# SYLLABUS NOTES

- Primary reference - USN T-45C NATOPS
- Secondary references -
  - USN FTI T-45 FAM P-1212
- Revised - 26 March 2023

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# BASIC QUALIFICATION TRAINING

# Fundamentals & Basic Two-Ship Operations

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# LEARNING OBJECTIVES

- Understand standardised start-taxi-takeoff procedures
- Perform two-ship departures and arrivals
- Execute standard two-ship formations
- Perform circuits (field)
- Understand the basics of radio communications

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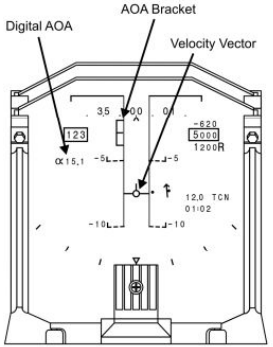
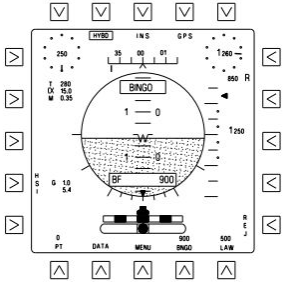
# PREREQUISITES

- Understand effect of lift augmentation surfaces
- Perform level, stable flight in clean configuration
- Perform level, stable flight in landing configuration
- Maintain on-speed AoA
- Perform climbing turns
- Perform descending turns




T-45C HUD AoA Display




T-45C ADI Display (MFD)

- AoA Indicators
  - HUD / ADI Display (MFD)
    - Digital AoA
    - AoA Bracket
  - AoA Indicator
  - AoA Indexer

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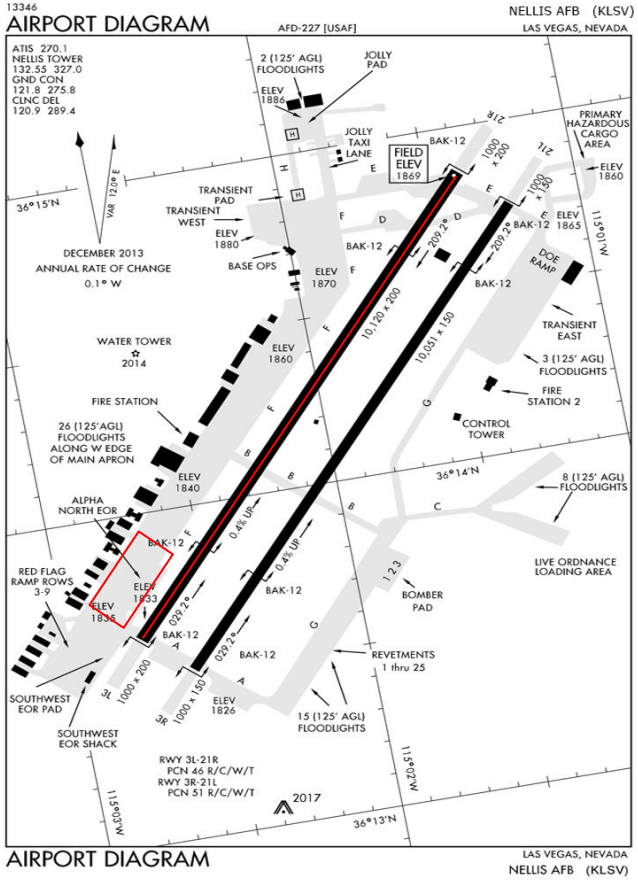
# NELLIS AFB

- Two parallel runways - Left/Right
  - 03 / 21 (029° / 209°)
- Elevation: 1869ft AMSL
- Pattern altitude: ~1,500ft AGL / 3,369ft AMSL
- TACAN: 12X
- ILS: 21L - 109.10
- ATIS: 270.1
- Ground/Tower: 132.55

## AWG-DU Standard Callsigns

- HAMMER
- ANVIL
- DRILL

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# STTO

- Startup per checklist
- Initial check-in post start - Comm 1: Nellis / Comm 2: Flight
  - **Comm 2** - Lead: “HAMMER Flight; HAMMER 11”, Wingman: “2”
- When ready to taxi
  - Taxi/Landing Light On (field only)
  - **Comm 2** - “HAMMER 11/12, up and ready - green jet”
  - **Comm 2** - Lead: “HAMMER push Comm 1, 1-3-2 decimal 5-5”
    - *No response required*
  - **Comm 1** - Lead: “HAMMER Flight; HAMMER 11”, Wingman: “2”
  - **Comm 1** - Lead: “HAMMER, 2-ship Goshawks taxi from ALPHA NORTH EOR for Runway 0-3 Left”
  - **Comm 2** - Lead: “1, Taxi”, Wingman: “2, Taxi”
- Ground speed:
  - Turns 10kts
  - Straight <25kts

