

INSTRUMENT PROCEDURES

Holding Patterns

A practical guide to holding clearances, entries, timing, speed limits, protected airspace, and checkride level decision making.

HOLDING PATTERNS

IFR PROCEDURES

HOLD ENTRIES

EFC

PROTECTED AIRSPACE

INSTRUMENT CHECKRIDE

THE BIG PICTURE

Holding patterns are used when ATC needs to delay aircraft, sequence traffic, protect airspace, manage weather, support missed approaches, or align an aircraft for an approach. For pilots, holding is more than drawing racetracks and memorizing entry sectors. A good instrument pilot understands the clearance, slows early, enters predictably, corrects for wind, respects speed and altitude limits, monitors time or distance, and knows exactly when to leave the fix.

The purpose is containment. You are not simply circling, you are staying inside protected airspace designed around specific speed, turn, timing, and wind assumptions.

WHAT A HOLD CONTAINS

ANATOMY

- A holding fix anchors the pattern.
- The inbound course normally ends at the holding fix.
- The hold also has an outbound course, turn direction, leg length or timing, altitude, speed limit, and clearance expectation.
- The fix may be a VOR, NDB, intersection, DME fix, RNAV waypoint, localizer fix, or another identifiable point.

WHY IT EXISTS

- ATC uses holding for traffic, weather, runway changes, equipment outages, airspace constraints, and flow control.
- Published holds may appear on departures, arrivals, approaches, and missed approaches.
- A hold in lieu of procedure turn can align the aircraft with an approach segment and support a normal final approach setup.

Instructor Tip

Draw the hold in three strokes: the fix, the inbound course to the fix, and the turns on the holding side. Once those pieces are clear, entries and wind correction become much easier.

Common Error

Misidentifying the fix makes every later decision wrong. At a VOR, begin the outbound turn at the first complete reversal of the to from indicator, then use heading and timing through the cone of confusion.

CLEARANCE FIRST

Copy The Hold Before You Fly The Hold

If the holding pattern is not charted, ATC holding instructions should give the direction of holding from the fix, the holding fix, the radial, course, bearing, airway, or route on which to hold, the leg length in miles if DME or RNAV is used, the direction of turns if left turns are required, and an EFC time with any additional delay information.

If a charted hold is assigned as published, fly the depicted pattern. If ATC omits full holding instructions for a charted hold, the pilot is expected to use the appropriate chart. If the hold is not charted and the instructions are incomplete, ask before reaching the fix.

A Complete Hold Clearance Tells You

Direction <small>N, E, S, or W of fix</small>	Holding Fix <small>VOR, waypoint, or fix</small>	Course / Radial <small>Inbound course or radial</small>
Leg Length <small>Time or distance</small>	Turns <small>Right if not stated</small>	EFC <small>Expect further clearance</small>

If turns are not specified, standard holding uses right turns.

ITEM	EXAMPLE	WHY IT MATTERS
Direction	Hold east	Tells where the hold lies from the fix.
Fix	ABC VOR	Defines the anchor point.
Course or radial	On zero niner zero radial	Defines the holding course.
Leg length	Five mile legs	Defines pattern size.
Turns	Left turns	Nonstandard direction must be known.
EFC	Expect further clearance one five three zero	Controls delay expectation and lost comm timing.

HOLDING CLEARANCE SIX

Direction, Fix, Course, Leg, Turns, EFC

Use this to copy and verify an unpublished hold. If one item is missing and the hold is not published, ask ATC.

Checkride Question

What are the required elements of an unpublished holding clearance? Give the six items, then say you would request clarification before the fix if any required item was missing.

HOLDING SIDE AND TURNS

Standard Means Right, Nonstandard Means Left

A standard holding pattern uses right turns. A nonstandard holding pattern uses left turns. If ATC does not specify left turns and the chart does not show left turns, assume right turns. Published holds show the turn direction graphically, and left turns should be stated unless the pattern is charted.

