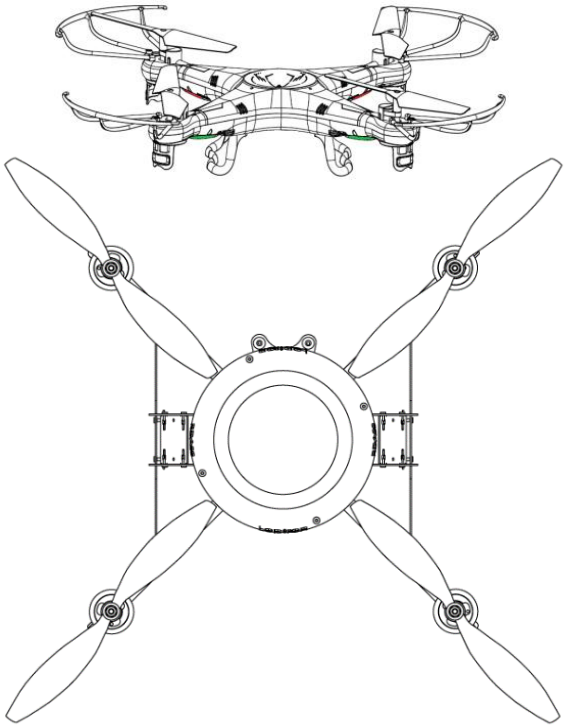
LEPTRON
UNMANNED AIRCRAFT SYSTEMS, INC.

Precision RDASS

Flight Training Guide



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1. INTRODUCTION

Congratulations on your decision to train with our factory pilots. The Leptron Precision RDASS and Avenger Aircraft are superior aerial data collection platforms. Leptron provides this manual to support safe, effective training on our small Unmanned Aircraft System (sUAS).

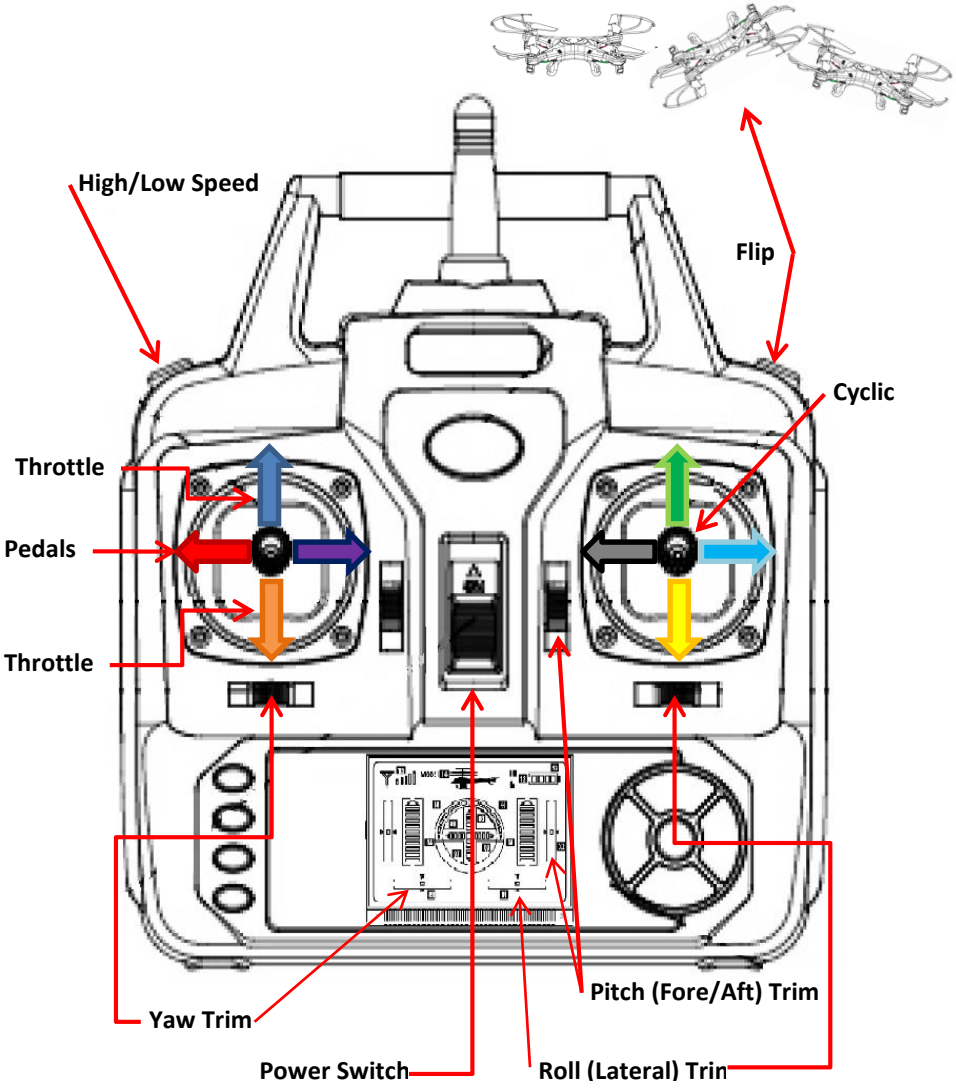
1.1 Documentation Conventions

 **NOTE**	An operating procedure, condition, etc., which is essential to highlight.
 **CAUTION**	An operating procedure, practice, etc. which, if Not strictly observed, could result in damage to or destruction of equipment.
 **WARNING**	An operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

SHALL:	used to indicate a mandatory requirement
WILL:	used to express a declaration of purpose
SHOULD:	used to indicate a nonmandatory but preferred method of accomplishment
MAY:	used to indicate an acceptable method

2. INDOOR FLIGHT TRAINING

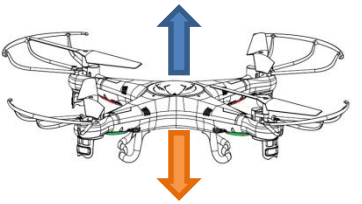
2.1 Know Your Indoor Trainer



Throttle

Climb

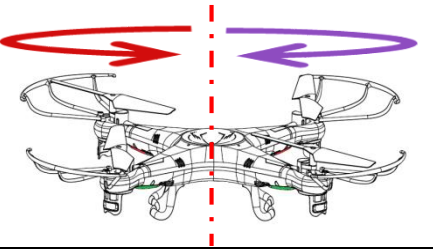
Descend



Pedals

Yaw (rotate) Left

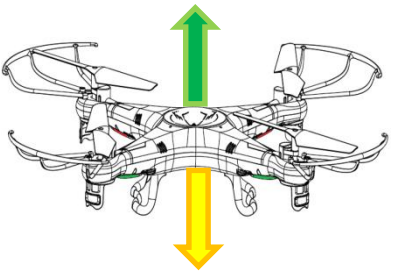
Yaw (rotate) Right



Fore/Aft Cyclic

Pitch (Slide) Forward

Pitch (Slide) Rearward



Lateral Cyclic

Roll (Slide) Left

Roll (Slide) Right

2.2 Install, Remove, and Charge a Battery

Condition(s):

