

Thunderbirds



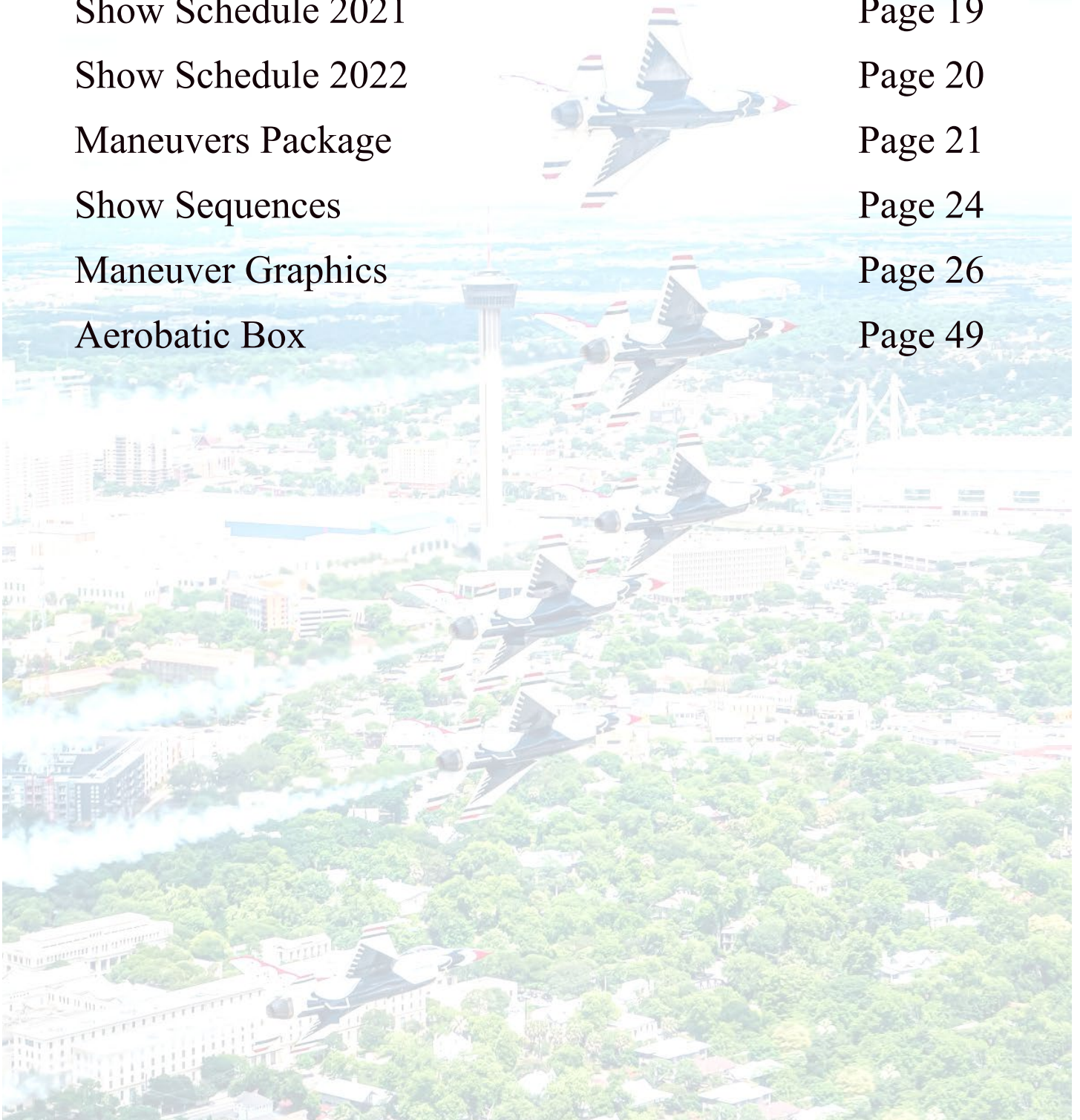
FAA and COMACC
Demonstration Acceptance Guide

2021



Table of Contents

Biographies	Page 5
Show Schedule 2021	Page 19
Show Schedule 2022	Page 20
Maneuvers Package	Page 21
Show Sequences	Page 24
Maneuver Graphics	Page 26
Aerobatic Box	Page 49





Col. John D. Caldwell

Commander/Leader

Col. John D. Caldwell is the Commander and Leader for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. He is responsible for a 130-person squadron that plans and presents precision aerial maneuvers to exhibit the capabilities of the F-16 and the high degree of professional skill required to operate those aircraft. As Thunderbird 1, Caldwell leads the Thunderbirds signature flying formations with as many as seven other pilots flying at speeds topping 500 miles per hour and with wing tips less than 18 inches apart from each other. Caldwell is in his third season with the team.

Caldwell graduated from the USAF Academy in 2002 and completed Euro-NATO Joint Jet Pilot Training Program in 2003. Caldwell then graduated from the F-16 Replacement Training Unit at Luke AFB, Ariz., in 2005 where he garnered the Red River Rat Trophy, the 2005 AETC Frances Gabreski Top Air-to-Air Student award and Top Graduate honors. Prior to the Thunderbirds, he was the Commander of the 28th Test and Evaluation Squadron, Eglin AFB, Fla.



EDUCATION

2002 Bachelor degree in Aeronautical Engineering, USAF Academy, Distinguished Graduate, Top Aeronautical Design Student
2007 Squadron Officer School, Distinguished Graduate
2009 United States Air Force Weapons School
2013 Master of Science degree in Aerospace Science & Technology, Embry Riddle University
2014 Air Command and Staff College, by correspondence
2015 Master of Science degree in Defense Analysis, Naval Postgraduate School, Distinguished Graduate, Outstanding Thesis Award, Outstanding Air Force Student

ASSIGNMENTS

Aug 2002 - Oct 2002	Operations Scheduler, 27th Fighter Squadron, Langley AFB, Va.
Oct 2002 - Nov 2003	Student Pilot, Euro-NATO Joint Jet Pilot Training Program, Sheppard AFB, Texas
Nov 2003 - Jan 2004	Student Pilot, Introduction to Fighter Fundamentals, Sheppard AFB, Texas
Feb 2004 - Feb 2005	Student Pilot, F-16 RTU, 308th FS, Luke AFB, Ariz.
Feb 2005 - Aug 2007	Chief of Standardization and Evaluation/Instructor Pilot, 524th FS, Cannon AFB, N.M.
Sept 2007 - Jun 2009	Instructor Pilot/Flight Commander, 61st FS, Luke AFB, Ariz.
Jun 2009 - Dec 2009	Student Pilot, USAF Weapons School, Nellis AFB, Nev.
Jan 2010 - Dec 2011	Chief of Weapons and Tactics, 555th FS, Aviano Air Base, Italy
Jan 2012 - Jun 2014	F-16 Division Commander, 85th TES, Eglin AFB, Fla.
Jun 2014 - Dec 2015	Student, Naval Postgraduate School, Monterey, Calif.
May 2016 - Jun 2016	Director of Operations, 85th TES, Eglin AFB, Fla.
Jun 2017 - Aug 2018	Commander, 28th TES, Eglin AFB, Fla.
Aug 2018 - Present	Thunderbird #1, Commander/Leader, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Command Pilot
Total flight hours: More than 3,100
Combat hours: 667
Aircraft flown: T-37, T-38A, F-16

MAJOR AWARDS AND DECORATIONS

Distinguished Flying Cross
Meritorious Service Medal with one oak leaf cluster
Air Medal with eight oak leaf clusters
Air Force Commendation Medal with three oak leaf clusters
Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	May 2002
First Lieutenant	May 2004
Captain	May 2006
Major	Feb 2012
Lieutenant Colonel	Jan 2016
Colonel	Mar 2021

Maj. Ian E. Lee

Left Wing

Maj. Ian Lee is the Left Wing Pilot for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 2, he flies the #2 jet and serves as the teams Navigation Officer. He is in his first year with the team.

Lee is a 2010 graduate of the USAF Academy. He has served in numerous capacities from the squadron to wing level as shop chief, instructor pilot, program manager and flight commander. He is a command pilot with more than 1,600 flying hours including more than 470 combat hours during operations Inherent Resolve and Freedom's Sentinel. Prior to joining the Thunderbirds, Lee flew the F-16 in the 79th Fighter Squadron at Shaw Air Force Base, S.C.



EDUCATION

2010 Bachelor of Science in Economics, U.S. Air Force Academy
2010 Bachelor of Science in Business Management, U.S. Air Force Academy
2010 Air and Space Basic Course, Squadron Officer College
2015 Squadron Officer School
2019 United States Air Force Weapons Instructor Course

ASSIGNMENTS

Oct 2009 - Sep 2011	Student Pilot, 80th Operations Support Squadron, Sheppard Air Force Base, Texas
Aug 2010 - Nov 2012	Undergraduate Pilot Training, 71st Flying Training Wing, Vance AFB, Okla.
Nov 2012 - Oct 2013	F-16 Initial Qualification Training, 309th Fighter Squadron, Luke AFB, Ariz.
Oct 2013 - May 2015	Assistant Chief of Scheduling, 77th FS, Shaw AFB, S.C.
May 2015 - Jul 2016	Standardization and Evaluation Liaison Officer, 77th FS, Shaw AFB, S.C.
Jul 2016 - Aug 2017	Advanced Programs Program Manager, 8th Fighter Wing, Kunsan Air Base, Republic of Korea
Aug 2017 - Jun 2018	Flight Commander, 314th FS, Holloman AFB, N.M.
Jun 2018 - Jan 2020	Flight Commander, 8th FS, Holloman AFB, N.M.
Jan 2020 - Present	Chief of Weapons and Tactics, 79th FS, Shaw AFB, S.C.

FLIGHT INFORMATION

Rating: Command Pilot
Flight hours: More than 1,700
Combat hours: More than 470
Aircraft flown: F-16, AT-38, T-38, T-6

MAJOR AWARDS AND DECORATIONS

Air Medal with "C" device with two oak leaf clusters
Aerial Achievement Medal with one oak leaf cluster
Air Force Commendation Medal with two oak leaf clusters

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	May 2010
First Lieutenant	May 2012
Captain	May 2014
Major	Jan 2020

Maj. Zane J. Taylor

Right Wing

Maj. Zane J. Taylor is the Right Wing Pilot for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 3, he flies the #3 jet and serves as the Chief of Scheduling. He is in his second season with the team.

Taylor is a 2010 graduate of the USAF Academy. He completed the Joint Specialized Undergraduate Pilot Training at Vance Air Force Base, Okla., and was selected for F-16 training at Joint Base San Antonio Lackland-Kelly, Texas, in 2012. After completing pilot training, he was assigned to the 77th Fighter Squadron, Shaw AFB, S.C. before becoming a flight commander for the 80 FS, Kunsan Air Base, Republic of Korea, where he was named Flight Lead of the Year. He has more than 1,400 hours in the F-16, including 280 combat hours over Iraq and Syria in support of Operation Inherent Resolve. Prior to the Thunderbirds, Taylor served as Evaluator Pilot and Chief of Standardization and Evaluation, 8th FS, Holloman AFB, N.M.



EDUCATION

- 2010 Bachelor of Science degree in Systems Engineering, USAF Academy
- 2010 Air and Space Basic Course, Squadron Officer College, Top Flight Jay Smith Memorial Award Winner
- 2017 Squadron Officer School, Flight Top Graduate, Flight Outstanding Contributor, Distinguished Graduate

ASSIGNMENTS

- Jul 2010 - Aug 2012 Student, Joint Specialized Undergraduate Pilot Training, Vance Air Force Base, Okla.
- Aug 2012 - Jul 2013 Student, F-16 Basic Qualification Course, JBSA Lackland-Kelly, Texas
- Jul 2013 - Mar 2016 Assistant Chief of Scheduling/Electronic Combat Pilot/Flight Lead, 77th Fighter Squadron, Shaw AFB, S.C.
- Mar 2016 - Apr 2017 Wing Electronic Combat Officer/Flight Commander/Instructor Pilot, 80th FS, Kunsan AB, ROK
- Apr 2017 - Jul 2018 Chief of Training/Chief of Standardization and Evaluation/Evaluator Pilot, 8th FS, Holloman AFB, N.M.
- July 2018 - Dec 2020 Thunderbird #4, Slot, USAF Air Demonstration Squadron, Nellis AFB, Nev.
- Dec 2020 - Present Thunderbird #3, Right Wing, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
Flight hours: More than 1,700
Combat hours: More than 280
Aircraft flown: T-6A, T-38, AT-38, F-16

MAJOR AWARDS AND DECORATIONS

Air Medal with one oak leaf cluster
Aerial Achievement Medal
Air Force Commendation Medal with two oak leaf clusters

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	May 2010
First Lieutenant	May 2012
Captain	May 2014
Major	Dec 2019

Maj. Michael M. Brewer

Slot

Maj. Michael M. Brewer is the Slot Pilot for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 4, he flies the #4 jet and serves as the squadron's Training Officer and Alumni Liaison. He is in his third season with the team.

Brewer is a 2005 graduate of Embry-Riddle Aeronautical University, Prescott, and commissioned from Officer Training School, Maxwell AFB, Ala. in 2010. He attended Joint Specialized Undergraduate Pilot Training at Vance AFB, Okla. After completing Pilot Training as a distinguished graduate, recipient of the AETC Commander's Trophy, and Flying Training Award in 2012, Brewer served as an F-15E Strike Eagle pilot in multiple assignments. He has more than 1,300 hours in the F-15E, including more than 315 combat hours over Afghanistan, Iraq and Syria in support of operations Enduring Freedom and Inherent Resolve. Prior to joining the Thunderbirds, Brewer served as an F-15E Instructor Pilot and Flight Commander, 334th Fighter Squadron, Seymour Johnson AFB, N.C..



EDUCATION

2005 Bachelor of Science degree in Aeronautical Science, Embry-Riddle Aeronautical University
2011 Air and Space Basic Course, Squadron Officer College
2016 Squadron Officer School

ASSIGNMENTS

Jan 2011 - Oct 2012	Pilot Training Student, 25th Flying Training Squadron, Vance Air Force Base, Okla.
Oct 2012 - Dec 2012	IFF Student, 49th FTS, Columbus AFB, Miss.
Dec 2012 - Oct 2013	F-15E Student, 333rd Fighter Squadron, Seymour Johnson AFB, N.C.
Oct 2013 - Jul 2015	F-15E Wingman/Scheduling Officer, 494th FS, RAF Lakenheath, U.K.
Jul 2015 - Feb 2016	F-15E Wingman/Chief of Aircrew Flight Equipment, 494th FS, RAF Lakenheath, U.K.
Feb 2016 - Oct 2016	F-15E Multi-Ship Flight Lead/Chief of Aircrew Flight Equipment, 494th FS, RAF Lakenheath, U.K.
Oct 2016 - Oct 2018	F-15E Instructor Pilot/Flight Commander, 334th FS, Seymour Johnson AFB, N.C.
Oct 2018 - Dec 2020	Thunderbird #3, Right Wing, USAF Air Demonstration Squadron, Nellis AFB, Nev.
Dec 2020 - Present	Thunderbird #4, Slot, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
Flight hours: More than 5,800
Combat hours: More than 310
Military aircraft flown: F-15E, F-16C/D, T-38C, T-6

MAJOR AWARDS AND DECORATIONS

Air Medal with oak leaf cluster
Air Force Commendation Medal with one oak leaf cluster

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	Dec 2010
First Lieutenant	Dec 2012
Captain	Dec 2014
Major	Aug 2020

Maj. Michelle M. Curran

Lead Solo

Maj. Michelle M. Curran is the Lead Solo Pilot for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 5, she flies the #5 jet and serves as the squadron's Chief of Standardization and Evaluation. She is in her third season with the team.

Curran entered the Air Force in 2009 with a Reserve Officer Training Corps commission from the University of St. Thomas in St. Paul, Minn. She completed the Joint Specialized Undergraduate Pilot Training in Columbus, Miss., and was assigned to the F-16 at Misawa Air Base, Japan. Curran has flown more than 1,500 hours in the F-16, including 163 combat hours over Afghanistan in support of operations Resolute Support and Freedom's Sentinel. Prior to the Thunderbirds, she was an F-16 Instructor Pilot and Flight Commander at Naval Air Station Joint Reserve Base Fort Worth, Texas.



EDUCATION

2009 Bachelor of Arts degree in Criminal Justice, University of St. Thomas
2010 Air and Space Basic Course, Squadron Officer College
2014 Squadron Officer School

ASSIGNMENTS

Nov 2009 - Nov 2011 Student, Joint Specialized Undergraduate Pilot Training and Introduction to Fighter Fundamentals, 14th Operational Support Squadron Columbus AFB, Miss.
Nov 2011 - Nov 2012 Student, F-16 Basic Course, 308th Fighter Squadron, Luke AFB, Ariz.
Nov 2012 - Nov 2015 F-16 Pilot/Chief of Scheduling, 13th FS, Misawa AB, Japan
Nov 2015 - Sept 2018 F-16 Instructor Pilot/Flight Commander, 355th FS, NAS JRB Fort Worth, Texas
Sept 2018 - Nov 2019 Thunderbird #6, Opposing Solo, USAF Air Demonstration Squadron, Nellis AFB, Nev.
Nov 2019 - Present Thunderbird #5, Lead Solo, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
Flight hours: More than 1,500
Combat hours: More than 160
Aircraft flown: T-6, T-38, F-16C

MAJOR AWARDS AND DECORATIONS

Air Medal
Air Force Commendation Medal with one oak leaf cluster

EFFECTIVE DATES OF PROMOTION

Second Lieutenant Aug 2009
First Lieutenant Aug 2011
Captain Aug 2013
Major July 2019

Maj. Kyle S. Oliver

Opposing Solo

Maj. Kyle Oliver is the Opposing Solo Pilot for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 6, he flies the #6 jet and serves as the squadron's Aircrew Flight Equipment Officer and Squadron Flight Safety Officer. He is in his second season with the team.

