Aerial Drone Tests and Scorable Scenarios for Evaluating System Capabilities and Remote Pilot Proficiency in Level 3 Open, Level 4 Obstructed, and Level 5 Confined Environments

Developed by the National Institute of Standards and Technology

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Level 4 Obstructed Environments

LEVEL

4

OBSTRUCTED Test Lane

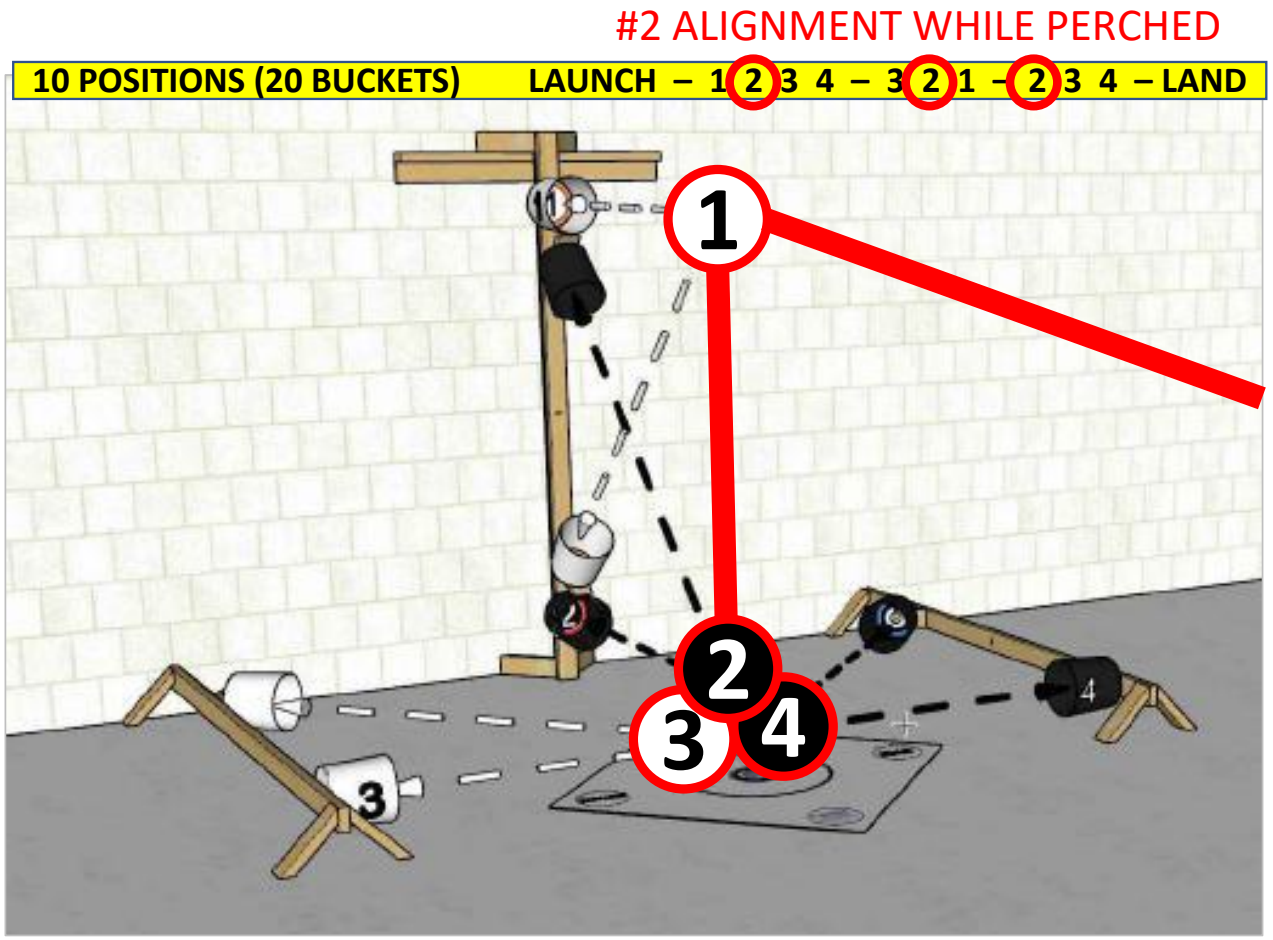
Payload Functionality Trials

Evaluate maneuvering in close proximity to objects while controlling zoom and exposure.

- ***25 minutes (5 minutes each)***
- ***50 Alignment & 50 Acuity Points***

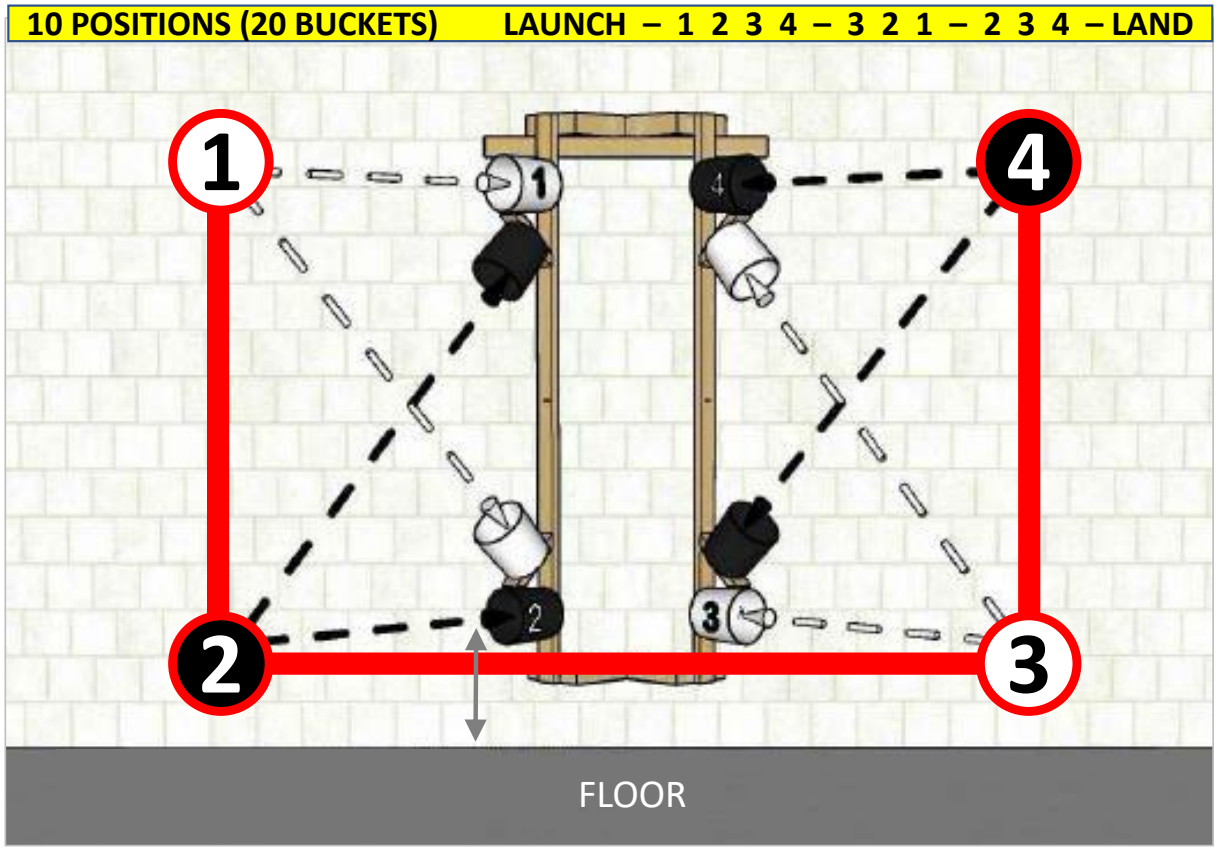
Perch (PAY 6)