1. Battery charger plugged into wall outlet
2. Depleted Syma X5 flight battery
3. Syma X5 power switch off
4. Remote control power switch off

Standard(s):

1. Identify when battery is depleted during flight
2. Remove battery from Syma X5
3. Connect battery to battery charger
4. Identify when a battery is fully charged
5. Iinstall fully-charged battery in Syma X5

Crew Actions:

Pilot on the Controls:

1. Lower throttle to full down position when low battery voltage is encountered
2. Turn off the Syma X5 power switch
3. Turn off the remote control power switch

Visual Observer:

1. Assist Pilot on the Controls replacing the depleted Syma X5 battery with a fully-charged battery

Procedure:

When the quadcopter has depleted the battery, the lights on the quadcopter blink slowly and the aircraft loses power. It is time to replace the battery with a fully-charged battery and charge the depleted battery. To charge a battery: connect the battery to a single-port or five-port charger. When the depleted battery is connected to the charger correctly, the red LED light will illuminate. When the battery has completed charging the red LED light will extinguish. This indicates that the battery is fully-charged and ready to fly. The charging time is approximately 2 hours and the expected flight time is five to eight minutes. Once the battery is fully-charged, disconnect the battery from the charger, open the battery compartment on the Seema X5, and connect the battery. Close the battery compartment and continue flying.

2.3 Bind Remote Control to Syma X5

Condition(s):

1. Syma X5 with battery installed and camera removed

Standard(s):

1. Properly bind the remote control to the aircraft
2. Avoid cross-binding with any adjacent aircraft

Crew Actions:

Pilot on the Controls:

1. Turn on the remote control power switch
2. Turn on the Syma X5 power switch
3. Announce “Clear on the Flight Line”

Remote Control Operator (RCO):

1. Assist Pilot on the Controls by confirming that no other flight crew is attempting to bind a remote control to the Syma X5 in use

Procedure:

The Pilot on the Controls will turn on the remote control first. Then turn on the Syma X5. Place the Syma X5 right side up on a level surface promptly. The Syma’s computer determines level shortly after power is applied and if the pilot takes too long to set down the Syma X5, the aircraft will not fly properly. The lights on the quadcopter will blink slowly. Announce “Clear on the Flight Line” and wait for any responses. When the Visual Observer confirms that the flight line is clear, apply full throttle and then replace the throttle to the full-down position. This binds the aircraft to the remote and the Syma X5 is ready to fly.

To Bind: Move Throttle Full-Up then Full-Down

CAUTION	If two remote controls attempt to bind simultaneously, the aircraft can become uncontrollable.

2.4 Flight Control Trim Adjustments

Condition(s):

1. Syma X5 with remote control bound

Standard(s):

1. Properly adjust yaw trim in order for Syma X5 to maintain heading without control input
2. Properly adjust pitch (fore/aft) trim in order for Syma X5 to maintain a stationary position without control input
3. Properly adjust roll (lateral) cyclic trim in order for Syma X5 to maintain a stationary position without control input

Crew Actions:

Pilot on the Controls:

1. Turn on the remote control power switch
2. Turn on the Syma X5 power switch
3. Announce “Clear on the Flight Line”

Visual Observer:

1. Assist Pilot on the Controls by confirming that no other flight crew is attempting to bind a remote control to the Syma X5 in use
2. Take a position perpindicular to the Pilot on the Controls to assist in determining fore/aft drift

Procedure:

Adjust all trims (pitch, roll, and yaw) until a long tone is heard indicating the trim is neutral. Apply throttle until the aircraft becomes light on the landing gear. Note any tendency for the aircraft to drift or yaw. Continue to apply throttle until the aircraft breaks contact with the ground. If the aircraft begins to drift, land immediately by lowering the throttle to the full-down position to stop the rotors. Apply trim in the opposite direction of drift. Apply throttle until the aircraft becomes light on the landing gear. If all trims have been adjusted properly the aircraft will not exhibit any tendency to drift. Continue to apply throttle until the aircraft leaves the ground. The aircraft should ascend vertically with minimal drift and no yaw. If any drift is present, repeat this procedure.

2.5 Vertical Takeoff to a 1m Hover

Condition(s):

1. Syma X5 with remote control bound

Standard(s):

1. Perform a smooth, continuous ascent to a hover
2. Establish a hover altitude of 1 meters ± ½ meter
3. Maintain heading ± 10 degrees.

Crew Actions:

Pilot on the Controls:

1. Turn on the remote control power switch
2. Turn on the Syma X5 power switch
3. Announce “Clear on the Flight Line”
4. Announce “Coming Up” just prior to takeoff

Visual Observer:

1. Assist Pilot on the Controls by confirming that no other flight crew is attempting to bind a remote control to a Syma X5

Procedure:

The Pilot on the Controls shall announce “Clear on the Flight Line” and announce “Coming Up” immediately prior to applying throttle. The Pilot on the Controls will apply sufficient throttle to achieve a positive climb through ground effect. The Pilot on the Controls will stabilize the aircraft at a 1m hover. Avoid the tendency to over-control the throttle. It is possible to maintain aircraft altitude in a hover without adjusting the throttle.

 CAUTION	If the aircraft becomes out of control immediately lower the throttle to the full down position to prevent burning out the small electric motors.

