



Sport Class Formation Warm Up 2025





Formation Warm-up & PRTC Overview



- Objectives and Schedule Overview
- Part I: FWU Area Brief
 - I.A: Airport & Area
 - I.B: Practice Areas
 - I.C: Ground and Departure/Rejoin Procedures
 - I.D: Formation SOP and Maneuvers Review
 - I.E: Formation Recovery Procedures
- Part II: Formation Lead Discussion
 - Q&A on procedures and techniques



FWU and PRTC - Objectives

- 2025 Racer qualification and credentialing
- Demonstrate Safely Expanded Speed Envelope Air Racing Procedures and additional racecourse operations to FAA and event organizers
- Continue to set precedent for closed-course, wing-tip-to-wing-tip air racing outside of Reno
- Showcase SARC and Sport Class values and procedures to FAA and event organizers
- Exercise ARO FAA Accreditation and LOA



Place Holder for Schedule Slides



Part I – FWU Area Brief



Place Holder for Area Brief Slides

03a, b as appropriate to location

Part I.D – Formation SOP Review





SCARA Formation Introduction & Background

- SCARA Formation Warm Up is TAILORED
- Training Philosophy & Pre-Reqs:
 - Significant Formation Experience
 - Safe for solo in 4 ship or larger formations
 - Formation experience in intended race aircraft
 - Familiarity with Sport Class SOP and Rules
 - **Specific Procedures To Support Racing**



“The Formation Contract”



- Flight Lead
 - Follow the SOP
 - Brief / Debrief
 - Fly stable platform
 - Control the flight maneuvers
 - Monitor flight
 - Terminate maneuvers if flight safety is compromised
 - Navigate
 - Communicate



“The Formation Contract”



- Wingman
 - Follow the SOP
 - Attend/understand briefing
 - Always maintain visual contact
 - Immediately advise lead if you do lose sight (blind)
 - Don't hit flight lead or other wingman
 - Follow briefed formations/positions/maneuvers
 - Maintain listening watch
 - Advise lead if traffic is observed
 - Have exit plan ready

COMMUNICATIONS:

- A communication plan will always be briefed
 - Use race number (Sport XX)
 - Brief all frequencies if local flying
 - Initial check-in after engine start is *generally* on CTAF
 - During FWU Freq Plan is CTAF – Company – CTAF
 - During PRS Freq plan is GND – Race Control – GND
- Frequency change protocol
 - *Use of “Go”*: Acknowledge in sequence (“check out”)
 - *Lead will check flight in on new frequency in either case*
- **Sport Class Standard at FWU and PRTC/PRS – Always use “GO”**



SCARA CONFIGURATION CHANGES

- Directed with *Radio Calls*
 - Respond with Race Number (if required)
 - Optional – Pitchout Signal at RTB
 - Optional – Supplement with hand/aircraft signals
- Executed from *Fingertip/Finger Four position*
 - If in other than Fingertip:
 - Lead will regroup in Fingertip then move to a new configuration
 - Lead may brief alternative for specific training events
 - One exception is Moving to Extended Trail
 - Pitchout from Echelon to Ext Trail is Standard
 - 3 sec spacing
 - Radio Calls
 - Flight must acknowledge initial command from lead
 - 4 calls "in"
 - Must be well-briefed by Lead

Fuel Management

- **“Bingo”**
 - Fuel state at which flight must terminate to return with legal minimums or as briefed by the Flight Lead
 - *Day VFR: 30 Minutes Reserve*
 - Generally briefed in ‘Time’ - fuel remaining in minutes in dissimilar aircraft formations
 - Example report: “Sport XX is bingo plus 5”
 - ***Do not overfly briefed bingo!***



Abnormal procedures and safety

SCARA Formation



Safety Overview

- This is all new – It's not RTS and PRS anymore
 - Many variables
 - Unknown – Unknowns
 - Keep your head on a swivel and bring up anything you might think has an impact
- It's not *“just”* a Demo
 - Everyone will be evaluated to be qualified to fly in future events
 - Low level, proximity, ground reference, dynamic formation, etc
 - A lot of the same risks of racing apply – Its each individuals job as part of the class to mitigate those risks



Abnormals Overview

- Collision Avoidance
- Lost Sight/Breakout
- Knock It Off
- May-Day
- Hard Deck
- Safety Equipment



Collision Avoidance



- Always keep lead in sight
- Always closely monitor relative motion and closure
- Always maintain separation
- Always consider prop wash and wake turbulence
- Never move ahead of your lead aircraft
- Never go “belly up” to your lead aircraft



