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Blue Angels

Maneuvers Manual



2020 BLUE ANGELS MANEUVERS

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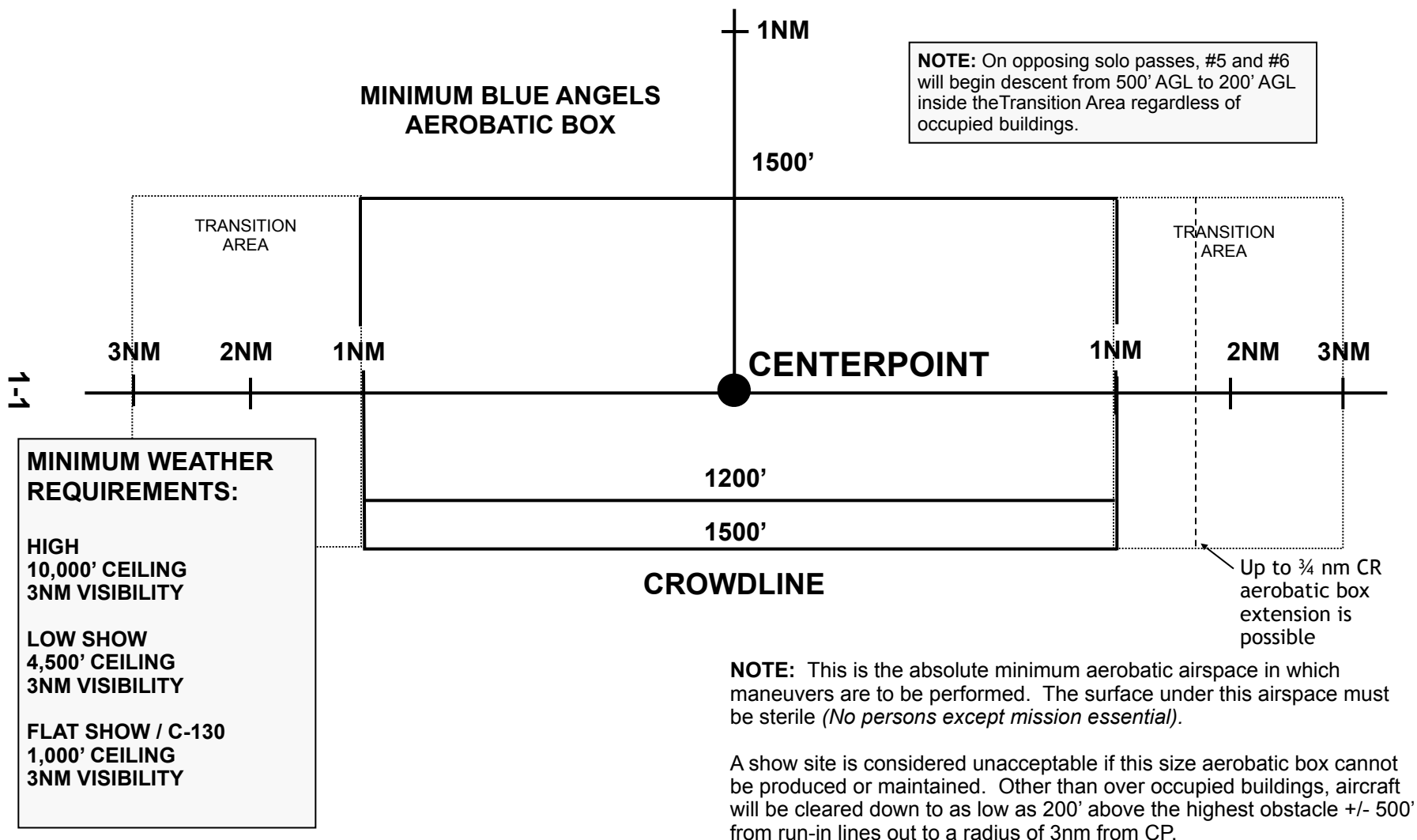
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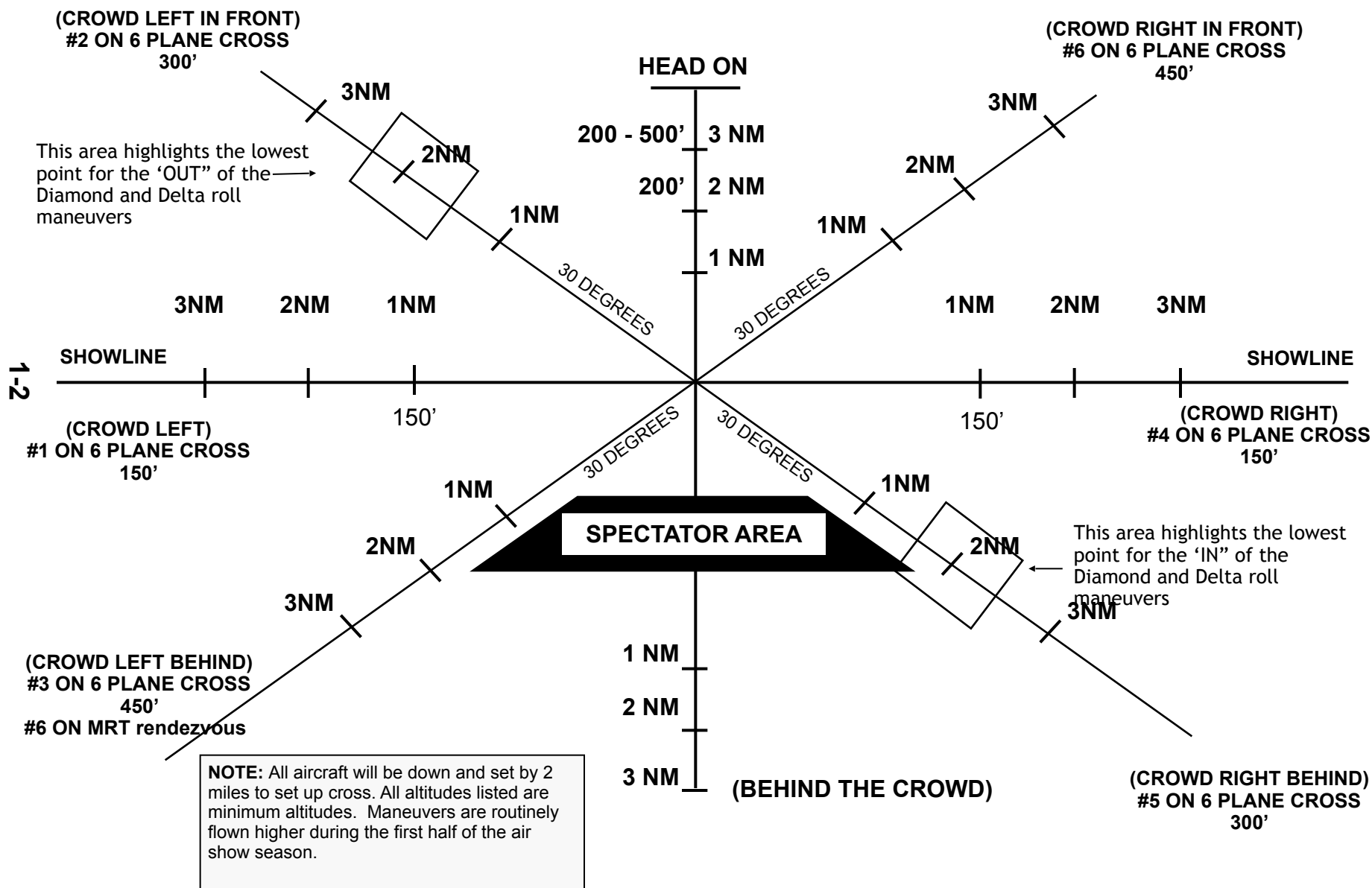
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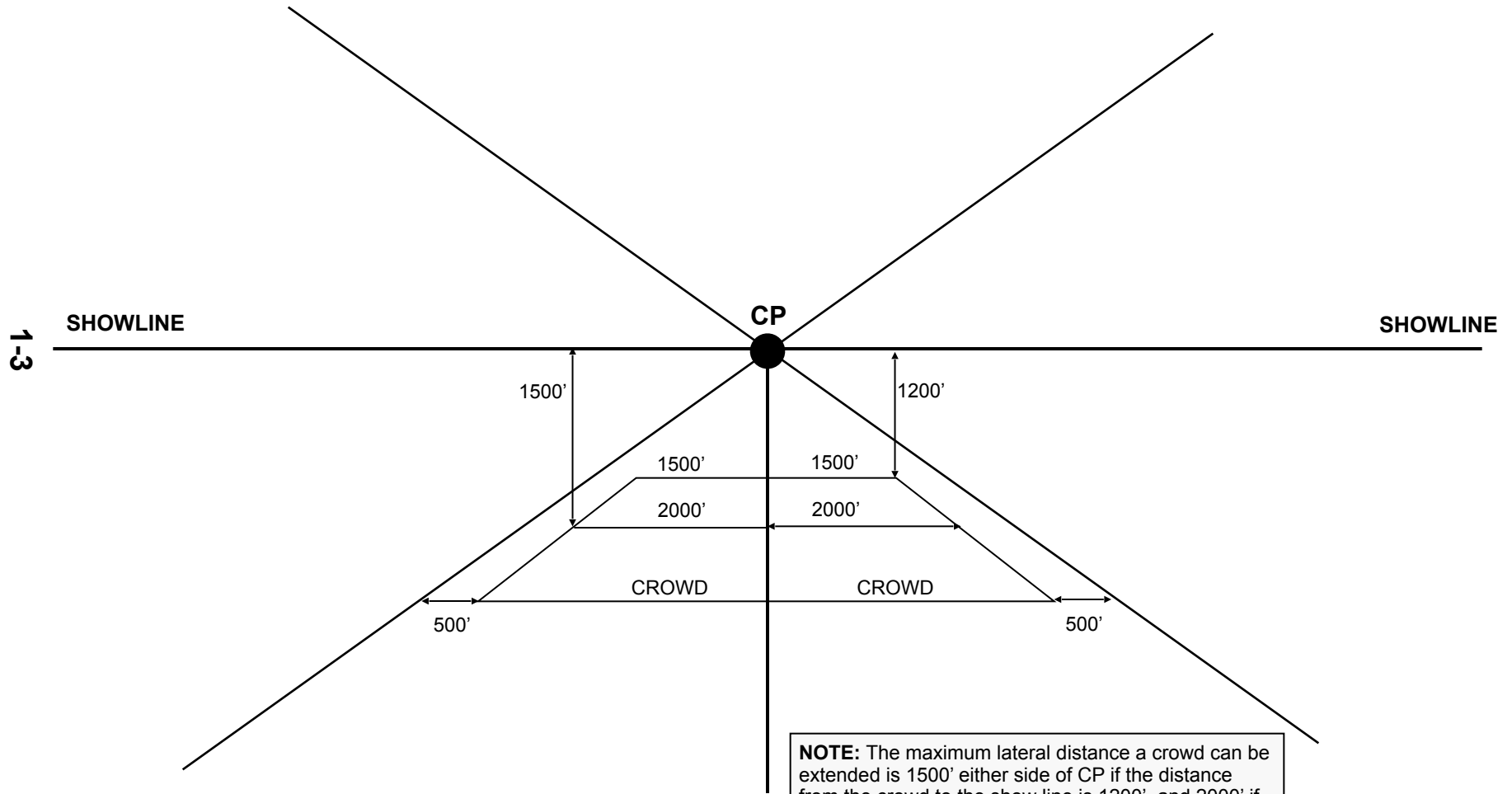
AEROBATIC BOX DIMENSIONS



APPROVED INGRESS / EGRESS ROUTES

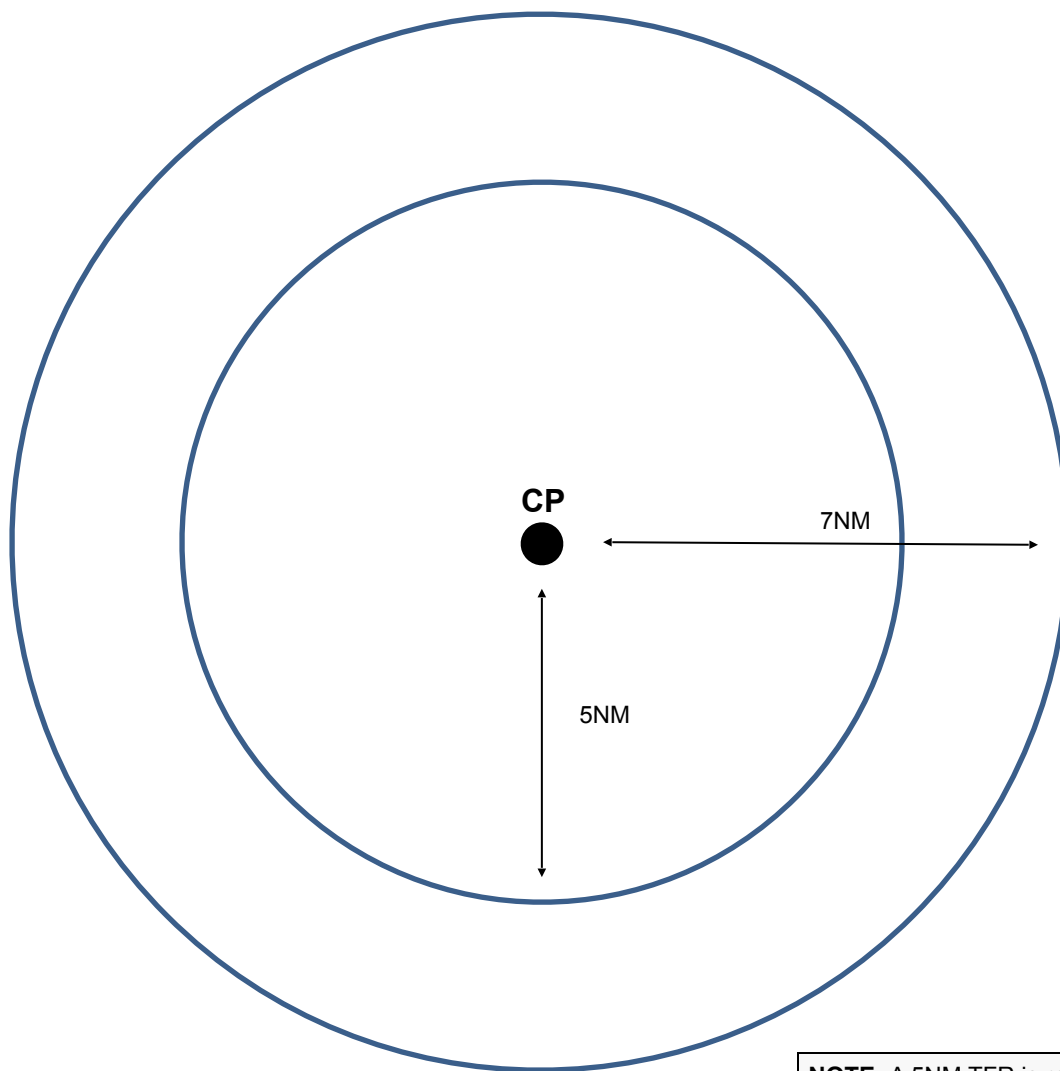


MAXIMUM CROWD DIMENSIONS



NOTE: The maximum lateral distance a crowd can be extended is 1500' either side of CP if the distance from the crowd to the show line is 1200', and 2000' if the distance from the crowd to the show line is 1500'. This provides a minimum of 500' lateral distance from the crowd on all ingress and egress routes.

TFR Dimensions



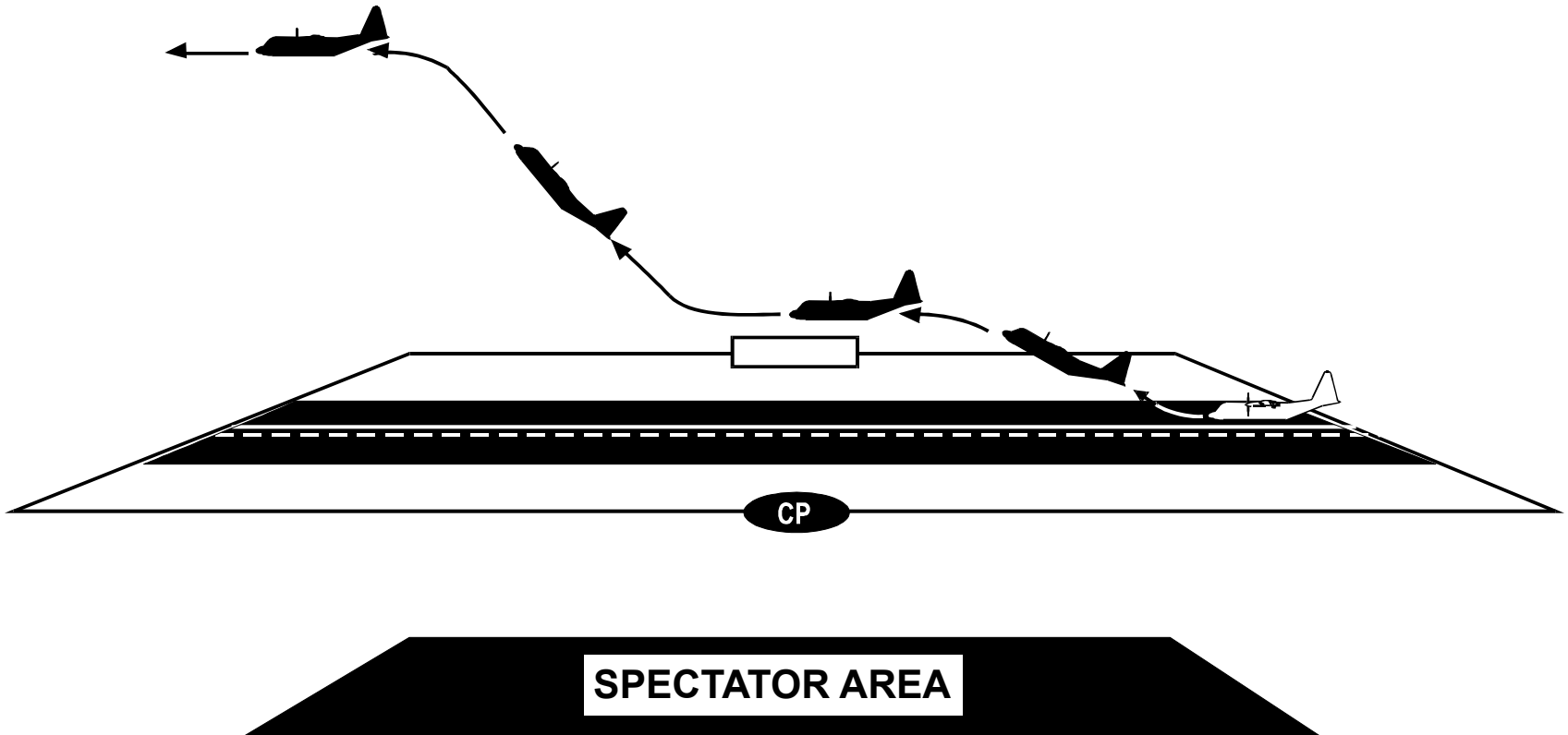
NOTE: A 5NM TFR is required for all flight demonstrations. A 7NM TFR is required for all demonstrations where the density altitude is expected to be greater than 4,000FT at the time of the demonstration.

HIGH SHOW

MANEUVERS

C-130 LOW TRANSITION TAKE-OFF

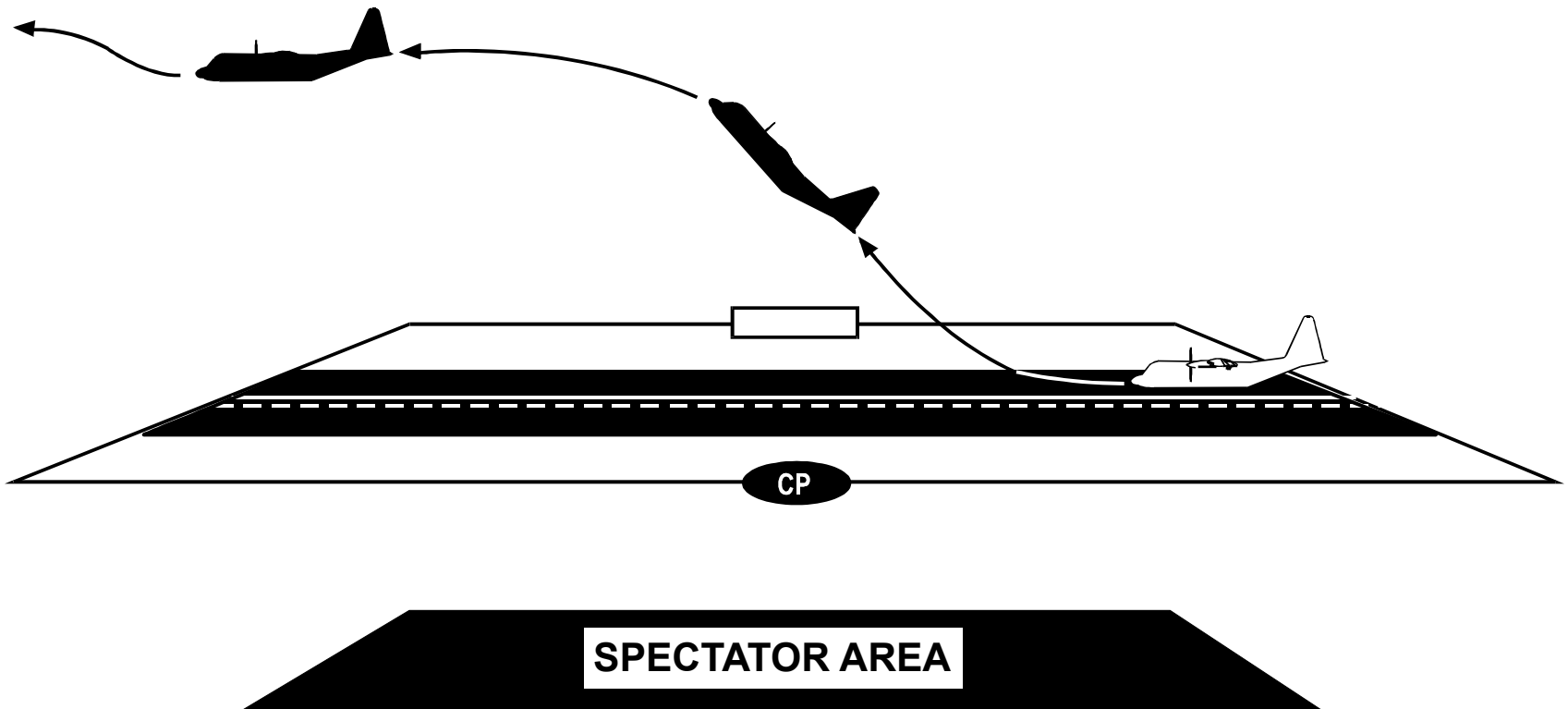
2-1



MANEUVER: On take-off the aircraft will execute a low-transition. At 150-170 KTS, the aircraft will rotate to 45 degrees nose high. The aircraft will level off at 1000-1500' AGL.

