

# MAAV Flight Safety Procedures

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## 1 Introduction

Read the entire document before operating the vehicle. A flight is a period of time that may include multiple takeoffs/landings and multiple operators, but may only utilize a single battery pack. For instance, switching operators without switching the battery pack only requires following the landing and takeoff procedures, not the postflight and preflight procedures.

## 2 Vehicle Operation Procedures

This section contains the procedures for safe operation of the vehicle from preflight to postflight. It also includes a basic overview of the operation of the killswitch and flight controller.

### 2.1 Killswitch Operation

- Left stick down is kill position.
- Left stick up is active position.

## 2.2 Flight Controller Operation

- Left stick up/down is height rate control.
- Left stick left/right is yaw rate control.
- Right stick up/down is absolute pitch control.
- Right stick left/right is absolute roll control.

## 2.3 Preflight Procedure

1. Ensure all persons near the vehicle are wearing appropriate eye protection and are a safe distance away from the vehicle.
2. Visually inspect vehicle. Check for loose bolts and fittings. Ensure there are no objects in danger of being hit by a prop.
3. Turn on killswitch controller. Ensure killswitch is in the kill position.
4. Turn on the flight RC controller.
5. Plug in the battery.
6. Flip the vehicle power switch to the on position.
7. On the flight RC controller, press the top right shoulder button until the LED by the vehicle power switch turns green. This ensures that the vehicle is in manual mode.

## 2.4 Takeoff Procedure

1. Shift the killswitch to the flight position to enable the vehicle.
2. Wait for the vehicle to beep rapidly, beep slowly the number of battery cells that are detected, and then beep rapidly again.
3. Pull both flight sticks on the flight controller down and out to idle the motors.
4. Fly. Generally, takeoff forcefully and relax throttle as soon as vehicle lifts off.

## 2.5 Landing Procedure

1. Land the vehicle as softly as possible.
2. Kill vehicle with the killswitch.

## 2.6 Postflight Procedure

1. Flip the vehicle power switch to the off position.
2. Unplug the battery from the vehicle.
3. Turn off the flight RC controller.
4. Turn off the killswitch controller.
5. Remove and charge the battery.

## **3 Flight Environment Safety**

This section pretains to maintaining a safe flight environment for all flights. A safe flight environment not only includes safe vehicle operation, but also the safety of bystanders and others not directly involved with the flight.

### **3.1 Killswitch Operator**

All flights must have a killswitch operator. The killswitch operator must pay attention to the vehicle and the area immediately surrounding it. The killswitch operator is responsible for disabling the vehicle either on command from the pilot, or when the vehicle has become a danger to other people or objects in the flight area.

### **3.2 Tethers**

Unless otherwise noted, the vehicle must have two tethers attached for all flights. There must be a team member holding the tethers for the duration of the flight. The members holding the tethers are responsible for holding the vehicle back if it starts to exit the flight area or demonstrate other unplanned behavior. The tethers are also used to catch the vehicle to prevent damage if the killswitch is activated while in flight.

### **3.3 Types of Flights**

#### **3.3.1 General Testing**

General testing flights can be preformed autonomously or under RC control. These flights must obey standard killswitch and tether procedures. These flights take place in flight areas that are reasonably clear of other objects and bystanders. The common areas for these flights are the Wilson Center and 107 GFL.

#### **3.3.2 RC Demonstration Flights**

RC controlled demo flights inherently have bystanders and spectators. During demonstration flights, all persons not involved in the flight must stay behind a safety line at least 25 feet from the vehicle at all times. All demonstration flights must have a killswitch operator. Tethers are required, but the number can be reduced from 2 to 1 at the judgement of the team lead running the demo.

#### **3.3.3 Full Mission Tests**

Full mission tests are designed to test the vehicle's capability to complete the mission under conditions as close to competition as possible. A killswitch operator is required, but tethers may be omitted. Because of this, the flight must be preformed in an area where MAAV can have complete control over. This is to ensure that bystanders cannot place themselves in danger during the course of the flight. Currently, the only area we have preformed this testing in is 107 GFL.

#### **3.3.4 FXB Atrium Flights**

All flights in the FXB Atrium must adhere to the building's specific rules regarding quadrotor flights. A copy of these rules is attached to the end of this document.