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SAFETY

ATM integration

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ATM INTEGRATION - LOST C2 LINK

| FLIGHT PLAN PLAN DE VOL | |
|---|---|
| PRIORITY Précédence <<< FF >>> | ADDRESS(ES) ADRESSE(S) E H A A Z Q Z X E B U R Z Q Z X E D D Y Z Q Z X L F F F Z Q Z X L F R R Z Q Z X L F B B Z Q Z X L E C M Z Q Z X L P P Q Z Q Z X |
| FIND TIME Date de départ | ORIGINATOR Origine |
| 1 9 0 8 3 3 | E H A M Z P Z X |
| SPECIFIC IDENTIFICATION OF ADDRESS(ES) AND/OR ORIGINATOR Identification spécifique de l'adresse(s) et/ou de l'origine | |
| 3 AIRCRAFT TYPE Type d'aéronef (FPL) | 7 AIRCRAFT IDENTIFICATION Identification de l'aéronef A C 7 4 3 2 |
| 4 NUMBER Nombre E A 3 0 | 8 FLIGHT RULES Règles de vol I |
| 13 DEPARTURE AIRPORT Aéroport de départ E H A M | 10 CRUISE SPEED Vitesse de croisière 3 3 4 0 |
| 14 DESTINATION AIRPORT Aéroport de destination L P P T | 11 TOTAL FEE Moyens de paiement 0 2 3 0 |
| 15 AIRLINE Compagnie U A S F O H U R I O N C H W U A S N T S D C T 4 8 1 1 0 2 4 1 2 W D C T S T G U A S P T M F A T I M A | 12 AIRCRAFT EQUIPMENT Équipement S / C |
| 16 SPECIAL AIRCRAFT IDENTIFICATION Identification spéciale de l'aéronef L P P T | |
| 17 SPECIAL AIRCRAFT IDENTIFICATION Identification spéciale de l'aéronef L P P T | |
| 18 SPECIAL AIRCRAFT IDENTIFICATION Identification spéciale de l'aéronef L P P T | |
| 19 AIRCRAFT EQUIPMENT Équipement de l'aéronef E / 0 3 4 5 → P / 3 0 0 → R / U → V → E S / X → M → J / L → F → X → X D / 2 4 → 3 3 0 → C → YELLOW A / WHITE C / DENY | |
| AIR CHARTER INT. | |

Current Operations. At the moment, any RPAS operations are facilitated as a “one off” deal. Consequently what the RPAS will do if there is a lost C2 Link event is negotiated between the RPA Operator and the ANSP(s) involved in the operation.

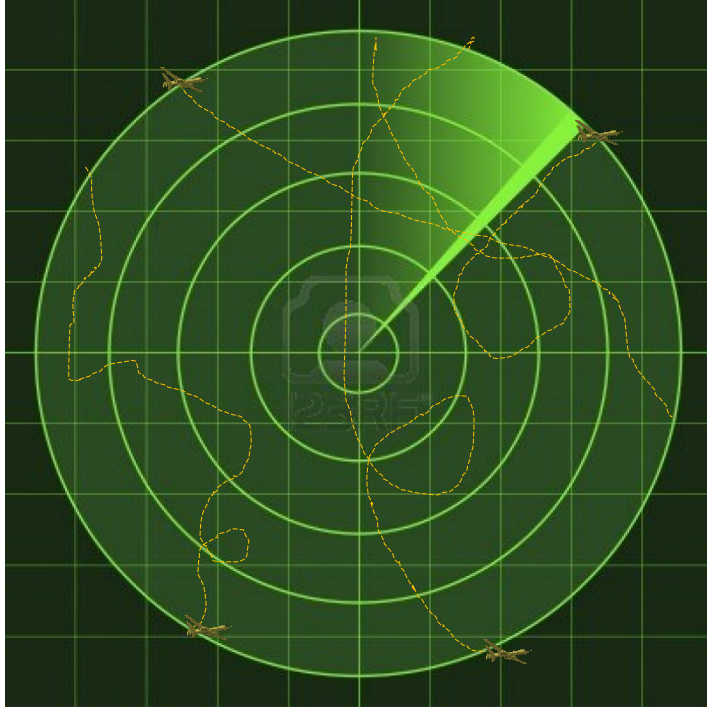
These agreed procedures may be provided as part of the flight plan.

