

# Operating Safely Near Airports

## A Fundamental Guide to FAA RADAR Operations

Presented to: Pacific Air Soaring Counsel - PASCO

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November 4<sup>th</sup>, 2006

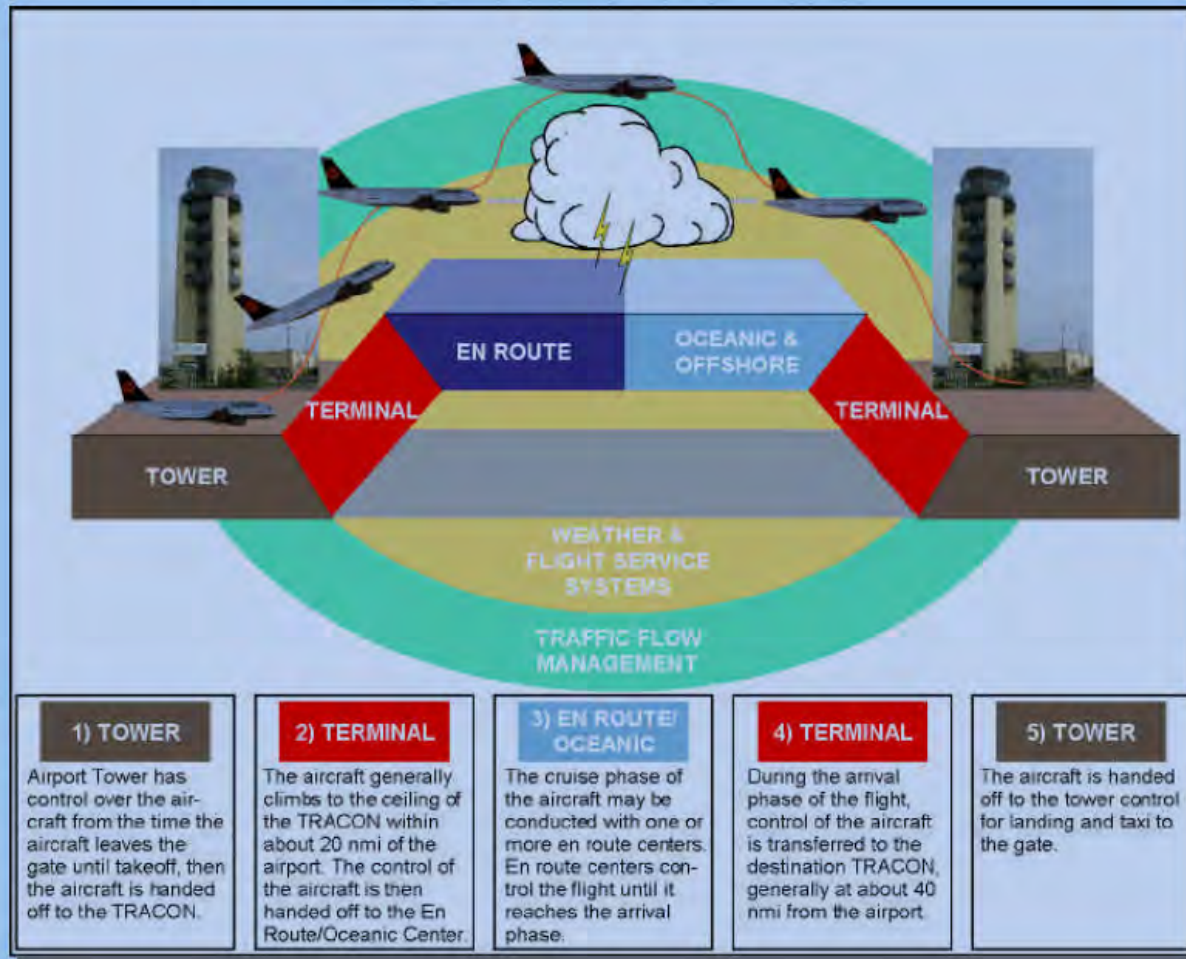


Federal Aviation  
Administration



# Phases of Air Traffic Control

Raytheon



C3I Systems  
Air Traffic Control

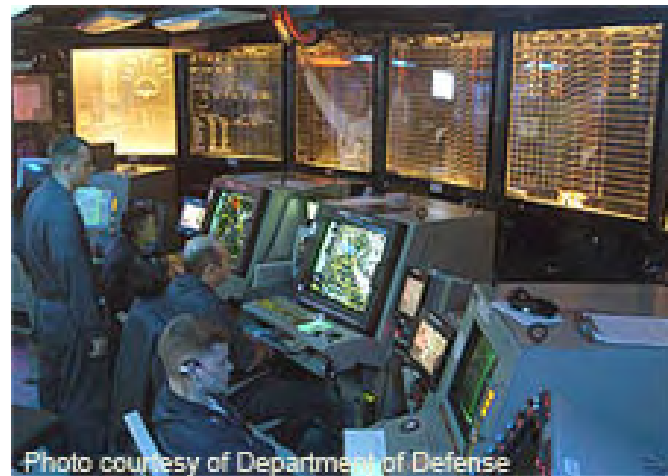


# How Do We “See” You Flying

- **Airport Surveillance Radar (ASR)**