The holding side is the side of the inbound course where the racetrack is flown. The nonholding side is opposite the pattern. Most protected airspace is on the holding side, so turn direction tells you where the protected maneuvering area lives.

STANDARD MEANS RIGHT

Standard right, nonstandard left

Left turns must be charted or assigned. Turning the wrong way can quickly place the aircraft outside protected airspace.

Common Error

Students often focus only on the fix and inbound course. The holding side tells you where the protected pattern is, and where wind correction must keep the airplane.

PUBLISHED AND UNPUBLISHED HOLDS

Many common holding patterns are charted on en route charts, area charts, departure procedures, STARs, and approach charts. When ATC says hold as published, fly the charted pattern. AIM guidance says only holding patterns depicted on approved government or commercial charts should be used.

If ATC assigns a hold where no pattern is charted, ATC should give complete holding instructions. If no holding pattern is charted and instructions have not been issued, ask before reaching the fix. If unable to obtain instructions before reaching the fix due to frequency congestion or similar issues, AIM guidance says to enter a standard pattern on the course on which the aircraft approached the fix and request further clearance as soon as practical.

Regulation Link

AIM 5 3 8 is the main FAA holding reference. It covers charted and uncharted holding, EFC, clearance limits, speed reduction, entries, timing, DME and RNAV holding, wind correction, bank angle, and RNAV cautions.

Checkride Trap

A published hold is not optional artwork. It tells you the protected pattern ATC expects. Do not invent a different hold because it looks easier in the cockpit.

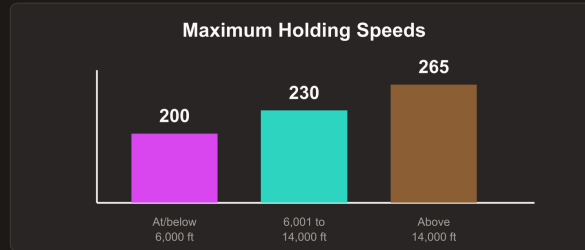
RISK	PREVENTION	CHECKRIDE PHRASE
Wrong side of fix	Draw inbound course and holding side.	Radial tells where I am, course tells what I fly.
Published hold mismatch	Use the charted pattern or request full instructions.	Hold as published means as depicted.
Unclear clearance	Ask for full holding instructions before the fix.	I will clarify before entering protected airspace.

SPEED AND TURN PERFORMANCE

Protected Airspace Assumes You Slow Before The Fix

Maximum holding airspeeds protect the size of the holding area. At or below 6,000 feet MSL, the maximum holding speed is 200 KIAS. From 6,001 feet MSL through 14,000 feet MSL, the maximum holding speed is 230 KIAS. Above 14,000 feet MSL, the maximum holding speed is 265 KIAS. Some holds have lower charted maximum speeds, such as 175 KIAS, and some holds from 6,001 through 14,000 feet may be restricted to 210 KIAS when charted.

When an aircraft is three minutes or less from a clearance limit and clearance beyond the fix has not been received, AIM expects the pilot to start reducing speed to cross the fix at or below maximum holding speed. If ATC gives advance notice of holding, plan to be at or below maximum holding speed at least three minutes before crossing the fix. If advance notice is not provided, slow as expeditiously as practical.



Speeds are KIAS unless a chart, ATC, or procedure specifies otherwise.

ALTITUDE	MAXIMUM SPEED	NOTES
At or below 6,000 feet MSL	200 KIAS	Check for charted lower speeds.
6,001 through 14,000 feet MSL	230 KIAS	Some holds may be restricted to 210 KIAS.
Above 14,000 feet MSL	265 KIAS	Higher altitude wind and groundspeed increase pattern size.
Charted speed in hold	As charted	Be at or below before crossing the fix.
Climb in holding	Up to 310 KIAS if allowed	Charted limits and 14 CFR 91.117 still apply.