C-130 LOW SHOW CLIMB

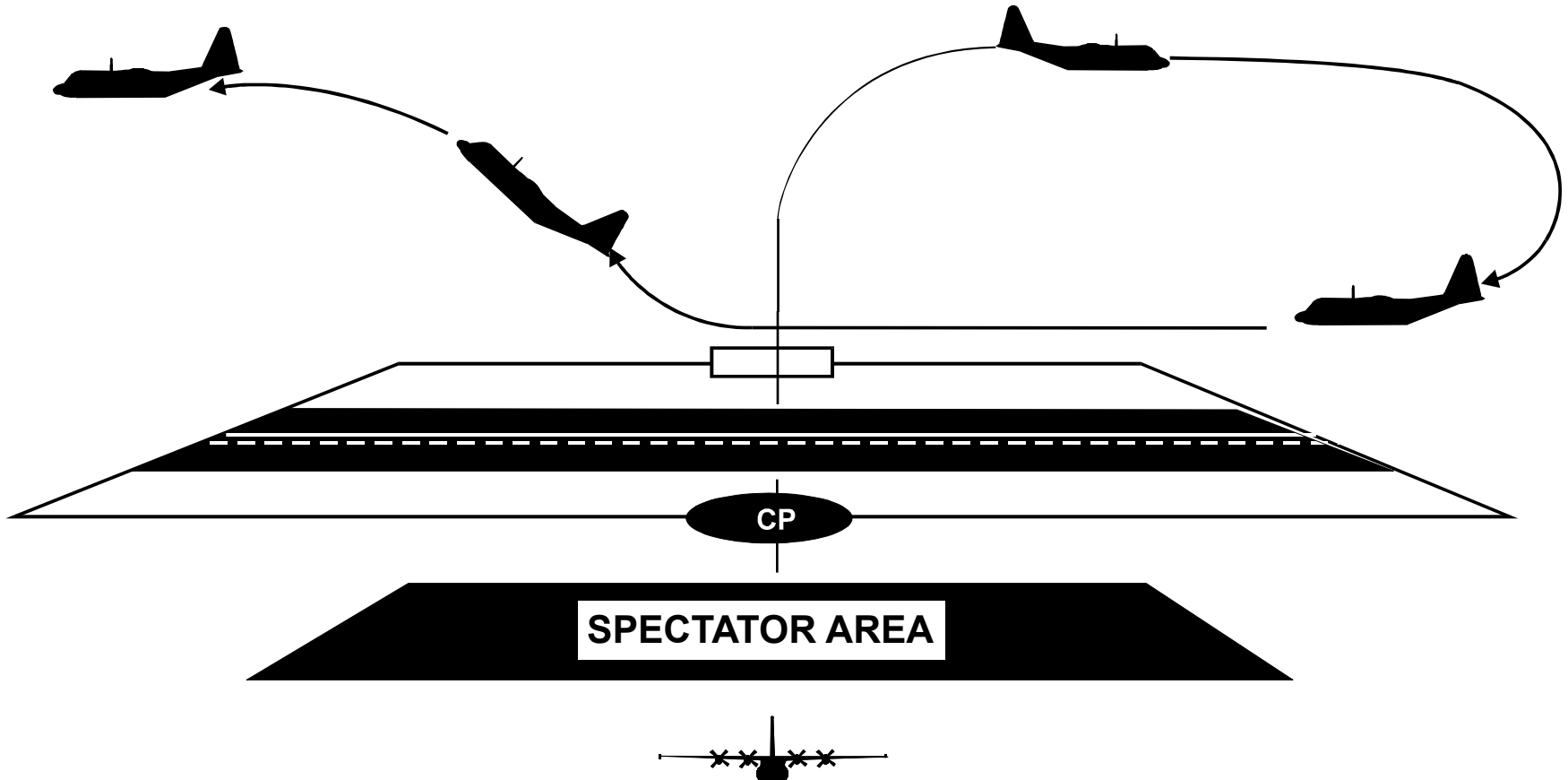
2-2



MANEUVER: On take-off the aircraft will execute a normal ground run. At 130 KTS, the aircraft will rotate to 30 degrees nose high. The aircraft will level off at 600-1200' AGL.

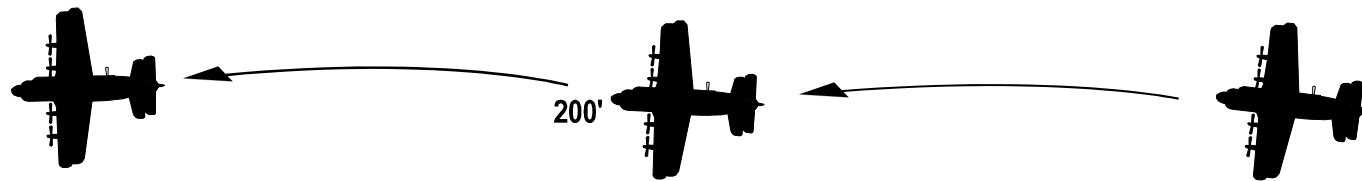
C-130 REMOTE ENTRY

2-3



MANEUVER: Ingressing from behind the crowd, a turn will be commenced at CP to establish a 1000' AGL downwind position. The aircraft will then commence a descending turn back to the show line. Abeam CP on the 500' line at 100' AGL, the aircraft will commence a 45 degrees nose-up climb to level off at 1000-1500' AGL.

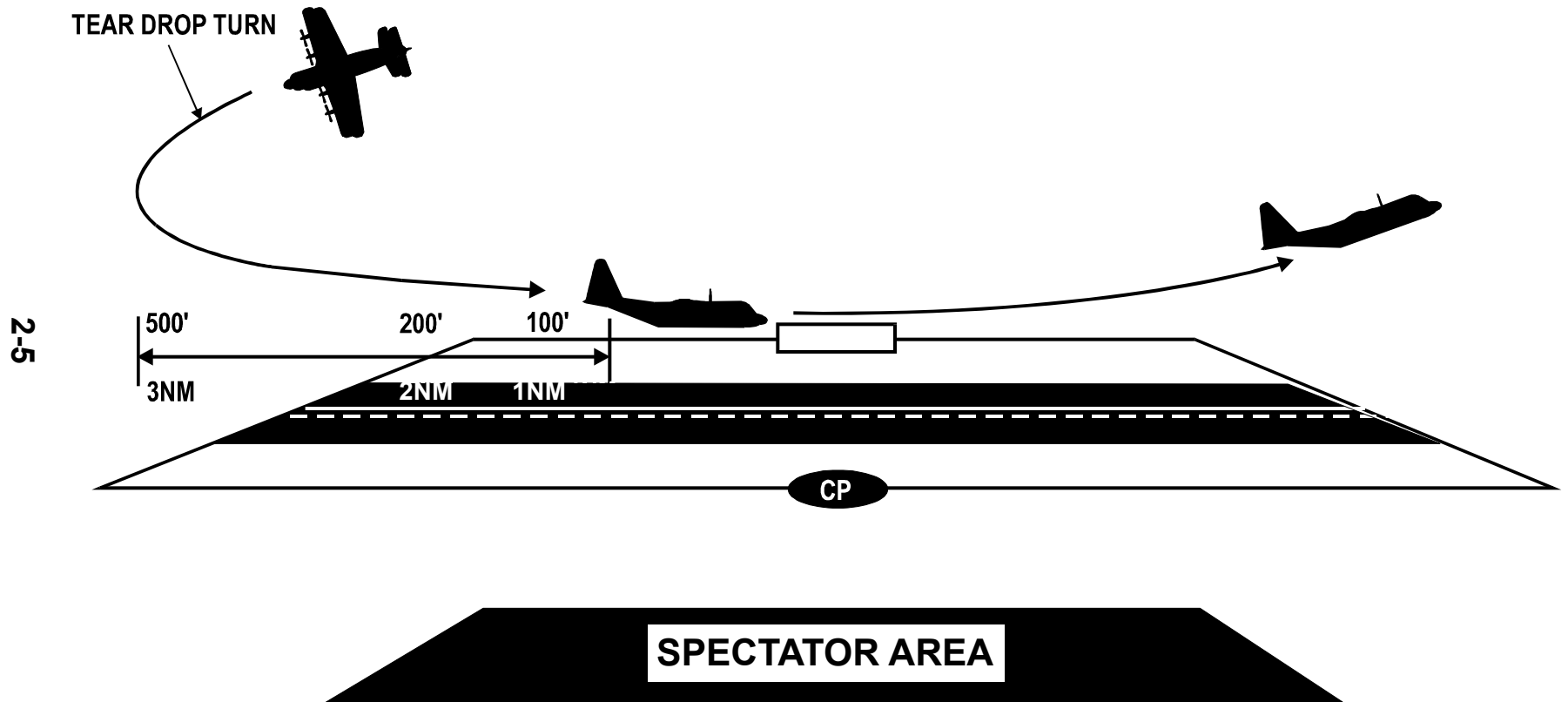
PARADE PASS



SPECTATOR AREA

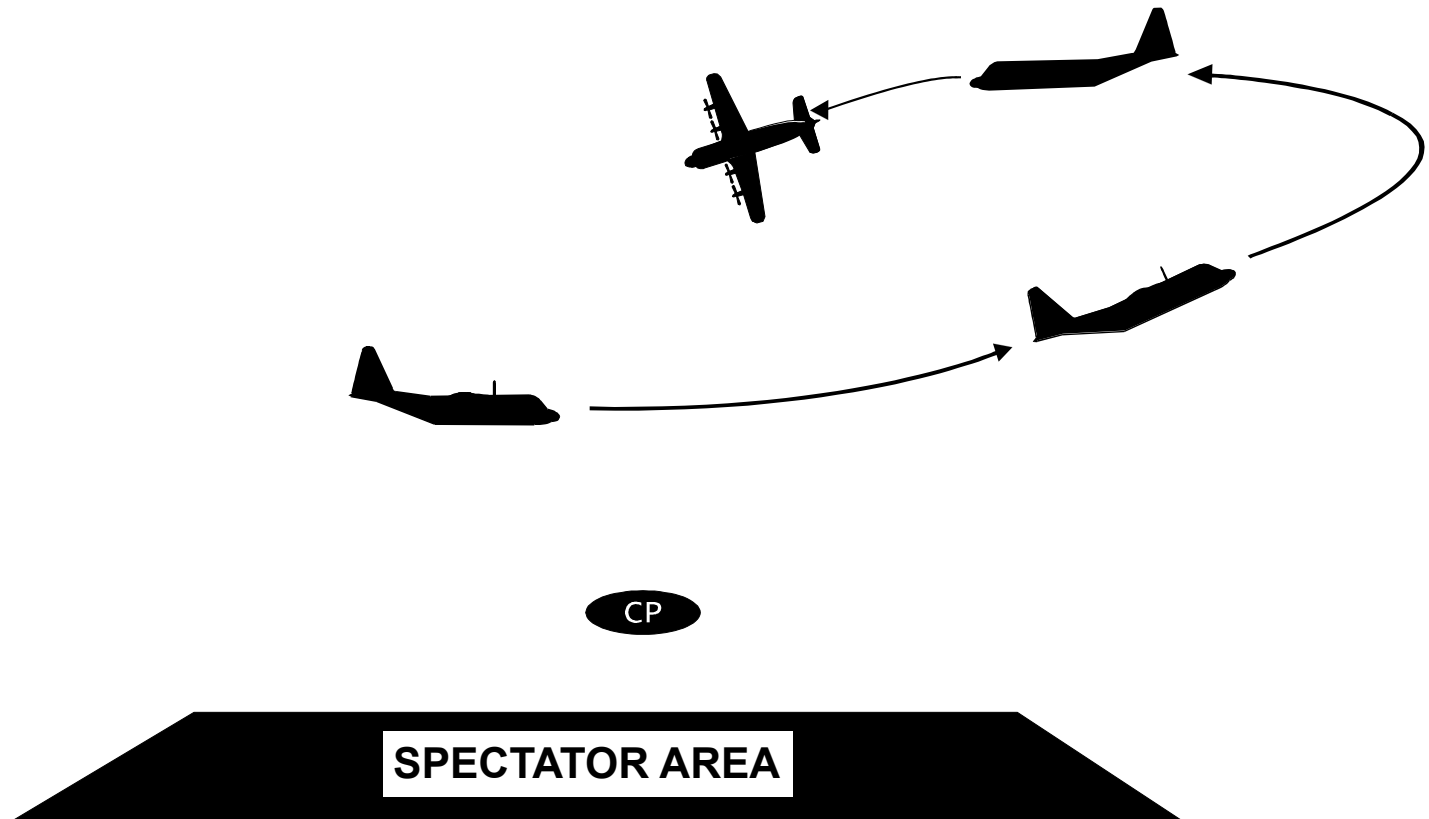
MANEUVER: The aircraft will complete the teardrop turn towards CP using the 30 degree ingress line. Once established on the 30 degree ingress line, a descent from 500' AGL to 200' AGL will be made. Abeam the crowd line, a roll into a 60 AOB turn towards will be performed. The turn will be continued to depart on the 30 degree egress line. Abeam the crowd line on the 30 degree egress line, wings will be leveled and a 10 degree nose-up climb will be initiated to 1200' AGL.

C-130 FLAT PASS



MANEUVER: The aircraft will make a teardrop turn back toward the show line to position itself on the 500' line. Abeam CP at 50' AGL, a climbing turn will be commenced away from the crowd to set up for the head on pass.

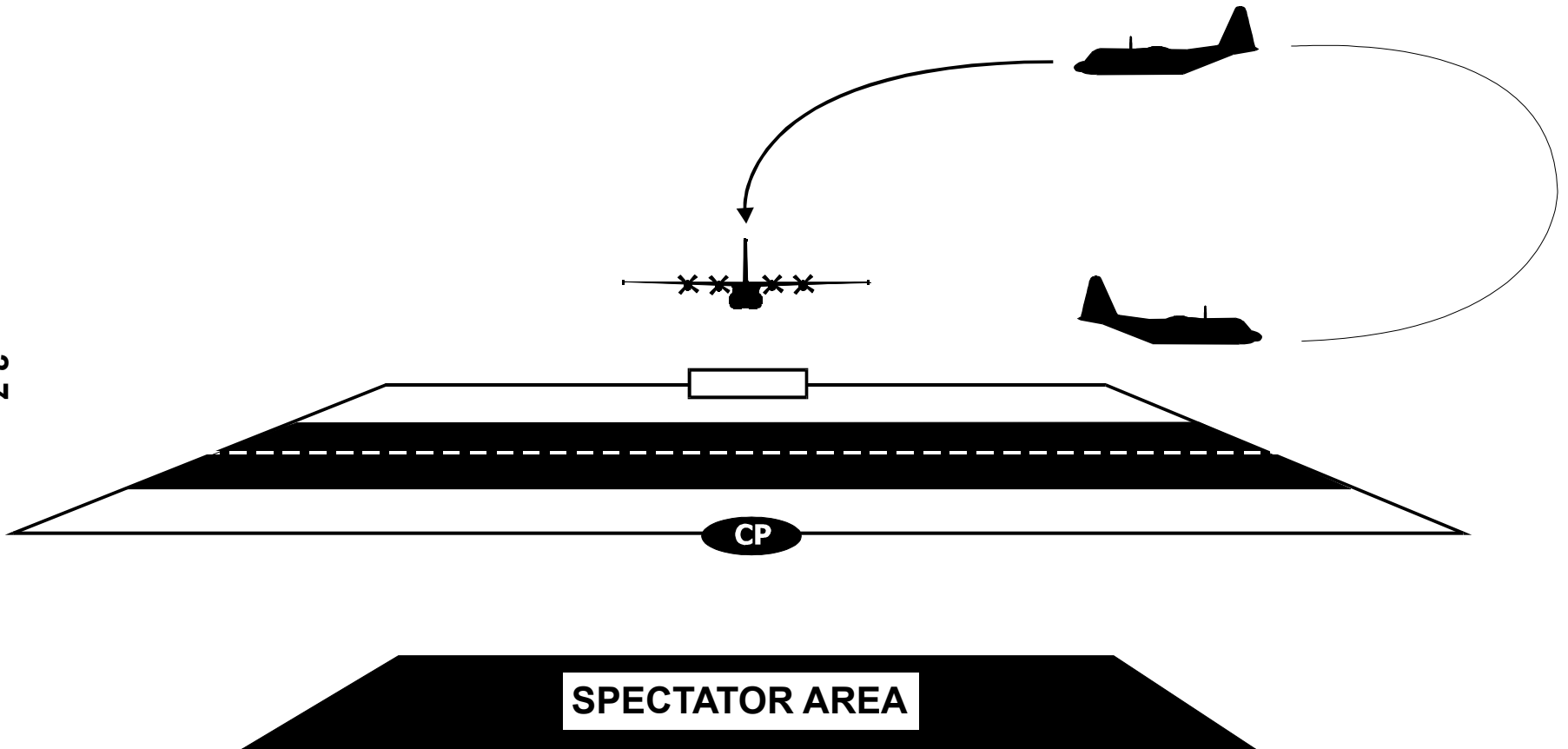
MINIMUM RADIUS TURN



MANEUVER: Passing CP at 50' AGL, the aircraft will execute a 10 degrees nose-up climb to 500' AGL rolling into a 60 AOB minimum radius turn for 270° of heading change away from the crowd to line up for the head on.

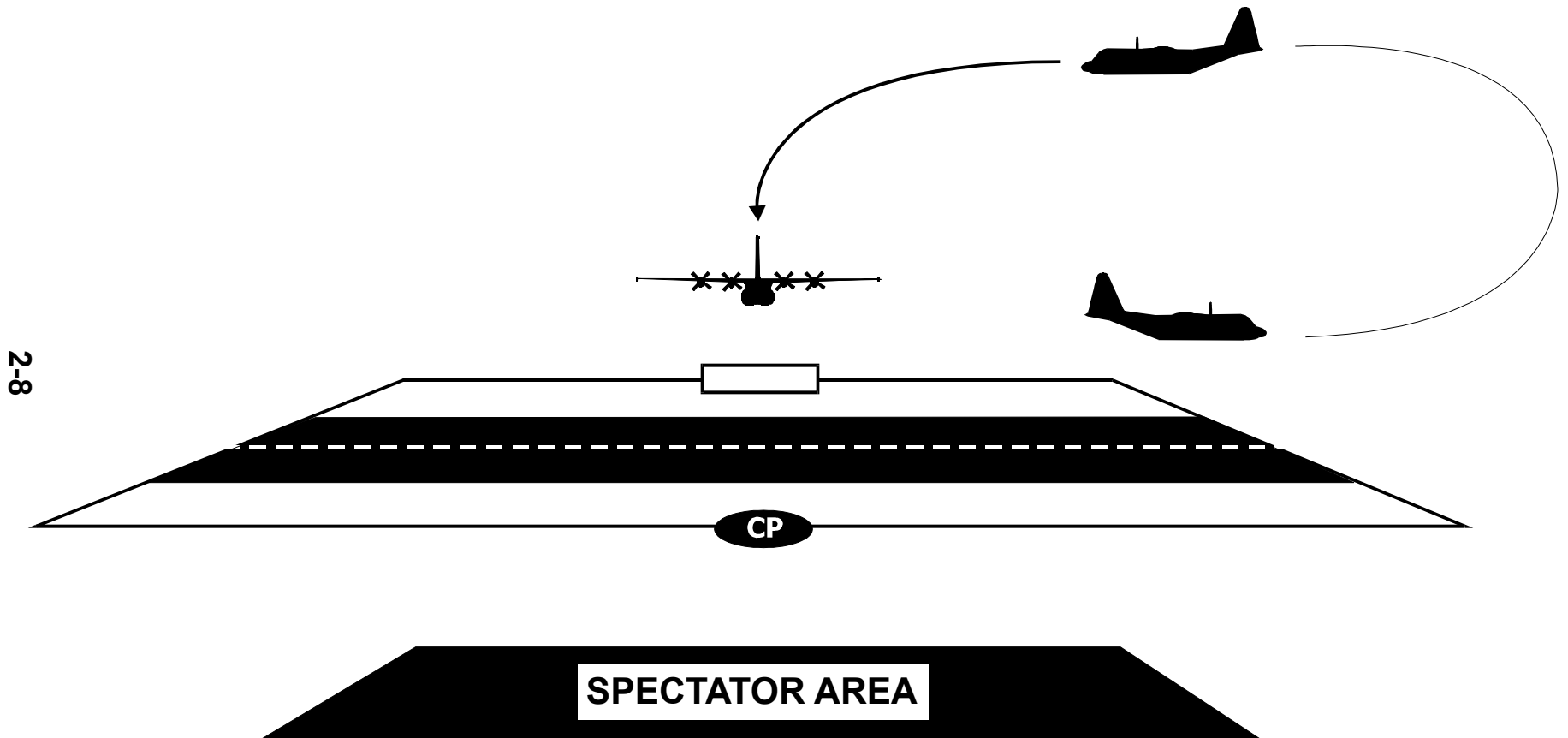
C-130 HEAD ON PASS

2-7



MANEUVER: The aircraft will rollout in a head-on profile towards CP at 200-500' AGL. The aircraft will enter the aerobatic box at 100' AGL. At $\frac{1}{2}$ nm prior to CP, a 20 degree climb will be commenced followed by a turn to level at 1200' on downwind to set up for the assault landing.

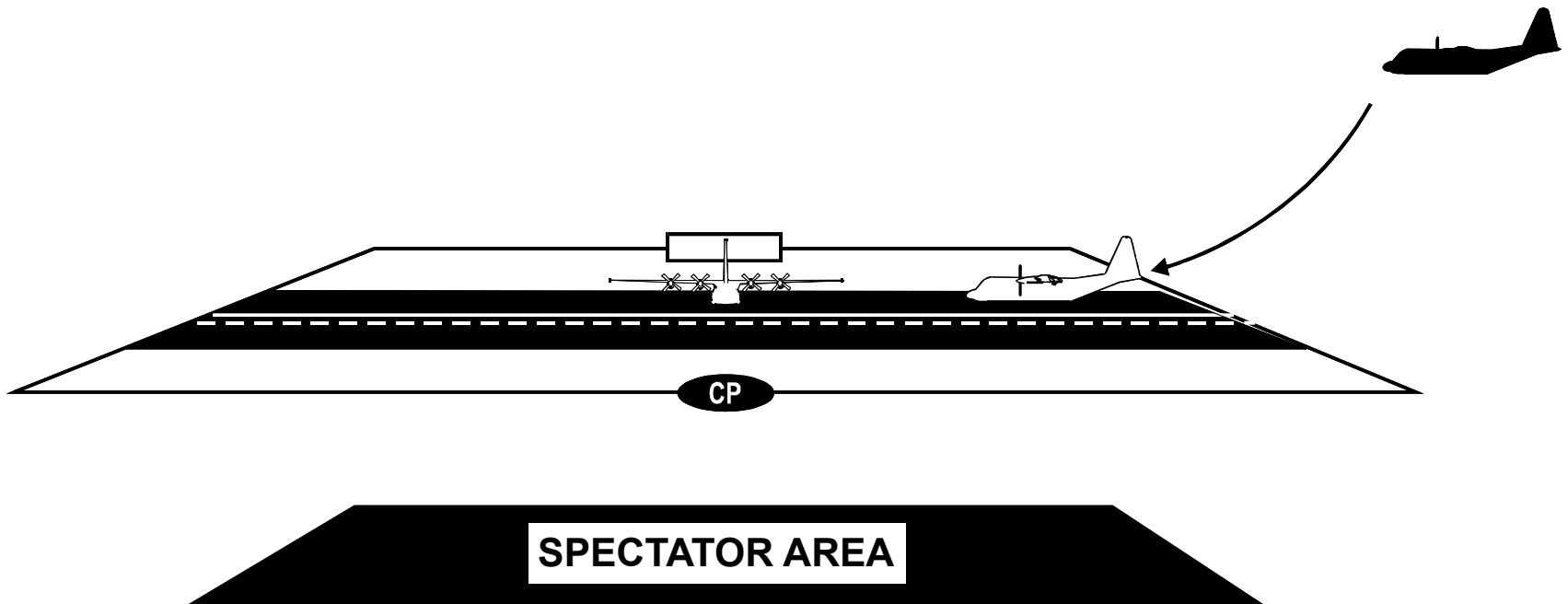
C-130 REMOTE HEAD ON PASS



MANEUVER: The aircraft will commence a turn to remain within 3nm of CP and roll out in a head-on profile towards CP at 200-500' AGL. The aircraft will enter the aerobatic box at 100' AGL. At ½ nm from CP, a 45 degree climb will be commenced to exit behind the crowd.

