NTSB National Transportation Safety Board

Office of Aviation Safety

GA Safety Seminar
December 12, 2015

Dale Carnegie Training

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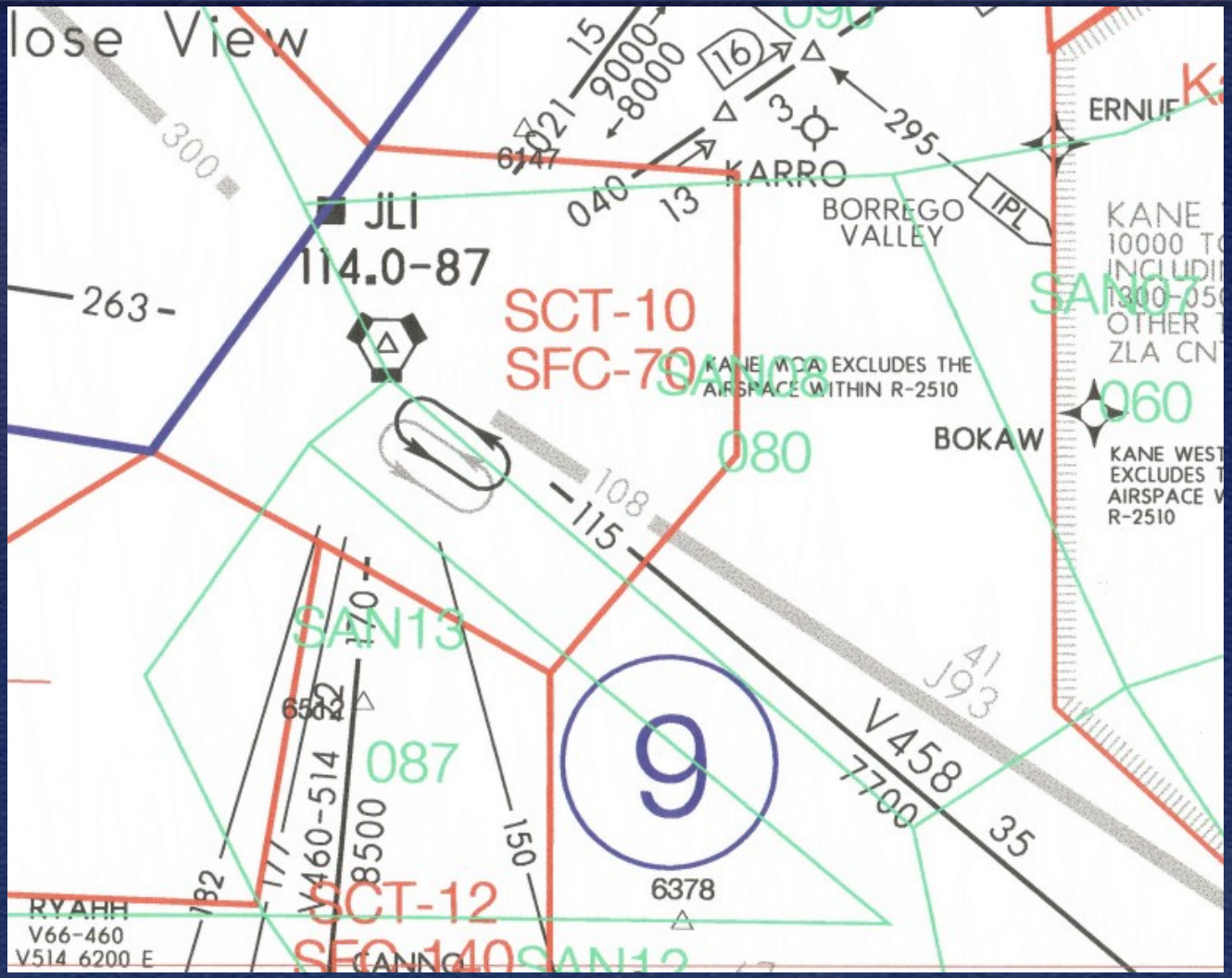
Controlled Flight Into Terrain
Julian, California

Accident Scenario

- N304PA – Controlled flight into mountains north of San Diego
- Night VMC, IFR flight plan
- Pilots - low time commercial students
- Radar controller – over 36 years of ATC experience
- Handoff controller – 21 years ATC

Location



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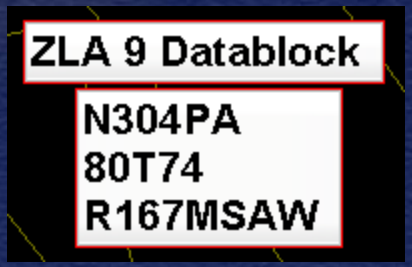
Accident Scenario

- N304PA had just been handed off to SoCal TRACON by Los Angeles Center sector 9.
- The aircraft had not yet left sector 9's area of responsibility
- Both the center and TRACON controllers were required to monitor the flight until it entered the TRACON

Accident Scenario (cont.)