- **RADAR Displays (RADS)**



# ***Q : What is a Primary Approach RADAR?***

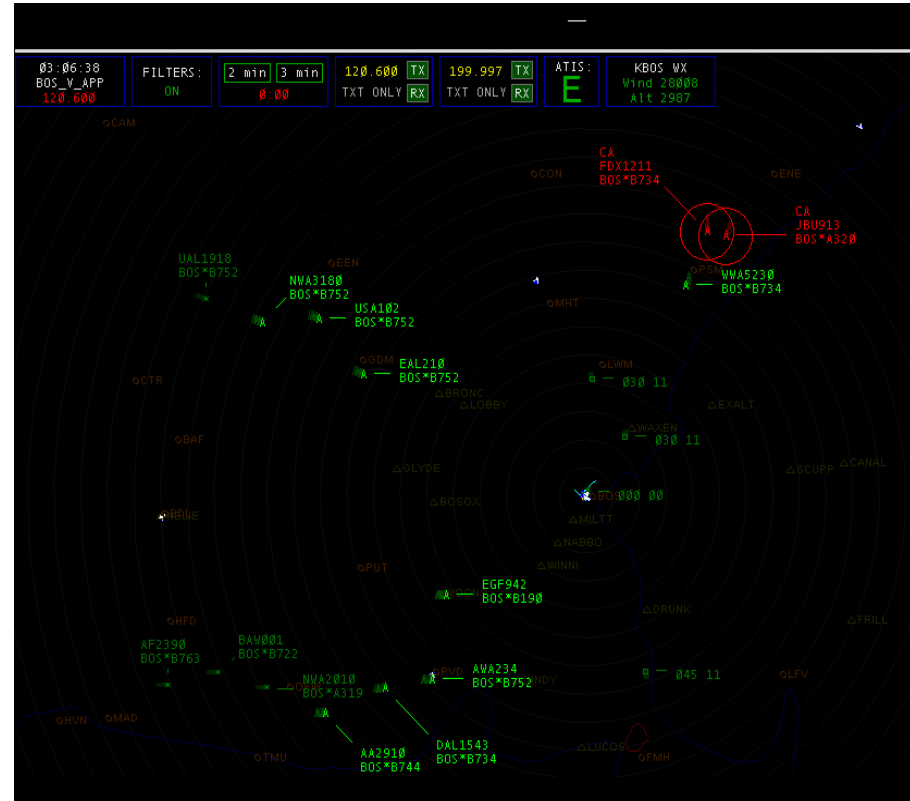
**A : A primary approach RADAR (Radio Detecting And Ranging) transmits, using a rotary antenna, high-frequency pulses (2.7 GHz – 2.9 GHz) into the airspace. These pulses are reflected by fixed and moving targets (aircraft), detected by a “receiver,” displayed on the RADAR screens of the air traffic controllers, after going through several stages of electronic processing.**

