Brigham Young University

AUVSI Capstone Team (Team 45)

Field Flight Checklist v2.0

ID	Rev.	Date	Description	Author	Checked By
PF-001	0.1	11-03-2018	Initial creation	Andrew Torgesen	Brandon McBride
PF-001	0.2	01-07-2019	Updates from feedback	Andrew Torgesen	Tyler Miller
PF-001	1.0	02-04-2019	Updates from feedback	Andrew Torgesen	Kameron Eves
PF-001	2.0	03-06-2019	Updates from feedback	Andrew Torgesen	John Akagi
PF-001	2.1	06-01-2019	Added Brix and “Start ROSbag” protocol	Ryan Anderson	[Checked By]

1 Purpose

The purpose of this artifact is to keep an up-to-date, standard protocol for ensuring safety and good performance for test flights in hardware. It is important that all test flights are run systematically, and according to the procedures and timelines outlined in this document.

2 Checklist

Day Before

- ☐ Check that the launch file does what it needs to with the plane grounded
- ☐ Ensure that the ROSbag records the data you want
- ☐ Charge airplane LiPo(s)
- ☐ Charge RC transmitter battery
- ☐ Parameter check
- ☐ Check WiFi config
- ☐ Check disk space on Odroid

Hardware Packing List

- ☐ Plane
- ☐ Wings
- ☐ Airplane batteries
- ☐ RC transmitter
- ☐ RC transmitter batteries
- ☐ 2+ sets of props
- ☐ Fiber tape
- ☐ Launch gloves
- ☐ Wrench for props
- ☐ Pliers

- ☐ Battery monitor
- ☐ Safety glasses
- ☐ Screwdriver
- ☐ Table (optional)
- ☐ Targets (optional)

Comms Packing List

- ☐ Router + power cable
- ☐ Brix
- ☐ Litebeam + 2 ethernet cables
- ☐ A/C POE adapter
- ☐ Extra ethernet cable
- ☐ Car power adapter
- ☐ 3-plug extension cable
- ☐ Walkie-talkies
- ☐ Generator (optional)

Flight Checklist: *Before Launching*

Before Powering Motor:

- ☐ Start network
- ☐ Safety pilot reads the Safety Pilot Checklist
- ☐ Attach wings
- ☐ Attach props and check tightness
- ☐ Strap down battery
- ☐ Connect battery monitor (full battery: 16.8 V)
- ☐ Check plane CG
- ☐ Check camera settings

- ☐ Ensure camera is on Shutter Priority Mode
- ☐ Ensure shutter speed is set to 1/4000th (the fastest setting)?

☐ Turn on transmitter

☐ Ensure that the arm and RC override channels are set to OFF

☐ (TEMPORARY) Hold UGV latch shut while connecting battery

☐ Connect battery

☐ (TEMPORARY) Release UGV latch when you hear it latch twice

☐ Ensure network connection

☐ Ensure origin (where the plane is launched from) latitude and longitude are correct in 3 files:

- ☐ "∼lat_ref", "∼ long_ref", and "∼h_ref" in ∼/new_ws/src/rosplane/rosplane/launch/Official.launch on the Odroid
- ☐ "ref_lat" and "ref_lon" in metis/launch/interop_full.launch
- ☐ "init_lat" and "init_lon" in interop_pkg/param/client_params.yaml *(if using the interop server)*

☐ Ensure the following variables are correct in interop_pkg/param/client_params.yaml *(if using the interop server)*:

- ☐ "SERVER_IP"
- ☐ "SERVER_PORT"
- ☐ "username"
- ☐ "password"
- ☐ NOTE: log-in information should be provided at the competition

☐ Launch ROS (through *screen*, if possible) (ensure aircraft is level)

☐ Ensure GPS Fix ($\geq$ 3 satellites)

☐ Calibrate Sensors

- ☐ IMU: rosservice call */calibrate_imu*
- ☐ Airspeed: rosservice call */calibrate_airspeed*
- ☐ Barometer: rosservice call */calibrate_baro*

- ☐ Check attitude estimation (except for yaw–if wrong, update ins offset)
- ☐ Check airspeed
- ☐ Check GPS

☐ Check RC

- ☐ Ensure RC transmitter is emitting enough power ($> 10\ mW$, 1 W in competition)
- ☐ Wire wiggle test
- ☐ Check control surface direction
  - ☐ Ailerons
  - ☐ Elevators
- ☐ RC Range Test (100ft, just do this once per setting config change)

☐ Lock shut hatch covers

☐ Check Autopilot

1. Begin with throttle 0%, Arm OFF, RC Override ON (both top switches toward the pilot)
2. ROStopic echo */status*
3. Secure aircraft (hold firmly)
4. Arm ON
   - ☐ Confirm *armed = true*
5. RC Override OFF
6. Perform the following in quick succession (no longer then 2 seconds)
   (a) Call "Clear Props"
   (b) Throttle to full
   - ☐ Confirm *RC Override = false*
   - ☐ Confirm air blowing towards tail

   (c) Throttle to idle
   - ☐ Confirm prop direction

☐ Start ROSbag

FLY

- ☐ Takeoff
  - ☐ Ensure area clear
  - ☐ Get into position
  - ☐ Go/No Go Call
    - ☐ Vision
    - ☐ UGV
    - ☐ Autopilot
    - ☐ Antenna Pointer
    - ☐ RC Pilot
    - ☐ Launcher
    - ☐ Team lead
  - ☐ Arm ON
  - ☐ RC Override OFF
  - ☐ Throttle full
  - ☐ Toss the aircraft
- ☐ RC Takeover
  - ☐ RC Override ON
  - ☐ Throttle to desired
- ☐ Handover to Autopilot
  - ☐ RC Override OFF
  - ☐ Throttle to full

Flight Checklist: *After Landing*

- ☐ Kill ROS
- ☐ Backup ROSbag

- ☐ Clean shutdown
- ☐ Unplug battery
- ☐ Gather all items

Post-flight

- ☐ Set battery to storage voltage