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Operational Services and Environment Definition (OSED) for Uncrewed Aircraft Systems Detect and Avoid Systems (DAA)

RTCA DO-398A
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Prepared by: SC-228
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FOREWORD

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- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and

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TABLE OF CONTENTS

1 INTRODUCTION 9

1.1 Document Structure 10
1.2 Plans for Future Development and Advanced Capabilities 12
1.3 OSED References and ICAO Standards And Recommended Practices and Procedures 12
1.3.1 Comparison of OSED and ICAO References 13
1.3.2 Comparison of ICAO SARPs and 14 CFR for Differences Related to DAA 14
1.4 Acronyms 16

2 ENVIRONMENT 21

2.1 Airspace 26
2.1.1 Transit Operations 29
2.1.2 Terminal Area Operations 30
2.1.2.1 DAA Terminal Area (DTA) – Airports 31
2.1.2.2 DAA Terminal Area (DTA) – Heliports/Vertiports 31
2.1.3 Urban Airspace 32
2.1.3.1 DAA Urban Area (DUA) 33
2.1.4 Airspace Cooperative Surveillance Equipage Rules 33
2.1.5 Alaskan and Hawaiian Airspace Differences 36
2.2 Extended Operations 36
2.3 Airspace Traffic Density 38
2.4 Altitudes 40
2.4.1 GB Surveillance Equipment Altitudes 40
2.4.1.1 GB Coverage Volumes 42
2.5 Flight Rules 43
2.5.1 Airport and Terminal Area Flight Rules and Clearances 44
2.6 Intruders 44
2.6.1 Intruder Equipage 44
2.6.2 Intruder Physical Characteristics 45
2.6.3 Intruder Kinematics 46
2.6.3.1 Intruder Kinematic Bounds 46
2.6.4 Intruder Encounter Geometries 47
2.6.4.1 Intruder Encounter Vertical Geometry 47
2.6.4.2 Intruder Encounter Horizontal Geometry 47
2.6.4.3 Intruder Encounter Special Geometry 50
2.7 Meteorological, Topographical, and Environmental Conditions 50
2.8 Equipment Environment 52
2.8.1 Airborne Equipment Environment 52
2.8.2 Ground Based (GB) Equipment Environment 52

3 DAA SYSTEM DESCRIPTION 53

3.1 Top-level Architecture 58
3.1.1 Cooperative Sensors 58
3.1.2 Airborne Non-cooperative Aircraft Sensors 59
3.1.3 GB Surveillance Equipment 59
3.1.4 GB Links (RF or Hardwired) 60
3.2 Other DAA Considerations 61
3.2.1 DAA Features to Enable Visual-Like Clearance 61
3.2.2 Loss of DAA System 61
3.3 C2 Link System 61

3.3.1 Lost C2 Link Caused by DAA Timeout 62

4 DAA ACTORS AND ACTIVITIES 65

4.1 Actors 65
4.1.1 DAA Equipment 65
4.1.2 Remote Pilot 65
4.1.3 Air Traffic Control (ATC) 65
4.1.4 ATC Automation Systems 65
4.1.5 Intruders 65
4.2 Activity Diagrams 65
4.3 DAA Activity Descriptions 68
4.4 Description of Activites to Maintain Well Clear 79
4.5 Roles and Responsibilities 80
4.5.1 Remote Pilot and Flight Crew 80
4.5.1.1 Remote Pilot and Flight Crew – Terminal Area 82
4.5.1.2 Remote Pilot and Flight Crew – Extended Operations and Vertical Transit 82
4.5.1.3 m:N Operations 83
4.5.2 Air Traffic Controllers 83
4.5.2.1 ATC – Terminal Area 86
4.5.2.2 ATC – Extended Operations 86
4.5.3 Other Aircraft and Pilots 87
4.6 Impact on Communications with ATC 87

