



AERIAL *DRONE*
COMPETITION



TEAM 1257A
COMPETITION LOGBOOK
MT. EVERETT REGIONAL SCHOOL
SHEFFIELD, MA





AERIAL *DRONE*
COMPETITION



MEET THE TEAM



Nico Bruno: Pilot/Co-Pilot

I am in 7th Grade. I joined the Drone Team because I love technology. I was also part of the VEX Robotics program. So, when I heard a drone team was starting it seemed a logical next step to take.



Wyatt Alden: Pilot/Co-Pilot/Coder

I am in 6th Grade. I joined the Drone Team because I love everything STEM. I'm especially interesting in coding. I was the lead coder for my VEX team as well this past year. This is my first year in robotics and drones and I love the tech and working as a team.



Zayre Traill: Visual Observer/Technician

I am in 7th Grade. I joined the Drone Team because it truly interested me to fly and control something that looked so uncontrollable. I wanted to get out of my house and do some afterschool activities, so when the opportunity presented itself, it interested me to join.



Tonia Mayard: Pilot/Technician

I am in 7th Grade. I joined the Drone Team because I want to work in a technical field some day. I'm not exactly sure what that is, but I've known I like building and problem solving ever since I starting playing with Legos as a kid. Actually, I still play with Legos 😊.



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HOW DRONES WORK



Image courtesy of DroneZon.com

A drone relies on rotors for its vertical motion. Drones use their rotors—which consist of a propeller attached to a motor—to hover, meaning the downward thrust of the drone is equal to the gravitational pull working against it; climb, when pilots increase the speed until the rotors produce an upward force greater than gravity; and descend, when pilots perform the opposite and decrease speed.

To hover, two of a drone's four rotors move clockwise, while the other two move counterclockwise, ensuring that the sideways momentum of the drone remains balanced. To avoid throwing its vertical motion off-kilter, the other two rotors on the drone will increase their spin. The same principle applies to moving forward and backwards—the rotors of the drone must apply thrust while making sure the spin of the rotors keeps the drone balanced.

<https://www.ctia.org/news/up-up-and-away-how-do-drones-work>



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GAME STRATEGY

Scoring for Piloting Teamwork Matches

Cleared alliance starting lane	10
Owned goal	10
Bonus ball	11
Drone landed on a landing pad	5
Drone landed on the blackout zone floor	15
Drone landed on the large landing site	25
Drone landed on the small landing site	40

GAME STRATEGY:

Pre-Start:

- Coordinate with alliance partner which team will take which starting lane.
- Coordinator with alliance partner who will enter the black out zone first.

In-Game:

- Take off and move to one of the starting lanes and clear all the ball
- Move to assist alliance partner in clearing the other lane if necessary
- Co-pilot assesses ball positions on field and directs flight to toward the goal with the closest balls
- Use down draft to move balls into goal.
- Co-pilot reassesses positions of balls and directs flight in one of the following:
 - Move toward an additional goal and score more balls
 - Move toward bonus balls and score
 - Descore balls from the opposing alliance
- Co-pilot assess game time to take next course of action
 - If time allows, continue through the last set of movements
 - If at 45 seconds, move to blackout zone.
- Visual Observer directs drone to land on small landing site.
- If not attainable and based on time, pilot may land on large site or floor.

Scoring for Autonomous Flight Skills Matches

Successful liftoff	5
Navigating under an arch gate	5
Navigating through a keyhole gate	5
Cleared ball from starting line	1
Drone landed on a landing pad	5
Drone landed on the blackout zone floor	15
Drone landed on the large landing site	25
Drone landed on the small landing site	40

Autonomous 1: (balls, archways, landing pad)

Liftoff from position directly across from top edge of starting lane	5 pts
Fly straight past the arch way's post	
Clear balls from lane	9 pts
Turn and fly through 2 gates	10 pts
Return to landing pad near middle of game field and land	5 pts
TOTAL:	29 pts

Autonomous 2: (blackout zone)

Liftoff from position in line with keyhole gates	5 pts
Fly through the first keyhole gate	5 pts
Fly through the second keyhole gate	5 pts
Fly to large landing site and land	25 pts
TOTAL:	40 pts