Oliver entered the Air Force in 2010 with a Reserve Officer Training Corps commission from The Ohio State University. He completed the Joint Specialized Undergraduate Pilot Training at Vance AFB, Okla., in 2012. After completing pilot training as a distinguished graduate and Commander's Trophy winner, Oliver served as an F-22 Raptor pilot in Alaska. Oliver has flown more than 1,200 hours, including more than 230 combat hours over Iraq and Syria in support of Operation Inherent Resolve. Prior to the Thunderbirds, Oliver served as the Assistant Director of Operations and Instructor Pilot, 27th Fighter Squadron, Joint Base Langley Eustis, Va.



EDUCATION

2010 Bachelor of Arts degree in Communication Technology, Ohio State University
2011 Air and Space Basic Course, Squadron Officer College
2014 Raptor Advanced Mission Planning School
2016 Squadron Officer School

ASSIGNMENTS

Mar 2011 - Oct 2012 Student Pilot, Joint Specialized Undergraduate Pilot Training, Vance Air Force Base, Okla.
Oct 2012 - Oct 2013 Student Pilot, F-22 Formal Training Unit, Tyndall AFB, Fla.
Oct 2013 - Oct 2016 Scheduler/Assistant Squadron Weapons Officer/Chief of Mobility/4-Ship Flight Lead, 90th Fighter Squadron, Joint Base Elmendorf-Richardson, Alaska
Dec 2016 - Nov 2017 Aircrew Flight Equipment Flight Commander/4-Ship Flight Lead, 1st Operational Support Squadron, JB Langley-Eustis, Va.
Nov 2017 - Sept 2019 Assistant Director of Operations/F-22 Instructor Pilot, 27th FS, JB Langley-Eustis, Va.
Sept 2019 - Present Thunderbird #6, Opposing Solo, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
Flight hours: More than 1,300
Combat hours: More than 230
Aircraft flown: T-6A, T-38C, F-16C/D, F-22A

MAJOR AWARDS AND DECORATIONS

Air Medal
Air Achievement Medal
Air Force Commendation Medal with one oak leaf cluster

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	Dec 2010
First Lieutenant	Dec 2012
Captain	Dec 2014
Major	Aug 2020

Lt. Col. Kevin J. DiFalco

Director of Operations

Lt. Col. Kevin J. DiFalco is the Director of Operations for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 7, he leads the Operations Section, which includes communications, computer systems analysts, training, standardization and evaluation, aircrew flight equipment and airlift support. He is in his second season with the team.

DiFalco commissioned in 2004 as a distinguished graduate of the Reserve Officer Training Corps at the University of Colorado at Boulder and earned his pilot rating in 2006. He is a former instructor at the USAF Weapons School and Chief of Staff Master's Fellow in Public Policy. DiFalco has flown more than 1,900 hours, including more than 297 combat flight hours. Prior to the Thunderbirds, he served as the Assistant Director of Operations for the 555th Fighter Squadron and Director of Operations for the 31st Operations Support Squadron, Aviano AB, Italy.



EDUCATION

2004 Bachelor of Science degree in Aerospace Engineering, University of Colorado at Boulder
 2010 Squadron Officer School
 2011 United States Air Force Weapons Instructor Course, Distinguished Graduate
 2014 Master of Science degree in Aerospace Science, Embry-Riddle Aeronautical University
 2018 Master of Public Policy, Princeton University
 2019 Air Command and Staff College, by correspondence

ASSIGNMENTS

Jan 2005 - Jul 2006	Student Pilot, Introduction to Fighter Fundamentals, Euro-NATO Joint Jet Pilot Training Program, 80th Operations Support Squadron, Sheppard AFB, Texas
Jul 2006 - Jun 2007	Student Pilot, F-16 Replacement Training Unit, 309th Fighter Squadron/Night Systems, 310th FS, Luke AFB, Ariz.
Jun 2007 - Feb 2011	Standards and Evaluation Officer/Personnel Reliability Program Monitor/Assistant Weapons Officer/Assistant Chief of Scheduling, 510th FS, Aviano Air Base, Italy
Feb 2011 - Jun 2011	Flight Commander, 35th FS Kunsan AB, Republic of Korea
Jul 2011 - Dec 2011	Weapons Instructor Course Student, USAF Weapons School, Nellis AFB, Nev.
Jan 2012 - Sep 2012	Wing Weapons Officer/Flight Commander, 8th OSS, Kunsan AB, ROK
Sep 2012 - Jan 2015	Chief of Weapons and Tactics/Flight Commander, 510th FS and 31st OSS, Aviano AB, Italy
Jan 2015 - Jul 2017	Chief of Standards and Evaluations, 16th Weapons Squadron, Wing Scheduler, 57th OSS, Precision Strike Flight Commander/Assistant Director of Operations, 16th Weapons Squadron, Nellis AFB, Nev.
Jul 2017 - Aug 2018	Chief of Staff of the Air Force Master's Fellow, Princeton University, Princeton, N.J.
Aug 2018 - Sep 2019	Assistant Director of Operations, 555th FS/Director of Operations, 31st OSS, Aviano AB, Italy
Sep 2019 - Present	Thunderbird #7, Operations Officer, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
 Flight hours: More than 1,900
 Combat hours: More than 297
 Aircraft flown: T-37, T-38A, T-38C, F-16

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with two Bronze Oak Leaf Clusters
 Air Medal with two Bronze Oak Leaf Clusters
 Air Force Commendation Medal
 Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	Jan 2005
First Lieutenant	Jan 2007
Captain	Jan 2009
Major	Jun 2015
Lieutenant Colonel	Nov 2019

Maj. Jason Z. Markzon

Advance Pilot/Narrator

Maj. Jason Z. Markzon is the Advance Pilot and Narrator for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 8, he flies the #8 jet and advances to show sites to coordinate the logistics for aerial demonstrations. Markzon also narrates the performances, provides orientation flights to support Air Force strategic communication goals, and serves as the primary liaison between the Thunderbirds and the air show industry. He is in his third season with the team.

Markzon entered the Air Force in 2007 with a Reserve Officer Training Corps commission from Arizona State University. He attended Undergraduate Pilot Training at Laughlin AFB, Texas, in 2009 and was selected to remain at Laughlin AFB as an instructor pilot at the 87th Flying Training Squadron. He completed his initial fighter training in the F-16 at Luke AFB, Ariz., and then was assigned to operational squadrons in the Republic of Korea and Japan. Prior to joining the Thunderbirds, Markzon was an F-16 flight evaluator and the Maintenance Operations Flight Commander, 35th Maintenance Group, 35th Fighter Wing, Misawa AB, Japan.



EDUCATION

2007 Bachelor of Science degree in Aerospace Engineering, Arizona State University
2008 Air and Space Basic Course, Squadron Officer College
2012 Squadron Officer School
2015 Masters of Business Administration, Strategic Management, Trident University

ASSIGNMENTS

July 2008 - Sept 2009 Student, Undergraduate Pilot Training, 47th Operations Support Squadron, Laughlin AFB, Texas
April 2010 - Mar 2013 T-38 Instructor Pilot/Standardization and Evaluation Liaison Officer, 87th FTS, Laughlin AFB, Texas
July 2013 - May 2014 Student, F-16 Basic Course, 310th Fighter Squadron, Luke AFB, Ariz.
July 2014 - Nov 2015 F-16 Pilot/Assistant Weapons Officer/Wing Electronic Combat Pilot, 51st OSS, Osan AB, ROK
Nov 2015 - Sept 2018 F-16 Evaluator Pilot/Maintenance Operations Flight Commander, 13th FS, Misawa AB, Japan
Sept 2018 - Present Thunderbird #8, Advance Pilot/ Narrator, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Pilot
Flight Hours: More than 2,300
Aircraft Flown: T-6, T-38, F-16C/D

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal
Air Force Commendation Medal with one oak leaf cluster

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	July 2007
First Lieutenant	July 2009
Captain	July 2011
Major	July 2017

Lt. Col. (Dr.) Noel Colls

Flight Surgeon

Lt. Col. (Dr.) Noel Colls is the Flight Surgeon for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 9, he provides primary medical care for a 130-person squadron, in addition to ensuring the health and fitness of eight demonstration pilots. Colls is on his third season with the team.

Colls received a direct commission through the Health Professions Scholarship program in 2003 prior to his matriculation into medical school at Texas Tech University Medical Center. He has logged more than 536 flight hours in 20 different aircraft, including more than 310 combat hours. Prior to joining the Thunderbirds, Colls served as a flight surgeon for the 389th and 391st Expeditionary Fighter Squadrons at Mountain Home Air Force Base, Idaho.



EDUCATION

1997 Bachelor of Science degree in Biology, Texas Tech University
2002 Masters of Science in Biology, Texas Tech Health Sciences Center
2008 Medical Doctorate, Texas Tech University Medical Center
2019 Operational Family Practice Residency, David Grant Medical Center

ASSIGNMENTS

Mar 2010 - Oct 2012 Flight Surgeon, 389th Fighter Squadron, Mountain Home Air Force Base, Idaho
Oct 2012 - Oct 2014 Flight Surgeon, 391st FS, Mountain Home AFB, Idaho
Oct 2014 - Jun 2016 Flight Commander, 82nd Aerospace Medicine Squadron Flight Medicine, Sheppard AFB, Texas
Jun 2016 - Jun 2019 Operational Family Practice Residency, David Grant Medical Center, Travis AFB, Calif.
Jun 2019 - Present Thunderbird #9, Flight Surgeon, USAF Air Demonstration Squadron, Nellis AFB, Nev.

FLIGHT INFORMATION

Rating: Senior Flight Surgeon

Flight Hours: More than 536

Combat hours: 310

Aircraft Flown: F-15E, F-16D, T-38A/C, C17A, CH47D, V22, KC10A, AC130W, HC130J, C0130H, C130J, UH60A, E7A, E3B, UH72A, QF4E, C12, T-6

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with one oak leaf cluster

Air Medal with one oak leaf cluster

Aerial Achievement Medal

Air Force Commendation Medal

Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	Apr 2003
Captain	May 2006
Major	May 2012
Lieutenant Colonel	May 2018

Capt. Katie E. Moorkamp

Executive Officer

Capt. Katie E. Moorkamp is the Executive Officer for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 10, she leads the executive support staff responsible for Thunderbirds' cyber and knowledge operations, budget, training and force support actions for the Commander/Leader. Moorkamp is in her second season on the team.

Moorkamp is a 2013 graduate of the USAF Academy. She has led personnel and services teams in various assignments in the United States as well as the Pacific theatre. Moorkamp was also the Installation Sexual Assault Response Coordinator for the 8th Fighter Wing at Kunsan Air Base, Republic of Korea. Prior to joining the Thunderbirds, Moorkamp was the Assistant Chief, Senior Leader Management, Headquarters Air Combat Command, Joint Base Langley-Eustis, Va.



EDUCATION

2013 Bachelor of Science degree in Foreign Area Studies, USAF Academy
2019 Master of Arts in Global Studies, Liberty University
2019 Squadron Officer School

ASSIGNMENTS

Jul 2013 - Aug 2014 Lodging Officer-in-Charge, 90th Force Support Squadron, F.E. Warren AFB, Wyo.
Aug 2014 - May 2015 Military Personnel Section Chief, 90th FSS, F.E. Warren AFB, Wyo.
May 2015 - Oct 2015 Manpower and Personnel Flight Commander, 90th FSS, F.E. Warren AFB, Wyo.
Oct 2015 - Jun 2016 Sustainment Services Flight Commander, 90th FSS, F.E. Warren AFB, Wyo.
Jun 2016 - Oct 2016 Readiness Chief, 8th FSS, Kunsan AB, ROK
Oct 2016 - Jun 2017 Installation Sexual Assault Response Coordinator, 8th FW, Kunsan AB, ROK
Jun 2017 - Apr 2019 Chief, Senior Leader Assignments, Air Combat Command, JB Langley-Eustis, Va.
Apr 2019 - Sep 2019 Assistant Chief, Senior Leader Management, Air Combat Command, JB Langley-Eustis, Va.
Sep 2019 - Present Thunderbird #10, Executive Officer, USAF Air Demonstration Squadron, Nellis AFB, Nev.

MAJOR AWARDS AND DECORATIONS

Air Force Commendation Medal with two oak leaf clusters
Joint Service Achievement Medal

EFFECTIVE DATES OF PROMOTION

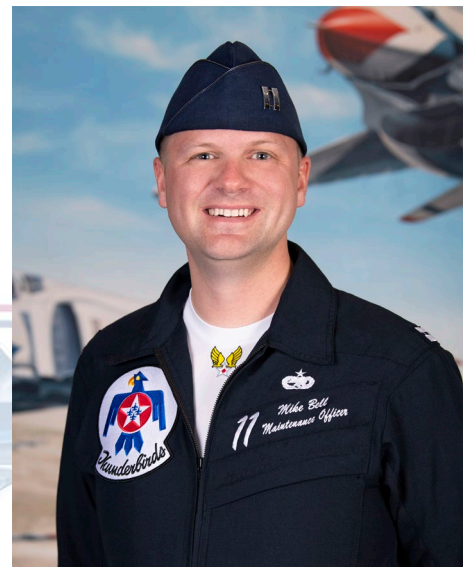
Second Lieutenant	May 2013
First Lieutenant	May 2015
Captain	May 2017

Capt. Michael W. Bell

Maintenance Officer

Capt. Michael Bell is the Maintenance Officer for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 11, he leads 90 personnel across 13 distinct logistics specialties to maintain the squadron's 13 assigned F-16 block-52 aircraft and associated support equipment. Bell is in his second season with the team.

Bell entered the Air Force in 2011 with a Reserve Officer Training Corps commission from Rutgers University. He is a Senior Aircraft Maintenance Officer with experience on F-15C/D/E, F-16CJ, F-22A and F-35A aircraft. Bell has led aircraft maintenance teams in the generation of 18,250 sorties. He has also served as the Executive Officer to the 35th Fighter Wing Commander. Bell has deployed multiple times to the Central Command area of operations in support of operations Enduring Freedom and Inherent Resolve. Prior to joining the Thunderbirds, Bell served as the Chief of Tactics for the 57th Maintenance Group, Nellis AFB, Nev.



EDUCATION

2011 Bachelor of Arts degree in Political Science, Rutgers University, Distinguished Graduate
2016 Squadron Officer School
2018 Advanced Maintenance and Munitions Operations School, Distinguished Graduate
2020 Master of Public Administration, Pennsylvania State University

ASSIGNMENTS

Feb 2012 - Sep 2012	Fabrication Flight Commander, 48th Equipment Maintenance Squadron, RAF Lakenheath, U.K.
Sep 2012 - Jun 2013	Assistant Officer-in-Charge, 494th Aircraft Maintenance Unit, RAF Lakenheath, U.K.
Jun 2013 - Mar 2014	Officer-in-Charge, 493rd Aircraft Maintenance Unit, RAF Lakenheath, U.K.
Mar 2014 - Nov 2014	Maintenance Flight Commander, 35th Maintenance Squadron, Misawa Air Base, Japan
Nov 2014 - Nov 2015	Officer-in-Charge, 35th Aircraft Maintenance Squadron, Misawa AB, Japan
Nov 2015 - Jan 2017	Officer-in-Charge, 35th AMS, Misawa AB, Japan
Jan 2017 - Sep 2017	Director of Operations, 379th Expeditionary Aircraft Maintenance Squadron, Central Command
Sep 2017 - Jul 2018	Executive Officer, 35rd Fighter Wing, Misawa AB, Japan
Jul 2018 - Dec 2019	Chief of Tactics, 57th Maintenance Group, Nellis AFB, Nev.
Dec 2019 - Present	Thunderbird #11, Maintenance Officer, USAF Air Demonstration Squadron, Nellis AFB, Nev.

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with one oak leaf cluster
Air Force Commendation Medal with one oak leaf cluster
Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	Aug 2011
First Lieutenant	Aug 2013
Captain	Aug 2015

Capt. Remoshay R. Nelson

Public Affairs Officer

Capt. Remoshay R. Nelson is the Public Affairs Officer for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. As Thunderbird 12, she leads the team's extensive marketing, publicity and community relations programs. Nelson is in her second season with the team.

Nelson entered the Air Force in 2011 with a Reserve Officer Training Corps commission from Howard University. She served as a diversity recruiter in the Gold Bar Program before completing the public affairs qualification course at Fort Meade, Md. Following training, she was assigned to the 436th Airlift Wing Public Affairs Office at Dover AFB, Del., as the chief of media operations. Nelson then served in public affairs assignments in Turkey, Botswana and various locations in Europe. Prior to joining the Thunderbirds, she was the Chief of Public Affairs, 8th Fighter Wing, Kunsan Air Base, Republic of Korea.



EDUCATION

2011 Bachelor of Science degree in Speech Communications, Howard University
2013 Public Affairs Qualification Course, Defense Information School
2014 Masters of Communication, University of Oklahoma
2016 Joint Intermediate Public Affairs Course, Defense Information School
2018 Squadron Officer School

ASSIGNMENTS

June 2011 - June 2012	AFROTC Gold Bar Recruiter, Northeast Region
July 2012 - Sept 2014	Chief of Media/Deputy Public Affairs Officer, 436th Airlift Wing, Dover AFB, Del.
Sept 2014 - Dec 2015	Chief of Public Affairs, 39th Air Base Wing, Incirlik AB, Turkey
Dec 2015 - June 2018	Public Affairs Planner, United States Air Forces in Europe and Africa
June 2018 - June 2019	Chief of Public Affairs, 8th Fighter Wing, Kunsan AB, ROK
June 2019 - Sept 2019	Public Affairs Officer, 57th Wing, Nellis AFB, Nev.
Sept 2019 - Present	Thunderbird #12, Public Affairs Officer, USAF Air Demonstration Squadron, Nellis AFB, Nev.