- Listen for communications errors
- Watch for altitude warnings
  - Los Angeles Center MSAW



  - SoCal TRACON MSAW
  - Coast Track (CST)

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ATC Issues

- Communications problems
  - Numerous callsign errors
  - Procedural deviations
  - Controller missed incorrect readback
- Awareness of aircraft status
  - Pilot ATIS report: off altitude?
- Non-compliance with safety alert requirements

Duty Priority

- Give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment must be used in prioritizing all other provisions of this order based on the requirements of the situation at hand.

Duty Priority (cont.)

- …When more than one action is required, controllers must exercise their best judgment based on the facts and circumstances known to them. That action which is most critical from a safety standpoint is performed first.

Safety Alerts

- Issue a safety alert to an aircraft if you are aware the aircraft is in a position/altitude that, in your judgment, places it in unsafe proximity to terrain, obstructions, or other aircraft.

Safety Alerts (cont.)

- Do not assume that because someone else has responsibility for the aircraft that the unsafe situation has been observed and the safety alert issued; inform the appropriate controller.

Safety Alerts (cont.)

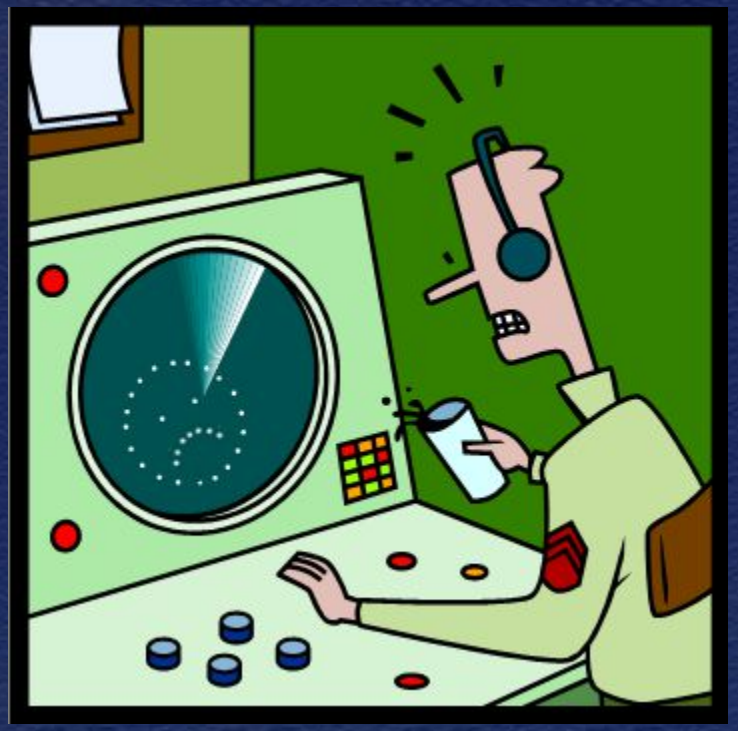
- The issuance of a safety alert is a first priority once the controller observes and recognizes a situation of unsafe aircraft proximity to terrain, obstacles, or other aircraft.

Safety Alerts (cont.)

- While a controller cannot see immediately the development of every situation where a safety alert must be issued, the controller must remain vigilant for such situations and issue a safety alert when the situation is recognized.

ATC Warning Systems

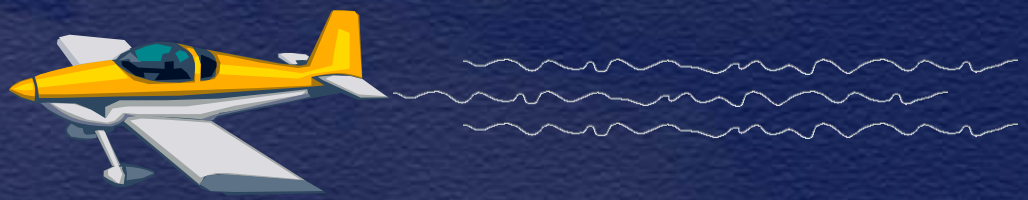
- Recognition of situations of unsafe proximity may result from Minimum Safe Altitude Warning, automatic altitude readouts, Conflict / Mode C Intruder Alert, observations on a PAR scope, or pilot reports.



Terrain / Obstruction Alert

- Immediately issue/initiate an alert to an aircraft if you are aware the aircraft is at an altitude which, in your judgment, places it in unsafe proximity to terrain/obstructions.

Safety Alerts (cont.)



- LOW ALTITUDE ALERT (call sign), CHECK YOUR ALTITUDE IMMEDIATELY.

Similar-Sounding Callsigns

- 2-4-20. AIRCRAFT IDENTIFICATION
  - Use the full identification in reply to aircraft with similar sounding identifications.

Similar-Sounding Callsigns

- 2-4-9. ABBREVIATED TRANSMISSIONS
  - Transmissions may be abbreviated as follows:
    - a. Use the identification prefix and the last 3 digits or letters of the aircraft identification after communications have been established. **Do not abbreviate similar sounding aircraft identifications** or the identification of an air carrier or other civil aircraft having an FAA authorized call sign.