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AUTONOMOUS STRATEGY

Auto Nomous 1: clear start, man 2 gates, land. Auto Nomous 2: Blackout 111



Auto 1: Starting Lane, Double Archways, Land

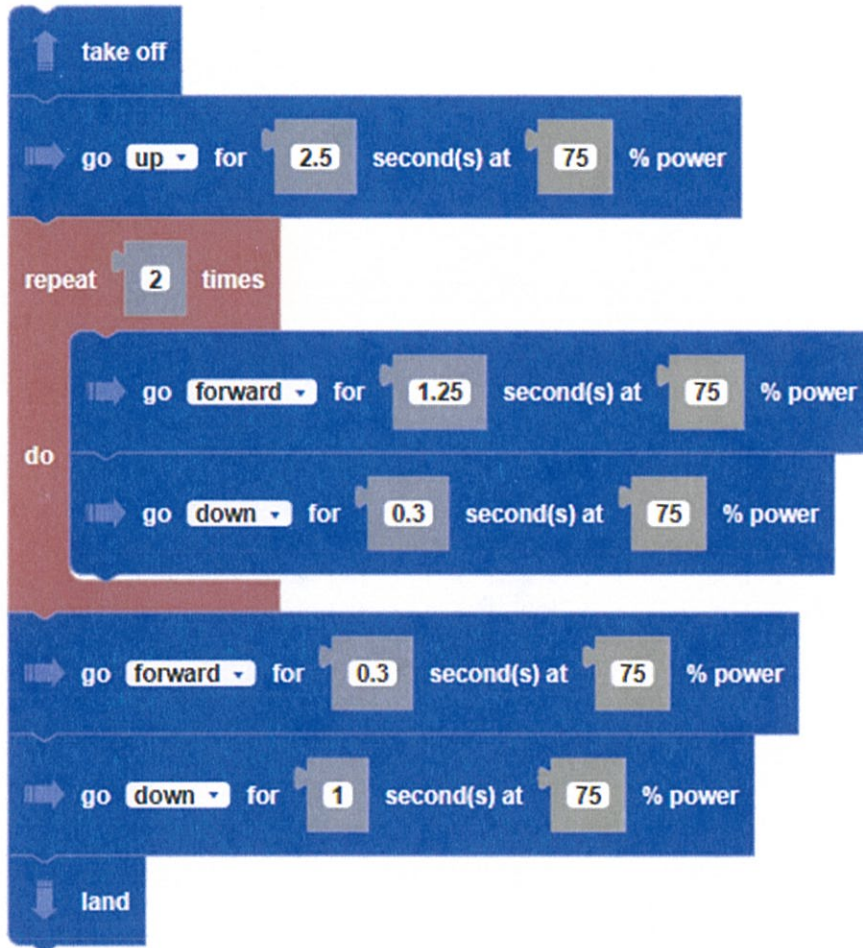
Launch Point: Directly across from corner of starting lane

Code:

```
take off  
go forward for 1.6 second(s) at 50 % power  
go down for 1.7 second(s) at 50 % power  
hover for 2 second(s)  
go up for 1.5 second(s) at 50 % power  
go forward for 1 second(s) at 50 % power  
turn right 90 degrees  
go forward for 2.5 second(s) at 50 % power  
go backward for 1.5 second(s) at 50 % power  
land
```

Auto 2: Blackout Zone

Launch Point: 2'10" from start of Blackout Zone







Drone Inspection Checklist

Mission 2023: Blackout

Team Number: 1257A

<input type="checkbox"/> Drone(s) is (are) a CoDrone EDU or Parrot Mambo: Rule <D1>		
<input type="checkbox"/> All Batteries and Motors are in good working order and functionally identical to the equipment on the stock drone: Rule <D1>	CoDrone EDU	Parrot Mambo
<input type="checkbox"/> Electronics are unmodified: Rule <D5>		
<input type="checkbox"/> Drone utilizes exactly four (4) motors with propellers attached: Rule <D4>		
<input type="checkbox"/> Teams have adequate physical guards for the propellers: Rule <D6>		
<input type="checkbox"/> Team is aware of rule <S1> – No flying drones except in designated areas.		
<input type="checkbox"/> Team is aware of rule <S2> – Stay in the pilot station or visual observer stations until given all clear after a match.		
<input type="checkbox"/> Team is aware of rule <S3> – Teams are responsible for maintaining control of their drone at all times.		
<input type="checkbox"/> Team is aware of rule <S4> – There is a virtual ceiling of 10 feet. If you do not have software to prevent flying above 10 feet, teams must use caution to stay below this limit.		
<input type="checkbox"/> Team is aware of rule <S5> – Teams must fly within the flight zone during a match.		
<input type="checkbox"/> Team is aware of rule <S6> – Batteries must be charged before launch,		
<input type="checkbox"/> Team is aware of rule <S7> – Flight team members are required to wear safety glasses in and around the flight zone.		

Team Member

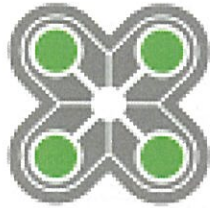
Student team member agrees that the drone(s) is (are) compliant with all the rules listed in the game manual and the team understands all of the safety rules.

Team Member Signature: _____

Inspector

Inspector agrees that the drone(s) passes inspection and the team understands all of the safety rules.

