CFMS Tracker Ground Verification Check

1. Objectives

This document is applicable to UA models that are not part of the list in the appendix of the UAV Hardware Tracker User's Manual.

This document provides the procedures to ascertain that the unmanned aircraft (UA) when installed with the UA Tracker, is able to operate safely through a ground verification check. The criteria described herein includes the following:

a. To verify that the attachment is done adequately, and the UA Tracker fulfills its intended function without affecting the UA's functionalities.
b. To ascertain that the UA Tracker is installed within the center-of-gravity (CG) limits of the UA and could be operated safely.

The required checks will need to be conducted on the ground before the UA model's first flight with the tracker attached to the UA.

Only after successful completion of the checks, will the UA Operator be allowed to commence their flight activity with the UA Tracker attached. UA Operator shall submit an acknowledgement form to CAAS via FormSG (https://go.gov.sg/jl09rz) upon successful completion of the checks. Should there be deviations during the checks or abnormal observations, UA Operators shall provide such details to CAAS via CAAS_CFMS_Helpdesk@caas.gov.sg.

2. Reference Documents

These checks were developed with reference to the following documents.

a. UAV Hardware Tracker User's Manual
b. FlyItSafe User Operating Manual

3. Equipment Required

a. UA Tracker package including the tracker hardware, tracker mount and 3M dual lock fastener Velcro strip (all as provided as part of CFMS Tracker package)
b. UA and UAS support equipment e.g., remote controller, landing system, where necessary.
c. Mobile device installed with FlyItSafe mobile application

4. Setup

a. Ensure that the tracker hardware setup is completed (refer to UAV Hardware Tracker User's Manual).
b. Determine a suitable location on the UA and attach the tracker mount using the pre-applied Velcro strip (refer to UAV Hardware Tracker User's Manual for guidelines on suitable mounting location on the UA).

c. Attach the tracker hardware to the tracker mount (refer to UAV Hardware Tracker User's Manual).
d. Ensure that UA is balanced about its CG after the attachment of the UA Tracker.

> ***NOTE**: If the UA is not balanced about the CG, do not proceed to fly with the UA Tracker attached. Feedback to CAAS with details via CAAS_CFMS_Helpdesk@caas.gov.sg.*

5. Check Procedures

The CFMS Tracker Ground Verification Check is to be conducted by the UA Operator before the first flight with the UA Tracker attached. If the UA Operator owns multiple UA of the same model, the conduct of this check is only required once before the UA model's first flight with the UA tracker attached.

In the event where there is an unexpected result/observation from procedure, UA Operator shall inform CAAS via CAAS_CFMS_Helpdesk@caas.gov.sg and provide details on the issue.

Refer to Appendix A for details of the procedures.

6. CFMS Tracker Ground Check Acknowledgement

Upon successful completion of the check, UA Operator is required to submit an acknowledgement form to CAAS via FormSG. The acknowledgement shall state the model and make of the UA and the check was conducted satisfactory. As part of the acknowledgement, UA Operator is also required to submit a photo of the UA with the UA Tracker installed. The photo is to be taken in a manner that allows for clear identification of the UA Tracker location on the UA.

https://go.gov.sg/jl09rz

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Appendix A CFMS Tracker Ground Check

Ensure UA and UA Tracker are set up as per Section 4 of the main document.

Step	Description	Expected Result / Evaluation Criteria
1.	With the UA Tracker attached, shake the UA to ensure the attachment is secure.	After shaking, ensure the following: a. Tracker hardware position within the tracker mount is unchanged. b. Tracker mount position on the UA is unchanged.
2.	Turn on tracker hardware and ensure that it is paired to the FlyItSafe mobile application (refer to FlyItSafe User Operating Manual).	CFMS tracker hardware paired successfully to FlyItSafe mobile application.
3.	Turn on UA and its associated supporting subsystems that are required for operation e.g., UA pilot remote controller. Conduct a system-level pre-flight check. This is to ensure that UA Tracker operation does not interfere with the reception/transmission of RF signals and safety functionalities associated with the UAS.	With the UAS operating together with the UA Tracker, ensure the following: a. Command & Control (C2) link[1] is established and maintained without any interference from the UA Tracker. b. UA status and sensor data[2] reported by the UA is valid. c. Other functionalities that are critical to the safety of flight are operating normally[3]. *[1]C2 link functionality may be validated based on, but not limited to, flight plan uploading, flight control surface commands, camera gimbal control or motor test spin command.* *[2]Sensor data include, but not limited to, attitude, altitude, battery indication and GPS data.* *[3]Safety critical systems include, but not limited to, collision avoidance sensor(s) and its functionality, and sensor(s) used during landing of the UA.*

***NOTE**: If any of the above procedure is unsuccessful, do not proceed to fly with the UA Tracker installed. Feedback to CAAS with details via CAAS_CFMS_Helpdesk@caas.gov.sg.*