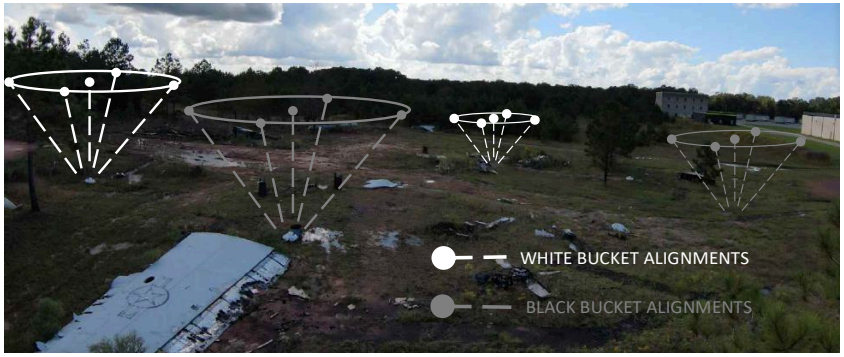
Scorable Open Scenarios

Day and Night Trials

WIDE AREA SEARCH

URBAN AREA SEARCH



NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY U.S. DEPARTMENT OF COMMERCE

Science and Technology

Pocket Guide for Aerial Drones

OPEN AREA

Tests and Scenarios

STANDARD TEST METHODS · RESPONSE ROBOT CAPABILITIES · CHALLENGE · TRAIN · EVALUATE · AERIAL · GROUND · AQUATIC · NIST

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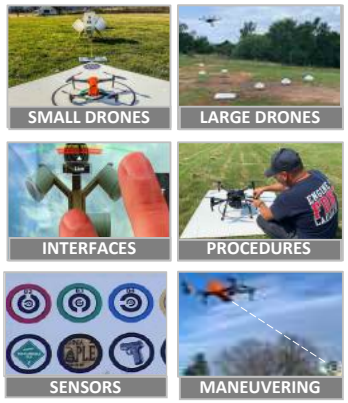
Version 2023D

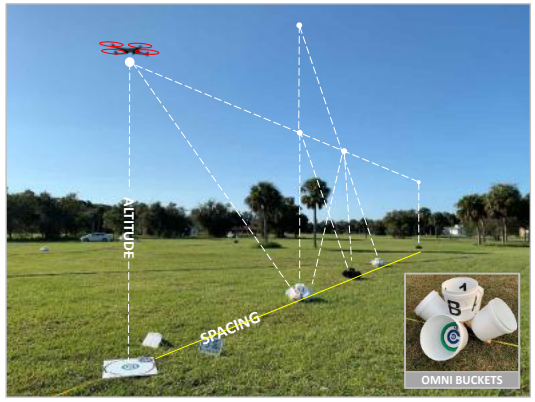
Open Area Test Lanes and Scenarios

Evaluate safety, capabilities, and proficiency

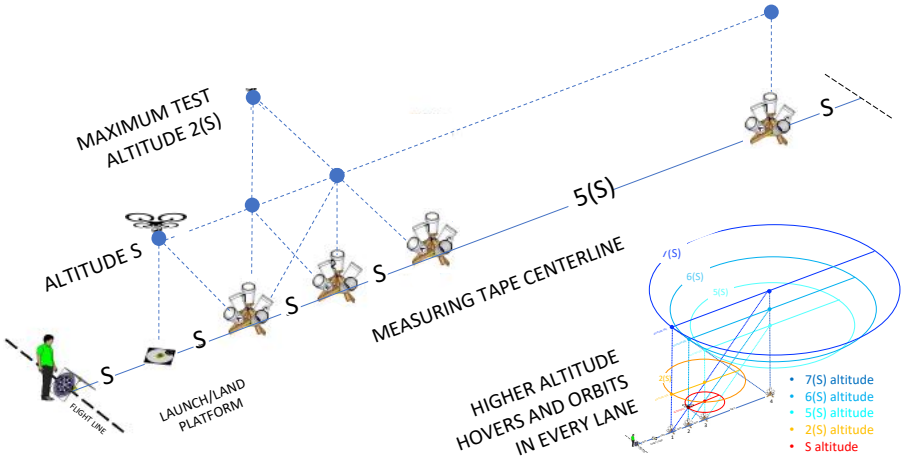
MEASURE & COMPARE



SCALABLE TEST LANES (ALTITUDE = SPACING)



The Open Test Lanes and related scenarios are scalable to be used at various altitudes both indoors on a basketball court and outdoors on a football field or parking lot.

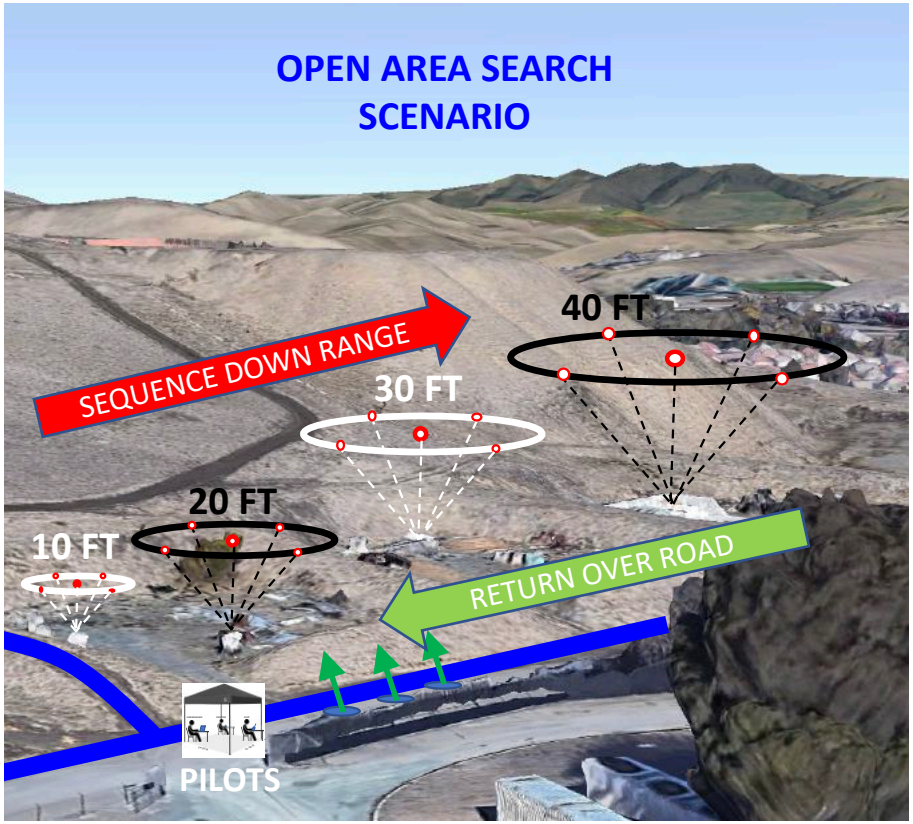


OMNI STAND SPACING = S	MAX TEST ALTITUDE = 2(S)	LANE LENGTH = 10(S)
3 m (10 ft)	6 m (20 ft)	30 m (100 ft)
6 m (20 ft)	12 m (40 ft)	60 m (200 ft)
9 m (30 ft)	18 m (60 ft)	90 m (300 ft)