This is okay for “one at a time” operations. It is not unreasonable to expect air traffic controllers to handle one off, individually agreed procedures when there is a low level of such operations, but...



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In the (near) future RPA operations are expected to increase dramatically. The one off agreed procedures will soon become too hard to keep track of, and could lead to loss of situational awareness by controllers, with resulting unsafe situations.

What is needed are procedures that are accessible to ATC, consistently applied, and fit for purpose. ICAO does this well – it is called standardization.



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ICAO has been working on this! The RPAS Panel and the ATMOPS panel have joined forces, to find ways to address the problem.

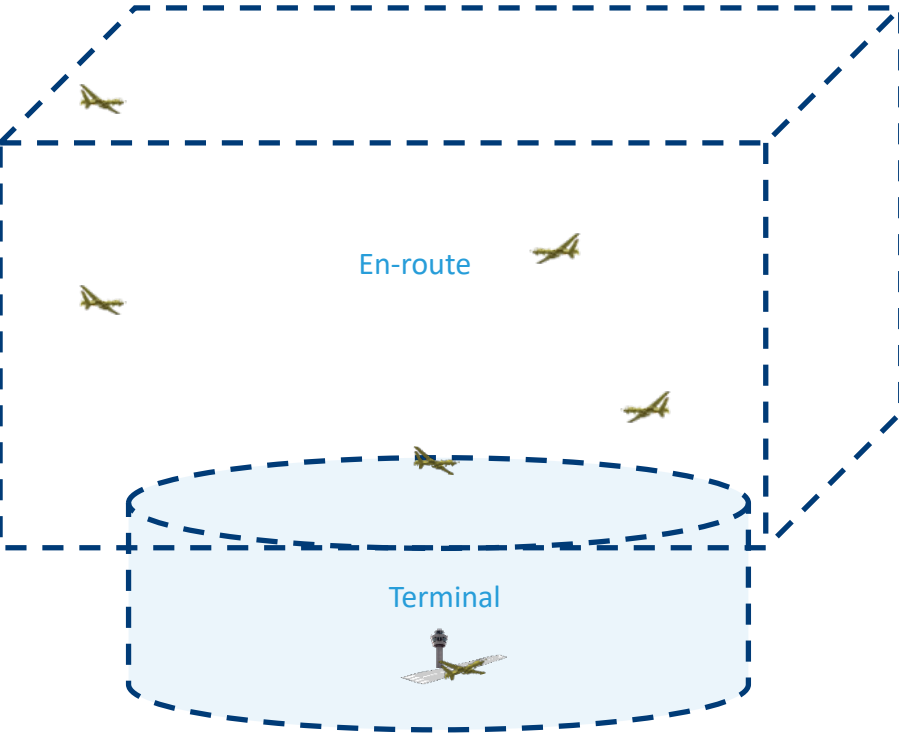
Standardised lost C2 Link Procedures. These procedures will be **accessible to ATC**, and offer a balance between **consistent application** but still offer a degree **flexibility**.



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ATM INTEGRATION - LOST C2 LINK



So we split it up. The joint task force of RPASP and ATMOPSP has identified that there are distinct phases of operation that lend themselves to a natural division in lost C2 Link procedures too.

Terminal Operations: When the RPAS is arriving or departing from an airport and climbing or descending.

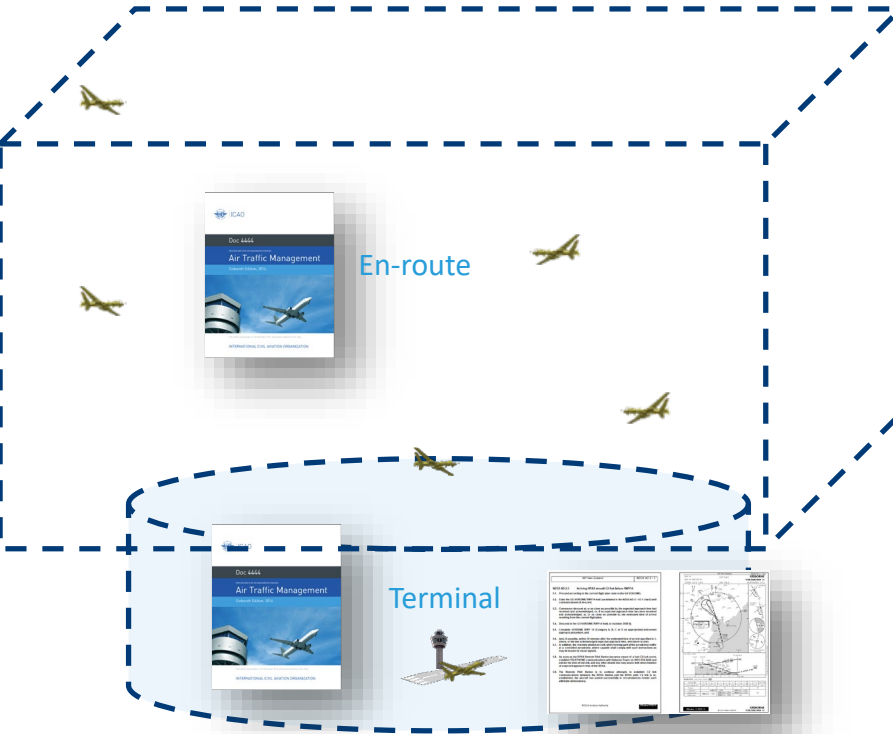
En-route Operations: When the RPAS is en-route and (more likely to be) maintaining a level.



