Thursday section Flight Crew 2: Harrison Guinn, Dylan Klos, Mike Lu

Having an effective safety management system (SMS) is essential for a successful UAS operation. One key component in SMS is crew resource management (CRM). CRM involves delegation of certain parts of the UAS operation to certain crew members to increase overall efficiency while avoiding the presence of gaps. In lecture, the class covered several 'positions' within the CRM model including PIC, Flight Engineer, Sensor Operator, each with their own specific purpose.

As a flight crew, we made several decisions to improve our flight crew's communication and overall efficiency. The first decision we made was designating parachute folding to Mike and Dylan on an alternating rotation. Next, we revised the checklist and designated steps based on the appropriate role, "PIC", "Flight Engineer", and "Sensor Operator". As a crew, we then created Table A to include a summary of what each role is responsible for during the operation. Table A and the revised checklist can be found below. We will be having a rotating schedule for each role, similar to the rotating parachute folding schedule. We also created a data sheet (Data Sheet - Version 1) to be used while we are out in the field to ensure we record all important information during the operation. Lastly, as a crew, we have determined that GroupMe would be our primary form of communication.

The revised checklist, Table A, and the data sheet was worked on equally among group members, with the introduction paragraph mainly written by Dylan with Mike and Harrison revising and contributing as needed.

PIC	Flight Engineer	Sensor Operator
- Create mission - Double checking altitude and speed settings. - Mission safety - Check connections between GCS and aircraft. - Retrieve Bramor	- Pre-departure equipment check (chute, battery) - Catapult setup - Aircraft setup and launch - Serve as a visual observer while Bramor is in the air. - Flight safety - Catapult breakdown	- Install and check sensors - Assist Flight Engineer as needed - Record flight info - Serve as a visual observer while Bramor is in the air. - Retrieve Bramor - Check data collected

Table A: Summary of flight responsibilities per role.

Revised Checklist- Version 3

PIC
Flight Engineer
`Sensor Operator`
All

Unpacking:

1.	*Kestrel*	*ON*
2.	*Define North*	*DEFINED*
3.	*State weather conditions*	*STATE*
4.	**Catapult rubber out**	**UNFOLD**
5.	**Catapult launch guide**	**UNFOLD**
6.	**Catapult legs**	**EXTEND**
7.	**Catapult legs safety locks**	**SECURE**
8.	**Catapult middle lock**	**SECURE**
9.	**Catapult safety pin**	**SECURE**
10.	**Catapult on level ground**	**CHECK**
11.	**Winch rope**	**EXTEND**
12.	**Winch rope state**	**CHECK**
13.	**Breaking rope state**	**CHECK**
14.	**Bungee state**	**CHECK**
15.	**Rubber warp to front**	**CHECK**
16.	**Rubber not armed**	**CHECK**
17.	*Wind direction*	*CHECK*
18.	**Combox antenna**	**CONNECT**
19.	**GCS Com-box**	**ON**
20.	*GCS Tablet*	*ON*
21.	**Combox battery**	**CHECK**
22.	*Tablet battery*	*CHECK*
23.	`Record battery information`	`RECORD`
24.	*Tablet sound*	*ENABLED*
25.	*Bluetooth*	*PAIRED*
26.	*C3P*	*ON*
27.	*Payload sensor*	*SELECTED*

Assembling:

1.	**Airframe and wing connectors**	**CHECK**
2.	**Airframe on catapult**	**PLACE**
3.	**Wing joiners in the wings**	**PLACE**
4.	**Airframe antenna**	**CONNECT**
5.	**Wings on the air frame**	**CONNECT**