5 NOMINAL SCENARIOS 91

5.1 UA and Overtaking IFR Traffic Receiving IFR Separation Services from ATC 93
5.2 ATC Calls Out Visual Flight Rules (VFR) Traffic to Remote Pilot 95
5.3 Remote Pilot Calls Out VFR Traffic to ATC and Coordinates Maneuver 97
5.4 UA Climbing IFR through Class G Airspace and Encounters VFR Traffic 100
5.5 Non-towered Airport in Class G Airspace Involving One-In, One-Out Procedures 103
5.6 Operations in Class A; DAA System Supporting Enhanced Communications with ATC 106
5.7 Class E VFR Intruder Separated Vertically by 500' 108
5.8 ATC Issues Instructions to IFR Intruder 111
5.9 ATC Issues Alternate Maneuver Unacceptable to the Remote Pilot 114
5.10 Intruder Maneuvers after RWC Maneuver Has Begun; Causes Change in RWC Maneuver 117
5.11 Controller Instructs Intruder 120
5.12 Overtake by VFR/Non-Cooperative with No Alert 121
5.13 IMC Transition to VMC Operation with EO/IR Surveillance with Short Alert 123
5.14 UA Departing Class D with VFR Intruder 126
5.15 UA Arrival with GPS Approach in Class D with VFR Intruder 129
5.16 Intruder Visually Separates from UA 132
5.17 Non-cooperative Intruder Causes UA to be Re-vectored for Second Approach 135
5.18 UA Linear Infrastructure Survey through Class D Airspace 137
5.19 DAA Separation on Final 139
5.20 UAS Traffic Monitoring 142
5.21 Power Line Inspection 145
5.22 UA Landing at Heliport in Class B Surface Area 149
5.23 UA Taking Off From Heliport in Class B Surface Area 150
5.24 Terminal Area UA Receives Resolution Advisory 152
5.25 Enroute UA with Terrain and Obstacle Awareness 155
5.26 Crewed Rotorcraft Encounters VFR Traffic in Urban Environment 159
5.27 UA Encounters VFR Traffic in Urban Environment 162

5.28 Automated UA Encounters VFR Traffic in Urban Environment 165
5.29 UA Landing at Elevated Heliport 168
5.30 RWC Alert While Hovering Enroute 170
5.31 DAA RA Mode Active Down to the Ground 173
5.31.1 DAA RA Mode Active Down to the Ground During Takeoff - Rotorcraft 173
5.31.2 DAA RA Mode Active Down to the Ground During Landing - Fixed Wing 174
5.32 Multiple UAs Landing Simultaneously at Heliport 176
5.33 Rotorcraft RA during Hovering Operations 178

6 OFF-NOMINAL SCENARIOS 181

6.1 UA Encounters VFR Traffic and Maneuvers Prior to ATC Approval 181
6.2 Automated Collision Avoidance RA (Optional Capability) 185
6.3 Remote Pilot Loses C2 Link with UA 188
6.4 Automated Collision Avoidance RA during Loss of C2 Link (Optional Capability) 190
6.5 Remote Pilot Loses Communications with ATC (Lost ATC Comms, but Not Lost C2 Link) 193
6.6 Remote Pilot Can't Control the UA and Can't Communicate with ATC or the Intruder 197
6.7 DAA Equipment Failure 199
6.8 UA Maneuvers to Regain DWC 201
6.9 UA Actions On Loss of GB Surveillance Data 204
6.10 VFR Intruder Blunder in Non-towered Airport Traffic Pattern 206
6.11 Aircraft Blunder in Towered Airport Traffic Pattern 208
6.12 DAA Spacing on Instrument Approach with Missed Approach 210
6.13 Right-Of-Way Rules Usage During RA 214
6.14 RA During Missed Approach 216
6.15 UA receives alerts against intruding aircraft that is broadcasting GNSS position information via a non-certified (or “non-aviation grade”) system 218

