

MID-AIR COLLISION AVOIDANCE (MACA) PROGRAM

161st Air Refueling Wing

Goldwater Air National Guard Base

Phoenix, AZ

2024-2025



Dear Fellow Aviators,

Midair collisions are an area of vital concern to everyone who flies an airplane. The actual number of mid-air collisions between Air Force aircraft and general aviation aircraft is relatively low; however, 80 percent of reported Air Force near misses occur with general aviation aircraft. Because of increasing general aviation traffic and heavy concentrations of military aircraft involved in training, we want to inform you about the flying characteristics and activity of the KC-135.

The purpose of this document is to alert you to the many areas of high midair collision potential in the skies over Arizona and to discuss ways to make them safer. This document will describe some of the types of military aircraft you may encounter, VFR arrival and departure routes, and military operating areas. It also provides information regarding midair collisions and ways we can all help avoid them.

The superb airmen assigned to the Goldwater Air National Guard (GANG) base are committed to maintaining a valid and active midair collision avoidance program. We hope this document will serve to increase your understanding of GANG flying activities so we may continue to safely share the skies. If you desire any additional information or a briefing from the GANG Base MACA team concerning our operations, please contact the GANG Flight Safety Office at (602) 302-9274 or 161arw.se.safetyorg@us.af.mil.



GOLDWATER AIR NATIONAL GUARD MISSION

The KC-135 is the core air refueling platform for the United States Air Force and has excelled in this role for more than 50 years. The 161st operates the KC-135 “R” model, the latest version of the aircraft. Depending on the fuel storage configuration, the KC-135 can carry up to 200,000 pounds of JP-8 fuel, and 83,000 pounds of cargo, or personnel. Between aeromedical evacuations, disaster relief efforts, and delivery of cargo and personnel, the 161st is one of the busiest tanker units in the Air Force and the Air National Guard. The wing deploys the tanker globally, landing and operating in both foreign and domestic soil in order to support multinational military and humanitarian missions, flying an average of 3,800 hours annually.

Today, Goldwater Air National Guard Base has capacity to host four additional KC-135s. For accommodations in the future, the base is pursuing construction that will extend its existing ramp eastward. In the long term, the expanded ramp area would perfectly accommodate the beddown of any larger, next generation refueling aircraft.

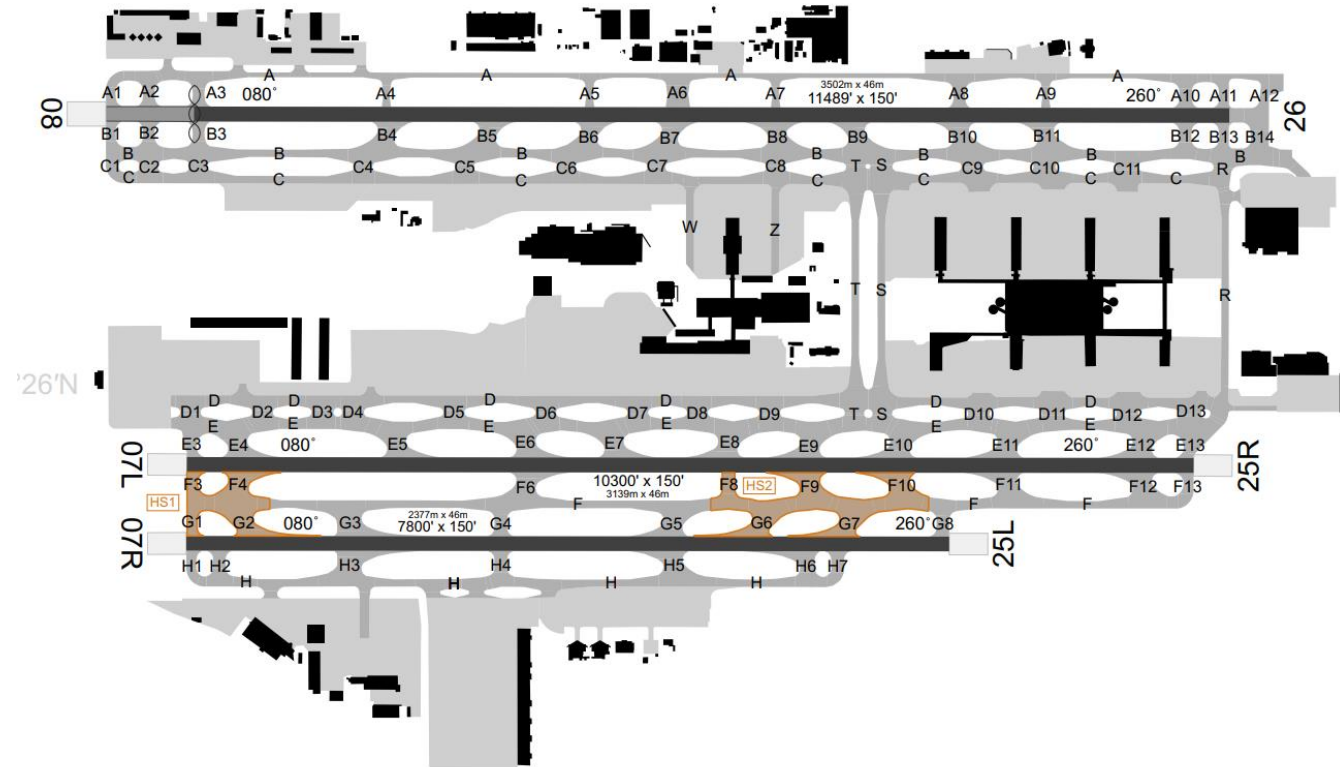
Air refueling is an important aspect of pilot training at Luke Air Force Base, Davis-Monthan Air Force Base, the 162nd Wing at Tucson International Airport, Marine Corps Air Station Yuma, and for the hundreds of military aircrews that train in Arizona’s plentiful airspace and year-round flying weather.

