



Ohio Pilot Manual

Tactical Drone Field Guide

Flight controls | Safety features | Field operation

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For trained pilots using the current Ohio aircraft controls and safety features.

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Pilot guide for FlowHold, Auto, Indoor, RC controls, lighting, receiver park, and emergency bailout.

Tactical Drone Field Guide

This manual explains how to fly and control the Ohio tactical drone.

It is written for new pilots. It covers the radio switches, screen messages, launch steps, FlowHold, Auto, Indoor, lighting control, remote reboot, receiver parking, battery installation, and emergency actions.

How To Use This Manual

Start with the quick reference, then use the detailed sections when you need more information.

Need	Go To
Understand the sticks and switches	Radio Functions
Read the screen	Screen And Status
Choose Indoor, Auto, FlowHold, Turtle, or emergency mode	Flight Modes
Launch, fly, land, or use special features	Flight Procedures
Handle a problem quickly	Emergency Actions
Clean, maintain, or service the aircraft	Care And Service

Main Idea

This craft is built for tight indoor flying and short outdoor moves.

FlowHold is the main assisted indoor flight mode. It can help hold one spot when the downward camera and sensor can see the surface well enough.

The screen tells the pilot how much help is available:

Display	Meaning
FLHD	FlowHold is actively holding one spot.
FL--	The sensor is sending data, and position hold may work if the craft slows

Display	Meaning
	down and conditions are good.
----	Position hold is not working because sensor health is too low. Fly manually.
FLST	Auto is using outdoor GPS position hold.

If the craft is in FL-- or ----, do not treat it as hands-off position hold.

If the craft is in FLHD, it should be safe to relax the movement stick when the surface and light stay good.

Pilot input always comes first. If you move the sticks, the craft should follow the pilot.

Radio Functions

Use this section to find what each stick, switch, and button does.

Stick Controls And Mode Selection

The radio can be set up as Mode 2 or Mode 3. Confirm which stick mode your radio is using before flight.

Stick Mode	Throttle And Turn	Move Forward Back Left Right
Mode 2	Left stick	Right stick
Mode 3	Right stick	Left stick

Throttle makes the craft climb or descend.

Turn rotates the craft left or right.

The movement stick flies the craft forward, backward, left, and right.

In FlowHold, release the movement stick smoothly. If the screen changes to FLHD, the craft is holding. If the screen stays FL-- or ----, keep flying manually.

RadioMaster Pocket Button Map

The RadioMaster Pocket has labeled switches on the case. The current drone setup uses RC channels 5 through 10.

Pocket Control	RC Channel	Drone Function
SA self-locking switch	RC5	Auto / Indoor selection
SB position switch	RC6	Speed profile: slow, norm, fast
SC position switch	RC7	Main mode / special features

Pocket Control	RC Channel	Drone Function
SD self-locking switch	RC8	Arm/disarm gate
SE momentary switch	RC9	Arm/disarm press, light cycle, long-press reboot, receiver park
S1 pot	RC10	Gimbal angle

RC5 Auto And Indoor

RC5 selects how the aircraft handles indoor and outdoor position help.

RC5 Position	Pilot Meaning
Indoor	Use this for tight areas and GPS transition zones.
Auto	Use this for normal mixed flying. Outside and above about 10 feet, Auto can use GPS position hold.

Use Indoor when GPS could be blocked, reflected, or misleading.

Use Auto for normal mixed flying when the aircraft may move between indoor and outdoor areas.

See Auto And FLST and Indoor Transition Areas for more detail.

RC6 Speed Profile

RC6 changes how much the craft is allowed to lean.

RC6 Position	Display	Feel
Low	slow	Smooth, tight indoor flying
Center	norm	Normal indoor flying
High	fast	Faster movement and outdoor short runs

Use **slow** for tight rooms.

Use **norm** for most flying.

Use **fast** only when there is room to stop.

See Flight Feel for more detail.

RC7 Main Mode And Special Features

RC7 is the main mode and special feature switch.

