



USAF Air Demonstration Squadron (Thunderbirds)  
2016 FAA Maneuver Package





**DEPARTMENT OF THE AIR FORCE  
USAF AIR DEMONSTRATION SQUADRON (ACC)  
NELLIS AIR FORCE BASE, NEVADA**

FAA Representatives,

This United States Air Force Air Demonstration Squadron (Thunderbirds) maneuver package is designed to provide you (FAA monitors) with a pictorial display of all demonstration maneuvers used by the Thunderbirds.

The Thunderbirds have three shows that may be performed depending upon weather or terrain considerations. A High Show, which includes formation rolls and loops, may be flown with a minimum ceiling of 8,000' and 5 nautical mile visibility. A Low show, which has formation rolls only, may be flown with a minimum ceiling of 3,500' and 5 nautical mile visibility. A Flat show, which includes no loops or rolls, may be flown with a minimum ceiling of 2,000' and 5 nautical mile visibility. (57 WG/CC or USAFWC/CC may waive the flat show minimum ceiling to 1,500'.)

The Department of Defense accepts full responsibility for the operation of Thunderbird demonstration maneuvers as described herein. Lieutenant Colonel Christopher Hammond, Commander, USAF Air Demonstration Squadron, has been designated as the representative for the Department of Defense for the execution of these maneuvers.

Thunderbird maneuvering airspace and minimum dimensions for an aerobatic box are depicted in section IV. FAA guidelines currently permit non-aerobatic passes to be flown no closer than 500' from the crowd. Aerobatic maneuvers shall occur at the 1500' show line; however non-aerobatic maneuvers may take place on the 500' show line. Non-aerobatic passes over the crowd will be a minimum of 500' AGL. Thunderbird formations in the transition area are permitted to descend from 500' to be at their minimums at 1NM from show center, even over occupied buildings. Any maneuvers may be flown as a flat pass if conditions dictate. Altitudes depicted are minimums.

My point of contact to address any questions concerning these maneuvers is Maj Kevin Walsh, Thunderbird Operations Officer, at (702) 271-6627 or DSN 682-9931.

*Christopher B. Hammond*

CHRISTOPHER B. HAMMOND, Lt Col, USAF  
Commander / Leader

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**Section II:** Low show: Displays all maneuvers unique to a low show.

**Section III:** Flat show: Displays all maneuvers unique to a flat show and other maneuvers available to the Thunderbirds that were not covered in previous pages.

**Section IV:** Airfield layout of a typical show site.

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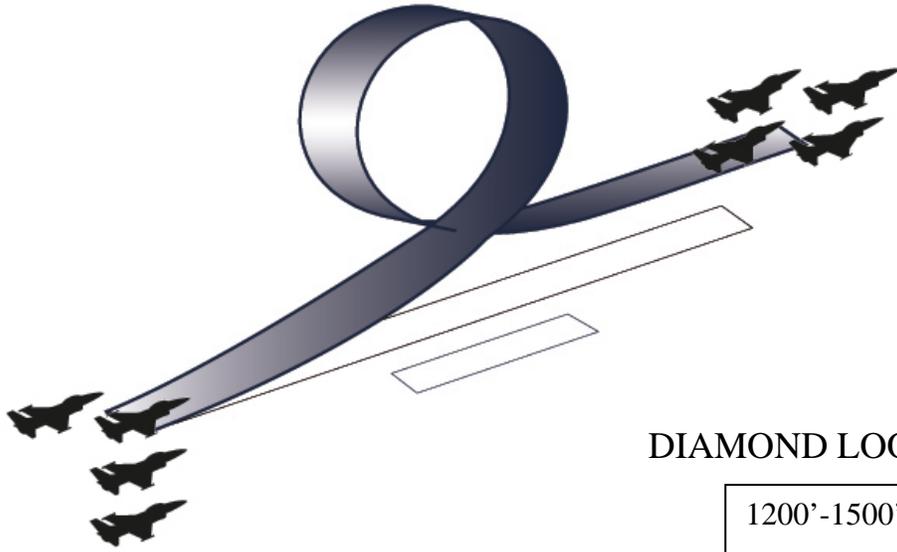
# Section I

## THUNDERBIRD 2016 HIGH SHOW

WEATHER 8000' AND 5 MILES VISIBILITY

6-SHIP		5-SHIP (Left Solo)		5-SHIP (Right Solo)	
<b>Diamond takeoff / Loop on takeoff</b>		<b>Diamond takeoff / Loop on takeoff</b>		<b>Diamond takeoff / Loop on takeoff</b>	
(LS) Roll on Takeoff					
(RS) Max Climb / Split S		Roll on Takeoff		Max Climb / Split S	
<b>Diamond Cloverloop Opener</b>	↑←	<b>Diamond Cloverloop Opener</b>	↑←	<b>Diamond Cloverloop Opener</b>	↑←
Opposing Knife Edge	→←	4 Point	→	4 Point	→
<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒
Opposing Inverted	→←	Inverted to Inverted	←	Inverted to Inverted	←
<b>Line to Diamond Loop (Ops √)</b>	←	<b>Line to Diamond Loop (Ops √)</b>	←	<b>Line to Diamond Loop (Ops √)</b>	←
(LS) Knife Edge	→	Knife Edge	→	Knife Edge	→
(RS) Slow Roll	←	<b>Diamond Roll</b>	⇒	<b>Diamond Roll</b>	⇒
<b>Diamond Roll</b>	⇒	High Alpha Pass	←	Slow Roll	←
(LS) 8 - Point	←	<b>Bon Ton Roule</b>	←	<b>Bon Ton roule</b>	←
(RS) Aileron Rolls	→	Aileron Rolls	→	Aileron Rolls	→
<b>Bon Ton Roule</b>	←	<b>Trail to Diamond Cloverloop</b>	↓⇒	<b>Trail to Diamond Cloverloop</b>	↓⇒
Calypso Pass	←	8 - Point	←	8 - Point	←
<b>Trail to Diamond Cloverloop</b>	↓⇒	<b>Diamond PIR</b>	←	<b>Diamond PIR</b>	←
Crossover Break	←↑→	Max Turn, 1/2 Cuban 8	→←	Max Turn	→
<b>Diamond PIR</b>	←	<b>Trail to Diamond Roll</b>	⇒	<b>Trail to Diamond Roll</b>	⇒
Opposing – Split S	→←	Sneak Pass	→	Sneak Pass	→
<b>Trail to Diamond Roll</b>	⇒	<b>Hi Low Pass (Ops √)</b>	←	<b>Hi Low Pass (Ops √)</b>	←
(RS) Sneak Pass	→	Solo Hit – No Rejoin	←	Solo Hit ½ Cuban Rejoin	←
(LS) High Alpha /Muscle Climb	←	Inverted to Inverted	→	<b>5-Card Loop</b>	←
<b>High/Low Pass (Ops √)</b>	←	<b>Diamond Loop</b>	⇒	<b>Line Break Loop</b>	⇒
(RS) Solo hit, ½ Cuban 8, Rejoin	←	Vertical Rolls	→	Solo Hit	←
<b>5-Card Loop with RS</b>	←	<b>Arrowhead Loop</b>	←	Vertical Rolls	→
(LS) Vertical Rolls	→	Solo Rejoin to Stinger	↑	<b>Arrowhead Loop</b>	←
<b>Line Break Loop with RS</b>	⇒	<b>Stinger BUP</b>	←	Solo Rejoin to Stinger	↑
(RS) Solo Hit	←	<b>Stinger Roll</b>	⇒	<b>Stinger BUP</b>	←
(LS) Max Turn, 1/2 Cuban 8	→←	<b>Stinger Loop</b>	←	<b>Stinger Roll</b>	⇒

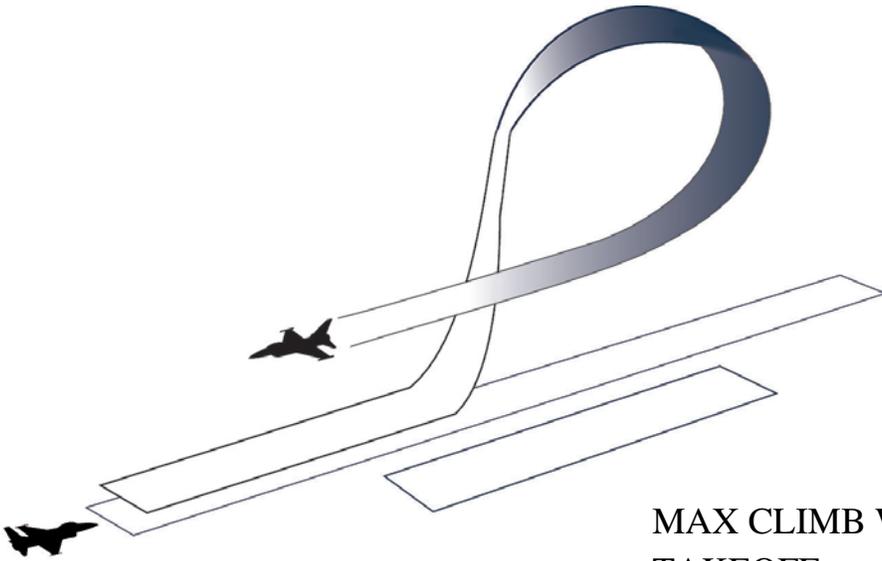
<b>Arrowhead Loop</b>	←	<b>High Bomb Burst</b>	⇒	<b>Stinger Loop</b>	←
Solo Rejoin to Delta	↑	Solo Hit	→	<b>High Bomb Burst</b>	⇒
<b>Delta BUP</b>	⇒	<b>High Bomb Burst Rejoin</b>	←	Solo Hit	→
<b>Delta Roll</b>	←	<b>Thunderbird Diamond Pitch (Pass)**</b>		<b>High Bomb Burst Rejoin</b>	←
<b>Delta Loop</b>	←	Aileron Roll Pitch – (Sneak Pass)		<b>Thunderbird Diamond Pitch (Pass)**</b>	
<b>Delta Burst and Warrior Loop</b>	↓→	(Stinger Closer)		Inverted to Inverted Pitch – (Sneak Pass)	
<b>High Bomb Burst</b>	⇒			(Stinger Closer)	
(LS) Solo Hit	→				
<b>High Bomb Burst Rejoin</b>	←				
<b>Thunderbird Diamond Pitch (Pass)**</b>	←				
Reflection Pitch (No Pitch)	←				
<b>Delta Blue Out Pitch Up (Delta Closer**)</b>	⇒				
(LS) Aileron Roll Pitch Up					
(RS) Inverted to Inverted Pitch					
** (Deployed show option for any show sequence)					