-161 ARW Fact Sheet



GOLDWATER AIR NATIONAL GUARD BASE

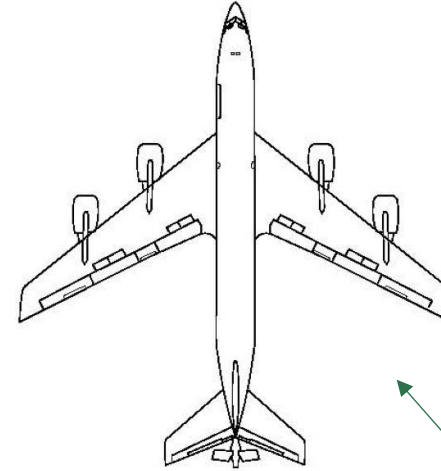
- Airport Identifier: KPHX
- Lat/Long: 33-26-03.4000N 112-00-41.7000W
33-26.056667N 112-00.695000W
33.4342778,-112.0115833
- Elevation: 1134.8 ft. / 345.9 m (surveyed)
- Variation: 12E (2000)
- Location: 3 miles E of PHOENIX, AZ
- Time zone: UTC -7 (year round; does not observe DST)
- Airport use: MILITARY/CIVILIAN (Open to the public)
- Activation date: 04/1940
- Control tower: YES
- Attendance: CONTINUOUS



- Airspace: CLASS B
- Wind indicator: lighted
- Beacon: white-green (lighted land airport)

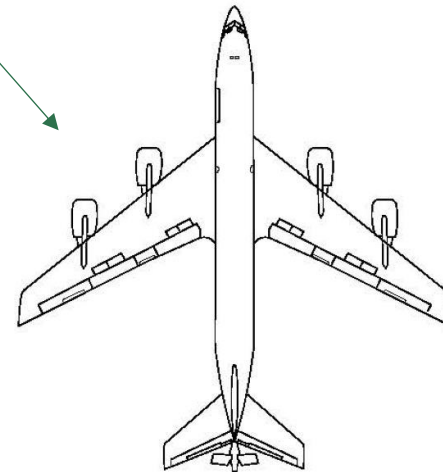
KC-135 OPERATING INFORMATION

- Mission: Multi-purpose global support platform
- Formation: 2-5 aircraft (usually single aircraft- Formations usually consist of 2 aircraft)
- Airspeeds
 - Departure: 180-250 kts or per the Departure Procedure
 - Recovery/Pattern: 160-250 kts
 - Approach: 140-190 kts
- TCAS: ETCAS (Civilian equivalent of TCAS II)
- ADS-B: OUT
- Radios: UHF and VHF capable, primarily use VHF to communicate with Air Traffic Control.
- KC-135 typically operates under IFR flight plans