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with one oak leaf cluster
Air Force Commendation Medal one oak leaf cluster

EFFECTIVE DATES OF PROMOTION

Second Lieutenant	May 2011
First Lieutenant	May 2013
Captain	May 2015

CMSgt Tim T. Johnson

Chief Enlisted Manager

Chief Master Sgt. Tim T. Johnson is the Chief Enlisted Manager for the United States Air Force Air Demonstration Squadron, the Thunderbirds, Nellis Air Force Base, Nev. He advises the commander on the squadron's health, morale, and welfare of assigned Airmen while guiding their career development. He also communicates concerns and issues of the enlisted force and ensures the commander's policies are known. Johnson is in his third season with the team.

Johnson entered the Air Force in March 1993 and attended technical training at Lowry AFB, Colo. as an Aircraft Armament Systems Technician. He has served in various duties in the Armament career field while stationed in Arizona, Japan, Korea, Nevada, and South Carolina. Johnson has deployed to Afghanistan in support of Operation Enduring Freedom. Prior to joining the team, he was Interim Maintenance Group Superintendent, Misawa Air Base, Japan.



EDUCATION

1997 Airman Leadership School
 2001 Associate in Applied Science, Aircraft Armament Technology, Community College of the Air Force
 2003 Noncommissioned Officers Academy
 2005 Senior Noncommissioned Officers Academy
 2010 Senior Enlisted Joint Professional Military Education Course
 2011 Senior Noncommissioned Officers Academy
 2014 Advanced Maintenance Superintendent Course
 2016 Bachelor of Science degree in Human Resource Management, Columbia Southern University
 2017 Contingency Wartime Planning Course
 2017 Senior Enlisted Joint Professional Military Education Course II

ASSIGNMENTS

Mar 1993 - May 1993	Trainee, Basic Military Training School, Joint Base San Antonio-Lackland AFB, Texas
May 1993 - July 1993	Student, Armament Systems Technician, Lowry Air Force Base, Colo.
Aug 1993 - Aug 1994	Load Crew Member, Kunsan AB, Republic of Korea
Aug 1994 - Sept 2000	Combat Armament Support Team Member/Squadron Lead Crew Member/SLC Chief, Luke AFB, Ariz.
Sept 2000 - Apr 2007	LC Chief/SLC Chief/Load Standardization Crew Member/NCOIC, Weapons Loading, Shaw AFB, S.C.
May 2007 - May 2008	Racks, Adapters and Pylons War Reserve Manager, Osan AB, Republic of Korea
June 2008 - June 2011	HH-60 Weapons Section Chief/Production Superintendent, Kadena AB, Japan
July 2011 - Feb 2013	Assistant Superintendent Thunder Aircraft Maintenance Unit, Nellis AFB, Nev.
Feb 2013 - Dec 2014	Weapons Standardization Superintendent, Nellis AFB, Nev.
Dec 2014 - Feb 2016	Wing Weapons Manager, Nellis AFB, Nev.
Mar 2016 - July 2016	(Interim) Maintenance Group Superintendent, Nellis AFB, Nev.
July 2016 - Oct 2018	Wing Weapons Manager, Misawa AB, Japan
Feb 2018 - June 2018	(Interim) Maintenance Group Superintendent, Misawa AB, Japan
Oct 2018 - Present	Chief Enlisted Manager, USAF Air Demonstration Squadron, Nellis AFB, Nev.

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with four oak leaf clusters
 Air Force Commendation Medal with one oak leaf cluster
 Air Force Achievement Medal

EFFECTIVE DATES OF PROMOTION

Airman Basic	Mar 1993
Airman	Sept 1993
Airman First Class	July 1994
Senior Airman	Mar 1996
Staff Sergeant	June 1999
Technical Sergeant	July 2002
Master Sergeant	June 2006
Senior Master Sergeant	Aug 2011
Chief Master Sergeant	May 2015

MSgt Sandra A. Santana

First Sergeant

Sandra A. Santana is the First Sergeant, United States Air Force Demonstration Squadron, Nellis Air Force, Nevada. She serves as the commander's advisor on matters concerning morale, welfare, enlisted career progression and mission readiness. She enforces policies and ensures all support agencies are responsive to the needs of unit personnel and their families. Santana is in her second season with the team.



Santana enlisted in the Air Force in 2001 and after basic military training, she graduated as an Aircrew Life Support technician at Sheppard Air Force Base, Texas. She later retrained to be a Special Missions Flight Attendant in 2010. Her assignment background includes various duties as Aircrew Flight Equipment Craftsman and several Flight Attendant duties at the Squadron level while working directly with Headquarters Air and Education Training Command and Headquarters Air Mobility Command as the subject matter expert. Prior to joining the Thunderbirds, she served as the First Sergeant, 11th Medical Operations Squadron, Joint Base Andrews, Md.

EDUCATION

2005 Airman Leadership School
 2012 Associate in Applied Science, Aircrew Safety Systems Technology, Community College of the Air Force
 2012 Associate in Applied Science, Aviation Operations, Community College of the Air Force
 2013 Noncommissioned Officer Academy
 2013 Senior Enlisted Joint Professional Military Education Course, by correspondence
 2016 Basic Instructor Course
 2016 Senior Noncommissioned Officer Academy, by correspondence
 2018 Professional Manager Certification, Community College of the Air Force

ASSIGNMENTS

July 2001 - Aug 2001	Student, Basic Military Training, Lackland Air Force Base, Texas
Aug 2001 - Oct 2001	Student, Technical Training School, Sheppard AFB, Texas
Nov 2001 - Feb 2005	Aircrew Life Support Apprentice, 62nd Fighter Squadron, Luke AFB, Ariz.
Mar 2005 - Mar 2006	Aircrew Life Support Journeyman, 25th FS, Osan Air Base, Republic of Korea
Mar 2006 - Apr 2009	Aircrew Flight Equipment Craftsman, 76th Airlift Squadron, Ramstein AFB, Germany
May 2009 - May 2010	Aircrew Flight Equipment Craftsman, 58 Operations Support Squadron, Kirtland AFB, N.M.
May 2010 - July 2010	Student, Technical Training School, Medina Annex, Joint Base San Antonio, Texas
Oct 2010 - Jan 2012	Special Missions Flight Attendant, 1st Airlift Squadron, Joint Base Andrews, Md.
Jan 2012 - May 2014	Special Missions Flight Attendant Instructor, 1st Airlift Squadron, Joint Base Andrews, Md.
May 2014 - Mar 2017	Special Missions Flight Attendant Evaluator, 1st AS, JB Andrews, Md.
Mar 2017 - Apr 2018	Assistant Flight Chief, Operations, 1st Airlift Squadron, Joint Base Andrews, Md.
April 2018 - Mar 2019	Flight Attendant Flight Chief, 99th Airlift Squadron, Joint Base Andrews, Md.
April 2019 - Nov 2019	First Sergeant, 11th Medical Operations Squadron, Joint Base Andrews, Md.
Nov 2019 - Present	First Sergeant, USAF Air Demonstration Squadron, Nellis Air Force Base, Nev.

MAJOR AWARDS AND DECORATIONS

Meritorious Service Medal with two oak leaf clusters
 Aerial Achievement Medal with oak leaf cluster
 Air Force Commendation Medal with oak leaf cluster
 Air Force Achievement Medal with two oak leaf clusters

EFFECTIVE DATES OF PROMOTION

Airman Basic	July 2001
Airman	Jan 2002
Airman First Class	Nov 2002
Senior Airman	July 2004
Staff Sergeant	Jan 2007
Technical Sergeant	Feb 2012
Master Sergeant	Dec 2016

2021 Show Schedule

February 14: Daytona Beach, Florida – “Daytona 500”

March 7: Las Vegas, Nevada – “Las Vegas Motor Speedway Flyover”

April 17-18: Cocoa Beach, Florida – “Cocoa Beach Air Show”

May 1-2: St. Joseph, Missouri – “Sound of Speed Airshow & 139AW Open House”

May 8-9: Barksdale AFB, Louisiana – “Defenders of Liberty Air & Space Show”

May 26: Colorado Springs, Colorado – “USAFA Graduation 2021 Flyover”

May 30-31: Wantagh, New York – “Bethpage Airshow at Jones Beach”

June 5-6: Smyrna, Tennessee – “The Great Tennessee Air Show”

June 12-13: Fairchild AFB, Washington – “Inland Northwest Skyfest 2021”

June 19-20: Ocean City, Maryland – “OC Air Show”

July 3-4: Traverse City, Michigan – “National Cherry Festival Air Show”

July 10-11: Dayton, Ohio – “Dayton Air Show”

July 17-18: Binghamton, New York – “Greater Binghamton Air Show”

July 24-25: Milwaukee, Wisconsin – “Milwaukee Air & Water Show”

July 28: F.E. Warren AFB, Wyoming – “Cheyenne Frontier Days”

July 31-August 1: McMinnville, Oregon – “Oregon International Air Show”

August 18: Atlantic City, New Jersey – “Thunder Over The Boardwalk Air Show”

September 4-6: Cleveland, Ohio – “Cleveland National Air Show”

September 11-12: Portsmouth, New Hampshire – “Pease Open House”

September 18-19: Reno, Nevada – “National Championship Air Races”

September 25-26: Mather, California – “California Capital Air Show”

October 2-3: San Juan, Puerto Rico – “2021 Puerto Rico International Air Show”

October 9-10: Houston, Texas – “Wings Over Houston Air Show”

October 16-17: Sanford, Florida – “Central Florida Air & Space Show”

October 23-24: Lancaster, California – “Los Angeles County Air Show”

October 30-31: Salinas, California – “California International Air Show”

November 6-7: Davis-Monthan AFB, Arizona – “Thunder and Lightning over Arizona”

2022 Show Schedule



March 19-20: Luke AFB, Arizona – “Luke Days Air & Space Expo”
March 26-27: Columbus AFB, Mississippi – “Wings Over Columbus”
April 2-3: Shaw AFB, South Carolina – “Thunder Over the Midlands”
April 9-10: Lakeland, Florida – “SUN ‘n FUN Aerospace Expo”
April 23-34: JB San Antonio-Randolph, Texas – “JBSA Kelly Field Air & Space Show”
April 30-May 1: Fort Lauderdale, Florida – “Fort Lauderdale Air Show”
May 14-15: March ARB, California – “March Field Air & Space Expo”
May 25: Colorado Springs, Colorado – “USAFA Graduation 2022 Flyover”
June 4-5: Fort Wayne, Indiana – “Fort Wayne Open House & Air Show”
June 11-12: Ocean City, Maryland – “OC Air Show”
June 18-19: Grand Forks AFB, North Dakota – “Grand Forks AFB Air Show”
June 25-26: Hill AFB, Utah – “Warriors Over the Wasatch Air & Space Show”
July 2-3: Battle Creek, Michigan – “Field of Flight Air Show & Balloon Festival”
July 16-17: Duluth, Minnesota – “Duluth Air and Aviation Expo”
July 23-24: Great Falls, Montana – “Fight Over the Falls”
July 27: Cheyenne, Wyoming – “Cheyenne Frontier Days”
July 30-31: JB Elmendorf-Richardson, Alaska – “Arctic Thunder Air Show”
August 20-21: Chicago, Illinois – “Chicago Air & Water Show”
August 24: Atlantic City, New Jersey – “Atlantic City Air Show”
August 27-28: Avoca, Pennsylvania – “Scranton Armed Forces Air Show”
September 3-4: New Century, Kansas – “KC Air Show”
September 10-11: Baltimore, Maryland – “Maryland Fleet Week & Air Show Baltimore”
September 17-18: JB Andrews, Maryland – “JB Andrews Air Show”
September 24-25: McConnell AFB, Kansas – “Frontiers in Flight Open House & Air Show”
October 1-2: Huntington Beach, California – “The Great Pacific Air Show”
October 15-16: Edwards AFB, California – “Aerospace Valley Air Show”
October 22-23: Fort Worth, Texas – “Bell Fort Worth Alliance Air Show”
October 29-30: Sanford, Florida – “Central Florida Air & Space Show”
November 5-6: Nellis AFB, Nevada – “Aviation Nation Air Show”



USAF Air Demonstration Squadron (Thunderbirds)

2021 FAA Maneuver Package





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

MEMORANDUM FOR FAA Representatives

FROM: USAFADS/CC

SUBJECT: 2021 Thunderbirds Maneuver Package

1. This United States Air Force Air Demonstration Squadron (Thunderbirds) maneuver package provides you with a pictorial display of demonstration maneuvers used by the Thunderbirds.


2. The Thunderbirds have three show types 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'). Transitions between show types and maneuvers occur on occasion if weather or other conditions prohibit safe execution of a given maneuver. Additionally, in the interest of pilot and public safety, show-site conditions, hazards within the TFR, and weather may drive resequencing of maneuvers or truncation of show sequence.

3. The Department of Defense accepts full responsibility for the operation of Thunderbird demonstration maneuvers as described herein. Colonel John Caldwell, Commander/Leader, USAF Air Demonstration Squadron, is the designated representative for the Department of Defense for the execution of these maneuvers and prioritizes safety over visual appeal or presentation.

4. Thunderbird maneuvering airspace and minimum dimensions for an aerobatic box are depicted in section IV. The team will review and approve modification or truncation to the aerobatic box on a case-by-case basis. FAA guidelines currently permit non-aerobatic passes to 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 may descend from 500' to be at their minimums at 1NM from show center, even over occupied buildings. All maneuvers can transition to a flat pass if conditions dictate.

5. The Thunderbirds may fly a demonstration with less than six aircraft. Fallout of the left and right solos is depicted in the maneuvers package as 5-ship shows; any other fallout scenarios will result in an incomplete diamond with or without solos as part of the formation. The Thunderbirds will occasionally fly a seventh aircraft during practice demonstrations and site surveys in a photo-chase profile. This aircraft will be flown by Thunderbirds 7 or 8 upon completion of syllabus-directed training. If the seventh aircraft is a 2-seat F-16, only a designated Thunderbird team member will occupy the rear cockpit. The photo-chase aircraft will maneuver as required to achieve the desired photographic position relative to the diamond, solos, or delta. The same rules and regulations governing the 6-ship within the TFR and aerobatic box also apply to the seventh aircraft. The photo chase aircraft will never fly during an official demonstration.

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


JOHN D. CALDWELL, Col, USAF
Commander/Leader

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2021 6-SHIP SHOW (29 Jan 2020)

HIGH SHOW	LOW SHOW	FLAT SHOW
Diamond Takeoff / Loop on Takeoff	Low Transition Formation Takeoff	Low Transition Formation Takeoff
(LS) Roll on Takeoff	(LS) Roll on Takeoff	(LS) Roll on Takeoff
(RS) Max Climb / Split S	(RS) Max Climb / Split S	(RS) Low Trans Takeoff
Diamond Cloverloop Opener ↗⇐	Low Opener ↗⇐	Flat Opener ↗⇐
Crossover Break ↔	Crossover Break ↔	Crossover Break ↔
Diamond PIR ⇐	Diamond PIR ⇐	Diamond PIR ⇐
(RS) Knife Edge →	(RS) Knife Edge →	(RS) Knife Edge →
Diamond Roll ⇒	Diamond Roll ⇒	Diamond Flat Pass ⇒
Calypso Pass ←	Calypso Pass ←	Calypso Pass ←
Echelon Pass in Review ⇒	Echelon Pass in Review ⇒	Echelon Pass in Review ⇒
(LS) Sneak Pass →	(LS) Sneak Pass →	(LS) Sneak Pass →
(RS) Slow Roll →	(RS) Slow Roll →	(RS) Slow Roll →
(LS) Aileron Rolls ←	(LS) Aileron Rolls ←	(LS) Aileron Rolls ←
Bon Ton Roulle ⇐	Bon Ton Roulle ⇐	Bon Ton Roulle ⇐
Opposing Knife Edge ↗⇐	Opposing Knife Edge ↗⇐	Opposing Knife Edge ↗⇐
Trail to Diamond BUP ⇒	Trail to Diamond BUP ⇒	Trail to Diamond BUP ⇒
Opposing Inverted ↗⇐	Opposing Inverted ↗⇐	Opposing Inverted ↗⇐
Trail to Diamond Cloverloop ↘⇐	High Low Hit ⇐	High Low Hit ⇐
(RS) Rejoin to Stinger ←	(RS) Rejoin to Stinger ←	(RS) Rejoin to Stinger ←
Low Bomb Burst ↘	Low Bomb Burst ↘	Low Bomb Burst ↘
(RS) Rejoin to Stinger (via sneak) ↑	(RS) Rejoin to Stinger (via sneak) ↑	(RS) Rejoin to Stinger (via sneak) ↑
(LS) High Alpha / Muscle Climb ←	(LS) High Alpha / Muscle Climb ←	(LS) High Alpha / Muscle Climb ←
5-Card Loop ⇐	5-Card Flat Pass (over crowd) ⇐	5-Card Flat Pass (over crowd) ⇐
(LS) Vertical Rolls →	8-Point Roll →	(LS) 8-Point Roll →
Line Break Loop ⇒	Stinger Break Cross ⇒	Stinger Break Cross ⇒
(LS) Max Turn, 1/2 Cuban →	(LS) Max Turn, 1/2 Cuban →	(LS) Max Turn →
Diamond 360 ↗	Diamond 360 ↗	Diamond 360 ↗
Solo Rejoin to Delta ↗	Solo Rejoin to Delta ↗	Solo Rejoin to Delta ↗
Delta BUP ⇐	Delta BUP ⇐	Delta BUP ⇐
Delta Roll ⇒	Delta Roll ⇒	Delta Flat Pass ⇒
Delta Loop ⇐	Delta 360 ⇐	Delta 360 ⇐
Delta Burst ↘	Delta Burst ↘	Delta Burst ↘
Opposing Split S ↗⇐	Opposing Split S / 4-Point ↗⇐	Opposing 4 Point ↗⇐
High Bomb Burst ⇒	Rapid Recovery ↗	Rapid Recovery ↗
Thunderbird Pitch ⇐	Thunderbird St-In	Thunderbird St-In
Reflection Pitch (Reflection Pass) ←	Solo St-In	Solo St-In

