ADEPT-FC Checklist

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Validation

Flight Description:

_____   _____
Flight date: MM-DD-YYYY   Flight number

_____   X_____
Pilot present   Signature of pilot present

_____   X_____
Engineer present   Signature of engineer present

_____   X_____
Approved by   Signature of approver

Materials

Check	Item	Quantity	Purpose/Description	Storage Location
	ADEPT-FC Aircraft	X1	Test aircraft	On mobile storage cart: Upper shelf
	Left Wing	X1	Left wing of the Adept-FC aircraft	On mobile storage cart: Lower shelf

Check	Item	Quantity	Purpose/Description	Storage Location
	Right Wing	X1	Right wing of the Adept-FC aircraft	On mobile storage cart: Upper shelf
	Carbon Fiber Rod	X1	Loading bearing rod used to attach wings	On mobile storage cart: Upper shelf
	Nose Gear	X1	Nose gear of aircraft	On mobile storage cart: Upper shelf
	Wing Nut	X2	Nut used to secure wings to body	On mobile storage cart: In plastic bag on upper shelf
	Washer	X2	Washer used to spread load of wing nut(s)	On mobile storage cart: In plastic bag on upper shelf
	Nose screws	X2	Screws that hold nose of aircraft during flight	On mobile storage cart: In plastic bag on upper shelf
	ADEPT-FC Aircraft	X1	Test aircraft	On mobile storage cart: Upper shelf
	Lipo Battery Voltage Tester	X1	Used to test the voltages of the Lipo batteries	In lipo pelican case in flammables cabinet
	Lipo Balance Charger	X2	Used to charge lipo batteries	On workbench
	7.4V Lipo	X5	Powers all avionics systems	In lipo pelican case in flammables cabinet
	18.5V Lipo	X4	Powers all propulsors	In lipo pelican case in flammables cabinet
	4-8 Power Cable Splitter	X1	Splits 18.5V connectors to 8 outputs (1 per propulsor)	On mobile storage cart: Upper shelf
	General Tool Set	X1	Used in assembly and repair process	Personal storage
	Wireless router	X1	Creates wireless network used to interface with aircraft	On table near mobile storage cart
	Ethernet cable	X1	Links aircraft to wireless network	In TX case
	TX	X1	Sends radio commands to aircraft	In storage box on mobile storage cart
	Linux Laptop	X1	Used to interface with aircraft via SSH	N/A
	Weather Station	X1	Measures weather conditions at flight location	Under workbench
	Weather Station Pole	X1	Holds weather station	Personal storage

Assembly

☐ Remove *ADEPT-FC Aircraft* from mobile storage cart and place on ground.

- [ ] Remove both doors from *ADEPT-FC Aircraft*.
- [ ] Slide the *Carbon Fiber Rob* through the center hole of the wing root on the *ADEPT-FC Aircraft*. Avoid touching the cut-off faces of the tube as they can give carbon fiber splinters.
- [ ] With two hands distributing the load as evenly and widely as possible, lift the *Left Wing* and slide it onto the left side of the *Carbon Fiber Rod*. Pass through:
  - [ ] 4 propulsor power connectors
  - [ ] 4 propulsor PWM cables
  - [ ] 1 shielded Hall-Effect sensor servo cable
  - [ ] 1 left flap servo cable (blue tape, "LF")
  - [ ] 1 left aileron servo cable (yellow and red tape, "LA")
- [ ] Secure *Left Wing* to ADEPT-FC Aircraft with *Wing Nut* and *Washer*. Only finger tighten. Over tightening can damage wing root.
- [ ] With two hands distributing the load as evenly and widely as possible, lift the *Right Wing* and slide it onto the right side of the *Carbon Fiber Rod*. Pass through:
  - [ ] 4 propulsor power connectors
  - [ ] 4 propulsor PWM cables
  - [ ] 1 shielded Hall-Effect sensor servo cable
  - [ ] 1 right flap servo cable (green tape, "RF")
  - [ ] 1 right aileron servo cable (red tape, "RA")
- [ ] Secure *Left Wing* to ADEPT-FC Aircraft with *Wing Nut* and *Washer*. Only finger tighten. Over tightening can damage wing root.
- [ ] Attach all PWM cables from both wings (labeled 1-8) to their associated PWM ports. The ports are fixed just inside of the wing root and also labeled 1-8.
- [ ] Attach the "LA", "LF", "RA", and "RF" servo cables to the associated ports. The ports are color coded and labeled.
- [ ] Connect the *Left Wing* Hall effect sensor into the ADC riser port 1. The partially exposed face should face the right of the aircraft.
- [ ] Connect the *Right Wing* Hall effect sensor into the ADC riser port 0. The partially exposed face should face the right of the aircraft.
- [ ] Remove the nut from the ADC board riser grounding bolt.
- [ ] Attach both grounding rings from the *Left Wing* and *Right Wing* Hall effect sensors to the grounding bolt on the ADC board riser.
- [ ] Replace the nut to the ADC board riser grounding bolt.
- [ ] Inspect all batteries for any sign of external damage or swelling.
- [ ] Test battery voltages. Voltages should be no less than design voltages and no greater than 1.0V over design voltages. If voltages are incorrect, charge batteries.
- [ ] Record each battery voltage along with battery name.
- [ ] Attach the *7.4V lipo* labeled "SE 1" to the servo power distribution board power header. This is the head nearest the left side of the aircraft on the front of the PDB. **BEFORE PLUGGING IN, CHECK POLARITY**. Secure on velcro strip near front right of aircraft.
- [ ] Attach the *7.4V lipo* labeled "ProLite RX" to the servo power distribution board power header. This is the head nearest the left side of the aircraft on the back of the PDB. **BEFORE PLUGGING IN, CHECK POLARITY**. Secure on velcro strip near front right of aircraft.
- [ ] Attach the *7.4V lipo* labeled "SE 2" to the ADC board power connector. Secure on velcro strip.
- [ ] Attach the *7.4V lipo* labeled "Pi 1" to the the Pi's primary power source. Secure on velcro strip near front left of aircraft.
- [ ] Attach the *7.4V lipo* labeled "Pi 2" to the the Pi's backup power source. Secure on velcro strip near front left of aircraft.
- [ ] Attach the *4-8 Power Cable Splitter* to each of the 8 motor power connectors.
- [ ] Place NEWT and CHUG *18.5V lipos* in the nose shield of the *ADEPT-FC Aircraft*. Be careful not to pinch or damage the pressure transducers or their cables. **Do NOT plug in yet.**
- [ ] Place LUMP *18.5V lipo* in the front of the aircraft on the center line (on a small piece of velcro). **Do NOT plug in yet.**
- [ ] Place BROCK *18.5V lipo* in the rear of the aircraft off of the center lines towards the right wing (on a small piece of velcro). **Do NOT plug in yet.**