7 EXPANDED OPERATIONAL SCENARIOS 223

7.1 Class B Airspace Operations 223
7.1.1 UA departing Class B Airport with helicopter intruder 223
7.1.2 UA approach into Class B Airport with intruder below Class B volume 226
7.2 DAA Use Cases for Onboard-Piloted VFR Operations in Some IMC 228
7.2.1 VFR Operations Use Case 1 - Approach from class E to class G airport in VMC 229
7.2.2 VFR Operations Use Case 2 - Approach from class E to class G airport with some IMC 230
7.2.2.1 Safety Analysis 231
7.2.2.2 Additional Mitigations 232
7.2.2.3 Common Conditions for Use Case 2 - Approach to class G airport with some IMC 232
7.2.2.4 Use Case 2a - No intruder 233
7.2.2.5 Use Case 2b - Cooperative VFR Intruder 234
7.2.2.6 Use Case 2c - Cooperative IFR Intruder, no IFR maneuvering 235
7.2.2.7 Use Case 2d - Non-cooperative VFR Intruder 237
7.2.2.8 Use Case 2e - Non-cooperative IFR Intruder 239
7.3 High Altitude Platform System (HAPS) Operations 240
7.3.1 HAPS (High Altitude Platform Systems) general operational and performance characteristics. 241
7.3.2 Launch and Recovery Element (LRE) 242
7.3.3 Mission Control Element (MCE) 242
7.3.4 Execution 243
7.3.4.1 Execution by Flight Phase 243
7.3.4.2 Pre-Flight Considerations 243
7.3.4.3 Taxi-Out 245

7.3.4.4 Take-Off ... 245
7.3.4.5 Departure and Terminal Operations ... 246
7.3.4.6 Climb ... 246
7.3.4.7 Cruise ... 248
7.3.4.8 Mission Execution ... 248
7.3.4.9 Descent ... 249
7.3.4.10 Terminal Area/Arrival ... 249
7.3.5 Scenario Background - HAPS Use Cases ... 249
7.3.5.1 HAPS with Fast Moving IFR intruder - ATC vectors intruder ... 250
7.3.5.2 HAPS with VFR intruder - ATC vectors HAPS ... 251
7.3.5.3 HAPS Use Case - GBSS detection (Non-cooperative) ... 252
7.4 Surface Operations Environment Definition ... 254
7.5 Enroute Automated UA Receives Directive RWC Guidance ... 254
7.5.1 Discussion of Integration Considerations & Gaps ... 256
7.6 Encounter with Small UA (V2V Surveillance) ... 256
7.7 Passively Coordinate RA via V2V ... 257
7.8 Horizontal RA during Landing at Heliport ... 257

8 ASSUMPTIONS ... 261

9 OPERATIONAL REQUIREMENTS ... 263

9.1 Operational Requirements Sources and Organization ... 263
9.1.1 Applicable Environments ... 264
9.1.2 Phases of Flight ... 265
9.2 Operational Requirement List ... 266
9.2.1 Operational Requirement 1 ... 266
9.2.2 Operational Requirement 2 ... 267
9.2.3 Operational Requirement 3 ... 268
9.2.4 Operational Requirement 4 ... 269
9.2.5 Operational Requirement 5 ... 270
9.2.6 Operational Requirement 6 ... 271
9.2.7 Operational Requirement 7 ... 272
9.2.8 Operational Requirement 8 ... 273
9.2.9 Operational Requirement 9 ... 274
9.2.10 Operational Requirement 10 ... 275
9.2.11 Operational Requirement 11 ... 276
9.2.12 Operational Requirement 13 ... 277
9.2.13 Operational Requirement 13 ... 278
9.2.14 Operational Requirement 14 ... 279