RC7 Position	What It Does
Low	Turtle on the ground. Stabilize emergency bailout while flying.
Center	Normal assisted flying. FlowHold indoors, Auto/FLST outdoors when ready.
High	Special features while disarmed, such as FlowHold level calibration or receiver parking.

Keep RC7 centered for normal flying.

RC7 high is not a normal flight position. Use it only when you are intentionally using a special feature. See Turtle, Stabilize Emergency Bailout, FlowHold Level Calibration, and ELRS Receiver Park for more detail.

RC8 Arm And Disarm Gate

RC8 is a two-position gate for arm and disarm.

Move RC8 first. Then quick press RC9.

RC8 Position	What It Allows
Disarm position	Allows the next RC9 quick press to disarm.
Arm position	Allows the next RC9 quick press to arm.

RC8 by itself does not arm or disarm the craft.

RC9 Momentary Action Button

RC9 is a momentary button. It has several jobs depending on how long it is pressed and where RC7 is set.

RC9 Action	What It Does
Quick press after RC8 is set	Arms or disarms.
Quick press during normal use	Cycles the lights.
Long press while disarmed	Reboots the flight controller.
Long press while disarmed and RC7 high	Parks the ELRS receiver so another aircraft can use the same radio.

To arm:

1. Wait for the ready message.
2. Move RC8 to the arm position.
3. Quick press RC9.

To disarm:

1. Move RC8 to the disarm position.
2. Quick press RC9.

If RC8 is not set correctly, or the RC9 press is missing, the screen may say:

press prearm switch

RC10 Gimbal

RC10 is the scroll wheel for gimbal angle.

Move the wheel to set the camera angle.

Screen And Status

Use this section to read the OSD and short radio status messages.

Status Messages

The status line gives the pilot a short health summary.

Before Arming

Before arming, the message may look like:

Batt 86%|norm|Indoor|rdy

or:

Batt 86%|norm|Indoor|boot

Meaning:

Text	Meaning
Batt 86%	Battery percent.
slow, norm, fast	RC6 speed profile.
Indoor	RC5 is set for indoor-safe behavior.
Auto	RC5 is set for automatic indoor/outdoor behavior.
rdy	Ready to arm.
boot	Still settling. Do not launch yet.

If it stays in boot too long during an arm attempt, the screen may say:

Source not settled, reboot craft

That means the aircraft did not settle in time. Reboot the craft and wait for **rdy**.

Stock safety messages may also appear. Treat them as real safety warnings.

In Flight

After arming, the message is shorter:

Batt 85%|norm|Indoor

The **rdy** or **boot** part is removed in flight to keep the screen easier to read.

OSD Screen Display

The OSD is the pilot's quick status screen. Use it to confirm battery, speed profile, Auto/Indoor state, ready/boot status, hold state, height, position information, video link, and storage state.



Labeled OSD screen display

OSD Area	What It Means
Main battery voltage	Shows craft battery voltage. Watch this during flight and land before voltage gets too low.
Motor RPM	Shows motor speed feedback when available.
Flight timer	Shows current flight time.
Altitude	Shows height estimate.

OSD Area	What It Means
GPS and position	Shows satellite count and position data when GPS is available.
SD card / storage	Shows if onboard storage is present and ready.
Status line	Shows battery percent, speed profile, Auto/Indoor state, and ready/boot status before arming.
Hold state	FLHD means FlowHold is holding. FL-- means sensor data is present but hold is not guaranteed. ---- means position hold is not working due to low health. FLST means Auto is using outdoor GPS position hold.
Compass heading	Shows direction reference.
Video strength	Shows video throughput, such as 25Mbps , on the lower edge of the screen. Higher and stable is better.
Video link / signal	Shows video link mode and signal bars.

Flight Modes

Use this section to understand what each flight mode is for.

Normal Assisted Flying

RC7 center is the normal flying position.

In normal assisted flying, the aircraft can use FlowHold indoors or Auto/FLST outdoors when ready.