Inspector Signature: _____



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FLIGHT
&
MAINTENANCE
LOGS

UAV FLIGHT & MAINTENANCE LOG

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propeller, broken motor)	MAINTENANCE PERFORMED (with technician signature)
1	4/3	for	PILOT: Zayne CO-PILOT: N/A VISUAL OBSERVER:	Cafe	Freeflight	8m	swat wings	Recess mis SW TECH:
2	4/3	#24	PILOT: Tonio CO-PILOT: VISUAL OBSERVER:	Cafe	free flight	8m		TECH:
3	4/3	for	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	Coff.	Free flight	6m		TECH:
4	4/3	Q4	PILOT: Tonio CO-PILOT: VISUAL OBSERVER:	Coff.	tree flight	7m		TECH:
5	4/3	CD3	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER: Zayne	Cafe.	standard round Blackout	16 Sec	Parrots have motor issues.	Replaced wings TECH: Zayne
6	4/3	unnamed	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER: Zayne	Cafe.	Blackout round (4)	10m		TECH: Replaced motor TECH: Zayne; Wyatt; Mr. J.
7	4/3	CD1	PILOT: CO-PILOT: VISUAL OBSERVER:	Caf.	Test	—	Rear left motor broken	
8	4/3	CD5	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	Coff.	tree flight	45		TECH:
9	4/3	CD7	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER: Zayne	Caf.	Blackout	30"	Crash	
10	4/11	CD2	PILOT: Tonio CO-PILOT: VISUAL OBSERVER:	Coff. #5	Free flight	5s	motor #2 DISCONNECT	
11	4/11	CD4	PILOT: CO-PILOT: VISUAL OBSERVER:	Coff.	Repair	—	Propeller wont start #4	Replaced motor removed just replaced wing. TECH: Zayne



UAV FLIGHT & MAINTENANCE LOG

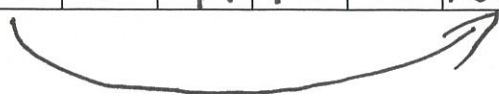
4/11/23
 1 in hangar
 2 > in repair

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propellor, broken motor)	MAINTENANCE PERFORMED (with technician signature)
12	4/11	CD5	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	HS Coff.	free flight	1d		
13	4/11	CD3	PILOT: Tonia CO-PILOT: VISUAL OBSERVER:	HS Coff.	free flight	3:28		TECH:
14	4/11	CD5	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	HS Coff.	start clear lane	3d		TECH:
15	4/11	CD3	PILOT: Tonia CO-PILOT: VISUAL OBSERVER:	HS Coff.	start clear lane	1h		TECH:
16	4/11	CD3	PILOT: Tonia CO-PILOT: VISUAL OBSERVER:	HS Coff.	start clear lane	1h		TECH:
17		CD1	PILOT: CO-PILOT: VISUAL OBSERVER:				Motor Down	TECH:
18		CD2	PILOT: CO-PILOT: VISUAL OBSERVER:				Motor Down #3	TECH:
19		CD1	PILOT: CO-PILOT: VISUAL OBSERVER:				Motor Down	TECH:
20	4/11	CD6	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER: Zayne	HS Coff.	Black out	30'	Success!	TECH:
21	4/11	CD6	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER: Zayne	HS Coff.	Black out	20s	Success	TECH:
			PILOT: CO-PILOT: VISUAL OBSERVER:					TECH:

UAV FLIGHT & MAINTENANCE LOG

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propellor, broken motor)	MAINTENANCE PERFORMED (with technician signature)
22	4/10	CD3	PILOT: Tonia CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	free flight 6-115 ft	7 min	_____	TECH: _____
23	4/10	CD2	PILOT: Nico Bruno CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Free Flight	20 min	_____	TECH: _____
24	4/10	CD1	PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Repair	—	No motors crashed once and failed to start	TECH: Zayre
25	4/12	CD6	PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	check out zone	20	_____	TECH: _____
26	4/12	CD2	PILOT: Nico Bruno CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Starting Lane	30 sec	_____	TECH: _____
27	4/12	CD1	PILOT: Tonia CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Starting Lane	30 sec	_____	TECH: _____
28	4/12		PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Starting Zone	1 min	_____	TECH: _____
29	4/12		PILOT: Nico Bruno CO-PILOT: _____ VISUAL OBSERVER: _____	HS Coff.	Blackout	1 min	First run: Success 2 run: Almost	TECH: _____
30	4/24	CD6	PILOT: Nico CO-PILOT: _____ VISUAL OBSERVER: _____	Element. Gym	Free Flight	10	_____	TECH: _____
31	4/24	CD3	PILOT: Tonia CO-PILOT: _____ VISUAL OBSERVER: _____	Element Gym	free Flight	5 min	_____	TECH: _____

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(continued)