**CHECKLIST** FORWARD COCKPIT ONLY — T-45C — DimOn

**PRESTART**

1. Parking brake ..... SET *(pulled OUT)*
2. ENGINE switch ..... ON
3. Exterior and interior lights ..... SET
4. Ext. lts master switch ..... OFF / **FIELD: ON**
5. ANTI-SKID switch ..... OFF / **FIELD: ON**
6. Standby baro altimeter ..... SET PRESSURE
7. GEN switch ..... ON
8. BATT 1 and BATT 2 switches ..... ON

THE BATTERIES WILL DISCHARGE AFTER 25 MINUTES UNDER LOAD, RENDERING THE AIRCRAFT INOPERABLE

**STARTING ENGINE**

1. GTS start button ..... PRESS MOMENTARILY, wait for ‘GTS’ light *(15 sec)*
2. ENGINE switch ..... HOLD in START position until ‘READY’ light goes on
3. Throttle ..... PRESS the FINGER LIFT once RPM reaches 20%
4. HUD, MFDs ..... ON *Left MFD: ADI, right MFD: HSI*
5. Radios / VOR, ILS, TCN ..... ON / SET

**POSTSTART / PRIOR TO TAXI**

1. Throttle ..... Advance slowly to 70% RPM
2. HYD 2 RESET button ..... PRESS *Check that ‘HYD’ caution light goes out*
3. Throttle ..... IDLE
4. Pitch trim ..... 3.5° UP / **FIELD: 2° to 3° UP** *Ensure no pressure on the stick*
5. (DEP) LAW, BINGO ..... SET
6. Flaps/slats ..... FULL / **FIELD: 1/2**
7. Parking brake ..... RELEASE *(pushed IN)*

DURING TAXI ABOARD SHIP CANOPY MUST BE CLOSED AND EJECTION SEAT ARMED

**BEFORE TAKEOFF / CATAPULT HOOK-UP**

1. PITOT HEAT switch ..... AS REQUIRED
2. Anti-skid, Flaps, Trim ..... CROSS-CHECK
3. Canopy / Seat ..... CLOSED / ARMED

RAISE LANDING GEAR PRIOR TO 200 KIAS.
RAISE FLAPS/SLATS ABOVE 140 KIAS AT SAFE ALT.

**DESCENT / PENETRATION**

1. MASTER ARM switch ..... SAFE
2. NAVAIDS ..... TUNED
3. Standby baro altimeter ..... SET PRESSURE
4. (DEP) LAW ..... SET

**LANDING**

1. Gear ..... DOWN *(below 200 KIAS)*
2. Flaps/slats ..... AS REQUIRED
3. Hook ..... AS REQUIRED
4. Speed brakes ..... AS REQUIRED
5. ANTI-SKID switch ..... OFF / **FIELD: ON**

**AFTER LANDING / CLEAR OF RUNWAY**

1. Seat ..... ARMED / **FIELD: SAFE**
2. Speed brakes ..... RETRACT
3. Flaps/slats ..... UP
4. Trim ..... SET TO ZERO
5. HUD, NAV equipment ..... OFF
6. PITOT HEAT switch ..... OFF

**BEFORE ENGINE SHUTDOWN**

1. Parking brake ..... SET
2. MFDs, Radios ..... OFF
3. Throttle ..... OFF
4. Seat / Canopy ..... SAFE / AS DESIRED

45 SECONDS AFTER SETTING THROTTLE TO OFF:

5. BATT 1 and BATT 2 switches ..... OFF
6. All remaining switches ..... OFF
7. ENGINE switch ..... OFF

| EXTERIOR LIGHTS | NAVIG | FORMAT | A-COLL | LAND |
|---|---|---|---|---|
| DECK – DAY<br>RECOVERY – DAY | OFF | | | OFF |
| DECK – NIGHT | STARTUP AND TAXI — OFF<br>‘SALUTE’ — ON, BRIGHT<br>NO-GO — OFF ASAP<br>ONCE TRAPPED — OFF | | | |
| RECOVERY – NIGHT | ON, BRIGHT | | | |
| GROUND (FIELD) | AS REQUIRED, NIGHT ONLY | | ON | AS DES. |
| RWY ENTRY (FIELD) | | | | ON |

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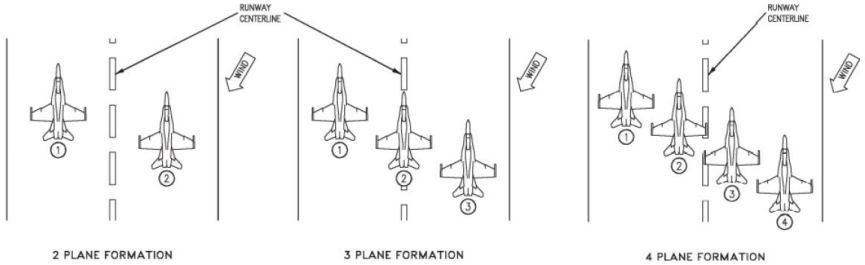
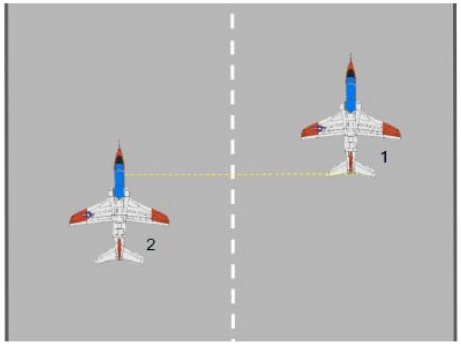
# LINE UP