Lost Sight/Breakout



- Breakout
 - For most SCARA procedures, Breakout is Up & Away
 - EXCEPTION: Low and Blind in the chute
- Rejoin/Departure Rejoin
 - Fly a predictable path
 - Lead will direct
 - Aircraft behind, stagnate, but stay on rejoin line
- Close Formation
 - Up and Away
 - Lead will call Knock It Off and direct lost wingman
- Echelon Enroute
 - Up and Away
 - Lead will direct lost wingman



Lost Sight/Breakout



- Extended Trail
 - Fly a predictable path – most likely wings level
 - Lead will direct flight
 - Aircraft behind, remain in formation!
 - Expect rejoin of remaining flight, and then lead direct lost wingman/men
- In the Chute (Race/PRS Scenario)
 - Low and Blind
 - Stay low, slide back
 - Lead will direct – expect remain in trail
 - High and Blind
 - Up and Away
 - Lead will direct – expect remain in trail



Safety Calls

- “*Knock It Off*” (KIO)
 - USE IT When a safety issue is *developing*
 - For **immediate hazards** to flight
 - Impending collision, etc.
 - In those cases, ***be directive first***

Safety Calls - Knock it Off

- **“Knock It Off”**
 - Anyone can call KIO
 - *“Sport XX Knock It Off, Altitude”*
 - Lead will acknowledge the call and all flight members will mirror his/her call”
 - *“22 Knock It Off”... “39 Knock It Off”, etc.*
 - Clear your flight path and await lead’s instructions – **do not stop flying formation!**
 - Flight will terminate maneuvering, move to straight and level flight and increase spacing at KIO call

Safety Calls - Mayday

- *“Mayday”*
 - *Engine Failure, Critical Systems Failure*
Structural Failure, Midair
 - After Mayday call - Lead will Knock It Off and take control
 - No echoed KIO call for a Mayday
 - Only essential comms
 - Clear your flight path and await lead’s instructions
 - Do not stop flying formation!
 - Flight will terminate maneuvering and increase spacing at KIO call

Safety Calls - Breakout

- *“XX Blind, Breaking Out”*
 - *Losing sight of Pace, Lead, or any racer/formation for whom a pilot has separation responsibility*
 - After breakout call, fly a predictable path
 - Lead will direct lost wingman
 - EXCEPTION: Low and Blind in chute
 - *“XX Blind, Low”*



Safety - The Hard Deck

- *“Virtual” ground level*
 - Minimum maneuvering altitude
 - Should be derived from current charts
 - High enough to allow reasonable chance of bailout or recovery from unusual attitude/aerobatic maneuver as applicable
 - Must be briefed on every formation mission
- *Call KIO if penetrated*
 - *“Sport XX Knock It Off, Hard Deck”*



Aircraft / Safety Equipment - Reminder



- Dual Controls
- Intercom system
- Ability to transmit from rear/right seat
- Fire Extinguisher

- **FOR PRS:**
 - Helmet
 - Gloves
 - Nomex flight suit
 - Close toed shoes



SCARA Formation Warm Up Flight Profile & Description



Flight Briefing



- Critical to success of the flight
 - Sets the tone for the whole flight
 - Lead will use the Sport Class *Briefing Checklist*
 - Brief the plan
 - Listen Up / Ask Questions
 - Don't depart brief without clear picture of expectations
 - Fly the plan



Flight Briefing

- Time Hack
- Establish Mission Objectives
- Weather & Environmentals
- Sequence of Events and *standards to be used*
- Mission Specifics
 - Details on how to achieve the training objectives.
- Contingencies
- Wrap Up & Final Questions



Typical Training Profile



- Start/Check in
- Taxi out
- Run up
- Interval Takeoff
- Takeoff Rejoin
- Route Formation
- Fingertip Formation
- Wing-work (station-keeping)
- Cross-unders
- Echelon turns
- Pitch-out & Rejoins
- Extended Trail
- RTB
- Recovery (overhead)

Part I.E – Formation Recovery Procedures





Recovery Comms



- Simplify Radio Calls for the overhead
 - VFR (GA) pattern aircraft are not familiar with overhead terminology
 - Sport XX Flight, 10 West, entering straight in overhead 8 (lead only)
 - Sport XX Flight, 3 mile initial, runway 8 (lead only)
 - Sport XX Flight, overhead, left break 8 (lead only)
 - Sport XX Downwind Abeam (all aircraft)
 - Sport XX Base / Gear
 - Sport XX Cold