- **Primary radar is capable of detecting small or large aircraft, as well as passing birds, clouds, and other non-desired objects.**



# Q : What is Secondary RADAR?

- **A : A secondary radar or beacon “interrogates ” the sky.**
- **Transponders on aircraft within range answer. These responses are picked up by the secondary radar antennas, analyzed and processed electronically to be displayed on the screens of the air traffic controllers.**
- **The data displayed for the secondary surveillance radar include:**
  - **the position of the aircraft**
  - **the aircraft call-sign and/or the beacon code (SQUAWK)**
  - **the aircraft flight level (Alt.)**
  - **the ground speed of the aircraft (Kts.)**





## ***MTI => MOVING TARGET INDICATOR***

- **A device incorporated into RADAR systems that cancels out objects on the display that do not move (like ground clutter), making it easier to see those objects that do.**
- **Problem is, depending on your relative motion to/from the RADAR antenna while gliding , the MTI may not see any movement from your target and DROP YOU OFF THE DISPLAY (without a transponder, of course)**



# What is TCAS?

## Traffic Collision Avoidance System

- The Traffic Alert and Collision Avoidance System (or TCAS) is a computerized avionics device which is designed to reduce the danger of mid-air collisions between aircraft. It monitors the airspace around an aircraft, independent of air traffic control, and warns pilots of the presence of other aircraft which may present a threat of a near mid-air collision (NMAC). It is an implementation mandated by [International Civil Aviation Organization](#) (ICAO) and the FAA to be fitted to all aircraft over 12,500 lbs or authorized to carry more than 19 passengers.
- In modern glass cockpit aircraft, the TCAS display may be integrated in the Navigation Display; in older glass cockpit aircraft and those with mechanical instrumentation, a TCAS display replaces the mechanical Vertical Speed Indicator (which indicates the speed with which the aircraft is descending or climbing).



# TCAS Indicator (w/VSI)





**“See and Avoid”  
is GREAT!**

**Most of the time...**

**You can never be too aware  
in a busy terminal  
environment for other  
airborne traffic.**



# Aircraft Accident: 10 miles WNW of Smith, NV; August 28<sup>th</sup>, 2006



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# ***BASIC ATC COMMUNICATIONS***

- **Who you are...**
- **Where you are...**
- **And what you want (your intentions)**