- Formation line up
  - Lead lines up downwind
  - Visual cue: Wingman's head in line with exhaust can of lead's aircraft




- Visual check of next aircraft (speed brake, flaps, nosewheel, launch bar)
- **Comm 1** - Lead: "Nellis Traffic, HAMMER Flight, 2-ship, Take-off Runway 0-3 Left, departing to the North"
- **Comm 2** - Lead: "HAMMER, Run it up"
  - *No response required*
  - Advance engines to 80%
- **Comm 2** - Lead: "1, Green jet", Wingman: "2, Green jet"

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# TAKE OFF

- Section takeoff
  - **Comm 2** - Lead: “Brakes, Brakes, Brakes”
  - Throttle gentle advance to 95%, anticipate rotate ~120kts
    - **Comm 2** - Lead: “Rotate”
  - Lead calls gear and flaps up before 200kts
    - **Comm 2** - Lead: “Gear up”
    - **Comm 2** - Lead: “Flaps up”
  - Strive to maintain parade formation
- Stream takeoff
  - 7 seconds from Lead’s brake release
- ~5° NU, 250kts until rejoin, accelerate to 300kts

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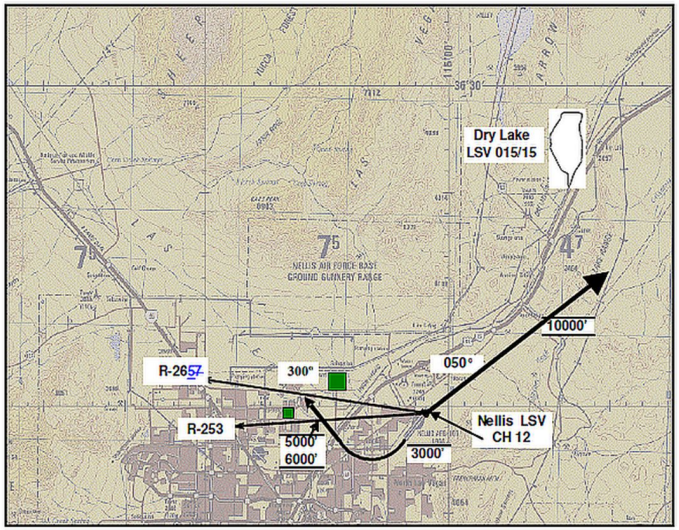
# DEPARTURE

## Runway 03

- Cross departure end at or below 3,000ft AMSL (1,131ft AGL)
- Turn right heading 050°, climb and maintain 10,000ft AMSL

## Runway 21

- Cross departure end at or below 3,000ft AMSL (1,131ft AGL)
- Turn right heading 300° to stay inside 4 DME, intercept Radial 265 outbound
- Climb and maintain 10,000ft AMSL

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# REJOINS

## Rejoin SOP

- **Comm 2** - Wingman: “2, Visual”, Lead: “Cleared Rejoin Right/Left”
- Contract Speed 250kts, Start 1,000ft below
- Work Cycle: **UP - FORWARD - IN**

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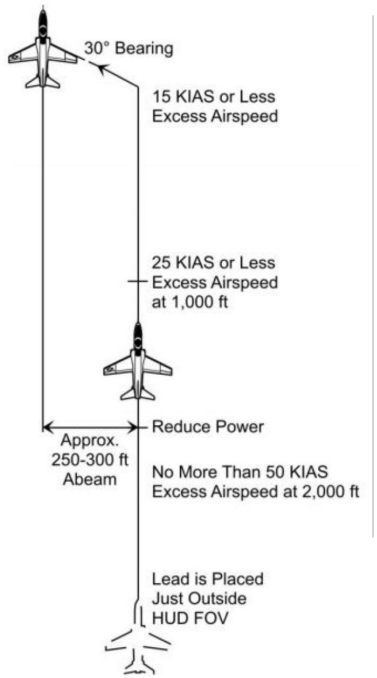
# REJOINS