2021 5-SHIP SHOW (29 Jan 2020)

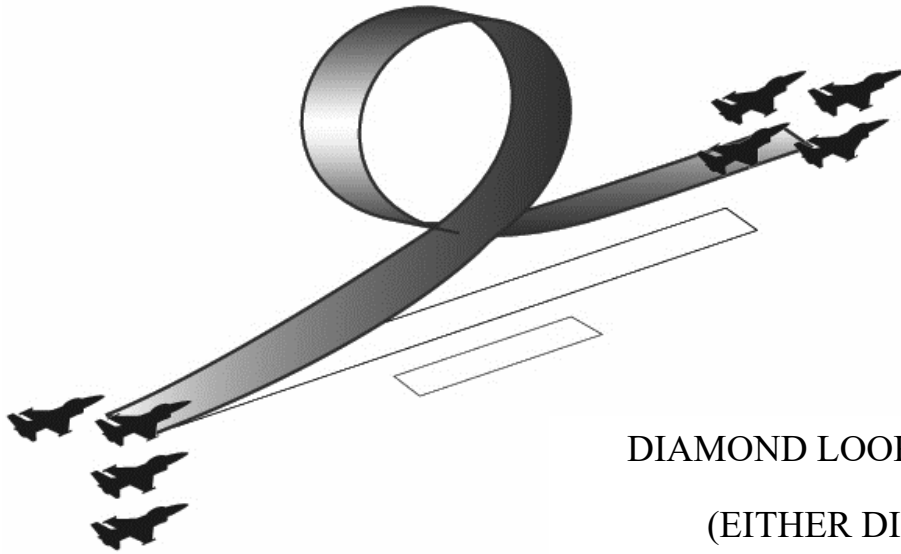
HIGH SHOW

LOW SHOW

FLAT SHOW

Diamond Takeoff / Loop on Takeoff		Low Transition Formation Takeoff		Low Transition Formation Takeoff	
(LS) Roll on Takeoff	(RS) Max Climb / Split S	(LS) Roll on Takeoff	(RS) Max Climb / Split S	(LS) Roll on Takeoff	(RS) Low Trans Takeoff
Diamond Cloverloop Opener	↗⇐	Low Opener	↗⇐	Flat Opener	↗⇐
Max Climb	↑	Immelmann	↑	Left Pitchback	↑
Diamond PIR	⇐	Diamond PIR	⇐	Diamond PIR	⇐
Knife Edge	→	Knife Edge	→	Knife Edge	→
Diamond Roll	⇒	Diamond Roll	⇒	Diamond Flat Pass	⇒
4-Point Roll	←	4-Point Roll	←	4-Point Roll	←
Echelon Pass in Review	⇒	Echelon Pass in Review	⇒	Echelon Pass in Review	⇒
Sneak Pass	→	Sneak Pass	→	Sneak Pass	→
Aileron Rolls	←	Aileron Rolls	←	Aileron Rolls	←
Bon Ton Roulle	⇐	Bon Ton Roulle	⇐	Bon Ton Roulle	⇐
Inverted	→	Inverted to Inverted	→	Inverted to Inverted	→
Trail to Diamond BUP	⇒	Trail to Diamond BUP	⇒	Trail to Diamond BUP	⇒
Inverted to Inverted	←	Repo for High Low Hit		Repo for High Low Hit	
Trail to Diamond Cloverloop	↘⇐	High Low Pass	⇐	High Low Pass	⇐
Rejoin to Stinger	↑	Rejoin to Stinger	↑	Rejoin to Stinger	↑
Low Bomb Burst	↘	Low Bomb Burst	↘	Low Bomb Burst	↘
(LS) High Alpha / Muscle ←	(RS) Slow Roll ←	(LS) High Alpha / Muscle ←	(RS) Slow Roll ←	(LS) High Alpha / Muscle ←	(RS) Slow Roll ←
4-Card Loop	⇐	4-Card Flat Pass	⇐	4-Card Flat Pass	⇐
Vertical Rolls	→	8-Point Roll	→	8-Point Roll	→
Slot Break Cross	⇒	Slot Break Cross	⇒	Slot Break Cross	⇒
Max Turn, 1/2 Cuban	→	Max Turn, 1/2 Cuban	→	Max Turn	→
Diamond 360	↻	Diamond 360	↻	Diamond 360	↻
Solo Rejoin to Stinger	↻	Solo Rejoin to Stinger	↻	Solo Rejoin to Stinger	↻
Stinger BUP	⇐	Stinger BUP	⇐	Stinger BUP	⇐
Stinger Roll	⇒	Stinger Roll	⇒	Stinger Flat Pass	⇒
Stinger Loop	⇐	Stinger 360	⇐	Stinger 360	⇐
Wedge Burst	↘	Wedge Burst	↘	Wedge Burst	↘
High Bomb Burst	⇒	Inverted	→ or ←	Inverted	→ or ←
High Bomb Burst RJ	⇐	Rapid Recovery	↻	Rapid Recovery	↻
Thunderbird Pitch	⇐	Thunderbird St-In		Thunderbird St-In	
ARPU	←	Solo St-In		Solo St-In	

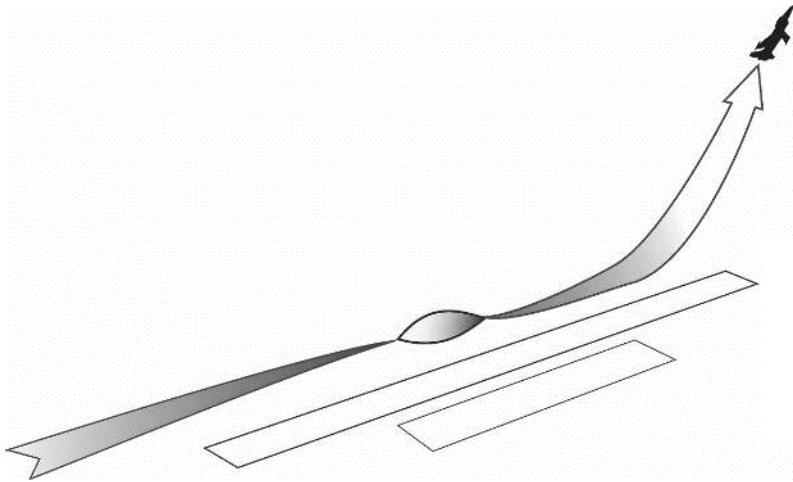
Maneuver Graphics



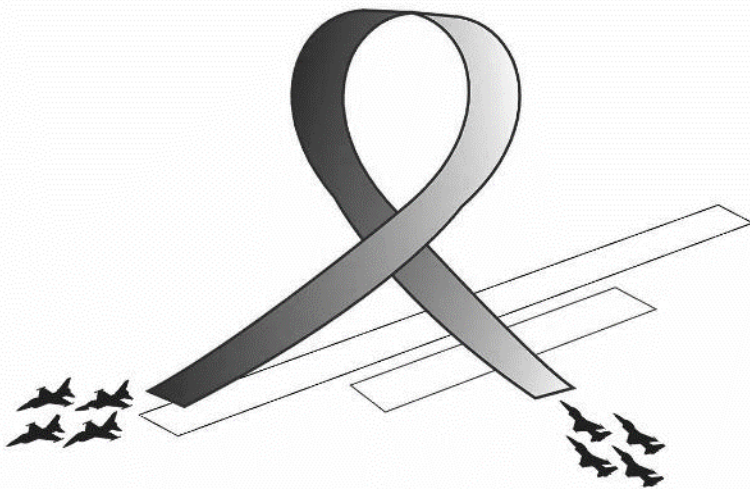
DIAMOND LOOP ON TAKEOFF
(EITHER DIRECTION)



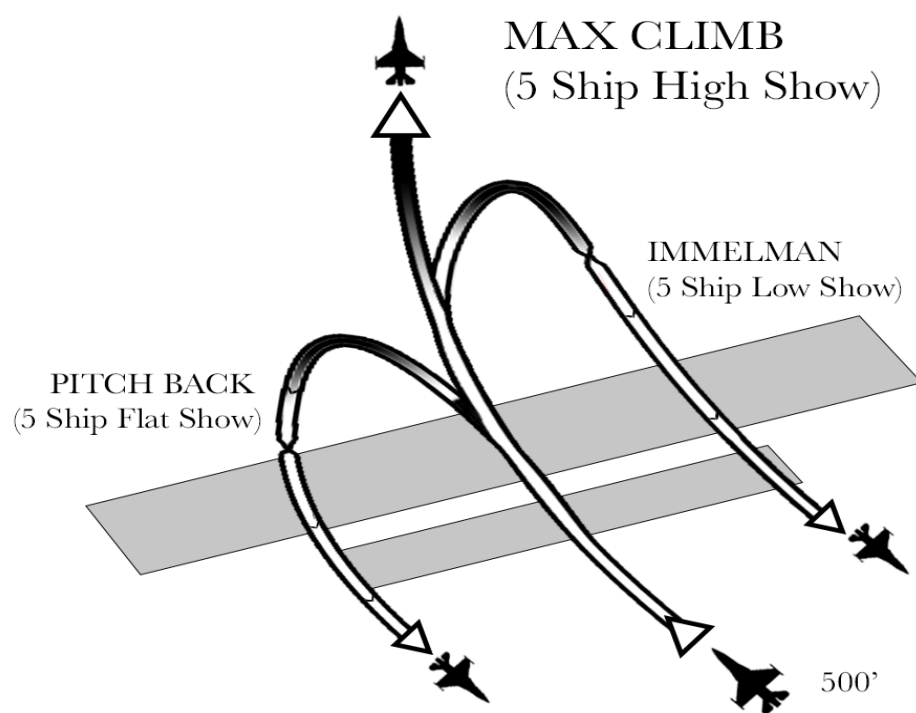
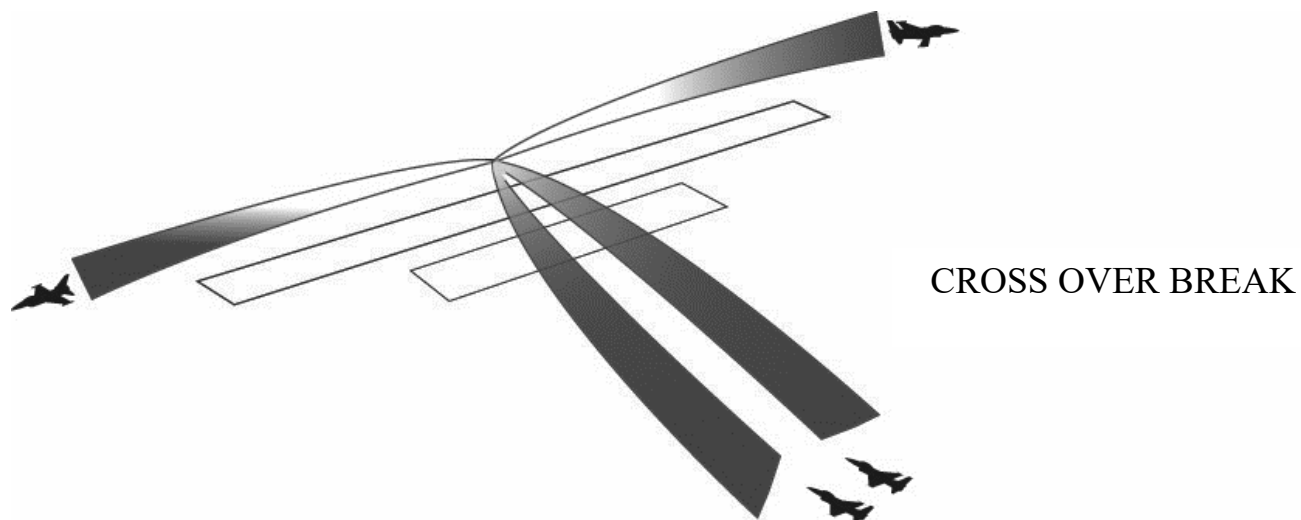
MAX CLIMB WITH
SPLIT-S ON TAKEOFF
(EITHER DIRECTION)

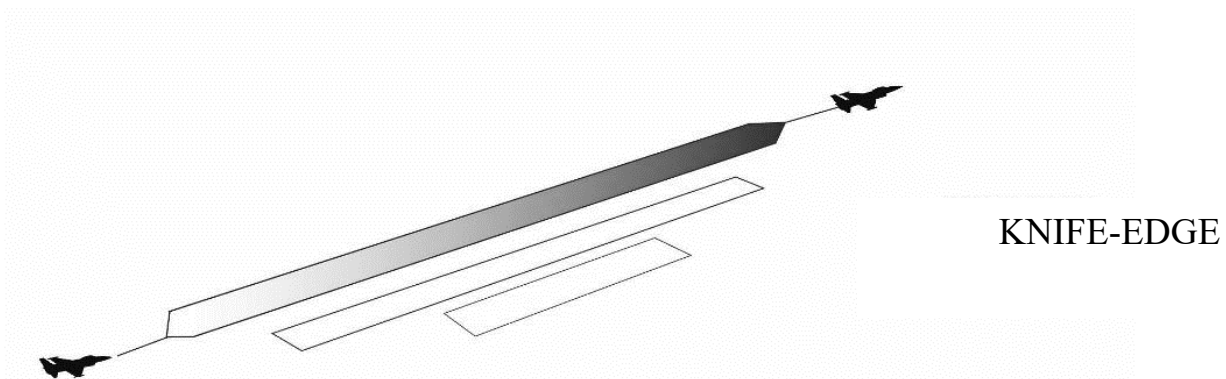
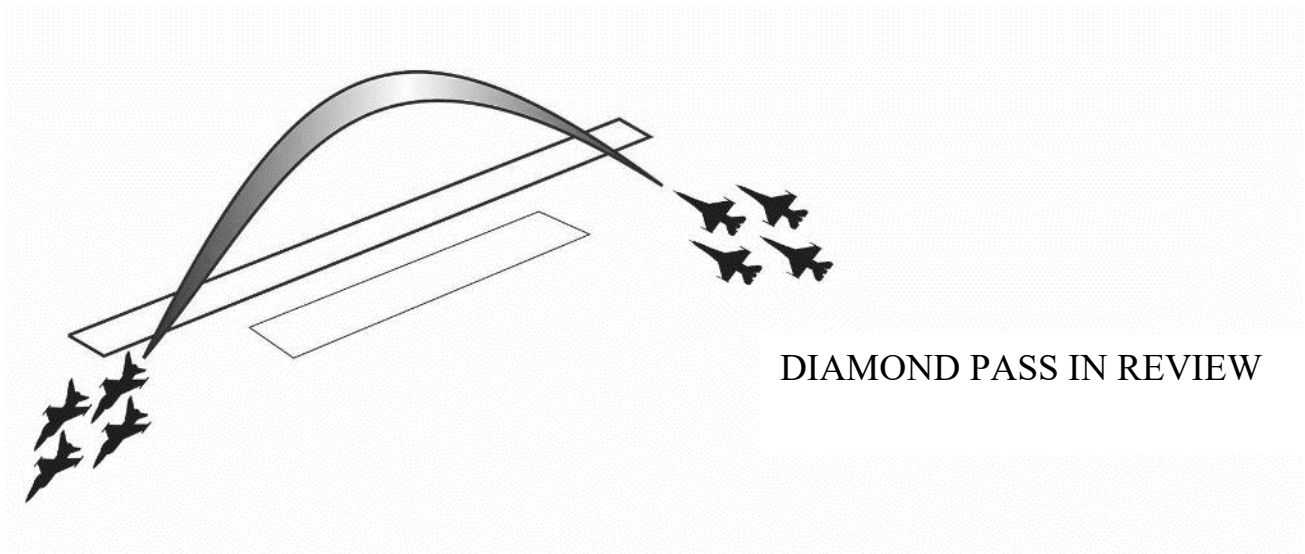


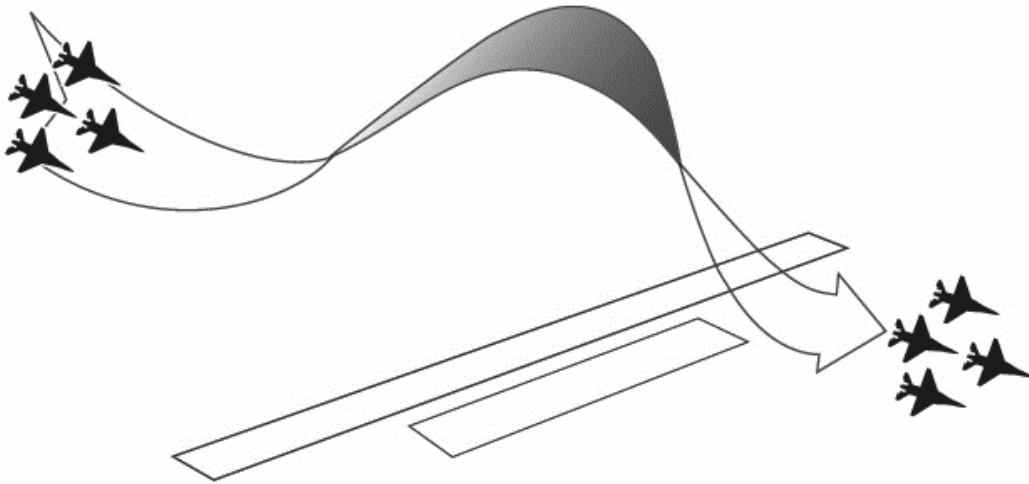
SOLO ROLL ON TAKEOFF
(EITHER DIRECTION)