If position hold is not active, keep flying manually. The craft should still behave like a manual altitude-assisted mode while it waits for better sensor conditions.

FlowHold

FlowHold is the main indoor hold mode.

It is meant for:

1. Hallways.
2. Rooms.
3. Bathrooms.
4. Shelving areas.
5. Around furniture.
6. Tight indoor spaces.

FlowHold helps most when the surface below has texture and enough light.

Good surfaces:

1. Carpet with texture.

2. Concrete with marks or texture.
3. Wood grain.
4. Tile with visible seams.
5. Garage floors with enough detail.

Harder surfaces:

1. Shiny vinyl.
2. Plain smooth floors.
3. Very dark carpet.
4. Blank surfaces.
5. Surfaces with reflections.

Bad conditions:

1. Very low light without downward lights.
2. No texture.
3. Fast motion over clutter.
4. Sudden large height changes below the craft.
5. Flying too high for useful sensor support.

What `FLHD` Means

FLHD means FlowHold has a real hold.

When **FLHD** is active, the craft should hold its spot if the surface and light stay good.

If you move the movement stick, pilot input takes priority. FlowHold should release and let you fly.

What `FL--` Means

FL-- means the optical sensor is sending data, and position hold may work if the craft slows down and conditions are good.

Conditions vary. **FL--** does not guarantee that the craft will latch into position hold when stopped.

Do not treat **FL--** as hands-off position hold.

What `----` Means

---- means position hold is not working because sensor health is too low.

Fly manually until the display returns to **FL--** or **FLHD**.

How To Get A Good FlowHold

Release the movement stick smoothly.

In good light and texture, the craft should help slow itself and settle into **FLHD**.

In weak light or weak texture, it may drift and stay in **FL--**. That is expected. Fly it manually until the hold returns.

If FlowHold Wanders

If **FLHD** is on but the craft slowly wanders:

1. Take control with the movement stick.
2. Move to a better lit or more textured area.
3. Let the craft slow again.
4. Wait for a solid **FLHD**.

If it keeps wandering, land and inspect the camera, sensor, lighting, battery, and props before flying again.

Auto And FLST

Auto is used when the aircraft may fly outside or move between indoor and outdoor areas.

When Auto has a good outdoor GPS hold, the OSD shows **FLST**.

Auto is intended to use GPS outside and above about 10 feet. It can transition as the aircraft moves in and out of GPS areas, but the pilot must still watch the OSD.

Use Auto:

1. Outside with open sky.
2. Around open yards or driveways.
3. When moving from indoors to outdoors.
4. When moving from outdoors back indoors and you have room to watch the handoff.

Do not depend on GPS hold close to buildings, vehicles, fences, metal objects, decks, or covered areas.

Use Indoor in those transition zones.

If Auto does not show a steady **FLST** or **FLHD**, fly manually until the hold is clearly active.

Indoor Transition Areas

Indoor mode is important near places where GPS can look good but still be wrong.

Use Indoor:

1. Under decks.
2. Under trucks.
3. In crawl spaces.
4. Near garage doors.
5. Near metal buildings.
6. Near covered porches.
7. Close to walls or vehicles.

The goal is simple: if GPS could pull the craft toward a bad position, keep it in Indoor.

Turtle

RC7 low with throttle low can enter Turtle while the craft is on the ground.

Use Turtle only to flip the craft if it lands upside down or stuck on its side.

Do not try to fly in Turtle.

When leaving Turtle, the aircraft may reboot before the next launch. Wait for the ready message before arming again.

Stabilize Emergency Bailout

RC7 low while flying selects Stabilize.

Use this as an emergency bailout if the craft is stuck to a ceiling, climbing rapidly, or acting wrong because of a sensor problem.

Stabilize is more manual. Be ready to manage throttle and land as soon as safe.

Flight Procedures

Use this section for normal pilot steps and special radio actions.

