



*Blue Angels*

FORMATION FLIGHT SIMULATION™

**Flight Training Guide  
for Commodore 64/128**

# *Blue Angels*

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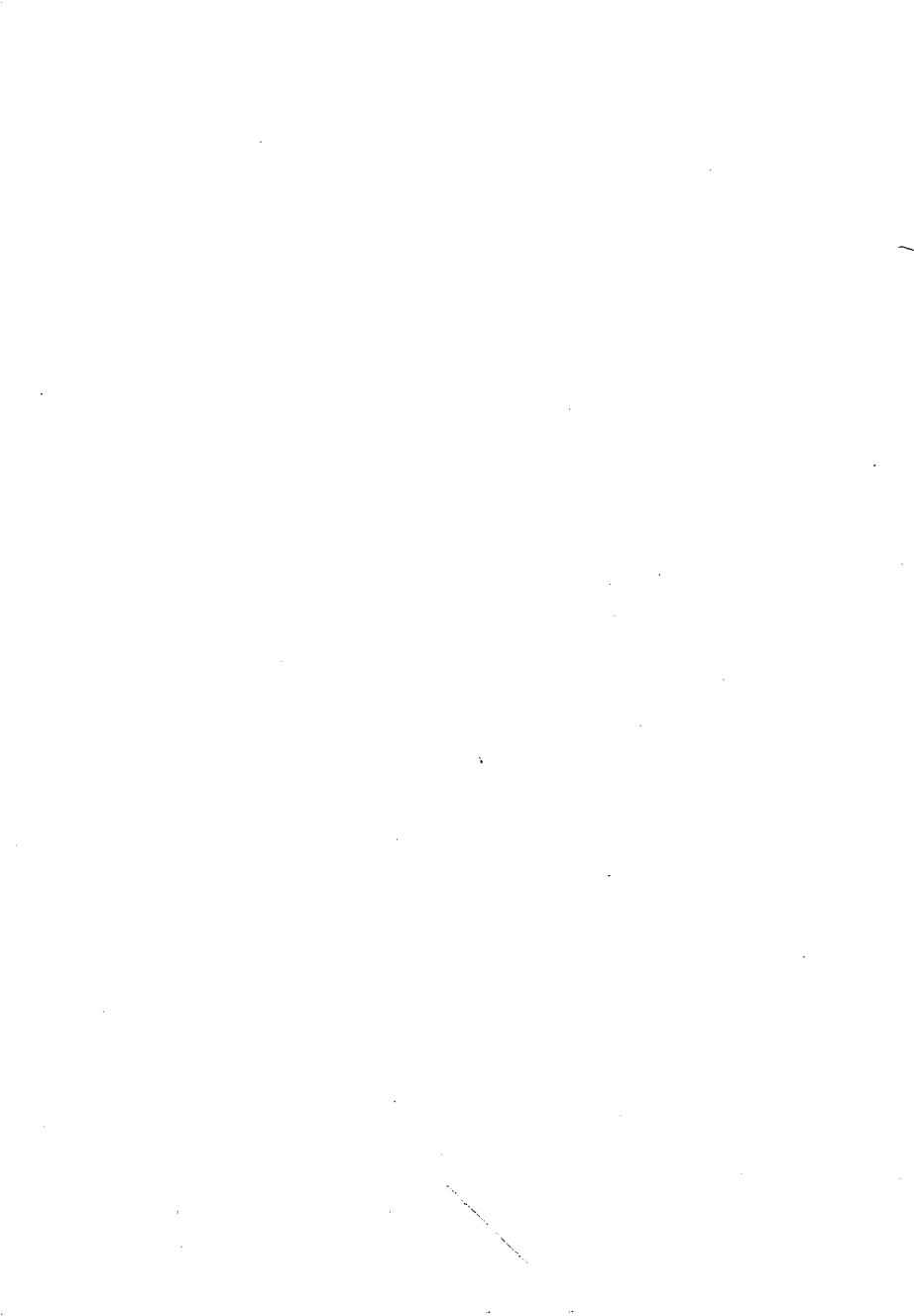
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# *Blue Angels*



*The Blue Angels have been thrilling spectators with precision flying for more than 40 years. A team of highly trained pilots in six F/A-18 Hornets, the Blue Angels have performed in front of more than 210 million people in performances around the country.*

*Now you can fly with this elite flying team. You'll learn how to handle an F/A-18 and how to perform the high-speed low-altitude maneuvers that are the hallmark of the Blue Angels. Most importantly, you'll learn how to be a member of a legendary team – performing these maneuvers in tight formation, precisely coordinated with split-second accuracy. Finally, you'll use these skills to participate in an entire air show as a pilot with the Blue Angels team.*





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## *How to Use This Manual*

Of course you're eager to take to the skies, but there are a few things you should know before you climb into the cockpit. Read the **Getting Started** section to find out how to copy the game disk. Check out the **Overview** section to find out how Blue Angels works – then you can go into **Spectator Mode** to watch an airshow. When you're ready to fly, start with the **Becoming a Blue Angel** section. **Basic Flight Controls** describe how to control your aircraft. Once you're familiar with the controls, you can step into the **Simulator** to try out various flight maneuvers.