6. **Winglets on the wings** **CONNECT**
7. **Wing gap tape** **SEAL**
8. **Pitot tube clean** **CHECK**
9. **Propeller** **CHECK**
10. Sensor cable CONNECTED
11. **Parachute hatch** **REMOVE**
12. Formatted memory card INSERTED
13. USB key INSERTED
14. **UAV battery** **PLACE**
15. **Battery elastic** **SECURE**
16. **Y connector attached to battery** **CONNECTED**
17. **UAV Battery** **CONNECTED**
18. *Motor Sound* *PLAYED*
19. *Camera settings* *CHECK*
20. **Front top Hatch** **SECURE**
21. *Airframe linked to GCS* *CHECK*
22. *Parachute* *POP*
23. **Parachute install to three red cord** **INSTALL**
24. **Parachute cords goes under** **CHECK**
25. **Parachute connect to hatch** **CONNECTED**
26. *Parachute hatch (close-open-close* *CLOSED*
27. **Parachute safety pin** **REMOVED**

Preflight:

1. *Mission* *OPEN/CREATE*
2. *Payload sensor selected* *CHECK*
3. *UAV battery* *CHECK*
4. *Communication* *CHECK*
5. *Satellites* *MORE THAN 7*
6. *Navigation map* *LOADED*
7. *Photo log* *CLEARED*
8. **Airframe from catapult** **REMOVED**
9. *Mode to manual* *SET*
10. *Servo,* **roll left** *CHECK*
11. *Servo,* **roll right** *CHECK*
12. *Servo,* **pitch down** *CHECK*
13. *Servo,* **pitch up** *CHECK*
14. *Propeller safety* *CHECK*
15. *Motor test* *CHECK*
16. *Mode to safe* *SET*
17. **Airframe** **LEVEL**

18. *Sensor initialization* *SET*
19. *Waypoints(speed & altitude)* *CHECK*
20. *Mission(T&L, P, R)* *SET*
21. *Takeoff point parm* *CHECK*
22. *Landing points parm* *CHECK*
23. *Auto camera switch* *SELECT*
24. *Mission* *UPLOAD*
25. *Failsafe check with crew* *CHECK*
26. *Sensor initialization* *SET*
27. *Airspeed (around 0 m/s)* *CHECK*
28. Lens clean CHECK
28. **Pitot cover** **REMOVE**
29. **Pitot test** **CHECK**

Launch:

1. **Trolley** **LOCK**
2. **Rubbers** **ON**
3. **Catapult safety** **CHECK**
4. **Catapult direction** **CHECK**
5. **CATAPULT** **ARMED**
6. **Airframe on catapult** **SECURE**
7. **Propeller** **ALIGN**
8. *Takeoff mode* *SET*
9. *UAV into takeoff mode* *CHECK*
10. **Leg on plate** **PLACE**
11. **Safety pin** **REMOVE**
12. Safety-situational awareness CHECK
13. **Catapult release** **PULL**
14. Record Launching time RECORD

Post flight:

1. Record landing time RECORD
2. Record battery level RECORD
3. Record flight summary info RECORD
4. **Catapult breakdown** **START**
5. *Inspect parachute* *INSPECT*
6. *Pack Parachute* *PACK*
7. *Inspect any damage (lens, airframe)* *CHECK*
8. *Take UAV, and parachute back to GCS*
9. Check for data CHECK

10. **Pitot tube cover** **COVERED**
11. **Parachute safety pin** **PLACED**
12. **Remove battery** **REMOVE**
13. **Aircraft breakdown** **START**
14. **Seal tape in trash**
15. `Memory card` `REMOVED`
16. Sweep area for any left equipment SWEEP

Data Sheet - Version 3

Date(mm/dd/yyyy)				
Flight Crew				
Temperature (°C)				
Wind direction				
Wind speed (m/s)				
Cloud (%)				
Com-box reading				
Satellite				
Communication decibel level (dB)				
UAV battery (V)				
Tablet battery (%)				
Parachute folded by				
Takeoff altitude (m)				
Rally altitude (m)				
Takeoff time* (hr:min)				
Landing time (hr:min)				
Flight duration (min)				

Time: default in 24-hour clock, unless specified with AM or PM.