Obstructed Test Lane



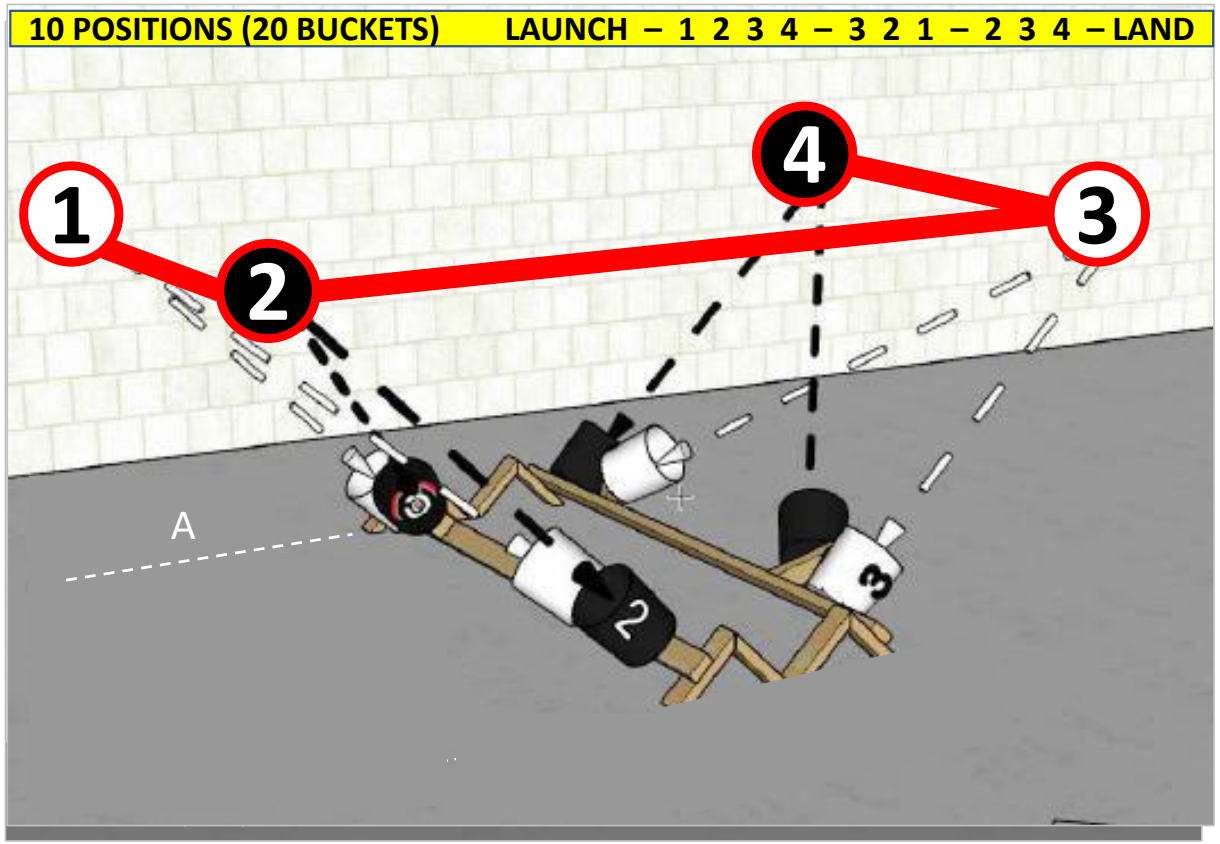
Wall (PAY 7)

Obstructed Test Lane



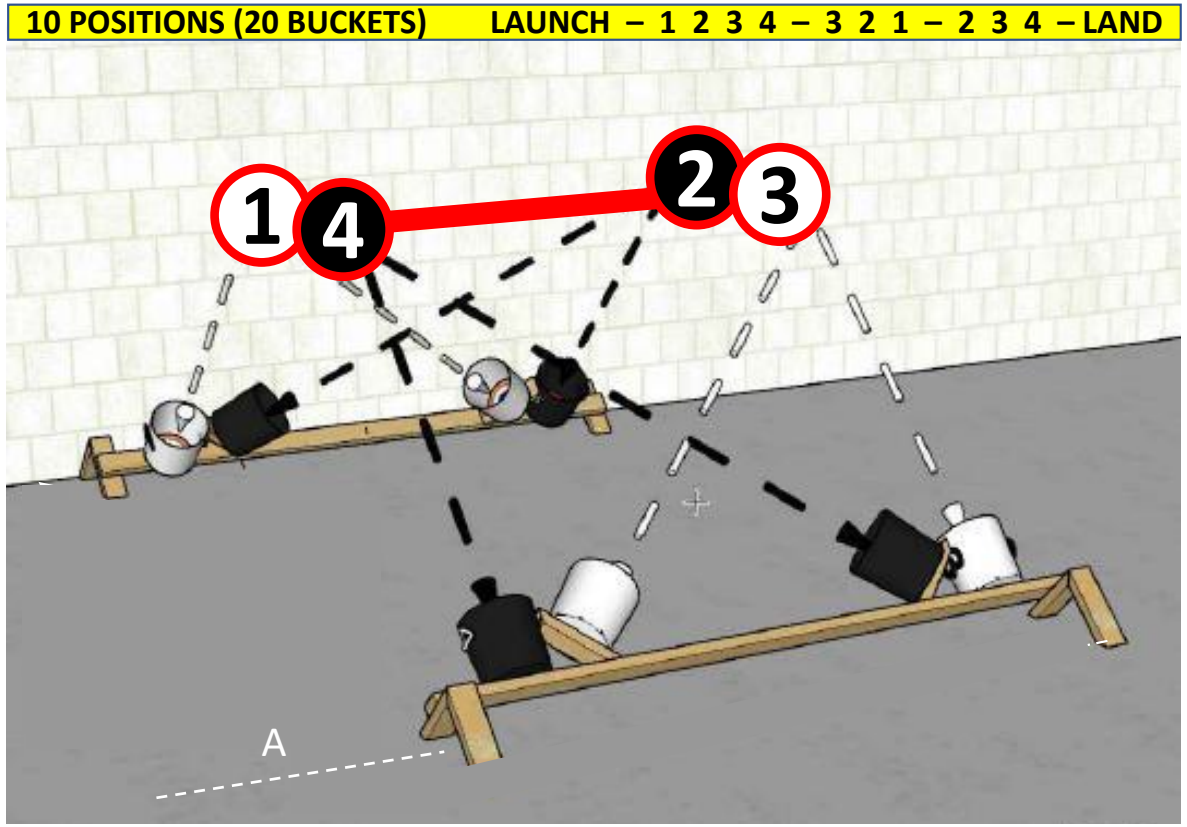
Ground (PAY 8)