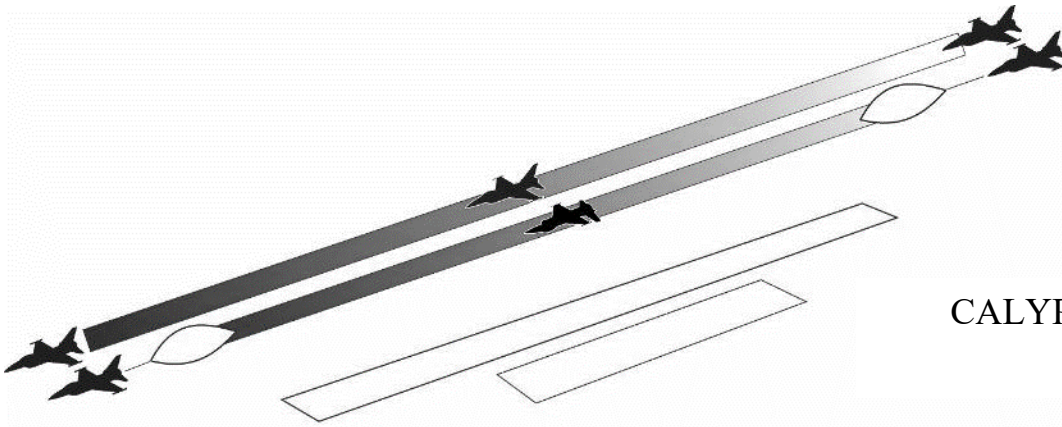
CLOVERLOOP
OPENER



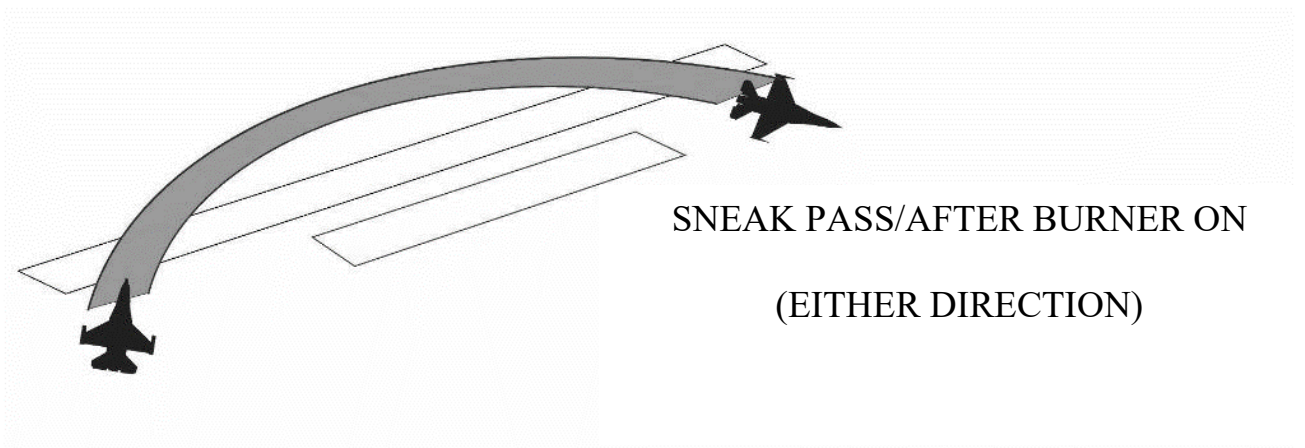
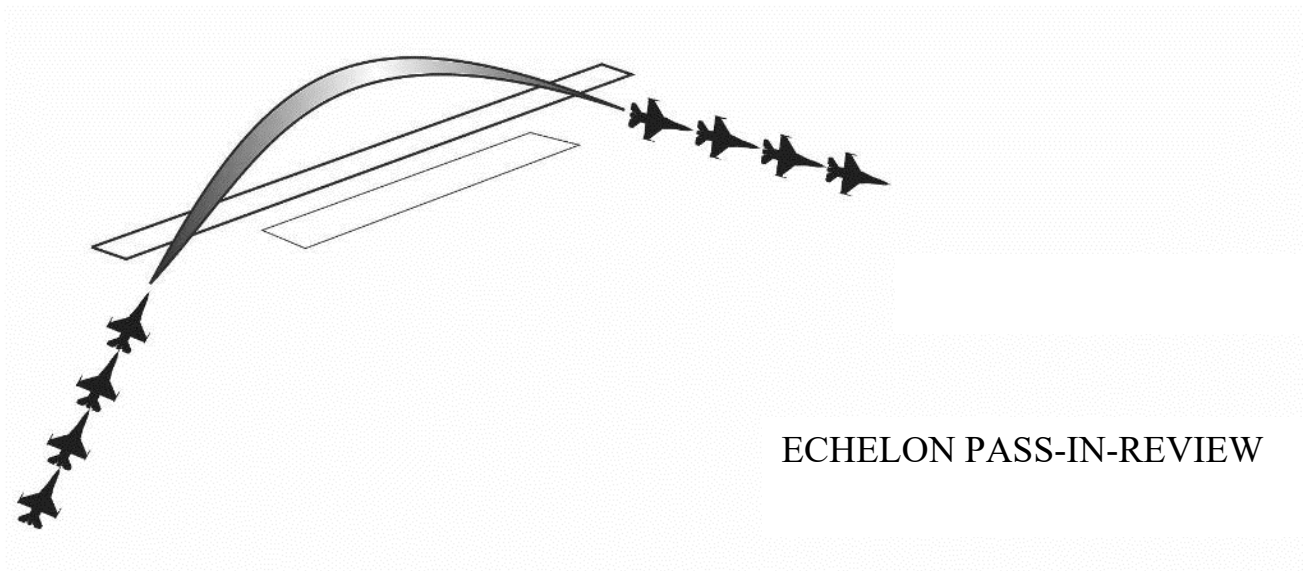


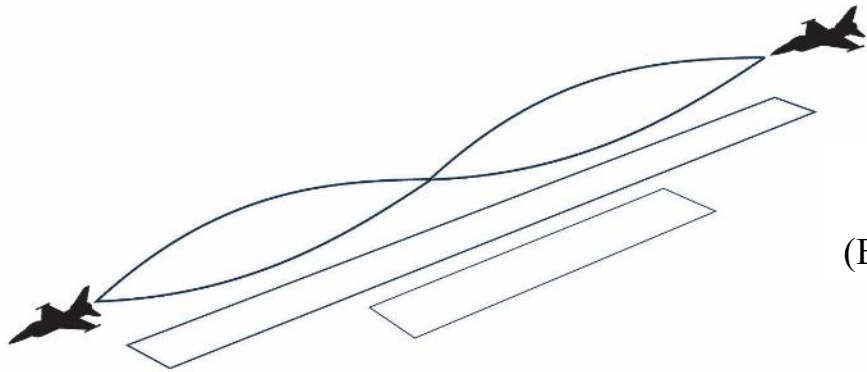


DIAMOND ROLL

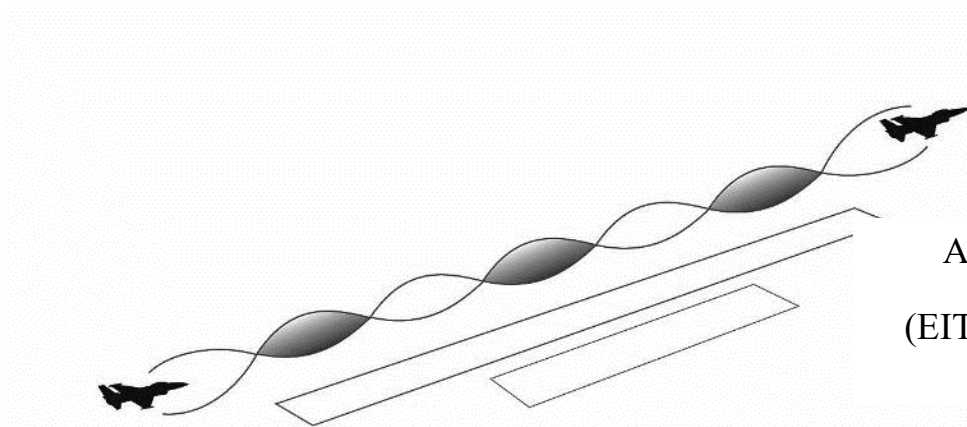


CALYPSO PASS

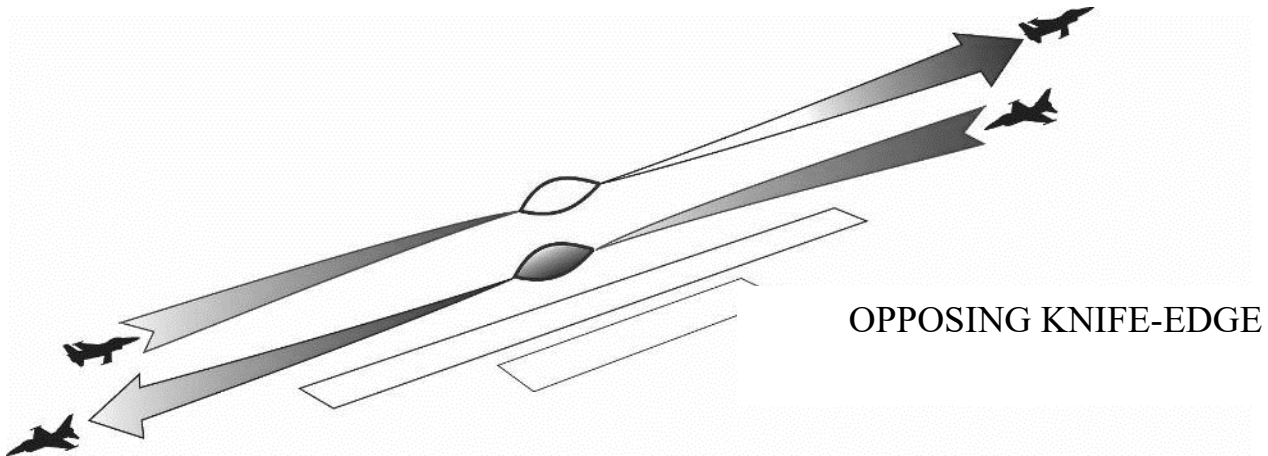
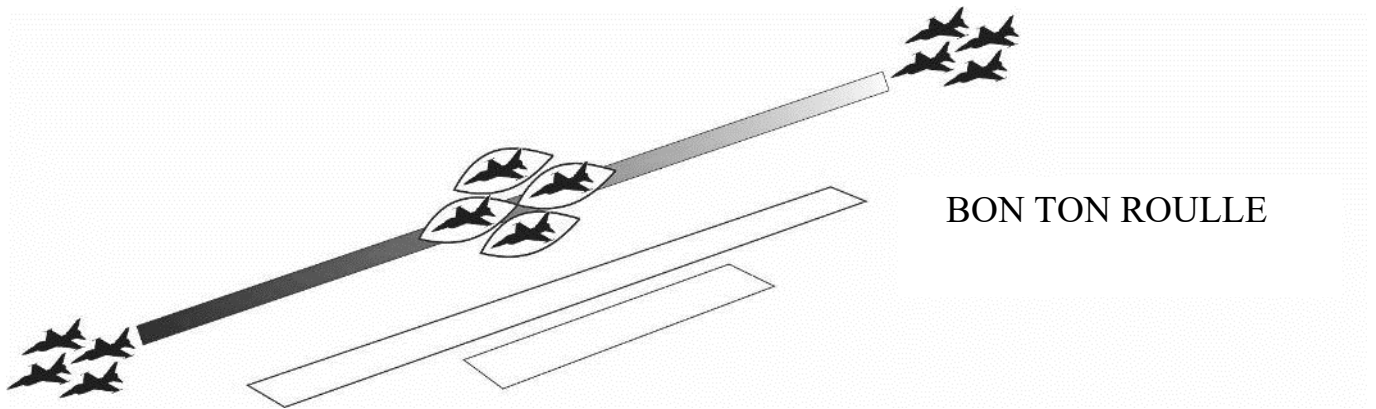


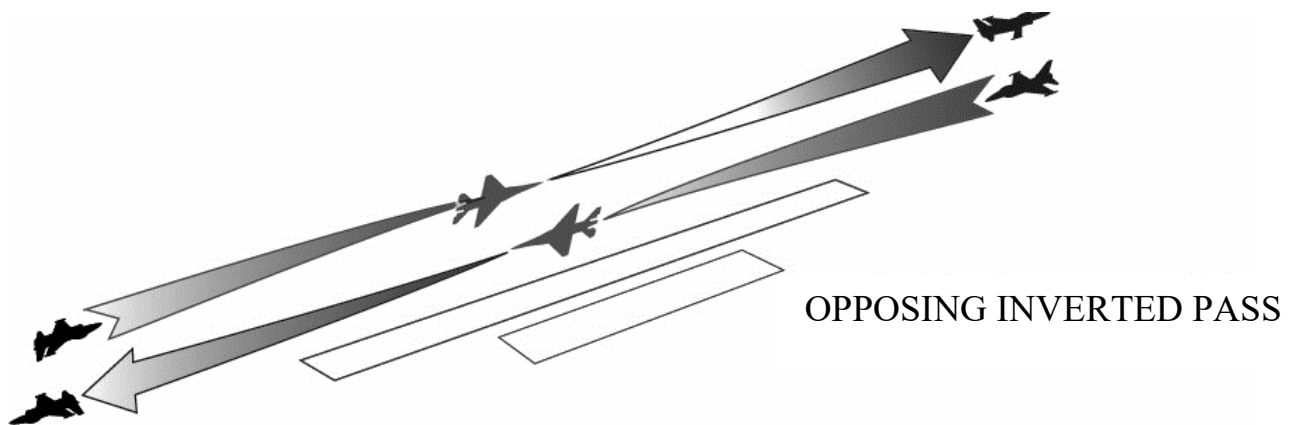


SLOW ROLL
(EITHER DIRECTION)

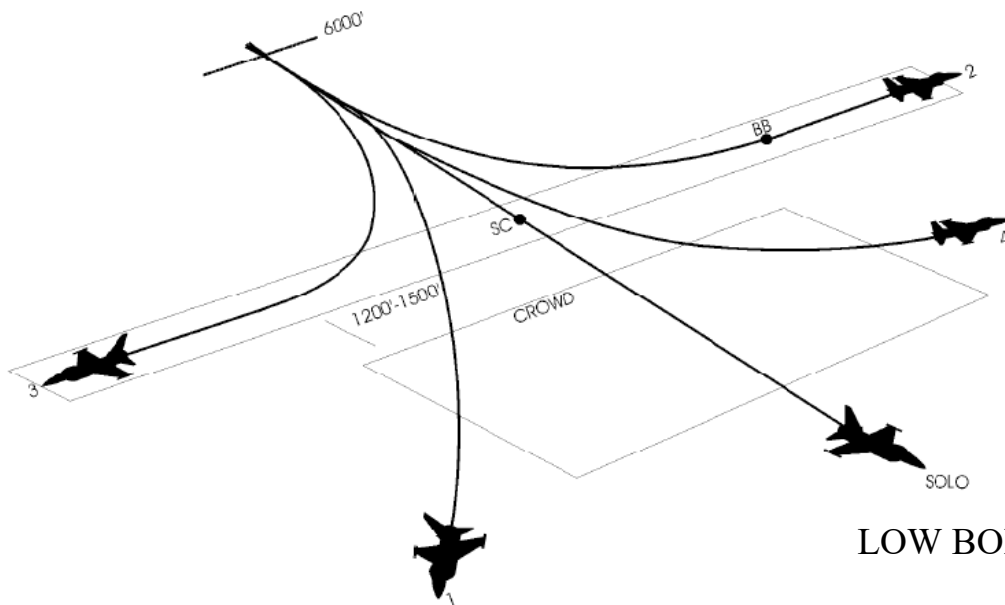
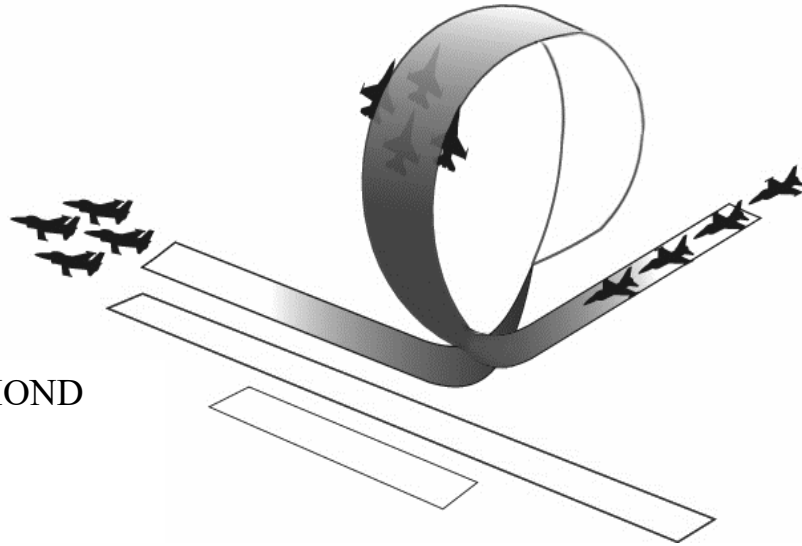