2.6 Vertical Descent and Landing from a 1m Hover

Condition(s):

1. Syma X5 with remote control bound
2. Aircraft in a stable hover located over the intended landing area

Standard(s):

1. Smooth, continuous descent from a hover to the ground
2. Maintain heading ± 10 degrees
3. Maintain throttle at full-down position until rotors come to a complete stop

Crew Actions:

Pilot on the Controls:

1. Announce “Landing to the Ground”

Visual Observer:

1. Confirm to the Pilot on the Controls that the aircraft is above the intended landing area

Procedure:

The Pilot on the Controls will apply downward pressure on the throttle in order to achieve a 1 m/s rate-of-descent. As the aircraft passes through 0.25 meters, the Pilot on the Controls will **VERY** slowly and progressively reduce the throttle to the full down position so that the throttle arrives at the full-down position just after the aircraft arrives at the ground. The Pilot on the Controls will maintain the throttle full-down position until the rotors completely stop.

2.7 Yaw Turns

Condition(s):

1. Syma X5 with remote control bound

Standard(s):

1. Perform a smooth, continuous ascent to a hover
2. Establish and maintain hover altitude of 1m ± ½ m
3. Stop at desired heading ± 10 degrees

Crew Actions:

Pilot on the Controls:

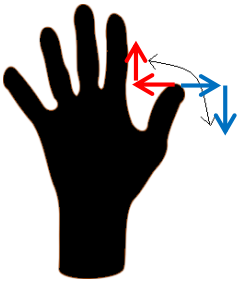
1. Announce direction of Yaw Turn Prior to turning (e.g. “Aircraft Nose Right” or “Aircraft Nose Left”)

Visual Observer:

1. Assist Pilot on the Controls by confirming that no other flight crew is attempting to bind a remote control to a Syma X5

Procedure:

The Pilot on the Controls will apply pressure on the pedals in the direction of desired yaw. The Pilot on the Controls will return the pedals to the spring-loaded neutral position by relaxing pressure on the pedals just prior to reaching desired heading. Remember that the thumb travels along an arc because it is attached to the hand. When the Pilot on the Controls moves the thumb to the left the thumbs natural tendency is to increase throttle and the aircraft will climb. The opposite is true, if the thumb moves to the right, the thumb will tend to travel down and the aircraft will descend. The Pilot on the Controls must consciously and actively overcome the tendency to climb in a left turn and descend in a right turn.



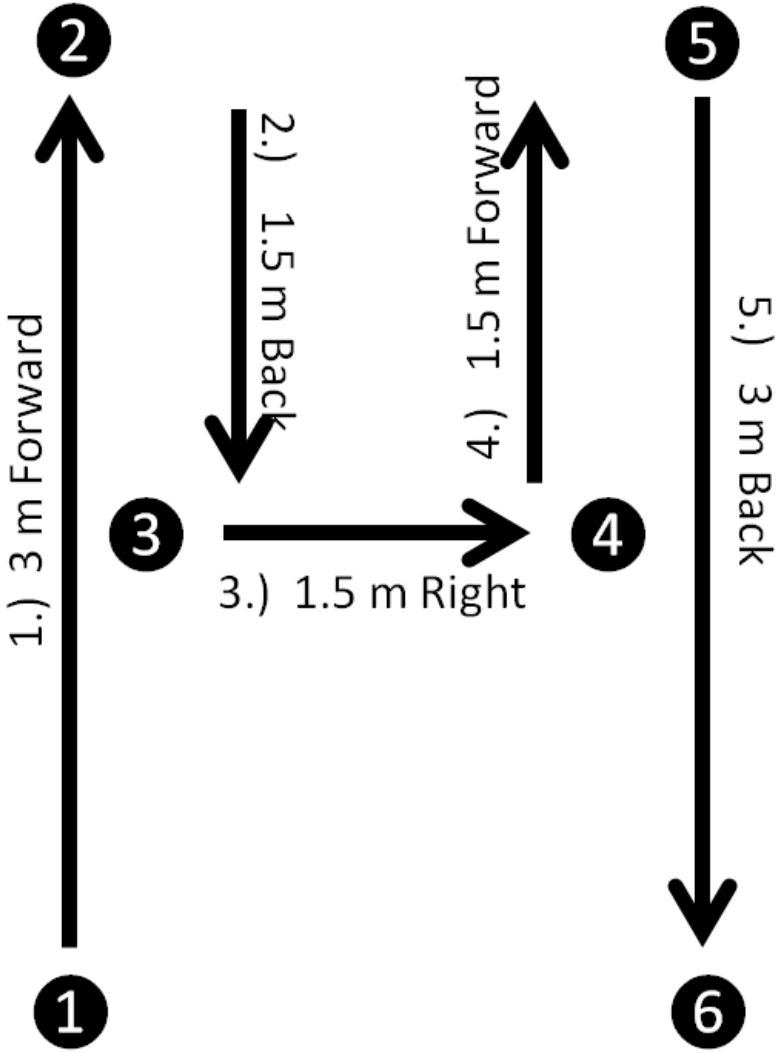


Figure 1 Indoor H Pattern

2.8 Tail-In H Pattern

Condition(s):

1. SYMA X5 at 1m flight altitude
2. Sufficient clearance to perform maneuver

Standard(s):

1. Maintain consistent speed throughout the maneuver
2. Maintain desired Ground Track ± 1 meters

Crew Actions:

Pilot on the Controls:

1. Announce to the Visual Observer direction of flight relative to the aircraft orientation. e.g. “Aircraft Forward”, “Aircraft Aft”, “Aircraft Slide Left”, Aircraft Slide Right”

Visual Observer:

1. Assist the Pilot on the Controls in obstacle avoidance

Procedure:

Beginning at position ❶, The Pilot on the Controls will apply forward pressure on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly return the cyclic to the spring-loaded neutral position by relaxing pressure on the cyclic in order to stop at position ❷. Apply aft pressure on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the spring-loaded neutral position to stop at position ❸. Apply pressure to the right on the cyclic to achieve 1 - 2 m/s sideward flight to the right. Smoothly return the cyclic to the spring-loaded neutral position to stop at position❹. Apply forward pressure on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly stop at position ❺. Apply aft pressure on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the spring-loaded neutral position to terminate at position ❻.