Obstructed Test Lane



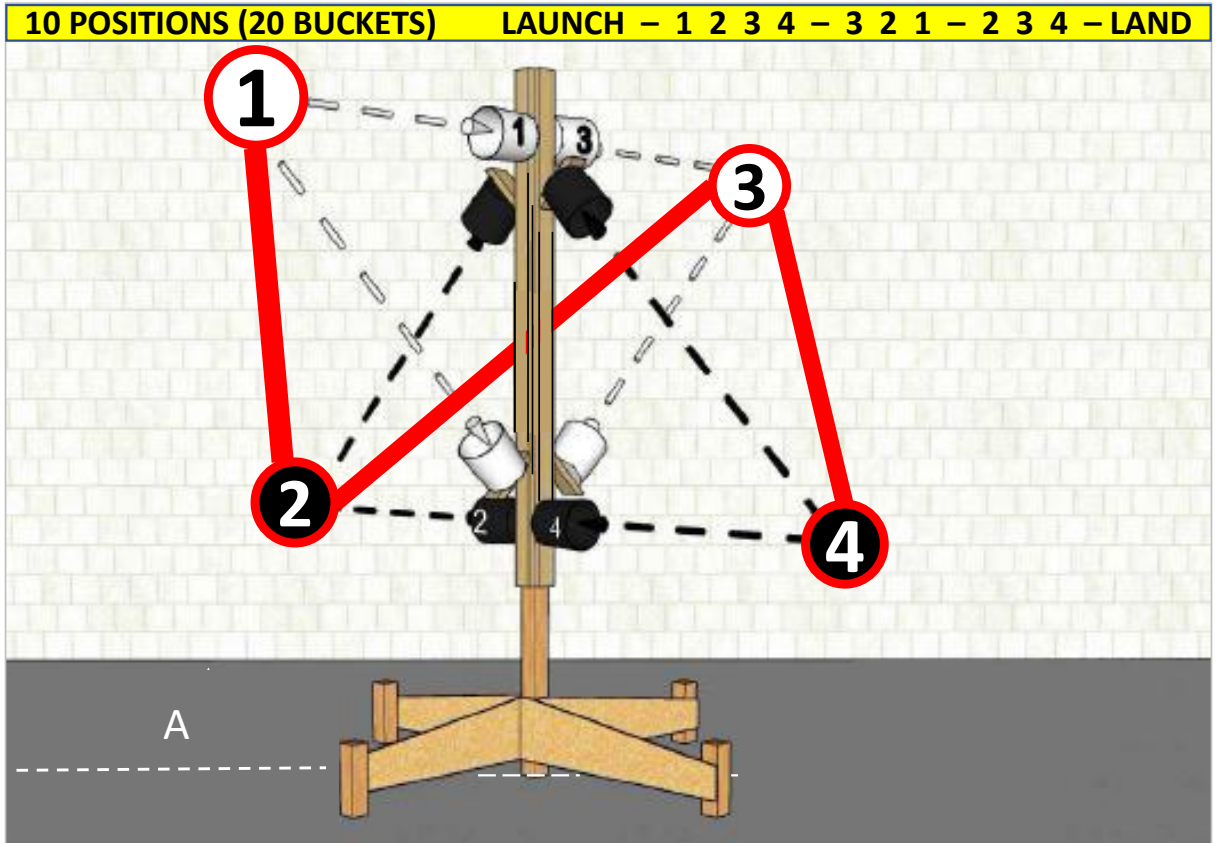
Alley (PAY 9)

Obstructed Test Lane



Post (PAY 10)

Obstructed Test Lane



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Science and Technology

LEVEL 4 | OBSTRUCTED
PAYLOAD FUNCTIONALITY

Pilot LAST Name _____

Pilot FIRST Name _____

Pilot Organization _____

Drone Make _____

Drone Model _____

Facility Location _____

Date (YYYY/MM/DD) _____ Team #: _____

PROCTOR NAME _____

BUCKET DIAMETER		VISIBILITY			WIND		PILOT VIEW		TIME LIMIT		
4 IN (10 CM)	8 IN (20 CM)	LIGHTED 300+ LUX	DIM 1-300 LUX	DARK < 1 LUX	AVERAGE ____ MPH	GUSTS ____ MPH	LINE OF SIGHT FACINE LANE OPTIONAL V.O.	INTERFACE ONLY BACK TO LANE MANDATORY V.O.	5 MIN	10 MIN	___ MIN
(CIRCLE ONE)		(CIRCLE ONE)			(FILL IN)		(CIRCLE ONE)		(CIRCLE ONE or FILL IN)		

ALIGNMENT SCORE: Circle points for images with UNBROKEN RINGS (5 pts), BROKEN RINGS (1 pt), Draw a line through all incomplete.
ACUITY SCORE: Circle correctly identified GAP DIRECTIONS in the answer key (1 pt each).

PERCH (PAY 6)

21 IMAGES TO CAPTURE
- 1 PRE-LAUNCH
- 20 ALIGNMENTS
- WHILE PERCHED

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1 1A	5 1	TR B TR L BR
2	5 1	WHILE PERCHED
2A		L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
3 3A	5 1	BR T TL R BL
2	5 1	WHILE PERCHED
2A		L BR T TL R
1 1A	5 1	TR B TR L BR
2	5 1	WHILE PERCHED
2A		L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
SCORE /50		SCORE /50

ELAPSED TIME (MM : SS)

PASS CIRCLE ONE FAIL

WALL (PAY 7)

21 IMAGES TO CAPTURE
- 1 PRE-LAUNCH
- 20 ALIGNMENTS

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
3 3A	5 1	BR T TL R BL
2 2A	5 1	L BR T TL R
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
SCORE /50		SCORE /50

ELAPSED TIME (MM : SS)

PASS CIRCLE ONE FAIL

GROUND (PAY 8)

21 IMAGES TO CAPTURE
- 1 PRE-LAUNCH
- 20 ALIGNMENTS

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
3 3A	5 1	BR T TL R BL
2 2A	5 1	L BR T TL R
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
SCORE /50		SCORE /50

ELAPSED TIME (MM : SS)

PASS CIRCLE ONE FAIL

ALLEY (PAY 9)

21 IMAGES TO CAPTURE
- 1 PRE-LAUNCH
- 20 ALIGNMENTS

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
3 3A	5 1	BR T TL R BL
2 2A	5 1	L BR T TL R
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
SCORE /50		SCORE /50

ELAPSED TIME (MM : SS)

PASS CIRCLE ONE FAIL

POST (PAY 10)

21 IMAGES TO CAPTURE
- 1 PRE-LAUNCH
- 20 ALIGNMENTS

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
3 3A	5 1	BR T TL R BL
2 2A	5 1	L BR T TL R
1 1A	5 1	TR B TR L BR
2 2A	5 1	L BR T TL R
3 3A	5 1	BR T TL R BL
4 4A	5 1	T BL B TR L
SCORE /50		SCORE /50

ELAPSED TIME (MM : SS)

PASS CIRCLE ONE FAIL

Scoring Alignment Points

Capture images of alignment rings to verify

ALIGN WITH BUCKETS AND LAND ACURATELY

10 ALIGNMENT RINGS TOTAL 50 POINTS

CAPTURE IMAGES OF THE INSCRIBED RINGS AND LAND ACCURATELY.