OPEN SCENARIO | SEARCH		ALIGNMENT		ACUITY
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
1 HOVER OVER STAND #1 AT CHOSEN ALTITUDE	LEFTWARD	1	5 1	T BL R BR L
2 PITCH BACKWARD		1A	5 1	TR B TR L BR
3 ORBIT LEFTWARD 90°		1B	5 1	R TL T BL B
4 ORBIT LEFTWARD 90°		1C	5 1	BR R TL L BR
5 ORBIT LEFTWARD 90°		1D	5 1	B TL R BL T
6 HOVER OVER STAND #2 AT CHOSEN ALTITUDE	RIGHTWARD	2	5 1	BL T BR R TL
7 PITCH BACKWARD		2A	5 1	L BR T TL R
8 ORBIT RIGHTWARD 90°		2D	5 1	TR B TL B BL
9 ORBIT RIGHTWARD 90°		2C	5 1	T BL R TL B
10 ORBIT RIGHTWARD 90°		2B	5 1	TL R TR L BR
11 HOVER OVER STAND #3 AT CHOSEN ALTITUDE	LEFTWARD	3	5 1	R TL B BL R
12 PITCH BACKWARD		3A	5 1	BR T TL R BL
13 ORBIT LEFTWARD 90°		3B	5 1	B TR R BL T
14 ORBIT LEFTWARD 90°		3C	5 1	BL R BL T BR
15 ORBIT LEFTWARD 90°		3D	5 1	L TL R BR T
16 HOVER OVER STAND #4 AT CHOSEN ALTITUDE	RIGHTWARD	4	5 1	TL B TR R BR
17 PITCH BACKWARD		4A	5 1	T BL B TR L
18 ORBIT RIGHTWARD 90°		4D	5 1	BR B TL B TR
19 ORBIT RIGHTWARD 90°		4C	5 1	R BL T TR B
20 ORBIT RIGHTWARD 90°		4B	5 1	TR L BL R TL
STOP TIMER			/100	/100
ELAPSED TIME (MM : SS)			PASS | FAIL (CIRCLE ONE)	PASS | FAIL (CIRCLE ONE)

Open Area Search Scenarios

Day and Night Trials

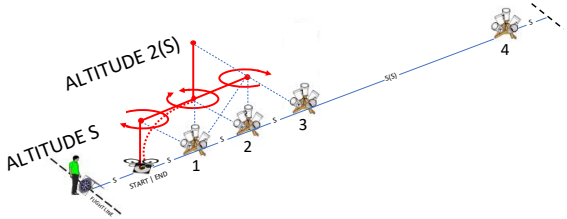


- Teams concurrently fly separate objectives set up at safe distances and/or altitudes apart (with a clearly designated and safe return path).
- Each pilot flies for 15 minutes across 3 different objectives for 5 minutes each. Teams move as necessary to maintain sight lines and communication.
- Scenarios restart with a different rotation of Pilot, Proctor, and VO.