**DIAMOND LOOP ON TAKEOFF**

1200'-1500' FROM CROWD

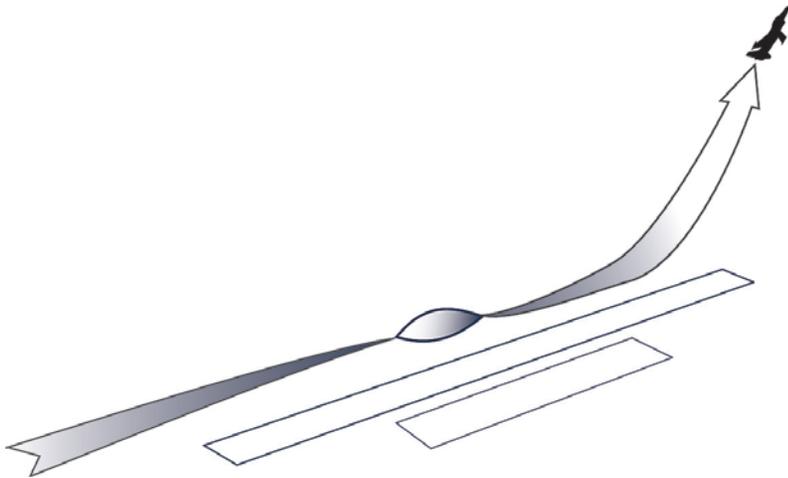
250' AGL MINIMUM



**MAX CLIMB WITH SPLIT-S ON TAKEOFF**

1200-1500' FROM CROWD

150' AGL MINIMUM



### SOLO ROLL ON TAKEOFF

1200' -1500' FROM CROWD LINE OR ROLL  
BEYOND END OF CROWD LINE

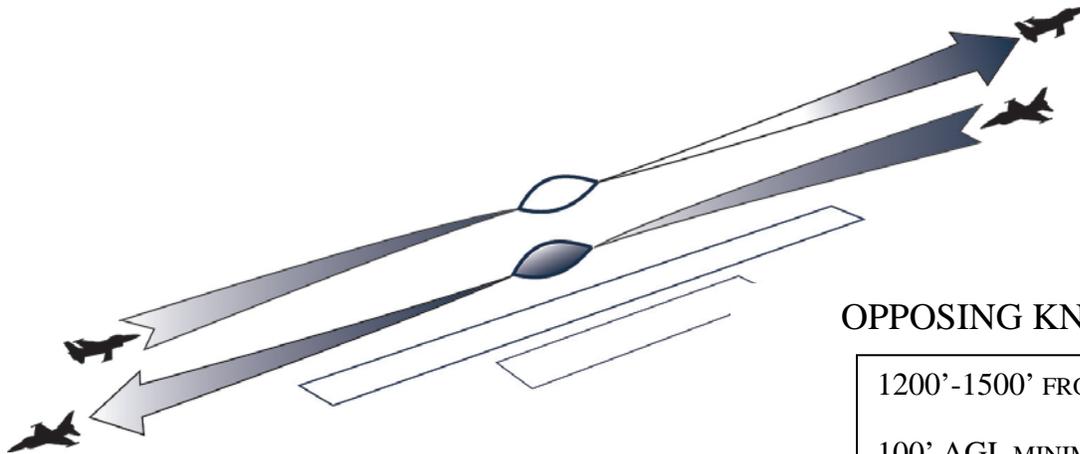
100' AGL MINIMUM



### CLOVERLOOP OPENER

1200' -1500' FROM CROWD

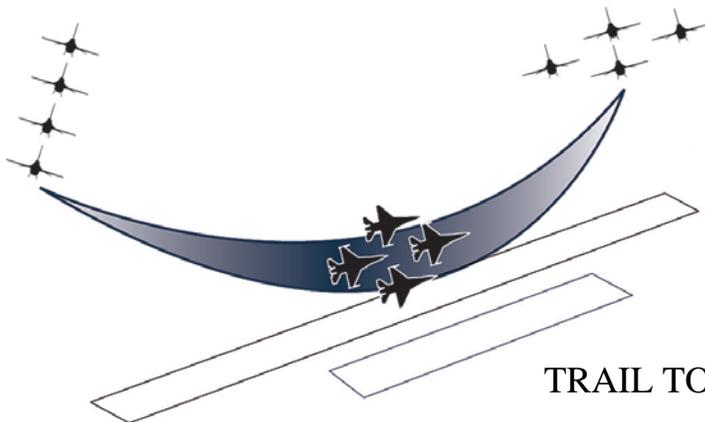
500' AGL MINIMUM



**OPPOSING KNIFE-EDGE**

1200' -1500' FROM CROWD

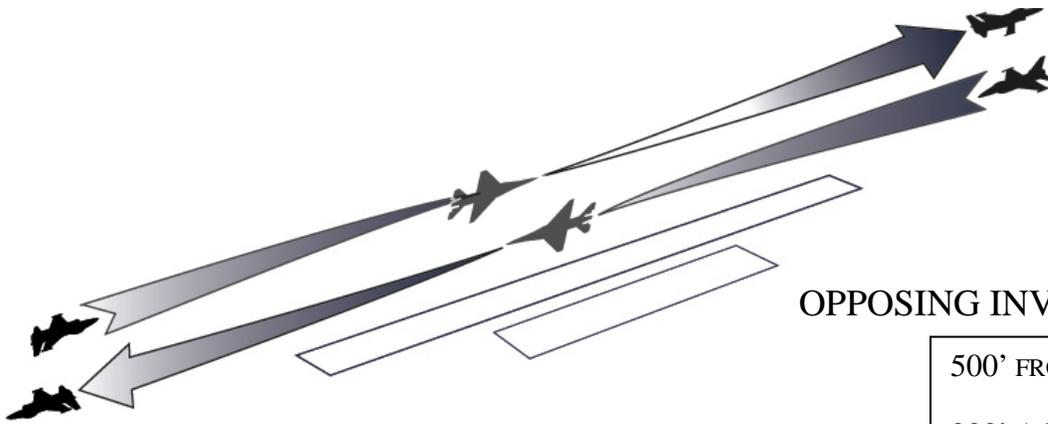
100' AGL MINIMUM



**TRAIL TO DIAMOND BOTTOM UP PASS**

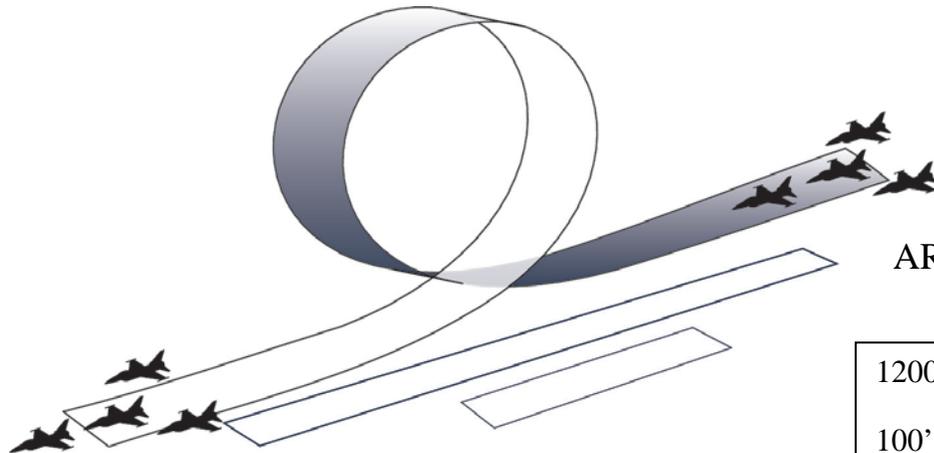
500' FROM CROWD

200' AGL MINIMUM



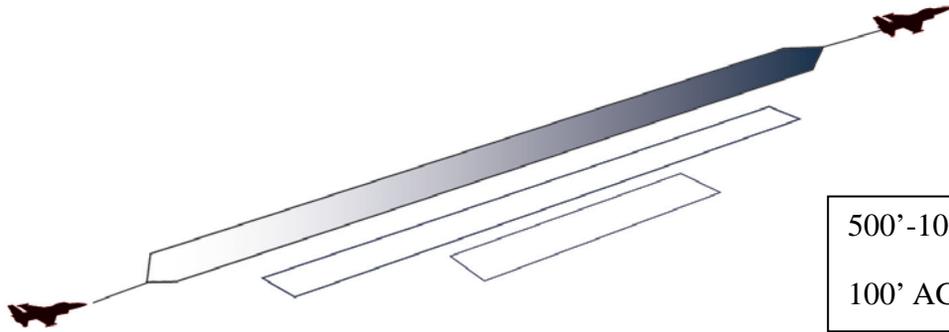
**OPPOSING INVERTED PASS**

500' FROM CROWD
200' AGL MINIMUM



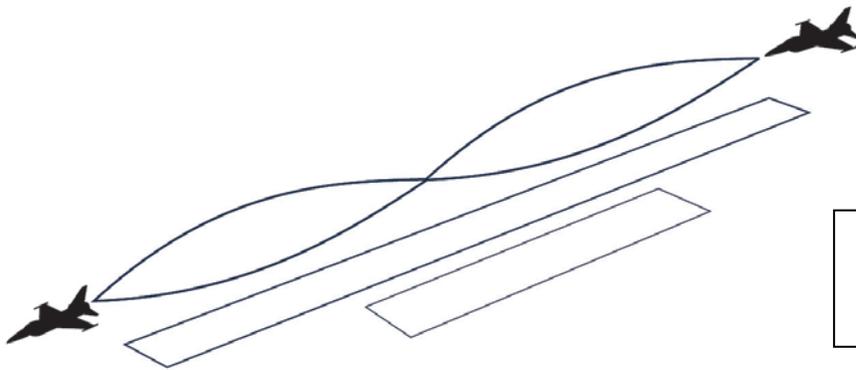
**ARROWHEAD LOOP**

1200'-1500' FROM CROWD
100' AGL MINIMUM



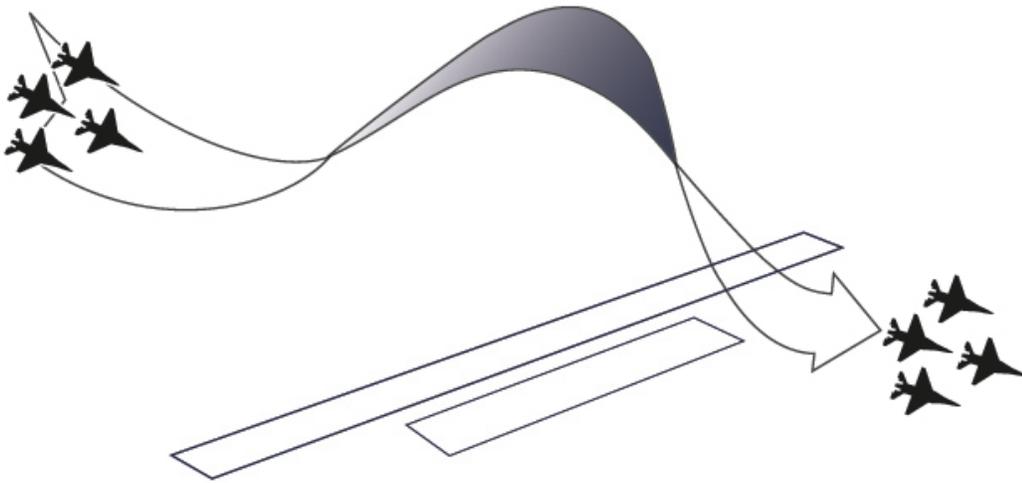
**KNIFE-EDGE**

500'-1000' FROM CROWD  
100' AGL MINIMUM



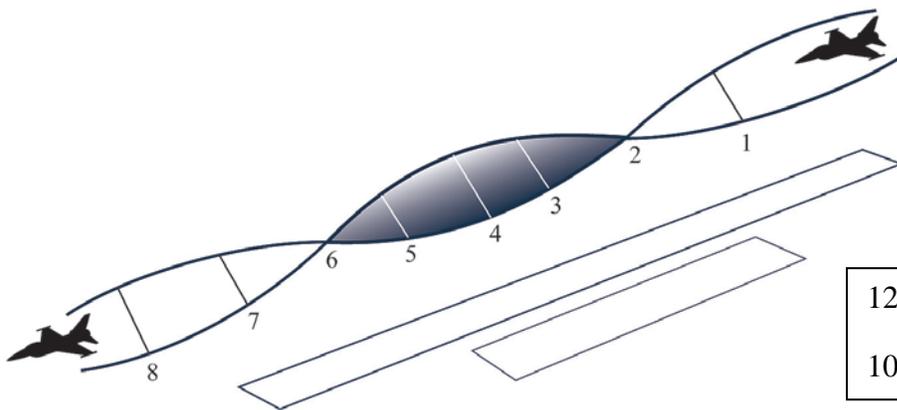
**SLOW ROLL**

1200'-1500' FROM CROWD  
100' AGL MINIMUM



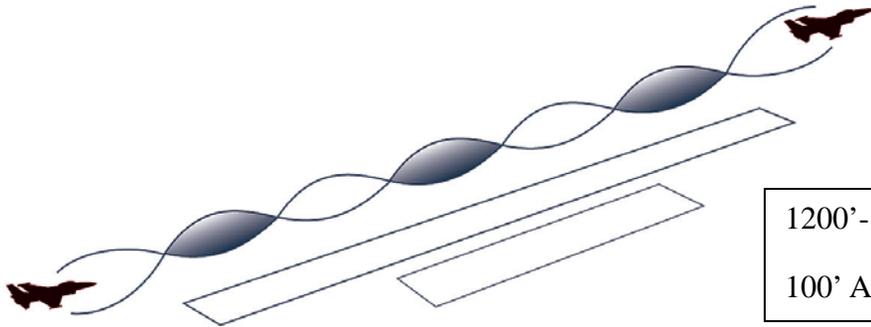
### DIAMOND ROLL

1200' -1500' FROM CROWD  
250' AGL MINIMUM



### EIGHT POINT ROLL

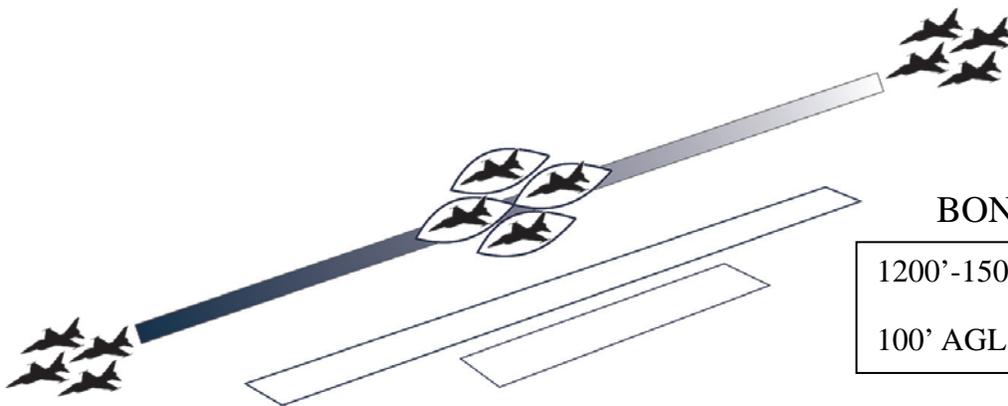
1200' -1500' FROM CROWD  
100' AGL MINIMUM