Of course, you can go right in and practice the maneuvers or even practice an airshow, but you'll do much better if you take things step-by-step. Flying an airshow is a difficult, demanding task requiring split-second timing and a good memory to perform the right maneuvers in the right sequence.

If you want to end up as a star performer on the Blue Angels team, you'll need to practice your maneuvers quite a bit. And when you have the maneuvers down, you can begin practicing how those maneuvers are combined into an airshow. When you've flown a simulated airshow, and then practiced one, you're ready for the big time – flying an airshow in front of thousands of people, zooming over their heads at hundreds of miles an hour, your aircraft separated by a few scant feet from your teammates on either side.

# *Blue Angels*

## *Getting Started*

Blue Angels works on the Commodore 64 and Commodore 128 (make sure it's in C64 mode), and uses a joystick in Port 2 for control.

- 1 Turn on your computer.
- 2 Insert your Blue Angels disk, label side up.
- 3 Type **Load "\*" ,8,1** then press **Return**. The program will load automatically.

## *Overview*

Blue Angels is much more than a flight simulator. You'll learn to fly an airshow as part of the elite Flight Demonstration Squadron of the U.S. Navy. There are a number of things you have to learn before you can fly an airshow. You must become familiar with flying the F/A-18 Hornet, performing maneuvers ranging from the simple to the complex at speeds close to that of sound at heights sometimes less than a hundred feet off the ground. And you must do this flying in formation with your teammates just a few feet from your wingtips. This section will show you how to select the various options available in Blue Angels, and how to take a look around the program before you join the Blue Angels yourself.

## *The Menu System*

The interface for Blue Angels consists of several menus with many selections available on each menu. These selections provide you with a multitude of different ways to train and fly for any of the six Blue Angels plane positions.





## *Selecting Modes and Options*

In all menus, use the joystick to move through the available choices. The current menu choice is highlighted. Then press the **fire button** to make the selection.

The options within the Main Menu can have many sub-menus. Depending on the feature in the sub-menus, the **fire button** will either select the feature, or show additional choices for that feature.

Finally, after you've selected all of the appropriate features required for your Main Menu option, use the joystick to highlight **Start Flight** on the last sub-menu and press the **fire button**.

Use the **F1** key when you're flying to return to the Main Menu, and press the Space Bar to pause the game.

## *The Main Menu*

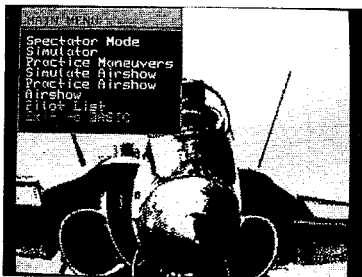


Figure 1 Main Menu

- 1 After the opening credits, a picture of the Diamond formation will appear. Highlight **Select Position** and press the **fire button** to select the Diamond position, or move the joystick right to highlight **Next Position** and press the **fire button** to scroll through the other two positions.

# Blue Angels

## *The Main Menu (continued)*

When you find the position you want, highlight **Select Position** and press the **fire button**.

- 2 When the Pilots List appears, move the joystick right or left to highlight the type of airshow you want. You'll see the names of the top nine pilots who have previously flown that airshow, and position 10 remains open for new pilots.
- 3 If this is your first airshow, move the joystick up or down to highlight position 10, type in your name, and press the **fire button**. If your name is already on the list, use the joystick to highlight it, then press the **fire button**.
- 4 Next, the Main Menu will appear (see Figure 1). From anywhere in the program, you can return to this screen by pressing the **F1** key. Here's a brief description of the choices on the Main Menu:

**Spectator Mode:** Lets you select and watch a prerecorded airshow from several locations.

**Simulator:** Lets you practice maneuvers in a flight trainer.

**Practice Maneuvers:** Puts you in the cockpit to practice maneuvers.

**Simulate Airshow:** Lets you practice an airshow in a flight trainer.

**Practice Airshow:** Get into the cockpit to practice a complete airshow.

**Airshow:** The real thing – fly a complete airshow.



**Pilot List:** Displays a listing of the pilots and their current ratings.

**Exit to Basic:** Leave the program and return to Basic.

## ***Spectator Mode***

This option lets you watch an airshow. This is a great way to get a feel for the maneuvers that you'll have to learn as a member of the Blue Angels. Just sit back and watch the pilots do their thing. When you've had enough, press **F1** to return to the Main Menu.