10 MEMBERSHIP ... 281

TABLE OF FIGURES

Figure 2-1 DAA System Environment – En Route, Extended and Transit Ops 22
Figure 2-2 DAA System Environment – En Route, Extended and Transit Ops using GBSS 23
Figure 2-3 DAA System Environment – Terminal Ops using GBSS 24
Figure 2-4 DAA System Environment – Urban Airspace 25
Figure 2-5 Airspace Classes (faasafety.gov) 27
Figure 2-6 ADS-B Out Required Airspace 34
Figure 2-7 Examples of Survey Extended Operation (NASA) 37
Figure 2-8 Sample LOS Analysis Results for GB Radar 41
Figure 2-9 GB Coverage Volumes 42
Figure 2-10 Example of NASA ACES Relative Heading Data 48
Figure 2-11 Example of NASA ACES Horizontal Angle of Threats 49
Figure 2-12 Example of NASA ACES Relative Heading Data – Non-cooperative Intruders 50
Figure 2-13 Example of NASA ACES Horizontal Angle of Threats – Non-Cooperative Intruders 50
Figure 3-1 GBSS and ATAR/EO/IR Track Data Incorporation 60
Figure 4-1 Activity Diagram for DAA with ATC Interaction 67
Figure 4-2 Activity Diagram for DAA systems incorporating off-nominal RA Responses 75
Figure 5-1 Scenario 5.1 – UA and Overtaking IFR AC under ATC Control 94
Figure 5-2 Scenario 5.2 – ATC Calls Out VFR Traffic to Remote Pilot 95
Figure 5-3 Scenario 5.3.a – Remote Pilot Calls Out Co-altitude VFR Traffic to ATC 98
Figure 5-4 Scenario 5.3.b – Remote Pilot Calls Out Descending VFR Traffic to ATC 98
Figure 5-5 Scenario 5.4 – UA Climbing through Class G and Encounters VFR Traffic 101
Figure 5-6 Scenario 5.5 – Non-towered Class G Airport with One-In, One-Out 104
Figure 5-7 Scenario 5.6 – DAA Supporting Enhanced Communications with ATC 106
Figure 5-8 Scenario 5.7 – Class E VFR Intruder Separated Vertically by 500' 109
Figure 5-9 Scenario 5.8 – ATC Issues Instructions to IFR Intruder 112
Figure 5-10 Scenario 5.9 – ATC Issues Alternate Maneuver, Pilot “Unable” 115
Figure 5-11 Scenario 5.10 – Change in RWC Maneuver due to Intruder Maneuver 118
Figure 5-12 Scenario 5.11 – Controller Instructs Intruder 120
Figure 5-13 Scenario 5.12 – Controller Instructs UAS 122
Figure 5-14 Scenario 5.13 – Immediate DAA Warning 124
Figure 5-15 Scenario 5.14 – UA Departs Class D with VFR Intruder 127
Figure 5-16 Scenario 5.15 – UA Arrival with GPS Approach in Class D with VFR Intruder 130
Figure 5-17 Scenario 5.16 – Intruder Visually Separates from UA 133
Figure 5-18 Scenario 5.17 – Non-Coop Intruder Visual Separation from UA on Approach 135
Figure 5-19 Scenario 5.18 – Linear Infrastructure Survey Penetrating Class D 138
Figure 5-20 Scenario 5.19 – DAA Separation during Instrument Approach 140
Figure 5-21 Scenario 5.20 – UAS Traffic Monitoring 143
Figure 5-22 Scenario 5.21 – Power Line Inspection 147
Figure 5-23 Scenario 5.22 – UA Landing at Heliport 149
Figure 5-24 Scenario 5.23 – UA Taking Off at Heliport 151
Figure 5-25 Scenario 5.24 – UA Receives RA 154
Figure 5-26 Scenario 5.25 – UA Enroute with Terrain and Obstacle Awareness 157
Figure 5-27 Scenario 5.26 – Crewed Rotorcraft Encounters VFR Traffic 161
Figure 5-28 Scenario 5.27 – UA Encounters VFR Traffic in Urban Environment 164
Figure 5-29 Scenario 5.28 – Automated UA Encounters VFR Traffic in Urban Environment 167
Figure 5-30 Scenario 5.29 – UA Landing at Vertiport 169
Figure 5-31 Scenario 5.30 – RWC Hovering Enroute 171
Figure 5-32 Scenario 5.31.1 – DAA RA Mode Active Down to Ground 173
Figure 5-33 Scenario 5.31.2 – DAA RA Mode Active Down to Ground During Landing 175
Figure 5-35 Scenario 5.32 – Multiple UAs Landing at Same Time 177
Figure 5-36 Scenario 5.33 – Rotorcraft RA During Hovering Ops 179
Figure 6-1 Scenario 6.1 – UA Maneuvers against VFR Intruder before Contacting ATC 183
Figure 6-2 Scenario 6.2 – Automatic Collision Avoidance RA Scenario 186