## **EXAMPLE:**

***“Reno Approach, Glider 9927G, over Dawson Creek, ten-thousand five hundred, climbing to ...”***

## *Points To Remember*

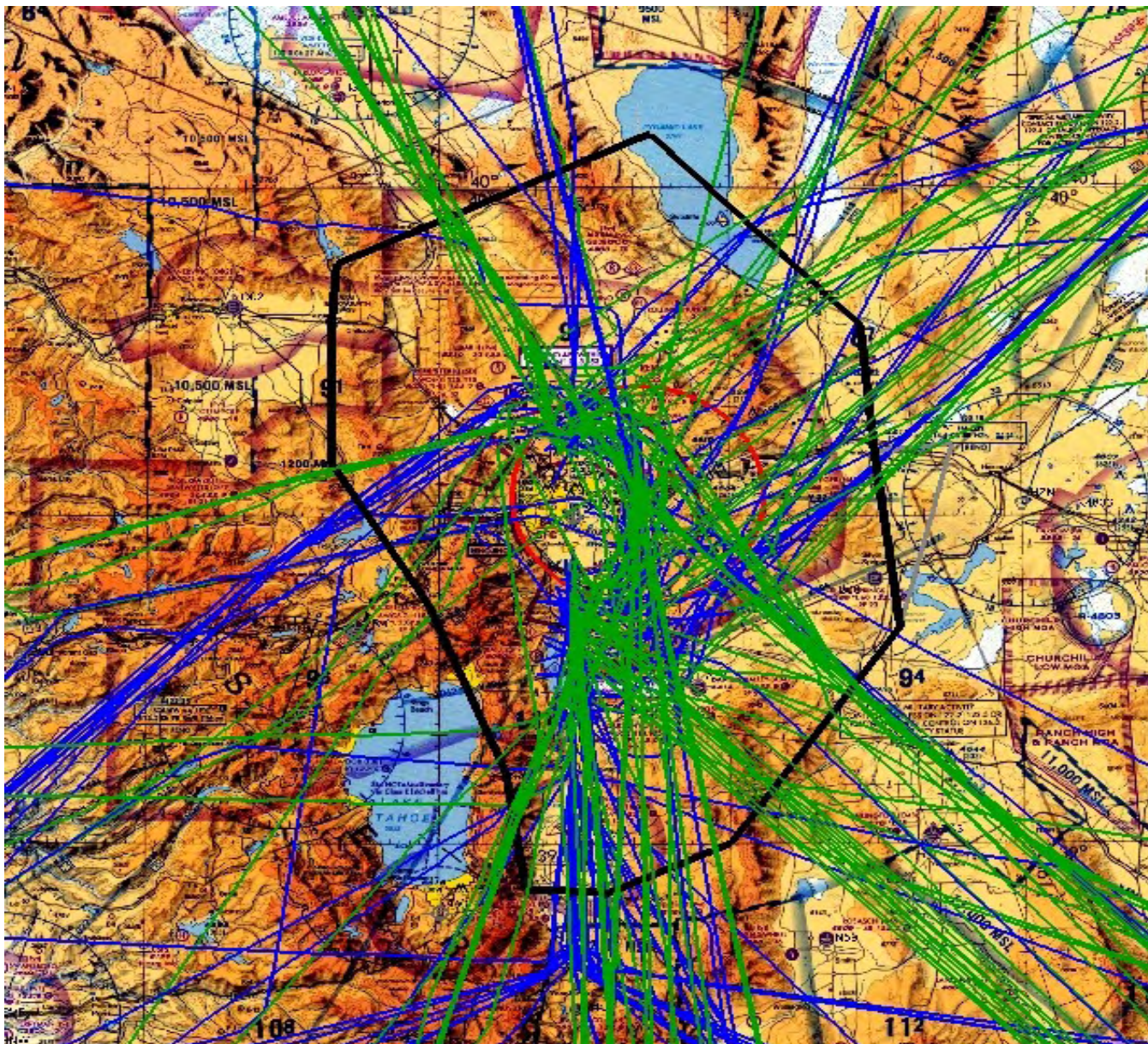
- **Be brief – Know the proper phraseology.**
- **Be precise – Give us a good idea of where you are flying, so that if we cannot see you on RADAR, (and without a transponder, we may not!) we can quickly ascertain if you will be a factor for other traffic.**
- **Be flexible – Depending on traffic, we may not be able to approve all requests.**
- **MOST IMPORTANTLY...**



# ***BE AWARE!!***

- **By monitoring the appropriate ATC frequency, you have a better chance of maintaining the situational awareness required for the highest level of safety while flying near congested Terminal Airspace.**
- **By congested we mean...**