### AILERON ROLLS

1200'-1500' FROM CROWD

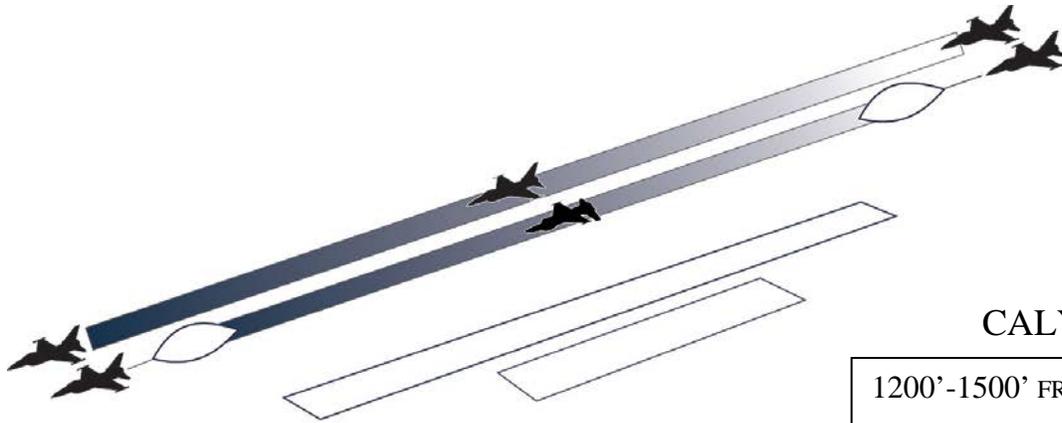
100' AGL MINIMUM



### BON TON ROULLE

1200'-1500' FROM CROWD

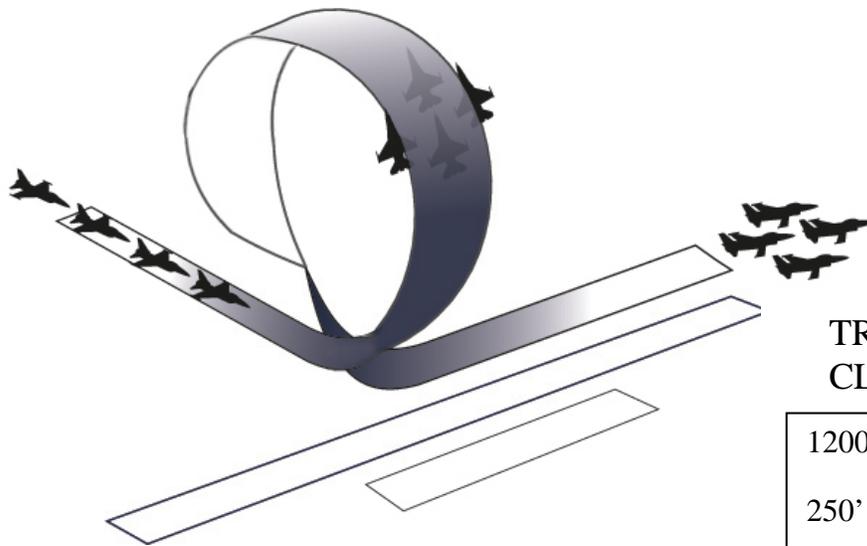
100' AGL MINIMUM



### CALYPSO PASS

1200'-1500' FROM CROWD

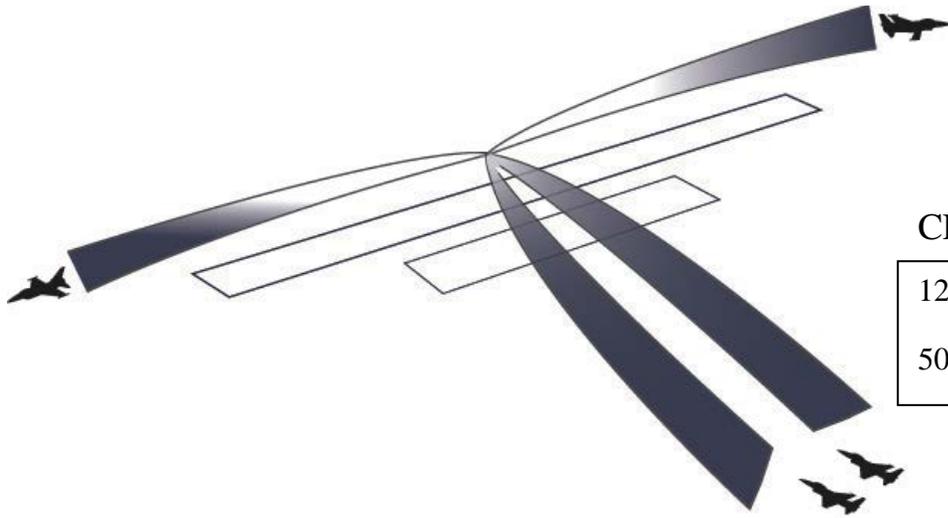
100' AGL MINIMUM



### TRAIL-TO-DIAMOND CLOVERLOOP

1200'-1500' FROM CROWD

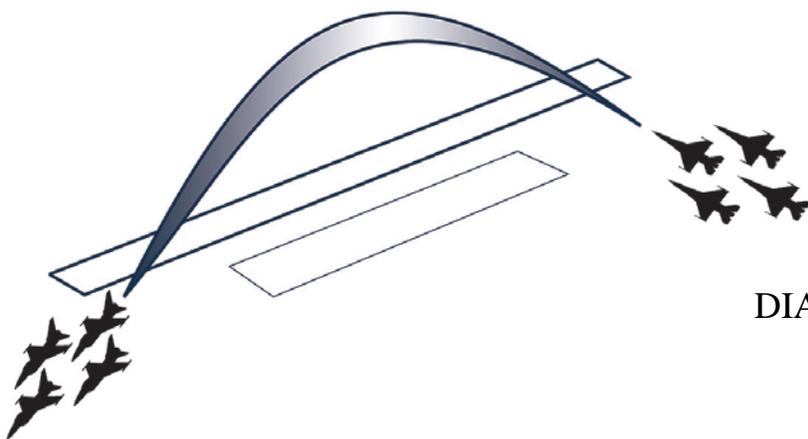
250' AGL MINIMUM



### CROSS OVER BREAK

1200' -1500' FROM CROWD

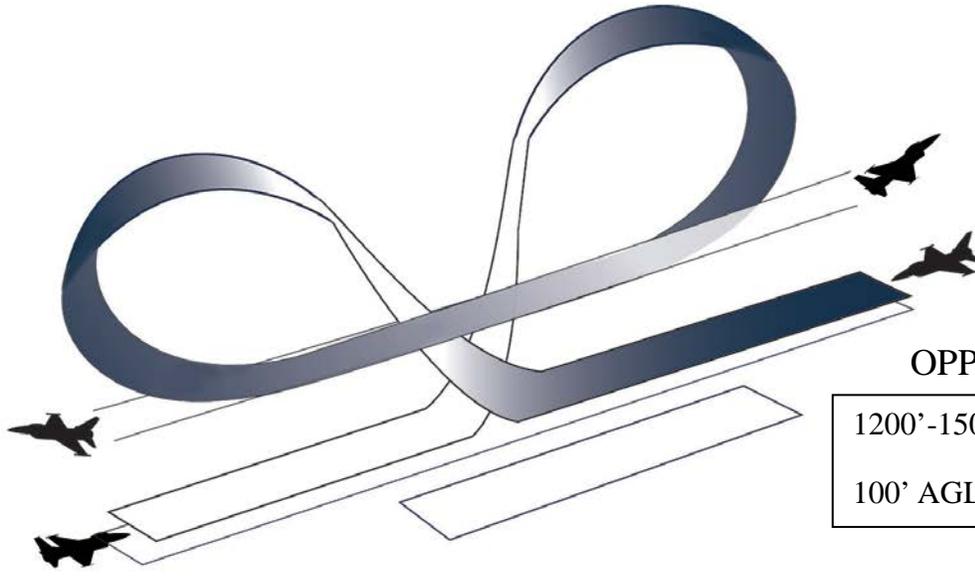
500' AGL MINIMUM



### DIAMOND PASS IN REVIEW

500' FROM CROWD

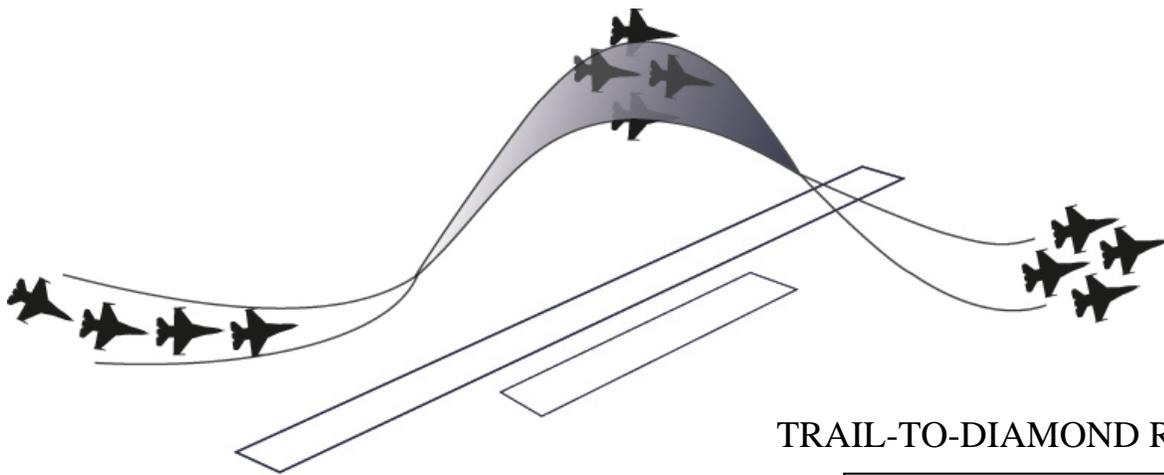
200' AGL MINIMUM



### OPPOSING SPLIT-S

1200' - 1500' FROM CROWD

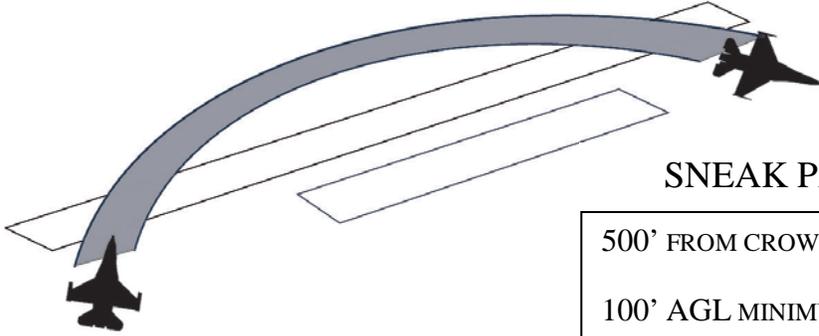
100' AGL MINIMUM



### TRAIL-TO-DIAMOND ROLL

1200' - 1500' FROM CROWD

250' AGL MINIMUM

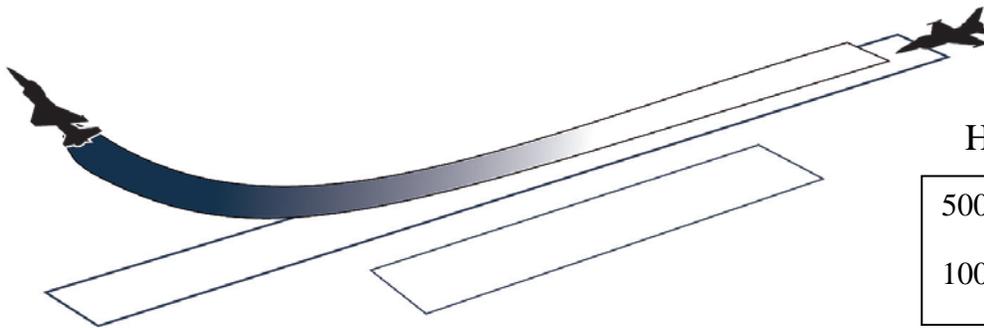


### SNEAK PASS/AFTER BURNER ON

500' FROM CROWD

100' AGL MINIMUM (500' AGL OVER CROWD)