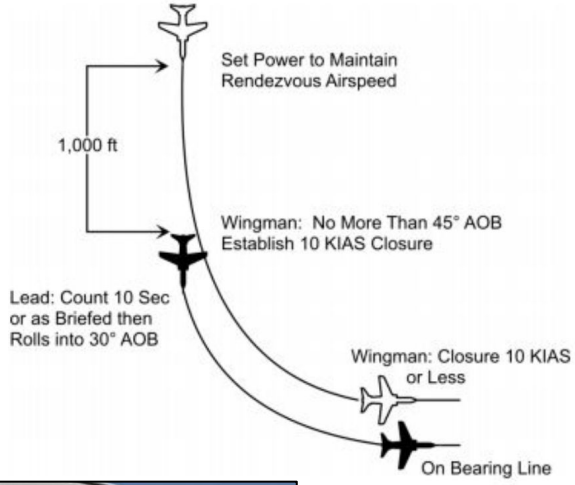
## Running Rejoin

- Least effective, but easiest method of rejoining
- Relatively time consuming
- Easy to overshoot




## Turning Rejoin

- Turning inside the lead aircraft generates closure



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# FORMATIONS

## Parade

- **Keep wingtip in-line with rear pilot's head**
- Forward/Back - 30° Bearing - Sight down leading edge of wing
- Up/Down - Equal top and bottom portion of the wing
- In/Out - Leading corner of stabilator with exposed exhaust nozzle

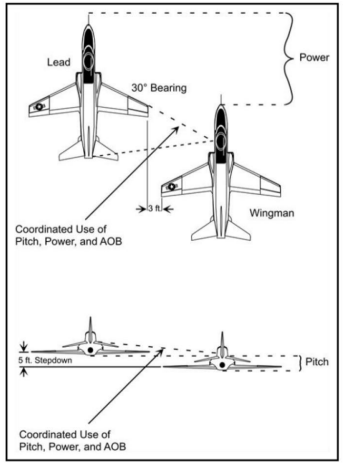


Figure 1-17 Maintaining Parade Position

## Turns

- **VFR/IFR turns into wingman or IFR turns away from wingman**
  - Wingman rotates to keep parade cues
- **VFR turns away from wingman**
  - Wingman rotates to keep lead on horizon

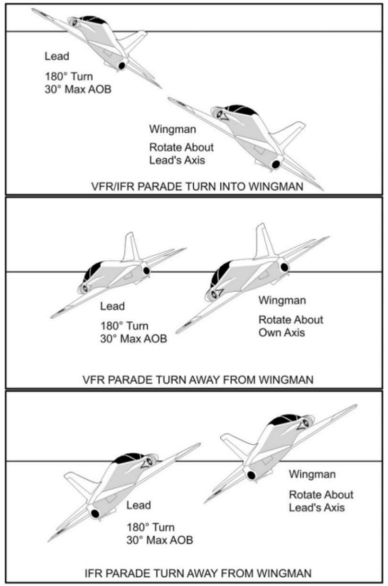


Figure 1-18 Parade Turns Into and Away

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# FORMATIONS

## Cruise

- **Keep wingtip on rear pilot's head**
- Forward/Back - 45° Bearing - Sight down leading edge of wing
- Up/Down - Equal top and bottom portion of the wing
- In/Out - Leading corner of stabilator with exposed exhaust nozzle

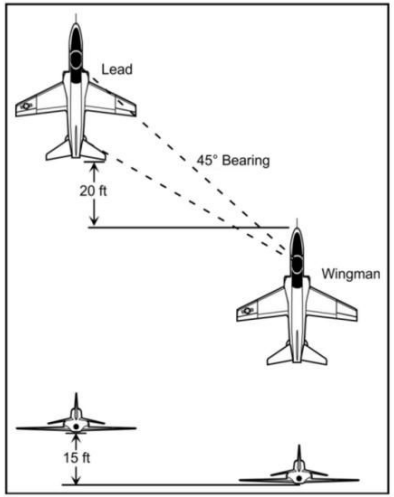
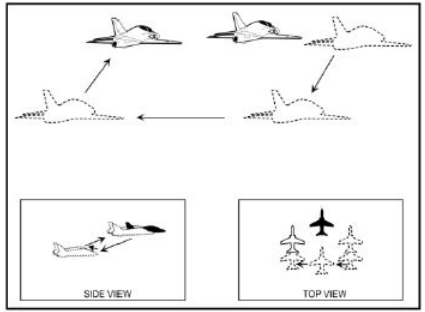


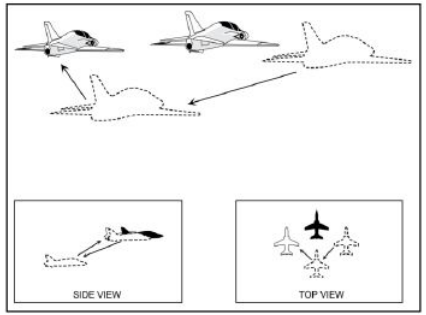

Figure 1-27 Cruise Position

## Cross-Under

1. Move down and back
2. Move across
3. Move up and forward




**Box Cross-under**




**V Cross-under**

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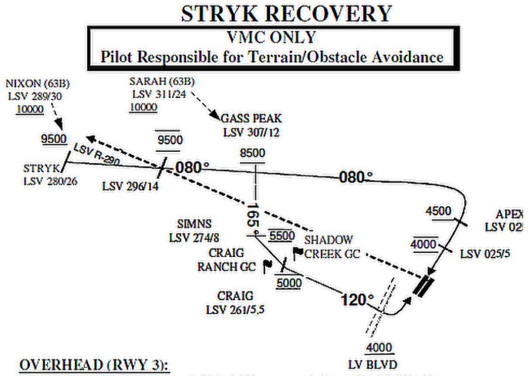
# ARRIVAL