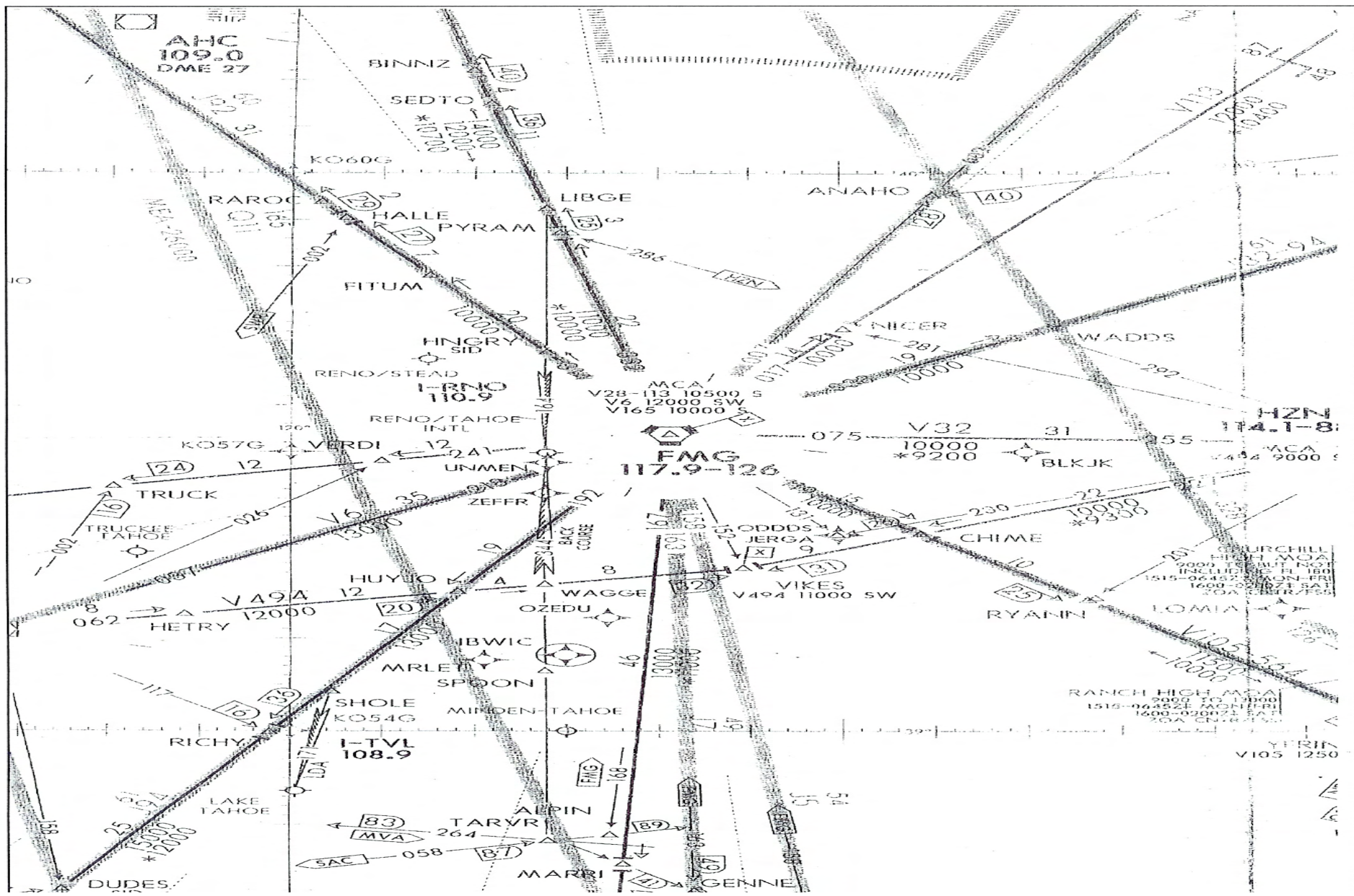




- **Also remember your proximity to other airports in the area (military AND civil).**



- **These airports are increasingly busy, and will get even busier as the new Very Light Jets (VLJs) come on line in the next couple of years.**





Aviation Safety Reporting System  
385 Moffet Park Dr · Suite 200 · Sunnyvale · CA · 94089



## Time

Date : 200608

Day : Wed

Local Time Of Day : 1201 To 1800

## Place

Locale Reference.Intersection : ZIMMR

State Reference : CO

Altitude.MSL.Single Value : 16000

## Environment

Flight Conditions : VMC



## Synopsis

A C560 CLIMBING OUT OF BJC EXPERIENCED A NEAR MISS WITH A SAILPLANE AT 16000 FT.

