Test Project

Module 2 – Drone Diagnostics and Repair

30 minutes

Unmanned Aerial Systems

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1 Introduction

In today's fast-paced agricultural landscape, drones have revolutionized the way farmers monitor crops, manage fields, and increase yields. However, keeping your agricultural drones in optimal condition is essential to ensure accurate data collection and efficient operations. You are part of a team that specializes in repairing agricultural drones from all major brands, ensuring quick and effective solutions to keep your clients' equipment running.

This involves the following:

Drone Calibration and Maintenance

Battery Repair and Replacement

Motor and Propeller Repairs

Software Updates and Troubleshooting

Structural Repairs

Repair and Replacing of external components.

As the assigned service technician, you are required to diagnose the reported symptoms, identify the root cause of each problem, complete the necessary repairs and demonstrate correct operation before returning the drone to the customer.

2 Description of project and tasks

2.1 Schedule

Competitors will complete this module on C3 in a 30-minute session during the day. Random time slots will be allocated during the morning briefing. The competitors must arrive at the diagnostics and repair station at the required time.

The first 25 minutes are allocated for inspection, diagnosis, repair, and documentation. The final five minutes are for the Functional Test where the competitor demonstrates, in the presence of the experts, that all reported customer complaints are corrected.

Competitors are required to provide a completed maintenance checklist in accordance with the maintenance manual provided and documentation; assessment will be conducted by a panel of two experts.

- Every Competitor receives the same drone configuration,
- All seeded faults are repairable,
- No software faults are included,
- Successful completion is demonstrated through the functional motor test and telemetry setup.

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2.2 Assessment Criteria

Module 2 will be scored by Experts during the Competition. Information about changes to specific tasks and required tests will be provided to Competitors in the morning briefing.

Competitors should complete all tasks independently within the time allocated to the Module.

First, prepare according to requirements.

Second, complete the tasks listed below

Note: During operations, strictly adhere to the operation safety rules and carry out the tasks as specified.

Lastly, after all tasks listed in this module are completed, Competitors should clean and organize the work area and submit the relevant materials and Record Sheets to the Experts.

Workplace safety procedures and protocols must always be demonstrated.

If you are advised of a safety infraction during this module, there will be a percentage of marks deducted for each infraction. On the 3rd infraction, the Competitor will be stopped, and the evaluation will be based on work already completed.

Experts will not intervene unless there is a safety concern.

2.2 Module Task

This module assesses the Competitors' practical capabilities in the whole maintenance and servicing of UAS, focusing on the **WS5100 UAV Agri tech Kit**. It simulates the full-process maintenance and servicing work of the UAS after completing the flight mission. Competitors are required to complete the inspection, cleaning and component status evaluation of the UAS in accordance with the specifications, identify potential safety hazards, and ensure that the UAS is in a condition for another flight.

Competitors shall master the basic maintenance and servicing specifications and practical methods of the WS5100 UAV Agri tech Kit, complete the maintenance and servicing work within the specified time, and fill in the flight and maintenance-related information completely.

Diagnostic and corrective actions will be performed with the following equipment:

- WS5100 UAV Agri tech Kit
- Drone Repair Toolkit
- Maintenance Manual
- Diagnostics Checklist
- Post Repair Report

Competitors are required to troubleshoot and provide a completed diagnostics checklist and post repair report in accordance provided maintenance manual and documentation, Competitors are expected to identify the primary faults and to complete the post repair report provided.

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2.2.1 Specific Task Requirements

(I) Basic Maintenance Requirements

1. Applicable models: WS5100 UAV Agri tech Kit;
2. Operation premise: Before starting maintenance and servicing, the UAS must be powered off to avoid operational safety hazards;
3. Information filling: Fill in the diagnostics and repair-related information completely and accurately.