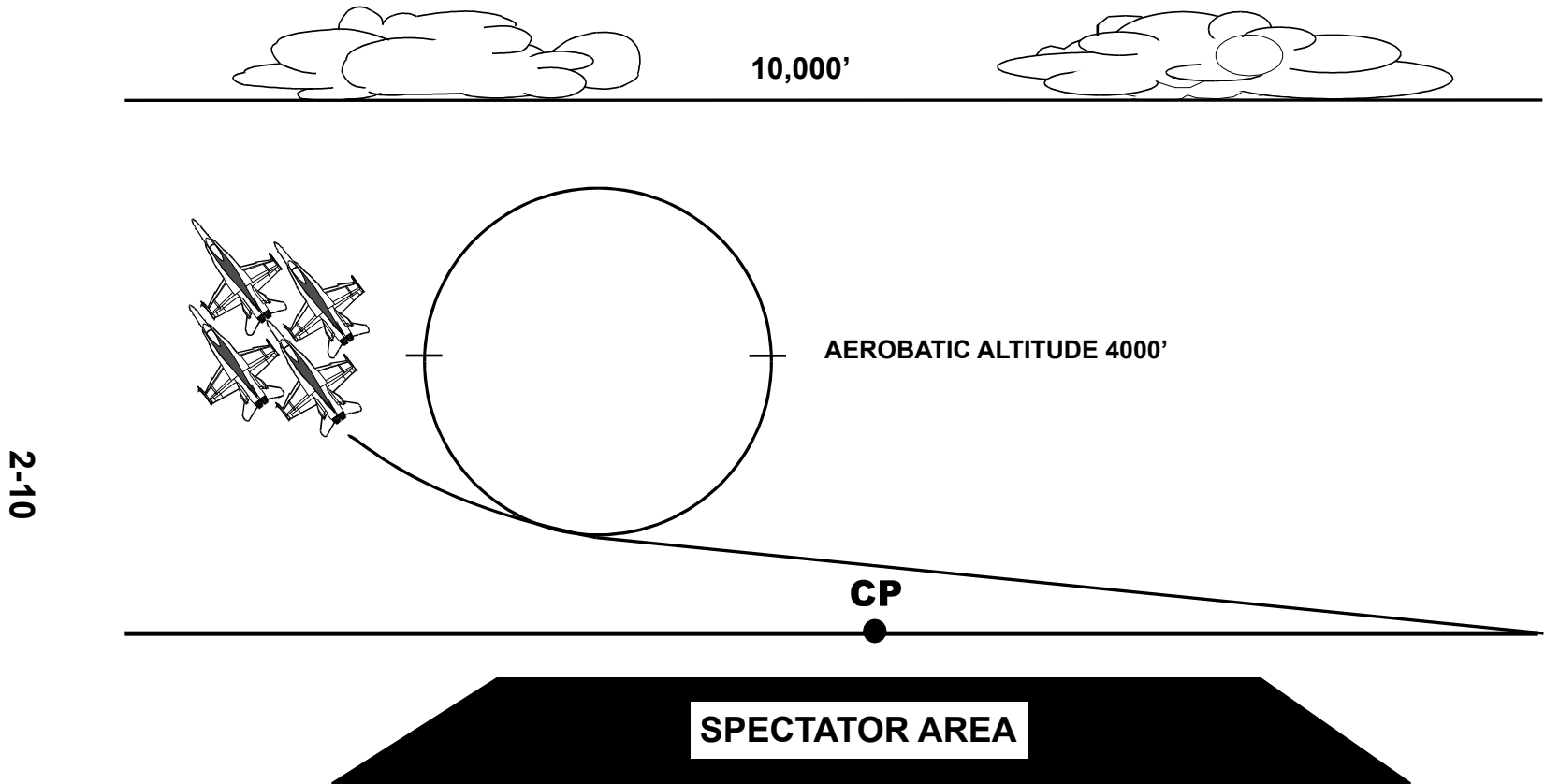
C-130 ASSAULT LANDING

2-9



MANEUVER: Behind the crowd, the landing gear/flaps will be lowered and a turn back towards the showline will be commenced, rolling out on runway centerline at 1000-1200' AGL. As the intended point of landing is approached, a 20-25 degrees nose-down approach will be commenced. After landing, the aircraft will back up, face the crowd line, and exit the runway.

DIAMOND BURNER GO / BURNER LOOP ON TAKE OFF

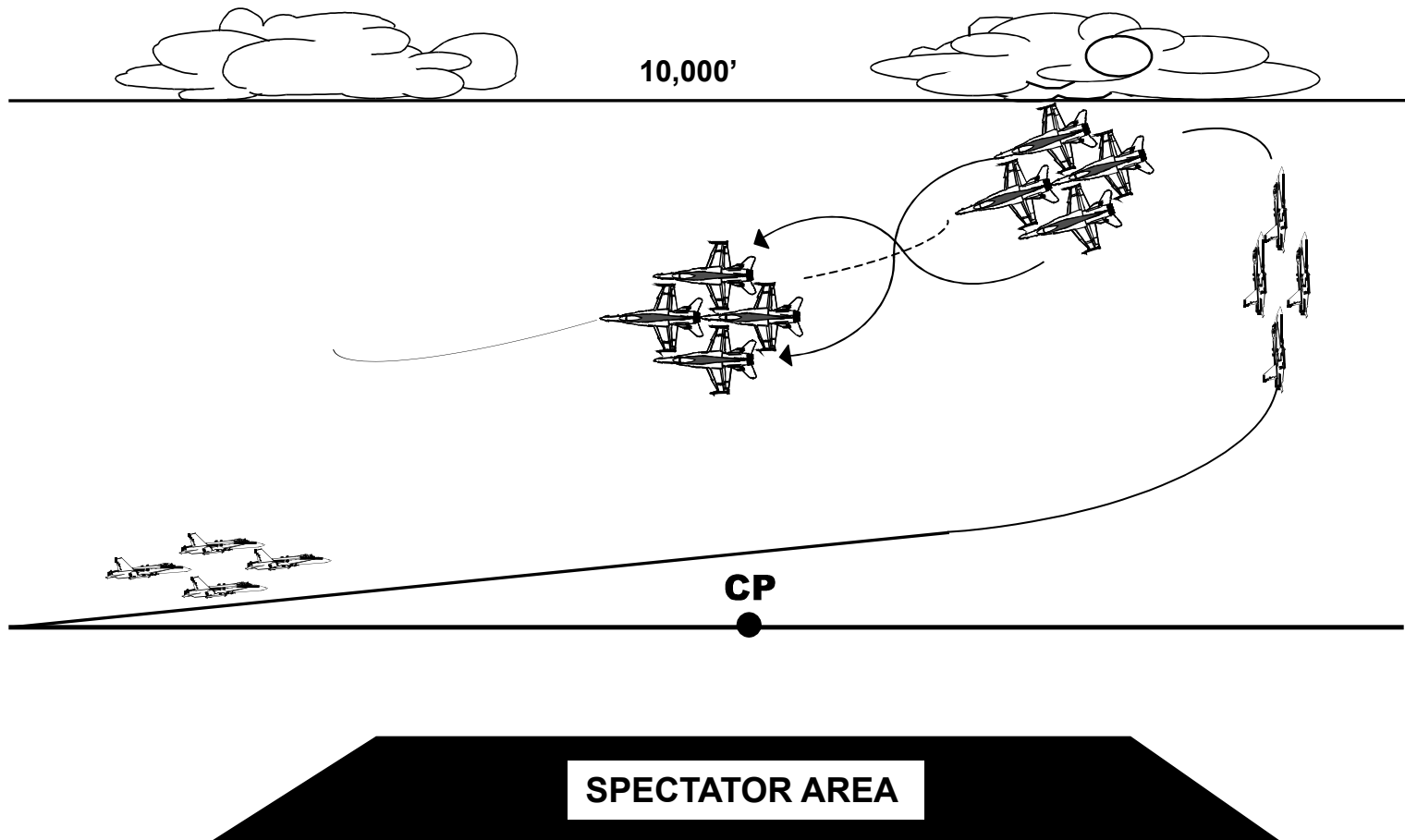


Note: Once requisite proficiency is gained in both the Diamond Burner Loop and Diamond Half Cuban Eight, these two maneuvers may be linked together for one continuous takeoff maneuver, with the Diamond Half Cuban Eight being first. The F/A-18 portion of all remote shows will begin with the Delta Head-On maneuver.

MANEUVER: The Diamond Burner Go is a formation takeoff in fingertip. Immediately after takeoff, the four aircraft will transition to the diamond while accelerating in a low transition on showline. The Loop commences from the low transition, and the show line clear is a turn behind the crowd.

NOTE: Aircraft are non-aerobatic below 4,000' when outside of designated aerobatic box.

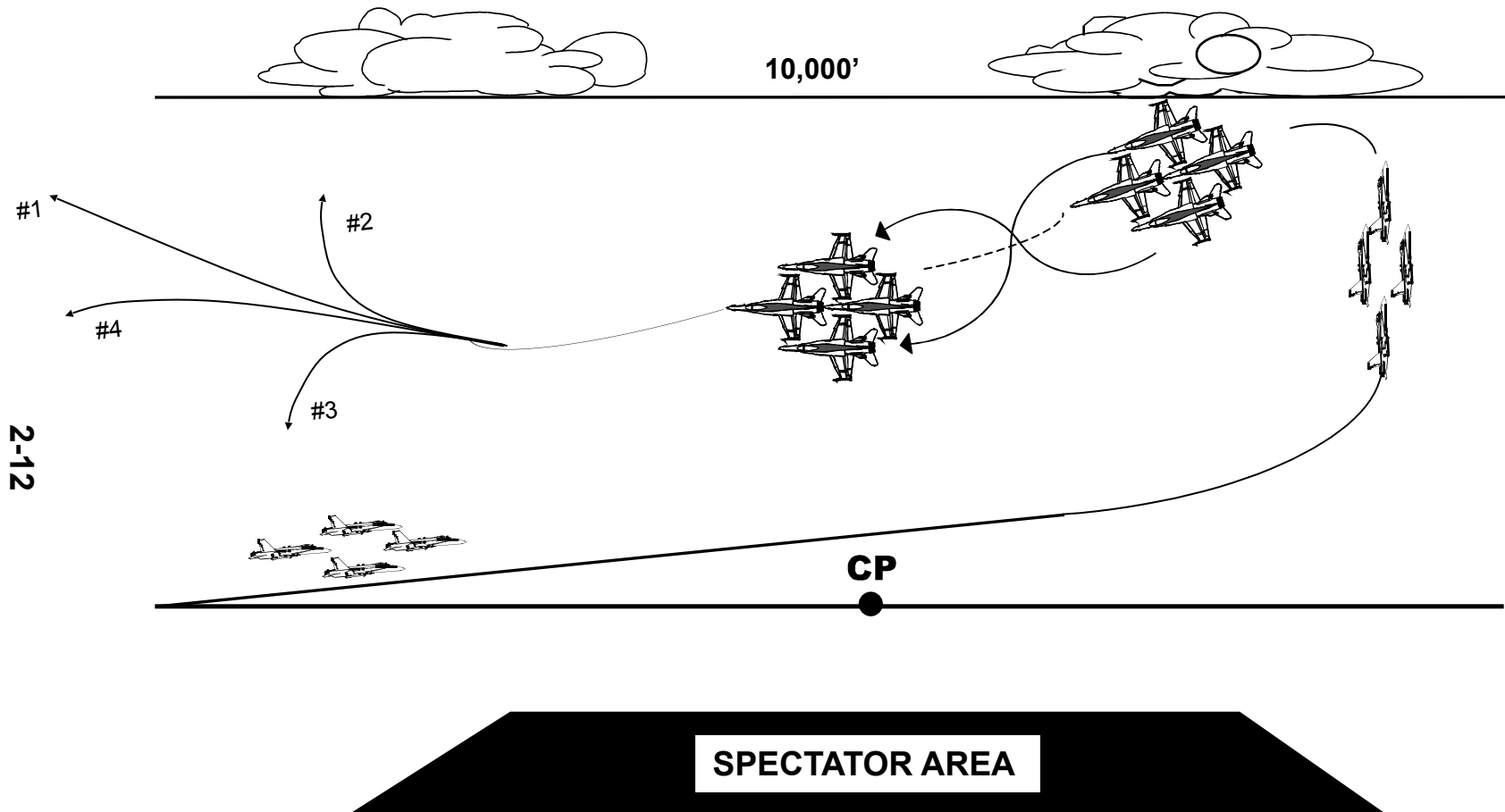
DIAMOND HALF CUBAN EIGHT ON TAKE OFF



Note: Once requisite proficiency is gained in both the Diamond Burner Loop and Diamond Half Cuban Eight, these two maneuvers may be linked together for one continuous takeoff maneuver, with the Diamond Half Cuban Eight being first.

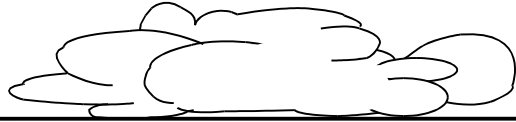
MANEUVER: The Diamond Burner Go is a formation takeoff in fingertip. Immediately after takeoff, the four aircraft will transition to the diamond while accelerating in a low transition on showline. The Half Cuban Eight commences from the low transition, and the show line clear is a turn behind the crowd.

DIAMOND HALF CUBAN EIGHT BREAK OUT

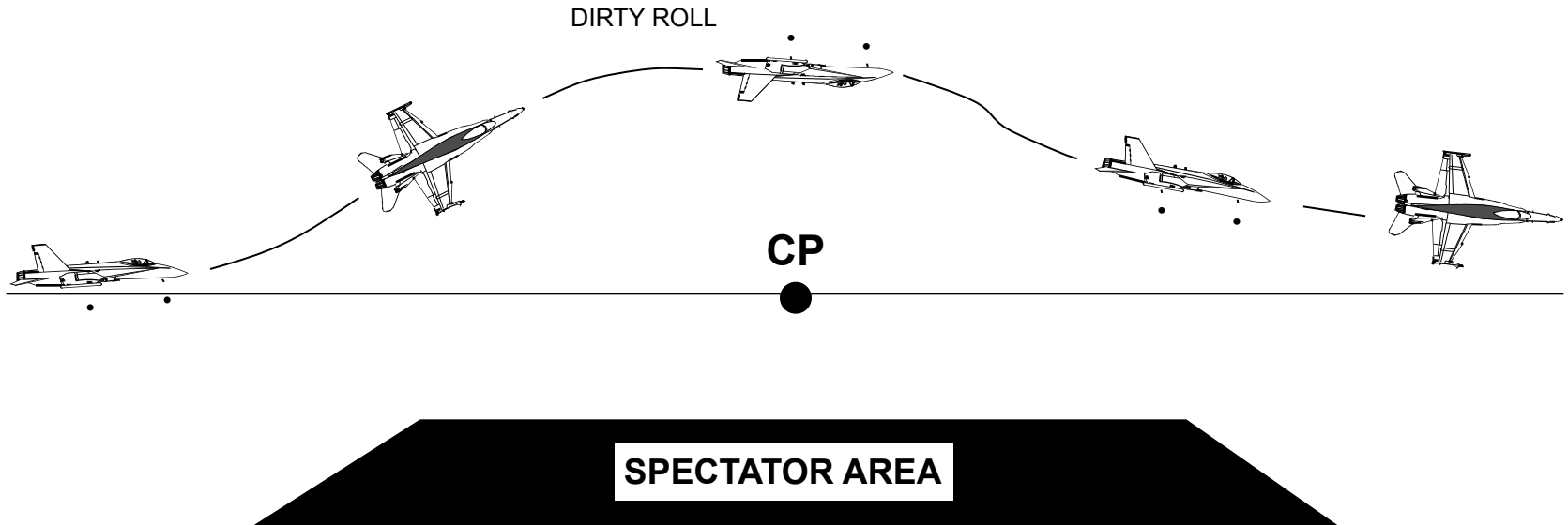


DIAMOND ½ CUBAN 8 BREAK OUT: If the clouds are biased to crowd left to the point that a ½ Cuban 8 can be accomplished but the backside loop cannot, then a ½ Cuban 8 Break Out can be done. As the formation passes through the horizon at approximately 500' AGL, they will split in three separate directions. 1 and 4 will exit out the show line while 2 and 3 egress 90 degrees in front of and behind the crowd respectively. The rendezvous will be conducted crowd left..

DIRTY ROLL ON TAKE OFF BLUE ANGEL 5



2-12

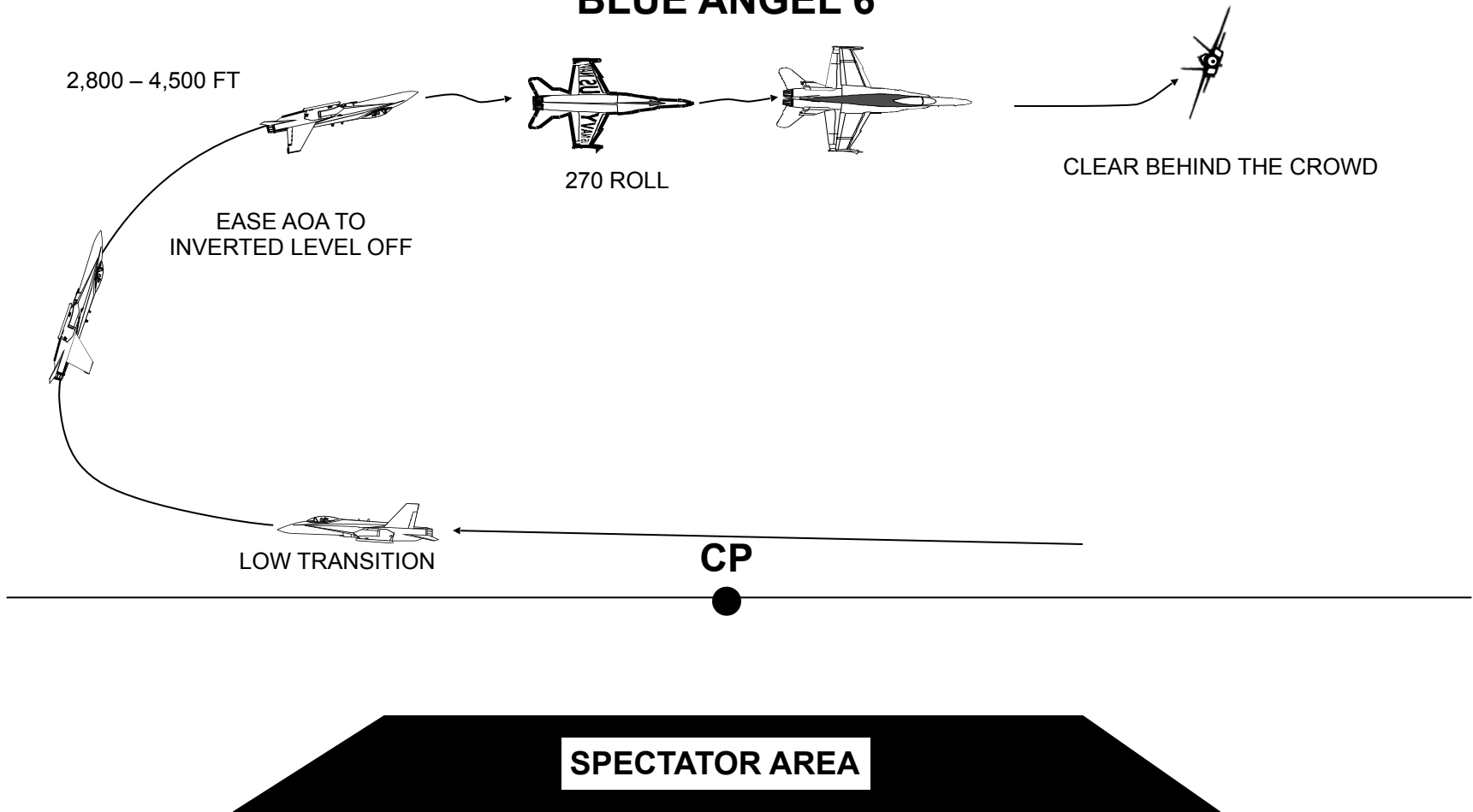


NOTE: When weather conditions are of concern, the lead solo will perform this maneuver prior to the diamond takeoff and complete an area weather observation.

MANEUVER: A left or right 360 degree roll away from the crowd with the landing gear extended. If this maneuver cannot be performed in the aerobatic box between 1200'-1500', it must be executed in the aerobatic box beyond the crowd line. It can be flown from either direction based on CP and prevailing wind. The show line clear is a climbing turn behind the crowd.

LOW TRANSITION / IMMELMAN ON TAKE OFF BLUE ANGEL 6

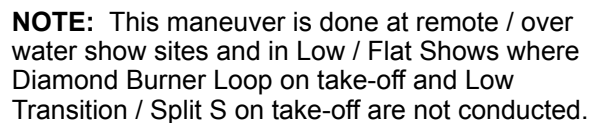
2-13



NOTE: Weather may preclude the Immelman, and #6 will execute the roll to inverted. See Flat Show T/O.

MANEUVER: #6 will execute a low transition and at 330 KCAS will execute a vertical pull to complete an Immelman maneuver. They will then track down showline from left to right and complete a 270 degree roll to clear behind the crowd at an altitude of > 2,000'.

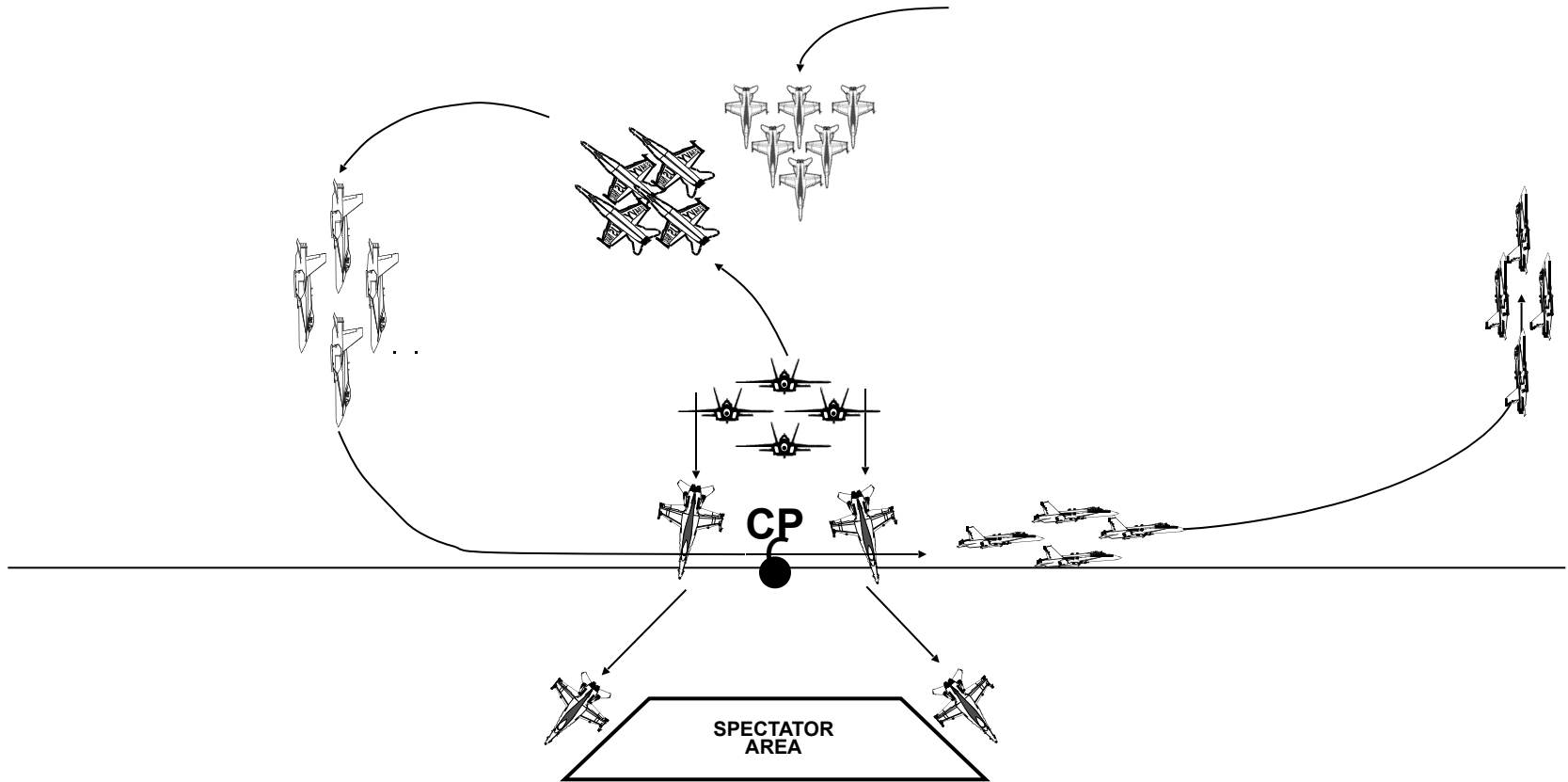
2-14



MANEUVER: The Delta will roll out in a head on set up and commence a climb. The solos are detached from the formation 1500' prior to CP. All aircraft are non-aerobatic and above 500' when crossing the spectator area. The Diamond continues the climb and exits the show line in a right turn. The solos then turn away from each other to cross back at CP.