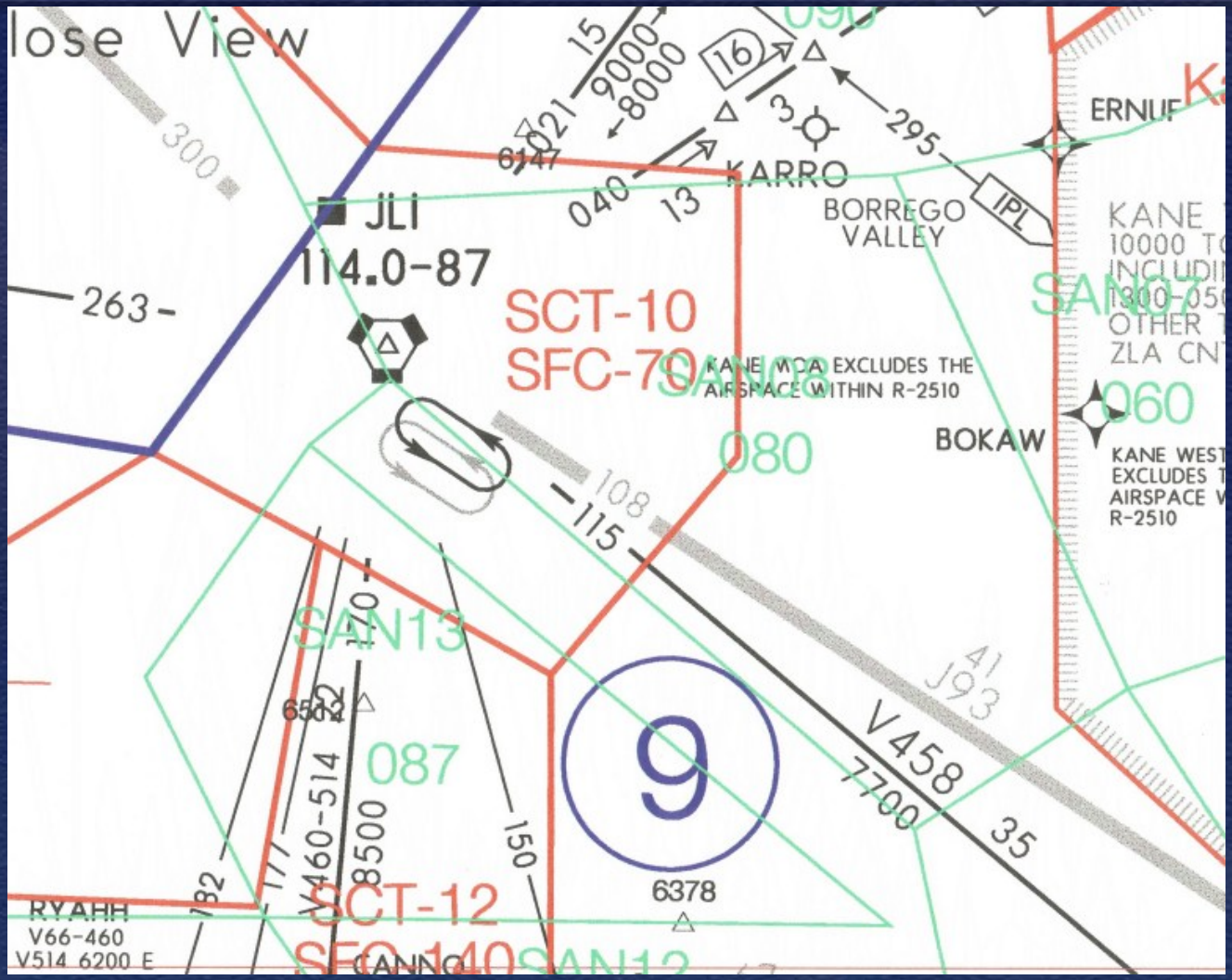
Similar-Sounding Callsigns

- 2-4-15. EMPHASIS FOR CLARITY
  - Emphasize appropriate digits, letters, or similar sounding words to aid in distinguishing between similar sounding aircraft identifications. Additionally:
  - Notify each pilot concerned when communicating with aircraft having similar sounding identifications.
  - EXAMPLE: "United Thirty-one United, Miami Center, U.S. Air Thirty-one is also on this frequency, acknowledge."

Pilot Issues

- Low total experience
- Low IFR experience
- Situational awareness / area familiarity
- Assertiveness
- N434PA caught the ATC mistake!