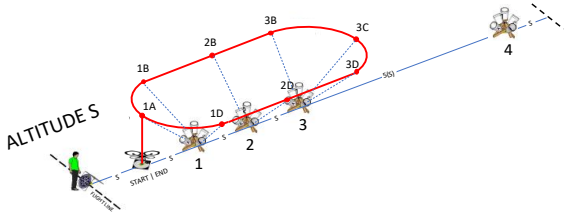
Bucket Alignments Define Flight Paths

Designated altitudes, positions, and orientations

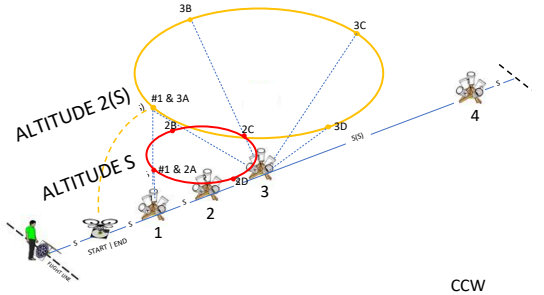
POSITION
MAN/PAY 1



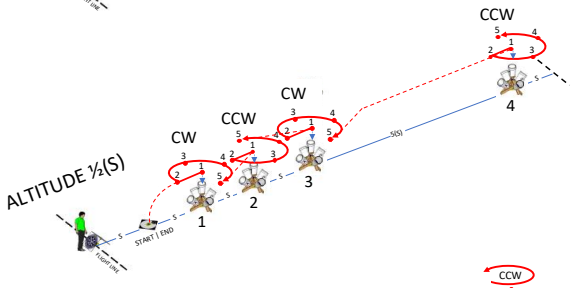
TRAVERSE
MAN/PAY 2



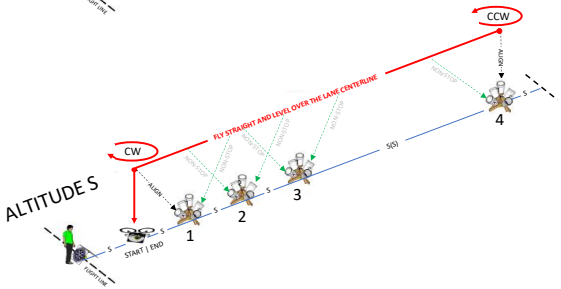
ORBIT
MAN/PAY 3



INSPECT
MAN/PAY 4



RECON
MAN/PAY 5



Metrics to Track Over Time

Measure System Capabilities and Pilot Proficiency

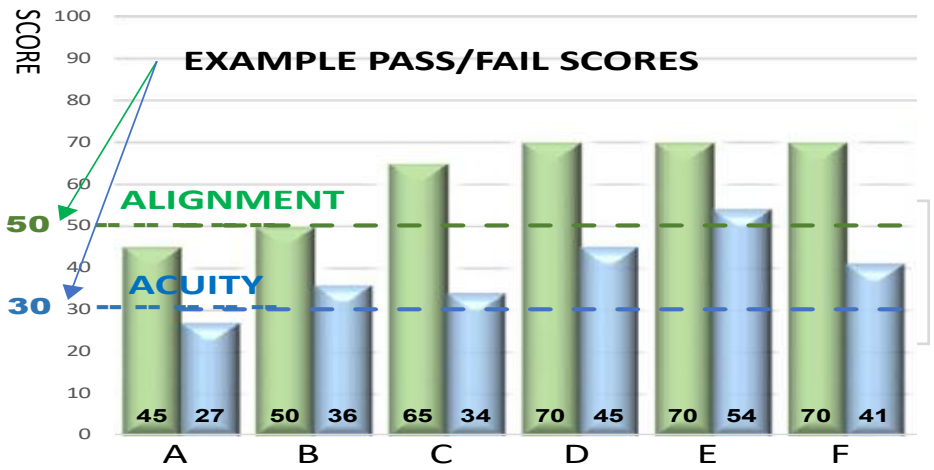
Completeness: Align with every bucket in the sequence and land accurately according to the procedure. The objective is scoring ALL points possible for your aircraft without making mistakes.

Score: For complete trials, track your scores over time. The average of your last five trials is an excellent measure of your proficiency on the aircraft and interface used.

Efficiency (Optional): For complete trials with maximum scores for a particular aircraft, the elapsed time can help identify the most efficient systems and techniques. Time limited trials can be used across multiple tests to maintain a schedule and similarly fatigue novices and experts.

Separate Scores: ALIGNMENT and ACUITY

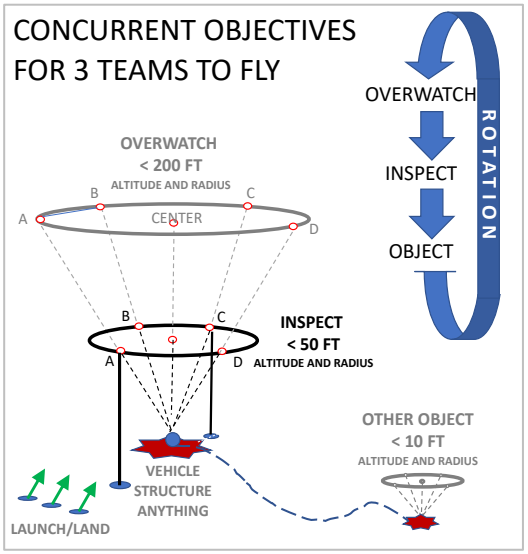
Track and Compare Scores Using the Same Drone

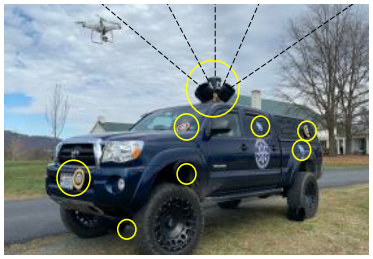


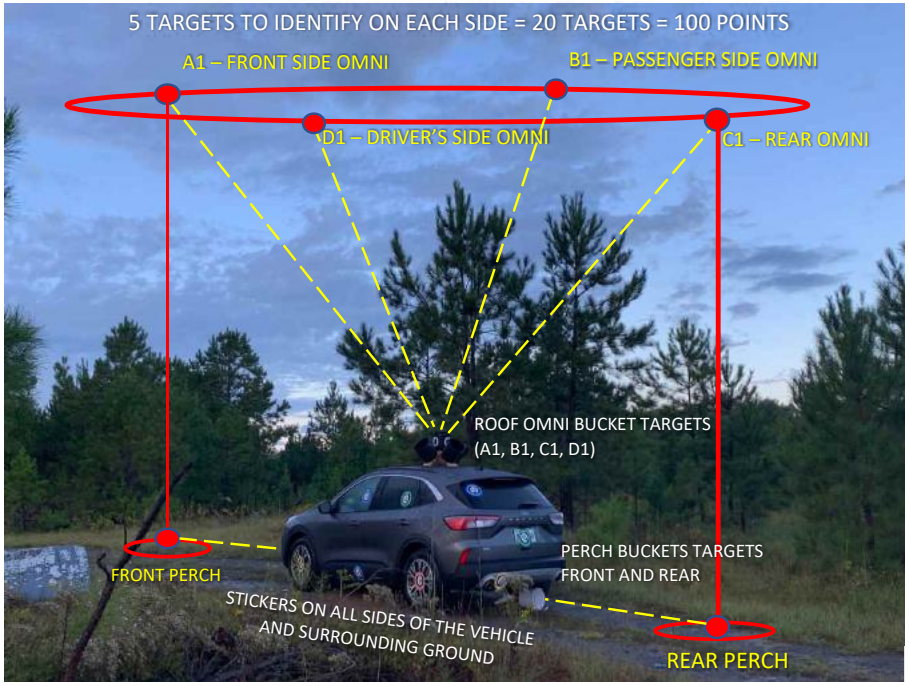
OPEN SCENARIO | VEHICLE			ALIGNMENT		ACUITY
START TIMER			ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
	ALIGN OVER OMNI BUCKET – START TIMER		#4 TOP TARGET:		
1	A1 - FRONT SIDE - ROOFTOP OMNI BUCKET	FRONT	A	5 1	T BL B TR L
2	A2 - FRONT SIDE - WINDSHIELD CENTER		A2	5 1	TR B TR L BR
3	A3 - FRONT SIDE - VIN #		A3	5 1	R TL T BL B
4	A4 - FRONT SIDE - LICENSE PLATE		A4	5 1	BR R TL L BR
5	A5 - FRONT SIDE - PERCH UNDERBODY BUCKET		A5	5 1	B TL R BL T
6	B1 - PASSENGER SIDE - ROOFTOP OMNI BUCKET	PASSENGER	B	5 1	TR L BL R TL
7	B2 - PASSENGER SIDE - FRONT WINDOW		B2	5 1	L BR T TL R
8	B3 - PASSENGER SIDE - REAR WINDOW		B3	5 1	TL R TR L BR
9	B4 - PASSENGER SIDE - EXTERIOR FEATURE		B4	5 1	T BL R TL B
10	B5 - PASSENGER SIDE - SURROUNDING GROUND		B5	5 1	TR B TL B BL
11	C1 - REAR SIDE - ROOTOP OMNI BUCKET	REAR	C	5 1	R BL T TR B
12	C2 - REAR SIDE - WINDOW CENTER		C2	5 1	BR T TL R BL
13	C3 - LICENSE PLATE		C3	5 1	B TR R BL T
14	C4 - EXTERIOR FEATURE		C4	5 1	BL R BL T BR
15	C5 - PERCH UNDERBODY BUCKET		C5	5 1	L TL R BR T
16	D1 - DRIVER SIDE - ROOFTOP OMNI BUCKET	DRIVER	D	5 1	BR B TL B TR
17	D2 - DRIVER SIDE - FRONT WINDOW		D2	5 1	T BL B TR L
18	D3 - DRIVER SIDE - REAR WINDOW		D3	5 1	TR L BL R TL
19	D4 - EXTERIOR FEATURE		D4	5 1	R BL T TR B
20	D5 - SURROUNDING GROUND OBJECT		D5	5 1	BR B TL B TR
STOP TIMER				/100	/100
ELAPSED TIME (MM : SS)			PASS | FAIL (CIRCLE ONE)		PASS | FAIL (CIRCLE ONE)