## Runway 03

- Descend only when within 12DME
- Arrive CRAIG (LSV261/5,5), heading 120° 5,000ft
- Cross Las Vegas Blvd at or above 4,000ft, then to 3,500ft for initial
- Initial- 4DME, heading 029°

## Runway 21

- Descend only when within 12DME
- Arrive APEX at or above 4,500ft for a direct 5DME initial, then descend to 3,500ft
- Initial: 5DME, heading 209°




**OVERHEAD (RWY 3):**
- Cross STRYK at or above 9,500' MSL, proceed direct GASS PEAK, cross LSV R-296/14 at 9,500' MSL.
- Cross GASS PEAK at or above 8,500' MSL.
- Proceed direct SIMNS and cross at 5,500' MSL.
- Proceed direct CRAIG at 5,000' MSL.
- Cross Las Vegas Blvd at or above 4,000' MSL then to 3,500' MSL for initial.
- Remain within 4 DME of LSV on turn to initial.

**STRAIGHT-IN RWY 3:**
- Depart CRAIG and descend to be at 3,000' MSL by Las Vegas Blvd. Do not descend below 3,000' MSL until within 5 DME of LSV or 4 NM of the runway.

**OVERHEAD (RWY 21):**
- Cross STRYK at or above 9,500' MSL, proceed direct GASS PEAK, cross LSV R-296/14 at 9,500' MSL.
- Cross GASS PEAK at or above 8,500' MSL.
- Cross APEX at or above 4,500' MSL then direct 5 NM initial. Contact Tower.
- Descend to cross LSV 025/5 at 4,000' MSL.
- Inside 5 NM, descend to 3,500' MSL.

**STRAIGHT-IN RWY 21:**
- Cross APEX at 4,000' MSL. Descend to be at 3,000' MSL by LSV 025/5.

**RANGE 63B EXIT**
- South Exit: Via NIXON at or above 10,000' MSL, then direct STRYK.
- East Exit: Via SARAH, then direct GASS Peak; comply with STRYK restrictions.

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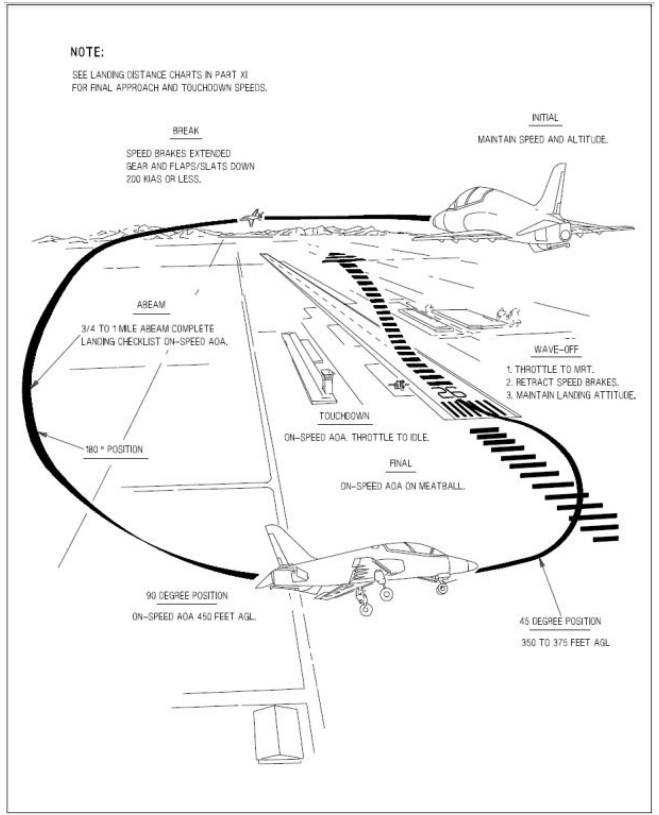
# FIELD PATTERN TECHNIQUE

## Overhead Break

- Lined up on dead side of runway - 300kts, 1500ft AGL
- **Spacing** 3 seconds
- **Break** - Maintain 1,500ft throughout
  - Throttle Idle, Speed Brake Extended (stays extended)
  - Bank Angle 60-70°
  - G-Pull - 3-4G's
  - Gear Down, Flaps Full <200kts
  - Airspeed decrease to on-speed AoA