Bank Angle

For holding without RNAV lateral guidance, AIM recommends the lesser of three degrees per second, thirty degrees of bank, or twenty five degrees of bank when using a flight director.

Common Error

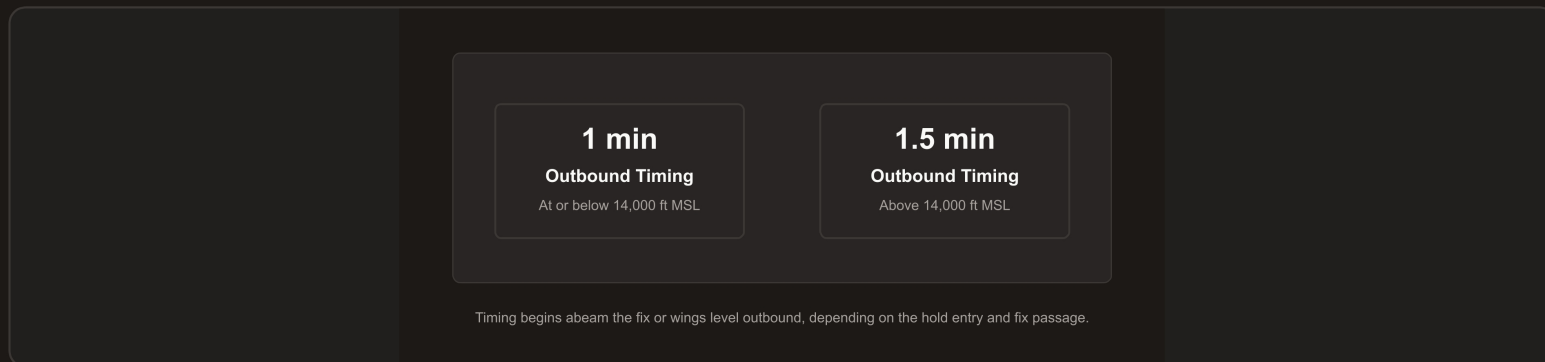
Crossing the fix too fast or using a shallow bank creates a larger ground track. If unable to comply with holding speed, tell ATC immediately and request another clearance.

TIMING AND DISTANCE

The Inbound Leg Is The Target

At or below 14,000 feet MSL, the inbound leg should be one minute. Above 14,000 feet MSL, the inbound leg should be one and one half minutes. The first outbound leg is normally flown for the same time appropriate to altitude, then later outbound timing is adjusted to achieve the desired inbound leg time.

Outbound timing begins over or abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when the turn to outbound is complete. Students often memorize outbound time and forget that inbound time is what the procedure is trying to produce.



INBOUND IS THE GOAL

Time outbound to make inbound correct

Shorten the next outbound leg if the inbound leg is too long. Lengthen the next outbound leg if the inbound leg is too short.

OUTBOUND TIMING START

Abeam or over the fix, whichever is later

If abeam cannot be determined, start the clock when the outbound turn is complete.

DME AND RNAV DISTANCE HOLDS

Some holding patterns use distance instead of time. DME or RNAV holding uses leg length in nautical miles, and the chart or ATC clearance specifies the outbound leg length. The outbound leg ends when the DME or along track distance shows the charted or assigned limit.

DME distances are based on slant range from the DME station. RNAV distance is computed differently, and small differences can appear, especially at higher altitudes. Do not time a distance hold unless timing is assigned or needed as backup.