Pilot Checklist

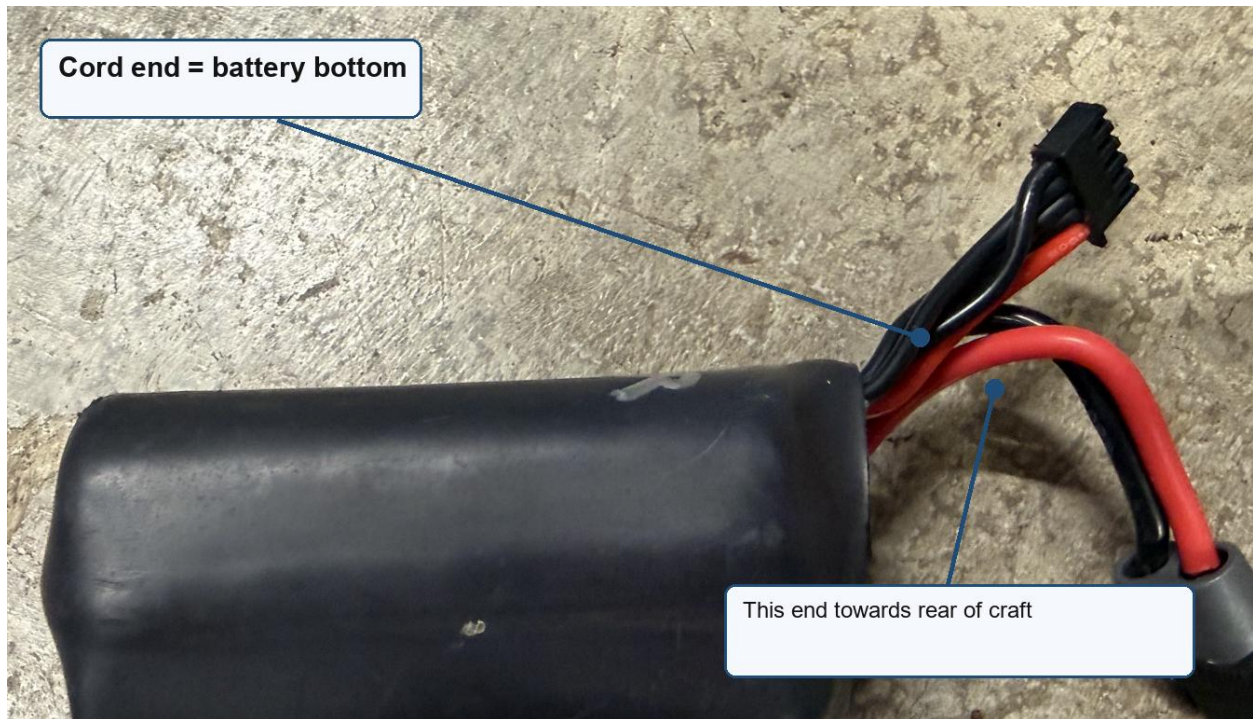
Use this checklist before each flight.

1. Battery is charged.
2. Battery is strapped down and clear of the lower light.
3. Props are clear and tight.
4. Downward camera and sensor are clean.
5. No dust, smoke residue, gas residue, oil, or fingerprints are on the camera or sensor window.
6. Downward lights are on if the room is dark.
7. RC5 is set to Auto or Indoor for the area.
8. RC6 is set to the desired speed.
9. RC7 is centered for normal flying.
10. Wait for **rdy** before arming.
11. Move RC8 to arm, then quick press RC9.
12. Launch smoothly and stay in control until the display shows a real hold.

For indoor flying, let the craft sit still for a few seconds before arming when possible. This helps the aircraft settle.

Battery Installation

Install the battery the same way each time so the craft balances correctly and the lower light stays clear.



