Beginner Flight Forms Book
Instruction Packet

AIRCRAFT SYSTEM

MAKE: _____

MODEL: _____

CONFIG: _____

REMOTE PILOT

CODE: _____

NAME: _____

ATTEST: _____

BEG FLIGHT TASKS

1. TAIL-IN HOVER	_____
2. HOVER YAW CONTROL	_____
3. RIGHT/LEFT MOTION	_____
4. FORWARDS/BACKWARDS	_____
5. CLIMB/DESCEND	
6. HORIZONTAL RECTANGLE	_____
7. VERTICAL RECTANGLE	
8. LAND/LAUNCH	
9. BOX PATTERN	_____
10. REVERSE ORIENTATION	

PROCTOR

NAME: _____

ATTEST: _____

DATE: _____

FACILITY: _____

CIRCLE:

FAIL   **PASS**

CONTENTS

FLIGHT TRAINING METHODOLOGY

Flight instruction should be done in the Demonstration-Performance methodology, a well-established methodology for teaching kinesthetic skills, such as flight controls. The Demonstration-Performance Method is broken down into four phases: Explanation, Demonstration, Learner Performance, and Evaluation. In the explanation phase, the instructor will explain the skills and techniques for the lesson. In the next phase, the instructor will demonstrate and walk through the motions of the lesson. Once the student has the controls, they will have the opportunity to repeat the actions of the demonstration as well as explore and practice the maneuver at hand to build the mental and physical connections. To complete the instruction, the students must demonstrate that they have learned the maneuver at hand. This can be done during the learning or as a final step and can be recorded within this packet.

TRAINING WORKFLOW

To begin the training, the instructor shall go over the basics of UAS control, focusing on the topics of Lesson 1. After demonstrating the basics, the instructor will conduct a Positive Exchange of Flight Controls to the first student. This occurs with the UAS in flight at a stable and safe location. Once the student confirms that they are ready, they may begin with the first lesson of basic flight controls. Without landing, the student will return the control back to the flight instructor, and the flight instructor will conduct a Positive Exchange of Flight Controls with the next student. Depending on the size of the student group and the duration of each student's practice, battery swaps may occur when the flight controls are in the instructor's hands.

As necessary, Lesson 2 and Lesson 3 may be combined – As before, the instructor provides an explanation followed by a demonstration. With the UAS still hovering, the instructor may conduct a Positive Exchange of Flight Control to the first student to begin their lesson on basic motion control. Rather than returning the controller, the student may continue into Lesson 3 by landing the UAS, conducting a post-flight inspection, conducting a pre-flight check, and initiating an autonomous launch. Once the UAS is steady and stable, the student may return the controller back to the instructor to continue to the next student.

Lesson 4 – Box Patterns and Nose-In Flight should be taught as a discrete lesson to provide sufficient time to demonstrate the flight stick controls and for the students to obtain sufficient practice. Flying the UAS in any orientation other than nose pointing away from the pilot is one of the most challenging aspects for new pilots, and sufficient time must be allotted for practice.

Altitude
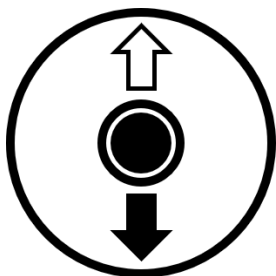
Push Up

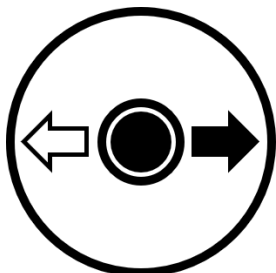Pull Down

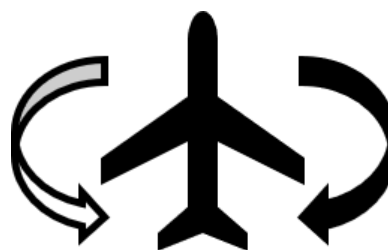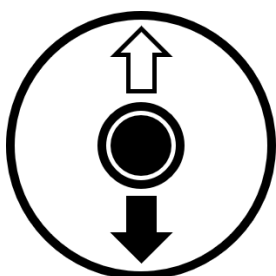**Heading**

Turn Left

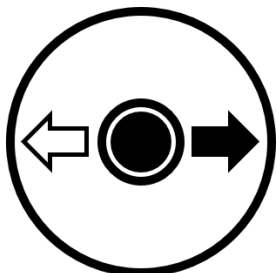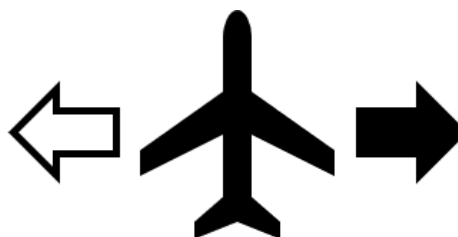Turn Right

Forward Motion

Push Forward

Pull Backwards

Side Motion

Roll Left

Roll Right

LESSON 1: BASIC CONTROLS

DESCRIPTION:

In this lesson, the student will be introduced to the basics of flight control – Altitude control, heading control, moving forward/backwards and rolling to the left/right.