(II) Full-Process Maintenance and Servicing Operation Requirements

1. Basic component inspection and cleaning: Complete a comprehensive inspection of core components such as the frame, propellers and motors, and complete the cleaning of dust, stains and other dirt in accordance with the specifications;
2. Whole machine structure inspection: Inspect the integrity of structural components such as the frame, arms and landing gear, and identify problems such as deformation, damage and loosening;
3. Battery Special Inspection: Inspect the battery appearance and interface condition, clean the interfaces in accordance with specifications, and check for faults such as swelling and corrosion.
4. Propeller and Motor Special Inspection: Inspect the installation status and integrity of the propellers, test the operation status of the motors, and check for problems such as abnormal noise and vibration.
5. Flight control system calibration: Open the supporting application, check the working status of the IMU, and complete a motor test;
6. Transmitter and receiver unit inspection: Inspect the installation status and integrity of the antenna, test the communication system to ensure stable signals without interference;
7. Maintenance records: During maintenance and servicing, complete the diagnostics checklist and review the issues described by the customer and find all faults and correct the faults, then complete the "Post – Repair Report" and conduct the required functional test.

Task # 1 –Maintenance Procedure for the WS5100

Use the Maintenance Manual and Diagnostics Checklist to determine the root cause and complete the required repair

Task # 2 – Detection and Elimination of any Faults

The customer has reported the following issues

1. The drone was experiencing unbalanced Lift.
2. An operator had a hard landing due to a battery failure.
3. Motor 1 is not getting power
4. Motor 4 getting power but is not always responsive
5. They cannot bind the Transmitter and Receiver
6.

Replace – non-repairable items and correct any electrical/wiring faults

Task # 3 – Complete the Maintenance Checks and complete the required checklist.

Task # 4 – Complete the Post Repair Checklist and required functional test.

3 Instructions to the Competitor

3.1 Competition Requirements

Each competitor will work in a separate workspace to complete this task on a rotating schedule.

Instructions

1. Competitors should not bring any device irrelevant to the Competition to the workstation.
2. Tools, electrical components and materials for the Skill are all provided maintained work area for Competitor access.
3. During the Competition, for matters irrelevant to the Competition contents, such as use of the washroom, or report of equipment, facilities, tooling, or tool faults, Competitors can seek help from the Experts.
4. Competitors may refer to the reference documents for the Skill provided.

Operation Safety Rules

1. Put on proper personal protective equipment according to operation requirements;
2. Take site safety protection measures and confirm them;
3. Before performing operations with power off, confirm that batteries are disconnected;
4. Before performing operations with power on, connect the battery only after confirming that no safety hazards exist;
5. Do not operate in an unsafe manner;
6. All the tools or materials used during operations should be stored correctly after use.

Note: If a competitor fails to comply with the operation safety rules and is considered to have operated in a dangerous manner or have caused a safety hazard in the workplace, or equipment damage or personal injuries, marks will be reduced until his/her right to participate in the Competition is cancelled.

4 Equipment, Machinery, Installations, and Materials Required.

4.1 Equipment Provided by the Competition Organizer

WS5100 UAV Agri tech UAS with faults and instructions for the fault-finding module.

One laptop installed with core programming and troubleshooting tools.

All equipment, tools, and materials are listed in the Infrastructure List.

Maintenance Manual

Testing equipment for fault finding module;

Area to complete the Repair and Maintenance Task.

Parts and tools required to complete the design and prototyping modules.

4.2 Equipment and Materials not Permitted

Non-Supplied Laptops or portable computers.

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Tablets, such as Android, IPAD, etc.

Memory sticks/digital storage devices.

Portable radios/music players.

Electronic organizers/diaries.

Wireless communication devices, including mobile phones.

Any power tools.

Any other software not provided by the Competition Organizer without the approval of Experts.

4.3 Items to be Provided by Teams

Each team must provide and wear team identification indicating their region. These must be always worn during the Competition.

During the module, no tools, equipment, stationery, components, parts, raw materials, manuals, drawings, electrical devices, or digital storage devices may be taken out of or brought into the testing area without the approval of the Chief Expert.

Appendix A - UAS Diagnosis and Maintenance

UAS Faults Record Form

UAS Faults Troubleshooting Checklist