Battery orientation

1. Place the craft on its back.
2. Set the battery on the craft with the cord end at the bottom. The cord end is where the wires come out.
3. The opposite end of the battery points toward the rear of the craft.
4. Use the velcro strap to secure the battery firmly.
5. Slide the battery so it butts up to the lower light.
6. Make sure the battery does not cover or block the lower light.
7. Plug in the XT60 connector only after the battery is strapped and positioned.
8. Check that the wires are clear of props, sharp edges, and moving parts before arming.

Normal Indoor Launch

Use RC7 center for normal assisted flying.

1. Set RC5 to Indoor.
2. Set RC6 to **slow** or **norm**.
3. Set RC7 center.
4. Wait for **rdy**.
5. Move RC8 to arm, then quick press RC9.
6. Raise throttle smoothly.

7. Climb out of ground wash.
8. Let the craft settle.
9. Watch for **FLHD** before trusting hands-off position hold.

Do not expect full FlowHold the instant the props spin.

At launch, the craft may need a moment to get clean sensor data. Stay in control until the hold is clearly active.

Lighting Control

RC9 quick presses can change the LED mode.

Each clean RC9 press cycles the lights:

RC9 Press	LED Mode
First press	Off
Next press	Police mode, front white with rear red/blue strobe
Next press	All white
Next press	Back to off

Mission Planner may show:

1. **LED Mode: OFF**
2. **LED Mode: POLICE**
3. **LED Mode: ALL WHITE**

RC9 is also used for arm/disarm, reboot, and receiver parking. Use short presses and long presses carefully.

Remote Reboot

Remote reboot lets the pilot restart the flight controller from the radio while the craft is disarmed.

Use remote reboot after Turtle or when the aircraft is sitting on the ground and the starting state does not look right.

To reboot:

1. Disarm the craft.
2. Keep RC7 out of the high special feature position.
3. Hold RC9 for 5 seconds.
4. Wait for the controller to reboot.
5. Wait for **rdy** before arming again.

Mission Planner may show:

--- RC9 LONG-PRESS REBOOT ---

Do not use remote reboot while flying.

ELRS Receiver Park

Receiver park lets the pilot disconnect the ELRS receiver on a downed aircraft so a reserve aircraft can be used with the same radio.

Use this when one aircraft is down, cannot be recovered right away, and a second reserve aircraft needs to fly.

Parking the receiver drops the radio link on the downed aircraft. This helps prevent two matching aircraft from listening to the same radio at the same time.

To park the receiver:

1. Make sure the craft is disarmed if you still have control.
2. Move RC7 high.
3. Confirm the OSD says **RC KILL RDY**.
4. Release RC9 once.
5. Hold RC9 for 5 seconds.
6. Wait for the radio link to drop.
7. Power the reserve aircraft.
8. Confirm the reserve aircraft shows normal status before flying.

Cold-power-cycle the parked aircraft to restore its ELRS link after recovery.

If you see **RC KILL RDY** and you are not trying to park the receiver, move RC7 back to center.

FlowHold Level Calibration

FlowHold level calibration is a special feature. It is used only when the aircraft can hold a steady FlowHold hover but still leans or drifts because its level reference needs correction.

Only run this when told to do so.

Use a safe indoor area:

1. Good light.
2. Good floor texture.
3. No wind or fans.
4. No people walking under the craft.
5. Plenty of room to land.

Basic procedure:

1. Set RC5 to Indoor.
2. Set RC7 center and establish a steady **FLHD** hover.
3. Move RC7 high.
4. Move RC5 low, then high with a clean switch movement.
5. Keep the sticks neutral while the craft collects data.

6. If the message says **XY CAL READY - LAND**, land smoothly.
7. Disarm to save the result.

Do not run level calibration in low light, over shiny floors, near walls, or while the aircraft is drifting.

Flight Feel

Slow is calm and soft.

Use it indoors, near people, near shelves, or in tight spaces.

It gives less lean angle, so it also has less ability to fight wind or stop quickly.

Norm is the main setting.

It gives a good mix of control and safety.

Use Norm for most flights.

Fast gives more lean angle.

Use it only when you have space.