## ***Becoming a Blue Angel***

You've had a chance to view an airshow, and to see some of the amazing feats of flying that the Blue Angels regularly perform. Now it's time to see if you have what it takes to become a member of this elite team. We'll start our briefing with some background on the Blue Angels team and the plane you'll be flying, the F/A-18 Hornet. After that, you'll put in some time on the simulator practicing maneuvers before you're ready to get into a plane and try these maneuvers out in the air.

Once you've practiced your maneuvers, it's time for you to pull these maneuvers together into the intricately-choreographed performance that is an airshow. You'll practice this first on the simulator, and then take to the air to try and get the split-second timing necessary to successful performance.

# Blue Angels

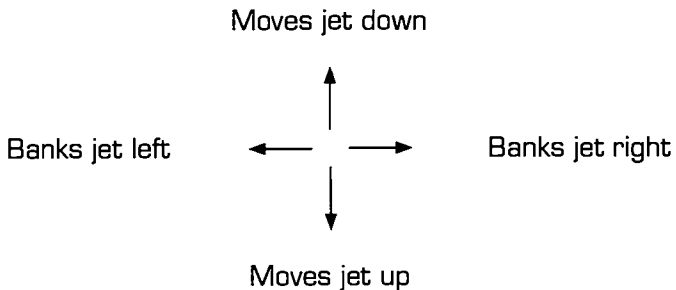
## Your Training

As a beginning pilot, choose a position to train for in an airshow. Watch some airshows in **Spectator Mode** and see how the different positions work. Then familiarize yourself with the Controls. Now you're ready for the **Simulator**, where you can train to fly the demanding set of maneuvers that make up an airshow. As you gain confidence with your ability, **Practice Maneuvers** in the actual aircraft, and then go on to simulate and **Practice an Airshow**. Finally, when you've honed your piloting skill to razor-sharp edge demanded by the Blue Angels, you're ready to tackle an actual airshow in front of thousands of computerized airshow buffs. Of course, once you've successfully completed an airshow, your career isn't over. You can try to refine your talent to the point where you make the Pilot's List of the all-time best. Or you can go back and tackle an airshow from one of the other two positions.

## Basic Flight Controls

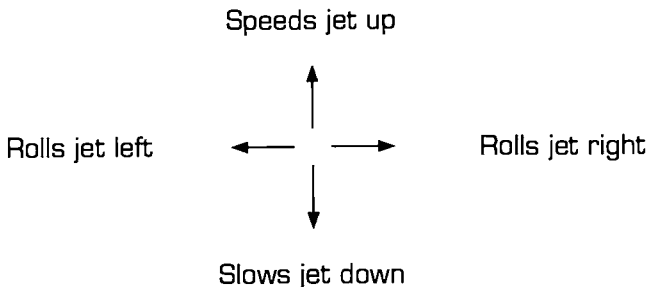
The controls of the F/A-18 are represented in a straightforward fashion on the joystick.

### Joystick Flight Controls





## ***Joystick Flight Controls(with fire button pressed)***



## ***The Simulator***

The flight simulator lets you practice your maneuvers before you try out your skills in an actual F/A-18. An added benefit is that your course can be marked out for you with large rectangles in the “sky”, so that you can see where the plane is supposed to go. Of course, you won’t see these rectangles when you actually practice the maneuver, but they’re a great help as you learn.

Learning to fly a maneuver requires the use of the cockpit instrumentation and a good memory. First, use the **Autopilot** to watch the maneuver being performed a few times to get a feel for how the maneuver proceeds. When you first try the maneuver for yourself, use **Help** – each time you get to a point where you must use the controls, the flight stops and the correct control to use is displayed.

The countdown clock located on the console constantly counts down to the next action you should take.

