

REPORT ON EUROCAE WORKING GROUP 73 UNMANNED AERIAL VEHICLES

Introduction

The inaugural meeting of EUROCAE W/G 73 “Unmanned Aerial Vehicles” was held at EUROCONTROL, Brussels on 20th and 21st April 2006. The meeting had been delayed and the venue changed to cater for the high number of delegates that had expressed an interest in attending. Originally the meeting was scheduled to take place on a single day and in advance of the EAS General Meeting. The delay was unfortunate but the decision taken to extend the meeting to 2 days proved to have been necessary. A copy of the agenda is attached as Enclosure 1. Of the 80 or so attendees there was a fair representation from the UAV community, spanning associations, potential operators, maintenance specialists and other interested parties. National CAA’s were represented with the UK CAA representative Cliff Whittacre making a considerable contribution throughout. Also well represented was the US interests with senior delegates from both the FAA and RTCA SC-203 (the US equivalent to WG 73) in attendance. As far as I could ascertain GA was not represented though, as yet, the formal attendance list has not been published.

Aim

The primary aim of this inaugural meeting was to elect a WG Chairman, nominate a Secretary and agree a committee structure. It was then necessary to set the objectives, determine the terms of reference of the various sub groups and set a schedule to produce the required deliverables. It is reasonable to conclude that by the end of the first day after much debate the group had agreed the Chairman, nominated the Secretary and formally adopted little else by way of approving work packages to be undertaken. But more of that later in this report.

W/G 73 – 20th April 2006. See Agenda – Enclosure No 1.

1. **Opening.** The W/G was opened by Gilbert Amato – EUROCAE Secretary General who explained the role of EUROCAE and indicated he had received over 150 replies for participation in this W/G. They came from a wide and varied cross section of world aviation agencies. He reminded delegates that EUROCAE WG’s are managed through open discussion with full transparency and with consensus. (Report note: I believe the latter proved to be the major stumbling block on day 1).
2. **EUROCONTROL Position**
Presenter: Alex Hendriks – Head of Airspace/Flow Management & Navigation Business Division
- Integration of UAV’s into civil airspace of major importance.

- Likened to a new phase in aviation history with the potential to a pace of development similar to that experienced over the past 100 years.
- He reviewed the Air Traffic Load in 2001 before presenting the forecasts for 2010 and 2020.
- He believed the UAV's would represent an ever-increasing share of traffic load development.
- The major problem was the transition. It must be
 - ï fully integrated with both civil and military aviation
 - ï have capability for Navigation, Comms and Surveillance
 - ï must be "Operational Management Requirements" driven and not "Technology" led. (Report Note: - I believe several delegates hoped it would be the other way round).
- In conclusion, because of EUROCONTROL's firm belief in UAV's, EUROCONTROL offered to chair the W/G (Dan Hawkes).

3. EUROCAE WG process

See Presentation Paper on the creation of WG 73 "Unmanned Aerial Vehicles" – Enclosure 2.

Presenter: David Bowen – EUROCAE Technical Secretary

- EUROCAE have been producing "Standards" for over 40 years including Min Op Performance (MOPS), Min Aviation System Performance (MASPS), Guidelines, Recommendations and Technical Specs.
- Challenges for this W/G
 - ï Introduction of UAV's into non-segregated airspace
 - ï Introduce UAV's into ATM systems and into the "current" regulatory framework. (Report Note: It was stressed that UAV's must be capable of introduction into the "current" regulatory framework as initially they would represent only a small percentage of all flights made).
 - ï To devise a work structure to arrive at the production of the two deliverables:
 - UAV related elements regarding the Operational Concept
 - UAV Operational Concept in a Civilian Environment Context
 - ï MASPS regarding:
 - Command, Control and Communications Systems for UAV's.
 - Sense and Avoid System for UAV's.

4. Committee Structure

Chairman	-	Dan Hawkes	EUROCONTROL (Ex UK CAA Avionics Regulator)
Vice-Chair	-	Doug Davis	FAA
		Gerard Mardine	Segem, France
RTCA SC203	-	John Walker	
Secretary	-	Dewar Donnithorne-Tait	

5. Objectives

- Must be integrated into already busy airspace, in safety, with public confidence maintained and with Insurers full backing.
- Need to ensure a level playing field for all users.
- Must always keep the "End Product" in mind (Report Note: to introduce UAV's into non-segregated airspace).
- Co-operation/liaison with US RTCA Sc203 most important.
- Operational Concept must be defined first, then equipment developed for fitment to Vehicles in structured manner.
- Process could take 18 months as opposed to original target of 9 months.