Open Vehicle Identification Scenarios

Day and Night Trials

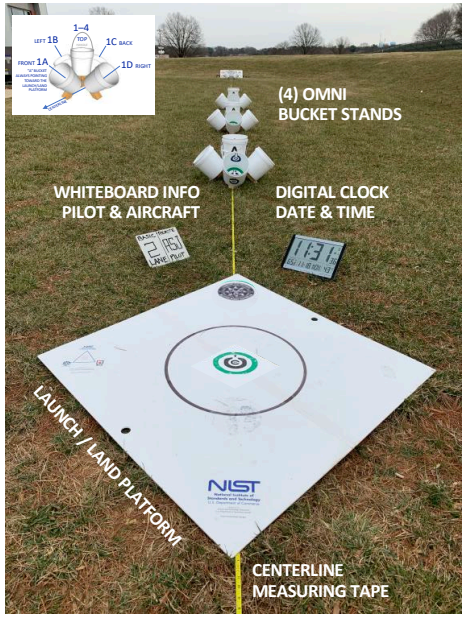




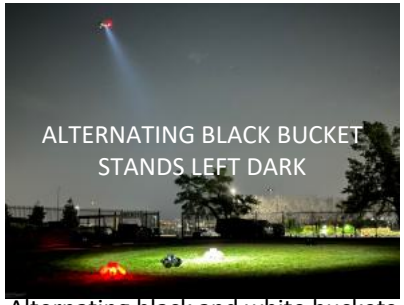


Day and Night Operations

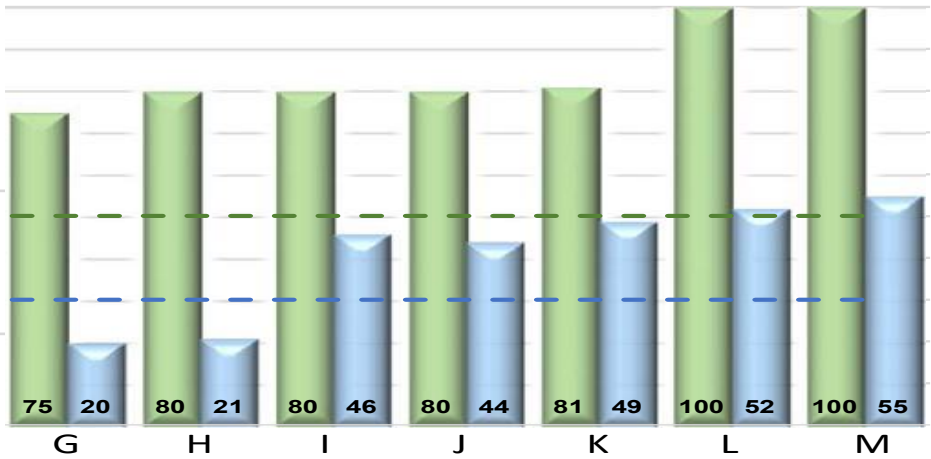
Evaluate using repeatable hovers and orbits



Shown with all white bucket stands for Basic Maneuvering (MAN).



Alternating black and white buckets stands for Payload Functionality (PAY).



Scoring Alignment Points

Capture images of alignment rings to verify

ALIGN WITH BUCKETS AND LAND ACURATELY

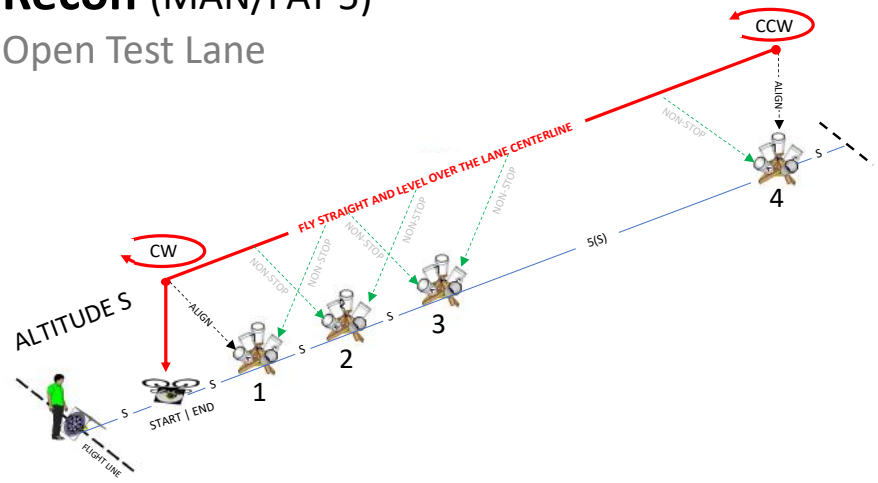
20 ALIGNMENTS TOTAL UP TO 100 POINTS

- Align with each bucket to capture a SINGLE IMAGE of the inscribed alignment ring. Only the first image is scored.
- Score captured images as:
  - – UNBROKEN RINGS (5 points)
  - – BROKEN RINGS (1 point)
  - – NO RINGS (0 points, strike through line)
- Score accurate landings as:
  - – CENTERED (5 pts) with the aircraft center point inside the 60 cm (24 in) diameter circle.
  - – OFFSET (1 pts) with at least one propeller motor inside the circle.
- Verification of captured alignment images can be during the trial when obvious or after the trial to eliminate discussions during the trial. Images can also be stored for documentation.