AILERON ROLLS
(EITHER DIRECTION)

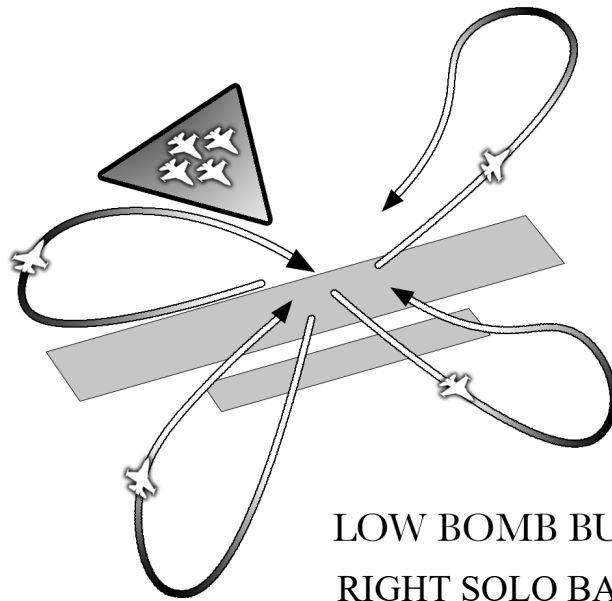




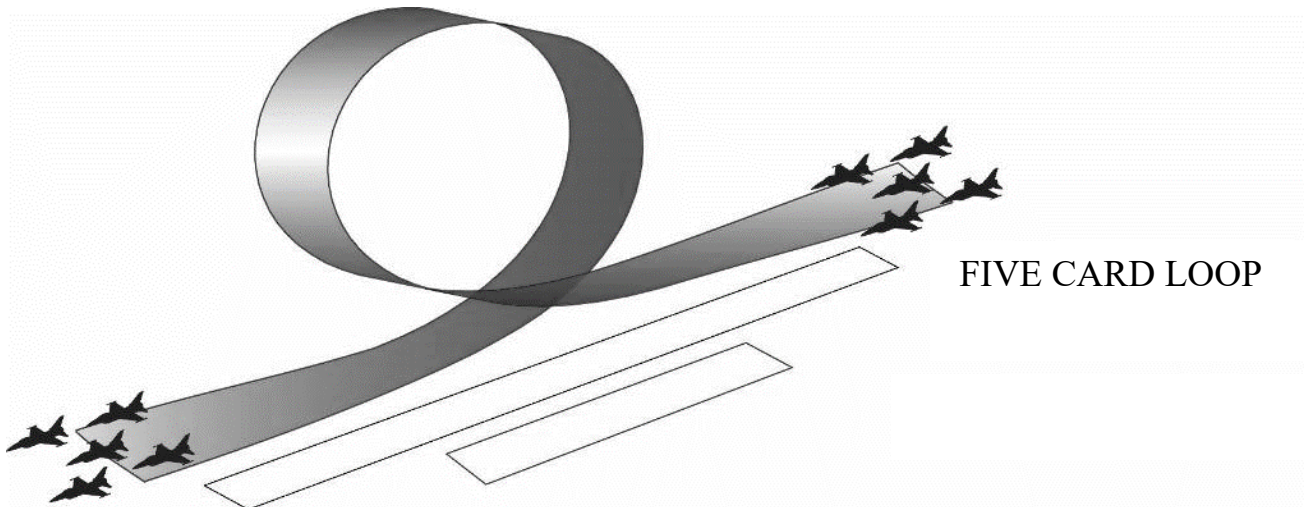
TRAIL-TO-DIAMOND
CLOVERLOOP



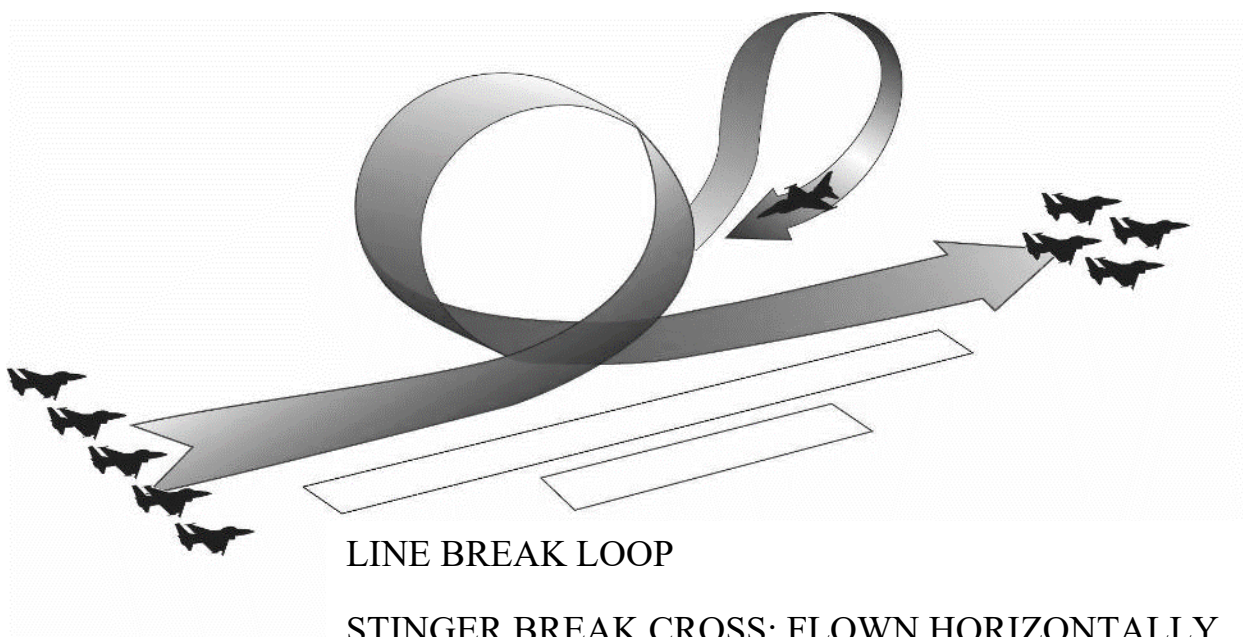
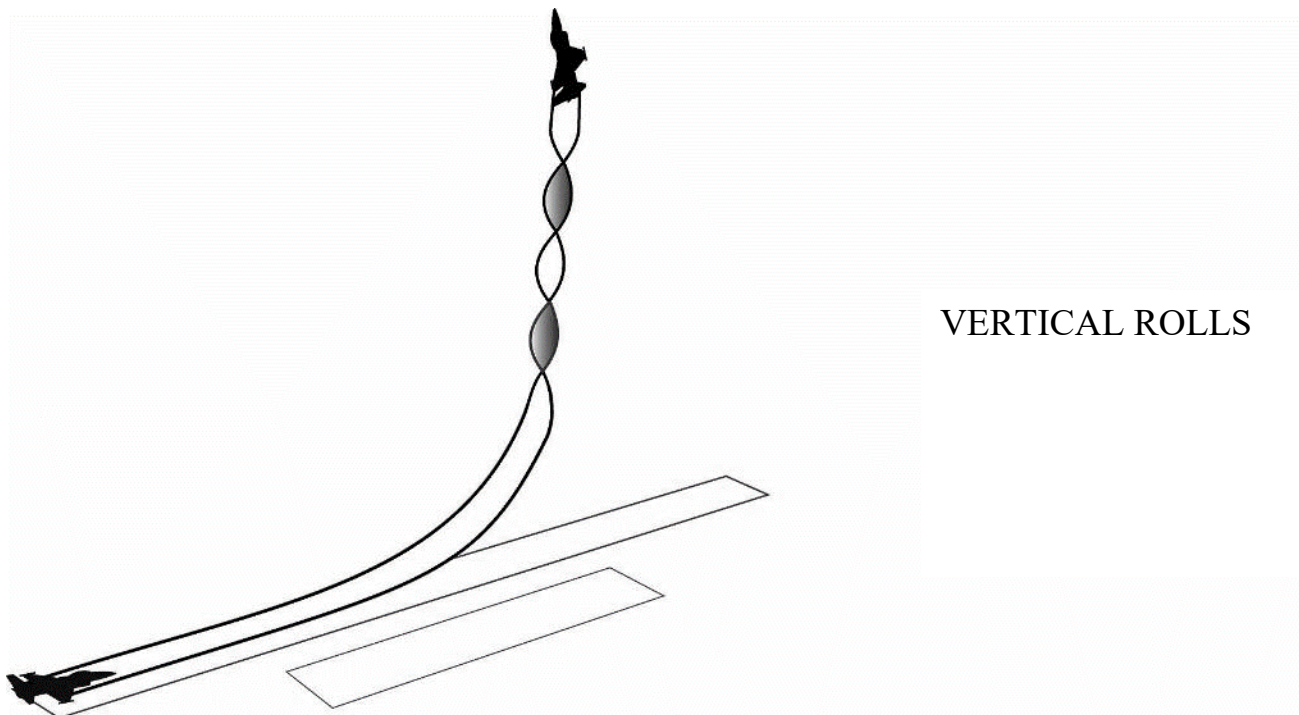
LOW BOMB BURST



LOW BOMB BURST CROSS
 RIGHT SOLO BACK-TO-FRONT SNEAK
 HIT TO REJOIN (ALL 6-SHIP SHOWS)

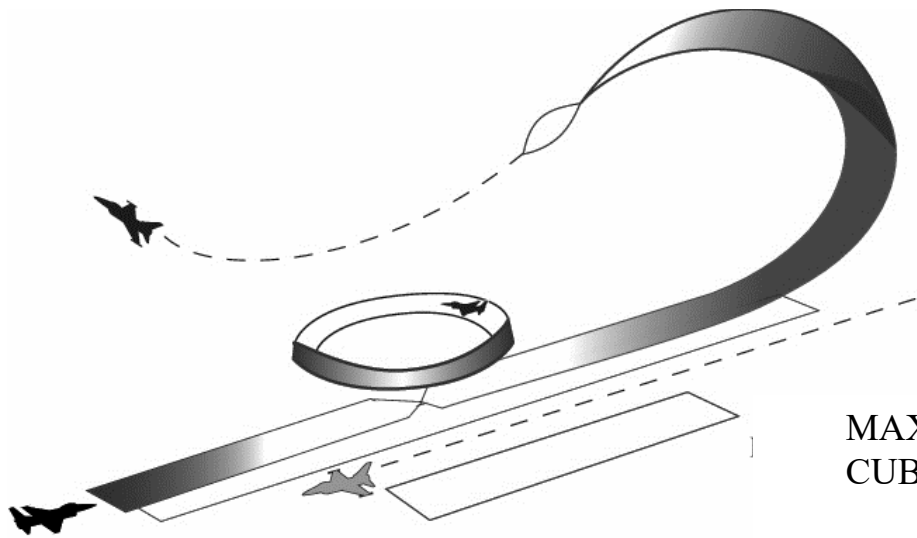


FIVE CARD LOOP

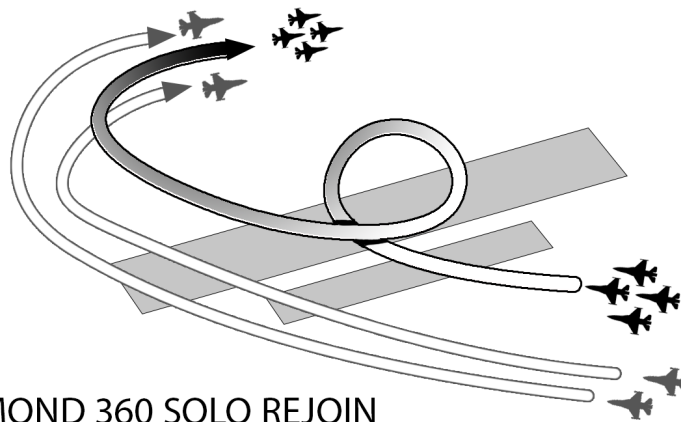


STINGER BREAK CROSS: FLOWN HORIZONTALLY

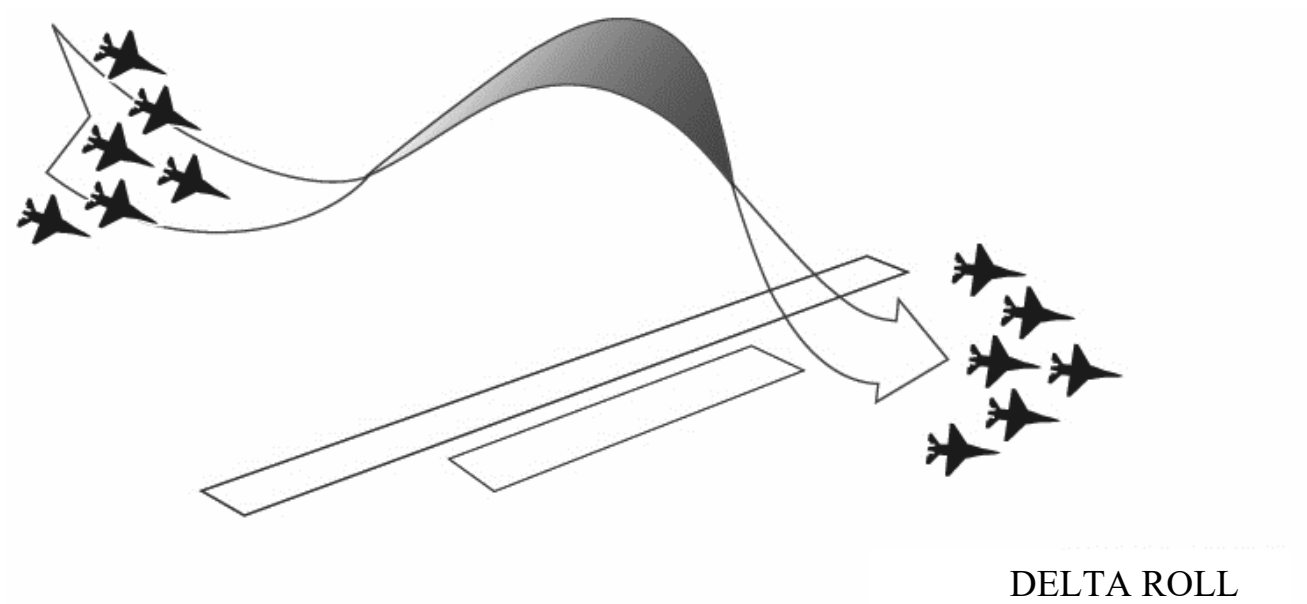
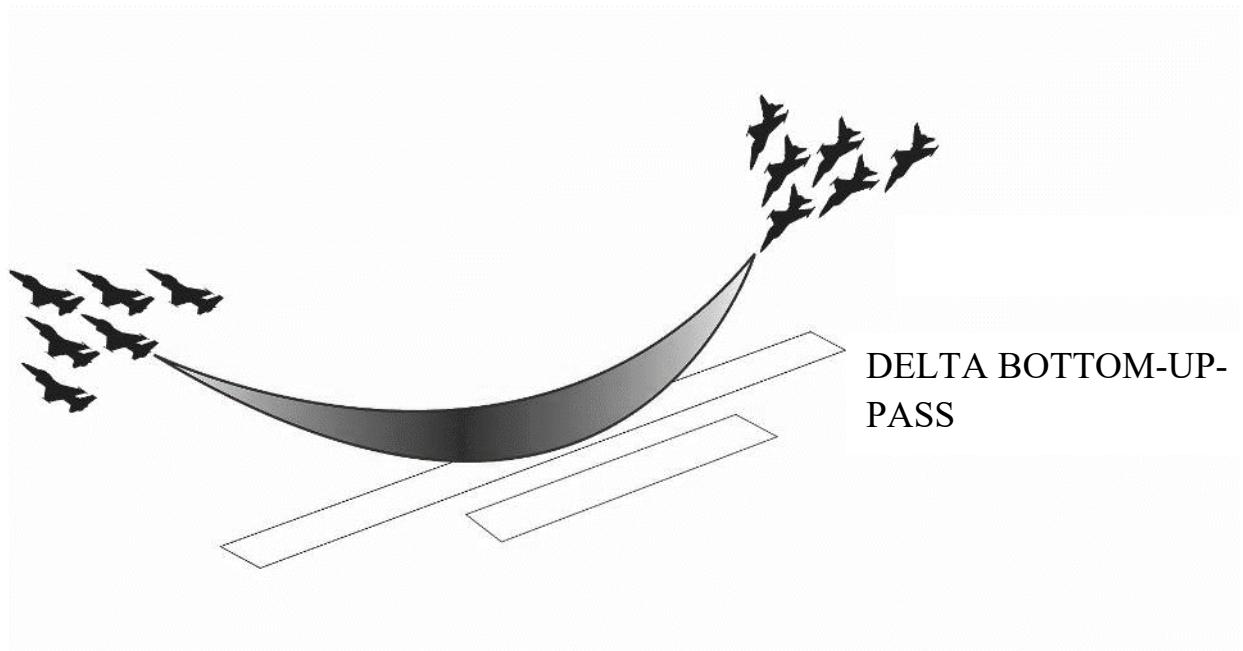
SLOT BREAK CROSS: FLOWN HORIZONTALLY AS
DIAMOND WITH SLOT BREAK OPPOSING HIT AT SC