6. Terms of Reference Based on Presentation Paper at Enclosure 2

Operations:

UK CAA

- ïi believes UAV's must be integrated into "current" ATM
- ïi current aircraft operators unlikely to agree to further large additional costs in respect of the carriage of "sense and avoid" equipment. (Report Note:- The carriage of transponders quoted as case in question).
- ïi GA wish to fly on a "See and be Seen" basis.

EUROCONTROL

- ïi do not expect major changes to ATM's to facilitate UAV's as initially they will be only a small aspect of the total ATM picture.
- ïi Term "non-segregated airspace" to be adopted throughout.
- ïi "Target Levels of Safety" not liked as basis for evaluation. RTCA SC 203 to provide their Text for consideration. Possible solution "Introduce and Operate UAV's in non-segregated airspace considering all aspects of safety".
- ïi System descriptions must clearly define those task allocated to "ground control" and those to the "UAV".
- ïi Above FL 190 VFR only in segregated airspace will remain in place.

ATM:

- ïi Major question on Spectrum allocation for 3C's and for download of any payload information. (Report Note: Spectrum Allocation on WRC 07 agenda but decision unlikely before 2010/2011).

UK CAA

- ïi Most important aspects are:-
"See and Avoid" methodology
"Spectrum Allocation"

Airworthiness:

- requirements to be based on EASA Advanced NPA – Airworthiness Standards.
- Formal meeting to be arranged with EASA.
- Design assurance criteria – likely to be as per current regulations.
- Guidance systems and Sense and Avoid are unique, so a new regulation may be needed in these specific areas.
- UAV’s under 150 kg AUW will remain under National control in respect of airworthiness standards. (Report Note: I believe this may have to be reviewed in respect of guidance systems and sense and avoid systems to ensure uniformity in safety standards are maintained).

UKCAA

- believe structural testing based on Kinetic Energy of the Vehicle provides a sound methodology to follow.

Concern expressed at potential for hostile action being taken against the data link!

Test & Maintenance:

For UAV’s over 150 kg AUW

- C of A, Restricted C of A or Permit to Fly
- If C of A or RC of A – utilise licensed engineers as per current practice or as detailed by EASA
- For Permit UAV’s – under National Control
- Ground Station will form part of the regulatory regime if their activity has any effect on the issue of a C of A, RC of A.

Note: From here the meeting became somewhat disjointed because consensus could not be reached on the applicable work packages or the sub-group structure. I include the next 2 sections as an indication of the guidance the Chairman gave to the meeting when presenting his ideas/conclusions on the generation of the required deliverables.

Day 1 Work Package Based (Generated by the Meeting)

Work Packages:

Documentation Search & Analysis	Operations
Terminology	Flight Crew Requirements
Operational Concept Context Report	ATM integration
Specific Technical Elements: Sense & Avoid Comms, loading, spectrum, security Command & Control	Maintenance

Day 2 Sub Group Based Solution (Proposed by the Chairman)

OPERATIONS	ATM	AIRWORTHINESS
SG Chairman:	SG Chairman:	SG Chairman:
Gerard Mardine	Eurocontrol or Adrian Clough	TBD
-	-	-
Scenarios	Procedures	Certification
Procedures	Licensing	Categories
Licensing	Competencies	Means of Compliance
Competencies	Comms & Spectrum	Command & Control
Required Equipment	Phraseology	Autonomy
"Sense & Avoid"	"Sense & Avoid"	

Note: "Sense & Avoid" seen as a major aspect and uncertainty remains as to which sub-group will ultimately be the "lead" on this aspect.

Decision: In the near term all groups must consider all aspects to ensure a breadth of understanding of the issues are established.