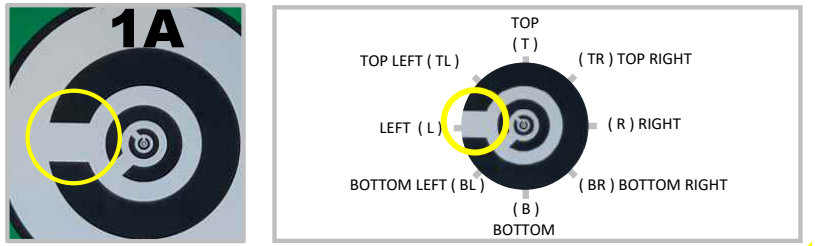
- First align with each PERPENDICULAR BUCKET to capture a SINGLE ALIGNMENT IMAGE of the inscribed ring.
- Score captured images with
  - UNBROKEN RINGS (5 points)
  - BROKEN RINGS (1 point)
  - NO RINGS (0 points, strike through line)
- Accurate landings are not scored.
- Verification of captured alignment 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.

Scoring Acuity Points

Identify increasingly small visual acuity targets

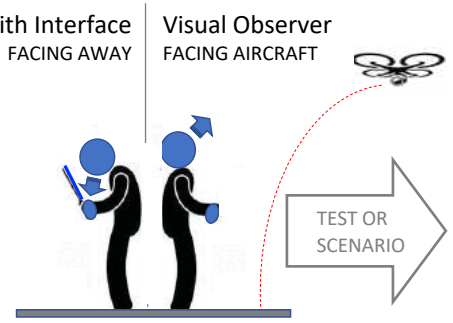
ALIGN THEN CONTROL ZOOM AND EXPOSURE

10 ACUITY TARGETS TOTAL 50 POINTS



REPORT GAP DIRECTIONS RELATIVE TO THE BUCKET NUMBER (TOP)

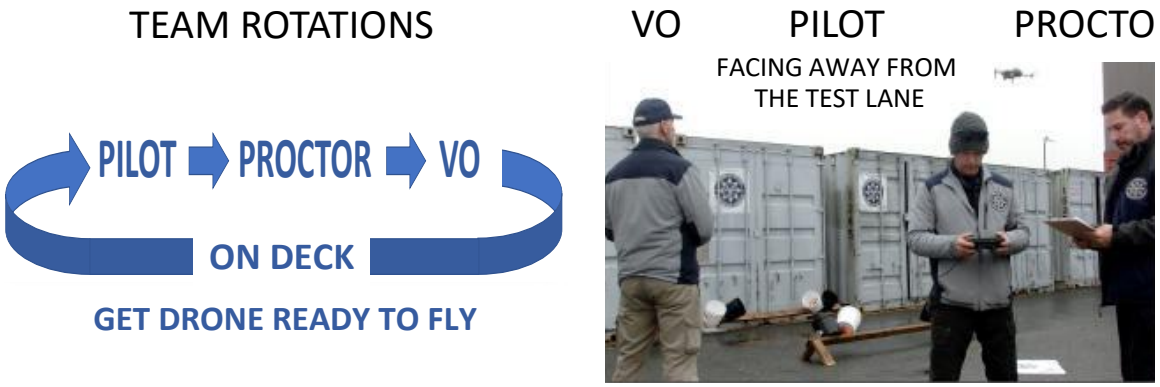
- Then align with each ANGLED BUCKET to IDENTIFY ACUITY TARGETS using camera zoom and exposure controls.
- Call out as many of the Concentric C gap directions as possible (1 pt each).
- Fly facing away from the test lane or scenario with a Visual Observer to evaluate flying interface only as if beyond visual line of sight.



ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	WHILE PERCHED
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L

Teams Rotate Through Each Role

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



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.

Level 4 Obstructed Lane Proctoring

Scoring Alignment Points

Capture images of alignment rings to verify

ALIGN WITH BUCKETS AND LAND ACURATELY

10 ALIGNMENT RINGS TOTAL 50 POINTS

CAPTURE IMAGES OF THE INSCRIBED RINGS AND LAND ACCURATELY.

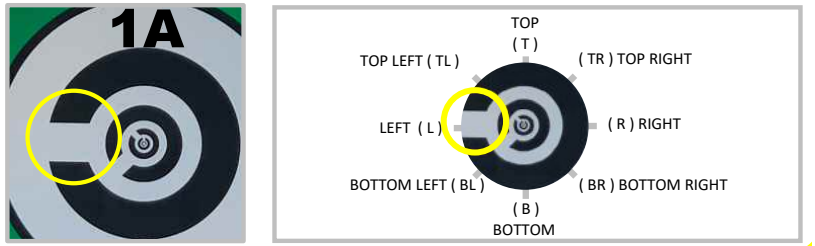
- First align with each PERPENDICULAR BUCKET to capture a SINGLE ALIGNMENT IMAGE of the inscribed ring.
- Score captured images with
  - UNBROKEN RINGS (5 points)
  - BROKEN RINGS (1 point)
  - NO RINGS (0 points, strike through line)
- Accurate landings are not scored.
- Verification of captured alignment 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.

Scoring Acuity Points

Identify increasingly small visual acuity targets

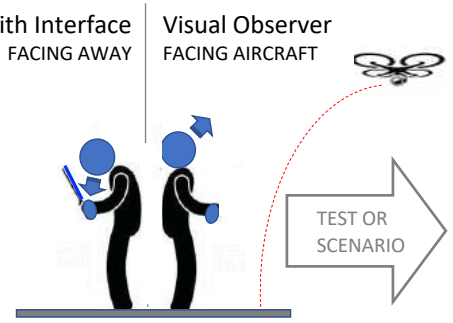
ALIGN THEN CONTROL ZOOM AND EXPOSURE

10 ACUITY TARGETS TOTAL 50 POINTS



REPORT GAP DIRECTIONS RELATIVE TO THE BUCKET NUMBER (TOP)