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ATM INTEGRATION - LOST C2 LINK



So we split it up. The joint task force of RPASP and ATMOPSP has identified that there are distinct phases of operation that lend themselves to a natural division in lost C2 Link procedures too.

Terminal Operations: When the RPAS is arriving or departing from an airport and is climbing or descending.

En-route Operations: When the RPAS is en-route and (more likely to be) maintaining a level.

We are developing **Generic Procedures** for both **Terminal and En-route**, and also allowing **special procedures**, unique to a **specific terminal operation**.



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SAFETY ATM INTEGRATION - LOST C2 LINK



VS

AP New Zealand NZQS AD 2-3

NZQS AD 2.5 Arriving RPAS aircraft C2 link failure RWY14

- Proceed according to the current flight plan route to the GS VOR/DME.
- Enter the GS VOR/DME RWY14 hold (as detailed in the NZQS AD 2-43.1 chart) until commencement of descent.
- Commence descent at, or as close as possible to, the expected approach time last received and acknowledged, or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan.
- Descent to the GS VOR/DME RWY14 hold to maintain 3000 ft.
- Complete VOR/DME RWY 14 (Category A, B, C or D as appropriate) instrument approach procedure; and
- land, if possible, within 30 minutes after the estimated time of arrival specified in 3, above, or the last acknowledged expected approach time, whichever is later.
- In addition, the remotely piloted aircraft, when forming part of the aerodrome traffic at a controlled aerodrome, where possible shall comply with such instructions as may be issued by visual signals.

As soon as the RPAS Remote Pilot Station becomes aware of a lost C2 Link event, establish TELEPHONE communications with Gisborne Tower on 061154 8226 and advise the time of loss of link, and any other details that may assist with determination of expected approach time of the RPAS.

The Remote Pilot Station is to continue attempts to establish C2 link communications between the RPAS Station and the RPAS until C2 link is re-established, the aircraft has landed successfully or circumstances render such attempts unnecessary.

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GISSBORNE VOR/DME RWY 14

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Generic vs Special. The decision to use the generic terminal (Arrival and Departure) lost C2 Link procedures or to develop special procedures that better suit the specific operations (complexity, traffic density etc) will need an assessment.

ICAO is developing guidance on how to conduct that assessment.

One size will not fit all!





ATM INTEGRATION - DAA

Detect and Avoid (DAA). Offers two responses to traffic.

DAA Resolution Advisory (DRA): An indication given to the flight crew recommending:

- a) a vertical and/or horizontal manoeuvre intended to mitigate a collision hazard from all current threats;
- or
- b) a vertical and/or horizontal manoeuvre restriction intended to limit the risk of collision.

DAA Remain-Well-Clear (RWC). The ability to detect, analyse and manoeuvre in order to ensure that a RPA is not being operated in such proximity to other aircraft as to create a collision hazard.



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ATM INTEGRATION - DAA



DAA Resolution Advisory (DRA): An indication given to the flight crew recommending:

- a) a vertical and/or horizontal manoeuvre intended to mitigate a collision hazard from all current threats; or*
- b) a vertical and/or horizontal manoeuvre restriction Intended to limit the risk of collision.*

You can think of this like an ACAS RA. Pilots will follow the DRA.

... and DRA...

It is relatively simple to add “... and DRA...” to ACAS provisions in PANS-ATM and PANS-OPS.