Observations:

- I believe the Chairman's proposal offers a satisfactory way to proceed; however, there were few volunteers on the day to do the work.
- Once the subgroup and their work packages are finalised by EUROCAE they will be posted on the EUROCAE Web Site and volunteers sought to assist the SG Chairman in undertaking their allotted tasks. I suspect this work will, if fact, be undertaken by a small group of "experts" using the JAA/EUROCONTROL UAV Task Force Report of 11 May 2004 and the work of the US RTCA SC 203 as the basis of a major part of their deliberations.
- **From an EAS Perspective we should remain particularly focused on:**
 - ïï **the Operational Concepts**
 - ïï **Operations in uncontrolled airspace**
 - ïï **Sense and Avoid Methodology/Technology**
 - ïï **Autonomy of Operations of UAV's especially in uncontrolled airspace.**
- Clearly there will be much focus by major airspace users on the operation of UAV's in the ATM in non-segregated airspace. I have no doubt they will solve many of the problems whilst addressing this specific aspect; however, I see the operation of UAV's in uncontrolled airspace of particular importance to EAS and GA in general. It is important we remain vigilant because, like the imposition of transponders, the costs of any additional equipment fit, to sport and recreational aircraft to enable UAV's to operate in uncontrolled airspace, could prove a significant financial burden and could spell the end for many who currently participating in aviation for sport and recreation.

Points to Note:

RTCA SC 203

- The formation of RTCA SC 203 was requested by AOPO supported by the FAA.
- The SC is being asked to speed the process of the introduction of UAV's into US airspace.
- All their meetings are open to the general public.
- They are producing:
 - WG1 MASPS for UAV's
 - WG2 MASPS for 3C
 - WG3 MASPS for Sense & Avoid (S & A)
 - New WG MASPS for Safety and Human Factors
- RTCA aiming to produce MOPS for 3C and S & A by Dec 07.
- S & A MOPS may look at autonomous S & A verses operator assist S & A.
- US believe we should pool information and not repeat unnecessary simulations in proving the case for UAV's.

Report Note: I believe the work and findings of RTCA SC 203 will prove a big influence on the outcome of the deliberations of WG 73. It is important to note that Doug Davis (FAA) was elected as a Vice Chair of WG 73.

Sense & Avoid

- On the topic of Sense and Avoid it would be remiss of me not to mention the number of times ADS-B was mentioned. There was the usual debate on whether it should be VDL-4, UAT or 1090 Squitter based but we can be assured it will, in my opinion, provide a significant part of the case for UAV operations. I can see the need for some form of ACAS to be incorporated where autonomous operations are needed, but I do not recall this aspect being addressed to any degree at this meeting. No doubt its importance will be established as the operational concepts are developed.
- I read with much interest the latest report by Francois van Haaff in which he addresses the ADS-B versus Mode S issue in some detail. I too believe it would be in the best interest of EAS to evaluate the merits of the two systems/solutions before the design of the LAST, or low power LAST, is finalised. It may be that ADS-B, coupled with an ACAS response capability, could prove much more effective for ourselves in sport and recreational flying as, to my mind, it seems more suited to autonomous types of operations.
- I am a novice on ADS-B but my gut feel tells me that sport and recreational pilots would be better served by spending money on a GPS position based, simple ADS-B system, most probably based on 1090 squitter technology rather than a Mode S transponder when most have little intent of flying into controlled airspace. I believe, therefore, there is

merit in EAS having a firm view on ADS-B verses Mode S before we meet with EUROCONTROL for the Sports Aviation day in December 06.

- Clearly, the operational aspirations of the UAV community will become clearer over the next 6 months or so as they define the type and scope of operations they wish to fly. There was some early debate on just how many scenarios would need to be included in the Report with suggestions ranging from 3 to a wide cross section covering the whole spectrum being muted. With UAV's ranging from small "model aircraft type" machines to large and heavy aircraft, the latter approach would seem the most appropriate if an accurate assessment of the requirement is to be established.

Presentations

It is not my intent to comment on the presentations until I have the presentation material to hand to study in more detail.

Next Meeting

The next plenary meeting of EUROCAE WG 73 is scheduled to be held in September 06, possibly in Madrid and possibly over 3 days. To reduce the expenditure for EAS and because of the location I would be content to part share the cost of attending by incorporating attendance with a holiday in the area. I believe it is important that we continue to participate in this WG but possibly more from an Observer position rather than directly working on any one of the 3 specialist working groups.

Graham Lynn
EAS Delegate to EUROCAE WG 73
May 2006

Enclosure 1 EUROCAE WG 73 UAV Meeting Agenda
Enclosure 2 Presentation Paper on the creation of WG 73 "UAV's"