Location



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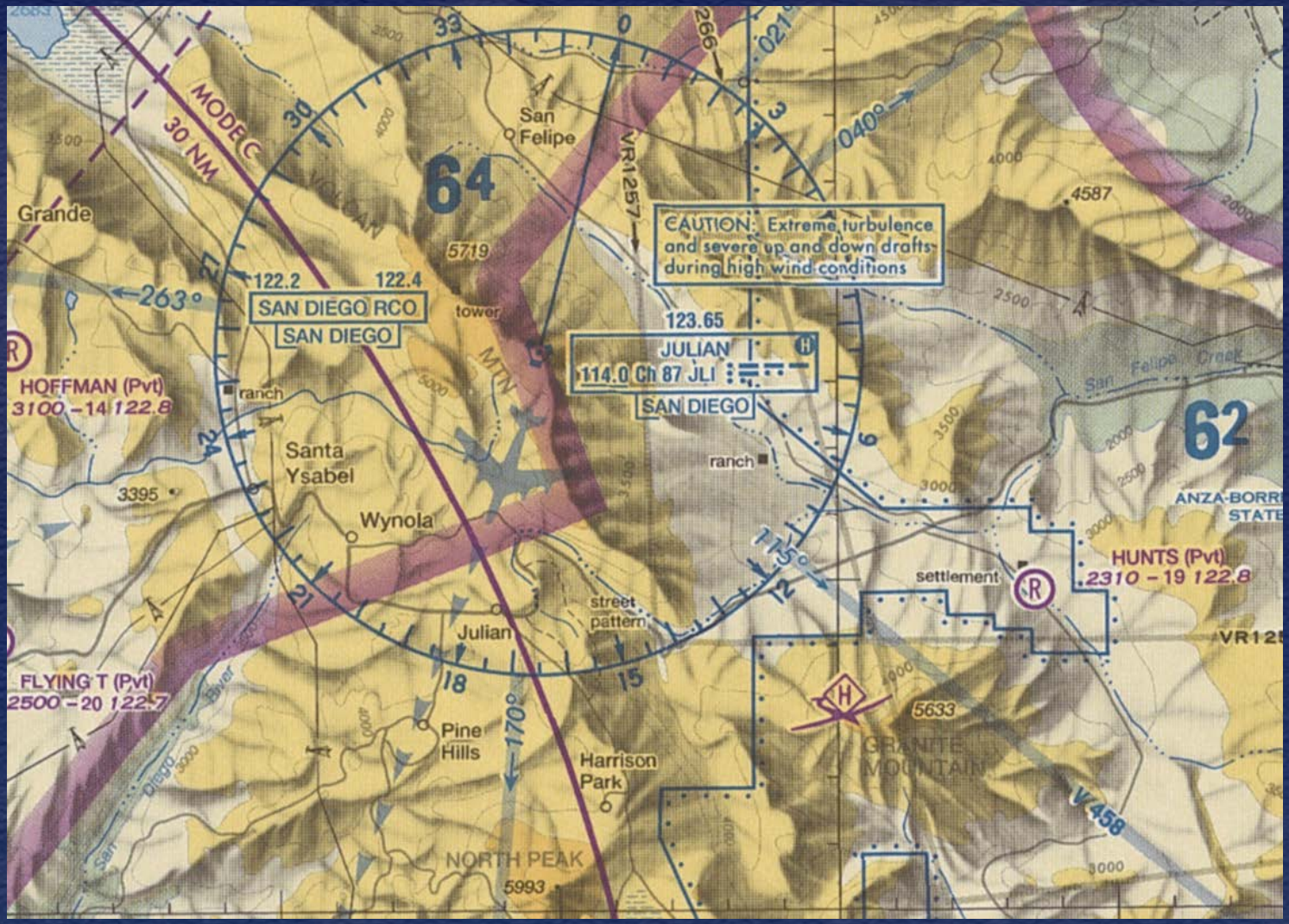
Location



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Probable Cause

- The incorrect use of an abbreviated callsign by the TRACON sector radar controller to issue a descent clearance to N434PA and the sector controller's failure to detect that the clearance had been read back with the full callsign by the pilot of N304PA. Also causal was the pilot's failure to question a clearance that descended them below the published Minimum En route Altitude (MEA). Contributing to the accident was the failure of both the Center and TRACON controllers to properly respond to the aural and visual Minimum Safe Altitude Warning (MSAW) alert.