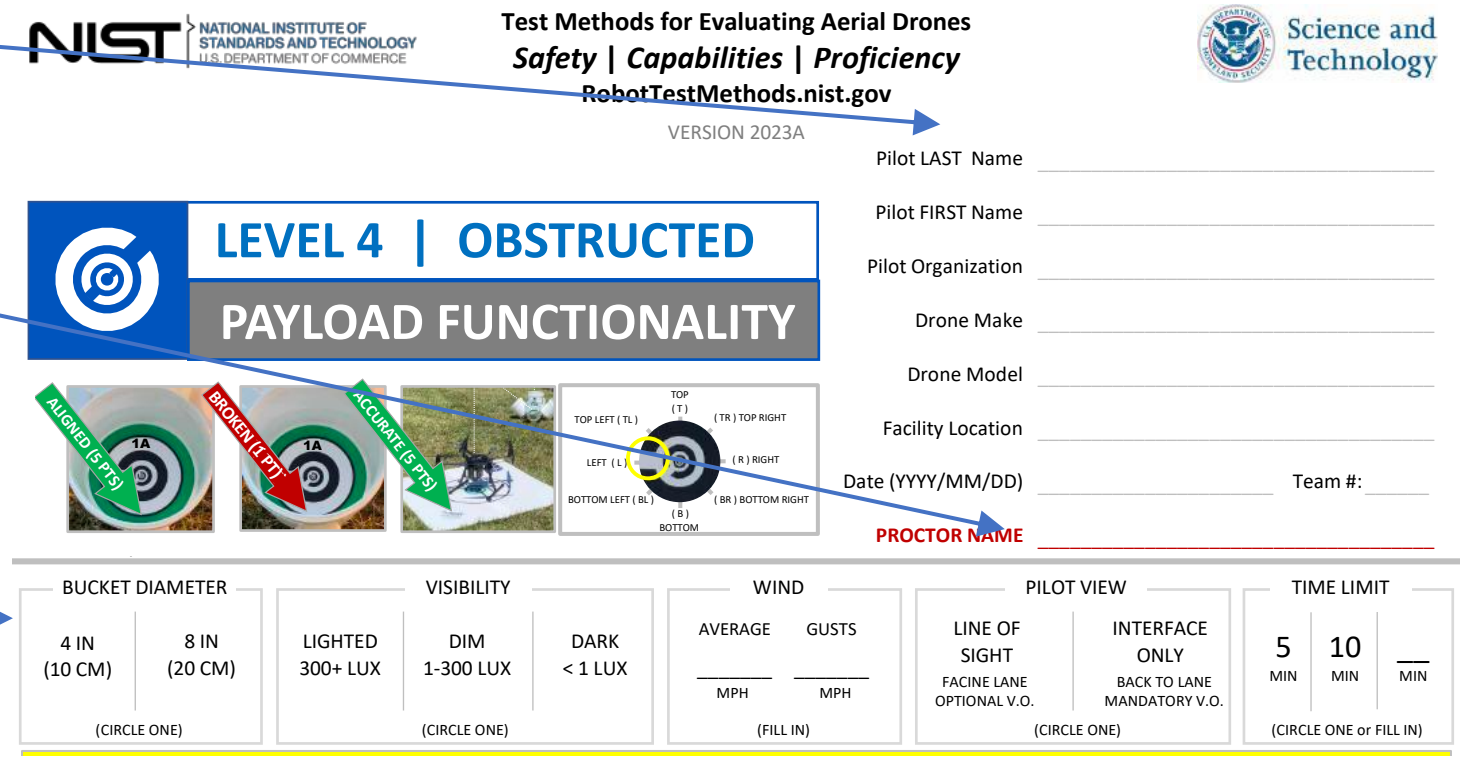
- Then align with each ANGLED BUCKET to IDENTIFY ACUITY TARGETS using camera zoom and exposure controls.
- Call out as many of the Concentric C gap directions as possible (1 pt each).
- Fly facing away from the test lane or scenario with a Visual Observer to evaluate flying interface only as if beyond visual line of sight.



Level 4 Obstructed Lane

Payload Functionality Trials

- Fill in the header information completely!
- PROCTOR ATTESTATION
  (The Proctor's printed name)
- Bucket Size
- Lighting
- Wind
- Pilot view
- Time limit



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LEVEL 4 | OBSTRUCTED
PAYLOAD FUNCTIONALITY

ALIGNED (5 PTS) BROKEN (1 PT) ACCURATE (5 PTS)

TOP (T) · TOP LEFT (TL) · (TR) TOP RIGHT · LEFT (L) · (R) RIGHT · BOTTOM LEFT (BL) · (BR) BOTTOM RIGHT · (B) BOTTOM

Pilot LAST Name _____
Pilot FIRST Name _____
Pilot Organization _____
Drone Make _____
Drone Model _____
Facility Location _____
Date (YYYY/MM/DD) _____ Team #: _____
PROCTOR NAME _____

BUCKET DIAMETER		VISIBILITY			WIND		PILOT VIEW		TIME LIMIT		
4 IN (10 CM)	8 IN (20 CM)	LIGHTED 300+ LUX	DIM 1-300 LUX	DARK < 1 LUX	AVERAGE _____ MPH	GUSTS _____ MPH	LINE OF SIGHT FACINE LANE OPTIONAL V.O.	INTERFACE ONLY BACK TO LANE MANDATORY V.O.	5 MIN	10 MIN	___ MIN
(CIRCLE ONE)		(CIRCLE ONE)			(FILL IN)		(CIRCLE ONE)		(CIRCLE ONE or FILL IN)		

Level 4 Obstructed Lane

Payload Functionality Trials

Brief reminders.

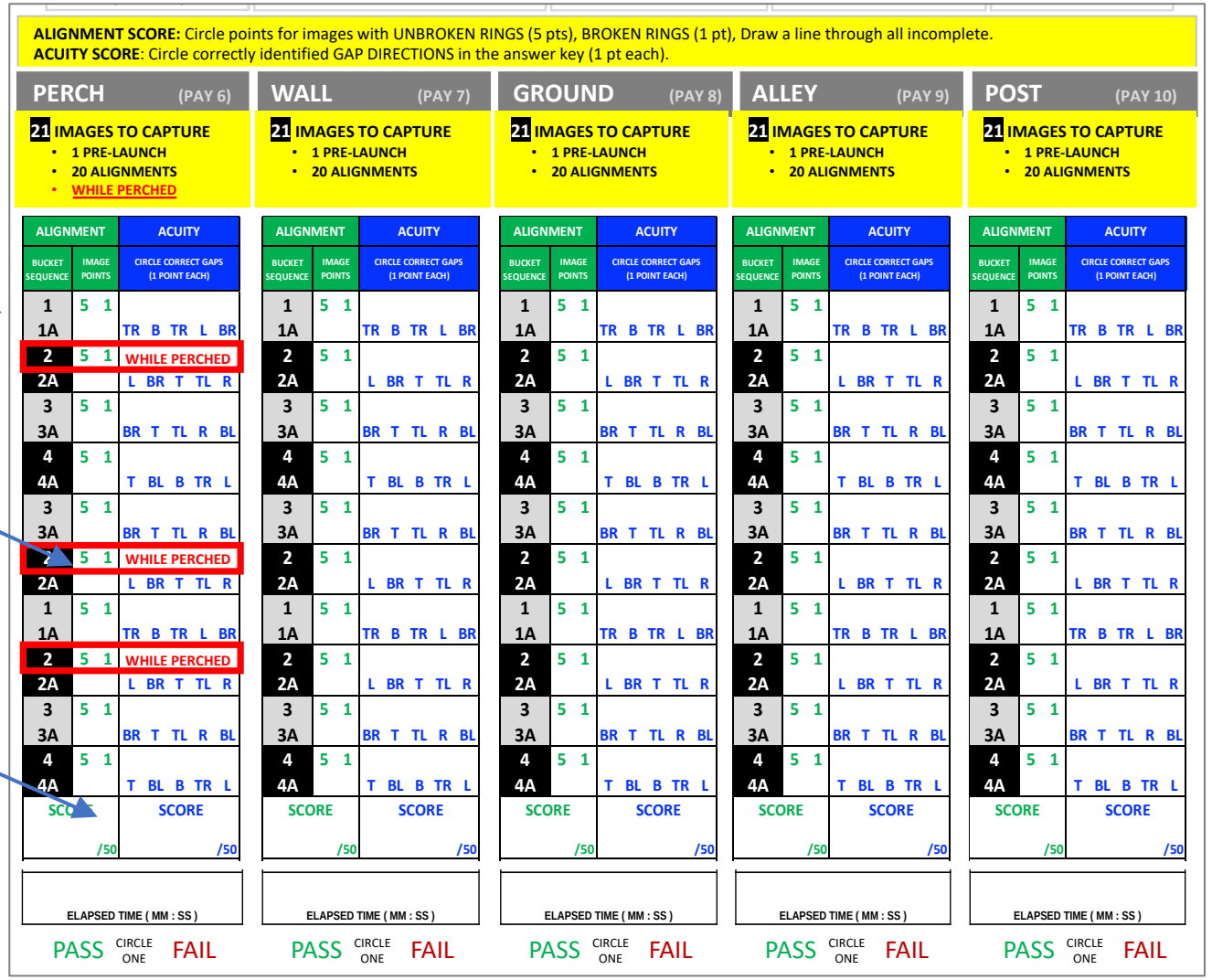
White and black bucket shading.