2.9 Nose-In H Pattern

Condition(s):

1. SYMA X5 at 1m flight altitude
2. Sufficient clearance to perform maneuver

Standard(s):

1. Maintain consistent speed throughout the maneuver
2. Maintain desired ground track ± 1 meters

Crew Actions:

Pilot on the Controls:

1. Announce to the Visual Observer direction of flight relative to the aircraft orientation. e.g. “Aircraft Forward”, “Aircraft Aft”, “Aircraft Slide Left”

Visual Observer:

1. Assist the Pilot on the Controls in obstacle avoidance

Procedure:

The Pilot on the Controls will yaw the aircraft 180 degrees in either direction to orient the aircraft nose-in. Beginning at position ❶, apply aft pressure on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the spring-loaded neutral position to stop at position ❷. Apply forward pressure on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly return the cyclic to the spring-loaded neutral position to stop at position ❸. Apply pressure to the left on the cyclic to achieve 1 - 2 m/s sideward flight to the aircrafts left. Smoothly return the cyclic to the spring-loaded neutral position to stop at position ❹. Apply aft pressure on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly stop at position ❺. Apply forward pressure on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly return the cyclic to the spring-loaded neutral position to terminate at position ❻.

2.10 Nose-in-the-Box

Condition(s):

1. SYMA X5 at 1.5m flight altitude
2. Sufficient lateral clearance to perform maneuver
3. Nose of the aircraft oriented toward a central area

Standard(s):

1. Maintain heading ± 10 degrees of desired heading
2. Maintain desired ground track ± 1m
3. Maintain consistent speed throughout entire maneuver

Crew Actions:

Pilot on the Controls:

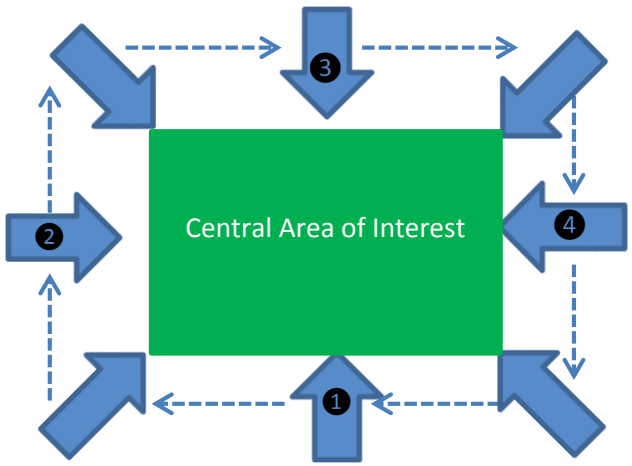
1. Maintain visual line of sight with aircraft throughout entire maneuver

Visual Observer:

1. Assist the Pilot on the Controls in determining the position of the aircraft over the intended ground track

Procedure:

Apply lateral cyclic pressure in the desired direction. Just prior to reaching the intersecting perpendicular flight path, slowly relax pressure on the cyclic and simultaneously apply pressure on the pedals in the **OPPOSITE** direction as the cyclic. Maintain pressure on the pedals until the aircraft has yawed 90 degrees. Resume lateral cyclic pressure. Continue to repeat **OPPOSITE** direction inputs as required.



2.11 Tail-in-the-Box

Condition(s):

1. SYMA X5 at 1.5m flight altitude
2. Sufficient clearance to perform maneuver
3. Tail of the aircraft oriented toward a central area

Standard(s):

1. Maintain heading ± 10 degrees of desired heading.
2. Maintain desired ground track ± 1m
3. Maintain consistent speed throughout entire maneuver

Crew Actions:

Pilot on the Controls:

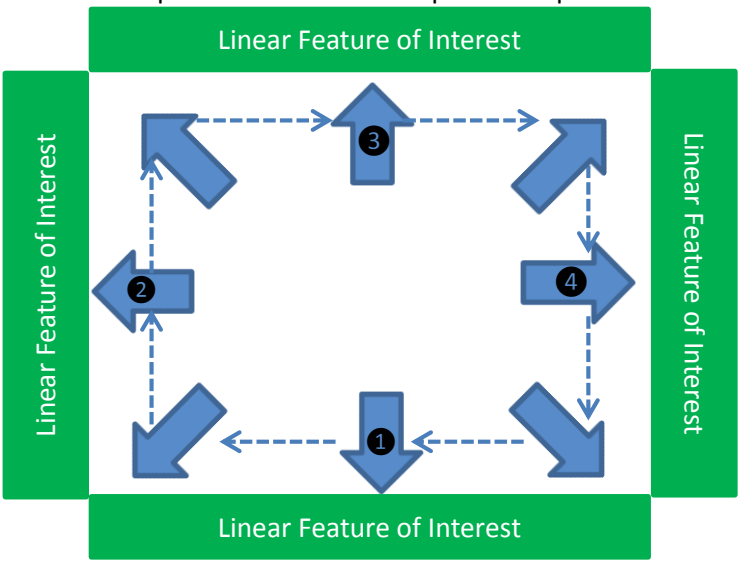
1. Maintain visual line of sight with aircraft throughout entire maneuver

Visual Observer:

1. Assist the Pilot on the Controls in determining the position of the aircraft over the intended ground track

Procedure:

Begin at position ❶ with the aircraft nose-in. Apply lateral cyclic pressure in the desired direction. Just prior to intersecting the perpendicular flight path❷, apply pressure on the pedals in the **SAME** direction as the cyclic until the aircraft has yawed 90 degrees. Begin a yaw turn by applying pressure on the pedals in the **SAME** direction as the cyclic. Apply slight aft cyclic to stop forward drift. Continue to repeat **SAME** direction inputs as required.



2.12 Glide Slopes Approach and Landing

Condition(s):

1. SYMA X5 in flight
2. Sufficient clearance to perform maneuver

Standard(s):

1. Maintain heading ± 10 degrees of desired heading.
2. Maintain desired ground track ± 1m
3. Maintain consistent speed throughout entire maneuver
4. Maintain a constant approach angle clear of obstacles to desired point of termination (hover) or touchdown (surface).

Crew Actions:

Pilot on the Controls:

1. Maintain visual line of sight with aircraft throughout entire maneuver

Visual Observer:

1. Assist the Pilot on the Controls in determining the position of the aircraft over the intended ground track
2. Assist the Pilot on the Controls in determining obstacle clearance while flying the approach

Procedure:

Begin with the aircraft has high as the indoor space will practically allow. Fly toward the intended landing point. When the desired approach angle is intercepted, begin the descent by decreasing the throttle. Adjust the throttle as necessary to maintain the intended glide slope. As the aircraft approaches the desired point of termination begin to decrease the horizontal speed by relaxing pressure on the cycle.

a.) To a hover. Progressively decrease the rate of descent and rate of closure in order to achieve a hover at a 1 meter altitude above the intended termination point.

b.) To the surface. Proceed as for an approach to a hover, except after establishing a 1 meter hover, descend vertically to the ground. After touchdown, smoothly lower the throttle to the full down position.