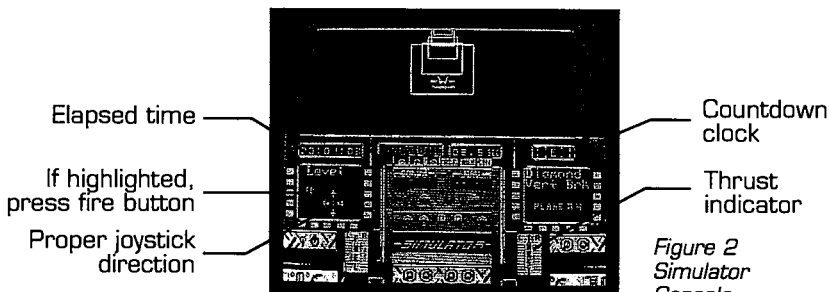
# Blue Angels

## *The Simulator (continued)*

Learn to use the countdown clock for tricky timing. If you're having real trouble with a maneuver, try it at medium speed or low speed. Once you've mastered it at a slower speed, then try it fast. Practice correcting for errors using the Evaluator DDI.

## *The Control Panel*

It's important to familiarize yourself with the simulator controls. The Simulator Console provides a number of indicators that are extremely helpful when you're learning how to perform a maneuver. Noting such things as precise timing and altitude when you practice help you accurately recreate the maneuver during an actual airshow.



**Compass:** Provides you with your heading.

**Countdown Clock:** This indicator at the top of the control panel shows the amount of time before you should start your next joystick action. This is important in timing your maneuvers.

**Left DDI:** Shows Help info.



**Right DDI:** Shows the name of the maneuver you are attempting and indicates which plane you are flying in the maneuver.

## *Simulator Options*

When you enter the simulator, you must first choose the position in the maneuver formation that you're going to fly. Highlight one of the three choices and press the **fire button**.

If you choose the Diamond position, the sub-menus that follow will display the Diamond take offs and maneuvers. If you choose either of the solo positions, the following sub-menus display solo take offs and maneuvers.

The first sub-menu that follows the Position Menu is called Maneuver Types. Highlight either **Take offs** or **Maneuvers**, and press the fire button. A list of maneuvers like those in Figure 3, 4, or 5 will appear.



Figure 3 A

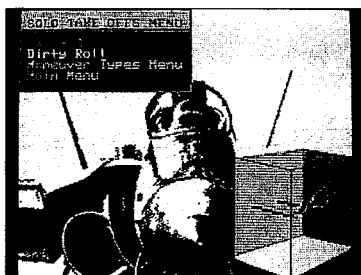


Figure 3B

*Take Offs:* These maneuvers are performed during takeoff.

(A complete description of each maneuver is found in Appendix 2.) When you highlight a maneuver, it is displayed in the cube to the right of the list. The maneuver is displayed the way the planes fly it.

# Blue Angels

## Simulator Options (continued)

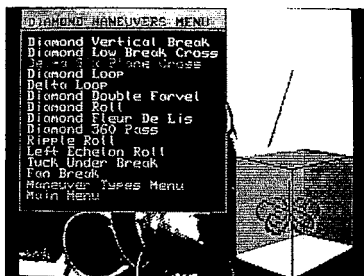


Figure 4 Maneuvers: These maneuvers are performed by the squadron in delta or diamond formation.

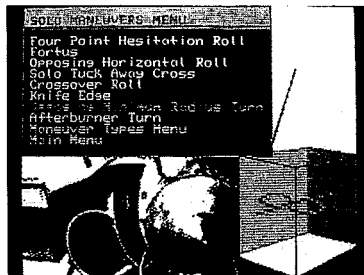


Figure 5 Solo: These maneuvers are performed by pilots 5 and 6 in the solo and opposing solo aircraft.

Once you've chosen a maneuver to fly, the Operations sub-menu appears.

This sub-menu lets you choose from several features to customize how you fly and view the maneuver. Features that are fixed are marked by **NA** (Not Applicable) and can't be changed.





**Help mode is:** Use the joystick to turn the Help feature on or off.

**Speed is:** Select **normal**, **medium**, or **low**. The slower speeds help you observe the maneuvers more closely, and give you more time to make position adjustments.

**Left DDI is:** This determines whether the left Digital Display Indicator in the cockpit is on or off.

**Right DDI is:** Determines whether the Right Digital Display Indicator is on or off.

**Sound is:** Turns the simulation's sounds on and off.

**Airshow Type:** Chooses airshow type. Press the **fire button** sequentially to indicate which type of show you want: **flat**, **high**, or **low**.

**Auto pilot is:** Lets you turn the automatic pilot on or off.

**Start flight:** When you've chosen all of your options, highlight this option and press **Return** to begin your flight.

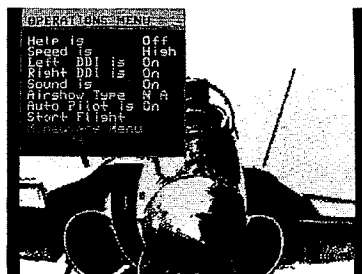


Figure 6: Operations Menu

## *Using the Simulator*

Once you've made your option choices, select **Start Flight** to begin.

