

FAA Team Seminar Handout

AC 90-48E — Why Midair Collisions Still Happen

The Human Factors Every Pilot Must Confront

Why Midair Collisions Persist

Midair collisions don't happen because pilots lack knowledge. They happen because pilots **behave in predictable ways that defeat their own visual system**. AC 90-48E documents the limitations — this handout shows the behaviors that make those limitations dangerous.

The Human-Factor Traps (The Real Causes)

- **Overconfidence in vision** Pilots trust their eyes even when glare, haze, refocusing delays, and windshield distortion hide traffic.
- **Cockpit fixation** Avionics, maps, and automation pull attention inward, reducing outside scan time.
- **Task saturation** During climb, pattern work, taxi, sightseeing, or instruction, pilots stop scanning.
- **Motion-dependence (Blossom Effect)** Collision-course traffic appears stationary until it suddenly blooms in the window.
- **Tunnel vision** Only a small portion of the visual field is processed with clarity.
- **Blind spots** Wings, doorposts, and pitch attitude hide converging aircraft.
- **Environmental degradation** Haze, smoke, humidity layers, and sun angle hide aircraft even in legal VFR.
- **Complacency in familiar airspace** Most midairs occur near airports and known landmarks.
- **False assumptions about other pilots** Not everyone is on frequency, scanning, or following the pattern.
- **Automation complacency** ADS-B In, TAS, and ATAS help — but none replace see-and-avoid.

The 5 Behaviors That Actually Reduce Midair Risk

1. Scan with discipline

Short, deliberate eye movements. One-second pauses. Move your head to clear structure.

2. Prioritize outside attention during workload spikes

Delay nonessential cockpit tasks during climb, pattern work, maneuvering, and taxi.

3. Clear blind spots deliberately

Use shallow banks in cruise. Adjust pitch in climb. Know your wing-type blind zones.

4. Treat stationary specks as threats

If it doesn't move, assume collision course until proven otherwise.

5. Use technology wisely — never as a substitute

Traffic systems assist; they do not absolve you of scanning.

Why AC 90-48E Alone Doesn't Change Pilot Behavior

The circular explains the problem, but **information does not change habits**. Pilots need:

- **Motivation** — personal relevance
- **Feedback** — awareness of missed traffic
- **Habit change** — structured scanning discipline
- **Local relevance** — haze, density, sun angle, pattern geometry
- **Identity framing** — professionalism, not compliance

A handout like this bridges the gap between *knowledge* and *behavior*.

Key Takeaway

Midair collisions are preventable — but only if pilots change habits, not just read guidance.

*Below is a **behavior-change checklist** built directly from the human-factor failures described in **AC 90-48E** and tailored specifically to **Part 91 pilots in Central Florida**, where density, haze, sun angle, and pattern congestion amplify the weaknesses the AC warns about.*

This is not a restatement of the AC — it is the behavioral translation of the AC’s content into actions that actually change pilot performance.

Behavior-Change Checklist for Part 91 Pilots

A practical, cockpit-usable list derived from AC 90-48E’s human-factor findings

1. Counter Overconfidence in Visual Capability

- Assume **your eyes are missing traffic** unless proven otherwise.
- Treat haze, glare, windshield scratches, and sun angle as **visibility degraders**, not nuisances.
- Fly **above** haze layers whenever possible.
- Use sunglasses that reduce glare without darkening the field excessively.

2. Break Cockpit Fixation

- Set avionics, frequencies, and automation **before** entering busy airspace.
- When workload rises, consciously shift attention **outside** every 5–7 seconds.
- During troubleshooting or programming, **stop the aircraft’s maneuvering** if possible.

3. Manage Task Saturation

- During climb, pattern work, airspace transitions, or sightseeing:
 - Reduce nonessential tasks.
 - Delay checklist items until stable flight.
 - Narration, instruction, or passenger interaction must **never** interrupt scanning.

4. Defeat Motion-Dependence & the Blossom Effect

- Treat any “stationary speck” as **potential collision-course traffic**.

- Clean the windshield before every flight — bug smears hide converging aircraft.
- Use **1-second scan stops** to detect stationary objects.

5. Expand Your Effective Field of View

- Use **short, 10-degree scan segments** with deliberate pauses.
- Move your **head**, not just your eyes, around doorposts and wing roots.
- In cruise, perform **gentle clearing turns** every few minutes.

6. Actively Clear Blind Spots

- High-wing: check **below** during descent and pattern entry.
- Low-wing: check **above** during climb and pattern work.
- Worst case: low-wing above high-wing — use shallow banks to uncover the blind zone.

7. Adjust for Environmental Limitations

- Expect reduced detection in:
 - Smoke
 - Haze
 - Humidity layers
 - Late-afternoon sun angles (major factor in Central Florida)
- If flying into the sun, increase scan frequency and reduce cockpit tasks.

8. Fight Familiar-Airspace Complacency

- Treat home-airport patterns as **high-risk zones**, not comfort zones.
- Expect nonstandard entries, straight-ins, and opposite-direction operations.
- At non-towered airports: self-announce early, clearly, and consistently.

9. Correct False Assumptions About Other Pilots

- Assume:
 - Someone is not on frequency.
 - Someone is not scanning.

- Someone is not following the pattern.
- Build your pattern strategy around **what you see**, not what you expect.

10. Prevent Automation Complacency

- ADS-B In, TAS, and ATAS are **supplements**, not replacements.
- If traffic systems show “no factor,” continue scanning as if they were **inoperative**.
- Never assume ATC sees everything — radar and workload limitations are real.

11. Strengthen Night-Scanning Habits

- Use **off-center viewing** (10 degrees off target).
- Avoid direct strobe or landing-light use until on the active runway.
- Expect ground lights to mask aircraft lights.

12. Pattern-Specific Vigilance

- Look **behind** the aircraft periodically — rear-sector conflicts are common.
- Scan base-to-final aggressively; this is where most pattern midairs occur.
- If unsure of another aircraft’s position: **stop descending** until visual contact is regained.

13. Ground-Operation Discipline

- No checklists while taxiing.
- No passenger conversation during movement.
- Identify hot spots **before** taxi.
- If confused: **STOP** and ask ATC.

14. Maneuvering-Flight Risk Controls

- During steep turns, canyon flying, formation, or sightseeing:
 - Double scan frequency.
 - Reduce bank angles when possible.
 - Avoid “showing” maneuvers near congested areas.

15. Reaction-Time Awareness

- Remember: **12.5 seconds** is the typical detect-decide-act time for midair avoidance.
- If traffic appears suddenly, assume you are already behind the timeline.

Why this checklist matters as much as the AC itself

AC 90-48E provides **information**, but pilots need **behavioral change**. The AC describes the problem; this checklist operationalizes it.

The AC alone is insufficient because:

- It does not create urgency.
- It does not address cognitive bias.
- It does not modify cockpit habits.
- It does not provide feedback loops.
- It does not adapt to local conditions (Central Florida haze, density, sun angle).
- It does not compete with cockpit technology for attention.

This checklist converts the AC's human-factor warnings into **repeatable cockpit behaviors** that actually reduce collision risk.