3. OUTDOOR FLIGHT TRAINING

3.1 Prepare the Aircraft for Flight

Condition(s):

1. Given a Precision RDASS with checklist.

Standard(s):

1. Install, secure, inspect, and inventory all mission equipment.
2. Prepare the aircraft, flight tablet, ground station, and remote controller for the assigned mission in accordance with the checklist

Procedure:

In accordance with the checklist, prepare the Flight Tablet and Ground Station for flight by verifying sufficient battery voltage, installing the antenna, and connecting the cable. Place the aircraft up-side down on a non-abrasive surface to check security and condition of the landing gear, Gimbal, Camera, and HDMI Ribbon Cable. Place the aircraft upright on a level non-metallic surface to install the antenna and check the motors and rotor blades. Verify the flight worthiness of the RDASS by checking the security and condition of the rotor blades. If the rotor blade(s) are damaged, replace the rotor blade(s) in accordance with Aircraft Flight Manual. Prepare the radio controller for flight by placing all switches in their nominal position (down and away), verifying sufficient battery voltage, and confirming trims are zeroed.

Training and Evaluation Requirements:

1. Training. Training will be conducted using the aircraft
2. Evaluation. Evaluation will be conducted using the aircraft.

 **WARNING**	Launching aircraft from a metallic service can give erroneous magnetometer readings which may result in uncontrolled flight.

3.2 Configure PccLite

Condition(s):

1. Precision RDASS with pre-flight checks complete.

Standard(s):

1. Correctly configure PccLite for the assigned mission in accordance with the checklist.

Crew Actions:

Flight Tablet Operator (FTO):

1. Open the Preflight checklist
2. Announce the settings for each check before pressing the confirm button.

Remote Control Operator (RCO):

1. Read aloud from the laminated flight checklist and cross-monitor the tablet operator to ensure PccLite is configured in accordance with mission requirements.

Procedure:

The laminated checklist mirrors the Preflight checklist in PccLite to allow crew coordination while configuring PccLite. A thorough crew brief shall be conducted prior to setting mission limits. All flight crewmembers shall be familiar with how the aircraft will react during all mission profiles as well as during contingencies e.g. lost communications between the ground station and the aircraft.

Training and Evaluation Requirements:

1. Training. Training may be conducted using the aircraft or a simulation.
2. Evaluation. Evaluation will be conducted using the aircraft.

3.3 Launch the Aircraft using PccLite

Condition(s):

1. Precision RDASS with preflight checks and PccLite preflight checks complete up to but not including Engine Enable.

Standard(s):

1. Initiate the count-down timer on the remote control immediately prior to takeoff..
2. Announce the remote control mode position (auto-pilot or steering)
3. Announce current altitude and minimum altitude before pressing the “Launch Now” button in PccLite.
4. Switch to Manual Mode on the remote control and terminate flight if aircraft fails to maintain constant heading or drifts excessively during takeoff.

Crew Actions:

Flight Tablet Operator (FTO):

1. Announce to Remote Control Operator “engines are enabled”
2. Wait for the Remote Control Operator to announce “Ready for Launch”
3. Announce current altitude and minimum altitude before pressing the “Launch Now” button in PccLite.
4. Announce “Launching Aircraft” prior to takeoff

Remote Control Operator (RCO):

1. Confirm that the flight line area is clear
2. Verify that the count-down timer is running
3. Announce the remote control mode position (auto-pilot or steering)
4. Announce “Ready for Launch” and carefully observe aircraft vertical takeoff to a hover

Procedure:

The FTO will announce “engines are enabled”, press “Enable” button. The RCO shall announce clear on the flight line, initiate the count-down timer, and announce “Steering Mode” or “Autopilot Mode” as appropriate. The RCO shall assume a flying posture on the remote controller and announce “Ready for

Launch". The FTO will press confirm on the engine enable page to advance to the launch page and then press "Launch Now" button and announce "Launching Aircraft".

The RCO will carefully observe the aircraft's vertical climb to the minimum altitude. If the aircraft drifts excessively on takeoff or fails to maintain heading, the RCO shall without delay engage Manual Mode and land the aircraft as soon as possible.

If the aircraft is launched in Steering mode, the RCO shall wait until the aircraft has established a stable hover above the lanuch point before sending flight commands. If the aircraft is launched in autopilot mode, the aircraft can be sent on a flight plan or flown using the virtual joysticks.

Note: it is recommended to set the minimum altitude a minimum of 8 meters above the field elevation of the takeoff point.

Training and Evaluation Requirements:

1. Training. Training may be conducted using the aircraft or a simulation.
2. Evaluation. Evaluation will be conducted using the aircraft.

3.4 Yaw Turns

Condition(s):

1. Precision RDASS in a stable out-of-ground-effect hover

Standard(s):

1. Maintain consistant rate-of-turn not to exceed 90 degrees in 3 seconds.
2. Stop yaw turn ± 10 degrees of desired heading.
3. Perform three-way positive transfer of the controls
4. Announce when focus is directed to the flight tablet

Crew Actions:

Operator Controlling the Aircraft:

1. Announce direction of Yaw Turn (e.g. “Aircraft Nose Right” or “Aircraft Nose Left”)
2. Command Left or Right yaw as appropriate

Procedure:

Yaw turns can be accomplished by using the virtual joysticks on the Flight Tablet or with the remote control in steering mode. It is helpful when sending flight commands with the flight tablet to use an anchor point. Keep at least one digit fixed in place on the side or bottom of the tablet to have a frame of reference when displacing the virtual joysticks.

To yaws using the remote control place the Mode Switch into Steering mode. Apply pressure on the pedals in the direction of desired yaw. Return the pedals to the spring-loaded neutral position by relaxing pressure on the pedals just prior to reaching desired heading.

When the aircraft is close-in the landing gear is a useful aid for determining orientation. For operations with greater distance from the FTO/RCO, the flight tablet’s Line-of-Sight indicator is better for determining aircraft orientation.

3.5 Vertical Descent and Landing from a Hover

Condition(s):

1. Precision RDASS in Stable 5m Hover
2. Aircraft in a stable hover located over the intended landing area

Standard(s):

1. Smooth, continuous descent from a hover to the ground.
2. Maintain Heading ± 10 degrees.

Crew Actions:

Flight Tablet Operator (FTO):

1. Announce to the Remote Control Operator "Landing Now" prior to pressing the "Land Now" button".

Procedure:

Landing may be accomplished using either the flight tablet or the remote control.