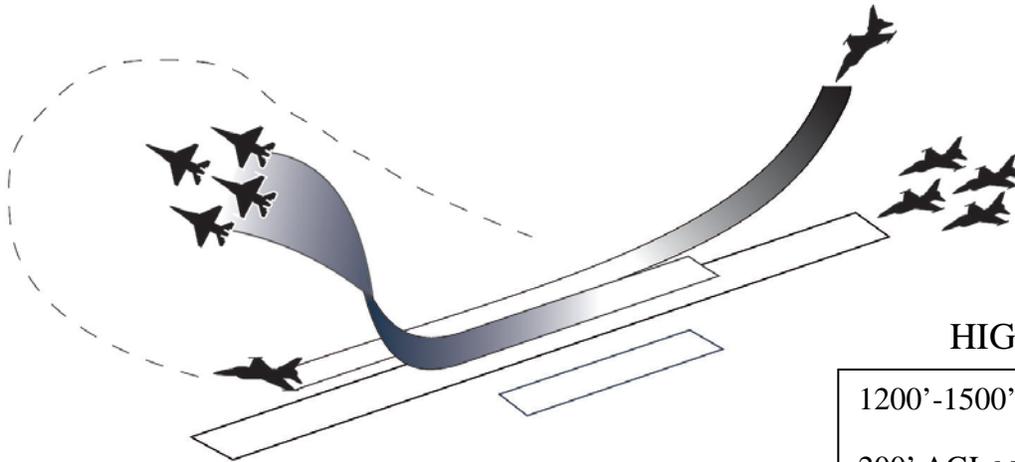
.94 MACH MAX



### HIGH AOA PASS

500' FROM CROWD

100' AGL MINIMUM

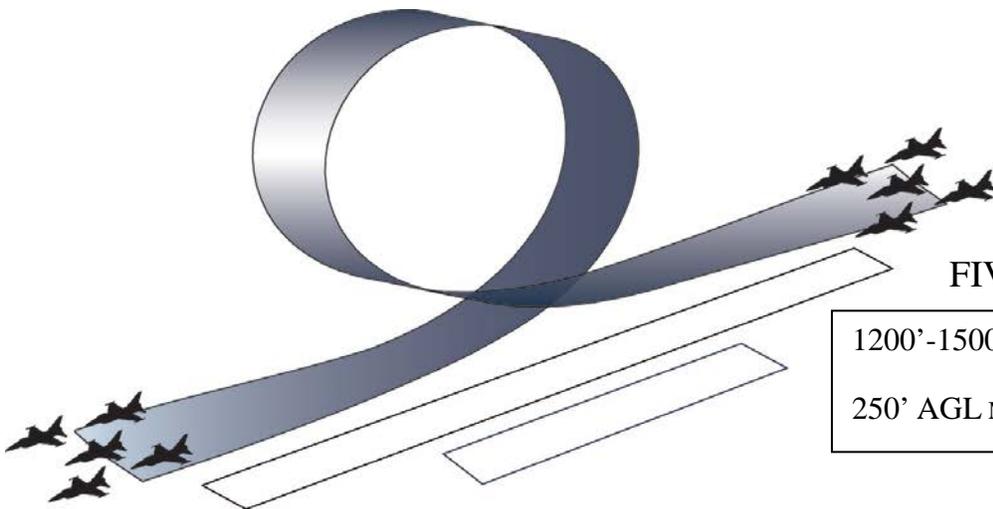


HIGH/LOW

1200' -1500' FROM CROWD  
200' AGL MINIMUM

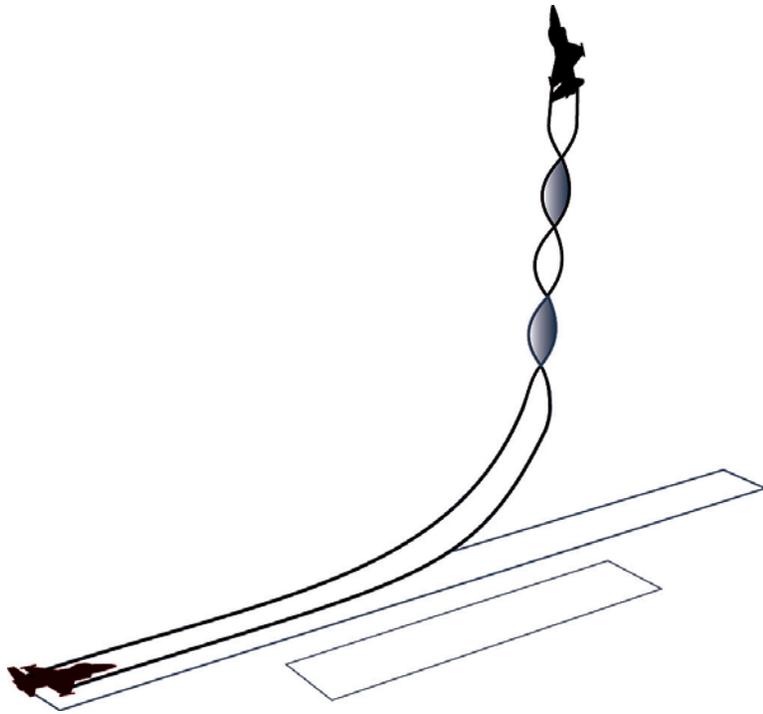
.94 Mach Max

Post Pass, Solo Executes Half Cuban then rejoins with Diamond.



FIVE CARD LOOP

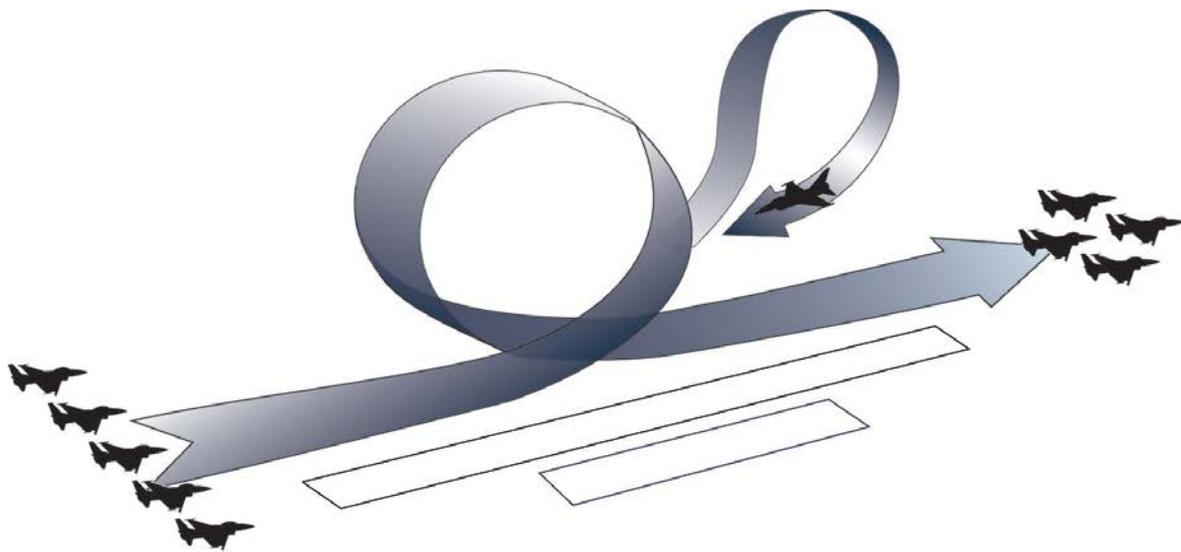
1200' -1500' FROM CROWD  
250' AGL MINIMUM