OPEN TEST LANE | RECON		ALIGNMENT		ACUITY				
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)				
1	FLY AT ALTITUDE S TO STAND #4	LAP 1	4	5 1	TL	B	TR	R	BR
2	YAW LEFT 180°		4	5 1	BR	T	BL	L	TL
3	FLY TO THE LAUNCH AND YAW RIGHT 180°		L	5 1	B	TR	L	BL	T
4	HOVER IN PLACE CHECK ALTITUDE S		1A	5 1	TR	B	TR	L	BR
5	FLY AT ALTITUDE S TO STAND #4	LAP 2	4	5 1	TL	B	TR	R	BR
6	YAW LEFT 180°		4	5 1	BR	T	BL	L	TL
7	FLY TO THE LAUNCH AND YAW RIGHT 180°		L	5 1	B	TR	L	BL	T
8	HOVER IN PLACE CHECK ALTITUDE S		1A	5 1	TR	B	TR	L	BR
9	FLY AT ALTITUDE S TO STAND #4	LAP 3	4	5 1	TL	B	TR	R	BR
10	YAW LEFT 180°		4	5 1	BR	T	BL	L	TL
11	FLY TO THE LAUNCH AND YAW RIGHT 180°		L	5 1	B	TR	L	BL	T
12	HOVER IN PLACE CHECK ALTITUDE S		1A	5 1	TR	B	TR	L	BR
13	FLY AT ALTITUDE S TO STAND #4	LAP 4	4	5 1	TL	B	TR	R	BR
14	YAW LEFT 180°		4	5 1	BR	T	BL	L	TL
15	FLY TO THE LAUNCH AND YAW RIGHT 180°		L	5 1	B	TR	L	BL	T
16	HOVER IN PLACE CHECK ALTITUDE S		1A	5 1	TR	B	TR	L	BR
17	FLY AT ALTITUDE S TO STAND #4	LAP 5	4	5 1	TL	B	TR	R	BR
18	YAW LEFT 180°		4	5 1	BR	T	BL	L	TL
19	FLY TO THE LAUNCH AND YAW RIGHT 180°		L	5 1	B	TR	L	BL	T
20	HOVER IN PLACE CHECK ALTITUDE S		1A	5 1	TR	B	TR	L	BR
STOP TIMER				/100					/100
ELAPSED TIME (MM : SS)				PASS | FAIL (CIRCLE ONE)					PASS | FAIL (CIRCLE ONE)

Recon (MAN/PAY 5)

Open Test Lane



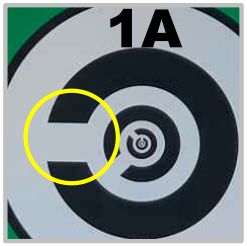
- Fly straight and level at a sustainable speed directly over the lane centerline to establish a stable hover over an object and perform quick reconnaissance tasks.
- Maintain altitude (S) throughout starting over the launch/land platform to align with the designated targets at both ends of the lane.
- A complete trial totals a distance of 80(S).
- Accurate landings are not included.
- **Alignment Points:** Capture a SINGLE IMAGE of each alignment ring throughout 5 laps with 20 buckets to score up to 100 alignment points.
- **Acuity Points:** While aligned with each bucket, identify as many acuity target gaps as possible to score up to 100 acuity points.

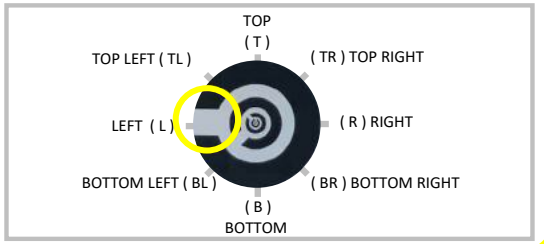
Scoring Acuity Points

Identify increasingly small visual acuity targets

ALIGN THEN CONTROL ZOOM AND EXPOSURE

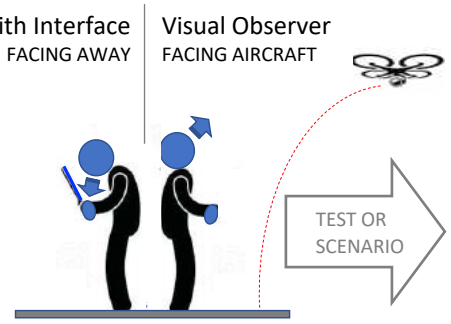
20 TARGETS TOTAL UP TO 100 POINTS





REPORT GAP DIRECTIONS RELATIVE TO THE BUCKET NUMBER (TOP)

- While aligned with each bucket, IDENTIFY ACUITY TARGETS using camera zoom and exposure controls.
- Verbally call out as many of the Concentric C gap directions as possible (1 pt each) with a Proctor.
- Fly facing away from the test lane or scenario (with a Visual Observer) to evaluate flying interface only as if beyond visual line of sight (BVLOS).



Teams Rotate Through Each Role

Each Pilot flies a 5-minute trial with help from others.
A 3-4 person team completes all 5 tests in 2 hours.

TEAM ROTATIONS

GET DRONE READY TO FLY

VO PILOT PROCTOR

FACING AWAY FROM THE TEST LANE

Four person teams always have one person getting their aircraft ready to launch right after the previous lands.

Three person teams work too, but require some time between each rotation to prepare the next aircraft.

PILOT

- Maintain control of the aircraft.
- Call out each intention of movement before doing so.
- Call out each bucket alignment and acuity target gap.

PROCTOR

- Fill in the form header.
- Read the test procedures to the Pilot.
- Confirm, record, and attest to scoring after the trial.