The FTO accomplishes a vertical descent and landing by positioning the landing waypoint on the map at the intended landing area and pressing "Land Now". The flight crew shall verify that the aircraft has a clear flight path from its current position to the landing point. The aircraft will turn toward and fly to the landing point. When the aircraft is above the landing point it will accomplish an automated descent and landing. When the aircraft is on the ground the rotors will shutoff automatically. If the rotors continue to turn after landing, Press "Kill" under the Engine Menu in PccLite.

In order to land and using the remote control, the RCO will place the mode switch in steering. The aircraft will not be able to descend below the minimum altitude until the FTO presses "Land Now". The RCO shall position the aircraft directly over the intended point of landing prior to the FTO pressing "Land Now". The RCO will apply and maintain downward throttle until the aircraft is on the ground and the rotors have stopped.

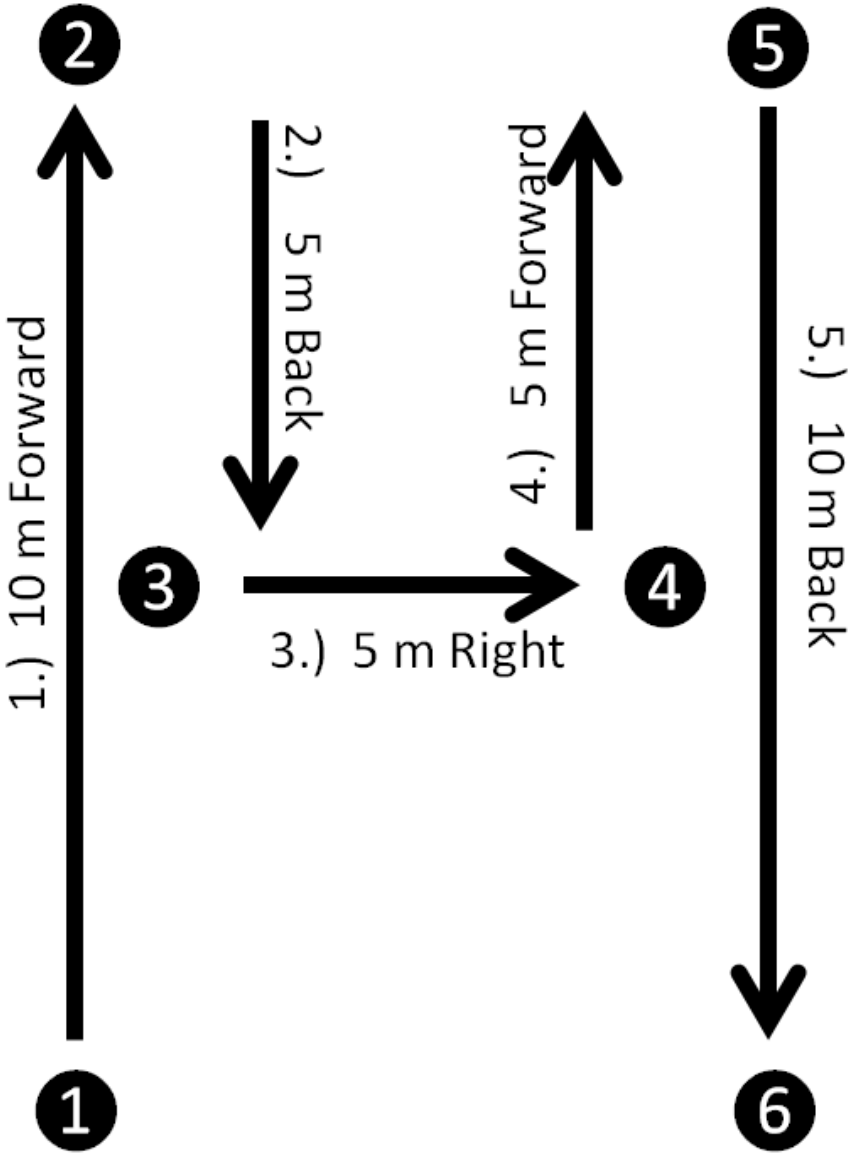


Figure 2 Outdoor H Pattern

3.6 Tail-In H Pattern

Condition(s):

1. Precision RDASS at a minimum 15m flight altitude
2. Sufficient clearance to perform maneuver

Standard(s):

1. Maintain consistent speed throughout the maneuver.
2. Maintain desired ground track ± 3 meters

Crew Actions:

Operator Controlling the Aircraft (OCA):

1. Announce to the Visual Observer direction of flight relative to the aircraft orientation. e.g. “Aircraft Forward”, “Aircraft Aft”, “Aircraft Slide Left”, Aircraft Slide Right”

Visual Observer (VO):

1. Assist the OCA in obstacle avoidance

Procedure:

For training the tail-in H Pattern shall be accomplished using both the flight tablet and the remote control. Beginning at position ❶, the OCA will apply a forward input on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly return the cyclic to the neutral position in order to stop at Position ❷. Apply an aft input on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the neutral position to stop at position ❸. Apply a right input on the cyclic to achieve 1 - 2 m/s sideward flight to the right. Smoothly stop at position ❹. Apply a forward input on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly stop at position ❺. Apply an aft input on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the spring-loaded neutral position to terminate at position ❻.

3.7 Nose-In H Pattern

Condition(s):

1. Precision RDASS at 10m minimum flight altitude
2. Sufficient clearance to perform maneuver

Standard(s):

1. Maintain consistent speed throughout the maneuver.
2. Maintain desired ground track ± 3 meters

Crew Actions:

Operator Controlling the Aircraft (OCA):

1. Announce to the Visual Observer direction of flight relative to the aircraft orientation. e.g. “Aircraft Forward”, “Aircraft Aft”, “Aircraft Slide Left”, Aircraft Slide Right”

Visual Observer (VO):

1. Assist the OCA in obstacle avoidance

Procedure:

For training the nose-in H Pattern shall be accomplished using both the flight tablet and the remote control. The OCA will yaw the aircraft 180 degrees in either direction to orient the aircraft nose-in. Beginning at position ❶, apply an aft input on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly return the cyclic to the neutral position to stop at position ❷. Apply a forward input on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly stop at position❸. Apply pressure to the left on the cyclic to achieve 1 - 2 m/s sideward flight to the aircraft’s left. Smoothly stop at position❹. Apply an aft input on the cyclic to achieve 1 - 2 m/s rearward flight. Smoothly stop at position ❺. Apply a forward input on the cyclic to achieve 1 - 2 m/s forward flight. Smoothly return the cyclic to the spring-loaded neutral position to terminate at position ❻.