DELTA HEAD ON BREAKOUT PART 1

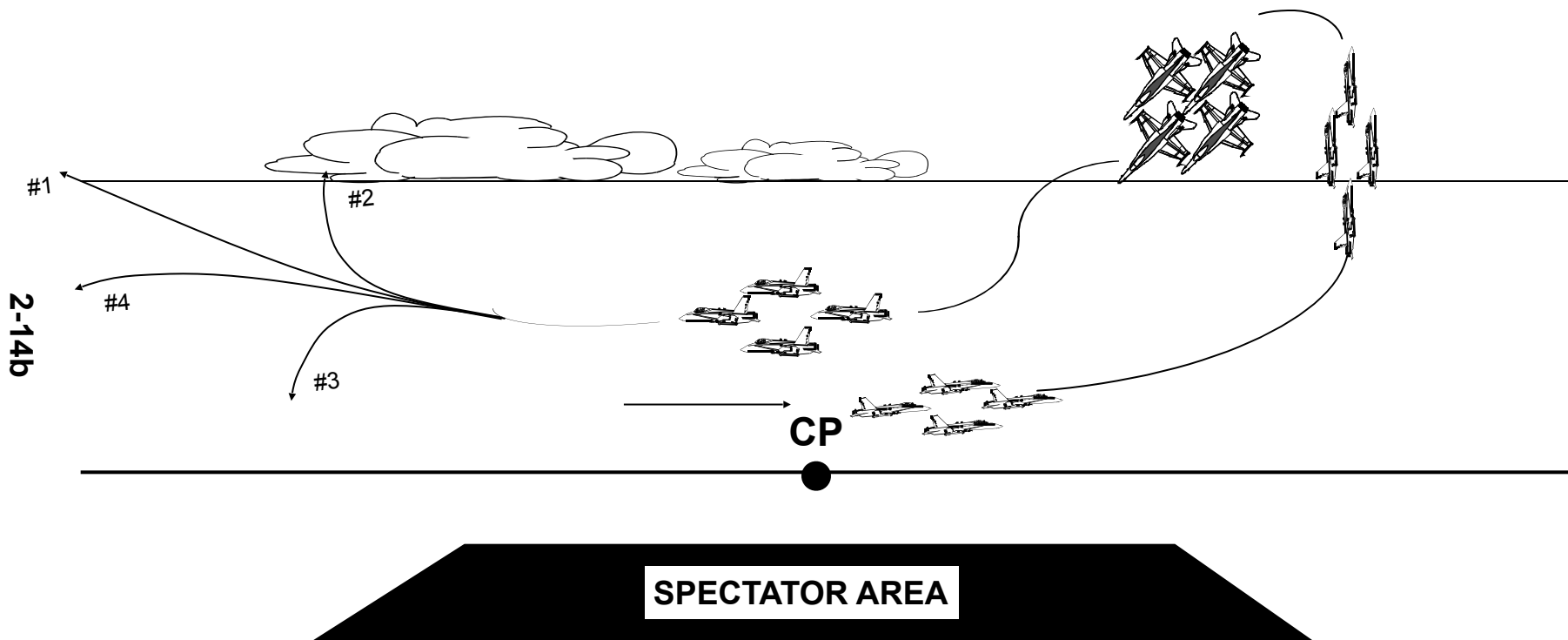
2-14a



NOTE: This maneuver is done at remote / over water show sites and only meeting High Show criteria.

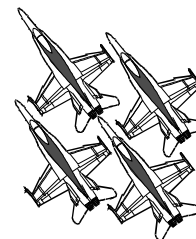
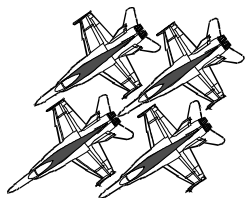
MANEUVER: The Delta will roll out in a head on set up and commence a climb. The solos are detached from the formation 2.0nm' prior to CP. All aircraft are non-aerobatic and above 500' when crossing the spectator area. The Diamond then begins a pull up into a right-hand barrel roll, and pulls back down showline CL to CR. The solos proceed behind the crowd above 500' and wings level.

HEAD ON BREAKOUT PART 2



MANEUVER: From the down of the barrel roll crowd left, the diamond will proceed crowd right and commence a vertical climb. Approaching 1.7 NM from CP, they will roll the formation 90 degrees to the left and complete the back side of the looping maneuver as a Cuban 8. As the formation passes through the horizon at approximately 500' AGL, they will split in three separate directions. 1 and 4 will exit out the show line while 2 and 3 egress 90 degrees in front of and behind the crowd respectively. The rendezvous will be conducted crowd left, behind the crowd.

DIAMOND 360



CP

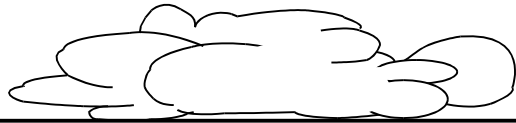


SPECTATOR AREA

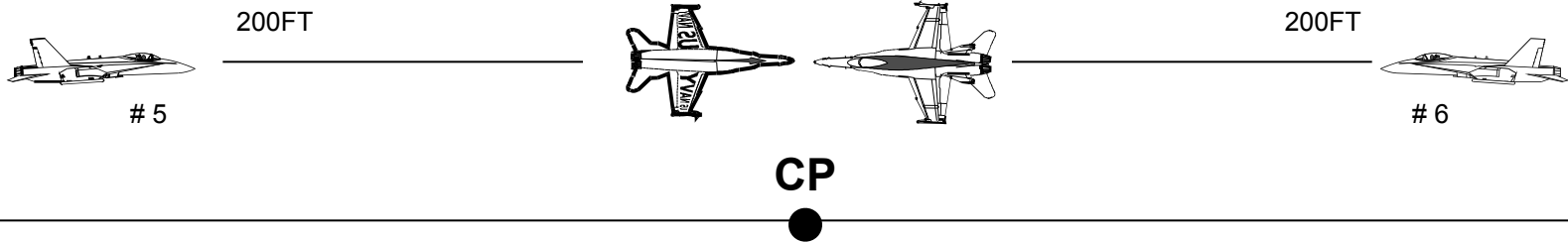
1000FT

MANEUVER: In Diamond formation the Diamond executes a non-aerobatic right to left circular pass at less than 60 degree AOB crossing over CP at a minimum ALT of 200'.

OPPOSING KNIFE EDGE



2-16



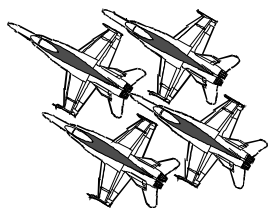
SPECTATOR AREA

MANEUVER: At CP each pilot will roll his aircraft into a 90 degree angle of bank prior to the cross. After the cross, both aircraft will roll upright and clear in front of the crowd.

DIAMOND ROLL

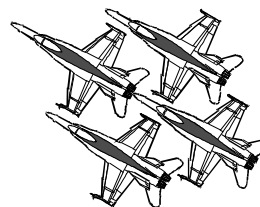


3200FT



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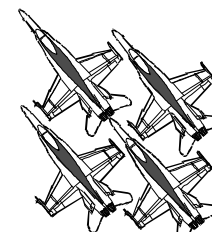
200FT



2MI

CP

200FT



1500FT

SPECTATOR AREA

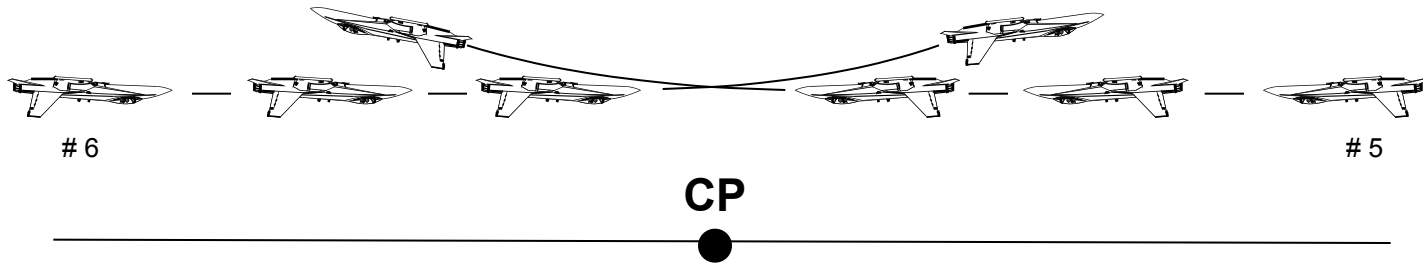
2-17

MANEUVER: Approaching CP in Diamond, all four aircraft roll 360 degrees in formation, starting the roll at 1500' and topping at approximately 3200'. Minimum altitude on the ingress and egress roll line is 200'.

INVERTED TO INVERTED ROLL



ROLL 360 DEGREES



6

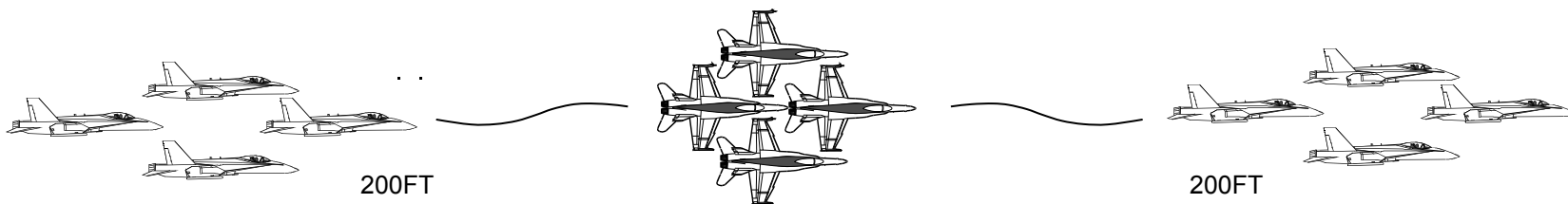
5

CP

SPECTATOR AREA

MANEUVER: Each pilot will roll his aircraft inverted at the edge of the aerobatic box. Crossing CP, each pilot will execute a 360 degree roll back to inverted and continue away from centerpoint with a very slight climb. Once .5NM from center point is reached, both aircraft will clear behind the crowd.

DIAMOND AILERON ROLL



200FT

200FT

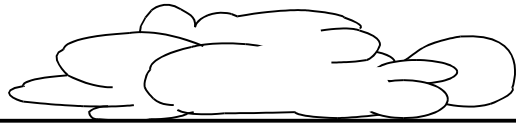
CP



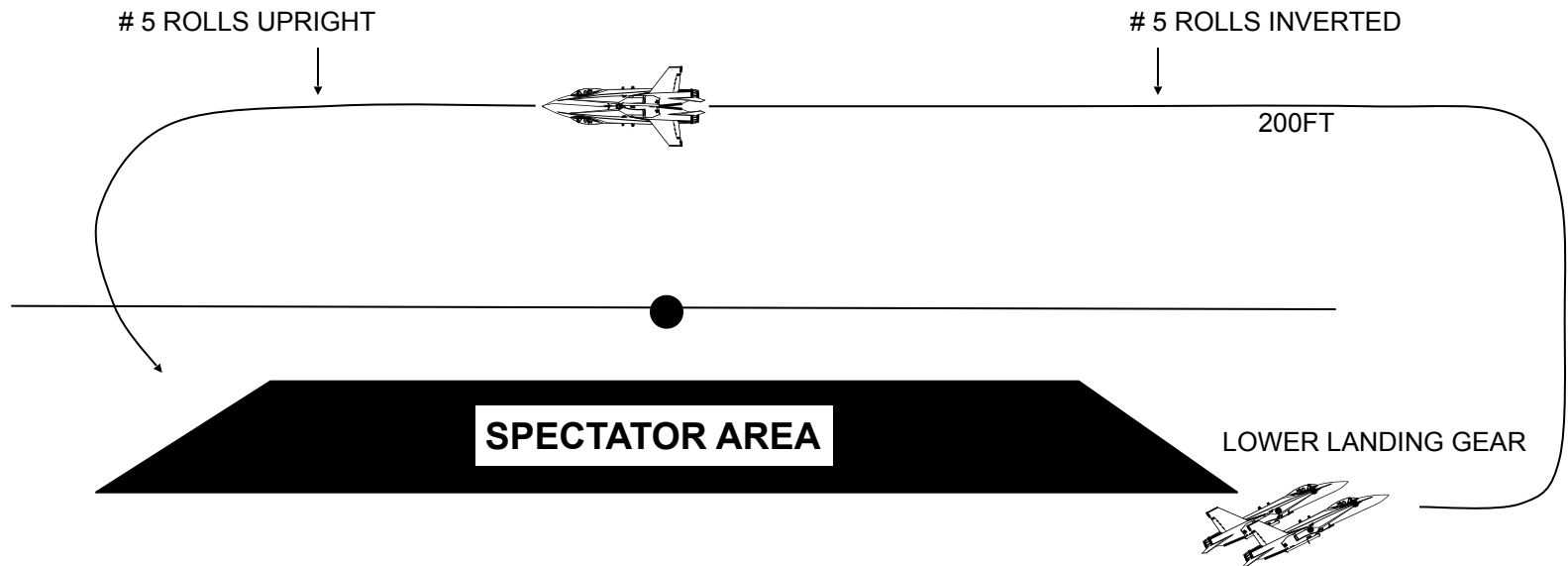
SPECTATOR AREA

MANEUVER: All four aircraft perform simultaneous 360 degree rolls within the aerobatic box.

FORTUS



2-20

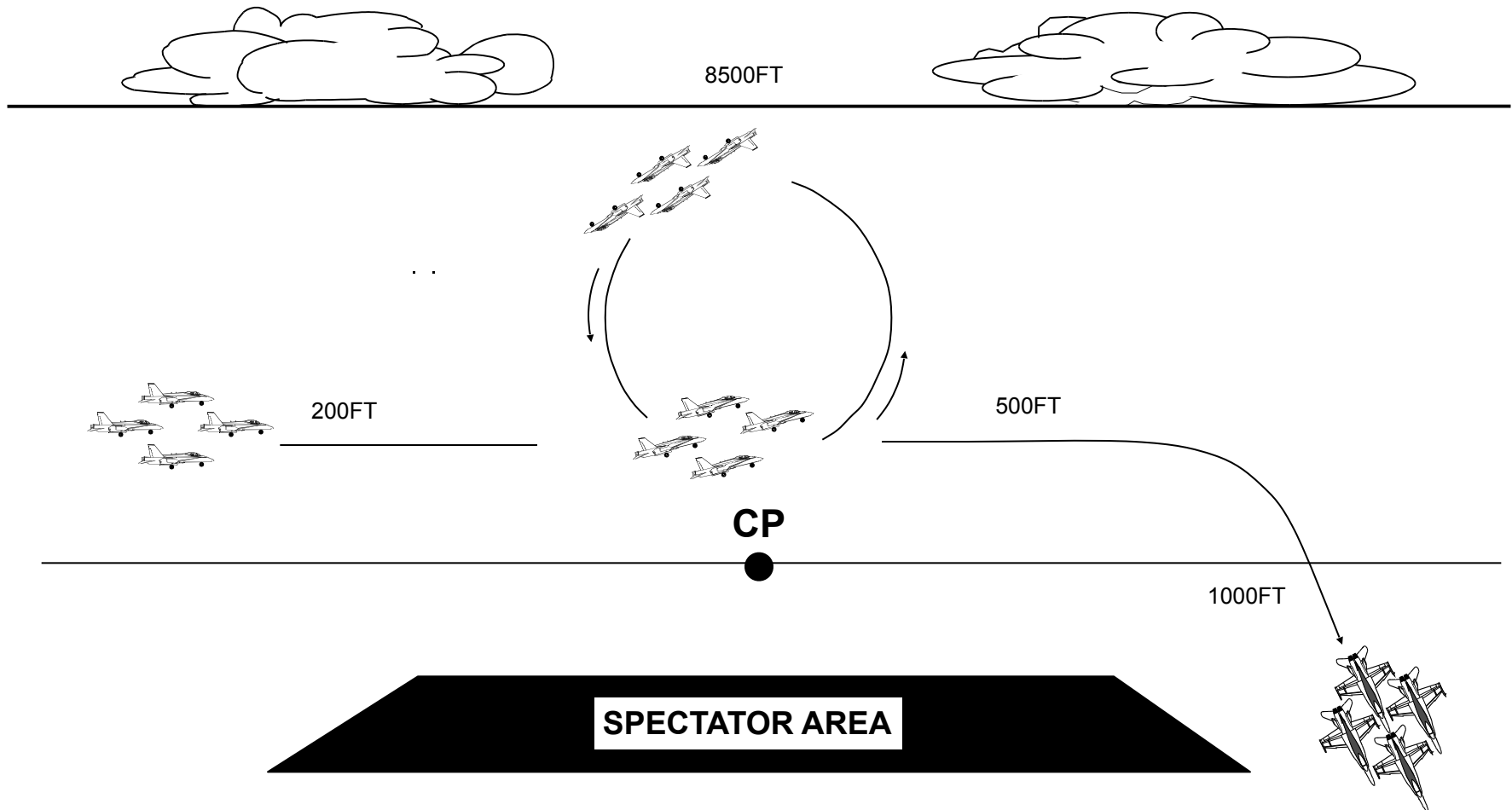


NOTE: In a single solo situation, #5 or #6 will perform an inverted dirty flat pass, rolling in at 1NM and rolling upright at 3/4nm.

MANEUVER: Both aircraft will approach from crowd right in the dirty configuration. #5 will roll inverted at the edge of the aerobatic box at a minimum of 200'. #6 will move to an abeam position upright, creating a mirror image effect. At CP both aircraft will climb. At 3/4nm, #5 will roll upright and both aircraft will clear crowd left behind the crowd.

DIAMOND DIRTY LOOP

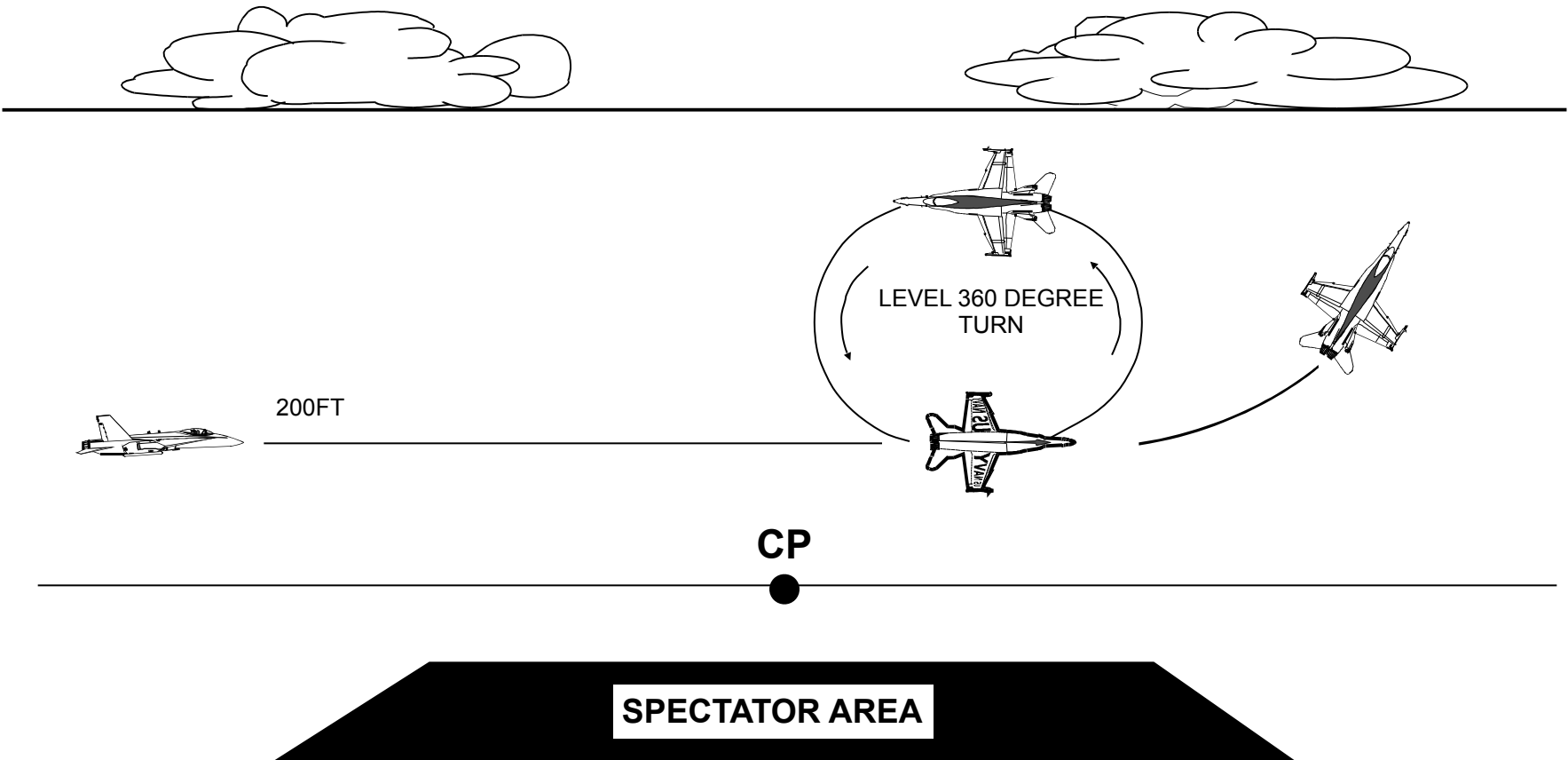
2-21



MANEUVER: In the Diamond formation all four aircraft will complete a loop over CP on the show line with the landing gear and hooks extended.

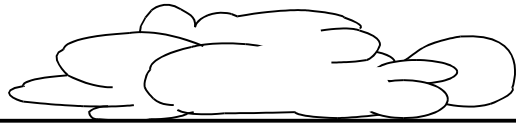
SOLO MINIMUM RADIUS TURN

2-22

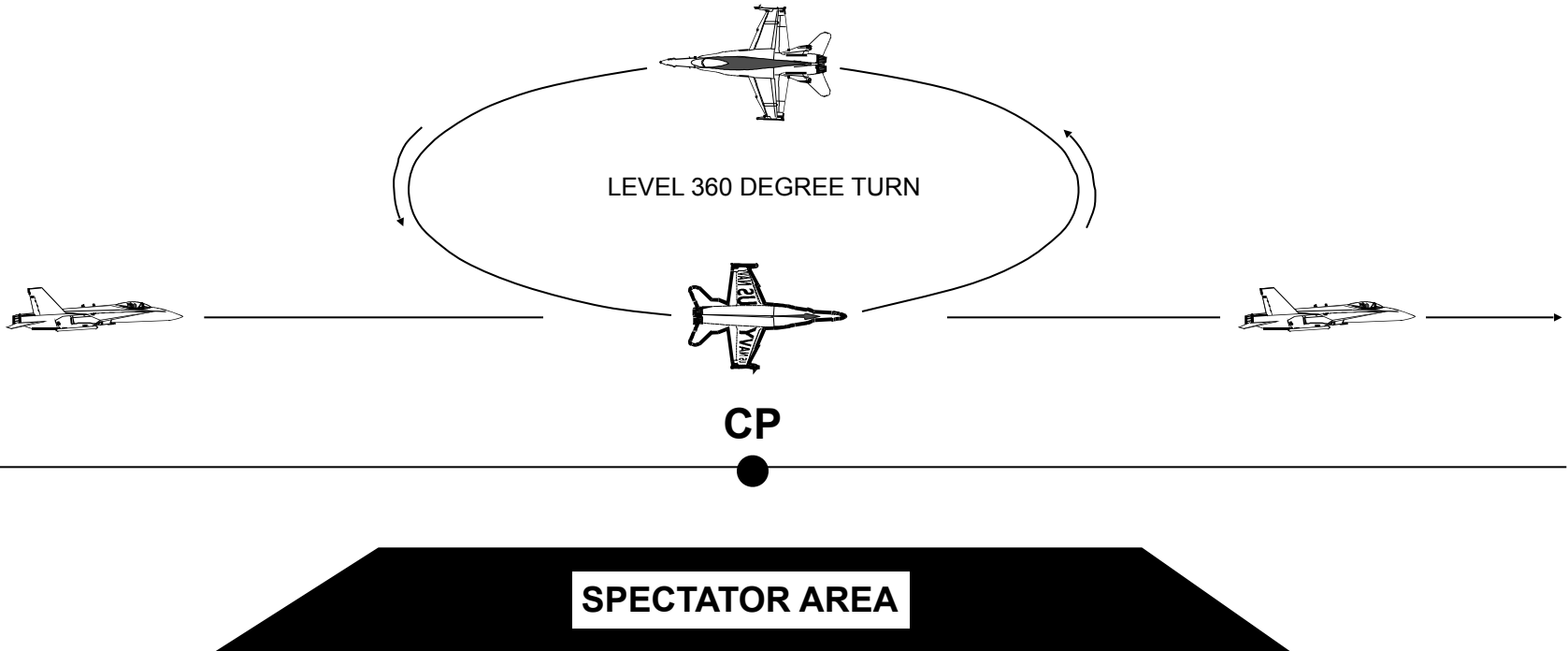


MANEUVER: This maneuver is a non-aerobatic level horizontal 390 degree turn at 150' AGL, away from the crowd. At the completion of the 360 degree turn, #5 will exit the flight line vertically outboard of the show line and level off above 1000' AGL. #6 will rendezvous from behind the crowd'.