Figure 6-3 Scenario 6.3 – Remote Pilot Loses C2 Link with UA 189
Figure 6-4 Scenario 6.4 – Remote Pilot Loses C2 Link with UA with Automated CA RA 192
Figure 6-5 Scenario 6.5 – Remote Pilot Loses Communications with ATC 195
Figure 6-6 Scenario 6.6 – Remote Pilot Loss of Control and Comms 198
Figure 6-7 Scenario 6.7 – DAA Equipment Failure 200
Figure 6-8 Scenario 6.8 – UA Maneuvers to Regain DWC 202
Figure 6-9 Scenario 6.9 – UA Actions on Loss of GB Surveillance Data 205
Figure 6-10 Scenario 6.10– AC Blunder in Non-towered Traffic Pattern 207
Figure 6-11 Scenario 6.11 – AC Blunder in Towered Airport Traffic Pattern 209
Figure 6-12 Scenario 6.12 – DAA Spacing on IAP with Missed Approach 212
Figure 6-13 Scenario 6.13 – Right of Way Usage During Collision Avoidance RA Scenario 214
Figure 6-14 Scenario 6.14 – RA During Missed Approach Scenario 217
Figure 6-15 Scenario 6.14 – RA During Missed Approach Scenario 218
Figure 6-16 Scenario 6.15 – GNSS Surveilance Scenario 220
Figure 7-1 Sectional showing DFW Service Area and Rt 183 224
Figure 7-2 Scenario 7.1.1 – UA departure from Class B Airport with intruder below 225
Figure 7-3 Sectional showing JFK Service Area and coastal cutout 226
Figure 7-4 Scenario 7.1.2 – UA approach into Class B Airport with intruder below Class B volume 227
Figure 7-5 VFR Operations use case 1 230
Figure 7-6 Scenario 7.2.2.4 Class G Approach with some IMC and No Intruder 234
Figure 7-7 Scenario 7.2.2.5 - Class G Approach with some IMC and Cooperative VFR Intruder 235
Figure 7-8 Scenario 7.2.2.6 Class G Approach with some IMC and Cooperative IFR Intruder, no IFR maneuvering 237
Figure 7-9 Scenario 7.2.2.7 Class G approach with some IMC and Non-cooperative VFR Intruder 239
Figure 7-10 HAPS CONOPS Overview 241
Figure 7-11 HAPS Mission Control Center 243
Figure 7-12 Scenario 7.3.5.3 – HAPS Maneuvers for Non-Cooperative VFR Intruder 253
Figure 7-13 Scenario 7.8 – HAPS Maneuvers for Non-Cooperative VFR Intruder 258