UAV FLIGHT & MAINTENANCE LOG

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propeller, broken motor)	MAINTENANCE PERFORMED (with technician signature)
32	4/24	CD5	PILOT: <u>Zach</u> CO-PILOT: VISUAL OBSERVER:	Elementary Gym	Freight flight	11 min		
33	4/24	CP3	PILOT: <u>Toni</u> CO-PILOT: VISUAL OBSERVER:	Elementary Gym	moving Bulls in the game	7 min		TECH:
34	4/24	CD6	PILOT: <u>Nico</u> CO-PILOT: VISUAL OBSERVER:	Elementary Gym	ping pong balls	2 min	lots of drift	TECH:
35	4/24	CD3	PILOT: <u>wyatt</u> CO-PILOT: VISUAL OBSERVER:	elementary gym	ping pong ball	2		TECH:
36	4/24	CD8	PILOT: <u>wyatt</u> CO-PILOT: VISUAL OBSERVER: <u>zoe</u>	elementary gym	blackout out 30	30	little drift	TECH:
37	4/24	CP3	PILOT: <u>tonia</u> CO-PILOT: VISUAL OBSERVER: <u>zoe</u>	elementary gym	Blackout 30	30	Drift	TECH:
38	4/24	CD2	PILOT: <u>wyatt</u> CO-PILOT: VISUAL OBSERVER:	Elementary HS Gym	Autonomous			TECH:
39	5/3	CD3	PILOT: <u>Nico</u> CO-PILOT: VISUAL OBSERVER:	Elementary Gym	Free Fly			TECH:
40	5/3	CD6	PILOT: <u>wyatt</u> CO-PILOT: VISUAL OBSERVER:	elementary gym	free fly	10 min		TECH:
41	5/3	CD6	PILOT: <u>wyatt</u> CO-PILOT: VISUAL OBSERVER:	elementary gym	starting zone	20		TECH:
42	5/3	CD3	PILOT: <u>Nico</u> CO-PILOT: VISUAL OBSERVER:	elementary gym	start zone		Muster 4	TECH:

zoe bent

UAV FLIGHT & MAINTENANCE LOG

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propellor, broken motor)	MAINTENANCE PERFORMED (with technician signature)
43	5/3	CD2	PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	Elem Gym	Tech	—	Propeller came out	repaired motor TECH: Z, MFT.
44	5/3	CD5	PILOT: Nico CO-PILOT: _____ VISUAL OBSERVER: Zayre	Elem. Gym	B-0 out			TECH: _____
47	5/3	CD6	PILOT: Wyatt CO-PILOT: _____ VISUAL OBSERVER: _____	Elem gym	wheel out	32g		TECH: _____
			PILOT: Zayre CO-PILOT: _____ VISUAL OBSERVER: _____					TECH: _____
			PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	CD1				TECH: _____
			PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	CD4				TECH: _____
			PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	CD1 - Motor				TECH: _____
			PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____				Part disassembled from circuit board	TECH: _____
			PILOT: _____ CO-PILOT: _____ VISUAL OBSERVER: _____	CD4 - same as CD1				TECH: _____

Sallyes for parts

UAV FLIGHT & MAINTENANCE LOG

FLIGHT #	DATE	DRONE ID	TEAM MEMBERS	LOCATION	OBJECTIVE	FLIGHT TIME	PERFORMANCE NOTES (crash, bent propellor, broken motor)	MAINTENANCE PERFORMED (with technician signature)
46	Mon May 15	CD2	PILOT: Joey CO-PILOT: VISUAL OBSERVER:	Hs Caf	Freeflight	1:37	crash	
47	Mon May 15	CD7	PILOT: Tobi CO-PILOT: VISUAL OBSERVER:	Hs Caf	Freeflight	1:54	—	TECH:
48	Mon May 15	CD2	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	Hs Caf	Freeflight	10:05	—	TECH:
49	Mon May 15	CD7	PILOT: CO-PILOT: VISUAL OBSERVER:	Hs Caf	Black start	1:15	—	TECH:
50	Mon May 15	CD3	PILOT: Ben CO-PILOT: VISUAL OBSERVER:	"	Black start	1:12	—	TECH:
51	Mon May 15	CD6	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	"	Black run	1:35	—	TECH:
52	Mon May 15	CD7	PILOT: Ben CO-PILOT: VISUAL OBSERVER:	"	Black run	1:40	—	TECH:
53	Mon May 15	CD3	PILOT: Wyatt CO-PILOT: VISUAL OBSERVER:	"	Black run	1:32	—	TECH:
54	Mon May 15	CD6	PILOT: Ben CO-PILOT: VISUAL OBSERVER:	"	Black run	1:20	—	TECH:
55	Mon May 15	CD3	PILOT: Ben CO-PILOT: VISUAL OBSERVER:	"	Black run	1:28	—	TECH:
			PILOT: CO-PILOT: VISUAL OBSERVER:					TECH:

CD2 M Curtis M

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