Recovery Notes

Co-existing with Local Traffic

- *Simple, Clear Comms*
- *Predictable, Consistent Overhead Entries and Patterns*
- *Courtesy to slower and/or training aircraft*
- *When in doubt of traffic interval*
 - *Ask for interval's position*
 - *Fly-through ("spin it") and re-enter, if needed*
- *Heads up for variety of skill levels and experience*
 - *Student Training common*



Overhead Pattern Execution

- Lead configures flight in echelon prior to Initial
- Normal Radio calls alert wingmen to upcoming pitchout
- Lead Signals pitchout and 5 sec interval (only hand signal we use)
- Pitchout at 1000' AGL
 - Fixed Gear A/C - Level P.O.
 - RG A/C - Pitch Out AND Up 500'
 - **Sport Class Standard is 5 sec Interval for Landing Pattern**
 - Alternate interval may be briefed by lead
 - Creates ~1,500' interval on downwind
 - Interval about 90° ahead in approach turn
 - Know your interval and aircraft ahead of it



Landing Pattern Execution

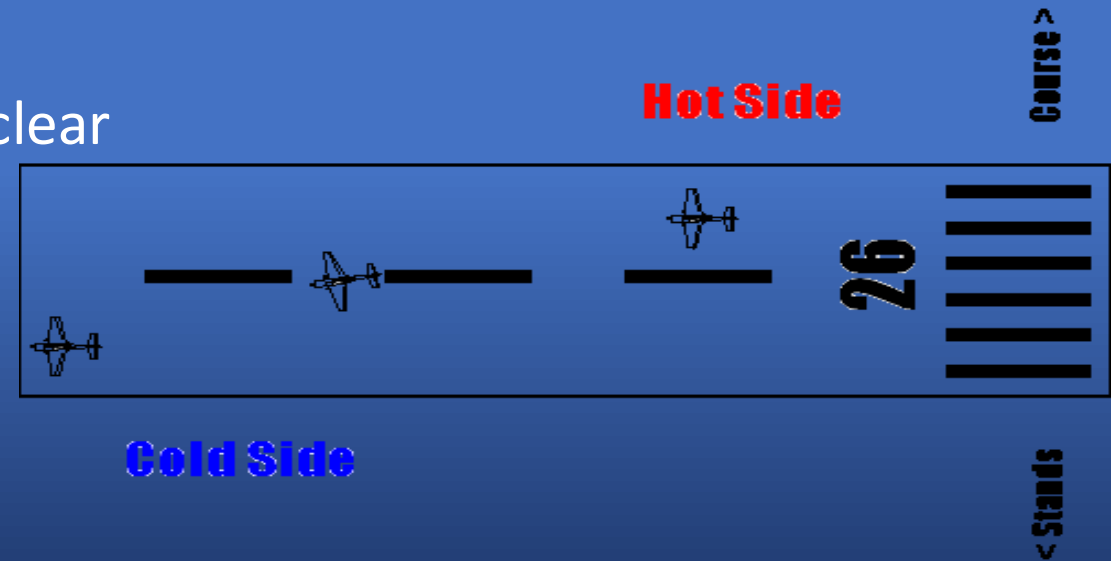


- Wing Pilots match aircraft ahead
 - Speed and configuration...aircraft type differences permitting
- Coming Off the Perch
 - Continuous descending turn to final
 - Use same turn point off perch
 - Adjust turn point as needed for aircraft type (speed differential)
 - Do not descend early on downwind
 - Don't chase lead down...forces entire pattern down
 - Keep interval(s) in sight
 - Adjust interval as needed with turn (lead/lag)
 - 90° behind aircraft ahead, 2000' spacing +/-

Landing Pattern

Hot-Cold Landing Procedure

- Lead lands long on hot side (or centerline of runway if conditions warrant), then moves to cold side (ramp exit side)
 - Each Wing Pilot does the same
 - **CONTROL YOUR CLOSURE ON INTERVAL BEFORE GOING COLD**
 - 2000' +/- spacing at threshold
 - <100 ft wide runway: No clear lane, increase interval
- All aircraft roll to briefed exit to clear
 - **No Early Turnoffs**





Taxi In/Shutdown



- Lead assembles flight clear of runway, or
- Individual Taxi OK – As briefed by lead
- **CAUTION entering ramp!!**
 - Other Flights and their crew
 - Do not taxi or coast across No Prop Turn Line



Debrief

- Lead Pilot directs the debrief
 - Wingmen get their shot when called
- Critique all aspects of flight, as required
 - Examine the *“what, why and how”* of the sortie
- Wingmen should not leave debrief with unanswered questions or concerns
- Remember: Egos checked at the door
 - Goals: Safety, Mutual Support and Constant Improvement!