# Blue Angels

## *Using the Simulator (continued)*

As you fly, the computer will track how accurately you are performing a maneuver. If you stray too far off the correct path, the screen will turn red and you'll hear a break message.

When the maneuver is completed or the formation is broken, you will be taken to the Evaluation Screen.

**Evaluation Screen:** Replays your performance so that you can see exactly how and where you strayed from the path of a perfect maneuver. The screen is divided horizontally into three sections, each of which gives you a different aeronautical cross-section of your flight. Combined, you can tell what you did wrong and how you can correct the flight.

**Top Section: Yaw** is the amount of left and right turn. If your dotted flight line strays far from the straight line, you need to work on your turning.

**Middle Section: Pitch** is the angle that your nose is pointing up and down. Again, if your dotted line is off the straight one, adjust the pitch of your jet.

**Bottom Section: Roll** is the (360 degree) position of your jet relative to ground. Are you upside down, level, wings perpendicular, etc.? The straight line shows how you should be; the dotted line shows if you've rolled too much or not enough.

**Maximum Error** is the percent you were off the correct path during the maneuver. If this number exceeds 100%, a break is called.

**Average Error** is the calculated average percent you were off the correct path throughout the maneuver.



### Menu Options:

**Repeat Maneuver:** Select this option to try the same maneuver over again.

**Main Menu:** Select this to return to the Main Menu.

**Redraw Full Speed:** Select this to redraw the evaluation screen full speed.

**Redraw Real Time:** Select this to redraw the evaluation screen in real time.

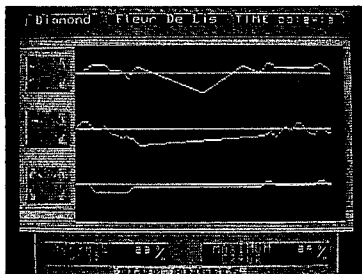


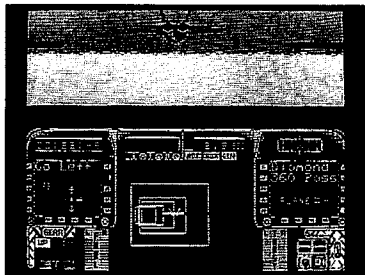
Figure 7: Evaluation Screen

## *Practice Maneuvers*

Once you've trained in the simulator, it's time to strap yourself into a few million dollars of high-tech aircraft and try it out for real. Of course, the view from the cockpit is different, but the instruments are much the same. Most importantly, you no longer have those handy rectangles in the sky to guide you through the maneuver. They are now on the console during practice maneuvers and during the airshow. You must depend on your instrumentation, memory and piloting skill to perform each maneuver. Of course, you can still use the Help Info on your DDI to remind you of the proper controls to use at each point in the maneuver. And the autopilot can help step you through the maneuvers.

# *Blue Angels*

## *Practice Maneuvers (continued)*



*Figure 8 Cockpit*

The controls and the options are fully described in the previous section. As in the simulator, when you finish a maneuver, the Evaluation Screen appears where you can review your performance.

When you go too far off the maneuver's prescribed track, a break is called out and you must begin the maneuver over again. Thorough practice on the simulator will make it less likely that you have to break off a maneuver.

## *Flying an Airshow*

Now that you have practiced the maneuvers and are confident in your ability to fly, it's time to combine those maneuvers into the intricate high-speed aerial ballet of a Blue Angels airshow. First, examine the following list of maneuvers for the different types of airshows.



## High Airshow

### Delta

Delta Takeoff  
with Loop

Diamond Loop

Diamond Roll

Diamond Double  
Farvel

Diamond Vertical  
Break

Diamond Low  
Break Cross

### Solos

Split S

Dirty Roll

Knife Edge

Opposing  
Horizontal Roll

Fortus

Solo Tuck  
Away Cross

Opposing  
Minimum  
Radius Turn

### Both

Fleur-de-lis

Delta Loop

Delta 6 Plane Cross

# Blue Angels

## Flying an Airshow (continued)

<b>Low Airshow</b>	
<b>Delta</b>	<b>Solos</b>
Delta Takeoff	Split S
	Dirty Roll
	Knife Edge
	Opposing
	Horizontal Roll
Diamond Roll	Fortus
Diamond Loop	
Diamond Double	Solo Tuck
Farvel	Away Cross
Tuck Under	Opposing
Break	Minimum
	Radius Turn
Left Echelon Roll	Afterburner Turn
Fan Break	4 Point
	Hesitation Roll

<b>Flat Airshow</b>	
<b>Delta</b>	<b>Solos</b>
Delta Takeoff	Split S
	Dirty Roll
	Knife Edge
	Opposing
	Horizontal Roll
360 Degree Pass	
Diamond Loop	
Diamond Roll	Fortus
Diamond Double	Solo Tuck
Farvel	Away Cross
Ripple Roll	



Now that you have reviewed the airshow maneuvers, you're ready to learn them.

