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

Test Methods for Evaluating Aerial Drones
Safety | Capabilities | Proficiency
RobotTestMethods.nist.gov
VERSION 2023A

Science and Technology

LEVEL 4 | OBSTRUCTED
PAYLOAD FUNCTIONALITY

Perform 5 different flight paths to triangulate around the dual bucket rails. Each flight path includes alignments with perpendicular buckets then angled buckets using zoom and exposure control to identify recessed targets.

- All sequences have 10 positions with 20 buckets to score: **1 2 3 4 – 3 2 1 – 2 3 4** *(forward–reverse–forward)*

- Score ALIGNMENT POINTS by capturing a SINGLE IMAGE of the inscribed rings to verify alignments during or after the trial: UNBROKEN RINGS (5 pts), BROKEN RINGS (1 pt).

- Score ACUITY POINTS by calling out the 5 increasingly small VISUAL ACUITY TARGET GAPS (1 pt each).

- Start timer at launch and end after the last task is completed. Trial time limits are typically 5 minutes each (25 minutes to complete all 5 tests) although organizations may set their own trial time limits and passing scores.

- Extreme deviation from the intended flight path, or contact with any object, ends the trial to ensure safety.


PERCH
PAY 6
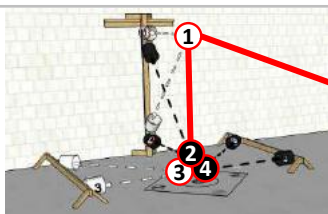
- Land or hover just above the ground within proximity to a wall or obstacle with additional ground obstacles on both sides. Launch and land repeatedly if necessary to score all buckets in the sequence of perch tasks.

- Inspect **vertical** and **horizontal** object features **all around the aircraft**.

- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**
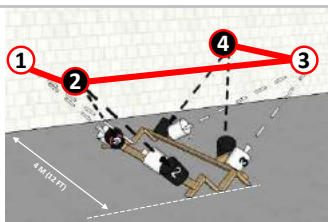

WALL
PAY 7
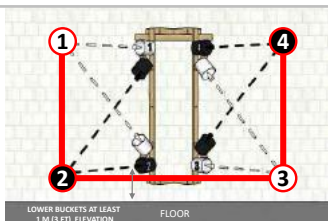
- Fly within proximity to a wall or obstacle at **45 degrees from forward** of the aircraft.

- Inspect **vertical** object features **upward** and **downward**.

- **Complete 10 positions to score up to 50 Alignment points and 50 Acuity points.**
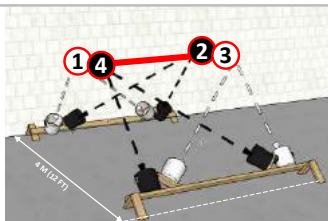

GROUND
PAY 8

- 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.**
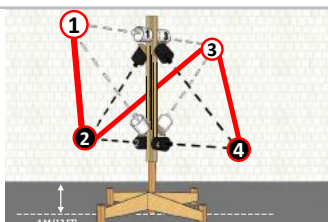

ALLEY
PAY 9

- 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.**

POSTS
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.**

PAYLOAD FUNCTIONALITY

CONFINED TEST LANE

Team #: _____

Lane #: _____

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 / FPV INTERFACE	TIME LIMIT 5-10 MIN / 10-20 MIN
(CIRCLE ONE)	(CIRCLE ONE)		(CIRCLE ONE)	(CIRCLE ONE or FILL IN)

PERCHED ... **POST** (PAY 10)

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

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

SCORE /100   SCORE /100

/50   /50

Elapsed

ELAPSED TIME (MM : SS)

PASS   FAIL
(CIRCLE ONE)

*If your training aircraft camera has a limited range of motion, align with as many buckets as possible. Pilot proficiency is only compared using similar systems.