SCORE WHILE PERCHED.

Circle alignment points when declared by the pilot with verification of images during or after the trial.

Separate totals for ALIGNMENT and ACUITY points (50 points each).

Any organization can select their own passing score.



ALIGNMENT SCORE: Circle points for images with UNBROKEN RINGS (5 pts), BROKEN RINGS (1 pt), Draw a line through all incomplete.
ACUITY SCORE: Circle correctly identified GAP DIRECTIONS in the answer key (1 pt each).

PERCH (PAY 6)	WALL (PAY 7)	GROUND (PAY 8)	ALLEY (PAY 9)	POST (PAY 10)
21 IMAGES TO CAPTURE • 1 PRE-LAUNCH • 20 ALIGNMENTS • WHILE PERCHED	21 IMAGES TO CAPTURE • 1 PRE-LAUNCH • 20 ALIGNMENTS	21 IMAGES TO CAPTURE • 1 PRE-LAUNCH • 20 ALIGNMENTS	21 IMAGES TO CAPTURE • 1 PRE-LAUNCH • 20 ALIGNMENTS	21 IMAGES TO CAPTURE • 1 PRE-LAUNCH • 20 ALIGNMENTS

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	WHILE PERCHED
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
3	5 1	
3A		BR T TL R BL
2	5 1	WHILE PERCHED
2A		L BR T TL R
1	5 1	
1A		TR B TR L BR
2	5 1	WHILE PERCHED
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
SCORE		SCORE
/50		/50
ELAPSED TIME (MM : SS)		
PASS CIRCLE ONE FAIL		

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
3	5 1	
3A		BR T TL R BL
2	5 1	
2A		L BR T TL R
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
SCORE		SCORE
/50		/50
ELAPSED TIME (MM : SS)		
PASS CIRCLE ONE FAIL		

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
3	5 1	
3A		BR T TL R BL
2	5 1	
2A		L BR T TL R
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
SCORE		SCORE
/50		/50
ELAPSED TIME (MM : SS)		
PASS CIRCLE ONE FAIL		

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
3	5 1	
3A		BR T TL R BL
2	5 1	
2A		L BR T TL R
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
SCORE		SCORE
/50		/50
ELAPSED TIME (MM : SS)		
PASS CIRCLE ONE FAIL		

ALIGNMENT		ACUITY
BUCKET SEQUENCE	IMAGE POINTS	CIRCLE CORRECT GAPS (1 POINT EACH)
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
3	5 1	
3A		BR T TL R BL
2	5 1	
2A		L BR T TL R
1	5 1	
1A		TR B TR L BR
2	5 1	
2A		L BR T TL R
3	5 1	
3A		BR T TL R BL
4	5 1	
4A		T BL B TR L
SCORE		SCORE
/50		/50
ELAPSED TIME (MM : SS)		
PASS CIRCLE ONE FAIL		

LEVEL 4 | OBSTRUCTED

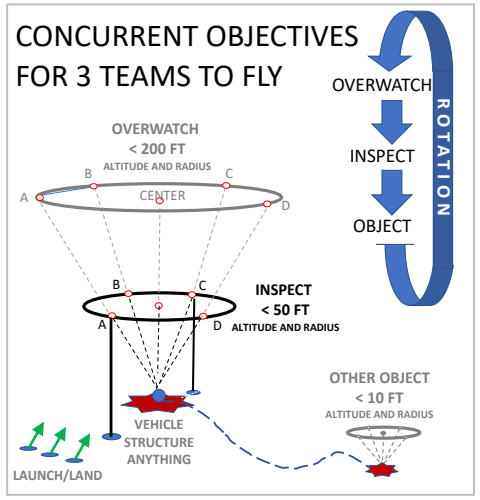
SCORABLE SCENARIOS

Obstructed Vehicle Inspection Scenarios

Day and Night Trials

USE SETS OF 5 “INLINE” DUAL BUCKET RAILS

DISTRIBUTED THROUGHOUT THE SCENARIO



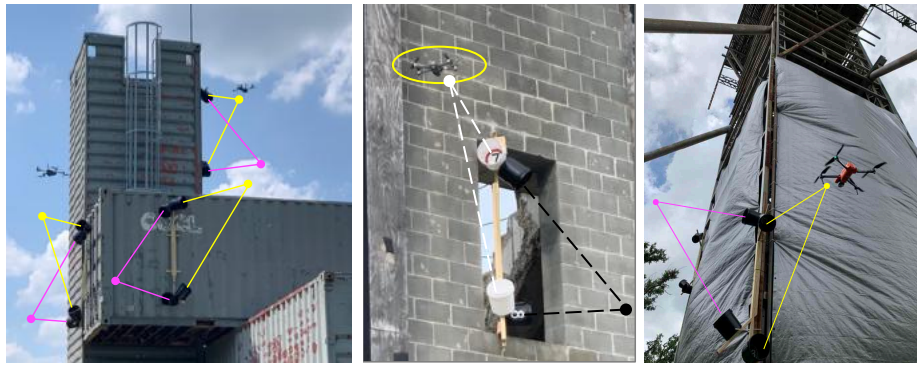
Obstructed Search Scenarios

Day and Night Trials

USE SETS OF 5 “OFFSET” DUAL BUCKET RAILS

HORIZONTALS DISTRIBUTED WITH OBJECTS OF INTEREST

VERTICALS IN ELEVATED WINDOWS AND ON STRUCTURES



- 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.