LEARNING OBJECTIVES

- The student will demonstrate the ability to move the UAS up/down, forward/backward, left/right.
- The student will demonstrate the ability to rotate the nose of the aircraft.
- The student will demonstrate the ability to maintain spatial awareness of the orientation and location of the aircraft.

INSTRUCTIONS

In the beginning stages of flight instruction, the use of flight instruction language can be used to build the kinesthetic skills for hand-eye coordination. Start with consistent and informative language to build the relationships of commands and actions. When conducting the evaluation, review the student's response time and accuracy of using the correct stick command. Check the student's proficiency by asking the student to complete the at least maneuvers for each of the basic motions.

Example Assessment – Right Motion:

- Move slowly to the right.
- Stop moving to the right.
- Move 10 ft to the right.

Use the Procedures below as a guideline.

PROCEDURES – BASIC CONTROL		
POSITIVE EXCHANGE OF FLIGHT CONTROLS	NOTES	POINT
1 TAIL-IN HOVER		☐
2 HOVER YAW CONTROL – LEFT MOTION (45/90/180)		☐
3 HOVER YAW CONTROL – RIGHT MOTION (45/90/180)		
4 RIGHT MOTION (SLOW->STOP->10 FT)		☐
5 LEFT MOTION (SLOW->STOP->10 FT)		
6 FORWARD MOTION (SLOW->STOP->10 FT)		☐
7 BACKWARD MOTION (SLOW->STOP->10 FT)		
8 CLIMB ALTIDUDE (SLOW->STOP->10 FT)		☐
9 DESCEND ALTITUDE (SLOW->STOP->10 FT)		
POSITIVE EXCHANGE OF FLIGHT CONTROLS		
IF A FAULT OCCURS, STRIKE THROUGH THE ENTIRE TRIAL AND CIRCLE THE REASON: APPARATUS GROUND BOUNDARY SAFETY		

FAIL __ PASS

LESSON 2: BASIC MOTION CONTROL – RECTANGLES

DESCRIPTION:

In this lesson, the student will be instructed to combine the basic maneuvers together to form basic flight shapes – a horizontal rectangle and a vertical rectangle. The horizontal rectangle will combine forward/backward motions with right/left motions – all on the right command stick. The vertical rectangle will combine climb/descend motions with right/left motions – working both the left and right command sticks.

LEARNING OBJECTIVES

- The student will demonstrate the ability to move the UAS up/down, forward/backward, left/right in sequence
- The student will demonstrate the ability to maintain spatial awareness of the orientation and location of the aircraft.

INSTRUCTIONS

When the student is ready, guide the student to complete the basic motions to form the horizontal and vertical rectangles. Provide step by step instructions with consistent and informative language to build the relationships of commands and actions. When conducting the evaluation, review the student's response time and accuracy of using the correct stick command. Check the student's proficiency by asking the student to complete the at least maneuvers for each of the basic motions.
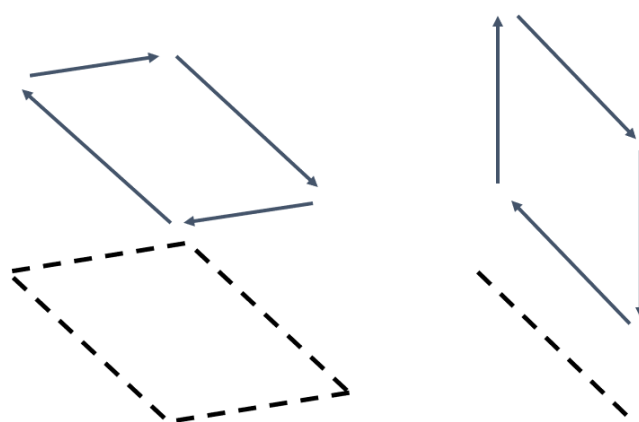
Figure 1: Horizontal and Vertical Rectangles

Use the Procedures below as a guideline.