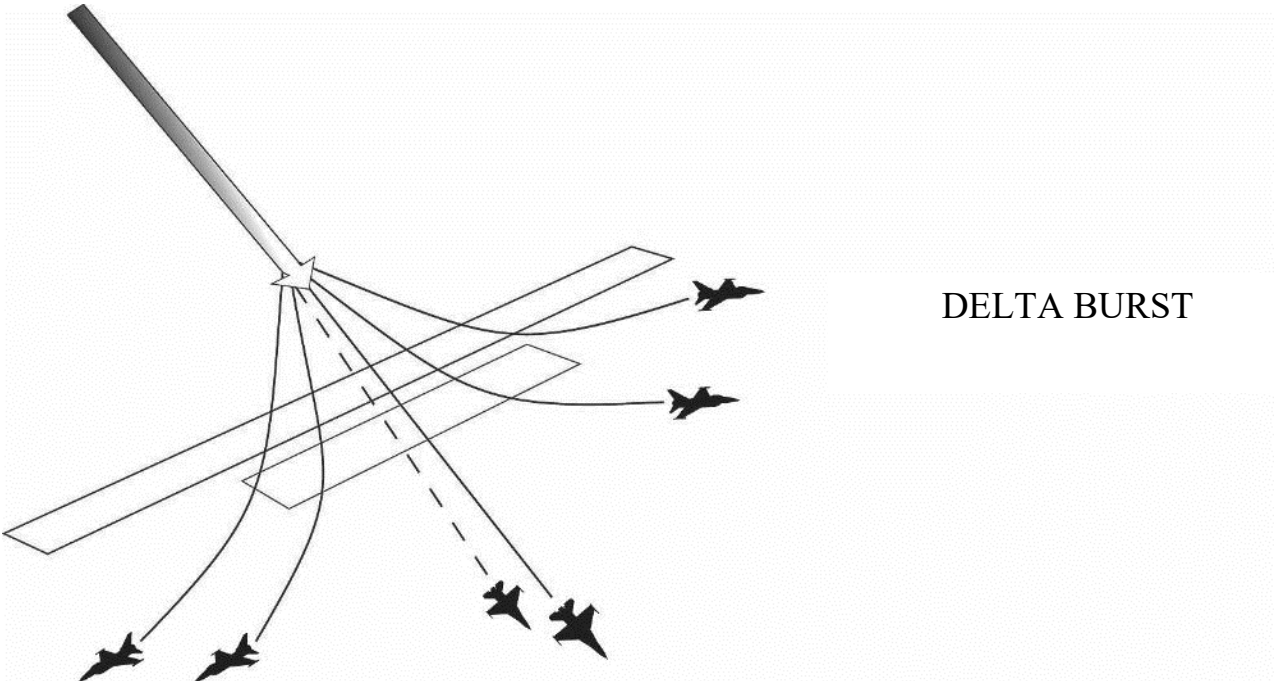
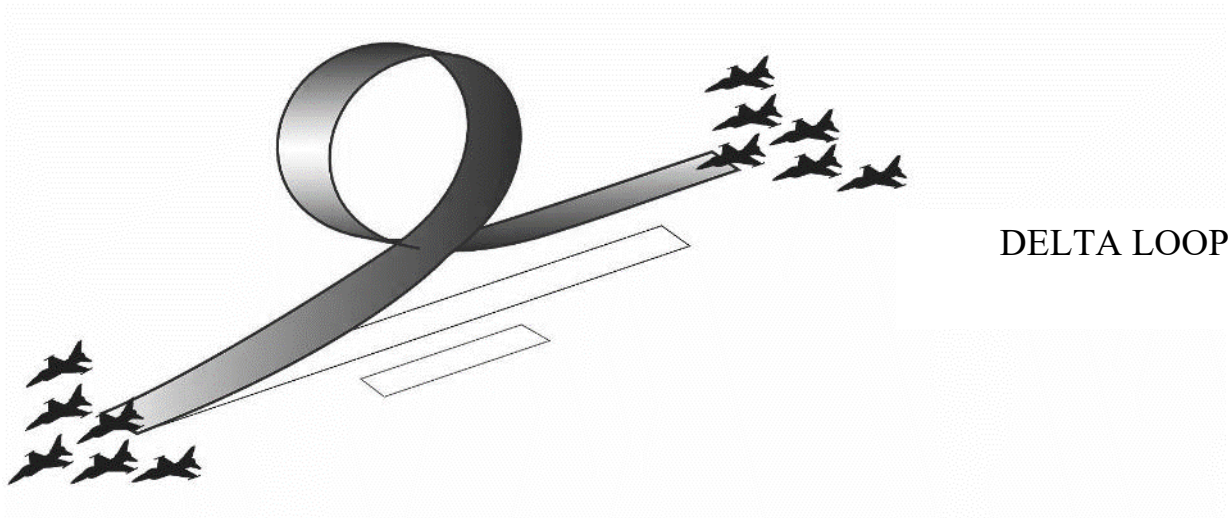


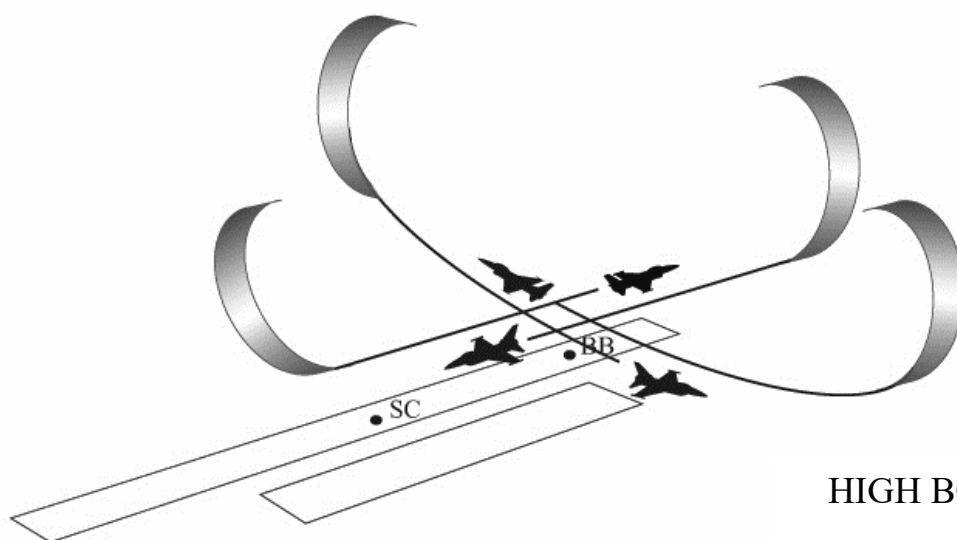
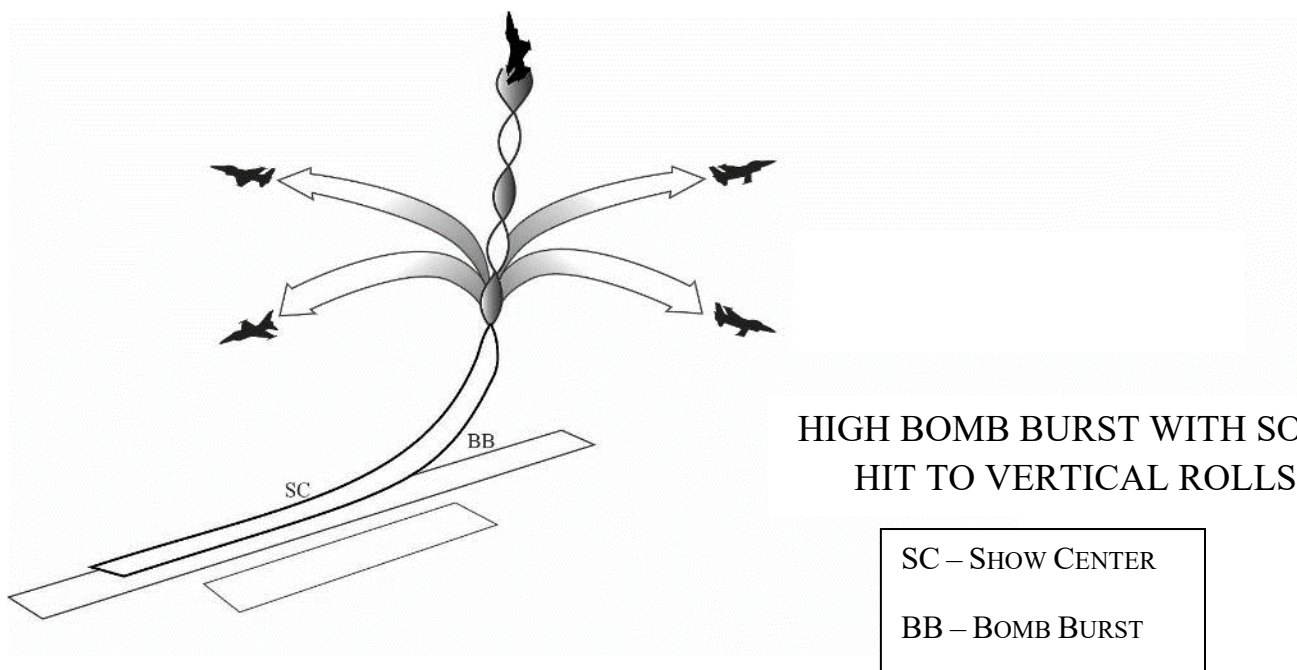
MAX TURN WITH HALF
CUBAN EIGHT

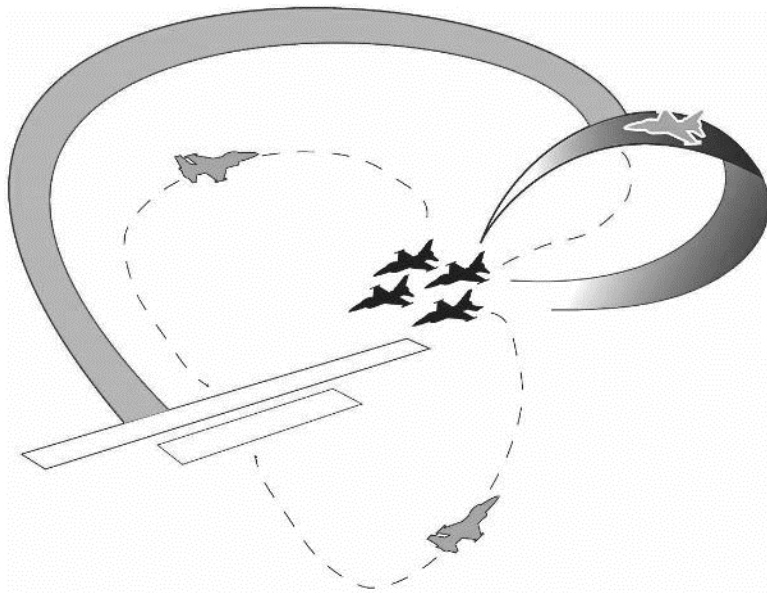


DIAMOND 360 SOLO REJOIN
(Afterburner On)

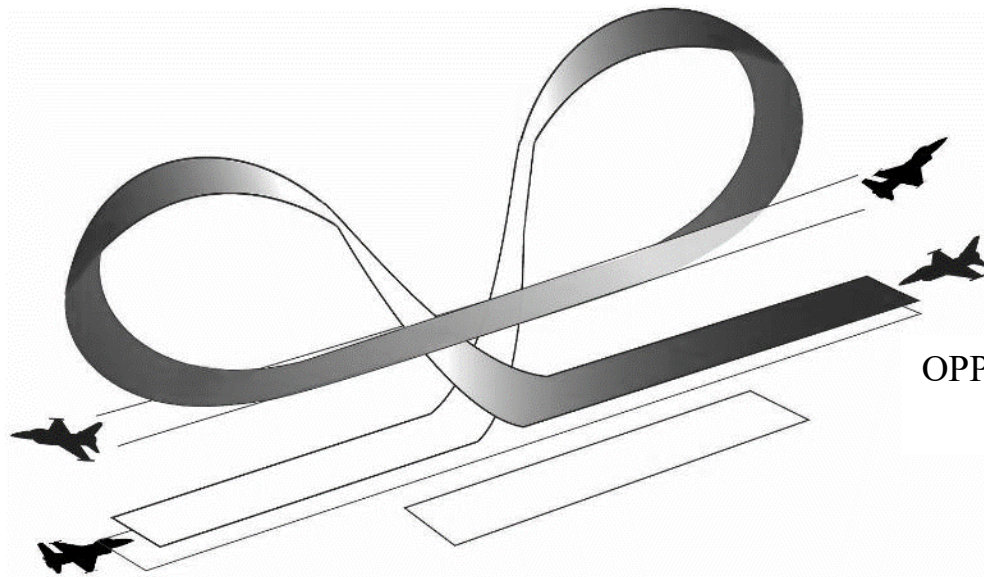




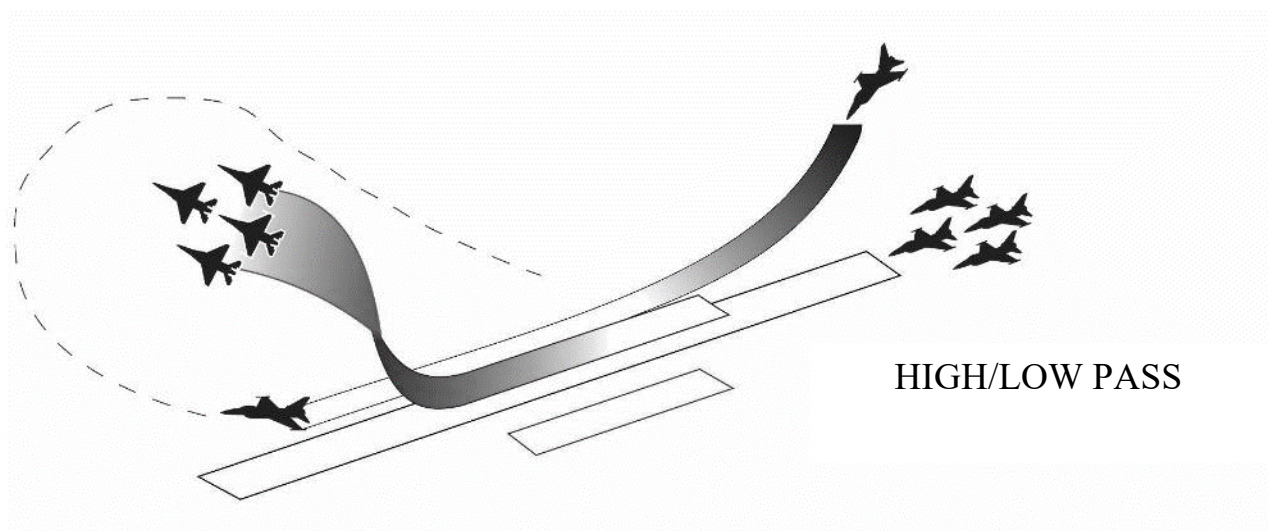
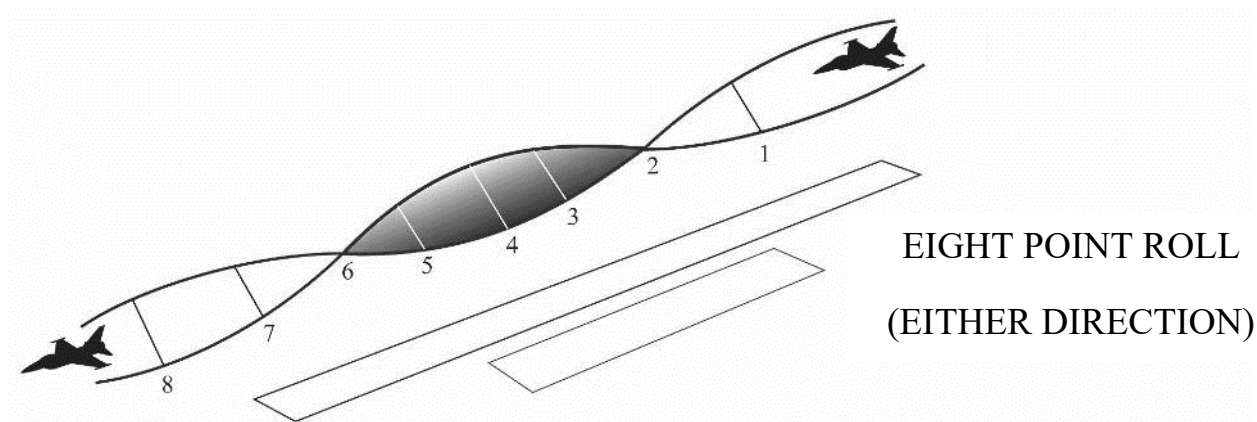