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LEVEL 4 | OBSTRUCTED
SCORABLE SCENARIOS

Pilot LAST Name _____

Pilot FIRST Name _____

Pilot Organization _____

Drone Make _____

Drone Model _____

Facility Location _____

Date (YYYY/MM/DD) _____ Team #: _____

PROCTOR NAME _____

BUCKET DIAMETER	VISIBILITY	WIND	PILOT VIEW	TIME LIMIT
4 IN (10 CM) / 8 IN (20 CM)	LIGHTED 300+ LUX / DIM 1-300 LUX / DARK < 1 LUX	AVERAGE ____ MPH / GUSTS ____ MPH	LINE OF SIGHT FACINE LANE OPTIONAL V.O. / INTERFACE ONLY BACK TO LANE MANDATORY V.O.	5 MIN / 10 MIN / ___ MIN
(CIRCLE ONE)	(CIRCLE ONE)	(FILL IN)	(CIRCLE ONE)	(CIRCLE ONE or FILL IN)

ALIGNMENT SCORE: Circle points for images with UNBROKEN RINGS (5 pts), BROKEN RINGS (1 pt), Draw a line through all incomplete.
ACUITY SCORE: Circle correctly identified GAP DIRECTIONS in the answer key (1 pt each).

		BUCKETS	ALIGNMENT	ACUITY
	START TIMER *(CAPTURE CLOCK IMAGE)* : :	NUMBER	IMAGE POINTS (5 OR 1 POINT)	CIRCLE GAPS (1 POINT EACH)
1	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	1	5 1 0	
2	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	1A		TR B TR L BR
3	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	2	5 1 0	
4	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	2A		L BR T TL R
5	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	3	5 1 0	
6	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	3A		BR T TL R BL
7	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	4	5 1 0	
8	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	4A		T BL B TR L
9	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	5	5 1 0	
10	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	5A		BL R TL L BL
11	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	6	5 1 0	
12	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	6A		TR B TR L BR
13	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	7	5 1 0	
14	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	7A		L BR T TL R
15	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	8	5 1 0	
16	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	8A		BR T TL R BL
17	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	9	5 1 0	
18	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	9A		T BL B TR L
19	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	10	5 1 0	WHILE PERCHED
20	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	10A		BL R TL L BL
	STOP TIMER. RECORD SCORES AND ELAPSED TIME.		/50	/50
			ELAPSED TIME (MM:SS)	

		BUCKETS	ALIGNMENT	ACUITY
	START TIMER *(CAPTURE CLOCK IMAGE)* : :	NUMBER	IMAGE POINTS (5 OR 1 POINT)	CIRCLE GAPS (1 POINT EACH)
1	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	1	5 1 0	
2	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	1A		TR B TR L BR
3	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	2	5 1 0	
4	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	2A		L BR T TL R
5	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	3	5 1 0	
6	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	3A		BR T TL R BL
7	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	4	5 1 0	
8	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	4A		T BL B TR L
9	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	5	5 1 0	
10	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	5A		BL R TL L BL
11	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	6	5 1 0	
12	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	6A		TR B TR L BR
13	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	7	5 1 0	
14	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	7A		L BR T TL R
15	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	8	5 1 0	
16	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	8A		BR T TL R BL
17	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	9	5 1 0	
18	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	9A		T BL B TR L
19	*PERPENDICULAR BUCKET:* ALIGN AND CAPTURE IMAGE	10	5 1 0	WHILE PERCHED
20	*ANGLED BUCKET:* CALL OUT ACUITY GAP DIRECTIONS	10A		BL R TL L BL
	STOP TIMER. RECORD SCORES AND ELAPSED TIME.		/50	/50
			ELAPSED TIME (MM:SS)	

Level 4 Review

Standards Enable Credentialing of Proctors and Remote Pilots

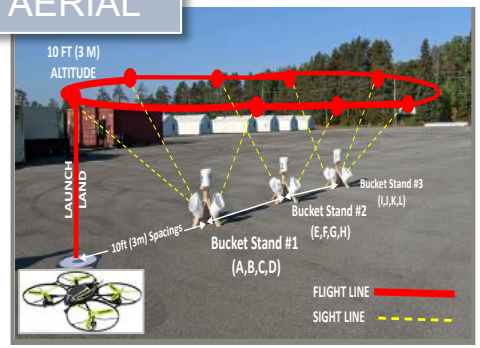
Safety | Capabilities | Proficiency

NIST Develops and Validates Test Methods

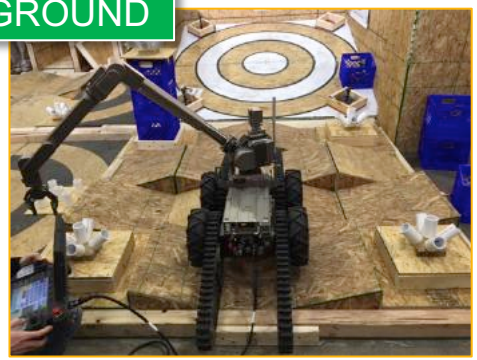
- ***Apparatus*** that can be reproducible by others.
- ***Procedures*** that are repeatable to conduct test trials.
- ***Performance Metrics*** that are quantitative and can be compared over time, across locations and internationally
- ***Evaluate Systems*** using expert pilots conducting complete trials
- ***Operator proficiency*** is compared with similar systems on the same lane spacing in similar environmental conditions with either complete or time limited trials

  Compare time limited trials that are incomplete by total points for similar elapsed times or calculate and compare the scoring rate as points per minute for different elapsed times

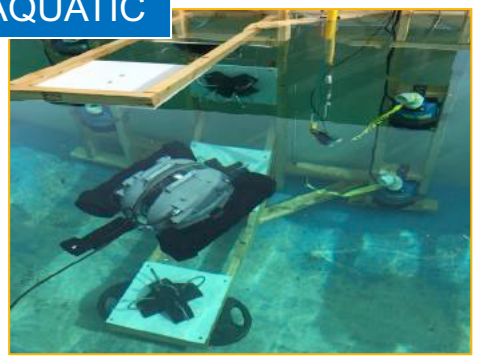
AERIAL



GROUND



AQUATIC



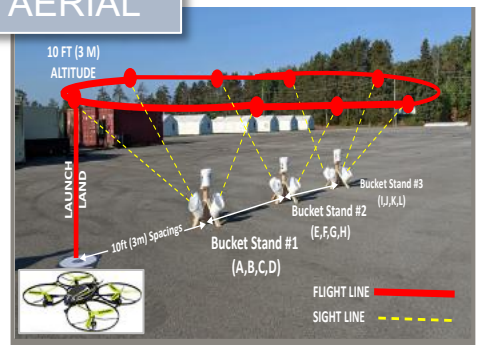
Standards Enable Credentialing of Proctors and Remote Pilots

Safety | Capabilities | Proficiency

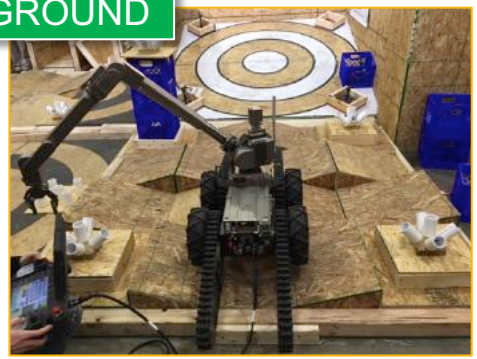
When conducting evaluations with these Test Methods the results should only be compared to similar environmental conditions.

