Data Link

Online Training Program for RPAS Certification Scheme

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Data Link: Means of connecting one location to another for communicating digital information

Command and Control Link (C2)
“Data Link between UA and remote pilot station for the purpose of managing the flight”

Others:
- ADS-B Out/ SSR C mode/ S mode [8.1 (c)]
- GSM SIM card /RFID [8.1(d)]
- Payload data say from Camera for eg.
Pre-requisite: ETA from WPC

Equipment Type Approval (ETA) from Wireless Planning and Coordination (WPC) Wing of Department of Telecommunications (DoT) is required.

ETA would be valid for the particular make and model.
Compliance Criteria for Data Link in RPAS

a) Full functioning of data link communication

b) System to alert the remote pilot with aural and visual signal for any loss of C2 data link

c) Communication range is sufficient to have permanent connection with the RPA

d) When link is lost or in contingencies, the RPA follows a pre-defined path to ensure safe end of flight within required area restrictions

e) Capability to inform remote pilot by means of a warning signal in event of data link loss

f) C2 data link loss strategy established, approved and presented in RPA flight manual
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Compliance Criteria for Data Link in RPAS - Verification

1. Verify the supporting documents provided for details about operating frequency, power, range, detection and reporting of data link loss
2. Flight test (Refer Annexure 1) to verify
   1. Distance communication from all possible azimuth angles against claims
   2. Performance, redundancies, backup etc against claimed capabilities
   3. Range for positive, negative and boundary case distances under various battery/power conditions
   4. That warning is given on data link loss

a) Full functioning of data link communication

c) Communication range is sufficient to have permanent connection with the RPA

e) Capability to inform remote pilot by means of a warning signal in event of data link loss
f) C2 data link loss strategy established, approved and presented in RPA flight manual

Verify that Steps taken in case of data link loss is detailed by Manufacturer in the RPA manual. These should be sufficient to address concerns regarding safety, security and compliance with regulations.

b) System to alert the remote pilot with aural and visual signal for any loss of C2 data link

d) When link is lost or in contingencies, the RPA follows a pre-defined path to ensure safe end of flight within required area restrictions

1. Verify the claims made in the supporting documents for sufficiency
2. Flight test
   1. Trigger link loss and verify if aural and visual indications are provided
   2. Trigger case for loss of more than 10s and verify if RPA returns following pre-defined path within required area restrictions
a) Full functioning of data link communication

1. Verify the documents submitted by the manufacturer.
   i. OEM to submit ETA copy and associated test reports as applicable.

2. Witness the test of verification as per below compliance.
   i) To be verified during a distance communication test from all possible azimuth angles against the data submitted by the OEM/Manufacturer
   ii) C2-Data Link capability vs performance comparison through test cases need to be demonstrated by OEM (Verification (functional) of Manufacturer’s Specifications on Stability & Control, Redundancy (Single or dual channel) and Back Up, if any)
   iii) Manufacturer to demonstrate the measures implemented including return to home functionality when data link is lost or other applicable contingencies.
Level fly the RPA along the airstrip, turn from left and return, go to the other side, turn from left, follow the airstrip direction and now turn back from right, go to the other side, turn from right and return back.
Method of Evaluation for Data Link Compliance Criteria in RPAS

a) Full functioning of data link communication… (during flight test)

i) On completion of minimum two swaths of straight-line flight between two farthest points in the flight plan RPAS communication link is fully functional all the time.

ii) Repeat above for the redundant link/ backup link provided if any.

iii) Response to contingencies and documentation covered during verification of 6.1(b,d,e)
b) Demonstration of system to alert the remote pilot with aural and visual signal for any loss of command and control link

1. Verify the documents submitted by the manufacturer.
2. Witness the test of verification as per below compliance.

Manufacturer to demonstrate during flight test whether aural and visual signal during loss of command and control data link is implemented satisfactorily to alert the RPA pilot.

Towards the end of flight test, disconnect the communication link from the GCS and verify.
Method of Evaluation for Data Link Compliance Criteria in RPAS

c) Determine that communication range is sufficient to have a permanent connection with the RPA

1. Verify the documents submitted by the manufacturer.

2. Witness the test of verification as per below compliance.

   Manufacturer to demonstrate communication range between the RPA and C2 Data Link for positive, negative and boundary case distances from the remote unit for having permanent connection in an environment free from interference.

   Similar test to be performed under various battery/power conditions

   Flight Testing manoeuvres as done for 6.1(a)
Method of Evaluation for Data Link Compliance Criteria in RPAS

d) Determine that when data link is lost or in other contingencies, the RPA follows a predefined path to ensure safe end of flight within the area restrictions

1. Verify the documents submitted by the manufacturer.
   1. That RPAS behaviour in such situations is described in detail in the RPAS flight manual.
   2. CB would assess sufficiency

2. Witness the test of verification as per below compliance.
   Manufacturer to demonstrate the contingencies implemented including return to home functionality when data link is lost or in other applicable contingencies.

   Towards the end of the cruise duration, disconnect the communication link from the GCS for more than 10 seconds when the RPAS is at the farthest point in the flight plan and observe behaviour.
e) Determine the capability of system to inform remote pilot by means of a warning signal in the event of data link loss

1. Verify the documents submitted by the manufacturer.
2. Witness the test of verification as per below for compliance.

   Manufacturer to demonstrate during flight test whether aural and visual signal during loss of command and control data link is implemented satisfactorily to alert the RPA pilot.

   Towards the end of flight test, disconnect the data link from the GCS and verify.
f) A command and control data link loss strategy must be established, approved and presented in the RPA flight manual.

1. Verify the documents submitted by the manufacturer.
   1. Manufacturer to provide description of function performed in case of link loss in RPA flight manual and CB to assess the sufficiency. CB will verify RPA manual in each audit.

2. Witness the test of verification as per below compliance.
   Manufacturer to demonstrate the contingencies implemented when command control data link is lost.
   Return to Home functionality covered in Flight testing part for 6.1(d). Any other functionality if claimed to be separately verified.
Thank You