## Circuit

- Single-ship radio comms - **Comm 1** - Lead: "HAMMER 11, Base Runway 0-3 Left"
- Turn base, 30° AOB when touchdown point is 45° behind you
- At 90° ~750ft AGL
- Rollout finals ~450ft AGL




Field Landing Pattern (Typical)

EGA815-82-1-003

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# NELLIS AFB STANDARD CIRCUIT

**Downwind**
200KIAS
Maintain 1500ft AGL

**Crosswind**
VV 5° NU
AOB 45°
200KIAS
Climb to 1500ft AGL

**Abeam Midpoint**
Landing Cx
On-Speed AoA
Maintain 1500ft AGL

**Upwind**
VV 5° NU
200KIAS
Climb to 500ft AGL

**Base Turn**
*As training edge passes touchdown point*
VV 5° ND
AOB 27-30°
On-Speed AoA

**Finals**
VV on touchdown point (3° ND)
On-Speed AoA
450-500ft AGL

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# QUESTIONS?

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# MISSION BRIEFING

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# MISSION BRIEFING

**Weather:** 06406KT 9999 SCT08/09 FEW21 15 Q2990

**Departure:** RWY03L, In Trail, Heading 050, Climb to 10,000ft MSL

**Serials:**

1 - Straight rejoin after takeoff, or turning rejoin when lead is established 10,000ft MSL (left orbit)

2 - Adopt Parade

3 - Adopt Cruise

4 - Cross-Under

**Arrival:** Initial RWY03L (4DME), Overhead break

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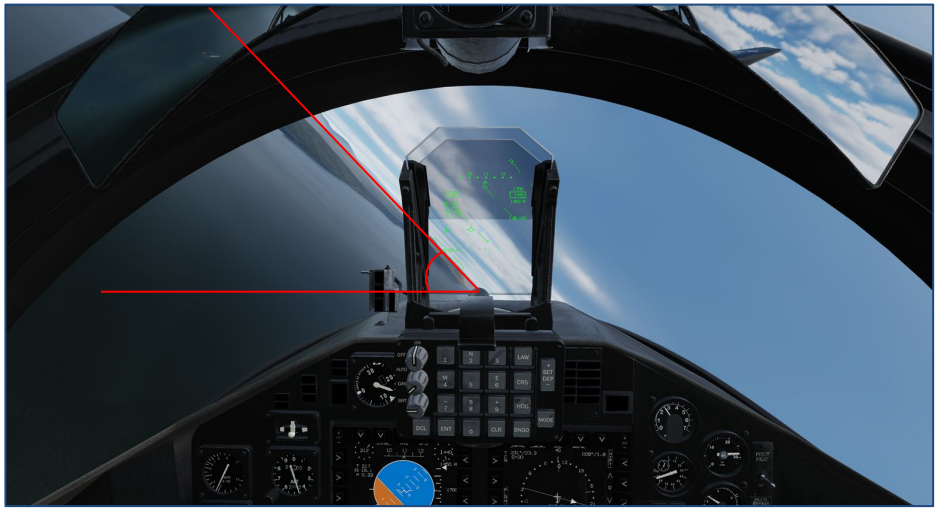
# Crosswind



Maintain 200 knots

~45° angle of bank

Continue climb to 1,500ft AGL (for simplicity, use 1,500ft AMSL)

**LOOK OUTSIDE**

Anticipate roll out on downwind heading

# Downwind

Spacing should be 1-1.5NM

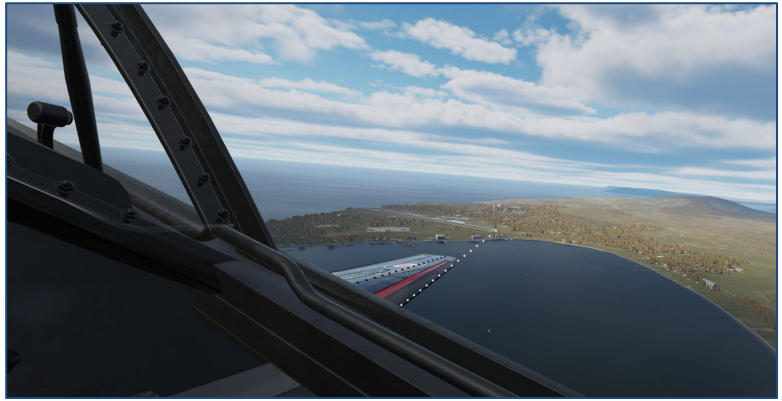
200 knots

1,500ft AGL - i.e 1,500ft AMSL + Field Elevation

**LOOK OUTSIDE**

Pre-landing checks approximately abeam runway midpoint

Maintain on-speed AoA - **Trim, Trim, Trim!**



Anticipate 45° left line-of-sight to touchdown point

*Visual cue: Trace a line along leading edge across to runway threshold*

# Base

When runway threshold in 45° left, smooth roll left, let nose drop

**LOOK OUTSIDE**

Judge the extended centreline and adjust angle of bank to smoothly roll out on finals