## ***Simulated Airshow***

As before, you begin with the Simulator to learn the sequence of maneuvers. The controls are the same as before, with the exception that you have no choice of maneuvers to practice – you just choose the type of airshow, and then you go through the entire set of maneuvers.

Again, use the instrumentation to guide you in your timing. Learn to spot the cues for the beginning of new maneuvers. Run through at medium or low speed to get the hang of it, then try full speed.

When you feel confident enough, move into your aircraft and try Practice Airshow.

## ***Practice Airshow***

This is the final stage of preparation. You've spent a lot of time getting ready, and here's your chance to make sure you have it all down pat. Again, all you have to do is choose the type of airshow and the aircraft position. The options are all the same as before, except that the Help is no longer available.

# *Blue Angels*

## *Airshow*

This is it. All those hours of training and preparation have brought you to this point, where you demonstrate your skill in front of thousands of people. Don't be nervous at the thought of all those eyes following your every move. Remember those maneuvers that you've drilled into your nervous system with hours of painstaking practice. Help is no longer available to you. But by this time, the flight patterns should be second nature to you – you'll do fine. Of course, there's always room for improvement – and if you reach the highest levels of achievement, your name is placed on the Pilot's List.

## *Pilot List*

This screen lists the all-time best scores as a percentage of error from the theoretical "perfect" airshow. The pilots on this list have performed with incredible accuracy during a demanding series of maneuvers, and only an outstanding pilot can expect to be listed here. To make it on the list, you must complete an airshow (in Airshow mode, that is) at full speed with a lower average error percentage than one of the pilots on the list. No wimps here.



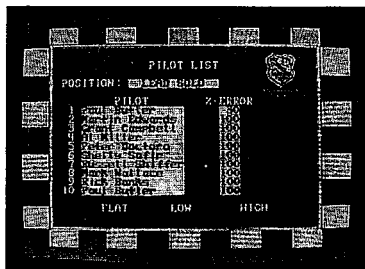


Figure 9 Pilot's List

Press the **fire button** to return to the Main Menu.

## ***Exit to Basic***

Selecting this command quits Blue Angels and returns you to Basic.

# *Blue Angels*

## ***Appendix 1: The Blue Angels***

The U.S. Navy Flight Demonstration Squadron, popularly known as the Blue Angels, has performed before more than 210 million spectators since it was created in 1946. Lieutenant Commander Roy M. "Butch" Voris was selected to organize and lead the original team. The Blue Angels performed their first airshow in June of 1946 at Jacksonville, Florida, flying three Grumman F6F Hellcats.

On August 15, 1946, the team began flying the faster and more agile Grumman F8F Bearcat, using the diamond formation which has since become the team's trademark. These prop-driven fighters served until 1949, when the jet-powered Grumman F9F-2 Panther was introduced. The new jets were painted bright blue with gold lettering and highly polished metal on the leading wing edges. This jet was flown by the team until the outbreak of the Korean War in June of 1950.

The Blue Angels served in combat aboard the aircraft carrier USS Princeton as the nucleus of Fighter Squadron 191. It was with "Satan's Kittens" that Lieutenant Commander Johnny Magda, squadron commanding officer, was shot down, becoming the first Blue Angel to lose his life in combat.

In late 1951, the Blue Angels were reformed using Grumman F9F-5 Panthers, stationed out of Corpus Christi, Texas. In the winter of 1954-55, the team switched to the swept-wing F9F-8 Cougars and moved to its current base of operations at Pensacola, Florida. The faster Cougar allowed the introduction of new maneuvers such as the Fleur-de-lis.



The Blue Angels continued a busy performance schedule and were viewed not only in live airshows but on television and in movies. In mid 1957, they switched to the new supersonic Grumman F11F-1 Tigers. Despite differences in aircraft trim, control sensitivity, and power, the team made the changeover without a schedule disruption.

The Tiger served the Blue Angels for 11 years. Its greater power allowed the introduction of several new maneuvers, including the four-plane diamond landing, the six-plane delta landing, the Double Farvel and the Dirty Roll.