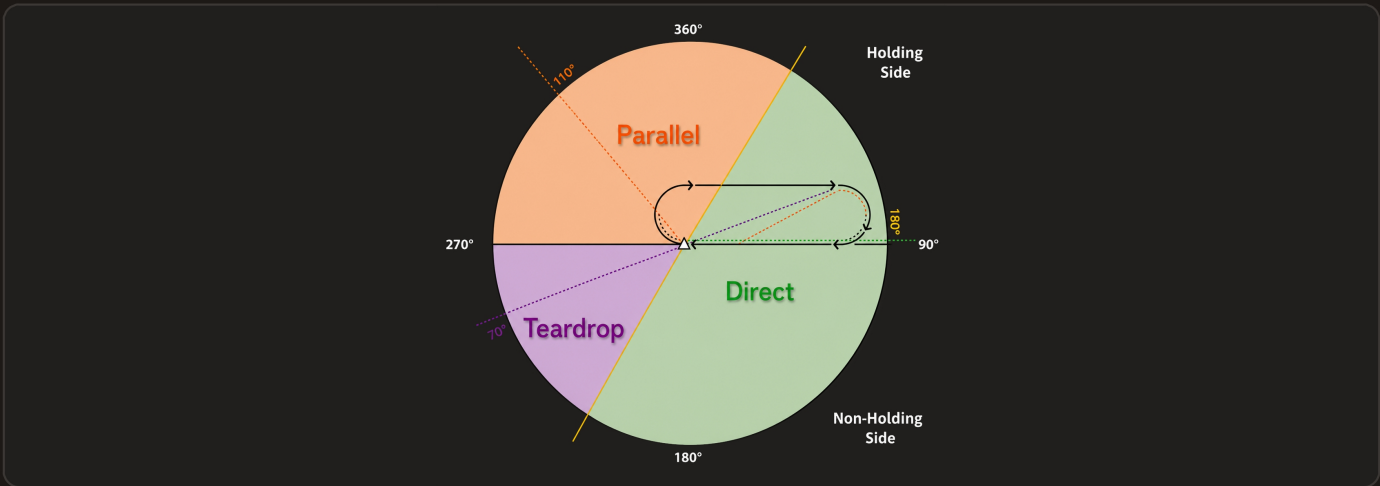
SITUATION	TIMING	NOTES
At or below 14,000 feet MSL	One minute inbound	Adjust outbound to achieve inbound time.
Above 14,000 feet MSL	One and one half minutes inbound	Higher speed and larger pattern expected.
Outbound timing start	Abeam or over fix, whichever is later	If no abeam, time after outbound turn complete.
Distance hold	Use nautical mile leg length	DME or RNAV distance controls turn point.

HOLDING ENTRIES

Entries Are A Protected Airspace Tool

The FAA recommends three holding entries: direct, parallel, and teardrop. These entries were derived as part of the protected airspace design. Other entry procedures may keep the aircraft within protected airspace, but direct, parallel, and teardrop are the recommended procedures and the cleanest checkride answer.

The entry is determined from the aircraft heading upon arrival at the holding fix. AIM says plus or minus five degrees in heading is within good operating limits for determining entry. When using RNAV lateral guidance, it is permissible to allow the system to compute the entry, but the pilot still monitors the result.



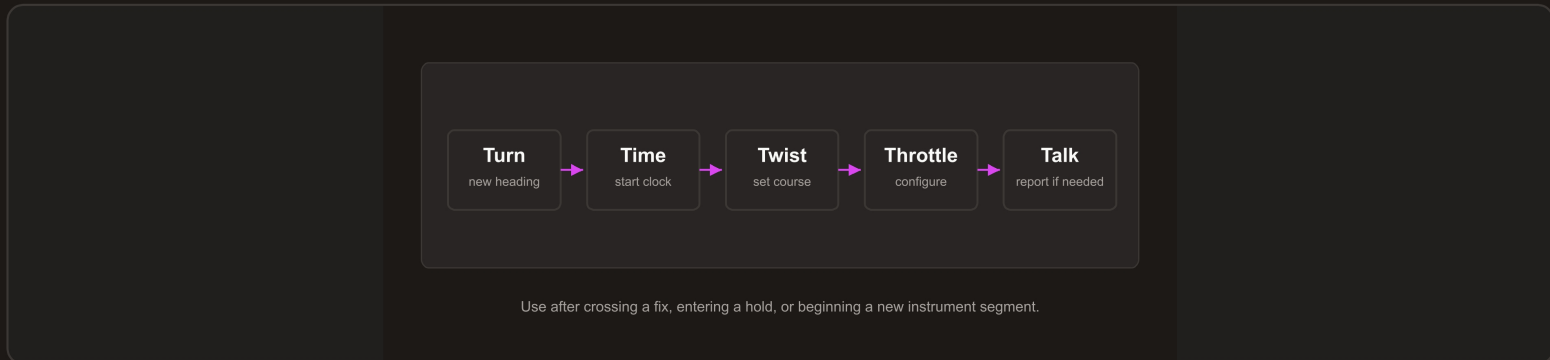
ENTRY	BASIC ACTION	COMMON ERROR
Direct	Cross the fix and turn to follow the pattern.	Overthinking a simple entry.
Parallel	Parallel the inbound course outbound on the nonholding side, then turn back to the fix or inbound course.	Turning away from the hold after the outbound parallel leg.
Teardrop	Fly an angled outbound heading inside the holding side, then intercept inbound.	Putting the thirty degree heading on the wrong side.