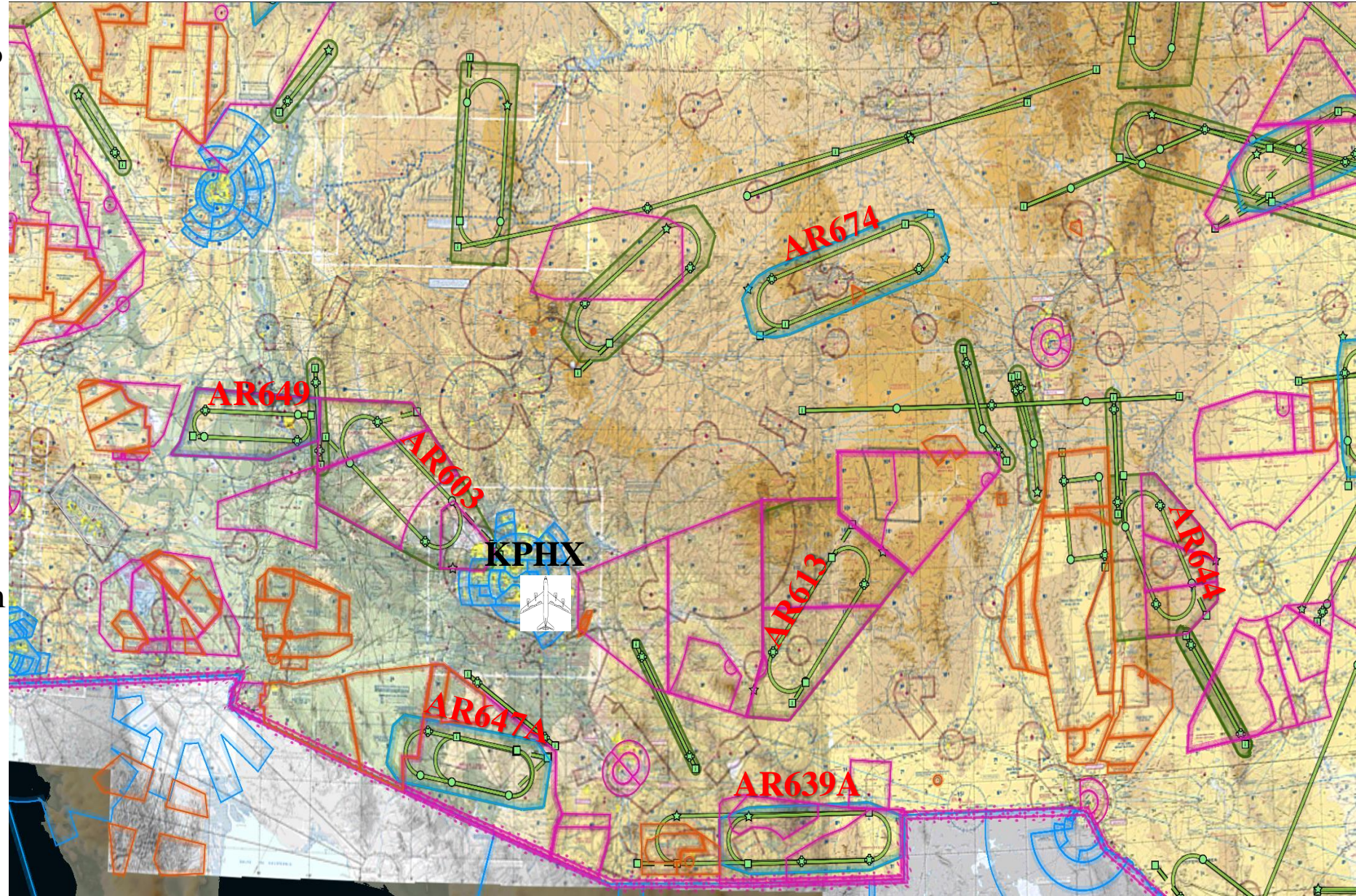
Typically:
1 nm horizontal separation
500' vertical separation

NOTE:
If you hear “COPPER __ FLIGHT”
checking in on ATC radios, that is a
formation flight- LOOK OUT FOR
MULTIPLE AIRCRAFT