SOLO MINIMUM RADIUS TURN

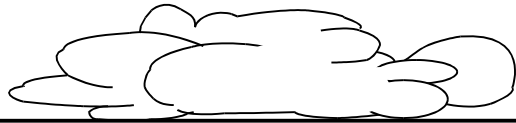


2-22

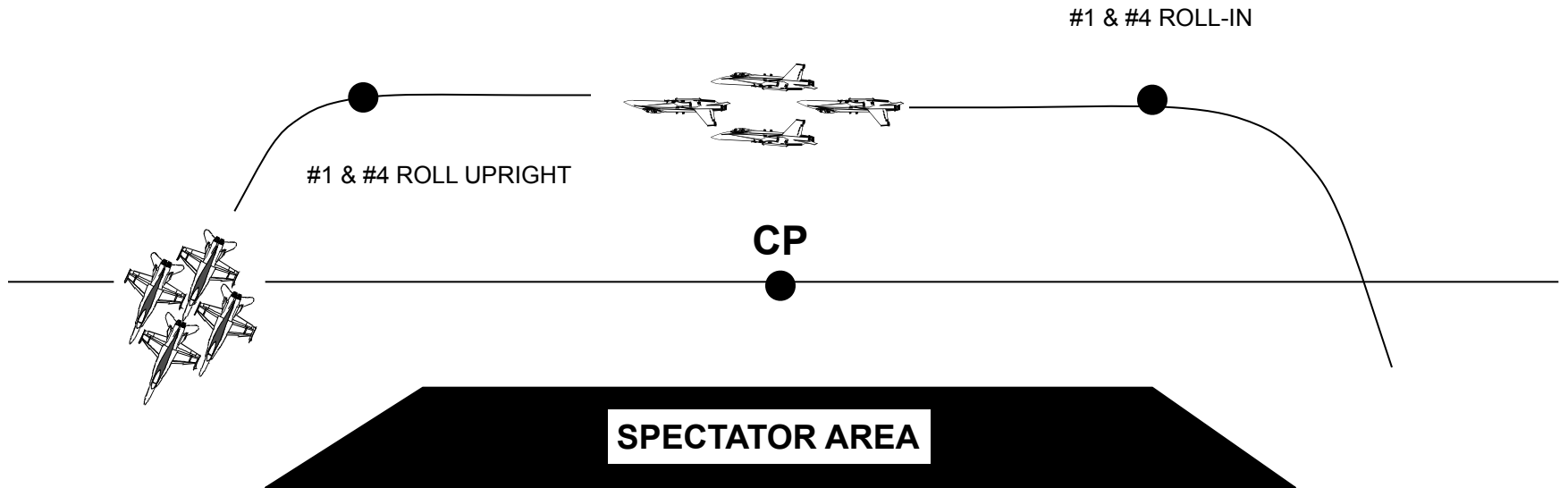


MANEUVER: This maneuver is a non-aerobatic level horizontal 360 degree turn at 200' AGL, away from the crowd. At the completion of the 360 degree turn, #6 will rendezvous over the top of #5 at 500' AGL.

DOUBLE FARVEL

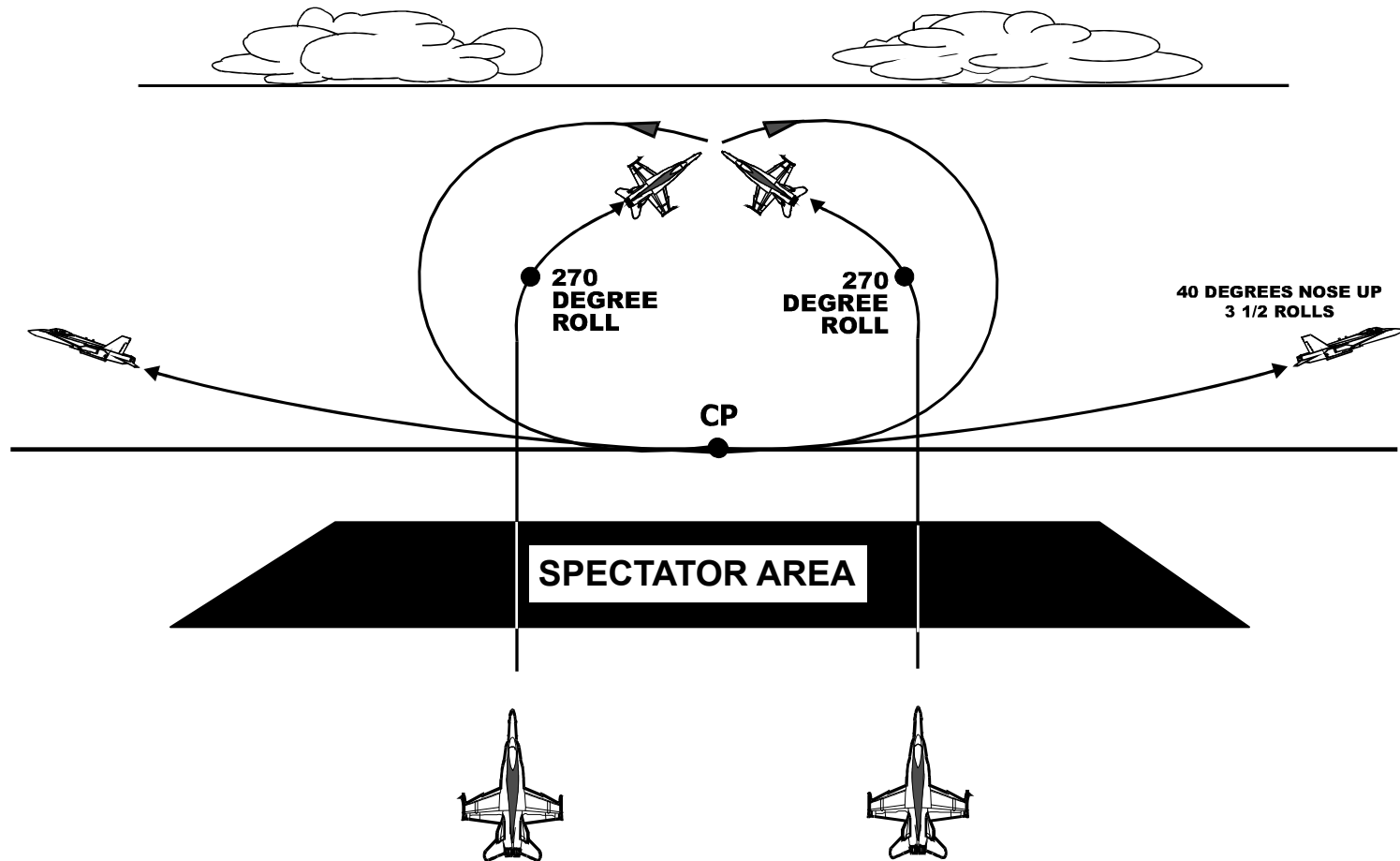


2-23



MANEUVER: #1 & #4 roll inverted simultaneously at the edge of the aerobatic box while #2 & #3 remain upright. Maintaining a diamond formation they commence a flat pass at 200'. No later than 1NM past CP #1 & #4 sequentially roll upright in a climb.

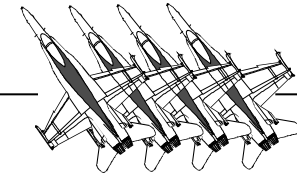
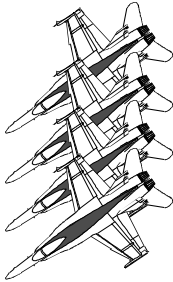
OPPOSING MINIMUM RADIUS TURN



NOTE: Low show clear is 20 degrees nose up and 2 1/2 rolls. Flat show clear is 10 degrees nose up and 1 1/2 rolls.

MANEUVER: From behind the crowd, #5 & #6 will approach in an abeam formation at 400 KCAS and 500' AGL crossing over the spectator area. They will extend to approximately 1500' past the show line with #5 moving 50'-75' aft of #6. Each aircraft will roll 270 degrees away from each other and commence a cross. They will cross again over CP at a minimum of 200' AGL. Both A/C will roll out in front of the show line, pull 40 degrees nose up and execute 3 1/2 rolls.

ECHELON PARADE



CP

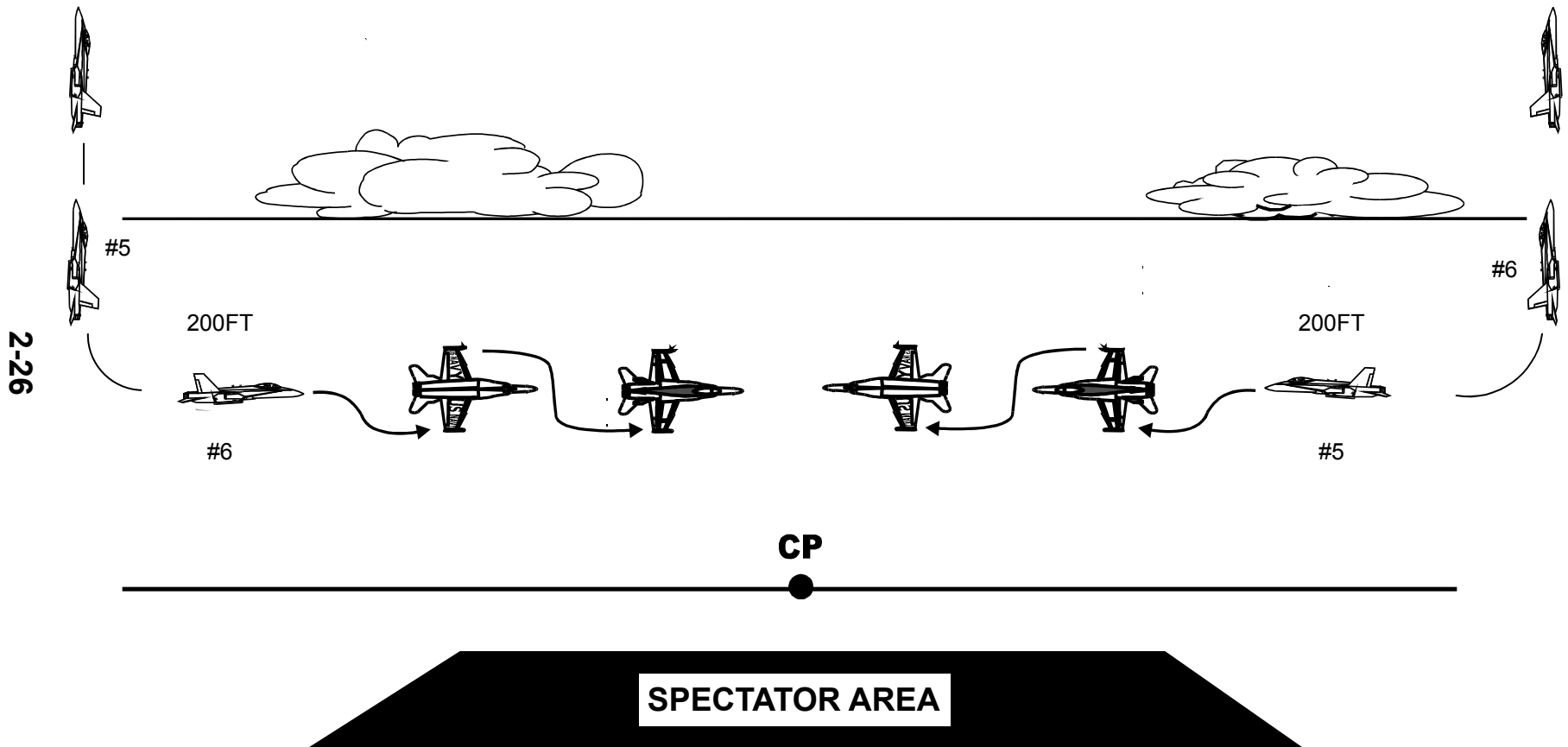


SPECTATOR AREA

1000FT

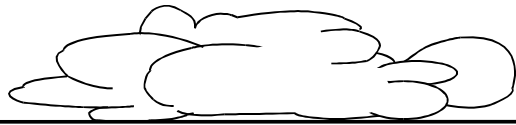
MANEUVER: In right Echelon the Diamond executes a right to left non-aerobatic circular pass at approximately 60 degree AOB crossing over CP at a minimum altitude of 200'.

OPPOSING HORIZONTAL ROLLS



MANEUVER: Approaching CP, each pilot will commence a 3-4 degree climb and then roll his aircraft 720 degrees. After rolling wings level, both pilots will pull 90° nose up, then roll 90° and pull to level flight. Once upright the pilots clear heading behind the crowd.

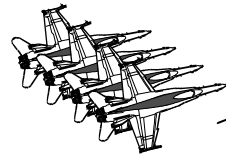
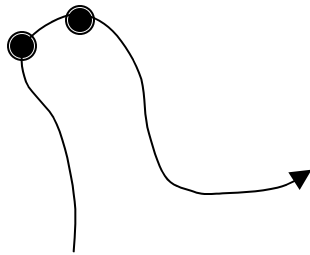
LEFT ECHELON ROLL



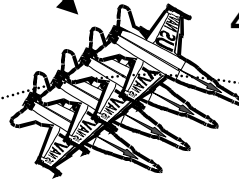
4500FT Clouds



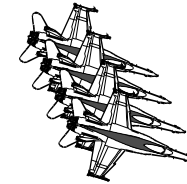
TRANSITION TO LEFT ECHELON



300FT

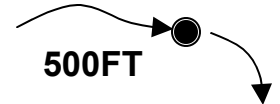


4000FT



TRANSITION BACK TO DIAMOND

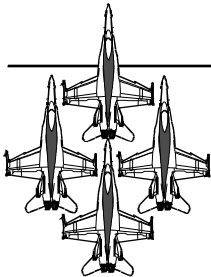
500FT



1500FT

CP

500FT



SPECTATOR AREA

MANEUVER: Ingressing from crowd left in front of the crowd, the Diamond transitions to left echelon. Approaching CP they commence a climb and then roll the formation 360 degrees to the left and egress to the right as they transition back to Diamond.

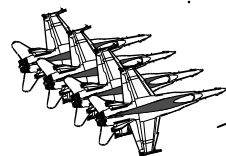
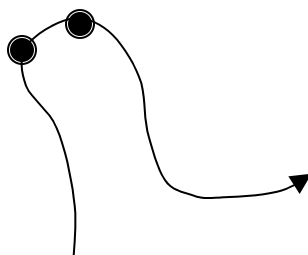
CHANGEOVER ROLL



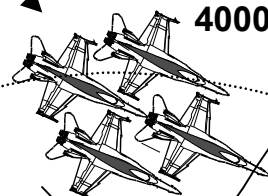
5000FT Clouds



TRANSITION TO LEFT ECHELON

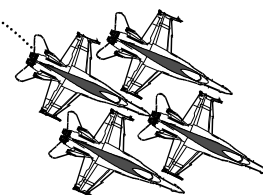


300FT



4000FT

TRANSITION BACK
TO DIAMOND



500FT

500FT

1500FT

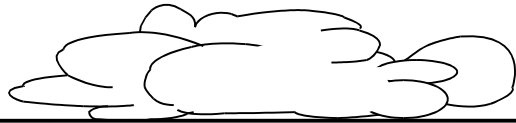
CP

SPECTATOR AREA

MANEUVER: Ingressing from crowd left in front of the crowd, the Diamond transitions to left echelon. Approaching CP they commence a climb and then roll the formation 360 degrees to the left, shifting to Diamond 90 degrees through the roll and egress behind the crowd, crowd right.

2-27a

SNEAK PASS, BLUE ANGEL 5



50FT



5



CP

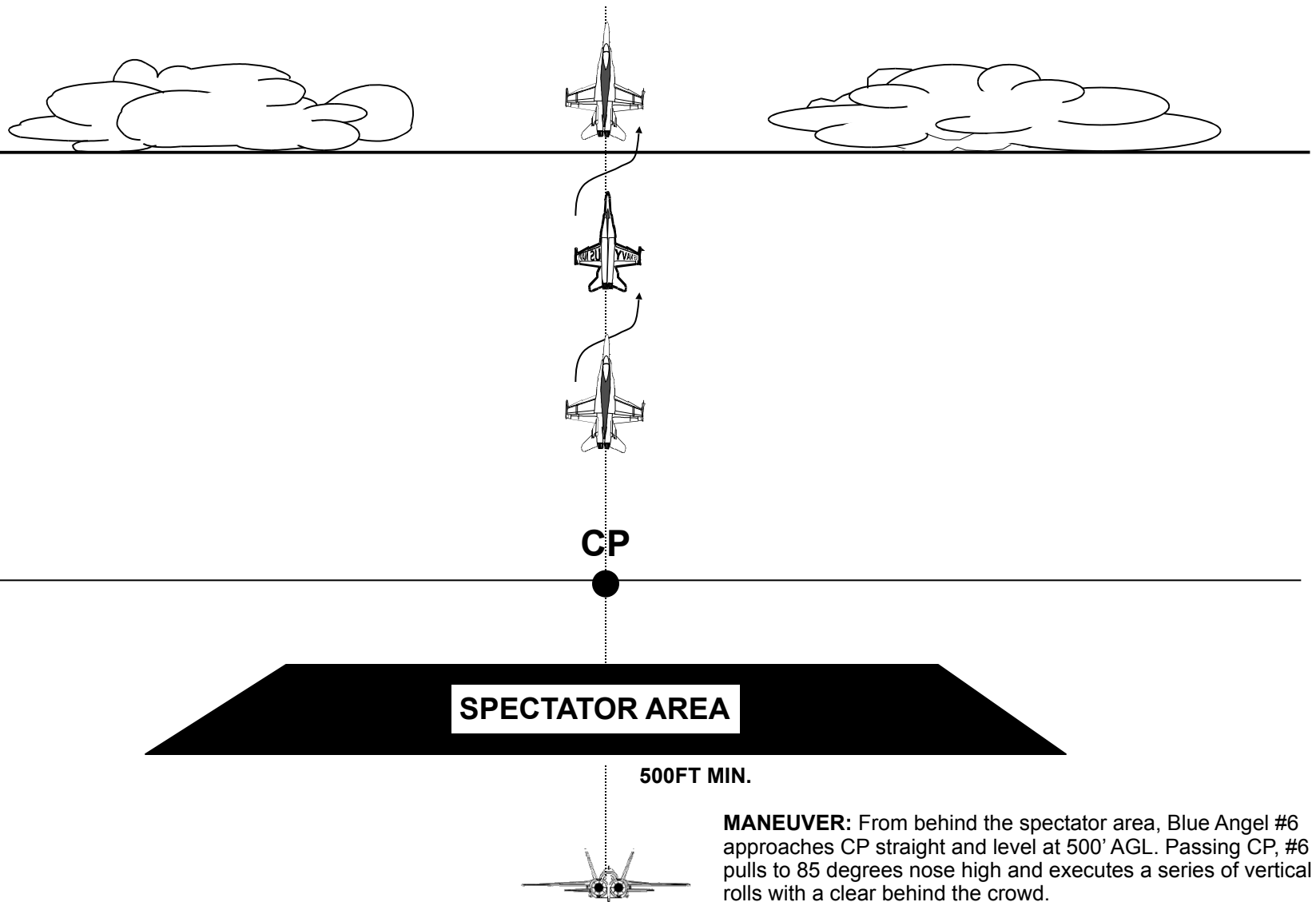


SPECTATOR AREA

MANEUVER: A flat pass on the 500' show line at 50' AGL . Once past the spectator area, a clear to crowd right behind the crowd is executed.

2-28

VERTICAL ROLLS, BLUE ANGELS 6





CP

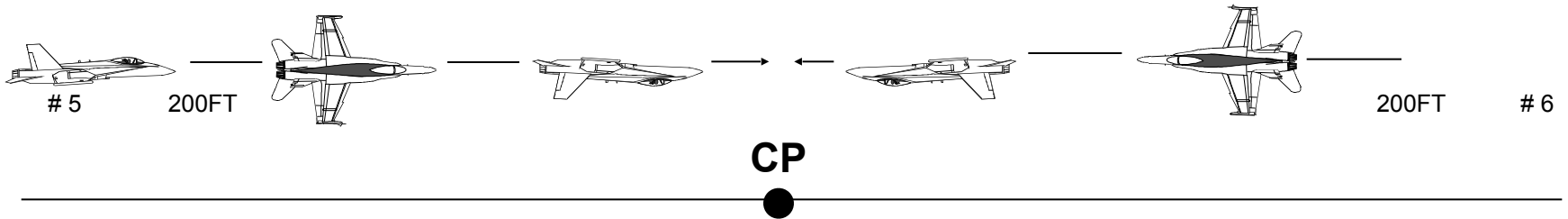
SPECTATOR AREA

MANEUVER: At approximately 3-1/2NM, aircraft #1,2,3,4 and 5 transition to a Line Abreast formation. Approaching CP, they complete a loop. Egressing crowd left, aircraft #1-4 shift back to Diamond and detach #5.

OPPOSING FOUR POINT ROLL

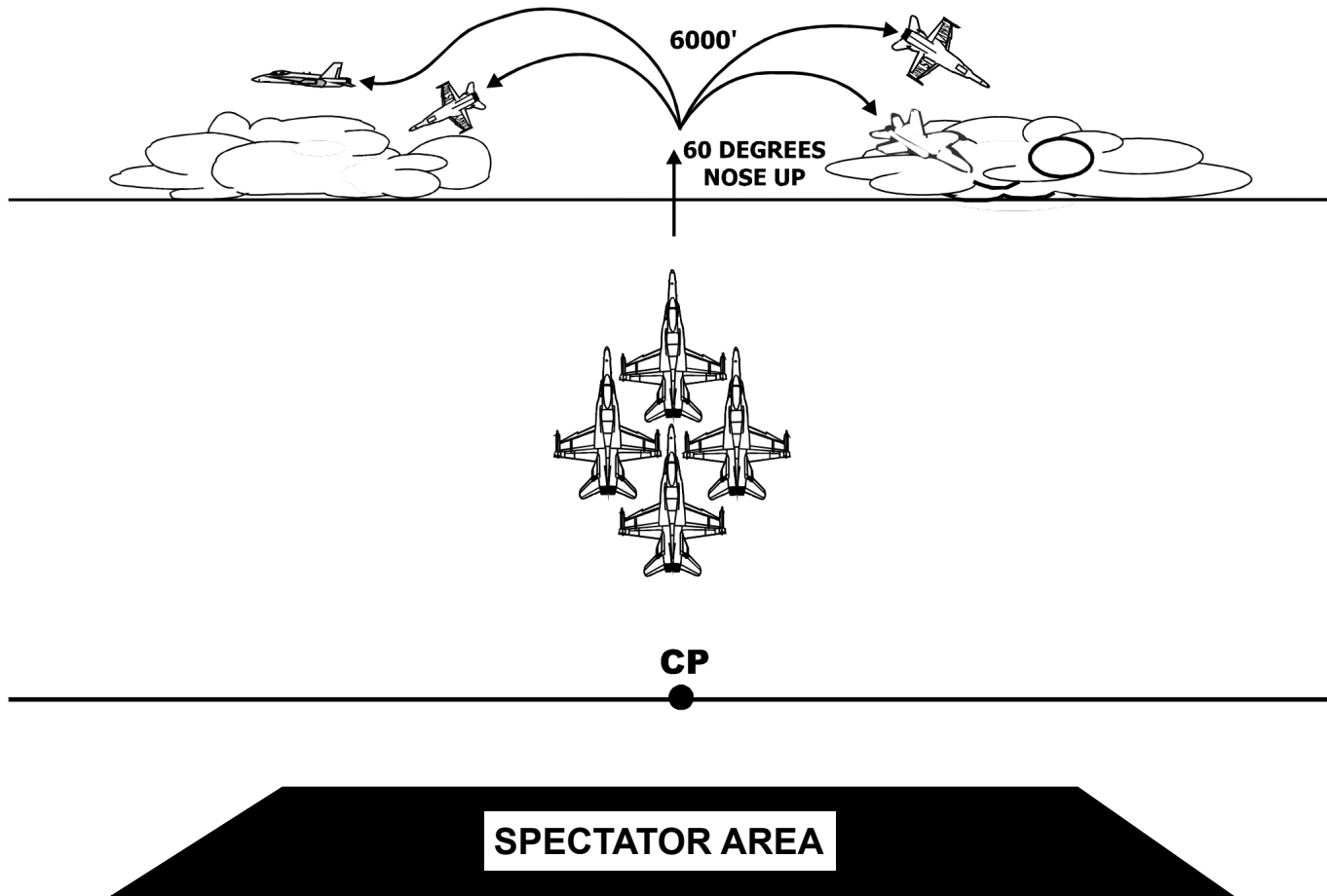


2-31



MANEUVER: Approaching CP at 200' AGL, each aircraft executes a left four point roll crossing over CP in the inverted position. High show clears will be executed in front of the crowd. Low and flat show clears will be executed behind the crowd.