Entry Boundary Judgment
 If you are near a sector boundary, choose the simpler entry that keeps you protected and stable. Explain your reasoning and keep flying the airplane.

Checkride Question
 Is a parallel entry mandatory? The recommended answer is that FAA entries are recommended and based on protected airspace design. Other protected methods may work, but the recommended entries are the best checkride choice.

FIVE TS AT THE FIX

Use Turn, Time, Twist, Throttle, Talk as a disciplined flow after crossing the holding fix. Turn to the correct heading, start or manage timing, set the navigation course, configure power and speed, and make any required report.



WIND CORRECTION

Fix Drift Before The Next Inbound Leg

Wind affects every part of the hold. Correct primarily on the inbound and outbound legs. A common technique is to triple the inbound drift correction on the outbound leg. For example, if inbound requires eight degrees left correction, outbound may require about twenty four degrees right correction. Adjust timing for headwind or tailwind and refine every circuit.

Without wind correction, the airplane can drift out of protected airspace. Chasing the needle only on the inbound leg is late correction. The outbound leg is where you prevent the next inbound error.

TRIPLE WIND

Inbound correction times three, opposite direction outbound

Use this as a starting estimate, then refine with timing and track results.

Common Error

Correcting inbound but flying runway straight outbound lets drift accumulate. Start the outbound correction early instead of waiting for the inbound needle to wander.

RNAV HOLDING

RNAV systems may provide lateral guidance for holding. Published holds may be loaded from the navigation database, and some ad hoc ATC assigned holds may be manually entered. The pilot is responsible for knowing system limitations and confirming the loaded or entered hold matches the assigned or charted hold.

AIM cautions that RNAV execution can differ from conventional holding assumptions. Some systems use ground track angle instead of heading to choose an entry, begin fly by turns before the fix, calculate outbound turns beyond the protected design point in strong wind, or apply timing and speed logic based on aircraft altitude before reaching the hold.

Automation Audit

Verify fix, inbound course, turn direction, leg length, altitude, and speed. A perfectly flown magenta hold is still wrong if the loaded hold does not match the clearance.

Checkride Scenario

If the RNAV navigator commands an outbound turn well past the charted distance, monitor the system, be prepared to intervene, and notify ATC if an ATC assigned hold becomes excessive.

HOLDING RISK	PREVENTION	PILOT LANGUAGE
RNAV error	Verify loaded hold details.	Automation helps, but I audit it.
Poor wind correction	Use triple outbound correction as a start.	Correct before the next inbound leg.
Wrong waypoint	Confirm waypoint name and hold details.	I will compare the box to the clearance.
Multiple holds at one fix	Check course, turns, altitude, and leg length.	The database hold may not be the assigned hold.

Holding At A VOR

Station passage matters. Expect needle instability close to the station, and use timing, heading, and situational awareness instead of chasing indications through the cone of confusion.