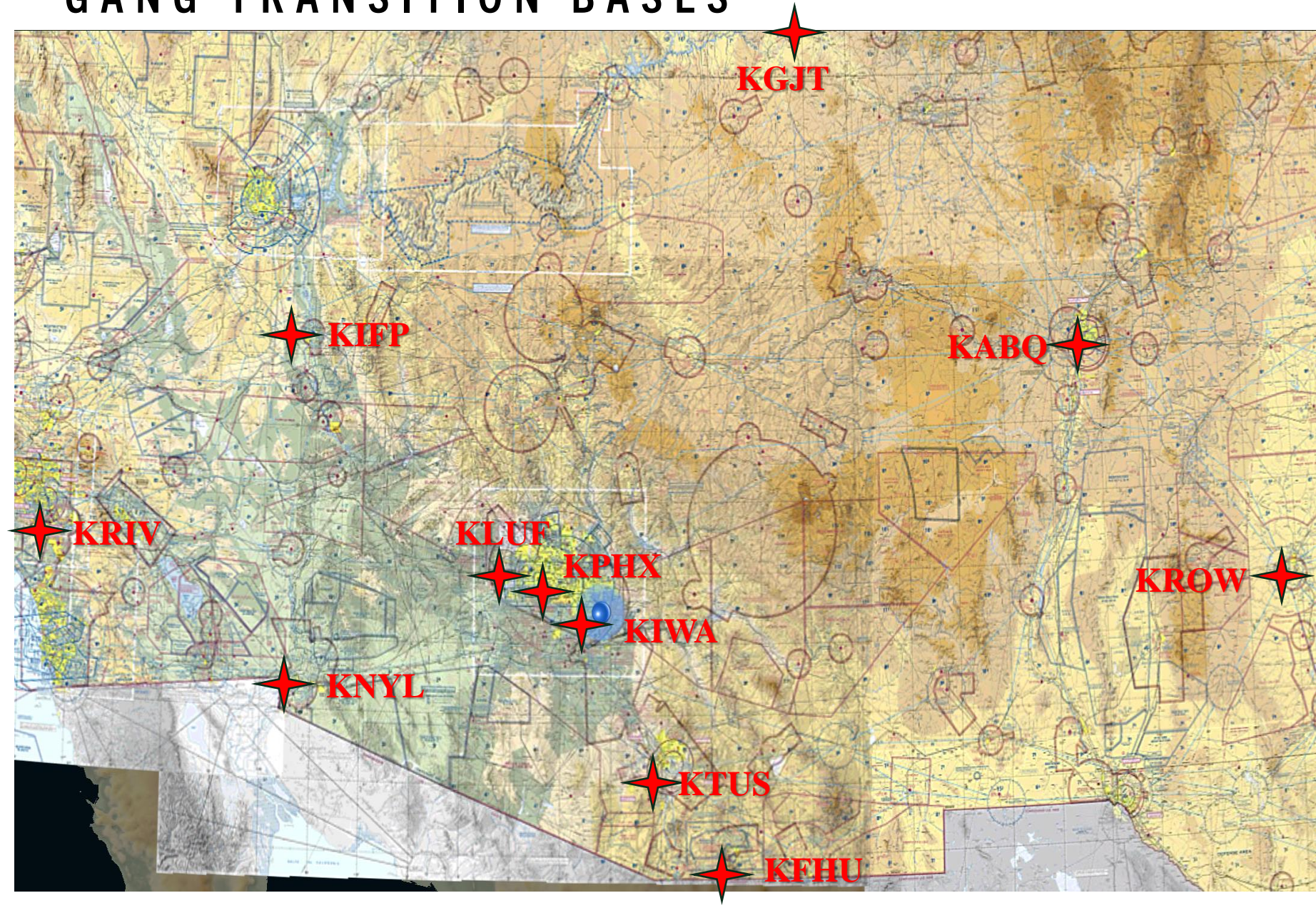
GANG LOCAL FLYING OPERATIONS

- The KC-135 spends about 50% of its local flying time in Air Refueling Tracks
- Local tracks we work in:
 - AR639A
 - AR647A
 - AR603
 - AR649
 - AR674
 - AR613
 - AR644
- Operating Altitudes range from 10,000' MSL to FL300