- WHILE BEING VECTORED AROUND A SLOWER ACFT ON THE ROCK14 DEPARTURE FROM THE BOULDER JEFFERSON COUNTY ARPT, WE EXPERIENCED A NEAR MISS WITH A SAILPLANE. WE WERE ASSIGNED A 240 DEG HDG, CLEARED TO FL230 FROM DENVER DEP CTL ON 126.1, AND CLIMBING AT 280 KTS AT 2000 FPM.
- AT EXACTLY 16000 FT MSL, WE WERE STARTLED BY THE SIGHTING OF THE GLIDER AT ABOUT OUR 1 O'CLOCK POSITION AND A QUARTER MILE DISTANT. THE GLIDER WAS FLYING AT APPROX THE SAME HDG IN STRAIGHT AND LEVEL FLIGHT SO HE WAS UNAWARE OF US AT THAT MOMENT. I MADE NO EVASIVE MANEUVER AND THE GLIDER PASSED OUR STARBOARD WING ABOUT TWO SECONDS LATER. MY GUESS IS THAT THE GLIDER WAS ABOUT A FOOTBALL FIELD LENGTH HORIZONTALLY AWAY
- -- CLOSE ENOUGH TO SEE THE PILOT CLEARLY.



## Synopsis

A C560 CLIMBING OUT OF BJC EXPERIENCED A NEAR MISS WITH A SAILPLANE AT 16000 FT.

- I CAN ONLY GUESS THAT THE PILOT OF THIS GLIDER WAS EQUALLY STARTLED BY THE SIGHT AND SOUND OF OUR PASSING CLOSELY AT A HIGH RATE OF SPEED AND THRUST. WE MENTIONED THE NEAR MISS SITUATION TO DEP CTL AND HE RESPONDED TO US THAT HE HAD **NO RADAR OR RADIO CONTACT WITH THE GLIDER.** GLIDER AIRCRAFT, OUTSIDE OF CLASS A, B, AND C AIRSPACE, ARE EXEMPT FROM XPONDER/ALT REPORTING EQUIP UNDER FAR 91.215(b)(5).

## Synopsis

### A C560 CLIMBING OUT OF BJC EXPERIENCED A NEAR MISS WITH A SAILPLANE AT 16000 FT.

- A WEEK AGO A HAWKER HS-125 JET COLLIDED WITH A GLIDER NEAR MINDEN (MEV) IN A SIMILAR CIRCUMSTANCE WITH NO CASUALTIES EXCEPT FOR THE TOTAL DESTRUCTION OF THE SAILPLANE AND SERIOUS DAMAGE TO THE JET.
- I BELIEVE IT WOULD BE PRUDENT FOR SAILPLANE PLTS TO CARRY A HANDHELD TRANSCEIVER AND POSSIBLY A MODE 3/A OR C XPONDER TO COMMUNICATE WITH ATC FOR SAFETY AND SURVIVAL REASONS. CARRYING ABOARD PORTABLE SYSTEMS WOULD NOT BE DIFFICULT.
- SIZE, COST, AND WEIGHT WOULD POSE VERY LITTLE PROBLEM. THIS INCIDENT IMPRESSED ON ME AND MY CO-PILOT OF THE IMPORTANCE OF 'SEE-AND AVOID' ON AN IFR CLEARANCE IN VMC. IN SPECULATION, IF THE GLIDER HAD BEEN DIRECTLY IN OUR PATH, I'M CONFIDENT THAT WE COULD HAVE EVADED A COLLISION AT THE INITIAL SIGHTING WITH A QUARTER MILE SEPARATION. IT WOULD HAVE BEEN VERY CLOSE REQUIRING AN ABRUPT PULL-UP MANEUVER. IF WE HAD NOT BEEN WATCHING, IN THIS SAME SCENARIO, I HAVE NIGHTMARES CONTEMPLATING THE RESULT.



# Q & A Time





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# Thank you for your participation today!

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