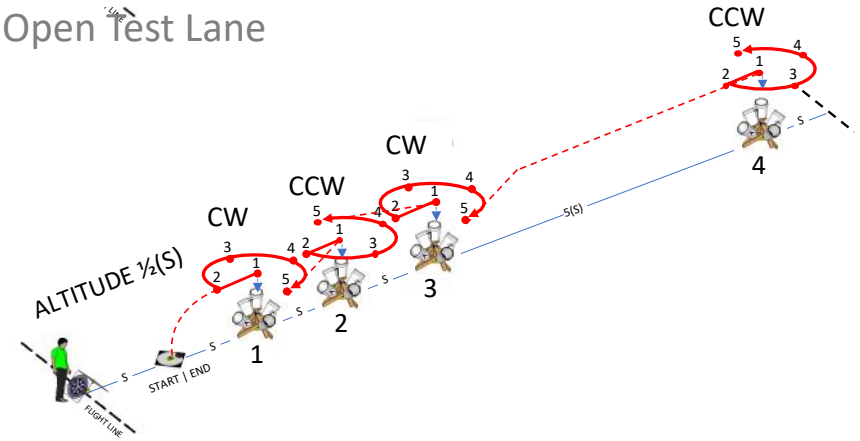
VISUAL OBSERVER (VO)

- Maintain sight with the aircraft and surroundings.
- Repeat the Pilot's intention of movement to confirm.
- Call out corrections and warnings as necessary.

OPEN TEST LANE | **INSPECT**		ALIGNMENT		ACUITY
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
1 HOVER OVER STAND #1 AT ALTITUDE 1/2(S)	ALT ½(S) – LEFTWARD	1	5 1	T BL R BR L
2 PITCH BACKWARD		1A	5 1	TR B TR L BR
3 ORBIT LEFTWARD 90°		1B	5 1	R TL T BL B
4 ORBIT LEFTWARD 90°		1C	5 1	BR R TL L BR
5 ORBIT LEFTWARD 90°		1D	5 1	B TL R BL T
6 HOVER OVER STAND #2 AT ALTITUDE 1/2(S)	ALT ½(S) – RIGHTWARD	2	5 1	BL T BR R TL
7 PITCH BACKWARD		2A	5 1	L BR T TL R
8 ORBIT RIGHTWARD 90°		2D	5 1	TR B TL B BL
9 ORBIT RIGHTWARD 90°		2C	5 1	T BL R TL B
10 ORBIT RIGHTWARD 90°		2B	5 1	TL R TR L BR
11 HOVER OVER STAND #3 AT ALTITUDE 1/2(S)	ALT ½(S) – LEFTWARD	3	5 1	R TL B BL R
12 PITCH BACKWARD		3A	5 1	BR T TL R BL
13 ORBIT LEFTWARD 90°		3B	5 1	B TR R BL T
14 ORBIT LEFTWARD 90°		3C	5 1	BL R BL T BR
15 ORBIT LEFTWARD 90°		3D	5 1	L TL R BR T
16 HOVER OVER STAND #4 AT ALTITUDE 1/2(S)	ALT ½(S) – RIGHTWARD	4	5 1	TL B TR R BR
17 PITCH BACKWARD		4A	5 1	T BL B TR L
18 ORBIT RIGHTWARD 90°		4D	5 1	BR B TL B TR
19 ORBIT RIGHTWARD 90°		4C	5 1	R BL T TR B
20 ORBIT RIGHTWARD 90°		4B	5 1	TR L BL R TL
STOP TIMER			/100	/100
ELAPSED TIME (MM : SS)			**PASS | FAIL** (CIRCLE ONE)	**PASS | FAIL** (CIRCLE ONE)

Inspect (MAN/PAY 4)

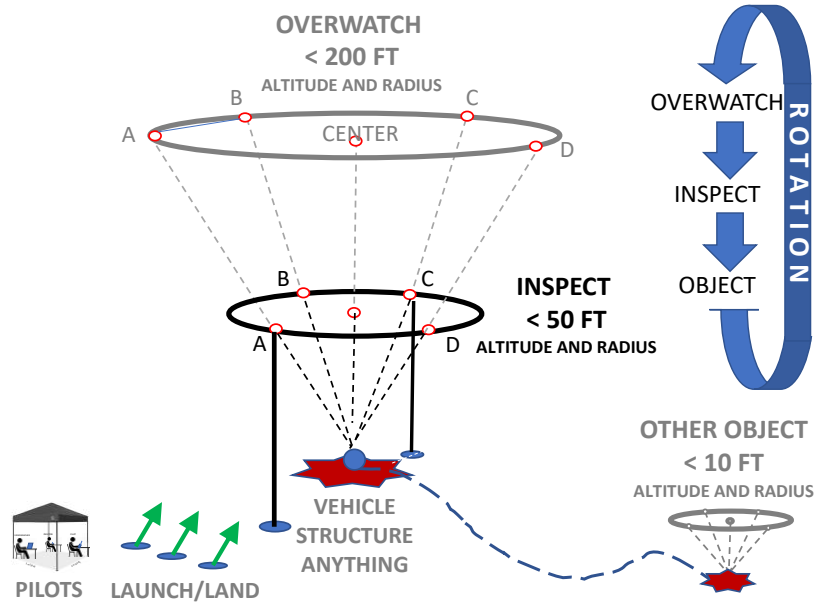
Open Test Lane



- Fly around objects in close proximity to inspect detailed features on the top and all four sides.
- Maintain altitude 1/2(S) throughout starting on top of each omni stand then rotate around all four omni bucket stands in alternating clockwise (A-B-C-D) and counter clockwise (A-D-C-B) directions.
- Accurate landings are not included.
- **Alignment Points:** Capture a SINGLE IMAGE of each alignment ring throughout 4 omni stands with 20 buckets to score up to 100 alignment points.
- **Acuity Points:** While aligned with each bucket, identify as many acuity target gaps as possible to score up to 100 acuity points.

Teams Sequence Through Scenarios

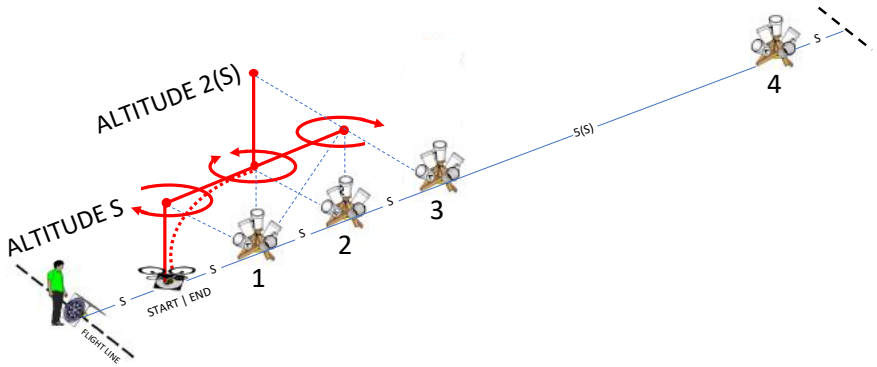
Each Pilot flies a 15-minute scenario, sequencing through 3 objectives for 5 minutes each.