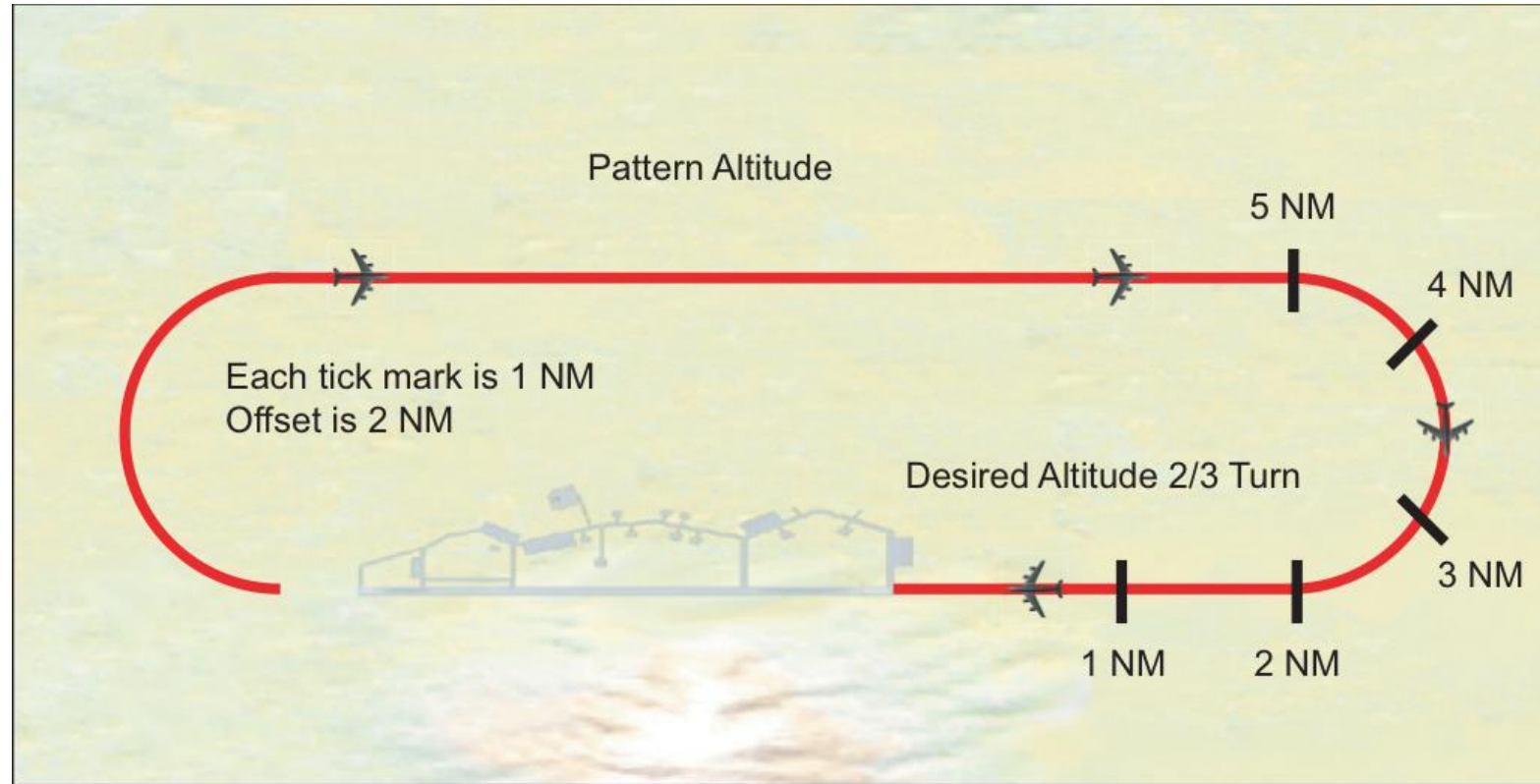
GANG TRANSITION BASES

- The KC-135 spends the other part of its local flying time doing touch and goes at different airfields
- Airfields we frequent:
 - KIWA
 - KLUF
 - KTUS
 - KFHU
 - KNYL
 - KABQ
 - KRIV
 - KIFP
 - KROW
 - KGJT
- Operating Altitudes range from surface to 1,500' MSL