Holding At An RNAV Waypoint

Confirm the waypoint, inbound course, turn direction, leg length, altitude, and speed. Monitor the first circuit carefully.

ALTITUDE AND APPROACH HOLDS

Holding Protects Lateral Space, Not Unlimited Vertical Space

Maintain the assigned altitude unless cleared to climb or descend. If the hold is part of an approach or hold in lieu of procedure turn, follow the charted minimum altitudes. The altitude prescribed for a procedure turn or hold in lieu is a minimum altitude until established on the inbound course. Do not descend just because you are inside the hold unless the clearance and procedure allow it.

HOLD IN LIEU OF PROCEDURE TURN

A hold in lieu of procedure turn is a holding pattern used as a course reversal on an instrument approach. It is established over a final or intermediate fix. It lets the pilot align with the final or intermediate segment and may allow descent to an altitude that supports a normal descent to the final approach fix.

It is a required maneuver when depicted unless an exception applies. It is not permitted when No PT is shown on the segment being used, when radar vectors to the final approach course are provided, when conducting a timed approach from a holding fix, or when cleared for an appropriate straight in approach. The holding direction must be flown as depicted, and the specified leg length or timing must not be exceeded.

SITUATION	FLY HOLD IN LIEU	REASON
Depicted and no exception applies	Yes	It is the required course reversal.
No PT on segment used	No	Procedure says course reversal not required.
Radar vectors to final	No	ATC provides alignment.
Timed approach from holding fix	No	Timed approach expects direct inbound.
Cleared straight in appropriately	No	ATC clearance removes course reversal need.

Regulation Link

AIM 5 4 9 explains when a hold in lieu of procedure turn is required, when it may be skipped, and why the depicted direction and leg length or timing matter.

Common Error

Treating a hold in lieu like optional practice holding is a classic instrument checkride trap. Fly it unless the procedure and clearance remove the need.

MISSED APPROACH HOLDS

Missed approaches often end in a holding pattern. The hold provides a protected place to climb, regroup, and receive further clearance. Fly the published missed approach as charted unless ATC assigns something else, and respect speed, altitude, direction, and leg length.

Checkride Question

When may you skip a hold in lieu? Answer: No PT routing, radar vectors to final, a timed approach from a holding fix, or an appropriate straight in clearance.

Checkride Phrase

A hold in lieu is a course reversal unless the procedure or ATC clearance removes that requirement. If I am unsure, I ask immediately.

EFC AND REPORTING

EFC Is The Clock That Matters If The Radio Goes Quiet

EFC means expect further clearance time. ATC should issue an EFC when assigning holding with delay expected. It tells the pilot when to expect another clearance, and it also tells the pilot when to leave the hold if communications fail, subject to 14 CFR 91.185. If holding instructions do not include an EFC, ask for one.

AIM guidance says pilots should report the time and altitude or flight level when reaching a clearance limit. Pilots should also report leaving the clearance limit. Under IFR when not in radar contact, position and estimate reports become more important because ATC uses those reports to maintain separation.

Lost Comm Link

If cleared to a holding fix with an EFC and communications fail, 14 CFR 91.185 controls route, altitude, and clearance limit timing. EFC tells both pilot and ATC when the aircraft should leave.

Checkride Question

What is EFC and why does it matter? It is the expected further clearance time. It supports delay planning and lost communications timing.

LOST COMMUNICATIONS IN HOLDING

If the clearance limit is a fix from which an approach begins, start descent or approach as close as possible to the EFC if one was received. If no EFC was received, use the ETA calculated from the filed or amended estimated time en route. If the clearance limit is not a fix from which an approach begins, leave at EFC if received, or on arrival if no EFC, then proceed to an approach fix.

SCENARIO	PILOT ACTION	REASON
Holding clearance includes EFC	Write the time and plan delay.	It governs lost comm departure from the hold.
No EFC received	Ask ATC for one.	Indefinite holding creates fuel and lost comm risk.
Reaching clearance limit	Report time and altitude when required.	ATC may depend on the report, especially without radar.
Leaving clearance limit	Report leaving when required.	Updates the traffic picture.