HIGH BOMB BURST REJOIN

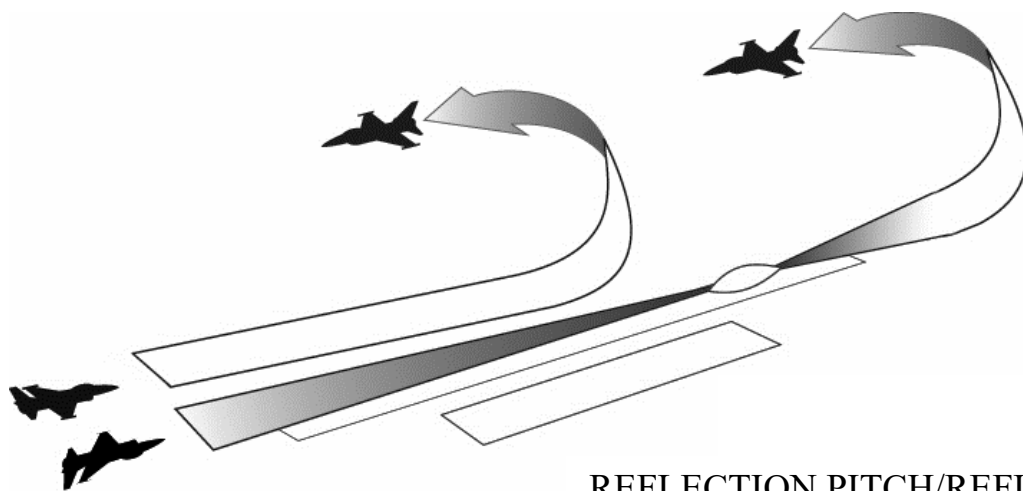
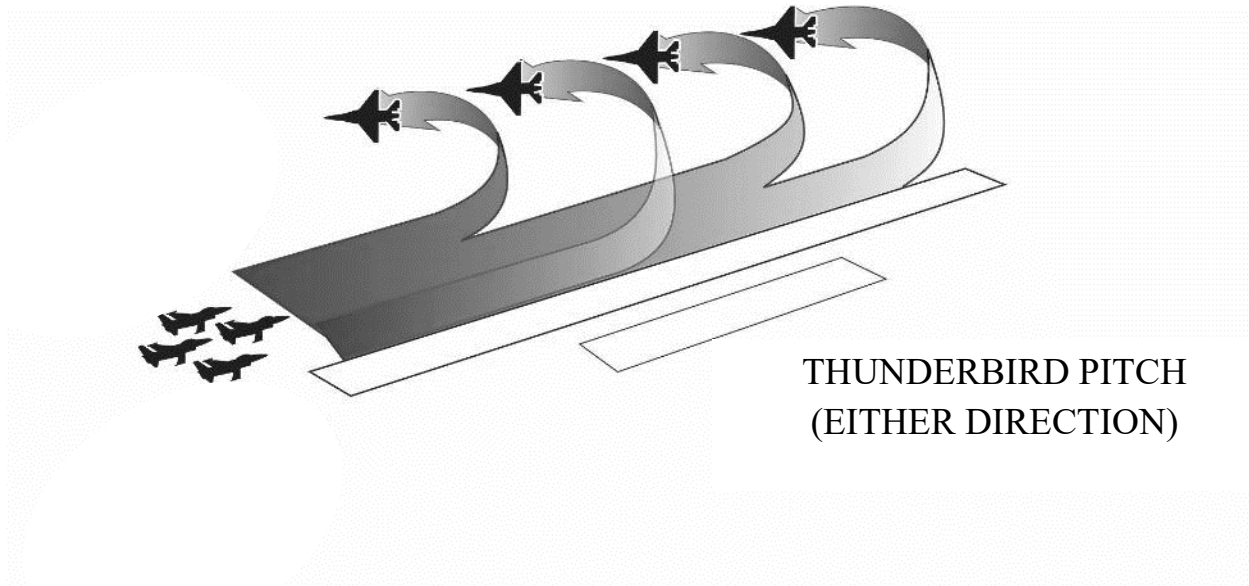


OPPOSING SPLIT-S

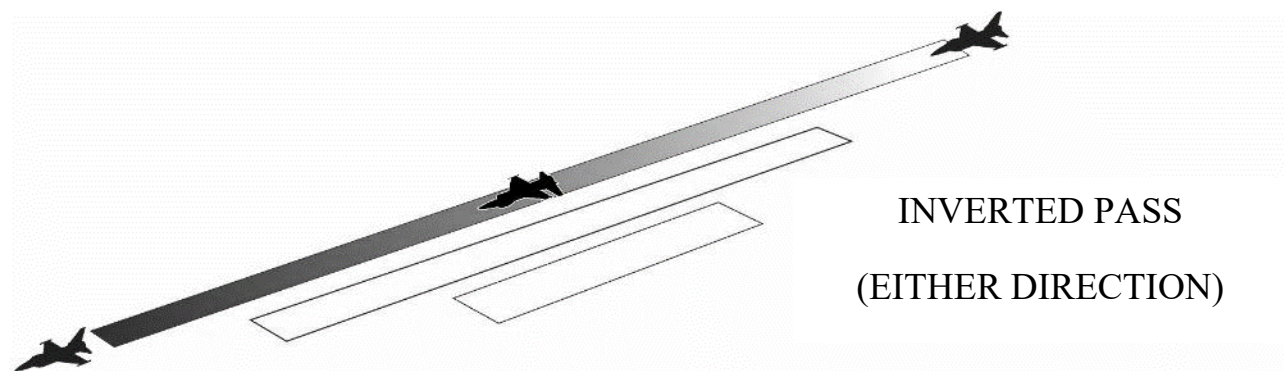
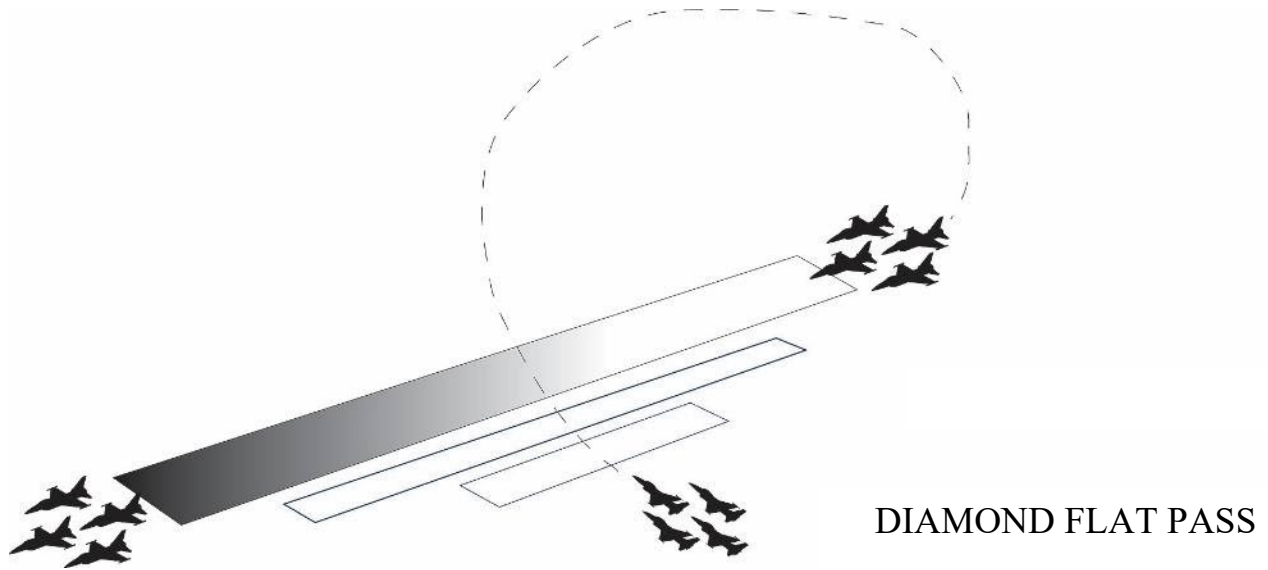


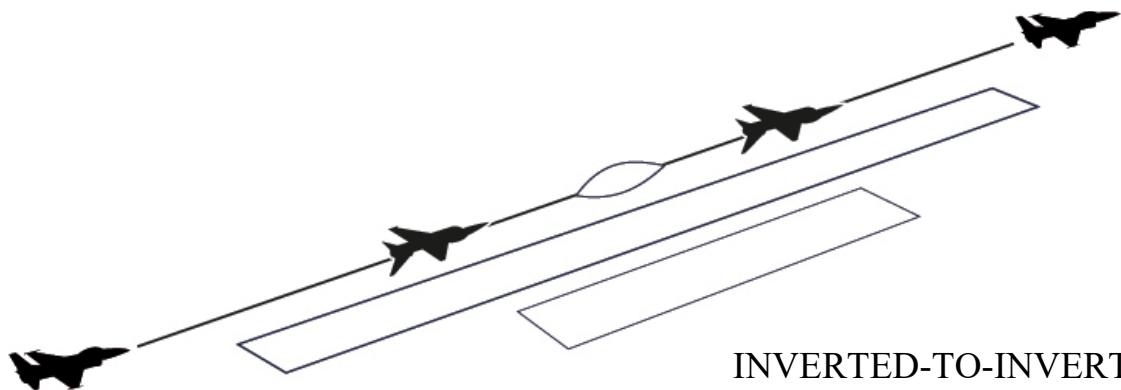
.94 Mach Max

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

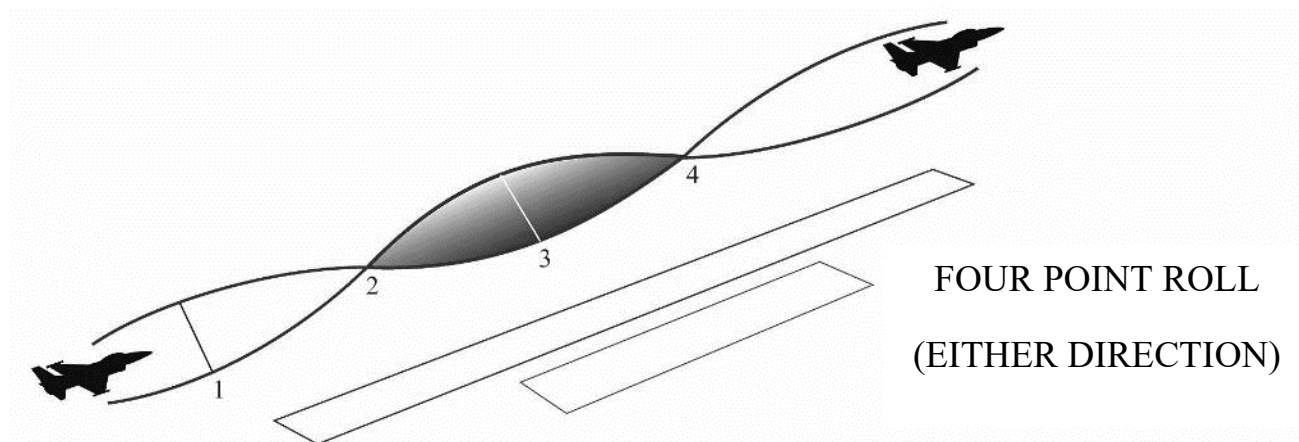


REFLECTION PITCH/REFLECTION PASS
(EITHER DIRECTION)

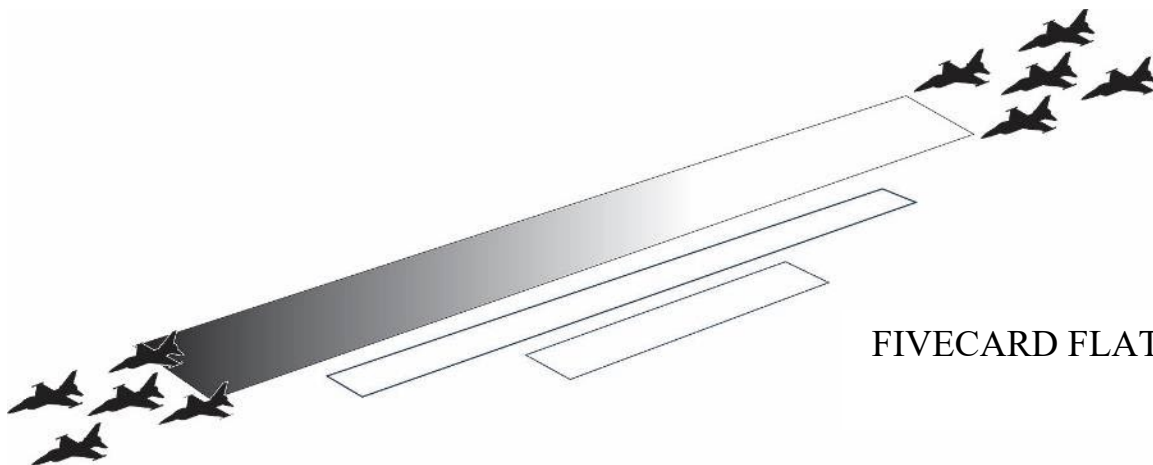




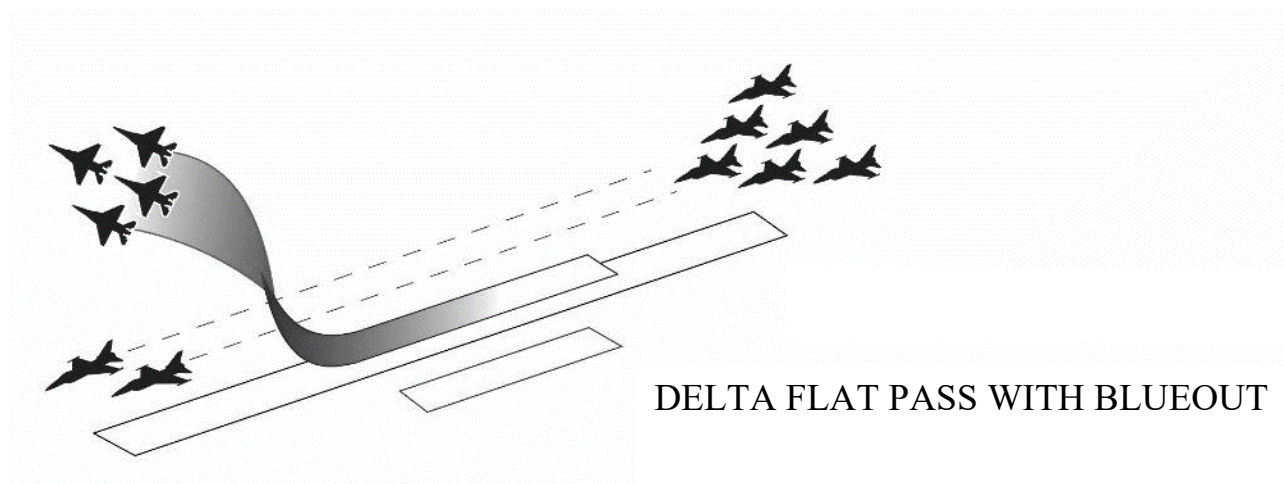
INVERTED-TO-INVERTED PASS
(EITHER DIRECTION)



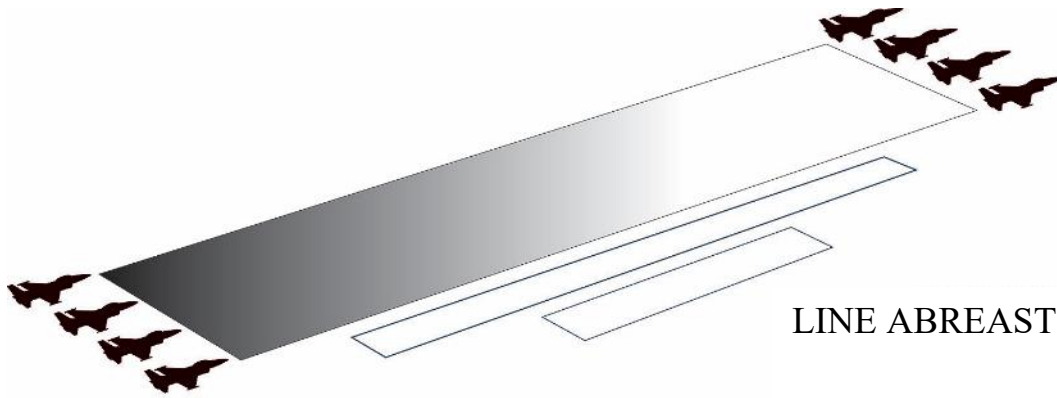
FOUR POINT ROLL
(EITHER DIRECTION)



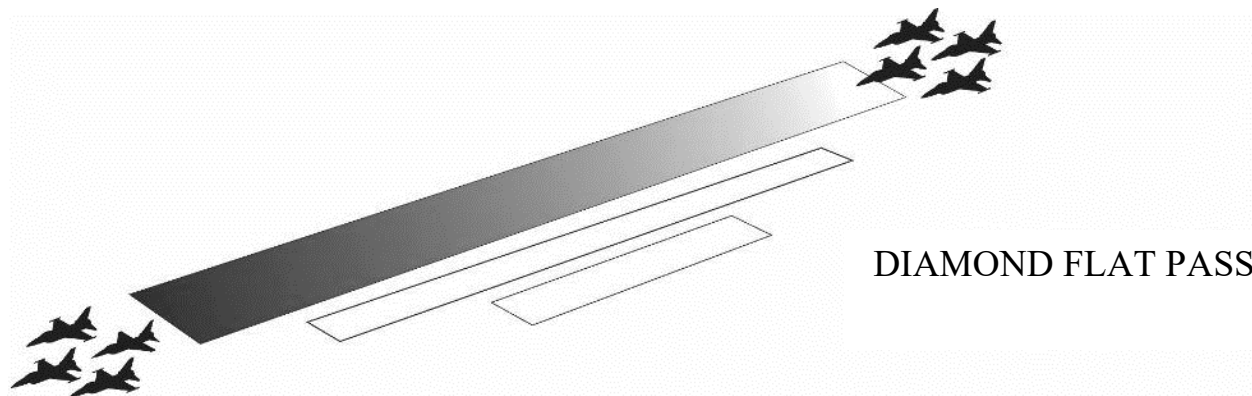
FIVECARD FLAT PASS



DELTA FLAT PASS WITH BLUEOUT



LINE ABREAST FLAT PASS



DIAMOND FLAT PASS

Aerobic Box