KC-135 TRANSITION PROFILE

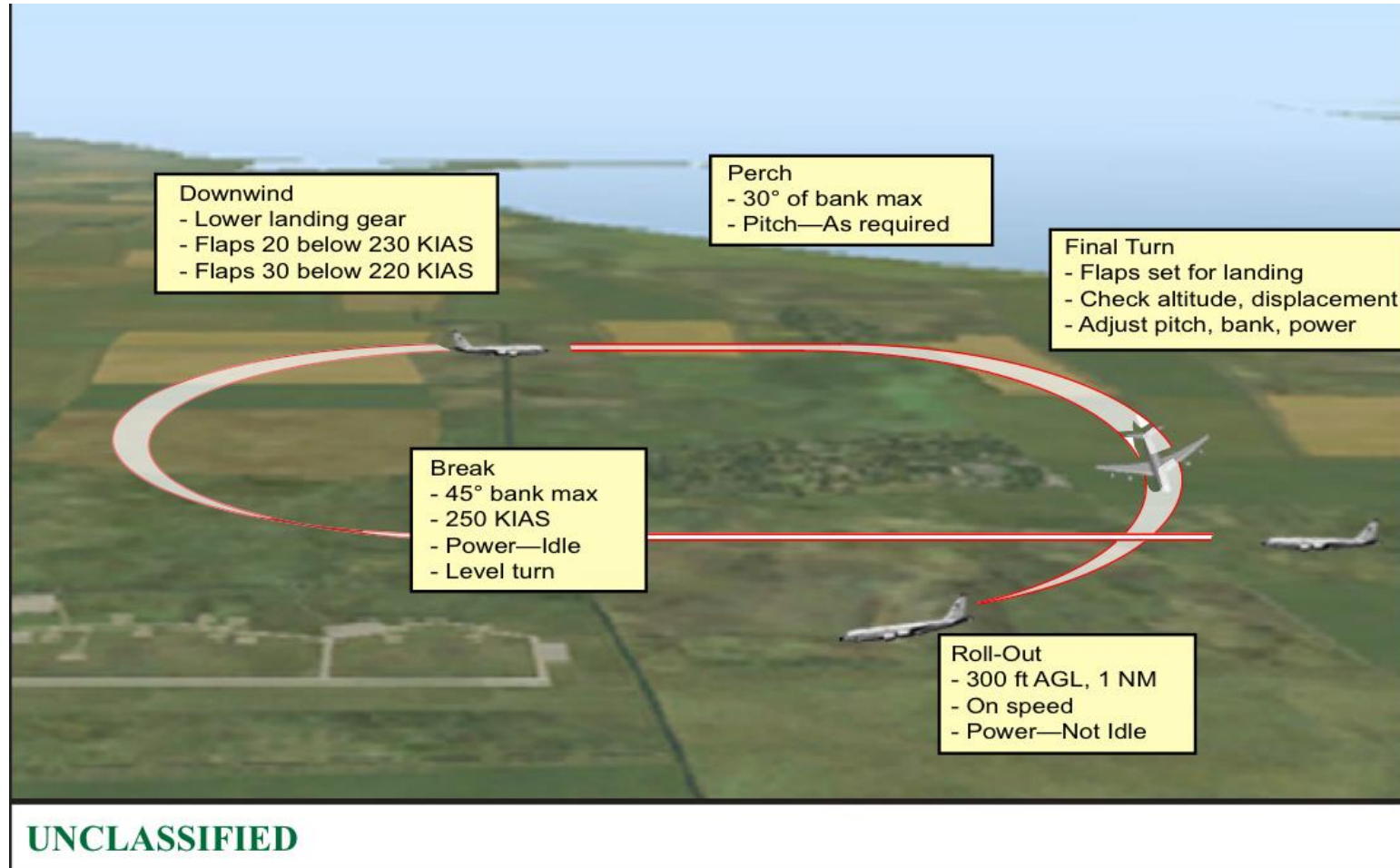
- The KC-135 spends about 40% of its flying time in the terminal area
- During transition training the aircrew are learning, teaching, and practicing new techniques along with emergency and normal procedures
- The KC-135 typically uses the standard VFR pattern profile during transition (Tough & Go) training
- Like most other traffic in the pattern there is a significant amount of training accomplished during this period, be on the lookout



UNCLASSIFIED

KC-135 OVERHEAD PROFILE

- The other type of pattern you may see the KC-135 accomplish is the overhead pattern
- This pattern is a very fast paced, continuous turn to land, high workload pattern
- If you see the KC-135 performing one of these, be on the look out for wake turbulence and wingtip vortices



KC-135 AIRCRAFT CATEGORY

- The KC-135 gross weight can vary between 140,000 lbs. up to 340,000 lbs. However, we are always considered a “Heavy” aircraft
- According to the AIM, any preceding “Medium or Light” aircraft should maintain a distance of 5-6 nautical miles or 2-3 minutes of separation
- It is highly recommended that you adhere to the separation minimum to allow a safer environment for all aviators

Aircraft Categories		Separation Minima - Time		Separation Minima - Distance	
Leading aircraft	Following aircraft	Departure* (minutes)	Arrival (minutes)	Departures* (nautical miles)	Arrival (nautical miles)
SUPER	HEAVY	2	3	6	6
	MEDIUM	3	3	7	7
	LIGHT	3	4	8	8
HEAVY	HEAVY	Distance only	Distance only	4	4
	MEDIUM	2	2	5	5
	LIGHT	2	3	6	6
MEDIUM fixed-wing aircraft with MTOW of 25,000 kg or more, and all MEDIUM helicopters	LIGHT	2	3	5	5



A WORD ABOUT “VISUAL SEPARATION”

AIM: Pilot/Controller Roles and Responsibilities

5-5-12. Visual Separation

a. Pilot.