Night or dark trials can be conducted with white or red headlamps illuminating the white buckets or only using the lights and sensors onboard the drone.

AERIAL



GROUND



AQUATIC

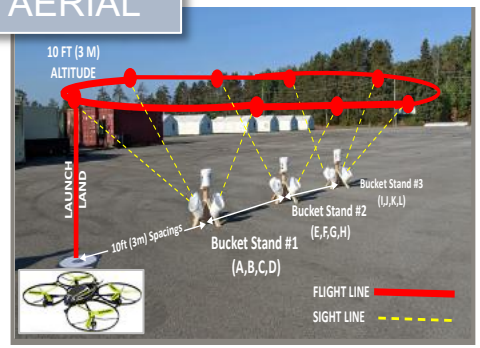
Standards Enable Credentialing of Proctors and Remote Pilots

Safety | Capabilities | Proficiency

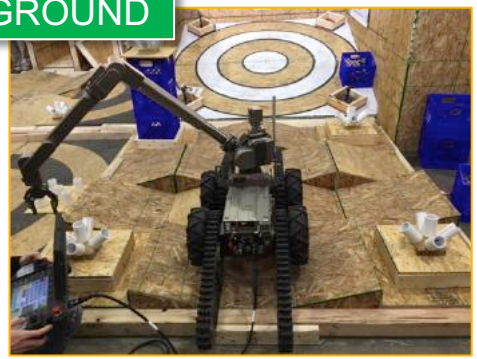
When Credentialing operators an organization can;

- Set their own pass/fail scoring threshold
- Adopt a pass/fail scoring threshold set by a regional or national association with which the organization collaborates
- Adopt a pass/fail scoring threshold set by a similar organization

AERIAL



GROUND



AQUATIC

LEVEL

4

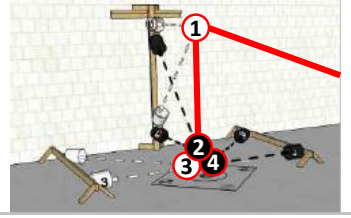
OBSTRUCTED Test Lane

Payload Functionality Trials

Evaluate maneuvering in close proximity to objects while controlling zoom and exposure.

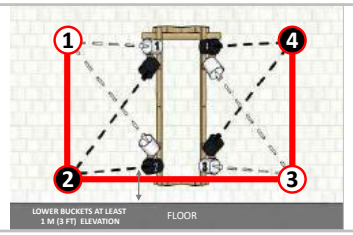
- ***25 minutes (5 minutes each)***
- ***50 Alignment & 50 Acuity Points***

PERCH
PAY 6



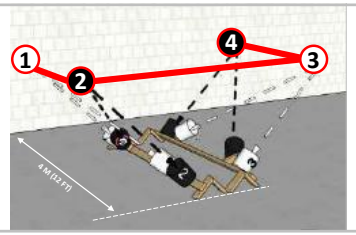
- Land or hover just above the ground within proximity to a wall or obstacle with additional ground obstacles on both sides. Launch and land repeatedly if necessary to score all buckets in the sequence of perch tasks.
- Inspect **vertical** and **horizontal** object features **all around the aircraft**.
- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**

WALL
PAY 7



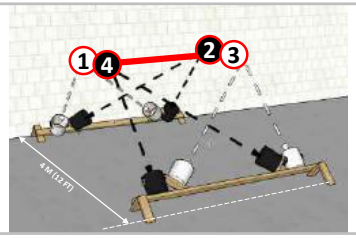
- Fly within proximity to a wall or obstacle at **45 degrees from forward** of the aircraft.
- Inspect **vertical** object features **upward** and **downward**.
- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**

GROUND
PAY 8



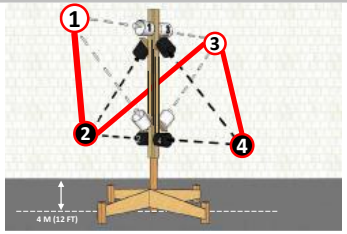
- Fly within proximity to a wall or obstacles at **90 degrees from forward** of the aircraft.
- Inspect **horizontal** object features **leftward** and **rightward**.
- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**

ALLEY
PAY 9



- Fly within proximity to a wall or obstacle in **front of the aircraft (0 degrees)** and **behind the aircraft (180 degrees)**.
- Inspect **horizontal** object features **leftward** and **rightward**.
- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**

POST
PAY 10



- Fly within proximity to a post and wall or obstacle and pass between the post and the wall.
- Inspect **vertical** object features **upward** and **downward** all around the post.
- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**

Scoring Alignment Points

Capture images of alignment rings to verify

ALIGN WITH BUCKETS AND LAND ACURATELY

10 ALIGNMENT RINGS TOTAL 50 POINTS

CAPTURE IMAGES OF THE INSCRIBED RINGS AND LAND ACCURATELY.

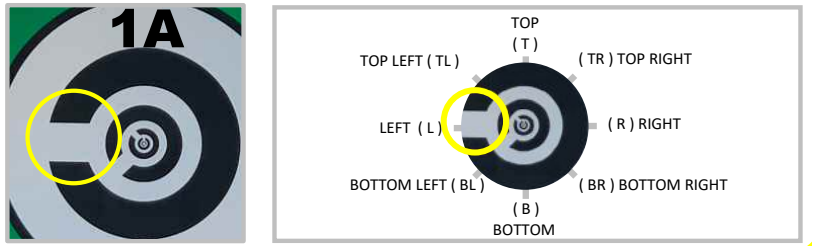
- First align with each PERPENDICULAR BUCKET to capture a SINGLE ALIGNMENT IMAGE of the inscribed ring.
- Score captured images with
  - UNBROKEN RINGS (5 points)
  - BROKEN RINGS (1 point)
  - NO RINGS (0 points, strike through line)
- Accurate landings are not scored.
- Verification of captured alignment 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.

Scoring Acuity Points

Identify increasingly small visual acuity targets

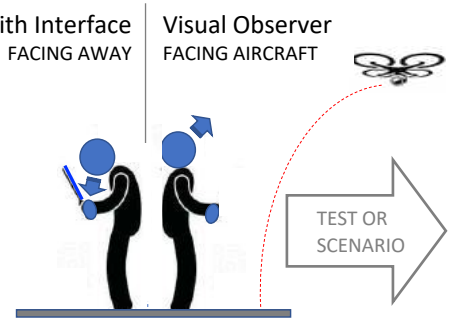
ALIGN THEN CONTROL ZOOM AND EXPOSURE

10 ACUITY TARGETS TOTAL 50 POINTS



REPORT GAP DIRECTIONS RELATIVE TO THE BUCKET NUMBER (TOP)

- Then align with each ANGLED BUCKET to IDENTIFY ACUITY TARGETS using camera zoom and exposure controls.
- Call out as many of the Concentric C gap directions as possible (1 pt each).
- 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.



Aerial Drone Tests and Scorable Scenarios for Evaluating System Capabilities and Remote Pilot Proficiency in Level 3 Open, Level 4 Obstructed, and Level 5 Confined Environments

Developed by the National Institute of Standards and Technology

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