, military and other security authorities as per the locally agreed procedures. Those procedures must be reviewed and practiced (for effectiveness check) at least annually, through an exercise or live event which is subject to a documented debrief review;*

e) *endeavour to identify the aircraft by:*

1) *attempting to establish two-way communication with the concerned aircraft or to obtain information from other aircraft in the area;*
2) *inquiring other ATSUs within the FIR or ATSUs serving the adjacent FIRs about the concerned aircraft and requesting their assistance in establishing two-way communication with it;*

f) promptly notify the GCAA Duty Investigator (Mobile: 050 641 4667); and

g) submit a ROSI within 3 hours from the time of the occurrence.

GUIDANCE TO REQUIREMENT No. SD 2016-16(04)a):

In some circumstances an ATIS broadcast associated with the airspace concerned may be sufficient to provide traffic information.

GUIDANCE TO REQUIREMENT No. SD 2016-16(04)b:

The extent of this area should be based on information derived from the reporter, such as the aircraft type, size, speed, general performance characteristics and fuel source. It may be necessary to extend this area if the intruder cannot be identified for an extended period.

Based on the Table 1 below, as the common types of UAS normally operate within a localized area, within Line of Sight of the operator, a reasonable assumption may be made that the UAS operation will normally be contained within approximately a 1 nm radius of the reported position of the drone.

To assist SUPs and ATCOs in conducting the tactical risk assessment a list of common UAS/ Drone types and performance characteristics should be provided to assist decision makers in this process. Where used, this list should be kept updated by ATSUs to reflect current technology and known new types of UAS/ Drones available.

Table 1:

From sources available as of October 2016 the following table gives an example of UAS types commonly operated in UAE and their performance characteristics.

Manufacturer	Model	Type	Weight	Max Speed Knots	Max Service Ceiling Ft	Duration Min
DJI	Phantom	Quadcopter	1.2Kg	30	20,000	25
DJI	Phantom 4	Quadcopter	1.2Kg	40	20,000	30
DJI	Inspire 2	Quadcopter	1.9Kg	60	14,000	27
DJI	Mavic	Quadcopter	700g	35	16,000	27
DJI	Matrice	Hexacopter	4.0Kg	45	15,000	30
Parrot	Bebop	Quadcopter	1Kg	20	1,000	25
Parrot	Disco	Fixed Wing	1Kg	40	1,000	40
Parrot	AR Drone	Quadcopter	1Kg	20	4,000	15
Yuneec	Typhoon	Quadcopter	1.3 Kg	20	5,000	25
Aibotix	X6	Hexacopter	4 Kg	20	10,000	30
Sensefly	eBee	Fixed Wing	700g	48	4,000	50
Asctec	Falcon 8	Hexacopter	2 KG	30	3,000	22
Microdrones	MD4	Quadcopter	1.1 Kg	25	3,000	25
Aeryon	Skyranger	Quadcopter	2.4 Kg	20	500	10
Lockheed Martin	indago	Quadcopter	2 Kg	35	500	40

GUIDANCE TO REQUIREMENT No. SD 2016-16(04)c):

Based on the performance characteristics of common UAS types, as contained in Table 1, it can be expected that the average maximum flight duration of an UAS intruder may not exceed 30 minutes. Therefore, following a period of no less than 30 minutes from the last report of the unauthorised aircraft, restrictions relating to the identified hazardous area may be relaxed.

Note: If reports indicate that the unauthorised aircraft has a higher performance characteristic than usual, then the above time periods should be adjusted accordingly.

The attached Appendix A is to assist ATSU's in developing processes to achieve the intent of this SD. The template provided is for guidance only and should be adapted by local units to suit their circumstances.

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APPENDIX A

Guidance Material for the Tactical Risk Assessment of Unauthorised Aircraft within Controlled Airspace

This tactical risk assessment template should be adapted by ANSPs to incorporate relevant local procedures, and be accompanied by supporting documentation as deemed appropriate.

Note:
In the context of this document, the term 'unauthorised aircraft' will be used as a generic term to encompass unknown or unidentified aircraft in controlled airspace, whether manned or unmanned, remotely piloted or autonomous.