DIAMOND VERTICAL BREAK

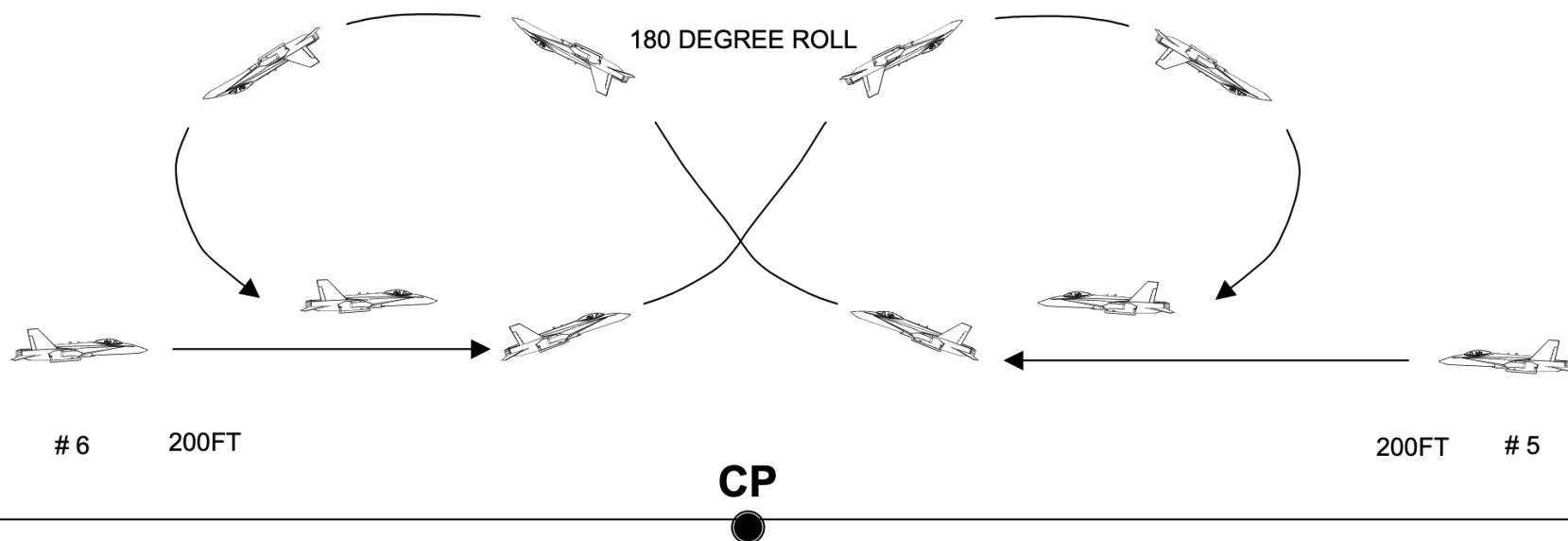


MANEUVER: Approaching from directly behind the crowd in a trail formation, the four diamond aircraft will commence a climb approaching CP. At 30 degrees nose up they will transition back to the diamond formation. Reaching 60 degrees nose up, they will split in four separate directions. At this point the maneuver is complete and they will rendezvous crowd left in front of the crowd.

VERTICAL PITCH



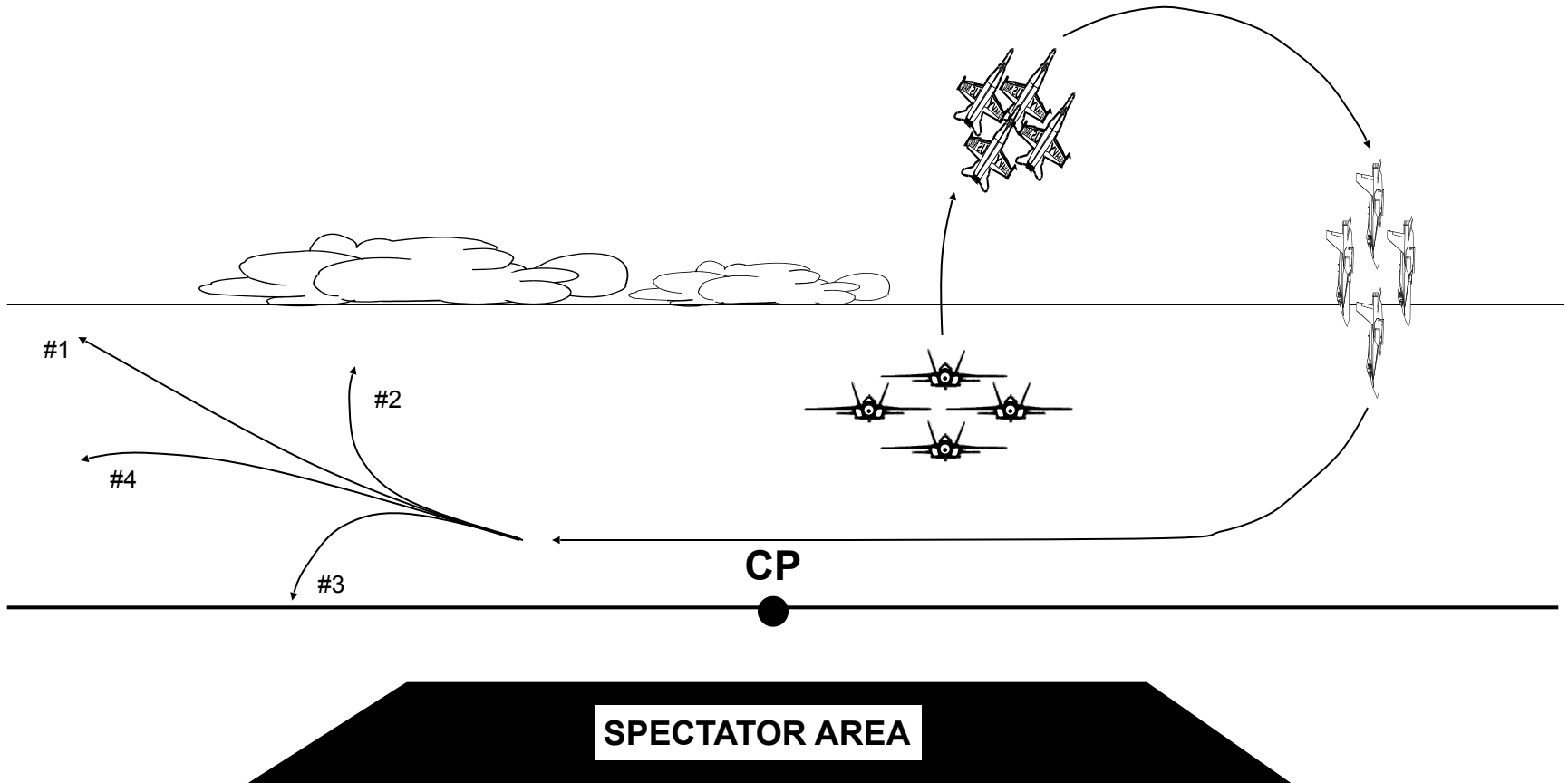
2-33



MANEUVER: Approaching CP at a minimum of 50', each aircraft pulls 65-70 degrees nose up and then rolls to inverted. Both aircraft complete a split "S" and cross over CP. At CP each pilot performs a right 360 degree roll, then clears behind the crowd.

BARREL ROLL BREAK

2-34

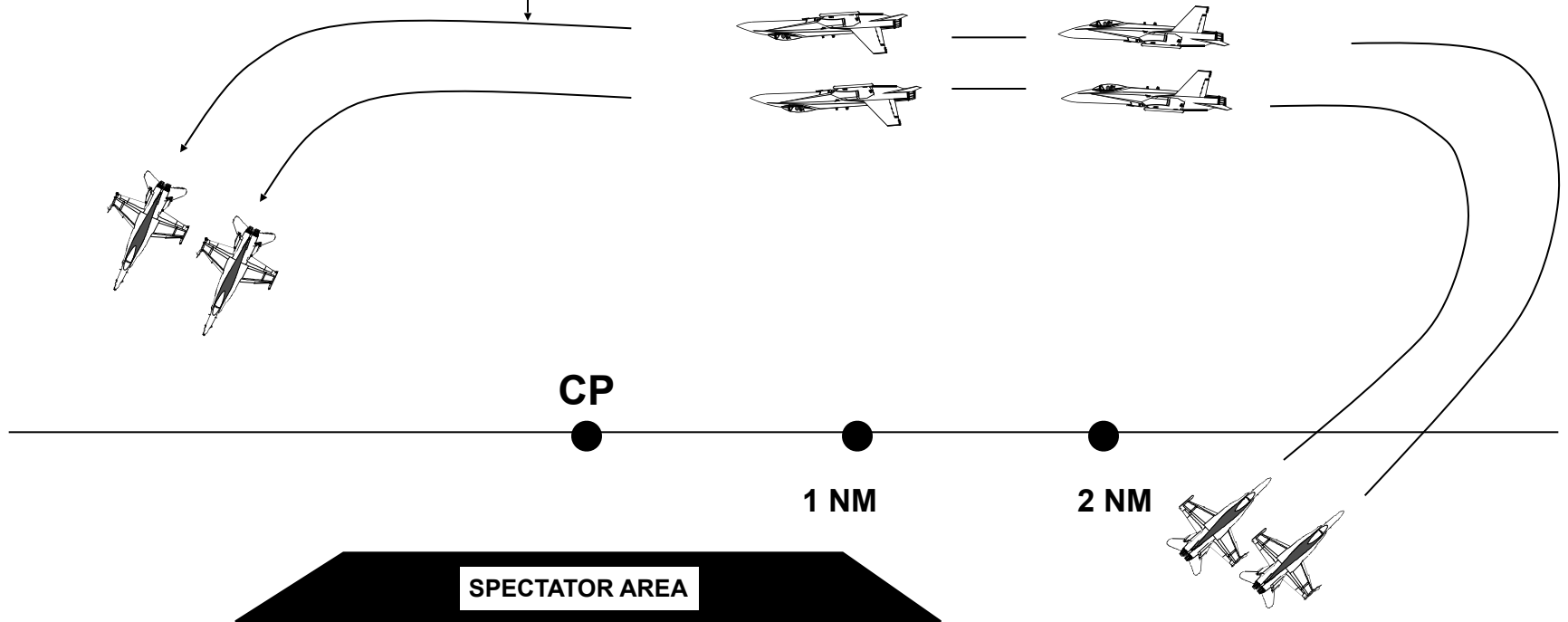


MANEUVER: Ingressing from in front of the crowd 2000' crowd right, the diamond formation will commence a vertical climb. Approaching 1.7 NM from CP, they will roll the formation 90 degrees to the left and complete the back side of the looping maneuver. As the formation passes through the horizon at approximately 500' AGL, they will split in three separate directions. 1 and 4 will exit out the show line while 2 and 3 egress 90 degrees in front of and behind the crowd respectively. The rendezvous will be conducted behind the crowd.

TUCK-OVER ROLL

2-35

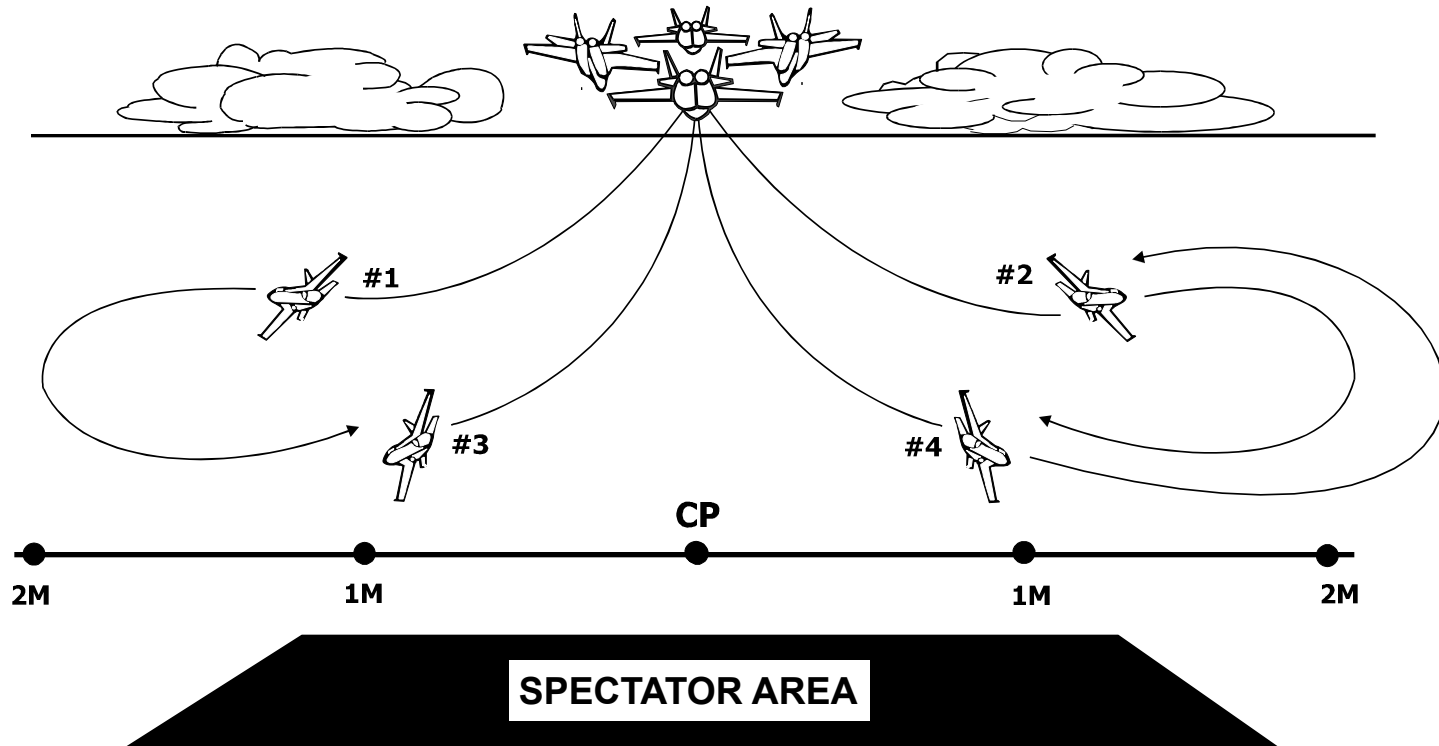
ROLL 450 DEGREES IN SECTION



MANEUVER (UPRIGHT TOR): At CP, both aircraft will perform simultaneous left 450 degree rolls, then proceed to join the Diamond for Delta maneuvers.

MANEUVER (INVERTED TOR): At the edge of the aerobatic box, both aircraft will perform a left roll to inverted. At CP, both aircraft will perform simultaneous left 240 degree rolls, then proceed to join the Diamond for Delta maneuvers.

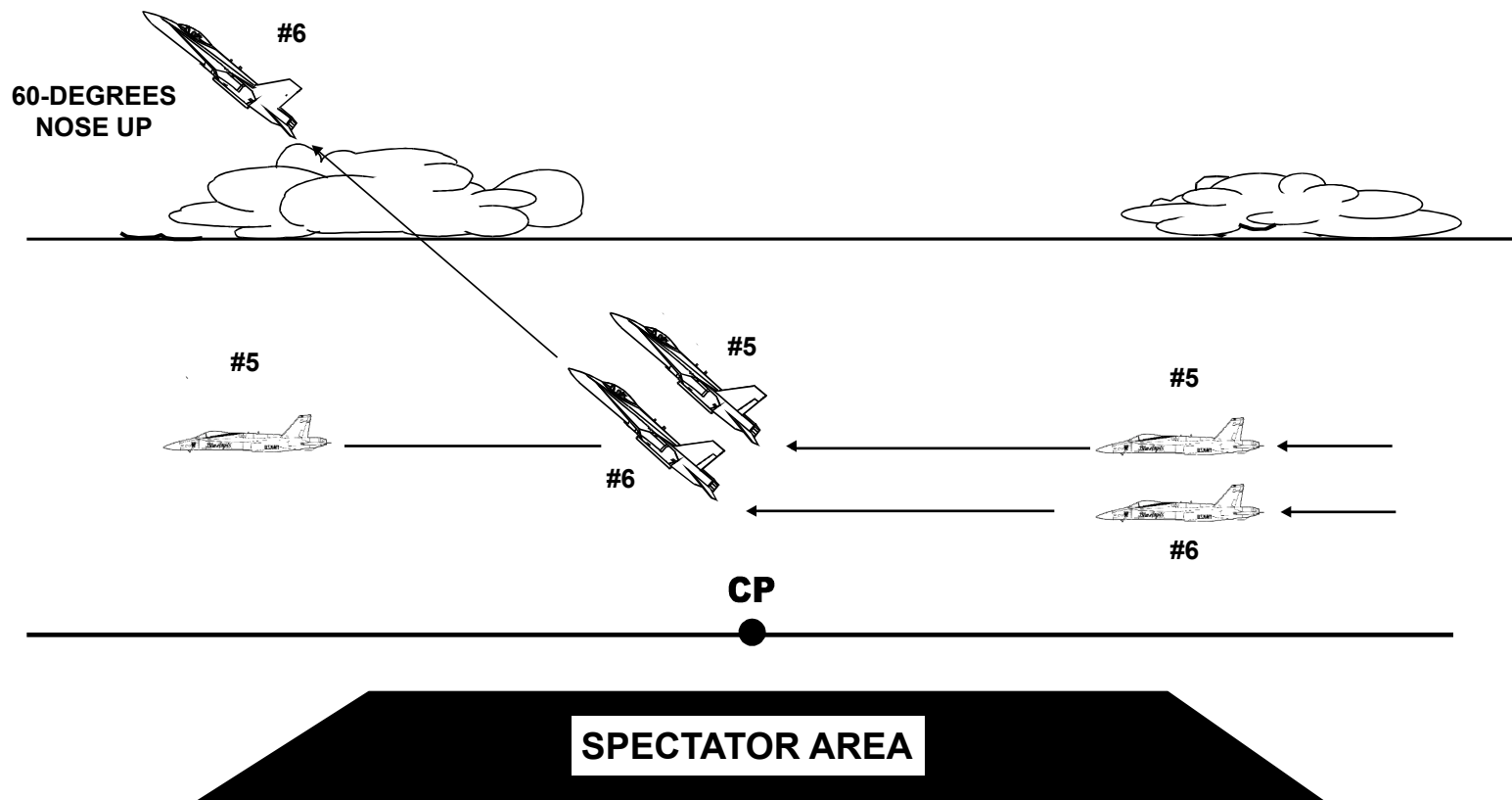
DIAMOND LOW BREAK CROSS



INBOUND ALTITUDES:
1, #4 AT 150' AGL
2 AT 300' AGL
3 AT 450' AGL

MANEUVER: Approaching from directly behind the crowd in diamond formation at 500' AGL, all four aircraft will separate in 4 different directions. All four aircraft will fly the outbound leg at 700' AGL, then execute a reversal turn to the show line and simultaneously cross over CP. The rendezvous is executed behind the crowd.

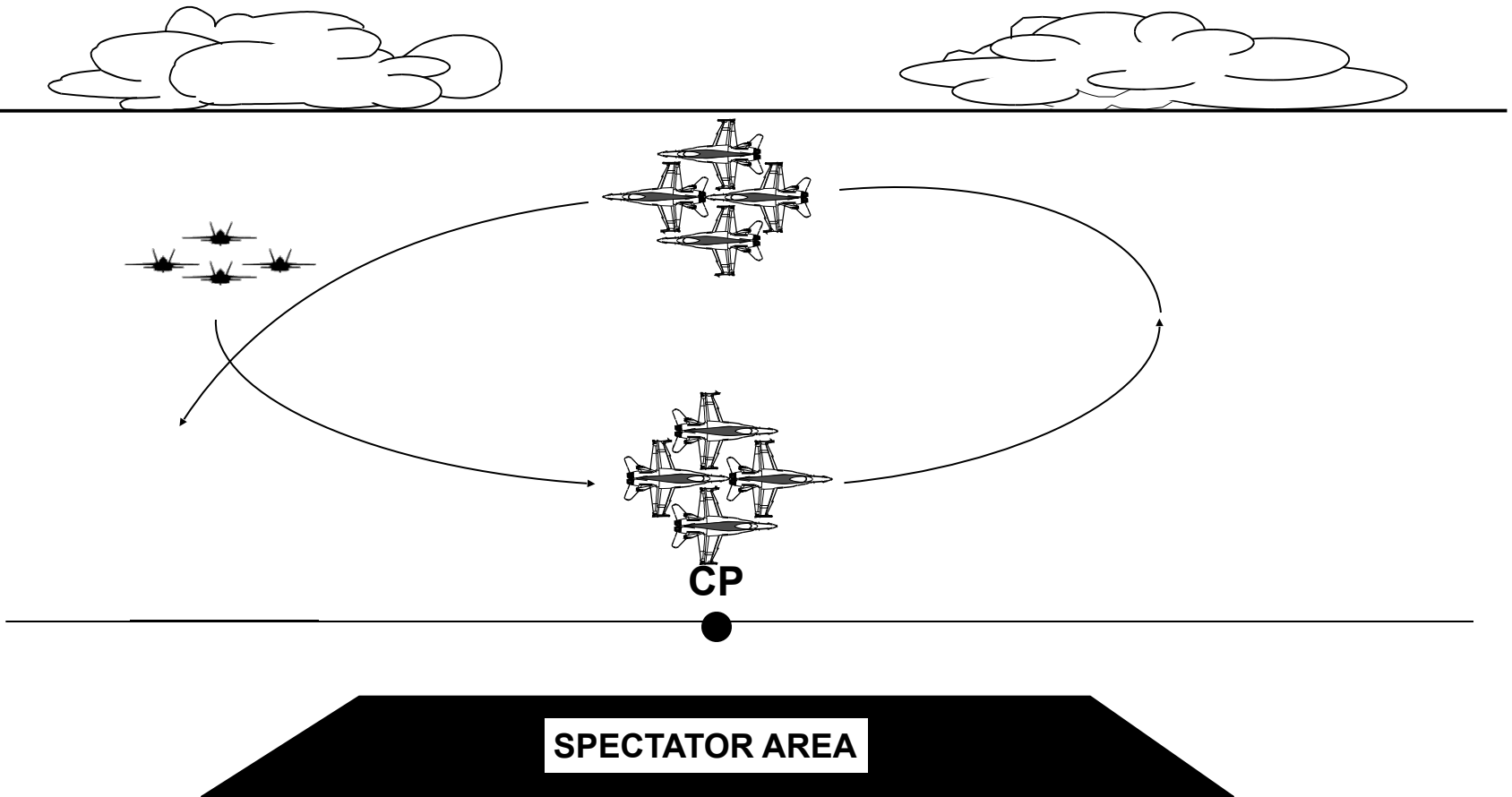
SECTION HIGH ALPHA PASS



MANEUVER: Both aircraft slow to approximately 120 KCAS abeam each other. At approximately the center point position, both aircraft will clear simultaneously. #6 will clear with a slow pitch up to 60 deg then a left roll to inverted, followed by a right 90 deg roll then clear behind the crowd above 1000' AGL. #5 will clear straight ahead and level. This maneuver can be flown from either direction, depending on prevailing wind.