PROCEDURES – HORIZONTAL/VERTICAL RECTANGLES		
POSITIVE EXCHANGE OF FLIGHT CONTROLS	**NOTES**	**POINT**
1 TAIL-IN HOVER		□
2 MOVE FORWARD 20 FT		
3 MOVE RIGHT 20 FT		
4 MOVE BACKWARD 20 FT		□
5 MOVE LEFT 20 FT		
6 CLIMB 20 FT		
7 MOVE RIGHT 20 FT		
8 DESCEND 20 FT		□
9 MOVE LEFT 20 FT		
POSITIVE EXCHANGE OF FLIGHT CONTROLS		
IF A FAULT OCCURS, STRIKE THROUGH THE ENTIRE TRIAL AND CIRCLE THE REASON: APPARATUS GROUND BOUNDARY SAFETY		

FAIL __ PASS

LESSON 3: LANDING AND LAUNCHING

DESCRIPTION:

In this lesson, the student will learn the basics of launching and landing, including pre-flight and post-flight checks. This lesson can be one in either order. The lesson is written for starting with launching, but if the student starts the lesson with the UAS in the air, start with landing.

LEARNING OBJECTIVES

- The student will demonstrate appropriate pre-flight and post-flight actions.
- The student will demonstrate the ability to utilize autonomous launch and landing routines.

INSTRUCTIONS

Guide the student through all the steps of the pre-flight checklist. Ensure that the student understands the significance of each step before moving on. Utilize the autonomous launch routine - as a final step, instruct the student to read the on-screen prompt before launching. Once airborne, instruct the student to a safe altitude and to maneuver the aircraft around to reinforce basic motion control. When ready, instruct the student to align the aircraft for landing and initiate an autonomous landing. Once landed, guide the student through any post-flight inspection or documentation to complete the lesson.

As an alternative, this lesson may be combined with Lesson 2. After completing the horizontal and vertical rectangle maneuvers, instruct the student to follow steps 6-8, then steps 1-3. Once the UAS is steady and stable, the student may return the controller back to the instructor to begin Lesson 2 with the next student.

PROCEDURES – LAUNCH/LAND		
AIRCRAFT ON PAD	**NOTES**	**POINT**
1 FOLLOW PRE-FLIGHT CHECKLIST		□
2 ANNOUNCE THE FLIGHT TO THE CREW		
3 INITIATE AUTONOMOUS LAUNCH		□
4 CLIMB TO AN ALTITUDE OF 10 FT AGL		□
5 MANEUVER THE AIRCRAFT AROUND – INSTRUCTORS CHOICE		
6 ALIGN THE AIRCRAFT FOR LANDING		
7 INITIATE AUTONOMOUS LANDING		□
8 CONDUCT POST-FLIGHT INSPECTION		□
AIRCRAFT ON PAD		
IF A FAULT OCCURS, STRIKE THROUGH THE ENTIRE TRIAL AND CIRCLE THE REASON: APPARATUS GROUND BOUNDARY SAFETY		

FAIL __ PASS

LESSON 4: BOX PATTERNS AND REVERSE ORIENTATION

DESCRIPTION:

In this lesson, the student will practice moving the UAS with changes in orientation. The lesson begins with a box pattern with the noise pointed in the direction of travel, followed by box patterns with the nose pointed in different orientations. The lesson concludes with a box pattern that includes reverse orientation controls - nose pointing towards the student in which the longitudinal and lateral controls are reversed.

LEARNING OBJECTIVES

- The student will demonstrate spatial awareness to identify the correct aircraft motion.
- The student will demonstrate the ability to maneuver the aircraft in different orientations.

INSTRUCTIONS

Building on the previous lessons, instruct the students to conduct the full pre-flight check and autonomous launch before starting the box patterns. Start with Box Pattern A as a warmup, then transition to Box Pattern B. Provide the student with instructions on which way to rotate or to maneuver as they complete each action. As appropriate, continue with Box Pattern B with alternate directions, but avoiding reverse orientation maneuvers. Once the student is ready, introduce Box Pattern C – this pattern contains a reverse orientation lateral motion – before the student flies this motion, ensure the student recognizes the reverse orientation. The final Box Pattern includes both lateral and longitudinal reverse orientation motions for practice.

Flight operations in orientations other than nose pointing away from the student is one of the most challenging aspects for new students – as appropriate, repeat box patterns or commands until the student reaches a satisfactory performance.