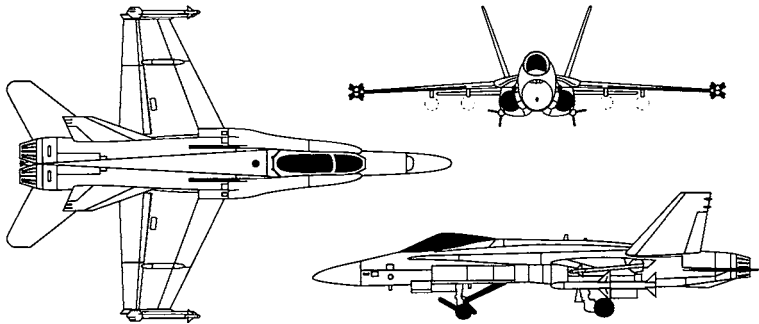
Once again, advances in aviation brought a new aircraft to the team. The 1969 season saw the Blue Angels using the McDonnell-Douglas F-4J Phantom II. The Phantom made possible the four-plane Line-Abreast Loop, the inverted Fleur-de-lis, the Tuck-Under Break and echelon landings, while the two solos were able to fly the opposing Dirty Rolls on take-off.

In 1973, the Blue Angels were altered from a Flight Demonstration Team to the Flight Demonstration Squadron. The next year, under Commander Tony Less, the squadron switched to the McDonnell-Douglas A-4F Skyhawk II. Though smaller than the Phantom, the shorter turning radius and faster roll capabilities of the delta-wing Skyhawks proved very effective in aerial demonstrations.

Finally, on November 8, 1986, the squadron adopted the single-seat, twin-engine McDonnell-Douglas F/A-18 Hornet.

# *Blue Angels*

## *F/A-18 Hornet*



*F/A-18 Hornet*

The McDonnell-Douglas F/A-18 Hornet is a multi-mission, high-performance tactical aircraft that was designed as both a fighter and an attack jet. Eventually, it will replace both the A-7 Corsair and the F-4 Phantom. The Hornet's combination of high power and light weight give this highly sophisticated aircraft impressive maneuverability, rate of climb and acceleration.

The Hornet is powered by two General Electric F404-GE-400 low-bypass turbofan engines that provide 32,000 pounds of thrust. The Hornet can carry up to 17,000 pounds of armament, including two Sparrow III and Sidewinder missiles in nine locations. Its radar can track multiple targets and display up to eight at one time.

The Hornet's excellent reliability and quality workmanship means less maintenance, repairs, and servicing, and an aircraft ready to fly when duty calls. The Hornet is the ideal aircraft for the demanding needs of the Blue Angels Squadron.



## ***Appendix 2: Description of Maneuvers***

There are 30 different maneuvers that can be part of a Blue Angels airshow. Some of the maneuvers are only performed by certain plane positions, while others are group maneuvers that all planes perform.

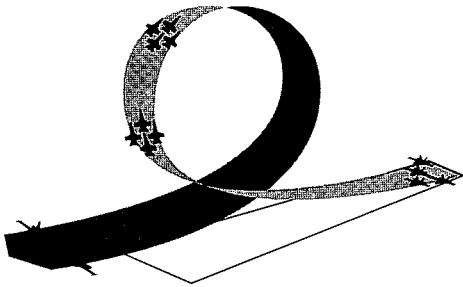
### ***Takeoff***

These maneuvers, as you might expect, are performed on takeoff.

#### ***Diamond Takeoff***

All four planes line up in a standard delta formation (one plane, then two planes, then three planes) with three feet of separation between their wingtips. They accelerate their engines and carefully check their instruments, then take off the brakes and the delta begins its takeoff roll.

#### ***Diamond Takeoff with Loop***



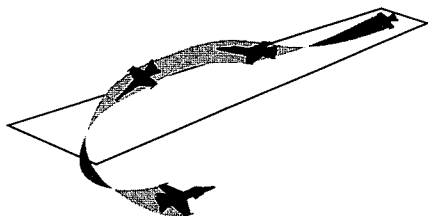
After takeoff, the Blue Angels go vertical. The aircraft maintain formation through the inverted position over the top. With increasing airspeed down the back side, the pilots experience a 4-g force as they round out the bottom of the loop.

# Blue Angels

## ***Split S***

This maneuver is flown only by the lead solo plane. On takeoff Blue Angel 6 makes a high performance climb followed by a half loop.

## ***Dirty Roll***



On the runway, Blue Angel No. 5 accelerates his aircraft to takeoff velocity. He pulls it up, climbs to 50 feet and, in a spectacular demonstration of the thrust generated by an F/A-18, rolls his aircraft 360 degrees with the gear and flaps still extended.

## ***Delta***

These maneuvers are performed by the Blue Angels in formations of four or six planes.