BURNER 270

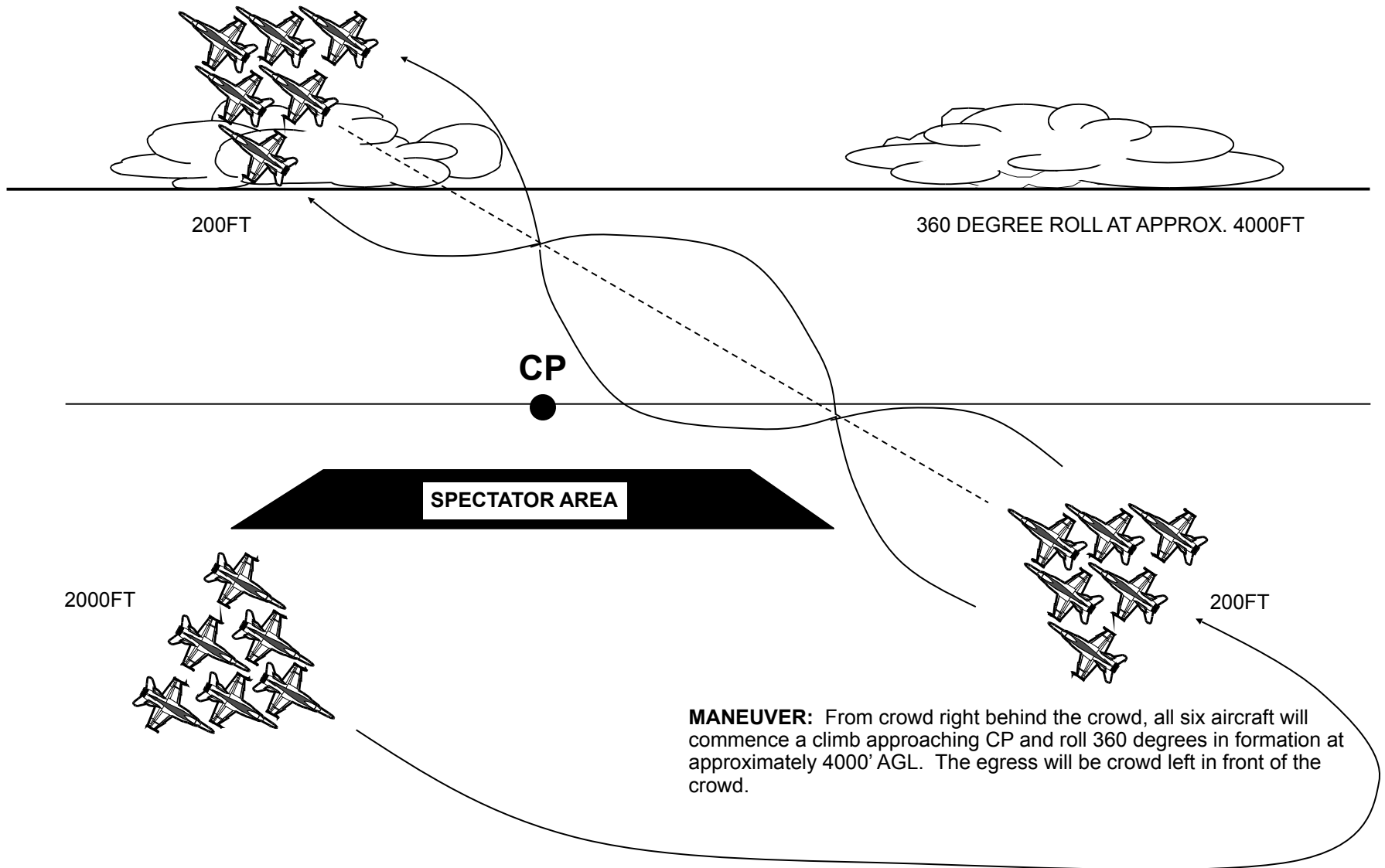
2-38



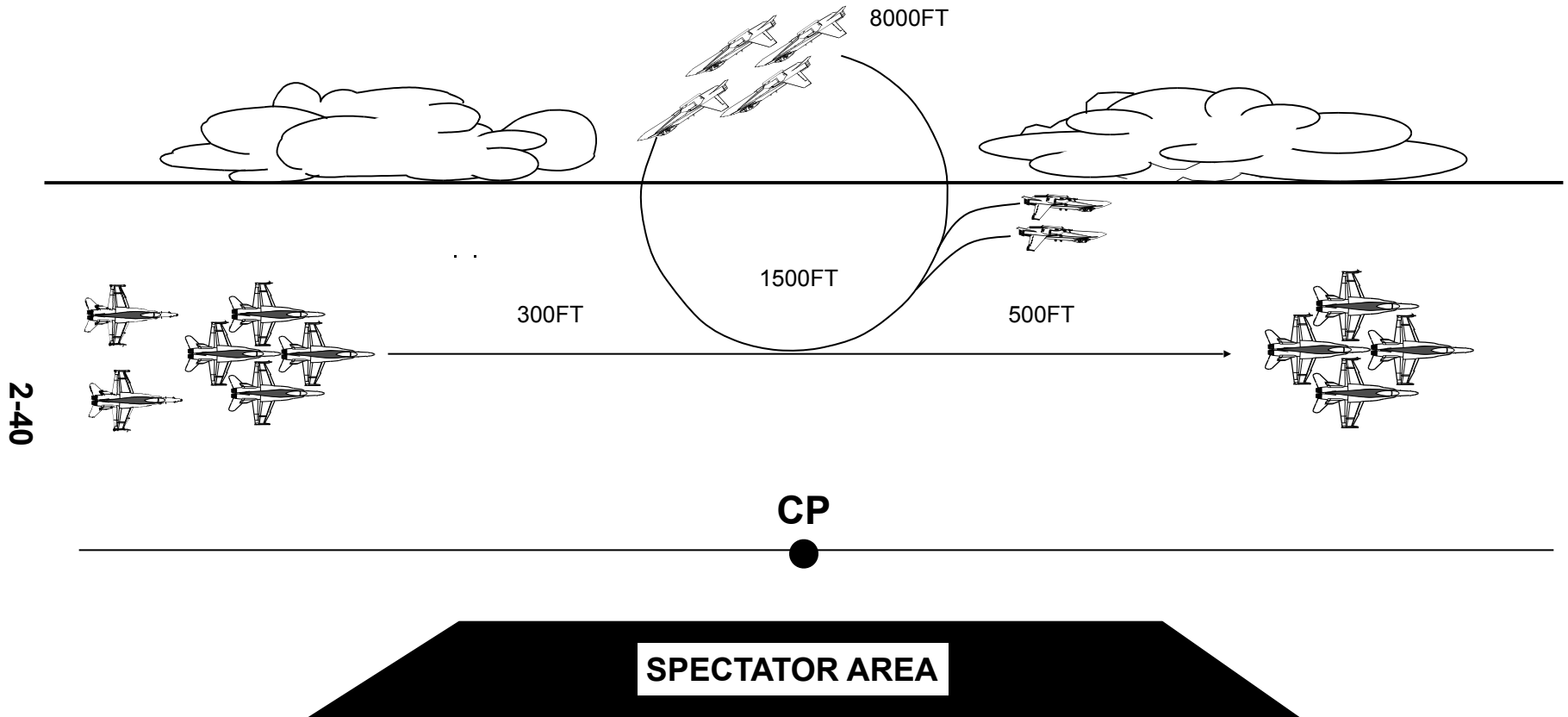
MANEUVER: Ingressing from crowd left in front of the crowd, the formation approaches in Diamond. Approaching CP at minimum altitude of 200' AGL they commence a slightly climbing left turn, selecting afterburner as they execute a 270° turn in front of the crowd and egress to crowd left behind the crowd.

DELTA ROLL

2-39

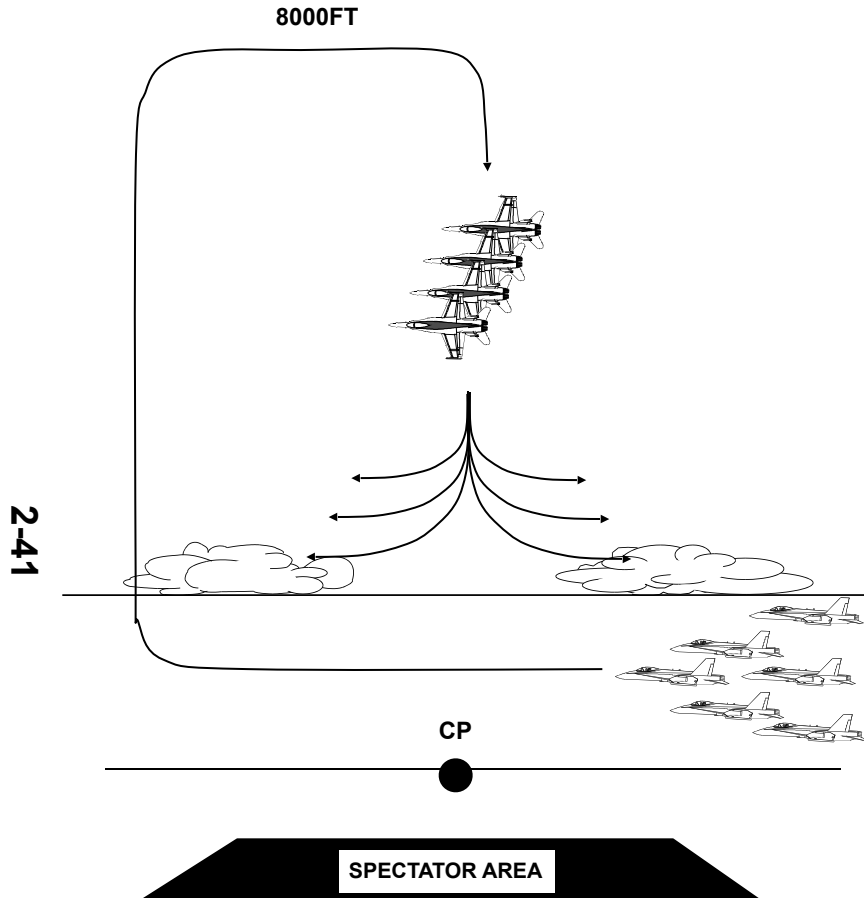


FLEUR DE LIS



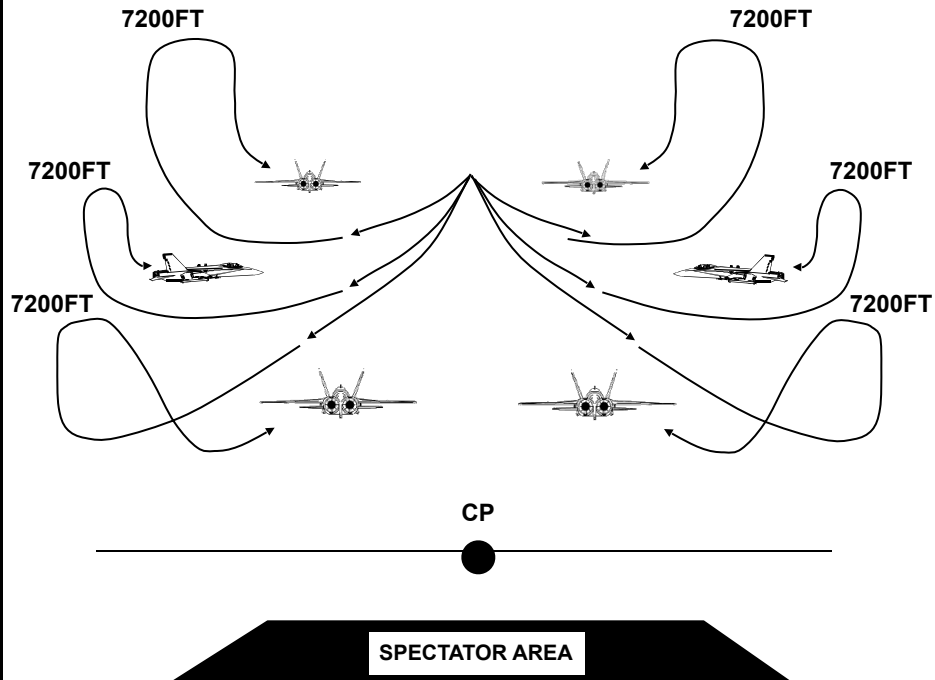
MANEUVER: Approaching the show line in a Double "V" formation, the six aircraft will commence a climb. At approximately 2000' prior to CP, all six aircraft will split simultaneously. The two solos will execute 1-1/2 rolls and exit crowd right initially, then turn behind the crowd. The four Diamond aircraft will rendezvous during their looping maneuver over CP and egress in Diamond crowd right to crowd right in front of the crowd.

LOOP BREAK



MANEUVER: From crowd right on the show line, all six aircraft will commence a loop in formation approaching CP. At the vertical down above CP, the six aircraft will slowly separate and exit in six different directions leveling at 1000' AGL, heading outbound on ingress / egress lines. At 3NM each pilot will perform a 1/2 Cuban Eight Reversal turn towards CP, descend to his respective altitude and cross CP.

6 PLANE CROSS

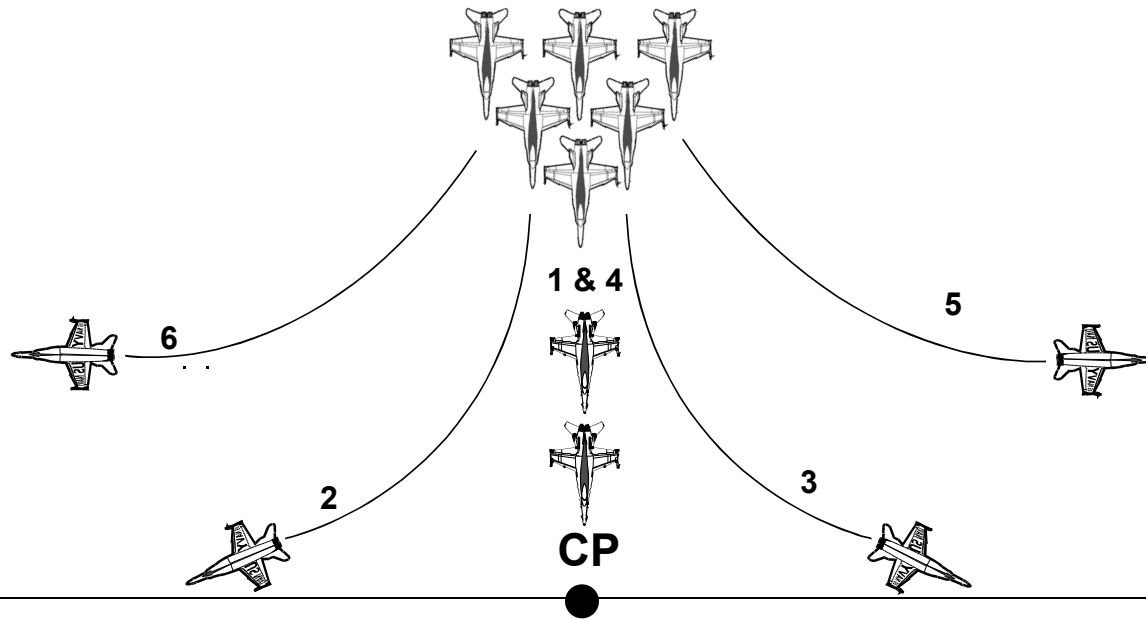


NOTE: All outbound aircraft are at 1000' AGL to 3NM. Inbound altitudes are routinely flown higher during the first half of the season.

MIN INBOUND ALTITUDES:

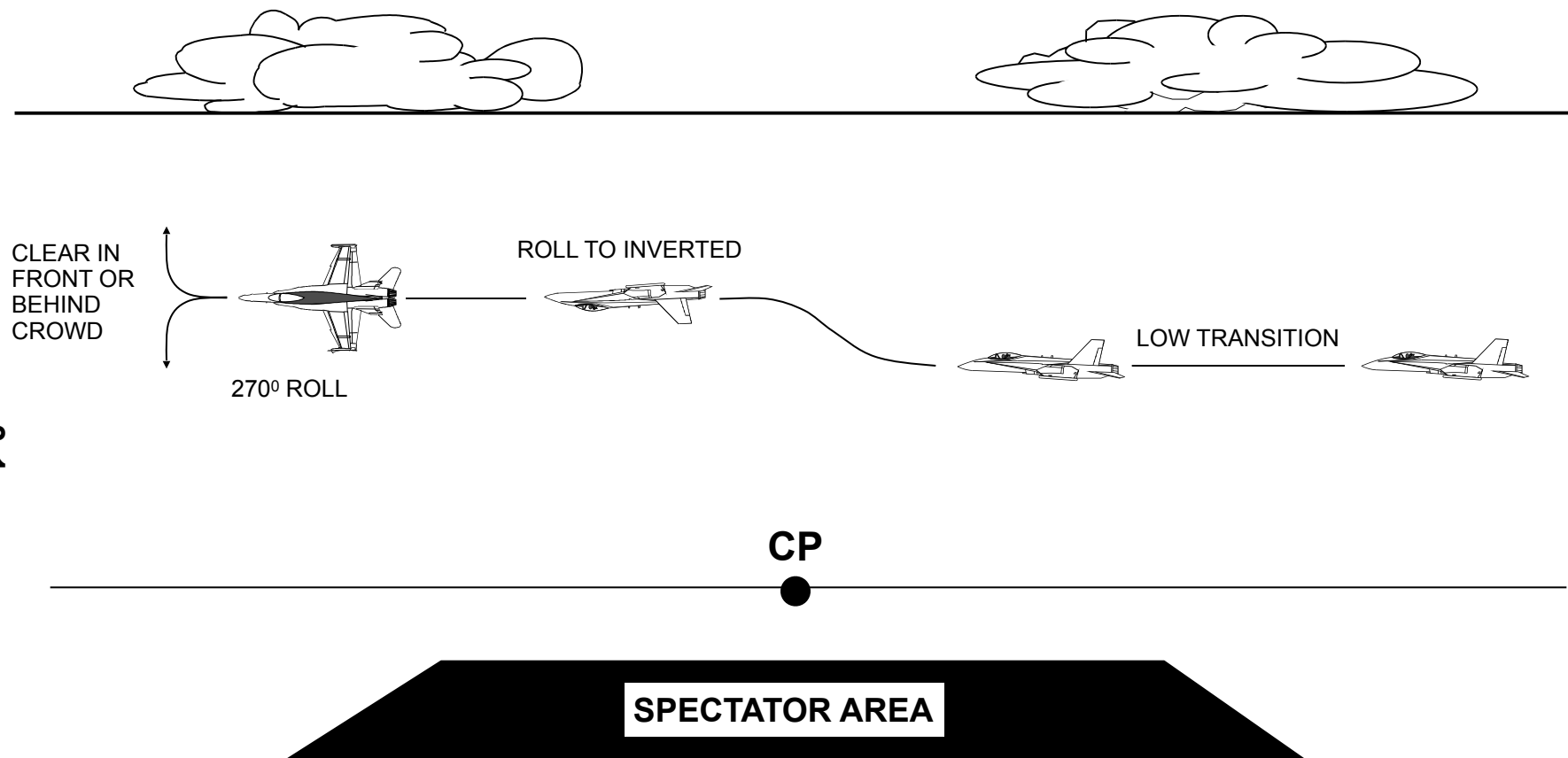
#1, #4: 150' AGL
 #2, #5: 300' AGL
 #3, #6: 450' AGL

DELTA BREAK OUT / HEAD-ON



MANEUVER: The Delta will roll out in a head on set up and commence a climb. One nautical mile in front of the crowd, Boss in the #1 jet will call "Ready, Break!" and the Delta will split. The Lead (#1) will pull up into a steady 2G climb straight ahead. The solos (#5 & #6) will pull outboard in a steady, 2G, 60 degree Angle-of-Bank, and offset by 90 degrees. The wingmen (#2 & #3) will pull outboard in a steady 2G, 45 degree Angle-of-Bank, and offset by 45 degrees. The lead and slot (#1 & #4) will continue straight ahead and exit behind the crowd. The solos and wingmen will rendez-vous with the lead and slot behind the crowd. If weather precludes the break out, the maneuver becomes a Head-On Pass. Boss will keep the Delta Formation and climb to a minimum of 500' AGL prior to crossing showline.

LOW TRANSITION / ROLL TO INVERTED BLUE ANGEL 6



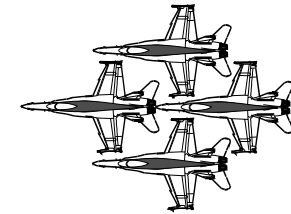
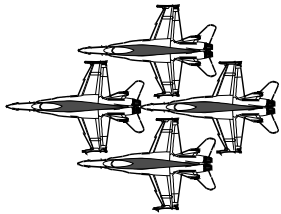
3-1

MANEUVER: #6 will execute a low transition and at 300KTS he will pull to 5-7 degrees nose up. At 100-200' AGL, he will roll the aircraft 180 degrees to the inverted position. At 350KTS he will roll the aircraft 270 degrees and clear in front of or behind the crowd.

DIAMOND FLAT PASS



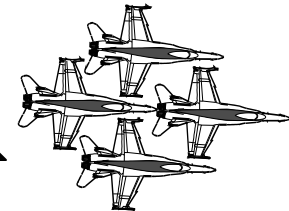
3-2



CP

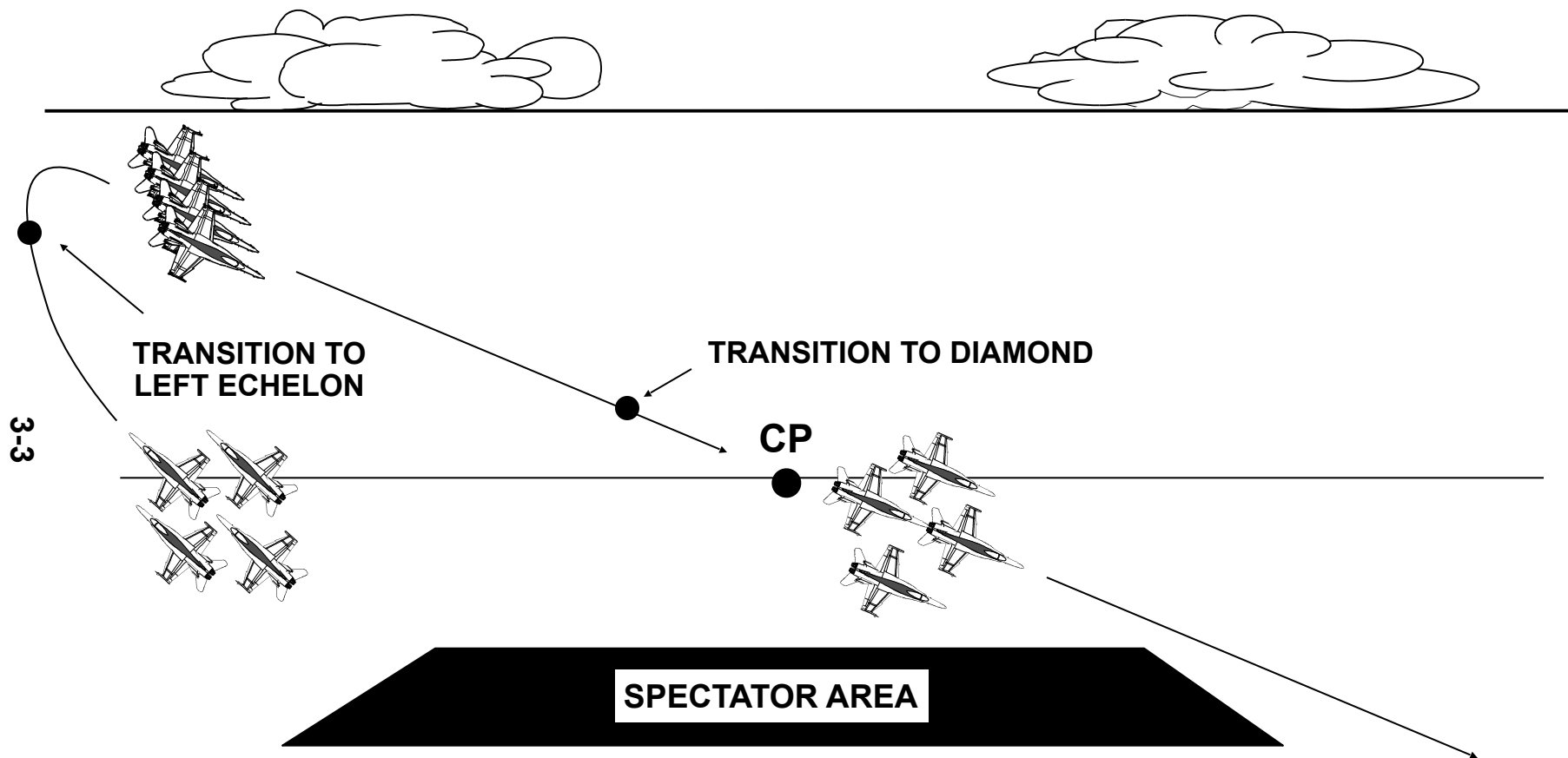


SPECTATOR AREA



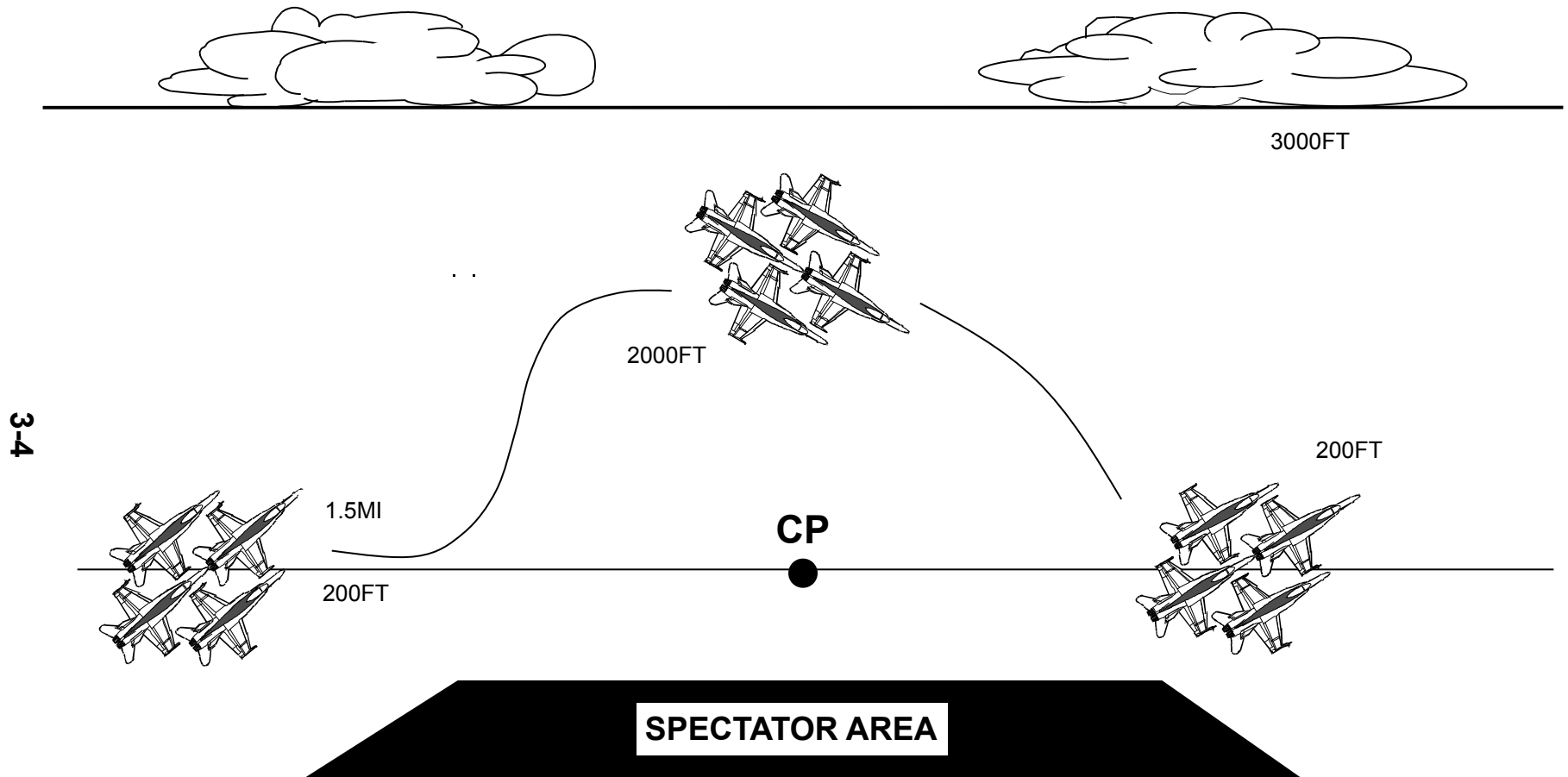
MANEUVER: The Diamond will perform a flat pass at 200' AGL on the 500' show line from crowd right to crowd left.