Preflight

- [ ] Record temperature, pressure, and wind data from weather station.
- [ ] Remove protective cover from 5-hole probe
- [ ] Conduct walkaround (defined in AP_Validation.md).
- [ ] Turn on TX. Check battery status of TX. If it is below 80%, charge.
- [ ] Move throttle stick all the way down.
- [ ] Set all SC switches to the fully forward position.
- [ ] Attach ethernet cable to Pi.
- [ ] Attach wireless router to ethernet cable connected to Pi. Power on the router.
- [ ] Wait for Pi to boot. If it has not booted, leave the keyboard and monitor attached and restart the device by removing and reconnecting its batteries.
- [ ] On linux laptop: Connect to ADEPT-FC wireless network
- [ ] On linux laptop: `ssh pi@192.168.0.100`
- [ ] Password: `*********`
- [ ] On Linux laptop, download most recent flight release: https://github.com/tbretl/adept-fc.git
- [ ] Rename flight release to `adept-fc`
- [ ] `scp -r adept-fc pi@192.168.0.100:`
- [ ] On PI, `cd adept-fc`
- [ ] `cd config_files`
- [ ] `vim autopilot_main.config`
- [ ] `i`
- [ ] Ensure proper AP gains are selected
- [ ] Enter density (rho) in kg/m^3 based on temperature
- [ ] `esc :wq enter`
- [ ] `cd ..`
- [ ] `sudo ./run.sh`
- [ ] Ensure proper AP gains have been loaded in stdout
- [ ] `pwm arm`
- [ ] Check direction and throw of all control surfaces.
- [ ] Check trim command on all control surfaces.
- [ ] Check flap extension and retraction.
- [ ] `pwm disarm`
- [ ] `all exit`
- [ ] `sudo git clean -fxd`
- [ ] `cd config_files`
- [ ] `vim sequence.dat`
- [ ] Set sequence number to flight number - 1
- [ ] `sudo ./run.sh`
- [ ] AT disarm (SC3 to forward).
- [ ] AP disarm (SC3 to forward).
- [ ] `pwm arm`
- [ ] Disconnect ethernet from Pi.

Taxi

- [ ] Move aircraft to taxiway.

- [ ] Verify crosswind is less than 7 MPH.
- [ ] Plug in all 4 propulsor batteries. Ensure symmetric cross loading of each motor battery. Ensure audible beep from each motor.
- [ ] Record each motor powered by each battery.
- [ ] Conduct a fan run-up test.
- [ ] Secure both doors.
- [ ] Taxi to active.

Before takeoff

- [ ] Flaps set to takeoff.
- [ ] Trim set to takeoff.
- [ ] Flight brief.
- [ ] Clearance.

Cruise / test

- [ ] Flaps to flight.
- [ ] Set rudder and elevator trim.
- [ ] At steady level flight, arm and engage AP (and AT).
- [ ] Conduct test.
- [ ] Disengage and disarm AP (and AT).

Before landing

- [ ] Ensure AP disarmed.
- [ ] Trim set to landing.
- [ ] Flaps set to landing.

Taxi off

- [ ] Flaps up.
- [ ] Taxi off of runway.
- [ ] Run propulsors on low throttle for 4 minutes.

Shutdown, lockout

- [ ] Plug in ethernet cable to aircraft.
- [ ] On linux laptop: Connect to ADEPT-FC wireless network
- [ ] On linux laptop: `scp -r pi@192.168.0.100:~/adept-fc ~/Documents`
- [ ] Password: `*********`
- [ ] On linux laptop: `ssh pi@192.168.0.100`
- [ ] `sudo ./bin/monitor`
- [ ] `pwm disarm`
- [ ] `all exit`
- [ ] `sudo poweroff`
- [ ] Disconnect propulsor batteries. Measure and record post flight voltages.

- [ ] Disconnect ADC battery. Measure and record post flight voltages.
- [ ] Disconnect both servo power distribution batteries. Measure and record post flight voltages.
- [ ] Disconnect both flight computer batteries. Measure and record post flight voltages.