

# ADEPT-FC Checklist

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## Validation

Flight Description:

Flight date: MM-DD-YYYY

Flight number

Pilot present

X  
Signature of pilot present

Engineer present

X  
Signature of engineer present

Approved by

X  
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
	Right Wing	X1	Right wing of the Adept-FC aircraft	On mobile storage cart: Upper shelf

Check	Item	Quantity	Purpose/Description	Storage Location
	Carbon Fiber Rod	X1	Loading bearing rod used to attach wings	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
	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
	HDMI Monitor	X1	Allows user to interface with Pi	On table near mobile storage cart
	HDMI Cable	X1	Connects Pi to Monitor	Stored with monitor
	USB Keyboard	X1	Allows user to interact with Pi	On table near mobile storage cart
	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	On table near mobile storage cart
	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

## Assembly

- ☐ Remove *ADEPT-FC Aircraft* from mobile storage cart and place on ground.
- ☐ Remove both doors from *ADEPT-FC Aircraft*.
- ☐ Slide the *Carbon Fiber Rod* 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.
- ☐ 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 2 18.5V lipos in the nose shield of the *ADEPT-FC Aircraft*. Ensure the selected 18.5V lipos are the ones with velcro on their skinny face. Be careful not to pinch or damage the pressure transducers or their cables. **Do NOT plug in yet.**
- ☐ Place 1 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 1 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

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- ☐ 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.
- **IF WALL POWER AVAILABLE**
  - ☐ Attach HDMI cable to Pi.
  - ☐ Attach HDMI Monitor to HDMI cable connected to Pi.

- ☐ Attach keyboard to Pi.
- **IF WALL POWER NOT AVAILABLE**
  - ☐ On linux laptop: Connect to ADEPT-FC wireless network
  - ☐ On linux laptop: `ssh 192.168.0.100`
- ☐ Login: `pi`
- ☐ Password: `*****`
- ☐ Download most recent flight release: <https://github.com/tbretl/adept-fc.git>
- ☐ `cd adept-fc`
- ☐ `make clean`
- ☐ `git clean -fxd`
- ☐ `make all`
- ☐ `sudo ./run.sh`
- ☐ `pwm arm`
- ☐ Check direction and throw of all control surfaces.
- ☐ Check trim command on all control surfaces.
- ☐ Check flap extension and retraction.
- ☐ Zero throttle, control surface commands, flaps, and trim. Engage autopilot and check for expected behavior.
- ☐ Zero throttle, control surface commands, flaps, and trim. Disengage autopilot.
- ☐ `pwm disarm`
- ☐ `all exit`
- ☐ `sudo ./run.sh`
- ☐ `monitor test`
- ☐ `all exit`

## Taxi

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- ☐ Move aircraft to taxiway.
- ☐ Record temperature, pressure, and wind data from weather station.
- ☐ Verify wind is less than 10 MPH.
- ☐ Range check the TX.
- ☐ Plug in all 4 propulsor batteries.
- ☐ `sudo ./run.sh`
- ☐ `pwm arm`
- ☐ Conduct a fan run-up test.
- ☐ Disconnect ethernet, HDMI, and keyboard from Pi.
- ☐ Secure both doors.
- ☐ Taxi to active.

## Before takeoff

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- ☐ Flaps set to takeoff.
- ☐ Trim set to takeoff.
- ☐ AP disengage.
- ☐ Flight brief.
- ☐ Clearance.

## Cruise / test

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- ☐ Flaps to flight.

- ☐ Set rudder and elevator trim.
- ☐ At steady level flight, engage AP.
- ☐ Conduct test.
- ☐ Disengage AP.

## Before landing

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- ☐ Ensure AP disengage.
- ☐ Trim set to takeoff.
- ☐ Flaps set to landing.

## Taxi to gate

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- ☐ Flaps up.
- ☐ Trim set to 0.
- ☐ Run propulsors on low throttle for 4 minutes.

## Shutdown, lockout

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- ☐ Plug in ethernet cable to aircraft.
- ☐ On linux laptop: Connect to ADEPT-FC wireless network
- ☐ On linux laptop: `ssh 192.168.0.100`
- ☐ Login: `pi`
- ☐ Password: `*****`
- ☐ `cd adept-fc/`
- ☐ Download ESC data
- ☐ `sudo ./bin/monitor`
- ☐ `pwm disarm`
- ☐ `all exit`
- ☐ `sudo poweroff`
- ☐ Disconnect propulsor batteries.
- ☐ Disconnect ADC battery.
- ☐ Disconnect both servo power distribution batteries
- ☐ Disconnect both flight computer batteries.