LEFT ECHELON FLAT PASS



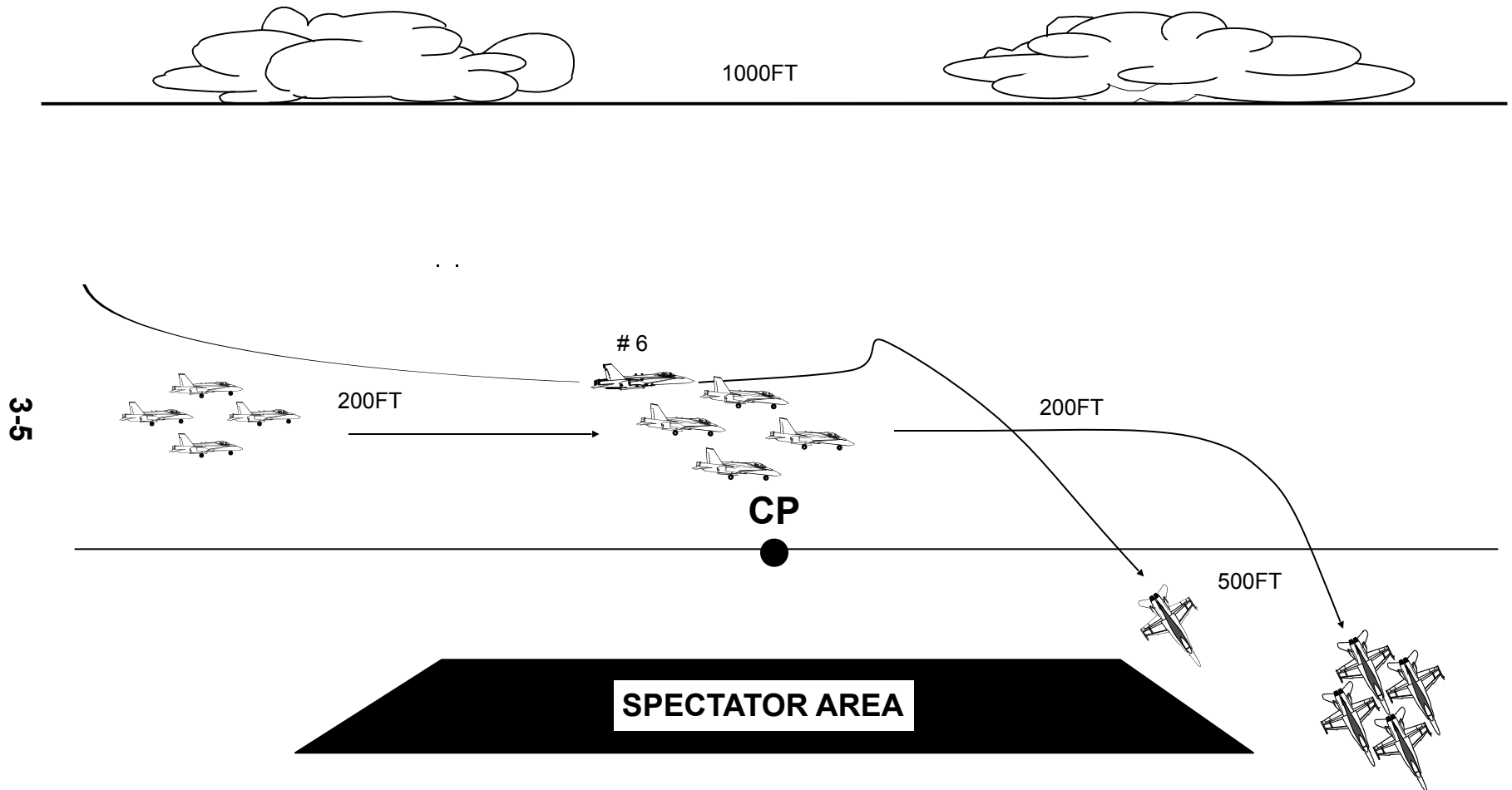
MANEUVER: Ingressing from in front of the crowd crowd left, the Diamond transitions to a left echelon formation on the turn in and conducts a flat pass at 300' – 500' AGL on the crowd left in front of the crowd line. The formation transitions back to diamond approximately 1 nautical mile in front of the crowd, crossing centerpoint at or above 500' AGL and egresses climbing on the crowd right behind the crowd line in diamond formation.

DIAMOND DIRTY ROLL



MANEUVER: Approaching CP in Diamond with Landing Gear extended, all four aircraft roll 360 degrees in formation, starting the roll at 1200' to apex at approximately 2000'. Minimum altitude on the ingress and egress roll line is 200'.

DIRTY CLEAN FLAT PASS

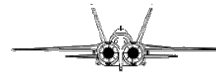


MANEUVER: In the Diamond formation all four aircraft will execute a flat pass down show line with the landing gear and hooks extended. Meanwhile, #6 will overtake the diamond while the diamond is approaching centerpoint. #6 will then climb to 1000' AGL and execute a right hand turn to clear behind the crowd.

SNEAK PASS, BLUE ANGEL 6



3-6



6 500 FT

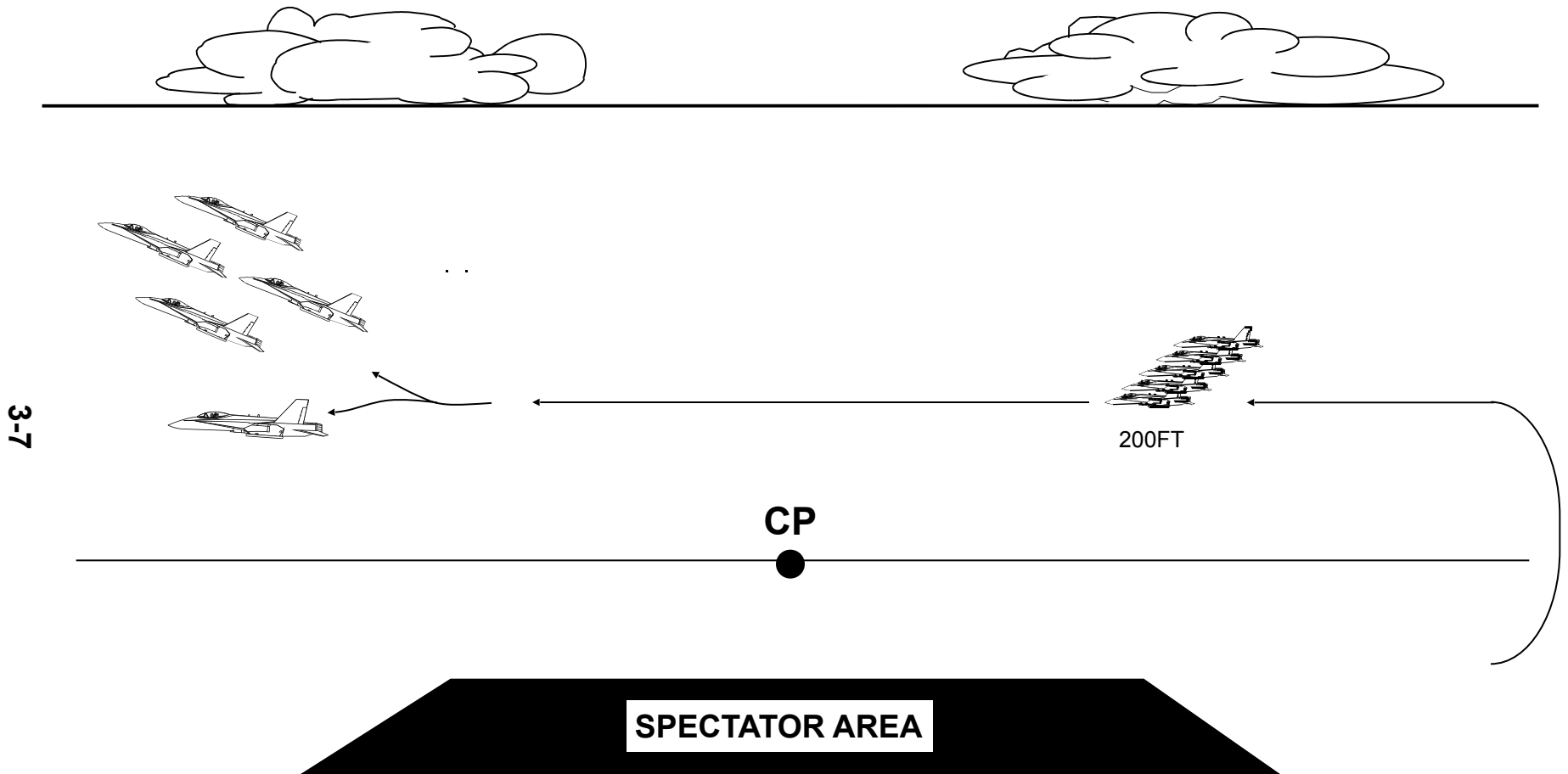
CP



SPECTATOR AREA

MANEUVER: A flat from behind the crowd to in front of the crowd 500' AGL . Once past the spectator area, a clear to crowd left in front of the crowd is executed.

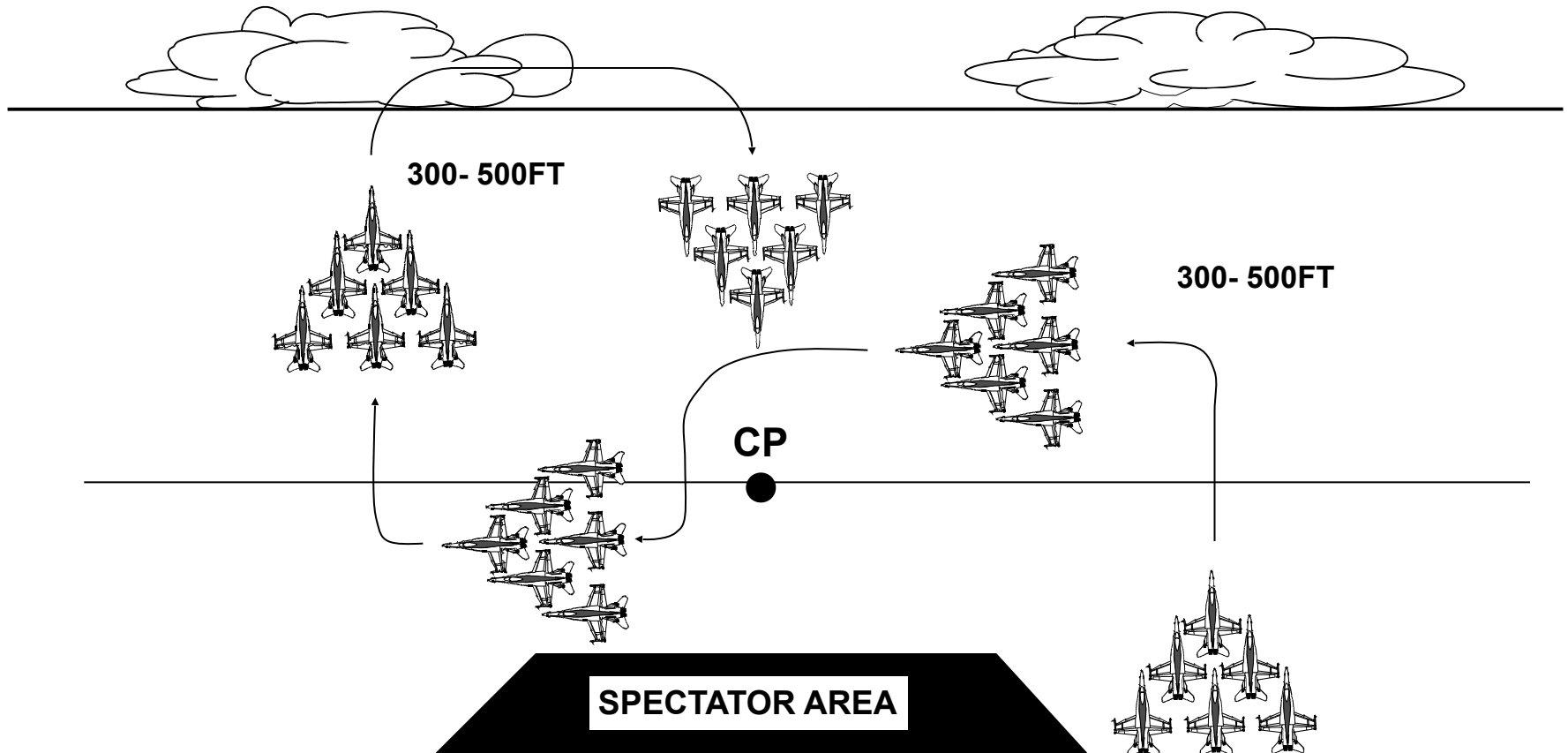
LINE ABREAST FLAT PASS



MANEUVER: At approximately 3 NM, aircraft #1,2,3,4 and 5 transition to a Line Abreast formation leveling off at 200' AGL on the 500' Show Line. Egressing crowd left, aircraft #1-4 shift back to Diamond and detach #5.

MANEUVERING DELTA

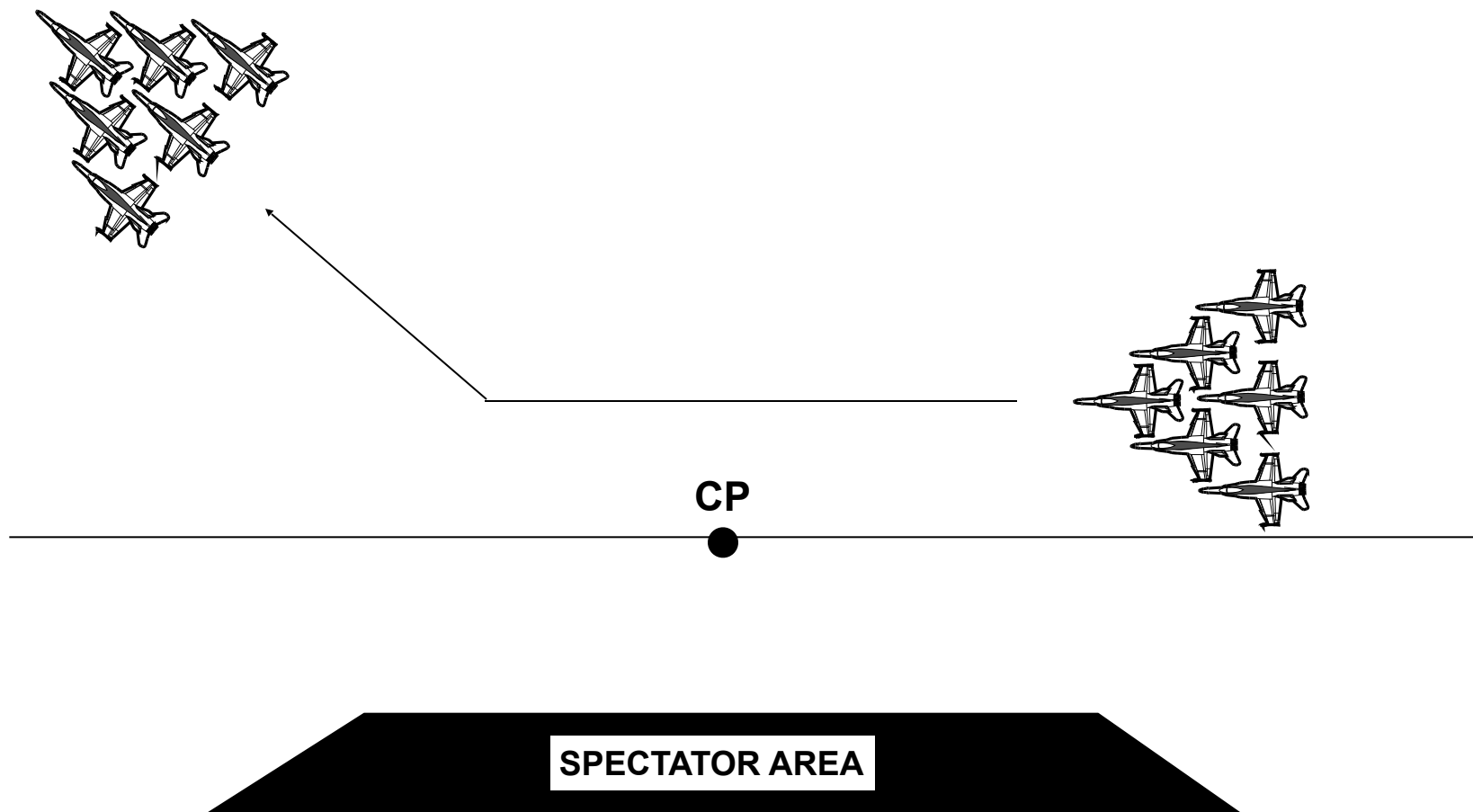
3-8



MANEUVER: In Delta formation, all six aircraft will approach from crowd left in front of the crowd. Approaching CP, the formation will commence a left turn to exit the flight line heading crowd right in front of the crowd to set up the Delta Flat Pass. This maneuver can be flown in mirror image from crowd right.

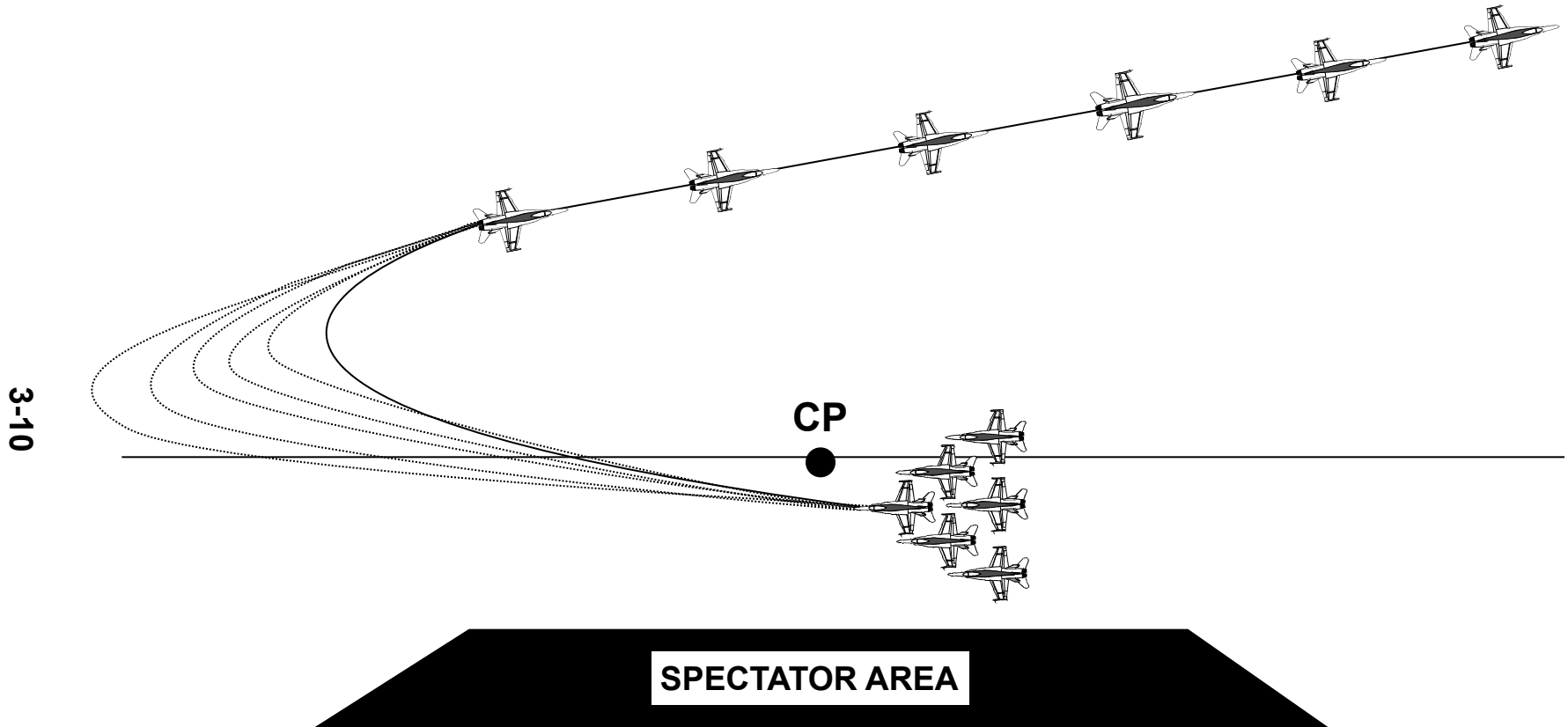
DELTA FLAT PASS

3-9



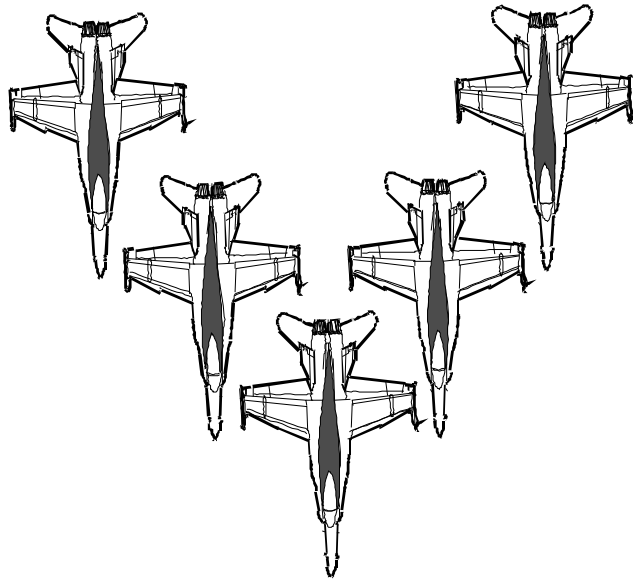
MANEUVER: Ingressing straight and level at 200' AGL from crowd right or crowd left, all six aircraft will perform a flat pass on the 500' show line and exit in front of the crowd to set up for the Delta Break Out / Head On.

DELTA PITCH UP BREAK



MANEUVER: Ingressing at 200' on the 500' line from crowd left or right. Each aircraft pitches out of the formation with approximately 2 second spacing, and turns away from the crowd to downwind, and configures for landing at 15-18' intervals.

5 Plane Contingency



Should any wingman fall out, #4 will fill that position to balance the formation. If a solo falls out, the other solo pilot will fly single solo using the same maneuvers with the exception of the following. If #5 is single solo, a MRT followed by sneak to Vertical rolls will be flown. If #6 is single solo a parade pass left to right followed by the Opposing MRT will be flown. For timing reasons a parade pass may be flown single solo in either direction to facilitate deconfliction from the diamond. If the Boss falls out, all aircraft will orbit overhead until he can resume.