### VERTICAL ROLLS

1200' -1500' FROM CROWD

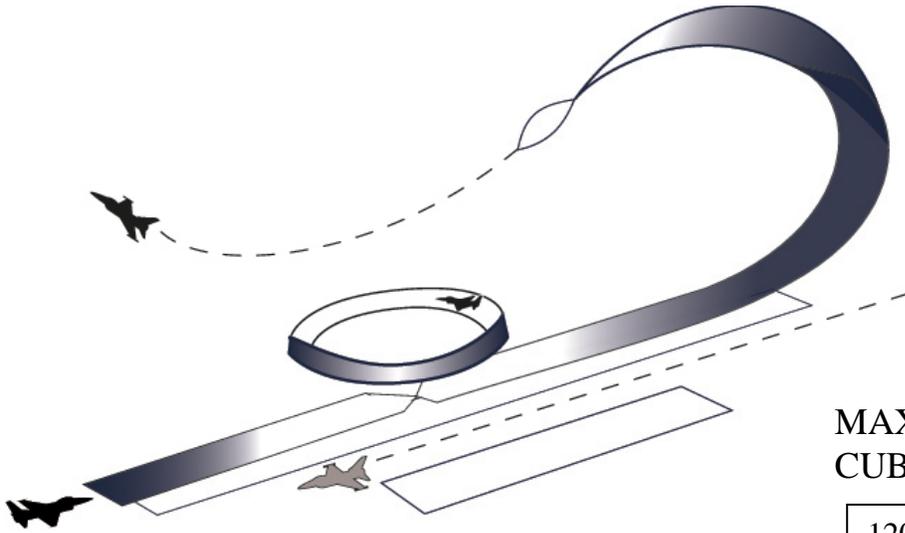
100' AGL MINIMUM



### LINE ABREAST LOOP PLUS SOLO BREAKAWAY

1200' -1500' FROM CROWD

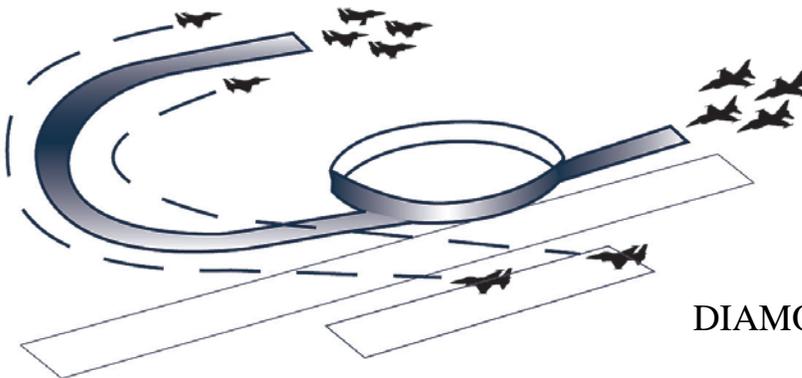
250' AGL MINIMUM



**MAX TURN WITH HALF CUBAN EIGHT**

1200'-1500' FROM CROWD

100' AGL MINIMUM

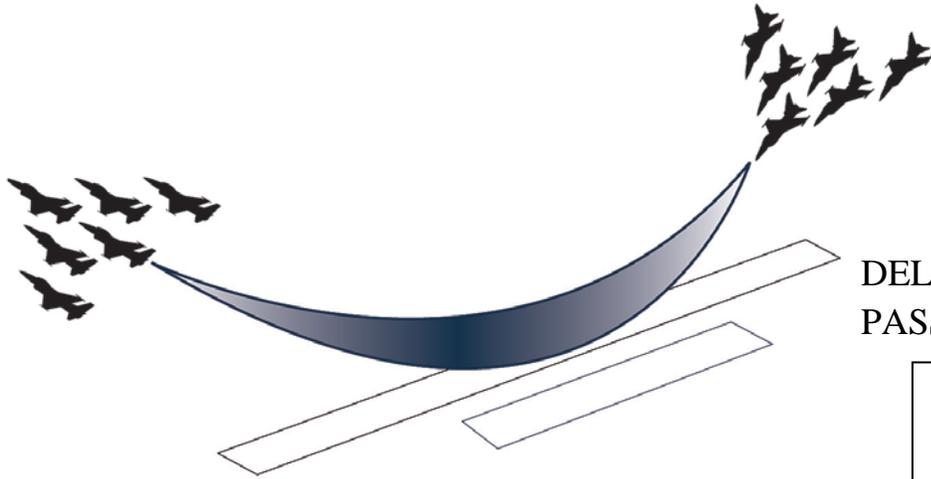


**DIAMOND 360 SOLO REJOIN  
(Afterburner on)**

1200'-1500' FROM CROWD

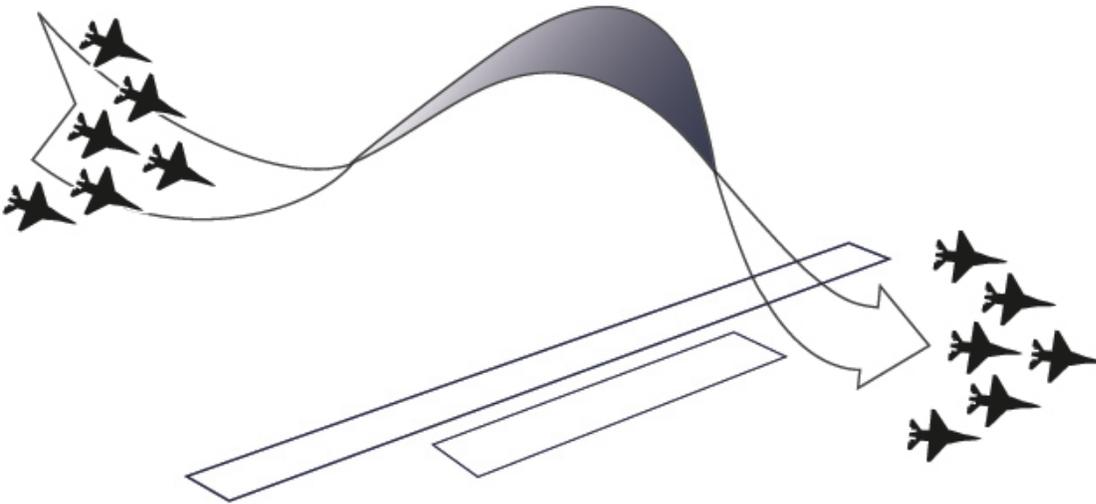
DIAMOND 200' AGL MINIMUM

SOLOS 500' OVER CROWD



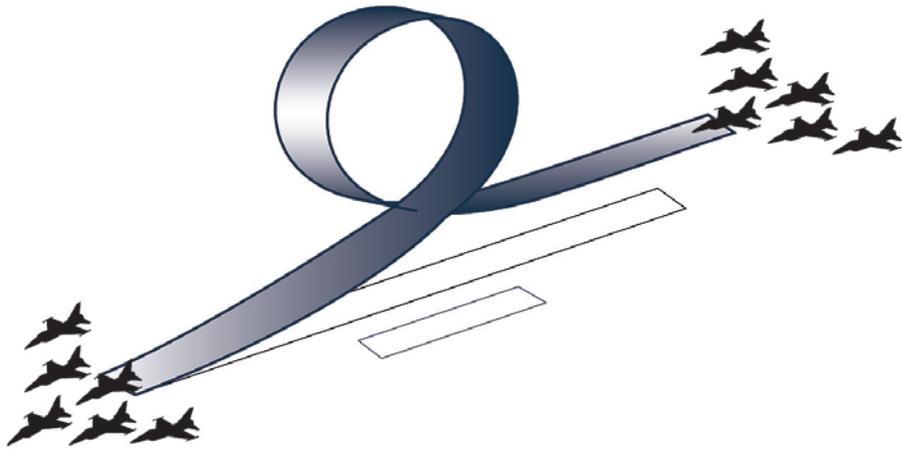
DELTA BOTTOM-UP-PASS

500' FROM CROWD  
200' AGL MINIMUM



DELTA ROLL

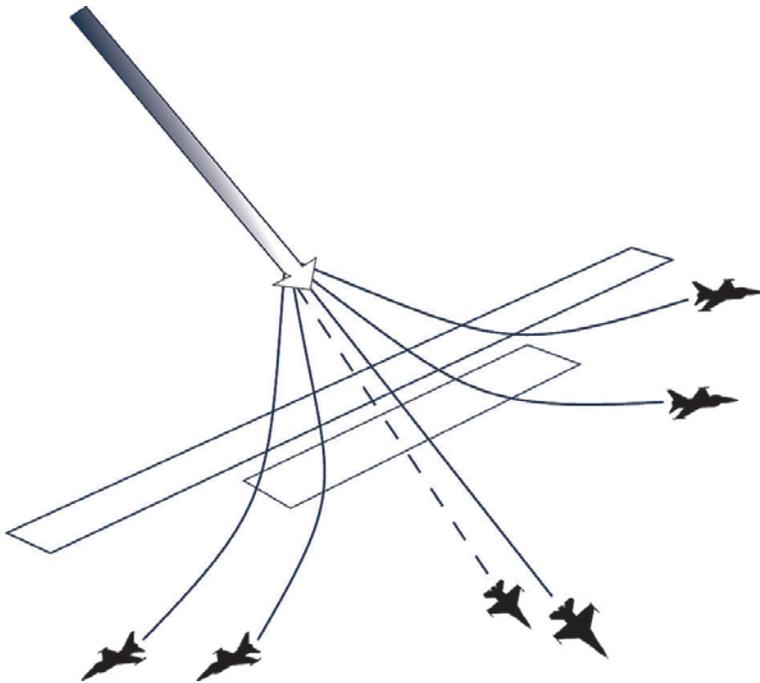
1200'-1500' FROM CROWD  
100' AGL MINIMUM