3.8 Nose-in-the-Box

Condition(s):

1. Precision RDASS at 10m minimum flight altitude
2. Sufficient lateral clearance to perform maneuver
3. Nose of the aircraft oriented toward a central area

Standard(s):

1. Maintain heading ± 10 degrees of desired heading.
2. Maintain desired ground track ± 3m
3. Maintain consistent speed throughout entire maneuver

Crew Actions:

Operator Controlling the Aircraft (OCA):

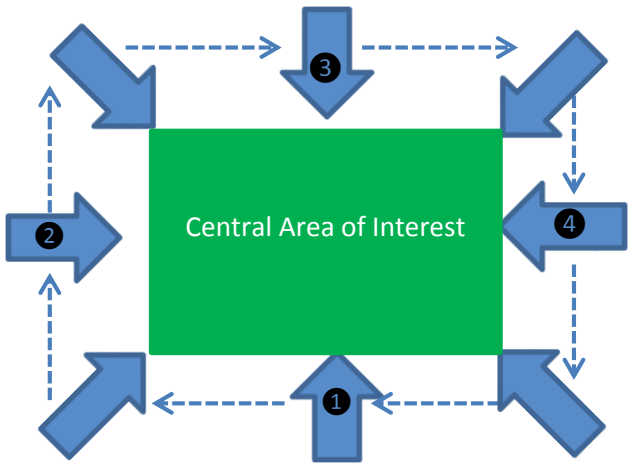
1. Maintain Visual Line of Sight with Aircraft throughout entire maneuver.

Visual Observer (VO):

1. Assist the Flight Tablet Operator in determining the position of the aircraft over the intended ground track

Procedure:

For training the nose-in-the-box shall be accomplished using both the flight tablet and the remote control. Apply lateral cyclic input in the desired direction. Just prior to intersecting perpendicular flight path, slowly neutralize the cyclic and simultaneously apply an input on the pedals in the **OPPOSITE** direction as the cyclic. Maintain the pedal input until the aircraft has yawed 90 degrees. Resume lateral cyclic input. Continue to alternate **OPPOSITE** direction inputs as required.



3.9 Tail-in-the-Box

Condition(s):

1. Precision RDASS at 10m minimum flight altitude
2. Sufficient lateral clearance to perform maneuver
3. Tail of the aircraft oriented toward a central area

Standard(s):

1. Maintain heading ± 10 degrees of desired heading.
2. Maintain desired ground track ± 3m
3. Maintain consistent speed throughout entire maneuver

Crew Actions:

Operator Controlling the Aircraft (OCA):

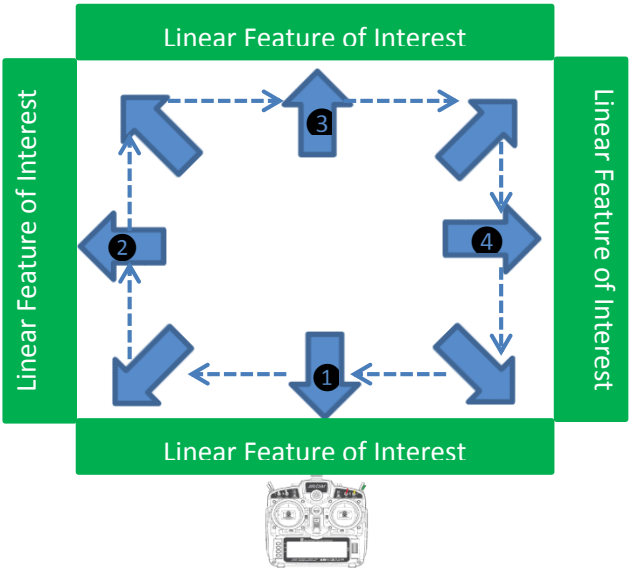
1. Maintain Visual Line of Sight with Aircraft throughout entire maneuver.

Visual Observer (VO):

1. Assist the Flight Tablet Operator in determining the position of the aircraft over the intended ground track

Procedure:

Begin at position ❶ with the aircraft nose-in. Apply lateral cyclic input in the desired orbit direction. Just prior to intersecting the perpendicular flight path, apply a pedals input in the **SAME** direction as the cyclic input. Maintain the pedal input until the aircraft has yawed 90 degrees. Continue to alternate **SAME** direction inputs as required.



3.10 Climb Out

Condition(s):

1. Precision RDASS at 10m flight altitude
2. Sufficient clearance to perform maneuver

Standard(s):

1. Stop over desired point ± 5 meters

Crew Actions:

Operator Controlling the Aircraft (OCA):

1. Maintain Visual Line of Sight with Aircraft throughout entire maneuver.

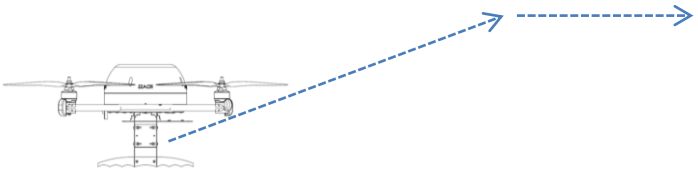
Visual Observer (VO):

1. Assist the OCA in obstacle avoidance.

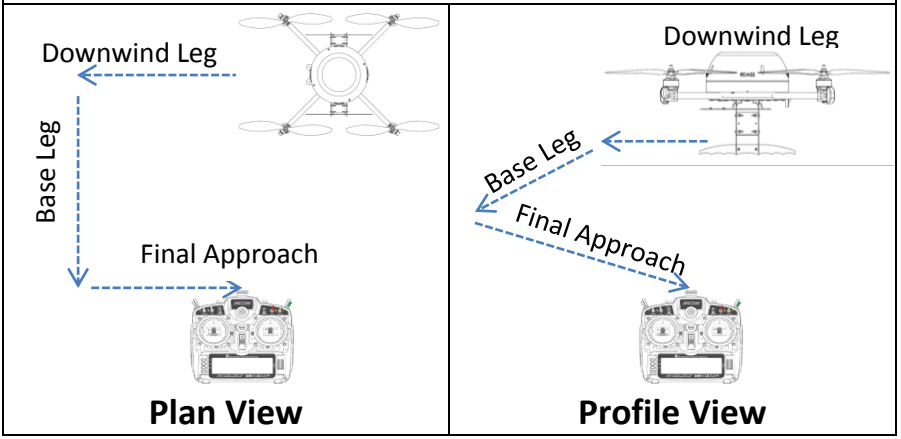
Procedure:

Remote Control. Apply simultaneous forward pressure on the throttle and the cyclic to climb up and out. As the aircraft approaches the desired altitude relax pressure on the throttle to allow the throttle to return to the spring-loaded neutral position while maintaining forward pressure on the cyclic.