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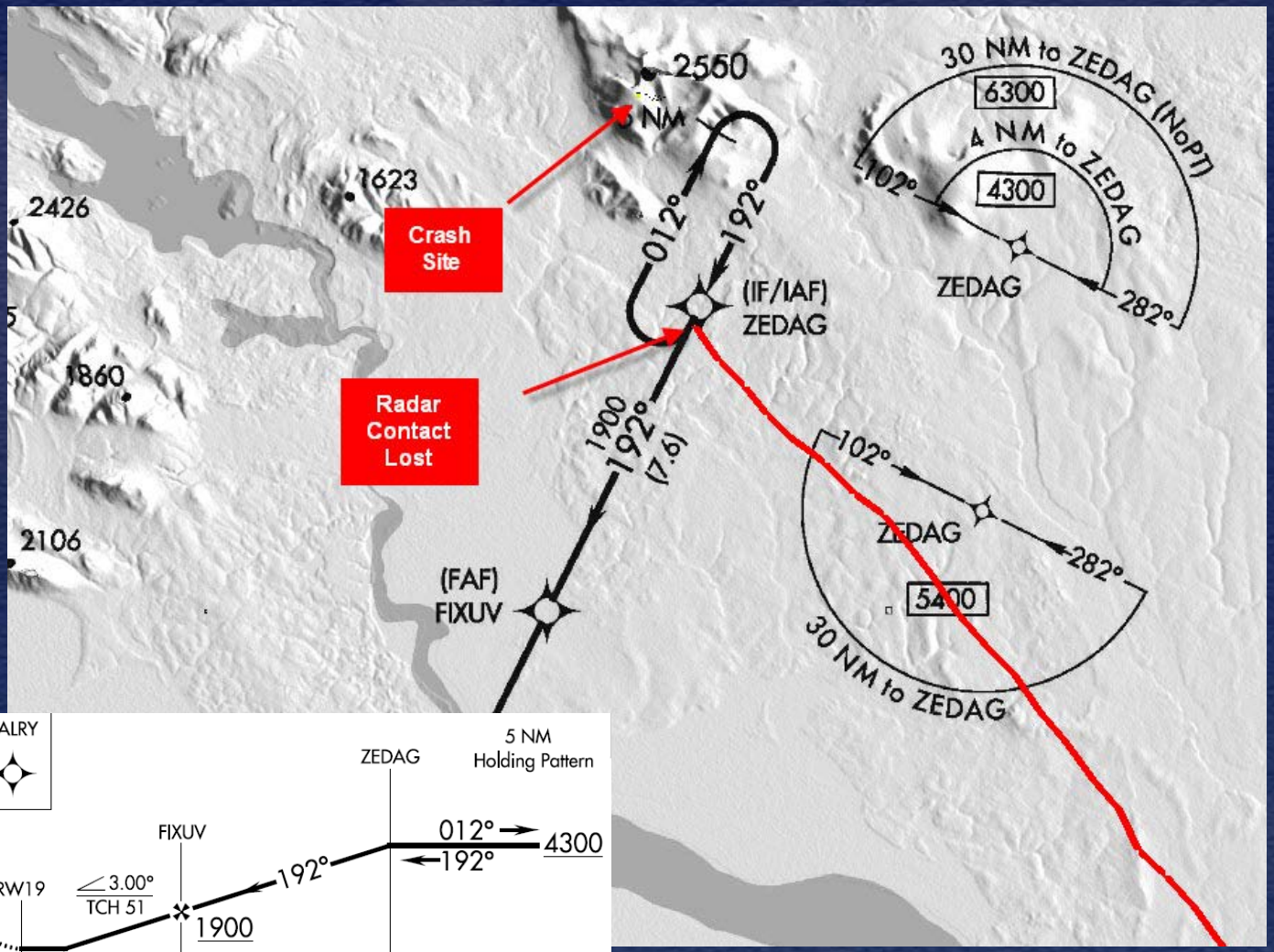
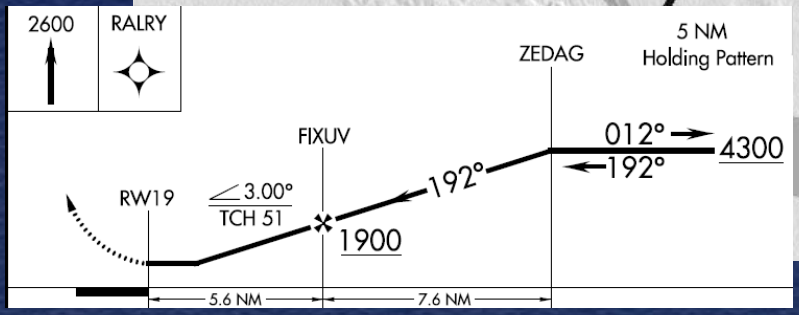
Controlled Flight Into Terrain
Aleknagik, Alaska

Accident

- Ace Air 51 (AER51) departed from King Salmon IFR to Dillingham.
- Pilot requested RNAV 19 approach and direct to ZEDAG, the IF / IAF
- Shortly before reaching ZEDAG, the pilot asked to enter holding, which was approved
- AER51 entered holding at 2000 feet and collided with terrain NE of ZEDAG