### DELTA LOOP

1200' - 1500' FROM CROWD

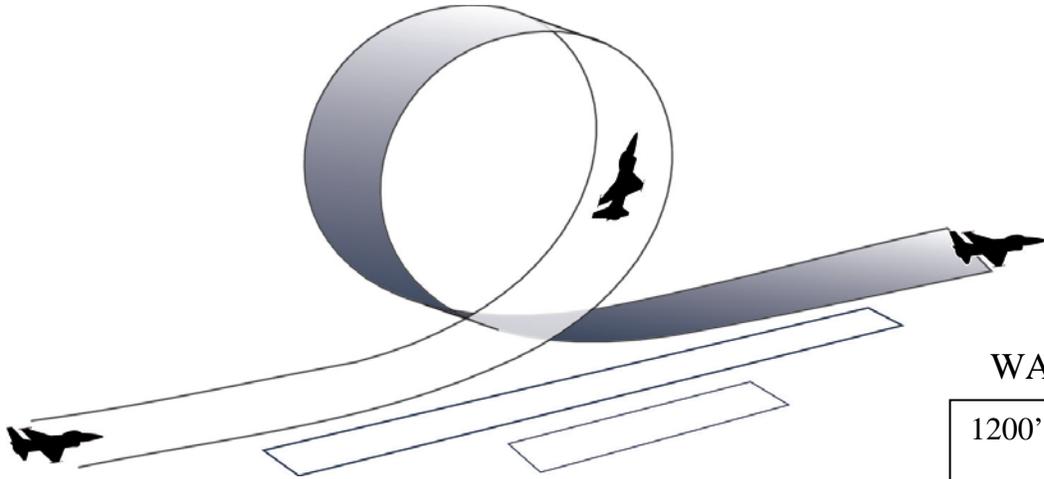
200' AGL MINIMUM



### DELTA BURST

WINGS LEVEL

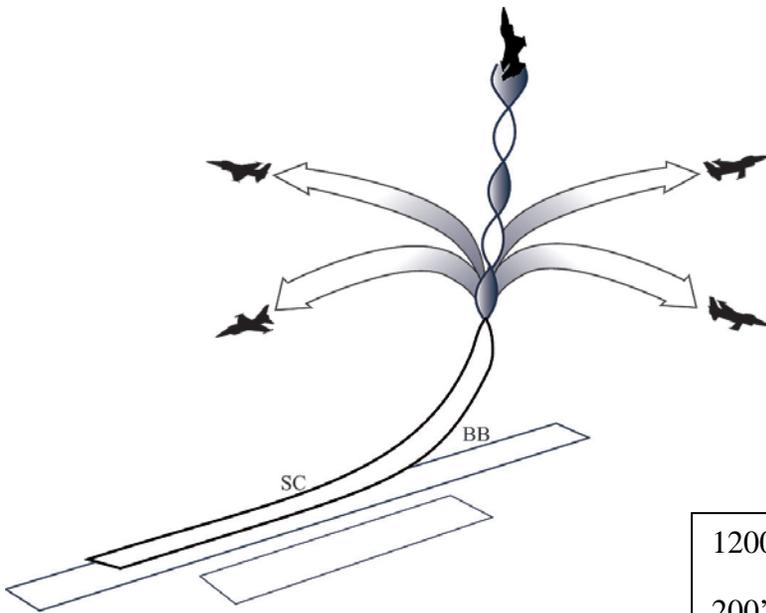
500' OVER THE CROWD



**WARRIOR LOOP**

1200'-1500' FROM CROWD

100' AGL MINIMUM

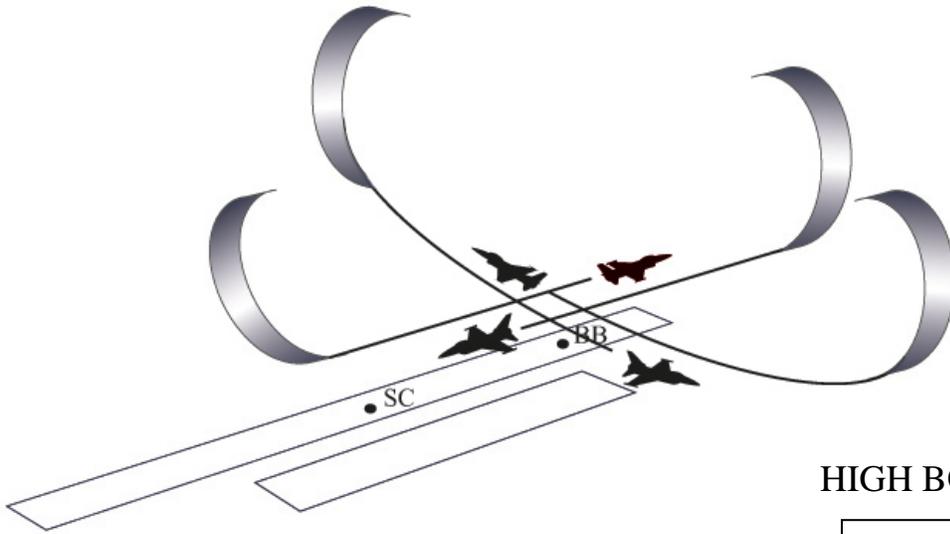


**HIGH BOMB BURST WITH SOLO  
HIT TO VERTICAL ROLLS**

1200'-1500' FROM CROWD    SC – SHOW CENTER

200' AGL MINIMUM

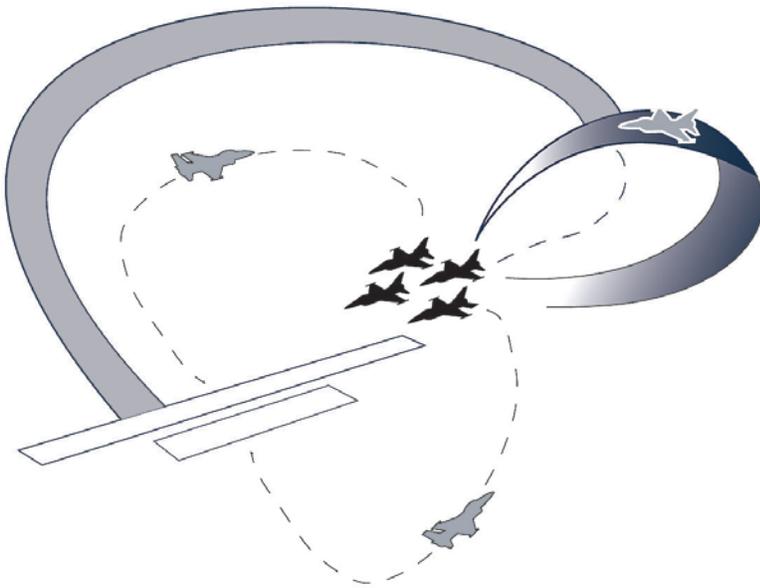
BB – BOMB



### HIGH BOMB BURST CROSS

1200-1500' FROM CROWD

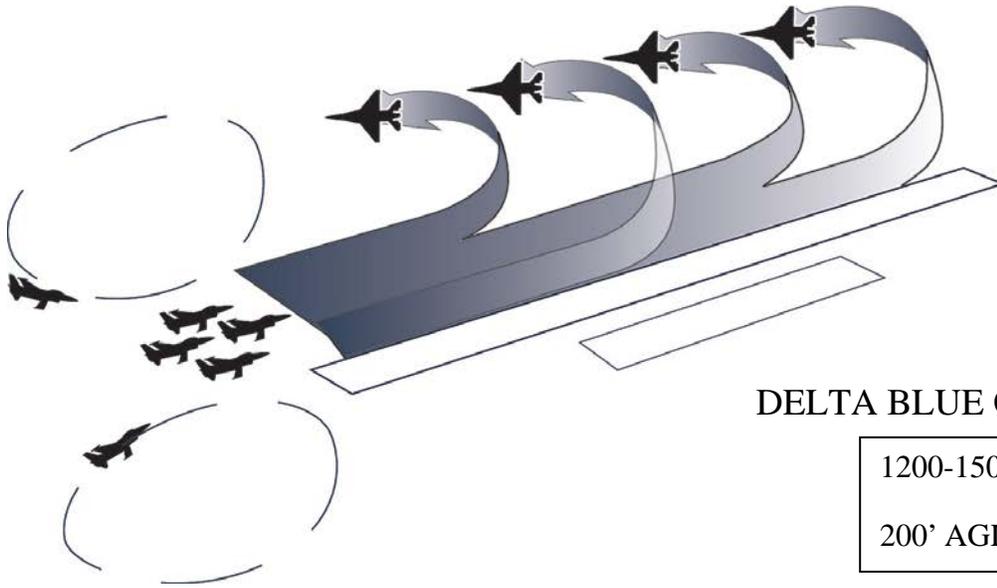
200' AGL MINIMUM



### HIGH BOMB BURST REJOIN

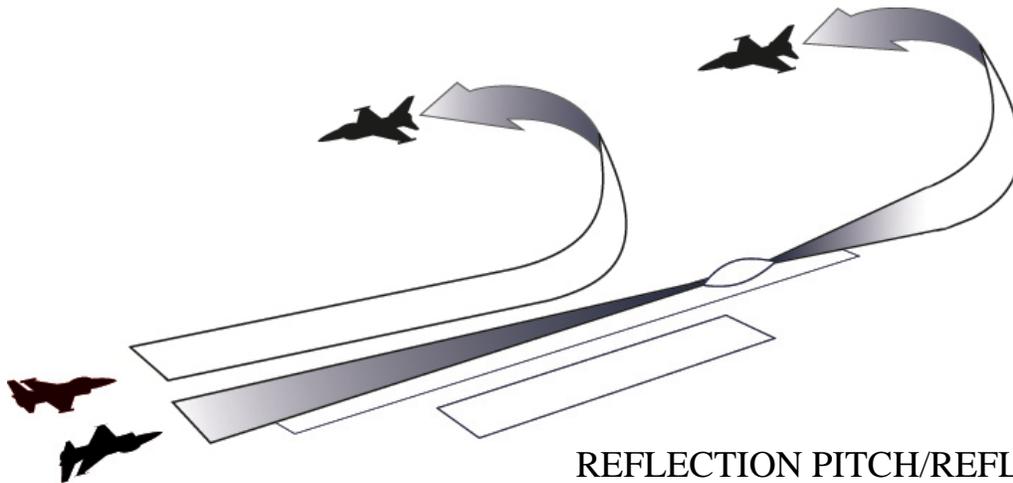
1200-1500' FROM CROWD

300' AGL MINIMUM



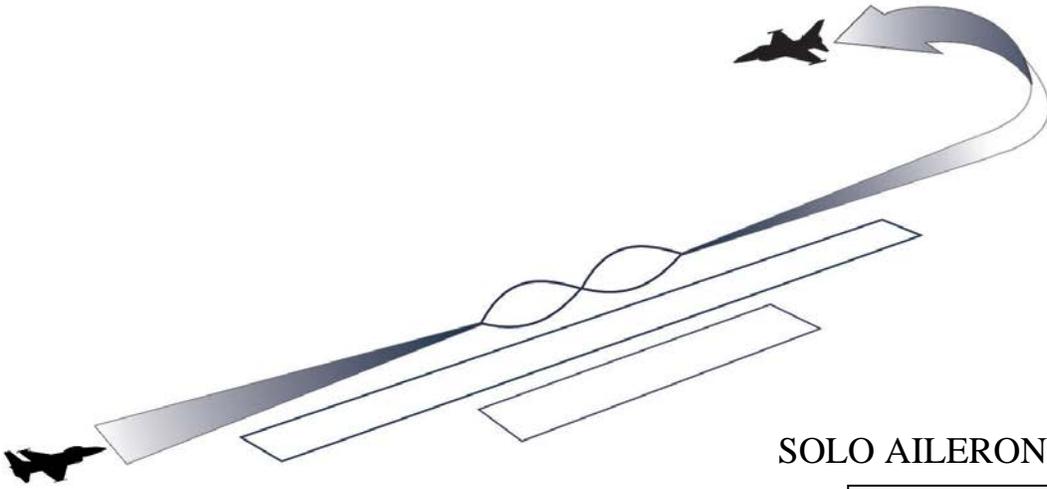
**DELTA BLUE OUT PITCH-UP**

1200-1500' FROM CROWD  
200' AGL MINIMUM



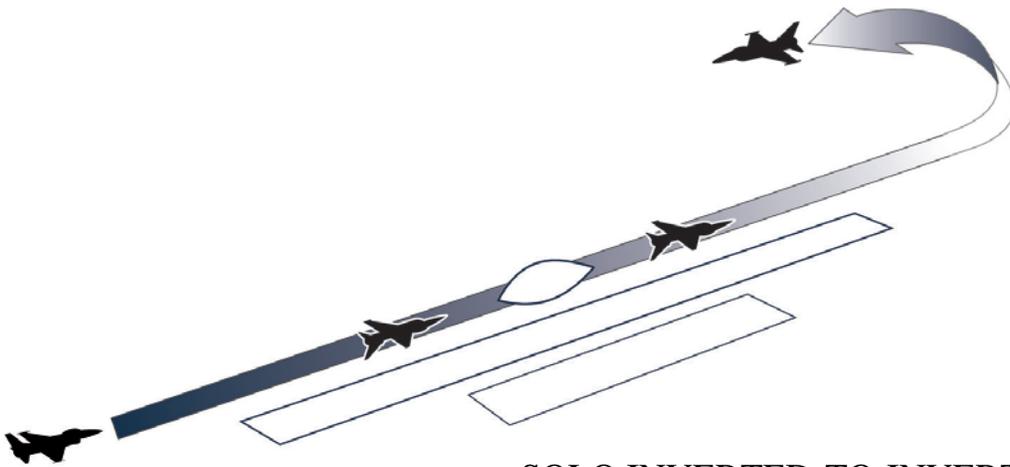
**REFLECTION PITCH/REFLECTION PASS**

1200-1500' FROM CROWD  
100' AGL MINIMUM



**SOLO AILERON PITCH-UP**

1200-1500' FROM CROWD  
100' AGL MINIMUM



**SOLO INVERTED-TO-INVERTED PITCH-UP**

1200-1500' FROM CROWD  
100' AGL MINIMUM

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## Section II

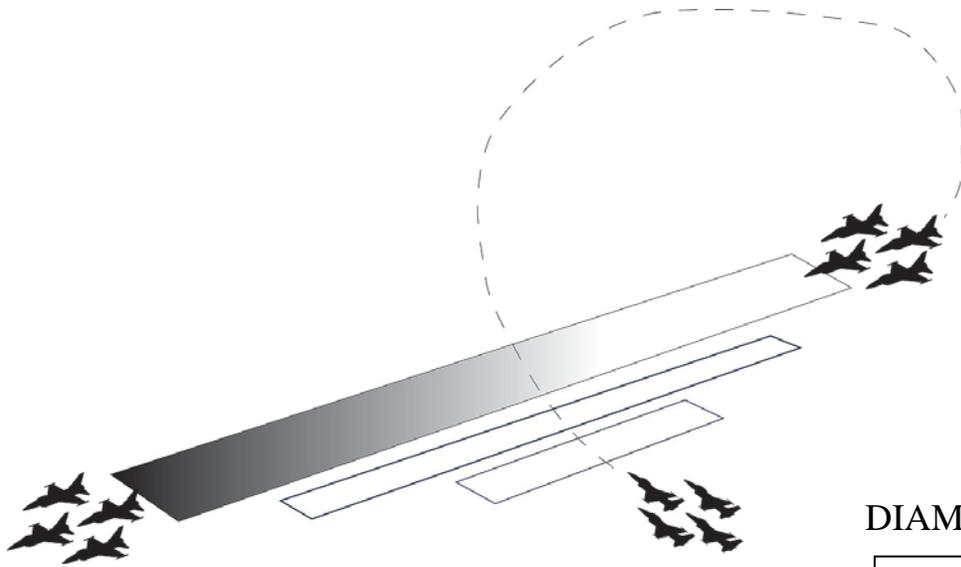
# THUNDERBIRD 2016 LOW SHOW

### WEATHER 3500' AND 5 MILES VISIBILITY

Many of the maneuvers featured in the low show have already been presented in the previous pages. The maneuvers that are unique to the low show are viewed on the following pages.

<b>Diamond Takeoff</b>		<b>Diamond Takeoff</b>		<b>Diamond Takeoff</b>	
(LS) Roll on Takeoff					
(RS) Max Climb / Split S		(LS) Roll on Takeoff		(RS) Maximum Climb/Split-S	
<b>Low Opener</b>	↑←	<b>Low Opener</b>	↑←	<b>Low Opener</b>	↑←
Opposing Knife Edge	→←	4-Point	→	4-Point	→
<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒
Opposing Inverted	→←	Inverted	←	Inverted	←
<b>Diamond PIR (Ops √)</b>	←	<b>Diamond PIR (Ops √)</b>	←	<b>Diamond PIR (Ops √)</b>	←
(LS) Knife Edge	→	Knife Edge	→	Knife Edge	→
(RS) Slow Roll	←	<b>Diamond Roll</b>	⇒	<b>Diamond Roll</b>	⇒
<b>Diamond Roll</b>	⇒	High Alpha Pass	←	Slow Roll	←
(LS) 8- Point	←	<b>Diamond BUP</b>	←	<b>Diamond BUP</b>	←
(RS) Aileron Rolls	→	Aileron Rolls	→	Aileron Rolls	→
<b>Diamond BUP</b>	←	<b>Arrowhead Roll</b>	⇒	<b>Arrowhead Roll</b>	⇒
Calypso Pass	←	8-Point	←	8-Point	←
<b>Arrowhead Roll</b>	⇒	<b>Bon Ton Roule</b>	←	<b>Bon Ton Roule</b>	←
Cross Over Break	←↑ →	Max Turn 1/2 Cuban	→ ←	Max Turn	→
<b>Bon Ton Roule</b>	←	<b>Trail to Diamond Roll</b>	⇒	<b>Trail to Diamond Roll</b>	⇒
Opposing – Split S	→←	Sneak Pass	→	Sneak Pass	→
<b>Trail to Diamond Roll</b>	⇒	<b>High/Low Pass (L.T.) (Ops √)</b>	←	<b>High/Low Pass (L.T.) (Ops √)</b>	←
(RS) Sneak Pass	→	Solo Hit	←	Solo Hit	←
(LS) High Alpha Pass	←	Inverted-to-Inverted	→	Inverted-to-Inverted	→
<b>High/Low Pass (L.T.) (Ops √)</b>	←	<b>Echelon PIR</b>	⇒	<b>Echelon PIR</b>	⇒
(RS) Solo Hit	←	Sneak Pass	→	Sneak Pass	→
(LS) Max Turn 1/2 Cuban	→←	<b>Diamond 360°</b>	←	<b>Diamond 360°</b>	←
<b>Echelon PIR</b>	⇒	Solo Rejoin	↑	Solo Rejoin	↑
(RS) Sneak Pass	→	<b>Stinger BUP</b>	←	<b>Stinger BUP</b>	←
(LS) 4 Point	←	<b>Stinger Roll</b>	⇒	<b>Stinger Roll</b>	⇒
<b>Diamond 360°</b>	←	<b>Low Bomb Burst</b>	↓	<b>Low Bomb Burst</b>	↓

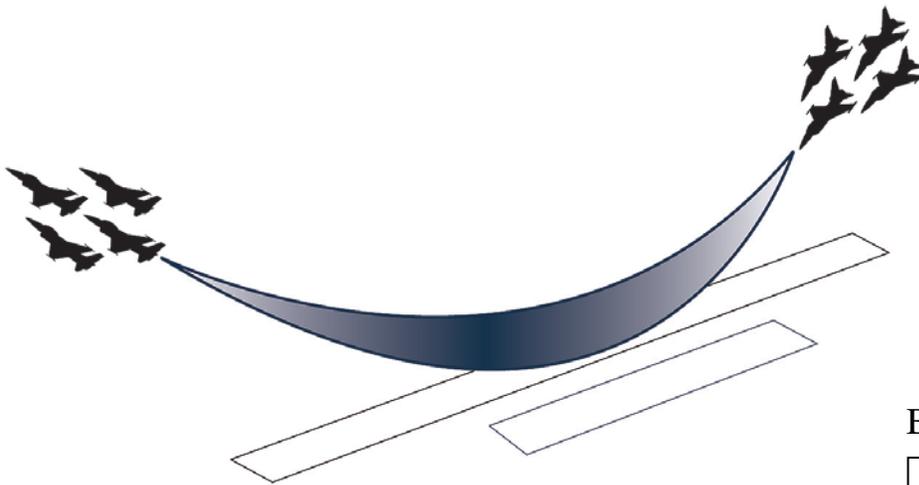
6-SHIP		5-SHIP (Left Solo)		5-SHIP (Right)	
Solo Rejoin to Delta	↑	<b>Diamond Closer</b>	↓	<b>Diamond Closer</b>	↓
<b>Delta BUP</b>	←	<b>Thunderbird Diamond Pitch</b>		<b>Thunderbird Diamond Pitch</b>	
<b>Delta Roll</b>	⇒	(LS) Aileron Roll Pitch Up		(RS) Inverted to Inverted Pitch	
<b>Low Bomb Burst</b>	↓				
Reflection Pitch – No Pitch	→				
<b>Diamond Closer</b>	↓				
<b>Delta Blue Out Pitch Up</b>					
(LS) Aileron Roll Pitch Up					
(RS) Inverted to Inverted Pitch					