TABLE OF TABLES

Table 1-1: References 13
Table 1-2: Differences between ICAO SARPs and 14 CFR 15
Table 1-3 Acronyms 16
Table 2-1 Airspace Class and Operational Scope 27
Table 2-2 Intruder Equipage Assumptions 35
Table 2-3 Airspace Traffic Density Based on 2011 JFK Data 39
Table 4-1 Descriptions of Activities Outlined in Figure 4-1 Activity Diagram for DAA with ATC Interaction 68
Table 4-2 Descriptions of Activities Outlined in Figure 4-2 76
Table 4-3 Descriptions of Activities to Maintain Well Clear 79
Table 4-3 Phraseology Meanings 88
Table 5-1 Nominal Scenario Breakdown 91
Table 5-2 Scenario Operational Type 93
Table 5-3 Scenario 5.1 – Timeline for IFR AC under ATC Control 94
Table 5-4 Scenario 5.2 – Timeline for ATC Calls out VFR Traffic to Remote Pilot 96
Table 5-5 Scenario 5.3.a/b – Timeline for Remote Pilot Calls Out VFR Traffic to ATC 99
Table 5-6 Scenario 5.4 – Timeline for UA Climbing through Class G with VFR Traffic 101
Table 5-7 Scenario 5.5 – Timeline for Non-towered Class G Airport w/ One-In, One-Out 105
Table 5-8 Scenario 5.6 – Timeline for DAA Enhanced Communications with ATC 107
Table 5-9 Scenario 5.7 – Timeline for Class E VFR Intruder Separated Vertically by 500' 109
Table 5-10 Scenario 5.8 – Timeline for ATC Issues Instructions to IFR Intruder 112
Table 5-11 Scenario 5.9 – Timeline for ATC Issues Alternate Maneuver, Pilot “Unable” 115
Table 5-12 Scenario 5.10 – Timeline for Change in RWC Maneuver 118
Table 5-13 Scenario 5.11 – Timeline for Controller Instructs Intruder 121
Table 5-14 Scenario 5.12 – Timeline for Controller Instructs UAS 122
Table 5-15 Scenario 5.13 – Timeline for Immediate DAA Warning 125
Table 5-16 Scenario 5.14 – Timeline for UA Departs Class D with VFR Intruder 127
Table 5-17 Scenario 5.15 – Timeline for UA GPS Approach in Class D with VFR Intruder 131
Table 5-18 Scenario 5.16 – Timeline for Intruder Visually Separates from UA 134
Table 5-19 Scenario 5.17 – Timeline for NC Intruder Visual Separation on Approach 136
Table 5-20 Scenario 5.18 – Timeline for Linear Infrastructure Survey Penetrating Class D 139
Table 5-21 Scenario 5.19 – Timeline for UA DAA Separation on Instrument Approach 141
Table 5-22 Scenario 5.20 – Timeline for UAS Traffic Monitoring 144
Table 5-23 Scenario 5.21 – Timeline for Power Line Inspection 148
Table 5-24 Scenario 5.22 – UA Landing at Heliport 150
Table 5-24 Scenario 5.22 – UA Taking Off at Heliport 152
Table 5-26 Scenario 5.24 – UA Recieves RA 155
Table 5-27 Scenario 5.25 – UA Enroute with Terrain and Obstacle Awareness 158
Table 5-28 Scenario 5.26 – Crewed Rotorcraft Encounters VFR Traffic 162
Table 5-29 Scenario 5.27 – UA Encounters VFR Traffic in Urban Environment 165
Table 5-30 Scenario 5.28 – Automated UA Encounters VFR Traffic in Urban Environment 168
Table 5-31 Scenario 5.30 – RWC Hovering Enroute 172
Table 5-32 Scenario 5.31.1 – DAA RA Mode Active Down to Ground 174
Table 5-33 Scenario 5.31.2 – DAA RA Mode Active Down to Ground During Landing 176
Table 5-34 Scenario 5.32 – Multiple UAs Landing at Same Time 178
Table 5-35 Scenario 5.33 – Rotorcraft RA During Hovering Ops 180
Table 6-1 Off-Nominal Scenario Breakdown 181
Table 6-2 Scenario 6.1 – Timeline for UA Maneuvers Prior to ATC Approval 184
Table 6-3 Scenario 6.2 – Timeline for Automatic Collision Avoidance RA Scenario 187
Table 6-4 Scenario 6.3 – Timeline for Remote Pilot Loses C2 Link with UA 190
Table 6-5 Scenario 6.4 – Timeline for Automated CA RA during Loss of C2 Link 193
Table 6-6 Scenario 6.5 – Timeline for Remote Pilot Loses Communications with ATC 196
Table 6-7 Scenario 6.6 – Timeline for Remote Pilot Loss of Control and Comms 198