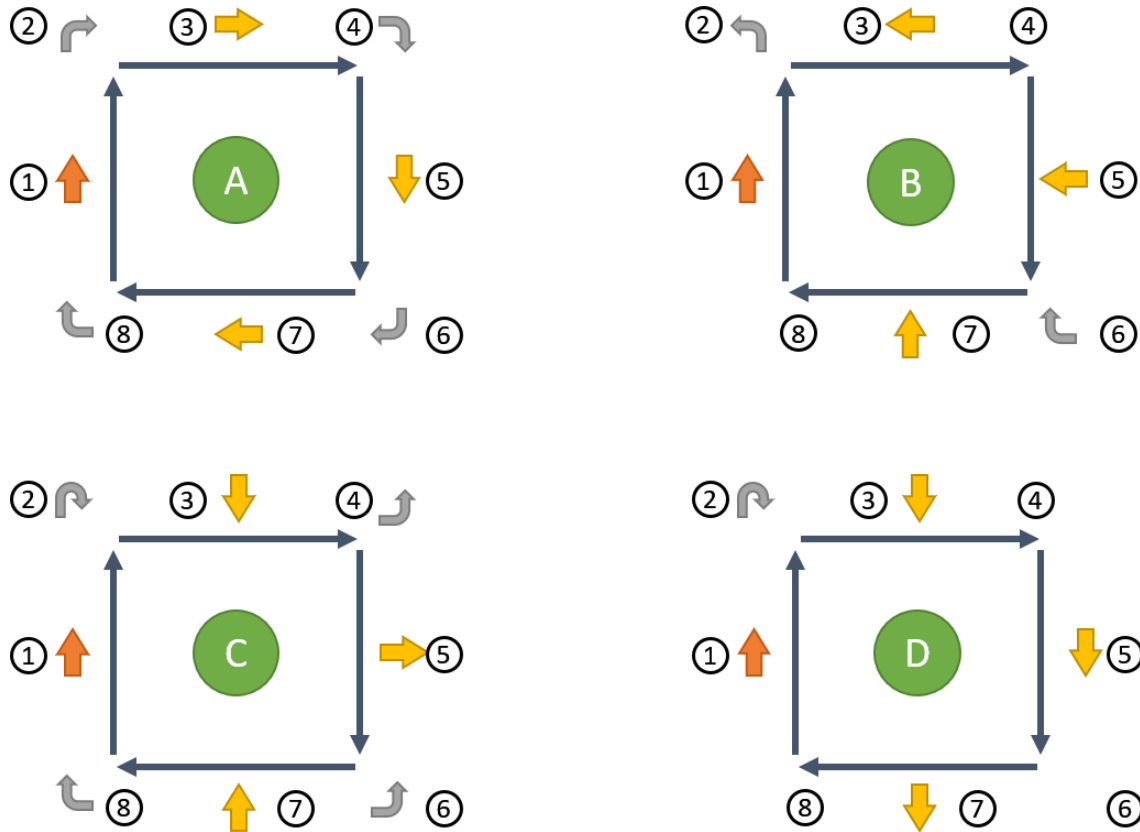| PROCEDURES – BOX PATTERNS AND REVERSE ORIENTATION		
AIRCRAFT ON PAD	**NOTES**	**POINT**
1 FOLLOW PRE-FLIGHT CHECKLIST		
2 ANNOUNCE THE FLIGHT TO THE CREW		□
3 INITIATE AUTONOMOUS LAUNCH		
4 COMPLETE BOX PATTERN A		
5 COMPLETE BOX PATTERN B		□
6 ADDITIONAL BOX PATTERN (AS APPROPRIATE)		
7 COMPLETE BOX PATTERN C		□
8 COMPLETE BOX PATTERN D		
9 ADDITIONAL REVERSE ORIENTATION (AS APPROPRIATE)		□
10 INITIATE AUTONOMOUS LANDING		
11 CONDUCT POST-FLIGHT INSPECTION		□
AIRCRAFT ON PAD		
IF A FAULT OCCURS, STRIKE THROUGH THE ENTIRE TRIAL AND CIRCLE THE REASON: APPARATUS GROUND BOUNDARY SAFETY		

FAIL __ PASS

Figure 2: Box Patterns - A) Nose in Direction of Flight, B) Backwards and Side Motion, C) Introduce Reverse Orientation, D) Practice Reverse Orientation

TIPS FOR TEACHING ORIENTATION

One tip to help students improve on flight operations in different orientations is to work on their spatial awareness is by adding two pre-action steps:

1. Identify the *aircraft* orientation.
2. Identify in what direction (forward/backward/right/left) the *aircraft* needs to go.

The key is to ask the student to describe orientation and the direction in terms of the aircraft. Ask the student:

"What direction is the aircraft pointing in?"

"Now, in what direction does the aircraft need to move?"

Guide the students towards the correct answers. Then, relate the answers to the stick commands – "roll to the right or roll to the left?"

This stage of flight training is the most variable across new students. Some students will have an excellent grasp of orientation and motion, but others may take significantly longer. The only way to master this is with repeated practice.