No.	ACTIONS TAKEN	DONE	COMMENTS
	INITIAL ACTIONS		
1.	**ATC to pass essential traffic information to other aircraft that may be affected by the Unauthorised Aircraft.**		
2.	**Confirm there is no approval for the intended operations affecting Name of the ATC Unit CTR/CTA.**		
Note 1: Deny access to Name of the ATC Unit CTA/CTR to any UAS operation unless the individual or organisation operating UAV can provide a copy of the approval issued by GCAA.			
3.	**REPORTED INFORMATION**		
3.1	Identifier of the reporter (aircraft/person etc.)		
3.2	Time of initial report		
3.3	**LOCATION**		
3.3.1	Is an accurate position/location of the unauthorised aircraft provided/available?		
3.3.2	Was the unauthorised aircraft stationary or moving?		
3.3.3	Direction of flight		
3.3.4	Approximate speed		
3.3.5	Altitude		
3.3.6	Maintaining level flight/ Climbing/ Descending?		
3.4	**AIRCRAFT/OBJECT DESCRIPTION**		
3.4.1	What is the type?		
3.4.2a	➢ Is it manned?		
3.4.2b	➢ Is it unmanned?		
3.4.3	➢ Fixed Wing? Multi-rotor?		
3.4.4	➢ Gyrocopter?		
3.4.5	➢ Other?		
3.4.6	➢ Model (If known)		
3.4.7	➢ Size		

3.4.8	➢ Colour		
3.4.9	➢ Fuel Source		
3.5	**For RPAS (drone) is the location of RPAS operator observed by reporting source?**		
Note 2: Common types of RPAS normally operate within a localized area, within line of sight of the operator. A reasonable assumption may be made that the UAS operation will normally be contained within approx. a 1 NM Radius of the reported position.			
Note 3: Based on performance characteristics of common UAS types, it can be expected that the average maximum flight duration of an UAS may not exceed 30 minutes.			

4	**Complete the local call out checklist**		
5	**Is airspace surrounding the Unauthorised Aircraft being sterilized? (if so, size of sterilisation area should be considered to be expanded with increased speed and/or unpredictable behaviour of Unauthorised Aircraft.)**		
Note 4: - ***Consider suspending runway operations at Name of the ATC unit if the*** **Unauthorised Aircraft** ***is within an area banded xxxxxxxxxxxxx.*** - ***Consider suspending departures if the*** **Unauthorised Aircraft** ***is within the XXXXXXX area.*** - ***Consider suspending arrivals if the*** **Unauthorised Aircraft** ***is located within XNM of the extended centreline on final approach and within X NM from touchdown for RWYxxxxxx and RWY XXXXXX.***			
Note 5: Runway operations may continue if information received provides reasonable assurance that the **Unauthorised Aircraft** ***is not a threat to aircraft. Essential Traffic information shall be passed in all cases.***			
6	➢ **Notification list**		
	➢ **GCAA Duty Investigator**		
7	**Alert and inform appropriate Sectors and adjacent ATSUs if deemed appropriate**		
8	**Limit number of aircraft within name of the ATC unit CTA/CTR if deemed appropriate.**		
9	**Submit ROSI within 3 hours**		

Additional Information Required:

1.	**Who reported the Unauthorised Aircraft.**		
	➢ **Operator/Callsign/ Name**		
	➢ **Any additional information available (Contact details)**		
	➢ **Weather data**		
2.	**Was assistance provided by available police/military aircraft to assess the situation?**		
3.	**Inform all concerned when normal operations resume.**		

ATTACHMENT 1 – RECORD OF AFFECTED AIRCRAFT			
DATE:	**TIME:**	**LOCATION:**	**UNIT/SECTOR:**
CALLSIGN	**DELAY (if any)**	**COMMENTS**	

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

SAFETY ALERT 04/2016

Issued: 29th June 2016

SUBJECT:
Contingency measures for unauthorised UAS operation or unknown/unidentified aircraft within controlled airspace.