Ideally rolling out with touchdown point on -3° glideslope

*~450ft AGL, 1.5NM from touchdown point*

Maintain on-speed AoA

# Finals/Landing Roll

- Always be ready to go-around
- Maintain glideslope (-3°)
- Maintain on-speed AoA (orange donut on Indexer)
- Place the velocity vector on the touchdown zone and keep it in the “E” bracket
- **Throttle controls <u>rate of descent</u>, pitch controls <u>speed</u>**
- Flare optional - not necessary in the T-45C

Too Shallow

On Glideslope

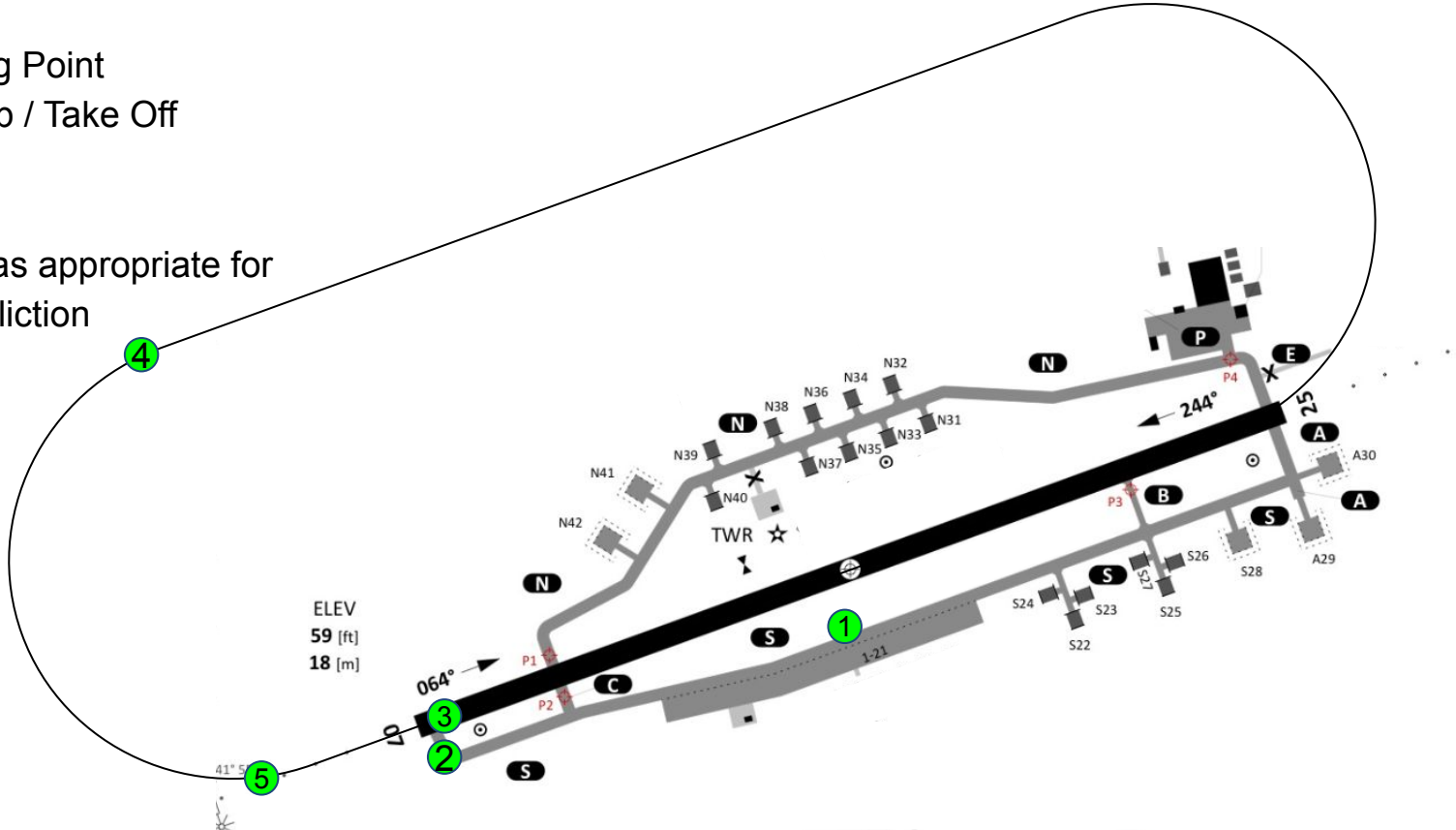
Too Steep

# Radio Communications

- **4 W's**
  - **W**ho you're talking to
  - **W**ho you are
  - **W**here you are
  - **W**hat you're doing
- *"Kobuleti Traffic, ENFIELD 11, Base Runway 07, 3-green touch-and-go, Kobuleti Traffic"*
- **Tips:**
  - SLOW DOWN
  - Listen to other traffic
  - Think about what you say before transmitting
  - Speak first, act second
  - KEEP IT SIMPLE
  - Remember the 4 W's!