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ATM INTEGRATION - DAA



But we are confident we have got it right!

... RWC...

A bit more thought was required to appropriately reflect RWC in PANS provisions.

DAA Remain-Well-Clear (RWC). The ability to detect, analyse and manoeuvre in order to ensure that a RPA is not being operated in such proximity to other aircraft as to create a collision hazard.

The RWC is not the same as an ACAS TA.

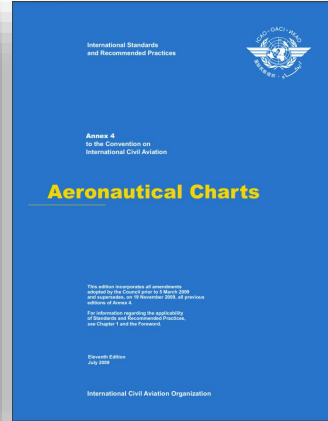
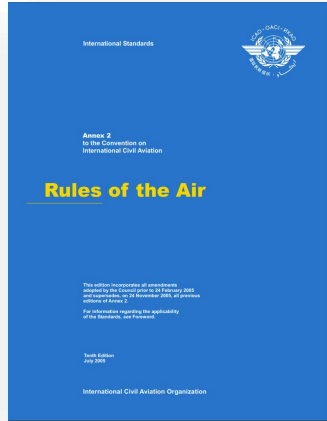
DAA systems can generate DAA remain well clear (RWC) advisories to remote pilots in command that **recommend** manoeuvres which, if promptly executed, ensure their aircraft will not get close enough to the other aircraft to become a collision hazard. **Remote pilots in command are not authorized to deviate from an ATC clearance** to follow a RWC, but may use RWC advisories to **request amended clearances** or instructions from ATC to execute the recommended DAA RWC manoeuvre.



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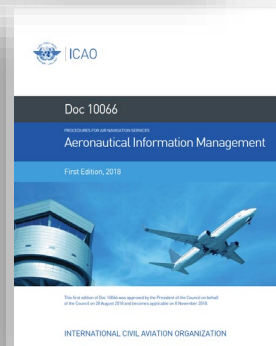


Expect Amendments to head your way soon. As with all amendments to ICAO Annexes and PANS, the review and consultative process will be followed.

There will be amendments to:

- Annex 2
- Annex 4 (charting)
- PANS-ATM (Doc 4444)
- PANS-OPS (Vol III – Aircraft Operating Procedures)
- PANS-AIM.

- And various manuals (RPAS Manual, AIM Manual etc)





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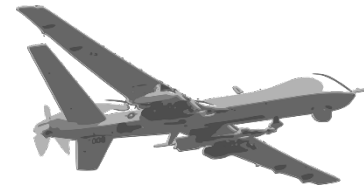
SAFETY ATM INTEGRATION - INTERCEPTIONS

**But wait....
there's more!**

Interception of aircraft and RPAS. ICAO has established a Task Force to investigate the facilitation of interception of aircraft that are remotely piloted.

This Task force is looking at the applicability of Annex 2, relevant Appendices and Attachments with regard to:

1. Interception by Military aircraft of RPAS
2. Interception by Military aircraft of RPAS in a lost C2 Link state





1. Interception by Military aircraft of RPAS

- Air-ground comms between:
 - ATC-RPS (via RPA)
 - ATC-Mil Jet
 - Mil Jet and Mil Base
- Ground-ground comms between:
 - ATC-RPS
 - ATC-Mil Base

So it's a bit easier 😊



2. Interception by Military aircraft of RPAS in a lost C2 Link state

- Air-ground comms between:
 - ATC-Mil Jet
 - Mil Jet and Mil Base
- Ground-ground comms between:
 - ATC-RPS
 - ATC-Mil Base

So it's a bit harder ☹️





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SAFETY ATM INTEGRATION - INTERCEPTIONS

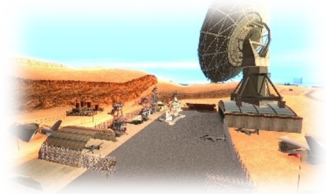
2. Interception by Military aircraft of RPAS in a lost C2 Link state

DAA may initiate automatic avoidance maneuvers when the intercepting aircraft gets close.

This may be interpreted as “suspicious”

So it’s actually a lot harder 😞 😞

But we love a challenge 😊





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THANK YOU