AER51 Ground Track





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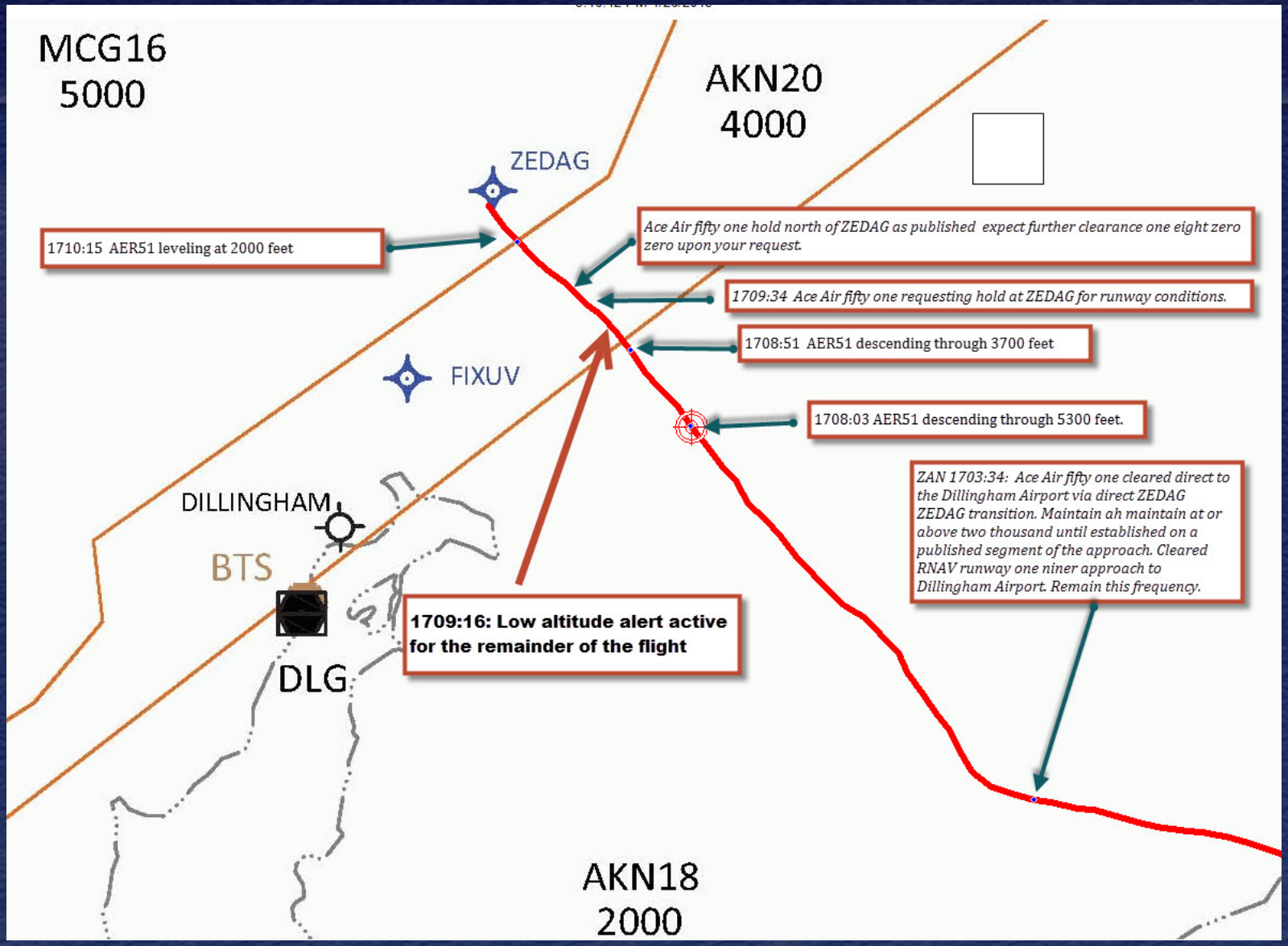
MCG16
5000
AKN20
4000
ZEDAG
1710:15 AER51 leveling at 2000 feet
Ace Air fifty one hold north of ZEDAG as published expect further clearance one eight zero zero upon your request.
1709:34 Ace Air fifty one requesting hold at ZEDAG for runway conditions.
1708:51 AER51 descending through 3700 feet
FIXUV
1708:03 AER51 descending through 5300 feet.
ZAN 1703:34: Ace Air fifty one cleared direct to the Dillingham Airport via direct ZEDAG ZEDAG transition. Maintain ah maintain at or above two thousand until established on a published segment of the approach. Cleared RNAV runway one niner approach to Dillingham Airport. Remain this frequency.
DILLINGHAM
BTS
DLG
1709:16: Low altitude alert active for the remainder of the flight
AKN18
2000