- This scenario mechanization enables embedded bucket scoring tasks to be performed similarly by all participating Pilots. So the results are comparable within the same scenario layout. Additional tactics can be overlayed onto these scenarios at your facility.
- Up to 3 teams concurrently fly different scenario objectives from safe distances and altitudes apart.
- Teams move as necessary to maintain sight lines with their aircraft and communications with other teams. The overwatch team leads communications.
- Scenarios restart every 20 minutes with a different rotation of Pilot, Proctor, and VO.

Position (MAN/PAY 1)

Open Test Lane

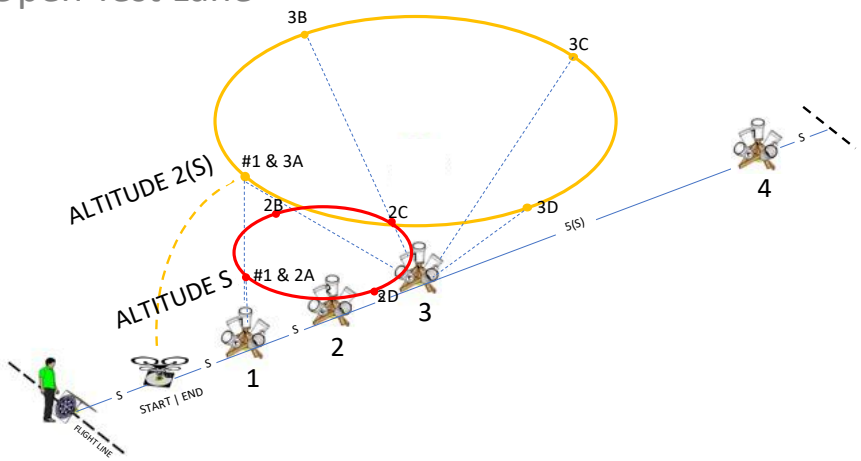


- Demonstrate positive aircraft control using basic flight maneuvers between designated hover positions, orientations, and altitudes along the lane centerline.
- Perform a series of maneuvers including climb, descend, yaw, pitch, and roll to simultaneously align with downward and forward buckets in each position.
- Land accurately on the platform with the chassis CENTERED (5 pts) within the 60 cm (24 in) diameter circle, or OFFSET (1 pt) at least one motor in the circle.
- **Alignment Points:** Capture a SINGLE IMAGE of each alignment ring throughout 1 lap through 10 positions with 20 buckets and accurate landings to score up to 100 alignment points.
- **Acuity Points:** While aligned with each bucket, identify as many acuity target gaps as possible to score up to 100 acuity points.

OPEN TEST LANE | **ORBIT**		ALIGNMENT		ACUITY
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
1 **ALIGN OVER STAND #1 AT ALT 2(S)** CHECK RADIUS	ALT 2(S) – LEFTWARD	1	5 1	T BL R BR L
2 **ALIGN WITH BUCKET 3A** CHECK ALTITUDE		3A	5 1	BR T TL R BL
3 **ORBIT LEFTWARD 90°**		3B	5 1	B TR R BL T
4 **ORBIT LEFTWARD 90°**		3C	5 1	BL R BL T BR
5 **ORBIT LEFTWARD 90°**		3D	5 1	L TL R BR T
6 **ALIGN OVER STAND #1 AT ALT 2(S)** CHECK RADIUS	ALT 2(S) – RIGHTWARD	1	5 1	T BL R BR L
7 **ALIGN WITH BUCKET 3A** CHECK ALTITUDE		3A	5 1	BR T TL R BL
8 **ORBIT RIGHTWARD 90°**		3D	5 1	L TL R BR T
9 **ORBIT RIGHTWARD 90°**		3C	5 1	BL R BL T BR
10 **ORBIT RIGHTWARD 90°**		3B	5 1	B TR R BL T
11 **ALIGN OVER STAND #1 AT ALT S** CHECK RADIUS	ALT S – LEFTWARD	1	5 1	T BL R BR L
12 **ALIGN WITH BUCKET 2A** CHECK ALTITUDE		2A	5 1	L BR T TL R
13 **ORBIT LEFTWARD 90°**		2B	5 1	TL R TR L BR
14 **ORBIT LEFTWARD 90°**		2C	5 1	T BL R TL B
15 **ORBIT LEFTWARD 90°**		2D	5 1	TR B TL B BL
16 **ALIGN OVER STAND #1 AT ALT S** CHECK RADIUS	ALT S – RIGHTWARD	1	5 1	T BL R BR L
17 **ALIGN WITH BUCKET 2A** CHECK ALTITUDE		2A	5 1	L BR T TL R
18 **ORBIT RIGHTWARD 90°**		2D	5 1	TR B TL B BL
19 **ORBIT RIGHTWARD 90°**		2C	5 1	T BL R TL B
20 **ORBIT RIGHTWARD 90°**		2B	5 1	TL R TR L BR
STOP TIMER			/100	/100
ELAPSED TIME (MM : SS)			**PASS | FAIL** (CIRCLE ONE)	**PASS | FAIL** (CIRCLE ONE)

Orbit (MAN/PAY 3)

Open Test Lane

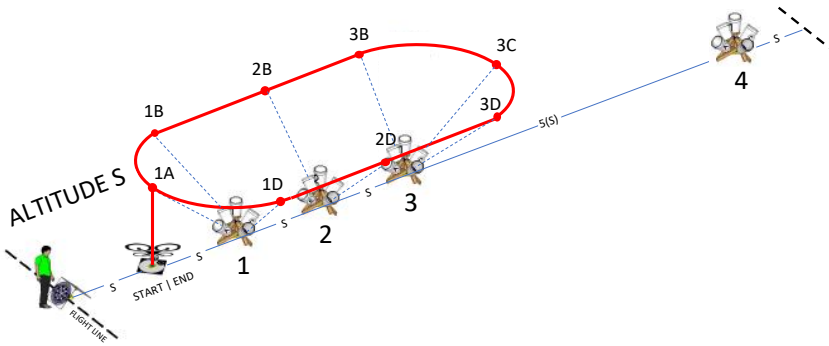


- Orbit an object at an equal altitude and radius while looking inward to identify features on four sides.
- Each orbit includes 5 bucket alignments: 1 downward radius check plus 4 angled buckets all around.
- Start aligned over omni stand #1 at altitude 2(S) to set the orbit radius around omni stand #3. Orbit both directions ending at the start point.
- Descend over omni stand #1 to altitude S to set the orbit radius around omni stand #2. Orbit both directions. Accurate landings are not included.
- **Alignment Points:** Capture a SINGLE IMAGE of each alignment ring throughout 4 orbits (leftward and rightward at each altitude) with 20 buckets to score up to 100 alignment points.
- **Acuity Points:** While aligned with each bucket, identify as many acuity target gaps as possible to score up to 100 acuity points.