Fast can get the craft moving quickly. Leave room to stop. FlowHold may help slow the craft in good conditions, but the pilot is still responsible for space and speed.

Emergency Actions

Use these steps when the aircraft does something unexpected.

If The Craft Climbs And Will Not Stop

1. Lower throttle.
2. If it keeps climbing, use the RC7 low emergency bailout.
3. Fly manually and land.
4. Disarm only when safe.

If The Craft Drops

1. Add throttle.
2. Keep the craft away from the floor.
3. If assisted hold feels wrong, take manual control and land.

If FlowHold Pulls Or Wanders

1. Move the movement stick to take control.
2. Check if the display is **FLHD**, **FL--**, or **----**.
3. Move to better light or texture.
4. Try again when the craft is slower and the display is healthier.

If Auto Moves Toward An Object

1. Take control right away.
2. Move away from the object.
3. Switch RC5 to Indoor if GPS may be causing the problem.
4. Do not trust Auto hold again until the area is more open.

If It Will Not Arm

1. Check the prearm message.
2. If it says **boot**, wait.
3. If it still says **boot**, reboot the craft.
4. Make sure RC8 is in the arm position, then quick press RC9.
5. Check that the craft is not leaning too far.

Care And Service

Use this section for cleaning, propellers, software, and records.

Camera Sensor And Lighting Care

The downward camera and sensor help the craft hold position.

Keep them clean.

Before flight, check for:

1. Dust.
2. Fingerprints.
3. Dirt.
4. Moisture.
5. Smoke residue.
6. Gas or oil residue.
7. Tape, wires, or battery straps blocking the view.

A dirty camera or sensor can make holding weak or completely nonfunctional.

Downward lights matter indoors. Turn on the removable lights in dark areas before launch. Make sure the battery does not block the lower light.

Propeller Service

Use the MWR Drone Portal aircraft information page for the current propeller direction diagram.

Viewed from above with the nose forward:

1. Front-left and rear-right use counterclockwise props.
2. Front-right and rear-left use clockwise props.

Because this aircraft has a custom motor/output setup, do not trust motor numbers alone when replacing props.

If a motor, ESC, wiring, or output assignment changes, verify motor direction with props removed before installing propellers.

Never run a motor direction test with propellers installed.

MWR Drone Portal

MWR Drone Portal is the normal operator software for service work.

Use it for:

1. Downloading flight logs.
2. Saving routine flight records.
3. Firmware updates.
4. Parameter backup and approved parameter changes.
5. Aircraft information and the offline manual.

For firmware updates:

1. Remove the flight battery.
2. Use USB only.
3. Follow the Portal backup step before writing firmware.
4. Let the Portal verify the board and firmware before the update.
5. Let the Portal check parameters after the update.

Do not load random parameter files. Use only approved project parameter files or changes from the project lead.

Mission Planner is still useful for advanced testing, but the Portal is the safer tool for normal service work.

Flight Logs

Flight logs help explain what happened if the aircraft acts wrong.

Use normal logging for test flights or any flight where the aircraft did something unexpected.

Routine agency flight records may use a smaller log setting when approved by the program lead.

If you are not sure which log setting to use, use normal logging.

What The Craft Should Not Do

The craft should not:

1. Keep pushing against pilot input.
2. Stay in **FLHD** when the hold is not real.
3. Enter **FLST** when outdoor position hold is not healthy.

4. Jump up or down just because an object passes below it.
5. Keep chasing old corrections after the pilot has moved the sticks.

If any of these happen, save the log and review before more testing.

Known Limits

Expect poorer FlowHold in low light.

Expect poorer FlowHold over shiny, smooth, or blank surfaces.

Expect outdoor position hold to be worse near buildings, vehicles, metal, decks, or covered areas.

Expect faster flight to need more room to stop.

Use the RC7 low emergency bailout only when you need direct control right now.

Simple Rule

If the craft is helping, let it help.

If the craft is not clearly helping, fly it yourself.

If the craft is fighting you, use the RC7 low emergency bailout and land.