REFERENCE PUBLICATION:
CAR PART II Chapter 10
CAR Part VIII, Subpart 4
CAR Part VIII, Subpart 10
GM 03 CONTINGENCY PLANNING FOR AIR TRAFFIC SERVICES

CATEGORY:
Attention and Recommendation

REASON:
The purpose of this Safety Alert is to:
- ensure civil aviation regulations are adhered to when unauthorised UAS operation or unknown/unidentified aircraft, either reported or observed, affect aircraft safety in controlled airspace, and
- provide recommendation and guidance on contingency measures to be implemented.

APPLICABILITY:
- UAE Air Traffic Services Units (ATSU)
- Air Traffic Controller Supervisors (SUP)
- Air Traffic Controllers (ATCOs)

DESCRIPTION:
The penetration by a manned or unmanned aircraft into a portion of controlled airspace without prior permission from the air traffic services provider may result in multiple safety, efficiency, environmental and security risk concerns. Such infringements:
- are potentially hazardous to other airspace users;
- may immediately result in a significant increase in ATCO's and Supervisor's workload such as coordination, the need to break-off an approach, change aircraft sequence for landing or implement other contingency measures, etc.;
- may cause an unacceptable cost to industry, incurred through closures of airports and airspace due to numerous delays and diversions; and
- may pose a significant threat to national security since such flights will not be under normal communications and surveillance.

Consequently, the development and implementation of comprehensive contingency measures, which as a minimum are analysed and assessed through collaborative decision-making processes between ATC Management, Supervisors, ATCOs and other relevant personnel, should minimise interference by unknown or unidentified aircraft operations with the normal operations.

Any deviation from GCAA regulatory requirements is considered a violation of UAE Civil Aviation Law and UAE National Civil Aviation Regulation with direct safety and security risk implications.

RECOMMENDATIONS:

Recommendation 1:
ATSUs should review contingency plans to ensure safe and orderly flow of traffic in the event of a disruption of an air traffic control service or a related support service due to airspace penetration by an unauthorised UAS operation or, an unknown or unidentified aircraft. The contingency plan should include the eventuality of closure or restrictions of airspace, airways or aerodromes following the report of such type of infringement.

Recommendation 2:
The ATSU should review current procedures for ATC Supervisors and ATCOs to ensure that they have been provided with adequate instructions, training (including awareness training of the GCAA regulatory requirements for Light Sport Aircraft and UAS Operations as per civil aviation regulations) and guidance for the management of authorised or unauthorised and unknown or unidentified aircraft operations and recognition of any indication of situations of unlawful interference with an aircraft. Such instructions and guidance should ensure that all hazards, risks and mitigations have been assessed appropriately and they may include any safety and security measures involving aerodrome and airspace availability, and appropriate involvement with police, military and other security authorities.

Procedures should ensure that as much information as possible is obtained from any reporting source. The following “aide-memoire” may facilitate the collection of such information:

a) Ensure that exact position/location of the reported aircraft/UAS is provided;
b) Was the aircraft/UAS stationary or moving? If moving, could this be best described as fast/slow or is it possible to provide an approximate speed?
c) If moving, what was the observed direction of flight?
d) At what altitude was the aircraft/UAS operating? Was it maintaining level flight, or climbing/descending?
e) Are you able to identify the type?
f) What size and colour was the aircraft/UAS? Was there any distinctive markings?
g) What is the location of the UAS operator if observed by the reporting source?
h) Any other question relevant to the situation at that time.

Recommendation 3:
An unauthorised UAS operation, or an unknown or unidentified aircraft which causes an unsafe situation is considered a serious incident with safety and security implications. ATSUs shall establish and implement a procedure to ensure:

- prompt notification to the GCAA Duty Investigator (Mobile: 050 641 4667); and
- a ROSI is submitted within 3 hours from the time of the occurrence.

Recommendation 4:
As soon as an ATSU becomes aware of an unauthorised UAS operation, or an unknown or unidentified aircraft in its airspace, the ATSU should endeavour to establish the identity of the aircraft whenever this is necessary for the provision of ATS or required by the appropriate military authorities in accordance with locally agreed procedures.

The following steps may assist an ATSU to identify the aircraft:

a) attempt to establish two-way communication with the aircraft;
b) inquire of other ATSUs within the FIR about the flight and request their assistance in establishing two-way communication with the aircraft;
c) inquire of ATSUs serving the adjacent FIRs about the flight and request their assistance in establishing two-way communication with the aircraft;
d) attempt to obtain information from other aircraft in the area.