FUEL, WEATHER, AND REAL WORLD JUDGMENT

Holding consumes fuel while the aircraft is not progressing toward landing. Pilots must track fuel remaining, expected delay, alternate requirements, and reserve needs. If delay threatens fuel minimums, advise ATC early. If fuel becomes critical, use correct emergency or minimum fuel communication and decision making.

Holding is often assigned during weather or traffic congestion, exactly when alternate planning matters most. Icing can reduce airspeed margins and climb performance, and turbulence may require a higher airspeed for safety. If a safe airspeed exceeds maximum holding speed, tell ATC immediately.

Regulation Link

14 CFR 91.123 requires compliance with ATC clearances unless an amended clearance is obtained, an emergency requires deviation, or safety requires otherwise.

Regulation Link

14 CFR 91.183 covers IFR communication and reporting. 14 CFR 91.185 controls IFR two way radio communication failure.

INTEGRATED CHECKRIDE PRACTICE

Say The Hold Out Loud Before You Enter

A sharp student might brief: Holding west of ABC on the two seven zero radial. Right turns, one minute legs, EFC one six one five. Inbound course zero niner zero to the fix. Entry will be teardrop. Slowing to holding speed now. Assigned altitude six thousand. Biggest threat is wind from the south, so I will correct outbound and verify inbound time.

Scenario: Hold East Of ABC VOR On The Zero Niner Zero Radial, Left Turns, EFC One Five Three Zero

The hold is east of the VOR. The defining radial is zero niner zero, so the inbound course toward the VOR is likely two seven zero. Turns are left because ATC specified left turns. EFC is one five three zero.

Scenario: Three Minutes From A Fix With No Further Clearance

Begin speed reduction so you cross at or below maximum holding speed. If no holding instructions are issued and no hold is charted, ask ATC before reaching the fix.

Scenario: Inbound Leg Is One Minute Twenty Seconds At 5,000 Feet

At 5,000 feet, target inbound time is one minute. The inbound leg is too long, so shorten the next outbound leg and check wind correction.

Scenario: Can You Use RNAV To Fly A Hold?

Yes, when appropriate. Know system limitations and verify the loaded or entered hold matches the assigned or charted hold. Monitor speed, bank, turn points, leg length, and protected airspace risk.

MEMORY AID	EXPRESSION	USE
Holding Clearance Six	Direction, Fix, Course, Leg, Turns, EFC	Copy and verify an unpublished holding clearance.
Standard Means Right	Standard right, nonstandard left	Quickly identify turn direction.
Inbound Is The Goal	Time outbound to make inbound correct	Adjust timed holding patterns.
Triple Wind	Inbound correction times three, opposite direction outbound	Start outbound wind correction.
Five T Flow	Turn, Time, Twist, Throttle, Talk	Manage workload at the fix.
Speed Gates	Two hundred, two thirty, two sixty five	Remember maximum holding speeds.

COMMON MISTAKES TO CATCH EARLY

LATE SLOWDOWN

Slowing after the fix is late. Protected airspace assumes you enter at an acceptable speed.

WRONG TURN DIRECTION

Left turns must be charted or assigned. If not, standard holding uses right turns.

DESCENDING EARLY

Do not descend in a hold unless the clearance and procedure allow it.

NO EFC

If assigned holding with delay expected and no EFC is issued, ask for one.

ENTRY FREEZE

Do not spend so long solving the entry that you miss altitude, speed, or clearance control.

UNVERIFIED RNAV

Loading a hold is not the same as confirming the assigned hold.

Final Instructor Thought

Holding is not a racetrack drawing contest. It is a protected airspace procedure flown under ATC expectations.

Study Takeaway

Understand the clearance, slow before the fix, enter predictably, correct for wind, respect timing or distance, and know when to leave.