### DIAMOND FLAT PASS

1200-1500' FROM CROWD

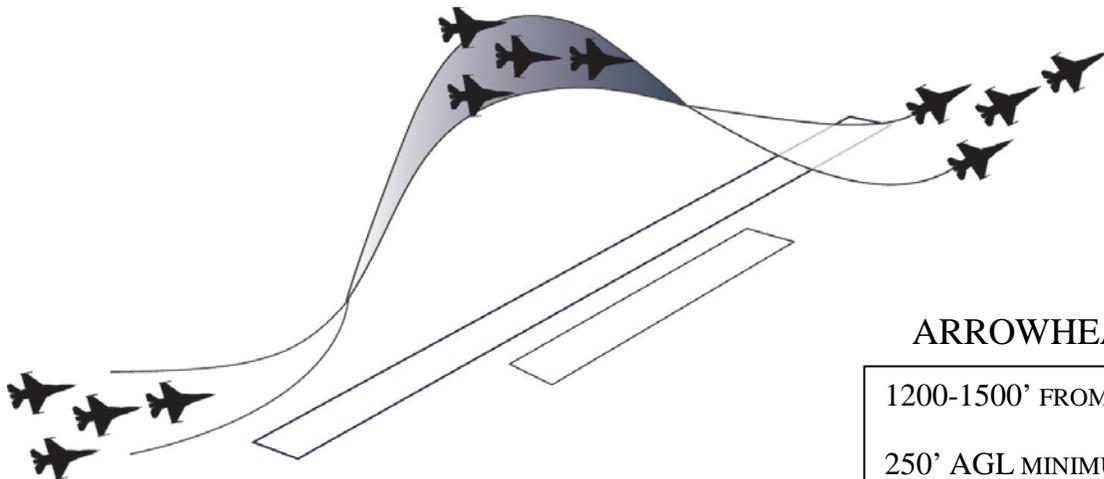
200' AGL MINIMUM



### BOTTOM-UP-PASS

500' FROM CROWD

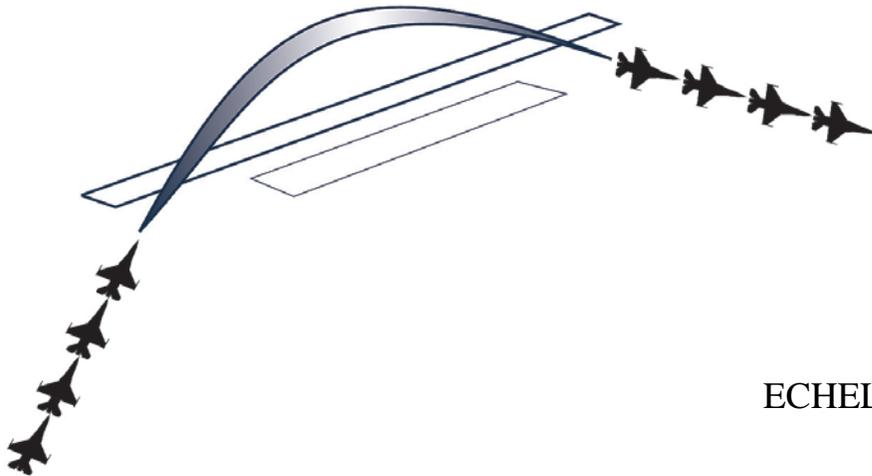
200' AGL MINIMUM



### ARROWHEAD ROLL

1200-1500' FROM CROWD

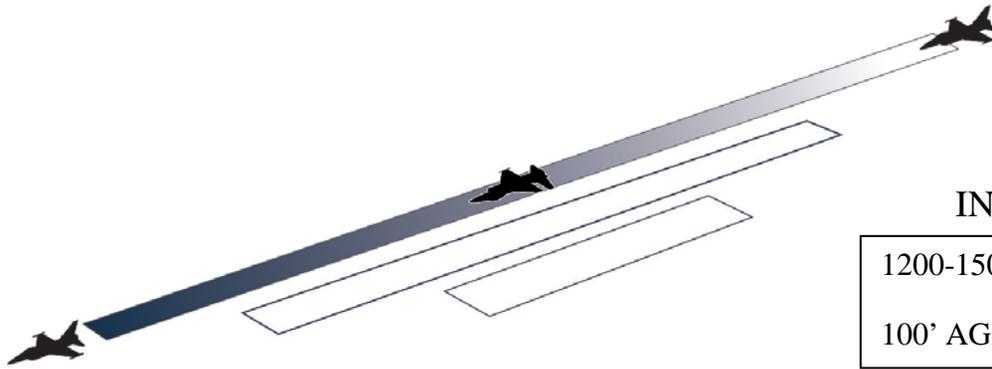
250' AGL MINIMUM



### ECHELON PASS-IN-REVIEW

500' FROM CROWD

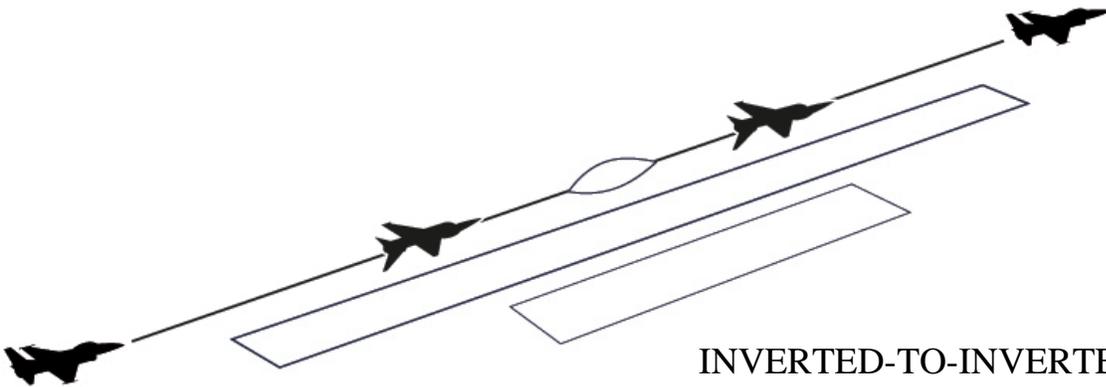
200' AGL MINIMUM



### INVERTED PASS

1200-1500' FROM CROWD

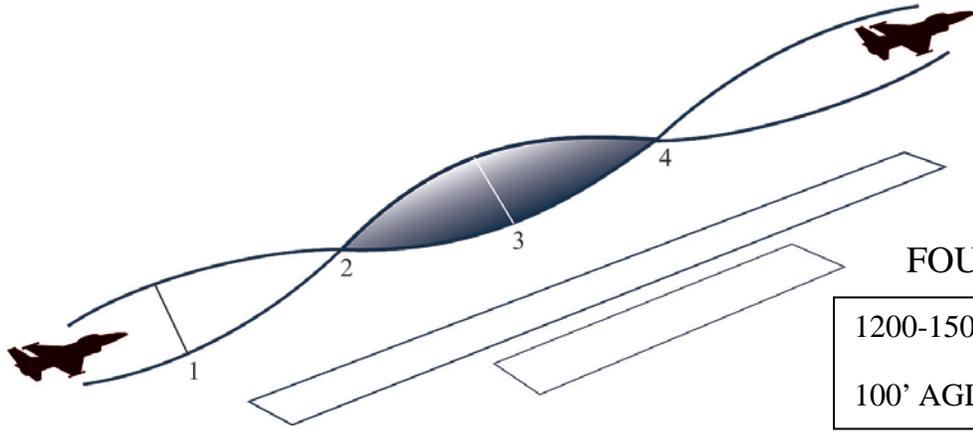
100' AGL MINIMUM



### INVERTED-TO-INVERTED PASS

1200-1500' FROM CROWD

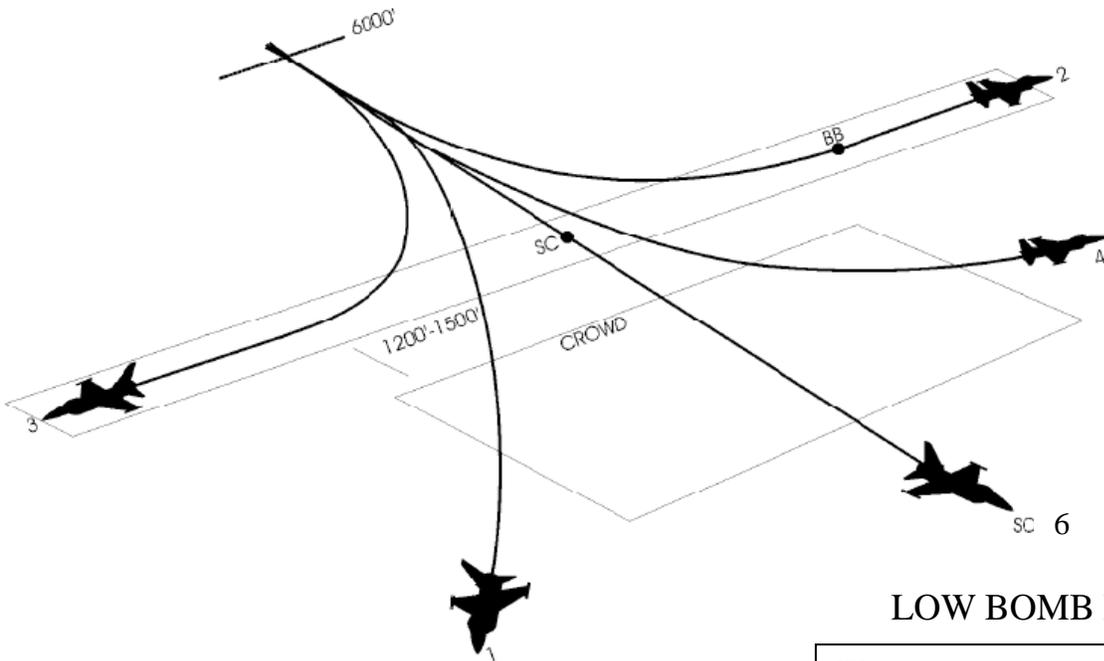
100' AGL MINIMUM



**FOUR POINT ROLL**

1200-1500' FROM CROWD

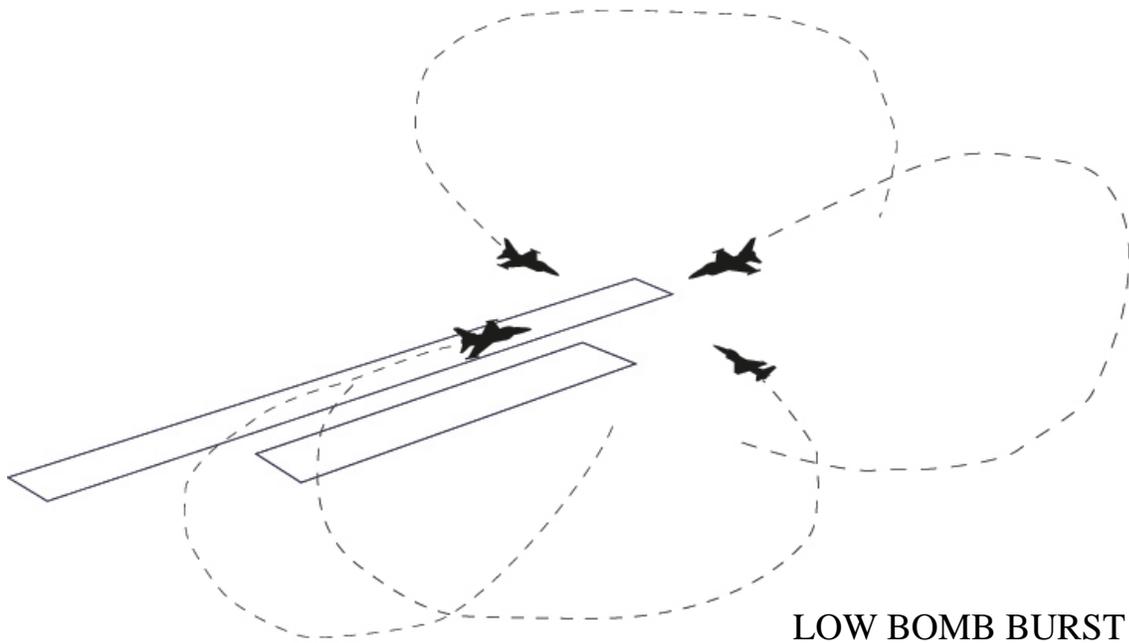
100' AGL MINIMUM



**LOW BOMB BURST**

WINGS LEVEL OVER CROWD

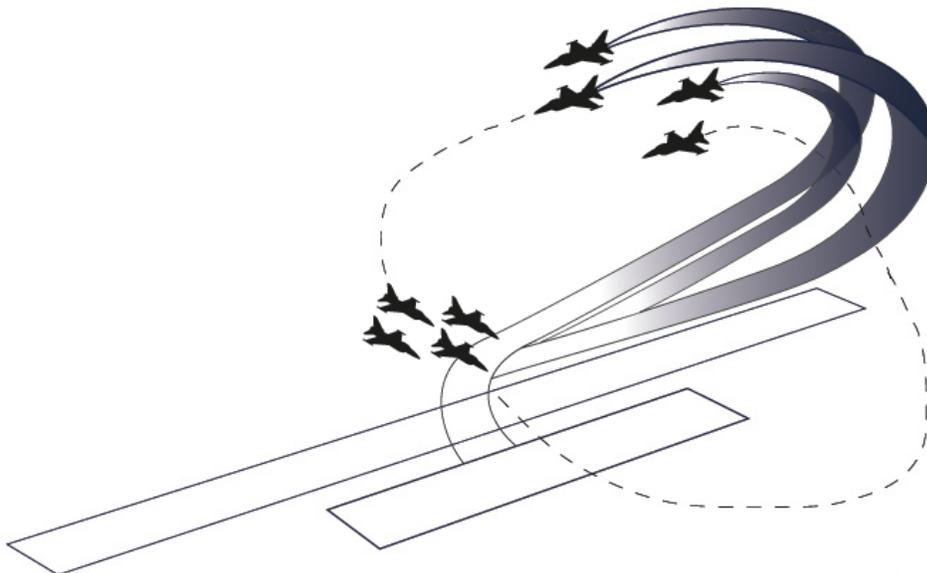
500' AGL MINIMUM



**LOW BOMB BURST CROSS**

500' FROM CROWD OVER BB

100' AGL MINIMUM



**LOW BOMB BURST  
REJOIN**

WINGS LEVEL OVER CROWD

500' AGL MINIMUM

## Section III

# THUNDERBIRD 2016 FLAT SHOW

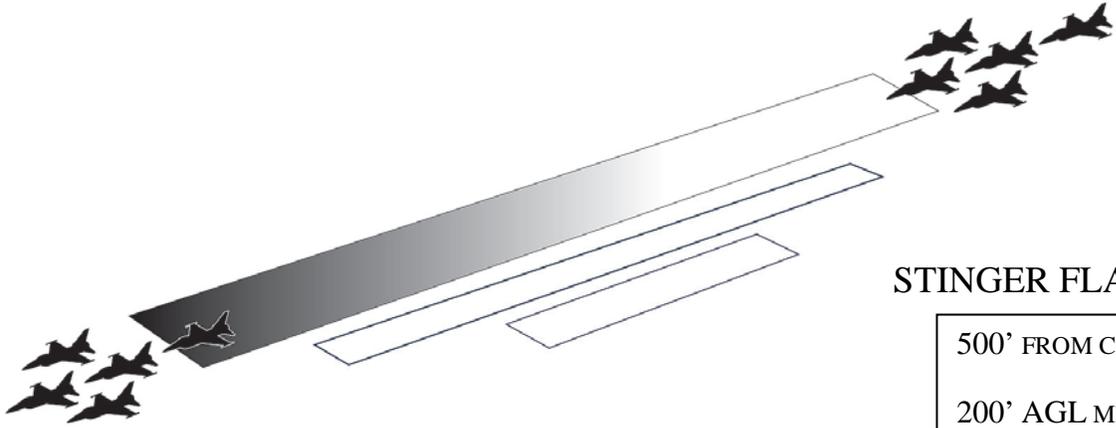
WEATHER 2000' AND 5 MILES VISIBILITY

WAIVER DOWN TO 1500' AND 5 MILES VISIBILITY BY 57 WG/CC or USAFWC/CC

Most of the maneuvers featured in the flat show have already been presented in the previous pages. The maneuvers that are unique to the flat show and all additional maneuvers available to the team are presented on the following pages.