1. Acceptance of instructions to follow another aircraft or to provide visual separation from it is an acknowledgment that the pilot will maneuver the aircraft as necessary to avoid the other aircraft or to maintain in-trail separation. Pilots are responsible to maintain visual separation until flight paths (altitudes and/or courses) diverge.
2. If instructed by ATC to follow another aircraft or to provide visual separation from it, promptly notify the controller if you lose sight of that aircraft, are unable to maintain continued visual contact with it, or cannot accept the responsibility for your own separation for any reason.
3. **The pilot also accepts responsibility for wake turbulence separation under these conditions.**



NEAR MIDAIR COLLISION

- Definition: A near midair collision (NMAC) as defined by the AIM (7-6-3) is “an incident associated with the operation of an aircraft in which a possibility of collision occurs as a result of proximity of less than 500 feet to another aircraft, or a report is received from a pilot or a flight crew member stating that a collision hazard existed between two or more aircraft.”
- Although the AIM mentions a definitive 500-foot proximity in this definition, it goes on to allow pilot or flight crew member to make a determination if a collision hazard existed regardless of how close the aircraft came to one another. Therefore, use your judgment and make an honest assessment.
- If you believe a collision hazard existed, report it. It’s your responsibility!



REPORTING A NEAR MIDAIR COLLISION

- Reporting a NMAC: First, you must inform ATC by using the following verbiage. “I wish to report a near midair collision.” This is in accordance with the AIM 7-6-3. Properly notifying ATC will ensure the necessary data is saved.
- NMACs are reported on FAA Form 8020-21, “Preliminary Near Midair Collision Report,” and should contain the following information:
 - Date, time, and location of the NMAC
 - Fix or facility nearest the NMAC
 - The NMAC location in respect to the fix or facility
 - Aircraft information, such as make, model, and registration number
 - Type of flight rules during the NMAC
 - The aircraft altitude during the NMAC
 - A brief description of the NMAC, along with comments
- Your participation in the reporting process is highly encouraged and essential for improvements in the air traffic system and mishap prevention.



A SOMBER TAIL TOO CLOSE TO HOME

- March 13th, 1982, a KC-135 callsign COPPER 5 was on a routine formation flight in northern Arizona
- Copper 5 returned to Luke Air Force Base to accomplish some practice IFR approaches
- Descending through 2,700 MSL on the HI-TACAN 3L Copper 5 started to emerge from the bottom of a cloud layer
- At the same location an American AA-A1 Yankee Grumman (VFR) was trying to “scud run” beneath some clouds heading west to Livermore CA, out of KPHX
- Luke AFB control tower had already called out unrelated traffic to the KC-135 but they did not see the Grumman



REGARDLESS OF WHO IS AT FAULT, EVERYONE LOSES IN A MIDAIR

A SOMBER TAIL TOO CLOSE TO HOME

- The Luke controllers saw the Grumman too late to warn Copper 5. The Grumman made a hard bank to its left (south) to try and avoid a midair collision
- It was too little too late; the Grumman impacted the KC-135 on the right side aft of the R2 door. Severing the vertical stabilizer, the KC-135 rolled inverted and crashed into the ground
- All individuals involved were killed. The two occupants of the Grumman along with Lt. Col. James Floor, Maj. Truman Young Jr., Lt. Col. Ted Beam, and Tech. Sgt. Donald Plough all belonging to COPPER 5.
- The callsign COPPER 5 has since been permanently retired in honor of the crew.
- A KC-135 tail has been memorialized for COPPER 5 at the entrance of the 161st ARW.