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Approach Clearance

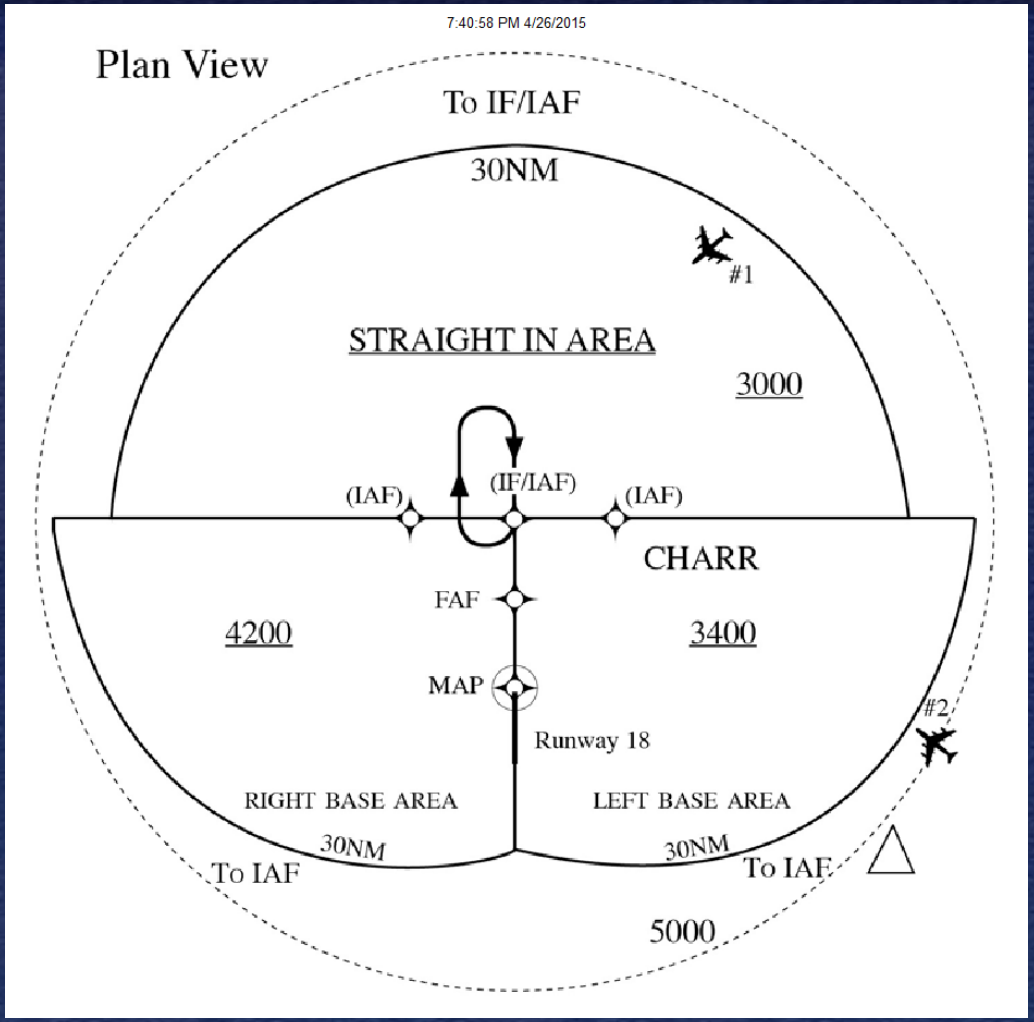
Approach Clearance

Ace Air 51 cleared to the Dillingham airport via direct ZEDAG, the ZEDAG transition, maintain...well maintain at or above 2,000 until established on a published segment of the approach, cleared RNAV runway 19 approach Dillingham airport, remain this frequency.

What does the 7110 say?

4-8-1(b): For aircraft operating on unpublished routes, issue the approach clearance only after the aircraft is: [p1 omitted]
2. Assigned an altitude to maintain until the aircraft is established on a segment of a published route or instrument approach procedure.
EXAMPLE-
Aircraft 2: The aircraft is inbound to the VOR on an unpublished direct route at 7,000 feet. The minimum IFR altitude for IFR operations (14 CFR Section 91.177) along this flight path to the VOR is 5,000 feet. "Cross the Redding V-O-R at or above five thousand, cleared V-O-R Runway Three Four Approach."

What does the 7110 say?



Aircraft 2: The aircraft is inbound to the CHARR IAF on an unpublished direct route at 7,000 feet. The minimum IFR altitude for IFR operations (14 CFR Section 91.177) along this flight path to the IAF is 5,000 feet. "Cleared direct CHARR, maintain at or above five thousand until entering the TAA, cleared RNAV Runway One-Eight Approach."

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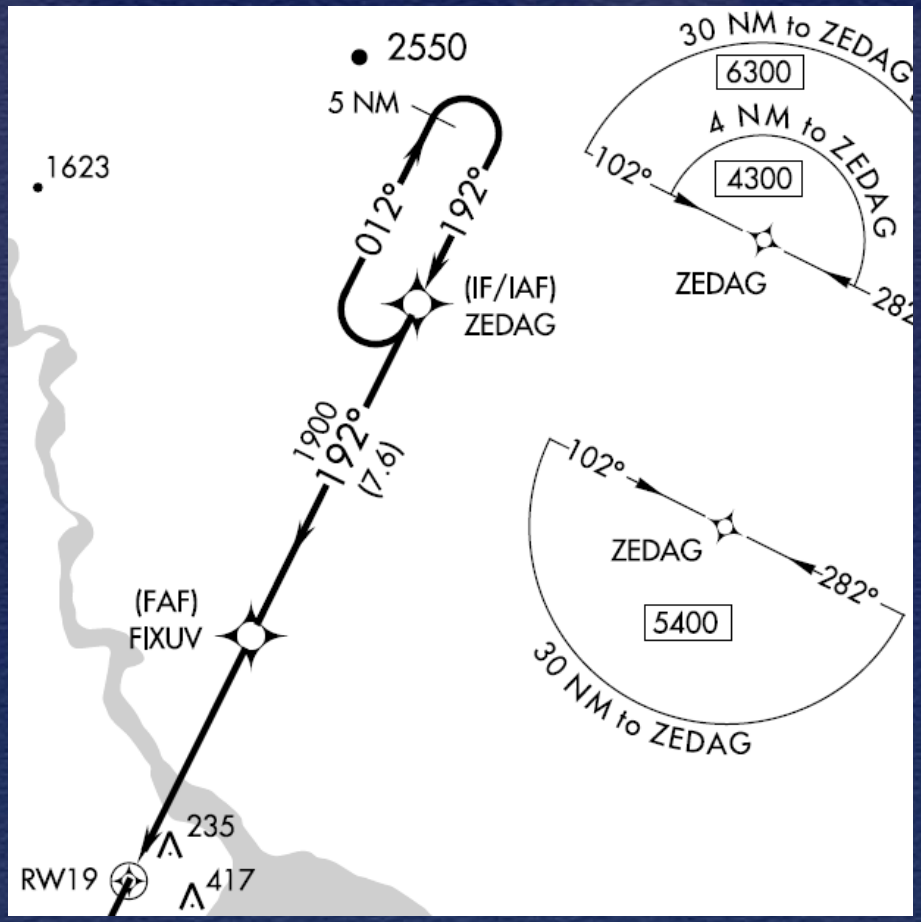
Incorrect Phraseology Can Be Ambiguous and Confusing