Table 6-8 Scenario 6.7 – Timeline for DAA Equipment Failure 200
Table 6-9 Scenario 6.8 – Timeline for UA Maneuvers to Regain DWC 202
Table 6-10 Scenario 6.9 – UA Actions on Loss of GB Surveillance Data 205
Table 6-11 Scenario 6.10 – Timeline for AC Blunder in Non-towered Traffic Pattern 208
Table 6-12 Scenario 6.11 – Timeline for AC Blunder in Towered Traffic Pattern 210
Table 6-13 Scenario 6.12 – Timeline for DAA Spacing on IAP with Missed Approach 213
Table 6-14 Scenario 6.13 – Timeline for Right of Way Usage During Collision Avoidance RA Scenario 215
Table 6-15 Scenario 6.14 – Timeline for Collision Avoidance RA During Missed Approach Scenario 218
Table 6-16 Scenario 6.15 – Timeline for GNSS Surveilance Scenario 220
Table 7-1 Scenario 7.1.1 – Timeline for UA departing Class B Airport with helicopter intruder 225
Table 7-2 Scenario 7.1.2 – Timeline for UA approach into Class B Airport with intruder below Class B volume 227
Table 7-3 Separation mitigations according to aircraft encounter pair 231
Table 7-4 HAPS Performance Parameter Estimates 241
Table 7-5 Summary of DAA by Phase of Flight 245
Table 7-6 Timeline for scenario 7.3.5.1 - HAPS with Fast Moving IFR intruder - ATC vectors intruder 250
Table 7-7 Timeline for Scenario 7.3.5.2 - HAPS with VFR intruder - ATC vectors HAPS 252
Table 7-8 Scenario 7.3.5.3 – Timeline for HAPS Maneuvers for VFR Intruder 254
Table 7-9 Scenario 7.5 – Timeline for HAPS Maneuvers for VFR Intruder 255
Table 7-9 Scenario 7.8 – Timeline for HAPS Maneuvers for VFR Intruder 259

1 INTRODUCTION

This document provides the Operational Services and Environment Description (OSED) for the RTCA Special Committee 228 (SC-228) Uncrewed Aircraft System (UAS) Detect and Avoid (DAA) Minimum Operational Performance Standards (MOPS). The purpose of this OSED is to provide a basis for assessing and establishing operational, safety, performance, and interoperability requirements for DAA systems.

Because there is no human pilot onboard an Uncrewed Aircraft (UA) looking out the window of a cockpit, a DAA system is being standardized in order to establish an acceptable alternative means of compliance with applicable standards. These include Title 14 (Aeronautics and Space) of the United States (US) Code of Federal Regulations (14 CFR), 91.111, 91.113, and 91.181, and Section 3.2 of the International Civil Aviation Organization (ICAO) Annex 2 to the Convention on International Civil Aviation. The DAA system is used to avoid nearby aircraft (hereafter referred to as "intruders"). This OSED for DAA uses the term "remote pilot" throughout to describe the person acting as the remote pilot of the UA and manipulating the flight controls. This OSED does not attempt to allocate responsibility for specific DAA tasks to individual members of the flight crew; instead, the OSED assumes a single remote pilot. Remote pilot and crew training for a specific DAA system may allocate responsibilities differently.

It is further recognized that, though designed to support remotely piloted operations, DAA systems may find use in vehicles with an onboard pilot. Use of the term "remote pilot" in this OSED should not be interpreted as excluding onboard pilot operations. It is assumed that any requirements on or expectations of a remote pilot are also applicable to an onboard pilot. This OSED does include some examples of an onboard pilot's use of a DAA system but is not comprehensive.