Recommendation 5:
ATSUs should immediately inform, in accordance with locally agreed procedures, the appropriate authority including police, military and other security authorities, if an unauthorised UAS operation or an unknown or unidentified aircraft may be the subject of unlawful interference.

Recommendation 6:
ATSUs should apply separation between identified aircraft and unauthorised UAS operations or an unknown or unidentified aircraft observed, and provide avoiding instructions. If the unauthorised or the unknown or unidentified aircraft operations cannot be observed by the ATSU, the ATSU must temporarily create a segregated airspace around the affected area(s) and provide the applicable separation minima to such airspace boundary.

In addition to completing a call-out list, the ATSU should analyse the threat to other aircraft operations using the information available at that point in time. The below list of actions may assist in resolving such situations:

a) Stop departures;
b) Airborne aircraft should avoid the affected area;
c) Attempt to establish two-way radio communication with the unknown or unidentified aircraft, e.g. relevant frequencies and 121.5 MHz;

d) Notify other ATSUs, police, military and other security authorities and request their assistance in establishing radio contact with the unknown or unidentified aircraft and determining the aircraft's position, altitude, description (type, colour, markings, etc.), route and intentions;
e) Immediately inform affected ATSUs, police, military and other security authorities, Emirates ACC Supervisor, GCAA Duty Investigator and others as appropriate, if unable to establish radio contact with the unknown or unidentified aircraft and/or if radar identity cannot be established and/or the aircraft is suspected or known to be subject to unlawful interference;
f) Military and other security authorities may determine that it is required to intercept or shadow unknown/unidentified aircraft (and possibly UAS operations), which would provide a high level of assurance on its position if this event continues for an extended period of time;
g) Sterilise the airspace surrounding the unknown or unidentified aircraft, with the exception of a military aircraft which is intercepting or shadowing the unknown or unidentified aircraft. Consider the speed/altitude/routing when determining the size of the sterilisation area to be put in place. Increased separation from the sterilisation area should be established;
h) Cease runway operations if unauthorised UAS operations or an unknown or unidentified aircraft affects the departure climb-out area, final approach for arrivals or other traffic in the vicinity of the aerodrome;
i) Allow operation of active runways to continue:
    i. with mitigation and caution after careful analysis of all available information even if the position of the unauthorised UAS operations or an unknown or unidentified aircraft may be deemed sufficiently far from the active runway. Note: ATC may consider changing runway direction; or
    ii. if information received provides reasonable assurance that the unauthorised UAS operations or an unknown or unidentified aircraft is not a threat to other aircraft;
    iii. continue monitoring of the situation until information has been received that it has been resolved.
j) Advise aircraft in the vicinity of the unauthorised UAS operation or an unknown or unidentified aircraft by passing essential traffic information (as appropriate) and instruct aircraft to take avoiding action if necessary;
k) Request any aircraft having visual contact with the unauthorised UAS operation (this can potentially identify the location of the UAS operator) or an unknown or unidentified aircraft to assist in providing further information to manage the situation;
l) If deemed appropriate limit the number of aircraft within the area of responsibility, e.g. CTA/CTR. Coordinate alternative procedures as necessary;
m) Alert aircraft operating in Class G airspace if appropriate.

Recommendation 7:

ATSUs should establish and implement processes and procedures to:

- ensure ATS personnel are trained in the promulgated federal rules prescribing UAS operations in the UAE; and
- instruct ATS personnel to:
    - direct requests for intended UAS operations affecting the ATCU's airspace to the GCAA;
    - deny approval, accept approval, or provide no objection for UAS operations without first obtaining relevant UAS Operational Approval from the GCAA;
    - deny access to ATCU's airspace to any UAS operation unless the individual or organisation operating the UAS holds an approval issued by the GCAA. Regulatory requirements and/or approvals established by other aviation authorities are insufficient; and
    - reference UAS flying zone maps published by GCAA only (refer www.gcaa.gov.ae). The use of any UAS flying zone maps or publications not published by the GCAA is illegal according to Civil Aviation Law Article 20 of the Federal Act 20 of 1991.

CONTACT:

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