OPEN TEST LANE | POSITION		ALIGNMENT		ACUITY
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
1 LAUNCH AND HOVER OVER STAND #1 ALIGN WITH BOTH BUCKETS	HOVER	1	5 1	T BL R BR L
2 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		2A	5 1	L BR T TL R
3 YAW LEFT 360° OVER STAND #1 ALIGN WITH BOTH BUCKETS	YAW L-360	1	5 1	T BL R BR L
4 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		2A	5 1	L BR T TL R
5 YAW RIGHT 360° OVER STAND #1 ALIGN WITH BOTH BUCKETS	YAW R-360	1	5 1	T BL R BR L
6 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		2A	5 1	L BR T TL R
7 CLIMB VERTICALLY OVER STAND #1 ALIGN WITH BOTH BUCKETS	CLIMB	1	5 1	T BL R BR L
8 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		3A	5 1	BR T TL R BL
9 DESCEND VERTICALLY OVER STAND #1 ALIGN WITH BOTH BUCKETS	DESCEND	1	5 1	T BL R BR L
10 C CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		2A	5 1	L BR T TL R
11 PITCH FORWARD TO STAND #2 ALIGN WITH BOTH BUCKETS	FWD	2	5 1	BL T BR R TL
12 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		3A	5 1	BR T TL R BL
13 PITCH BACKWARD TO STAND #1 ALIGN WITH BOTH BUCKETS	BKWD	1	5 1	T BL R BR L
14 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		2A	5 1	L BR T TL R
15 PITCH FWD TO STAND #2 THEN YAW LEFT 180° ALIGN WITH BOTH BUCKETS	FWD-L180	2	5 1	TR B TL L BR
16 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		1C	5 1	BR R TL L BR
17 PITCH FWD TO LANDING THEN YAW RIGHT 180° ALIGN WITH BOTH BUCKETS	FWD-R180	L	5 1	B TR L BL T
18 CAPTURE ONE IMAGE DOWNWARD THEN ONE IMAGE FORWARD		1A	5 1	TR B TR L BR
19 LAND IN CIRCLE CENTERED (5 PTS) OR OFFSET (1 PT) COUNT SINGLE LANDING TWICE FOR ALIGNMENT SCORE	LAND	P1	5 1	BL R TL L BL
20 CAPTURE ONE IMAGE OF P1 AND P2 ACUITY TARGETS		P2	5 1	L BR T TL B
STOP TIMER			/100	/100
ELAPSED TIME (MM : SS)			PASS | FAIL (CIRCLE ONE)	PASS | FAIL (CIRCLE ONE)

Traverse (MAN/PAY 2)

Open Test Lane



- Fly sideways parallel to objects while looking forward to identify features as if along a road, truck, bus, building, fence, tree line, etc.
- Maintain altitude (S) throughout to complete two laps in both directions around the first three omni stands.
- Land accurately on the platform with the chassis CENTERED (5 pts) within the 60 cm (24 in) diameter circle, or OFFSET (1 pt) at least one motor in the circle.
- **Alignment Points:** Capture a SINGLE IMAGE of each alignment ring throughout 2 laps with 20 buckets and accurate landings to score up to 100 alignment points.
- **Acuity Points:** While aligned with each bucket, identify as many acuity target gaps as possible to score up to 100 acuity points.

OPEN TEST LANE | **TRAVERSE**		ALIGNMENT		ACUITY
START TIMER		ALIGN BUCKET	IMAGE POINTS	CORRECT GAPS (1 POINT EACH)
1 HOVER OVER THE LAUNCH AT ALTITUDE S	ALT S – LEFTWARD	1A	5 1	TR B TR L BR
2 ORBIT 90° LEFTWARD AROUND STAND #1		1B	5 1	R TL T BL B
3 ROLL LEFTWARD TO STAND #2		2B	5 1	TL R TR L BR
4 ROLL LEFTWARD TO STAND #3		3B	5 1	B TR R BL T
5 ORBIT 90° LEFTWARD AROUND STAND #3		3C	5 1	BL R BL T BR
6 ORBIT 90° LEFTWARD AROUND STAND #3		3D	5 1	L TL R BR T
7 ROLL LEFTWARD TO STAND #2		2D	5 1	TR B TL B BL
8 ROLL LEFTWARD TO STAND #1		1D	5 1	B TL R BL T
9 ORBIT 90° LEFTWARD AROUND STAND #1		1A	5 1	TR B TR L BR
10 LAND IN CIRCLE (5 PTS CENTERED, 1 PT OFFSET)		P1	5 1	BL R TL L BL
11 HOVER OVER THE LAUNCH PLATFORM	ALT S – RIGHTWARD	1A	5 1	TR B TR L BR
12 ORBIT 90° RIGHTWARD AROUND STAND #1		1D	5 1	B TL R BL T
13 ROLL RIGHTWARD TO STAND #2		2D	5 1	TR B TL B BL
14 ROLL RIGHTWARD TO STAND #3		3D	5 1	L TL R BR T
15 ORBIT 90° RIGHTWARD AROUND STAND #3		3C	5 1	BL R BL T BR
16 ORBIT 90° RIGHTWARD AROUND STAND #3		3B	5 1	B TR R BL T
17 ROLL RIGHTWARD TO STAND #2		2B	5 1	TL R TR L BR
18 ROLL RIGHTWARD TO STAND #1		1B	5 1	R TL T BL B
19 ORBIT 90° RIGHTWARD AROUND STAND #1		1A	5 1	TR B TR L BR
20 LAND IN CIRCLE (5 PTS CENTERED, 1 PT OFFSET)		P2	5 1	L BR T TL B
STOP TIMER			/100	/100
ELAPSED TIME (MM : SS)			**PASS | FAIL** (CIRCLE ONE)	**PASS | FAIL** (CIRCLE ONE)