This OSED describes using a MOPS-compliant DAA systems with sensors onboard and/or offboard a UA operating under Instrument Flight Rules (IFR) while transiting through Class B, Class C, Class D, Class E up to Flight Level (FL) 180, or while transitioning through Class G airspace or while conducting extended operations in Class D, E, and G airspace. DAA equipment also enables operations in the Terminal Area during approach and departure in Class C, D, E, and G airspace and off-airport locations. DAA functionality as specified in this OSED is not expected to be required for operations within Class A, Class E above FL180, or Special Use Airspace (SUA), although DAA equipment may remain on and Resolution Advisories (RAs) will be followed. This includes Traffic Alert and Collision Avoidance Version(TCAS) or Airborne Collision Avoidance System X for Uncrewed aircraft (ACAS X).

Optional DAA equipment classes enable lower Size, Weight and Power (SWaP) onboard non-cooperative sensors, Terminal Area alerting and guidance, and Ground Based (GB) surveillance equipment.

With the above mentioned introduction of DAA equipment classes and their applicability to various UAS sizes and concepts of operations (ConOps) applied, this OSED describes DAA system functions and capabilities generically without reference to specific implementations or equipment classes that are defined in the system MOPS.

Figure 1-1 depicts the document hierachy as it pertains to the items not referenced in this document. Documents following the hierachy of DO-398 can, and will, reference the contents found within this document.

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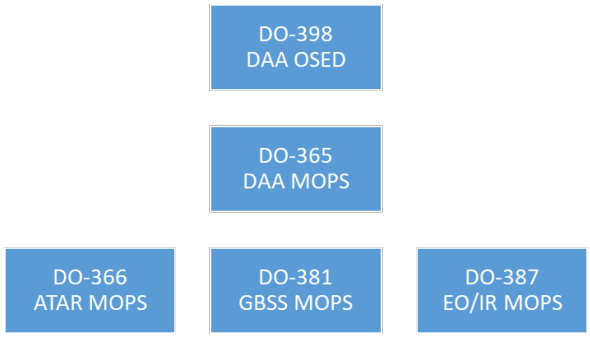


Figure 1-1: DAA Document Hierarchy

This OSED for DAA does not directly apply to UAS operations under 14 CFR Part 101 or 107. UA performance is covered by RTCA DO-365.

The guiding RTCA Special Committee 228 (SC-228) Terms of Reference (TORs),[1] and this OSED focus on both airborne DAA systems with sensors onboard the UA and GB surveillance equipment.

The scenarios in this OSED expand upon the Federal Aviation Administration (FAA) Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap, 3rd Edition 2020 and provide additional operational detail necessary for DAA MOPS development.

In developing the services and environment description, the OSED for DAA identifies numbered Operational Assumptions (ASSUMP-OSED.##) and Operational Requirements (OR.##), which are necessary to bound the scope of the document. Operational Assumptions, while important, do not establish a requirement upon the system or other actors in the environment. Operational Assumptions establish the environment under which this document and the associated requirements are valid. While Operational Requirements do establish requirements, the object of the requirement will always be an actor "external to the DAA system" (e.g., requirements on training or responsibilities for remote pilots or Air Traffic Control (ATC) personnel). Operational Requirements contain the word "shall" and the requirement text and surrounding paragraphs will identify the external actor or system which is expected to meet the intent of that requirement. DAA System Requirements are developed in the DAA MOPS; Surveillance System Requirements are developed separately in their respective MOPS (e.g. airborne radar requirements are developed in the Air-to-Air radar MOPS).

The OSED describes a DAA system built and integrated with other ground and avionic systems as proposed in Operational Views depicted in Section 2 using DAA architectures developed in Section 3. The OSED for DAA references MOPS, MASPS, and other standards where specific functionallity is required to achieve the envisioned operational capability. The referenced standards contain the system, subsystem, and interface requirements which achieve the capabilities developed in this OSED for DAA.

1.1 DOCUMENT STRUCTURE

This OSED for DAA is organized in 9 sections to describe different aspects of UAS operations:

1 Terms of Reference for RTCA Special Committee 228 Minimum Performance Standards for Uncrewed Aircraft Systems Rev 10, 11 June 2020

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