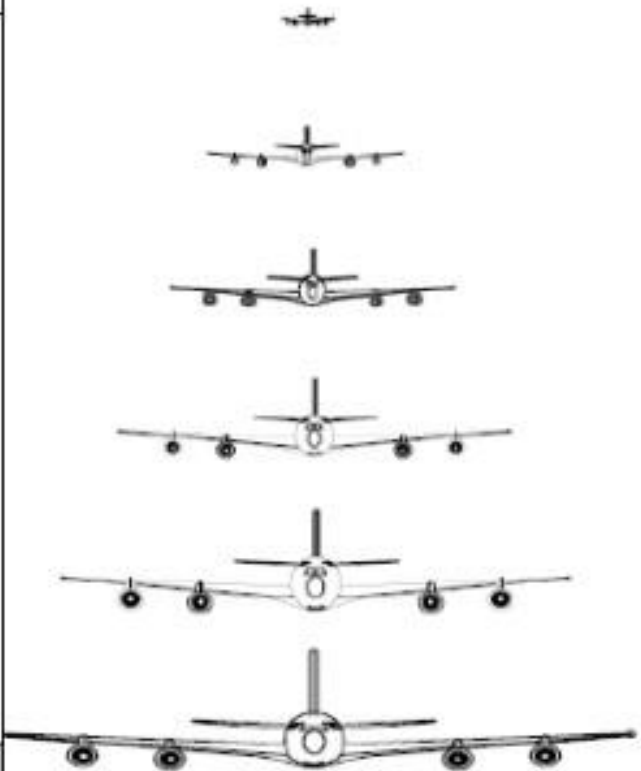
AIRCRAFT CLOSURE RATE

- For a pilot unaware of surrounding traffic, it takes approximately 10 to 12 seconds to spot the traffic, identify it, realize it's a collision threat, react, and have the aircraft respond
- Two aircraft converging at 750 mph may be less than 12 seconds apart when the pilots are first able to detect each other
- It is imperative for pilots and aircrew to engage in diligent clearing procedures to identify early and often potentially hazardous threats
- The reason most often noted in midair accident statistics is "failure of pilot to see other aircraft".
- In most cases, one of the pilots involved could have seen the other aircraft in time to avoid contact by using proper scanning techniques.

AIRCRAFT CLOSURE RATE CHART

Based on the combined speeds of two aircraft.

Distance	Seconds	Seconds
	At 600 MPH	At 210 MPH
10 miles	60	170
5 miles	30	85
3 miles	18	56
2 miles	12	38
1 mile	6	18
.5 mile	3	9



PILOT REACTION TIME

- One function of the eye that is a source of constant problems to the pilot is the time required for accommodation.
- Our eyes automatically refocus and accommodate on near and far objects.
- The change from something up close, like a dark panel two feet away, to a well-lighted landmark or aircraft target a mile or so away, takes 1 to 2 seconds, or longer, for eye accommodation.
- That can be a long time when you consider the 12-15 seconds needed to avoid an in-flight collision.

Event	Seconds
See Object	0.1
Recognize Aircraft	1.0
Become Aware of Collision Course	5.0
Decision to Turn Left or Right	4.0
Muscular Reaction	0.4
Aircraft Lag Time	2.0
TOTAL Time Before Aircraft Begins to Move	12.5

PROFILE OF MIDAIR COLLISIONS

- During a three-year study of midair collisions involving civilian aircraft, the National Transportation Safety Board (NTSB) determined that:
 - 1) The occupants of most midairs were on a pleasure flight with no flight plan filed.
 - 2) Nearly all midair collisions occurred in VFR conditions during weekend daylight hours.
 - 3) The majority of midairs were the result of faster aircraft overtaking and hitting a slower aircraft.
 - 4) No pilot is immune. Experience levels in the study ranged from initial solo to the 15,000 hour veteran.
 - 5) The vast majority of midairs occurred at uncontrolled airports below 3,000 feet.
 - 6) Enroute midairs occurred below 8,000 feet and within 25 miles of the airport.
 - 7) Flight instructors were onboard one of the aircraft in 37% of the midairs.

HOW YOU CAN PREVENT MIDAIR COLLISIONS

1. PLAN AHEAD - Thoroughly plan and review your intended route of flight before walking to your aircraft. If possible, plan to avoid alert areas, MTRs, and MOAs. Check NOTAMs and identify potential conflict areas.

2. SEE AND AVOID - Scan the airspace ahead of your flight path and to the side using a disciplined scan pattern. Check behind you, if you can, since the majority of mid-air collisions occur when faster aircraft overtakes a slower one.

3. CLEAR - Before executing a climb, turn, descent, or any other maneuver, ensure the area is clear!

4. COMMUNICATE - When flying into or out of uncontrolled airports, broadcast your position and intentions. Request and use all available RADAR services whenever possible. Don't relax your visual scan in a RADAR controlled environment.

5. SQUAWK - If your aircraft is transponder equipped turn it on.

6. BE SEEN - Turn on your anti-collision lights and/or other appropriate lights whenever the engine is running. Turn on your landing light (within POH recommendations/limitations) when operating below 10,000' MSL, day or night, but especially within 10 miles of an airport or in areas of reduced visibility.

QUESTIONS

- Please reach out to us if you have any questions or comments.



- GANG Flight Safety Office at (602) 302-9274 or 161arw.se.safetyorg@us.af.mil.