# Radio Communications

- **Examples**
  1. Taxi
  2. Holding Point
  3. Line Up / Take Off
  4. Base
  5. Finals
  6. Other as appropriate for deconfliction



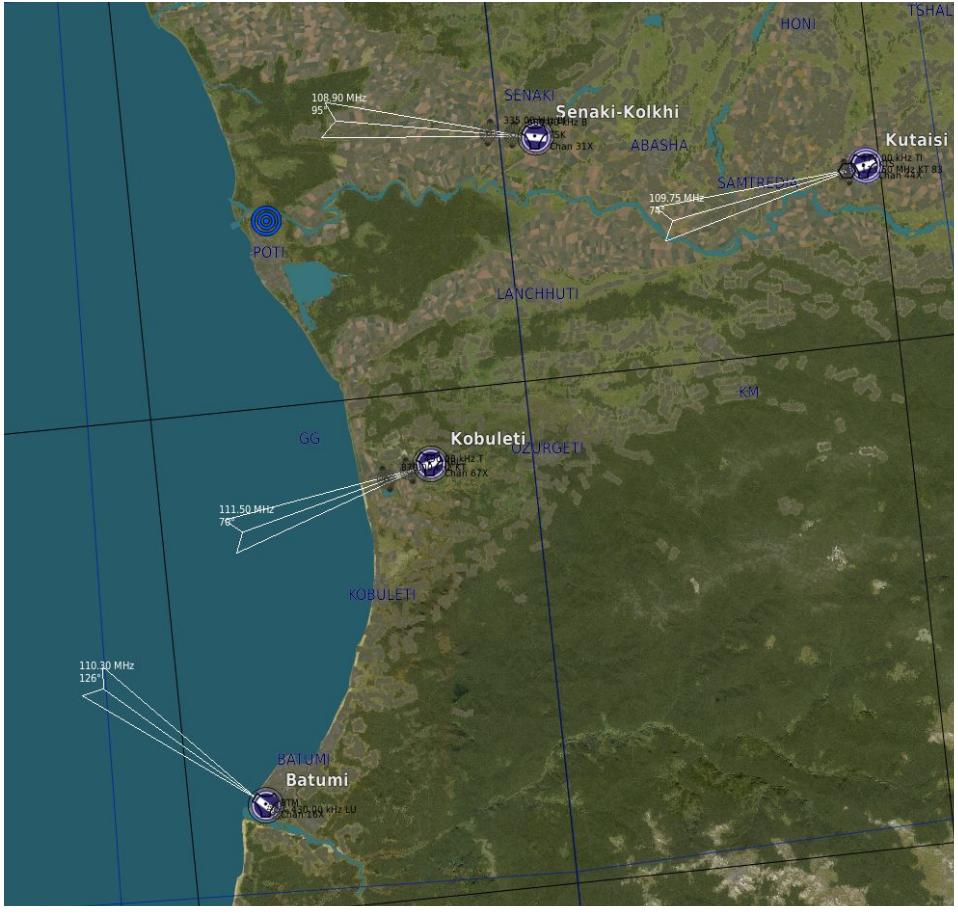
# Mission Briefing

# Weather

27005KT 9999 SCT041 20 Q1013 RMK BLU=

# NOTAMS

Nil


HONI
TSHAL
SENAKI
Senaki-Kolkhi
108.90 MHz
95°
ABASHA
Kutaisi
SAMTREDIA
109.75 MHz
75°
POTI
LANCHHUTI
KM
GG
Kobuleti
UZURGETI
111.50 MHz
76°
KOBULETI
110.30 MHz
126°
BATUMI
Batumi

# Flight Overview

- **FLIGHT OVERVIEW**

- **MISSION OBJECTIVES**
  - Safe field departure and arrival

- **TRAINING OBJECTIVES**
  - Practice safe takeoff, circuit and landing
  - Practice radio communications at an uncontrolled field
  - Demonstrate sound airmanship

# Admin

- **PRE-FLIGHT**
  - Primary - ENFIELD11
  - Spare - ENFIELD21
- **GROUND**
  - Start Procedures
  - Check In / Alpha Check
  - Taxi
- **TAKEOFF**
  - Runway
- **CIRCUIT**
  - Altitude
  - Deconfliction
- **POST LANDING**
  - Comm
  - Taxi
- **POST FLIGHT**
  - TacView review
  - Debrief
- **CONTINGENCIES**
  - Allowable slide times
  - Go / no go criteria
  - Fallouts / spares
  - Weather / Bash

# Flight Overview

- **FLIGHT OVERVIEW**

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# RECAP

- OVERALL FLOW
- QUESTIONS?