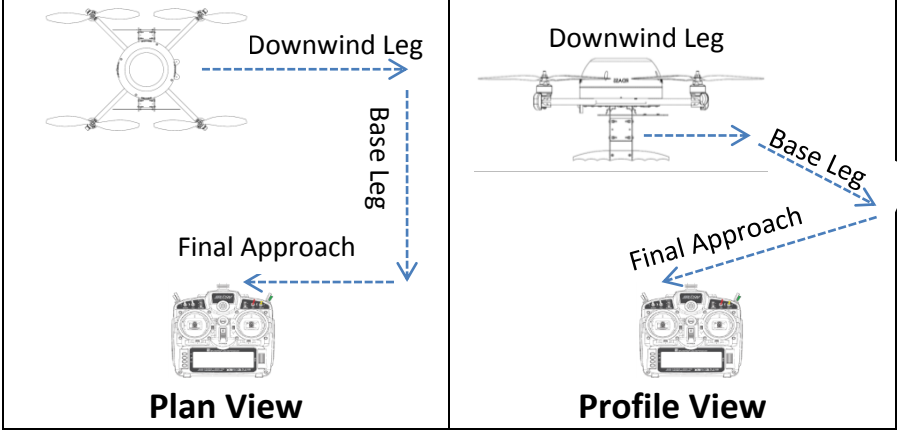
Flight Tablet. Increase the Fly-to altitude to desired altitude. The aircraft will begin to climb. Apply a forward cyclic input on the virtual joysticks in the desired direction. The aircraft will stop climbing once it reaches the fly-to altitude.

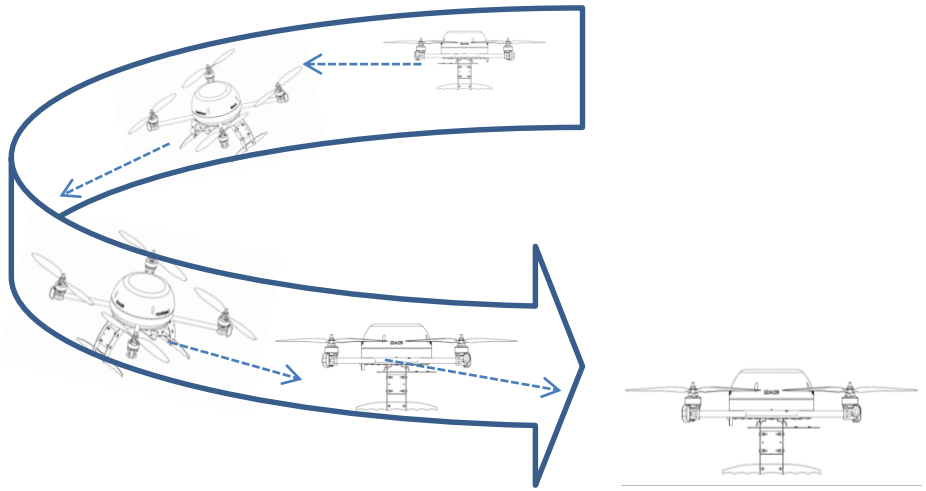


Left Turn Traffic Pattern



Right Turn Traffic Pattern





3.11 Glide Slope Approach to a Hover

Condition(s):

1. Precision RDASS at a 35m hover altitutde
2. Precision RDASS at least 75m from the Operator Controlling the Aircraft
3. Sufficient obstacle clearance to perform maneuver

Standard(s):

1. Maintain heading ± 10 degrees of desired heading.
2. Maintain desired ground track ± 3m
3. Maintain consistent glideslope during descent
4. Arrive within a 3m radius above intended point of landing

Crew Actions:

Operator Controlling the Aircraft (OCA):

1. Announce flight actions e.g. beginning descent, turning left, etc.

Visual Observer (VO):

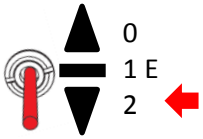
1. Operator Controlling the Aircraft in determining the position of the aircraft over the intended landing area
2. Assist the Operator Controlling the Aircraft in maintaining obstacle clearance and avoidance

Procedure:

Flight Tablet. Decrease the fly-to altitude to minimum altitude or as low as obstacles allow. As the aircraft begins to descend, use the virtual joysticks to steer the aircraft toward the point of intended landing.

Remote Control. Simultaneously decrease the throttle and give direction flight control inputs on the cyclic to direct the vehicle toward the intended point of landing. If the RCO desires to terminate the approach at the surface, the FTO must press the “Land Now” button to allow the RCO to descend below the minimum altitude set in mission limits.

3.12 Fly in Emergency Manual Mode



Condition(s):

1. Precision RDASS at a 15m hover altitude, tail-in

Standard(s):

1. Correctly identify the Mode Switch
2. Employ crew coordination during aircraft control transfer
3. Maintain altitude ± 5m

Crew Actions:

Flight Tablet Operator (FTO):

1. Announce “Emergency, Take the Aircraft”

Remote Control Operator (RCO):

1. Engage the manual mode by placing the mode switch in position 2.
2. Announce “I have the aircraft”
3. Maintain a tail-in aircraft orientation

Procedure:

The crew will position the aircraft at a 15m hover altitude avoiding looking into the sun. The FTO announces “Emergency, Take the Aircraft”. The RCO engages the Emergency Manual Mode and announces “I have the aircraft”. The RCO adjusts the throttle as necessary to maintain altitude. Maintain the aircraft in a tail-in orientation. Trace an H-Pattern while maintaining altitude. If at any time during the practice maneuver the RCO doubts the outcome or exceeds the ± 5m standard the Remote Control shall be placed into steering or autopilot mode without delay.

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