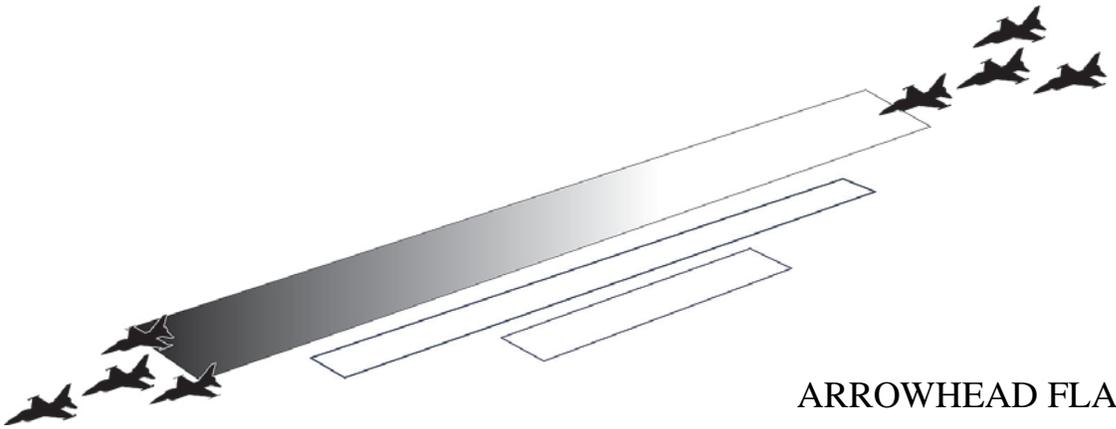
6-SHIP		5-SHIP (Left Solo)		5-SHIP (Right	
<b>Diamond Takeoff</b>		<b>Diamond Takeoff</b>		<b>Diamond Takeoff</b>	
(LS) Roll on Takeoff					
(RS) Low Transition Takeoff		(LS) Roll on Takeoff		(RS) Low Transition Takeoff	
<b>Flat Opener</b>	↑←	<b>Flat Opener</b>	↑ ←	<b>Flat Opener</b>	↑ ←
Opposing Knife Edge	→↔	4 - Point	→	4 - Point	→
<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒	<b>Trail to Diamond BUP</b>	⇒
Opposing Inverted	←	Inverted	←	Inverted	←
<b>Diamond PIR (Ops √)</b>	←	<b>Diamond PIR (Ops √)</b>	←	<b>Diamond PIR (Ops √)</b>	←
(LS) Knife Edge	→	Knife Edge	→	Knife Edge	→
(RS) Slow Roll	←	<b>Line Abreast Flat Pass</b>	⇒	<b>Line Abreast Flat Pass</b>	⇒
<b>Line Abreast Flat Pass</b>	⇒	High Alpha Pass	←	Slow Roll	←
(LS) 8 - Point	←	<b>Diamond BUP</b>	←	<b>Diamond BUP</b>	←
(RS) Aileron Rolls	→	Aileron Rolls	→	Aileron Rolls	→
<b>Diamond BUP</b>	←	<b>Arrowhead BUP</b>	⇒	<b>Arrowhead BUP</b>	⇒
Calypso Pass	←	8 - Point	←	8- Point	←
<b>Arrowhead BUP</b>	⇒	<b>Bon Ton Roule (L.T.)</b>	←	<b>Bon Ton Roule (L.T.)</b>	←
Cross Over Break	←↑ →	Inverted to Inverted	→	Inverted to Inverted	→
<b>Bon Ton Roule (L.T.)</b>	←	<b>Echelon PIR</b>	⇒	<b>Echelon PIR</b>	⇒
Opposing 4 Point	→↔	Sneak Pass	→	Sneak Pass	→
<b>Echelon PIR</b>	⇒	<b>High/Low Pass (Ops √)</b>	←	<b>High/Low Pass (Ops √)</b>	←
(RS) Sneak Pass	→	Solo Hit	←	Solo Hit	←
(LS) High Alpha	←	Max Turn	→	Max Turn	→
<b>High/Low Pass (Ops √)</b>	←	<b>Diamond 360°</b>	←	<b>Diamond 360°</b>	←
(RS) Solo Hit	←	Solo Rejoin	↑	Solo Rejoin	↑
(LS) Max Turn	→	<b>Stinger BUP</b>	←	<b>Stinger BUP</b>	←

(RS) Sneak Pass	→	<b>Stinger Flat Pass</b>	⇒	<b>Stinger Flat Pass</b>	⇒
<b>Diamond 360°</b>	←	<b>Stinger Closer</b>	↓	<b>Stinger Closer</b>	↓
Solo Rejoin to Delta	↑	<b>Low BB</b>		<b>Low BB</b>	
<b>Delta BUP</b>	←	<b>TBird Diamond Closer</b>		<b>TBird Diamond Closer</b>	
<b>Delta Flat Pass **</b>	⇒	<b>Thunderbird Diamond Pitch</b>		<b>Thunderbird Diamond Pitch</b>	
<b>Delta Closer</b>	↓	(LS) Aileron Roll Pitch Up		(RS) Inverted to Inverted Pitch	
<b>Delta Blue Out Pitch Up</b>					
(LS) Aileron Roll Pitch Up					
(RS) Inverted to Inverted Pitch					
<b>** Blue Out</b>					
<b>** Reflection Pitch</b>					
<b>** Low BB</b>					
<b>** Thunderbird Diamond Pitch</b>					
<b>** Allows for a low BB ensuring safety/deconfliction. Solos land prior to the low BB</b>					



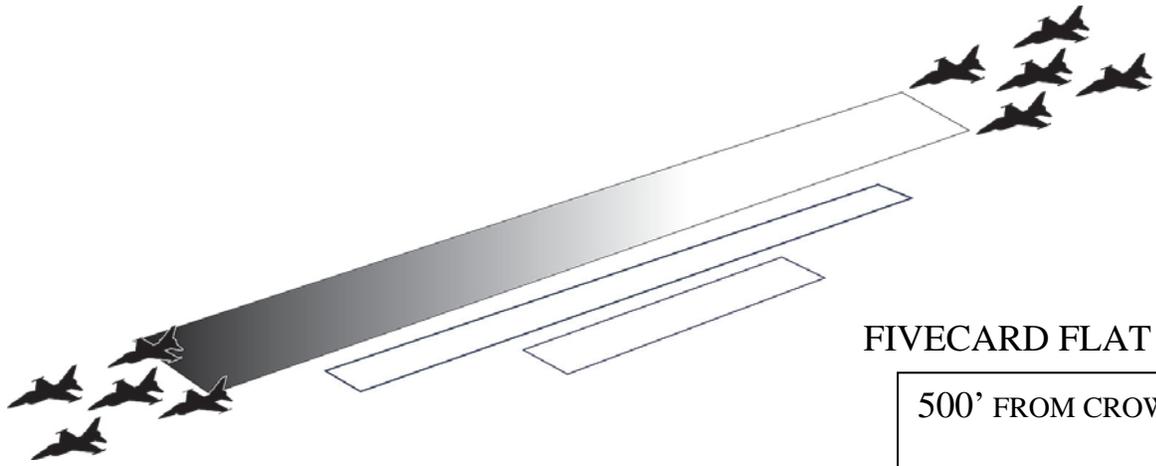
**STINGER FLAT PASS**

500' FROM CROWD  
200' AGL MINIMUM



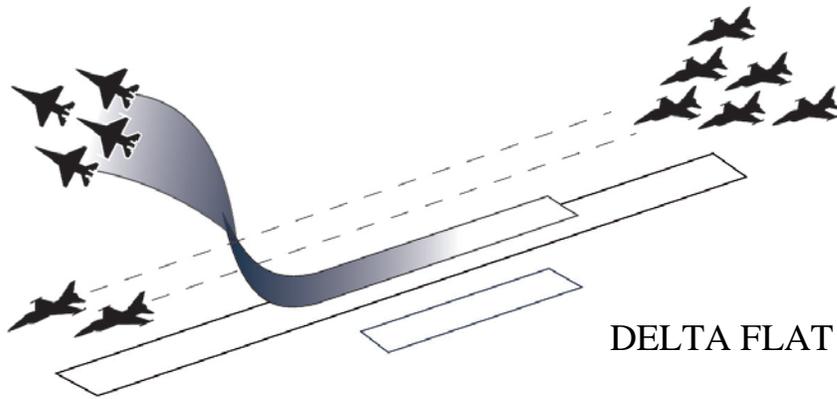
**ARROWHEAD FLAT PASS**

500' FROM CROWD  
200' AGL MINIMUM



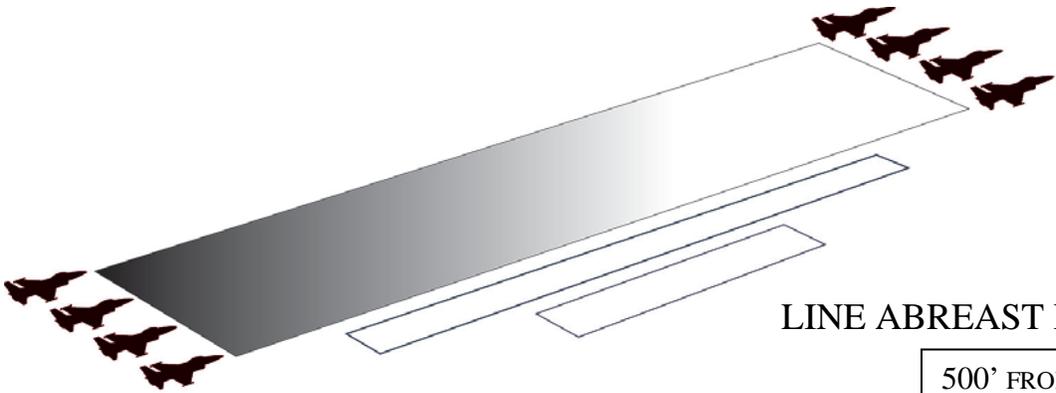
FIVECARD FLAT PASS

500' FROM CROWD  
200' AGL MINIMUM



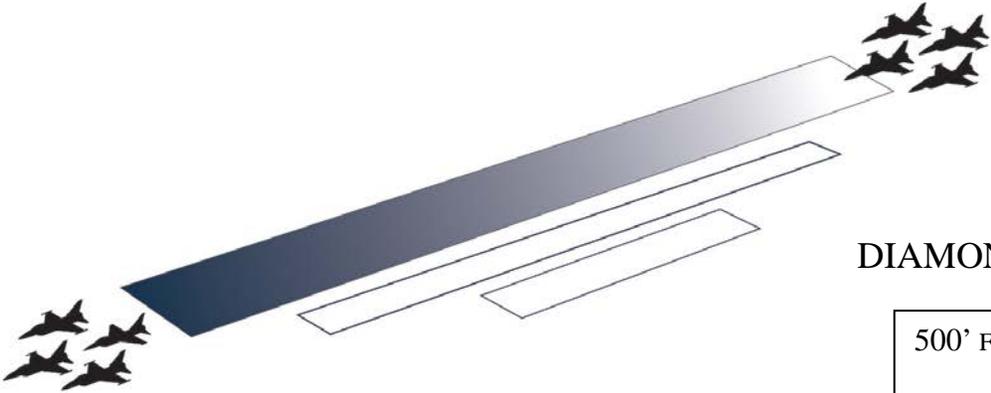
DELTA FLAT PASS WITH BLUEOUT

500' FROM CROWD  
200' AGL MINIMUM



**LINE ABREAST FLAT PASS**

500' FROM CROWD
200' AGL MINIMUM



**DIAMOND FLAT PASS**

500' FROM CROWD
200' AGL MINIMUM

# Section IV

## Airfield layout of a typical show site