- Nowhere in the 7110 is use of “Maintain [altitude] until established on a published segment of the approach” permitted as approved phraseology.
- All examples of phraseology specify the segment or fix to be used to join the procedure. Pilots shouldn’t have to guess.
- Use approved phraseology – it matters!

Approach Clearance

Ace Air 51 cleared to the Dillingham airport via direct ZEDAG, the ZEDAG transition, maintain...well maintain at or above 2,000 until established on a published segment of the approach, cleared RNAV runway 19 approach Dillingham airport, remain this frequency.

Correct Clearance



- AER51 cleared direct ZEDAG, enter the TAA at or above 5,400, cleared RNAV runway one-nine approach.

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N590GM
Near Alamosa, CO

Audio Preview

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Sectional Chart

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Some hints got missed…

- The pilot is asking questions he should have known the answers to before he took off. This is major cause for concern.
- Mountain MIAs are typically 2000 AGL. If an aircraft is 2000 or more feet below the MIA, there is terrain around that's at least as high as it is. Elevated CFIT risk!
- "I'm new into Alamosa…" – BIG RED FLAG!

Some hints got missed

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SAFETY ALERT

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★Controlled Flight Into Terrain in Visual Conditions

Nighttime Visual Flight Operations Are Resulting in Avoidable Accidents

The problem

- Recent NTSB investigations have identified several accidents that involved controlled flight into terrain (CFIT) by both instrument flight rules (IFR)-rated and visual flight rules (VFR) pilots operating under visual flight conditions at night in remote areas.
- In many of these cases, the pilots were in contact with air traffic control (ATC) at the time of the accident and receiving radar service.

Some hints got missed…

- Any visual operation in remote areas can be effectively IFR – it's DARK out there! Visual terrain avoidance may be impossible.
- Know the topography of your area.
- If you have any concern about any aircraft's altitude (or anything else!), ACT! Never hesitate to take action to ensure safety.

Probable Cause

The pilot's failure to maintain clearance from mountainous terrain. Contributing to the accident was the pilot's inadequate preflight planning, improper in-flight planning and decision making, the dark night, and the controller's failure to issue a safety alert to the pilot.

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N4478F
Gatlinburg, Tennessee

Accident

- N4478F was an IFR departure from Gatlinburg, TN, an uncontrolled airport.
- The pilot filed and was cleared from Gatlinburg over Volunteer VORTAC, which is the published IFR departure route
- The pilot was offered and accepted vectors while climbing through 2,000 feet in a 3,200 MVA area. The heading issued pointed the aircraft into a 4,400 MVA area.

Photo 3: Initial Pole Strike with Cloud Cover (Courtesy of the Sevier County Sheriff's Office)

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Sheriff's Report...

plans to stay for a long weekend. She stated they left the local airport located in Sevierville and were still climbing in altitude when there was a warning alert within the plane stating "Warning Terrain" which she believed occurred three (3) times. She stated shortly after the alert there was a loud sound followed by a physical jolt to the plane. At some point the plane veered sideways and then came to a stop suspended almost upside down in the trees. She stated the family members were hanging being held by their seatbelt restraints. She stated her mother struggled loose and somehow became dislodged from her seat and fell from the plane an estimated fifteen to twenty five feet (15-25) landing on the ground below. She stated her father continued to try to free himself from his restraints when the plane became dislodged and also fell to the ground. She stated the plane at some point caught fire and was burning, but she was not sure how long it had been when it landed on the ground. She stated her father was able to get himself free and then got everyone else out of the plane and clear from the wreckage. There was a house very close to the site so

Probable Cause

The air traffic controller's failure to comly with the required vectoring and safety alert procedures, which resulted in the aircraft's flight into rising terrain. Contributing to the accident was the FAA's practice of using air traffic controllers who were performing required radar operational duties to supervise other controllers and the ATC facility's culture of non-compliance with required procedures.

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Any questions?