Part II – Lead Procedures/Technique Discussion





Briefing and Debriefing

- Briefing:
 - Set the tone for the flight
 - Lead is (you are) in command
 - Professional *and* fun!
 - Candid and Direct when/where needed
 - Organized and purposeful
 - Use the briefing card
 - State clear objectives and sequence for the flight
 - Brief the Flight, Fly the Brief



Briefing and Debriefing

- Debriefing:
 - Capture what occurred on the flight
 - Any Safeties?
 - Did you fly the plan?
 - Provide constructive debrief for Lead & Wingmen
 - Own what you did and what you could do better
 - Expect Wingmen to do the same
 - Manage the debrief
 - Lead Debriefs the Flight
 - Wingmen get their shot after
 - Cross-talk and debating wastes time



Leading and Teaching

- **Leading:**
 - Fly a stable platform
 - Control the flight maneuvers
 - Fly the sequence you briefed, or clearly state an “audible”
 - Monitor the Flight
 - Terminate maneuvers if flight safety is compromised
 - Recognize Wingman/Wingmen overload
 - Navigate
 - Manage the Area
 - Plan the RTB
 - Communicate – Internal (Flight) and External (ATC)



Leading and Teaching

- **Teaching:**
 - Most of it happens in the debrief
 - Occasionally a “teaching moment” occurs in flight
 - Use it, but keep it brief, especially in multi-ship hops
 - Minimize radio calls to a plane with an IP in it
 - When debriefing:
 - Use “What”, “Why”, and “How”
 - What happened or What the trend is
 - Why it is happening (cause/effect)
 - How to correct (provide good technique development)
 - Stress both “Goods” and “Others”



Policy / Procedure / Technique



Standardization

- Starts with Leads and CPs
- GOALS:
 - We all deliver a standard product
 - No matter who leads, the wingmen have a similar experience and are taught to fly to the same standard



Policy / Procedure / Technique



Policy

- Broad Specifications on the manner in which Sport Class expects members to perform *all* tasks
 - Ex: No Brief, No Fly; Use of Radio Calls for all Maneuvers
 - Ex: Maintaining Start Lane and Start Passing Limitations



Policy / Procedure / Technique



Procedures

- Dictate how tasks will be performed
- SOP = Standard Operating *Procedures*
- Pilots expected to follow procedure unless deviating for safety
 - Ex: Use “Go” for freq changes
 - Ex: PO&RJ or Extended Trail Procedures
 - Ex: Passing Procedures, MayDay Procedures
- Following Procedure/SOP is what keeps us predictable...and safe!



Policy / Procedure / Technique



Technique

- Individual Methods or Behaviors
 - How “you” execute a maneuver
- Must be compatible with SOP
- Must not interfere with other pilots’ expectations of SOP
 - Ex: Power and Airspeed Management in Rejoins
 - Ex: Bank and G management in Pylon Turns



Policy / Procedure / Technique

- “As Briefed By Lead”, aka, “or As Briefed”
 - Lead may brief alternate parameters or techniques to fit aircraft, pilots or situations
 - Alternative parameters or techniques must still support Policy and Procedure (SOP)
 - Ex: Lead may brief an alternate interval for overhead breaks to land
 - 5 seconds standard – Briefing less for fixed gear airplanes is OK
 - Lead may not brief deviations from Policy or SOP just because they don’t like them (“We’ll do this *my way*”)
 - Ex: “we’re using all hand signals today”
 - If you don’t like the SOP, submit Policy/SOP change
- Bottom Line: SOP is delivered and proliferated, *or derailed*, by Leads and CPs



Flight Conduct

- **Syllabus Review**

- Syllabus builds from flight to flight

- **Formation Warm-Up**

- Station Keeping, X-Ups, Echelon, PO&RJ
 - Add Extended Trail and Line Abreast Intro
 - Lost Sight/Breakout Exercise
 - May accomplish Upset Recovery Demo (for “Advanced” rookies)

- **PRS**

- Area work builds to Upset Recovery Demo and Line Abreast
 - Entry to course is via chute until last day (with exceptions)
 - On-course practice starts with course demo (from echelon entry)
 - Passing is scripted, then open
 - Add Simulated Emergencies as students progress

Questions? Let's Go Fly!