### ***Diamond Vertical Break***

The Blue Angels climb to vertical, turn so the bottoms of the aircraft face each other, and then break back.

### ***Diamond Low Break Cross***

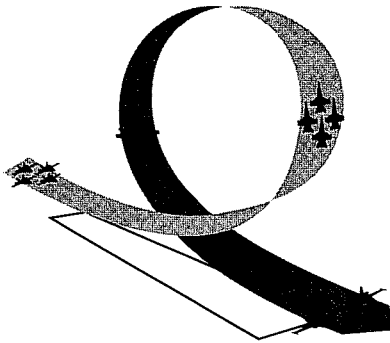
Flying toward the stands, the Blue Angels break diamond formation with two aircraft flying to the north and two flying to the south. Each pair performs a three quarter horizontal loop, passing each other at minimum separation.



### ***Delta 6 Plane Cross***

From the right, the six-aircraft delta formation performs the front half of a loop. As the aircraft come over the top at 8,000 feet and re-enter the vertical, all six break away to six points of the compass. Each pilot, having accelerated his aircraft to 500 mph, then begins a Half-Cuban Eight reversal turn. As they pull up and over the top, all six pilots roll their aircraft 180 degrees and head back toward the center point. From six points of the compass and generating more than 1,000 mph of closing velocity, the aircraft cross at center point with minimum separation.

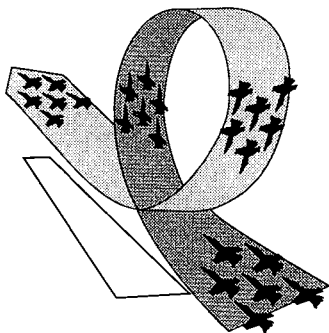
### ***Diamond Loop***



From the left, the tight Blue Angel diamond approaches the flight line at 500 mph. The Angels and their aircraft head up through the vertical. The pilots maintain formation as they go over the top and round out the loop.

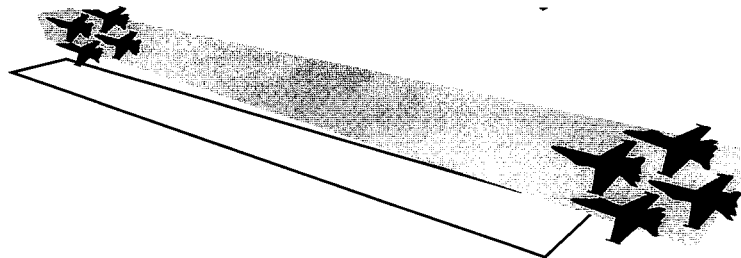
# *Blue Angels*

## *Delta Loop*



The Blue Angel delta approaches from the left and begins a climb into the vertical. All aircraft maintain minimum separation as they perform a graceful looping maneuver and exit to the right.

## *Diamond Double Farvel*

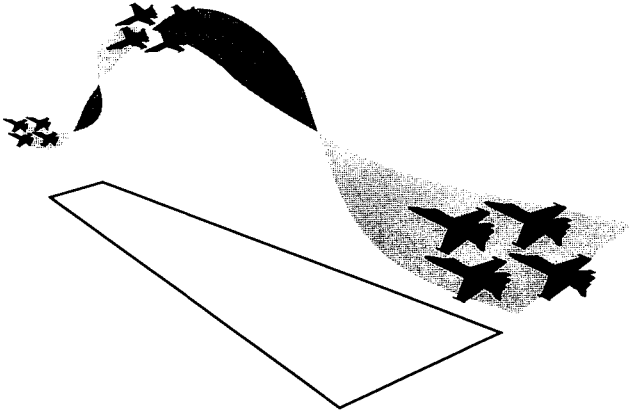


The Blue Angel diamond approaches from the right maintaining wingtip to canopy separation – but aircraft 1 and 4 are upside down.





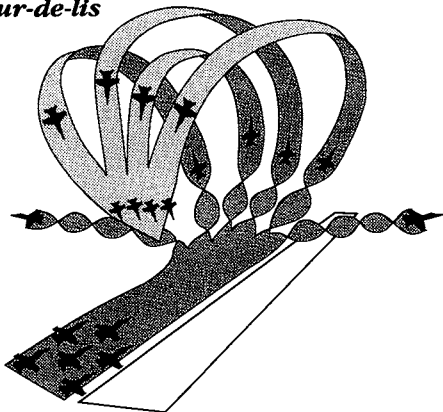
## *Diamond Roll*



The diamond approaches from the right and begins a climb. On signal from the leader, they roll 360 degrees as if welded together. Upon completion of the roll, they exit the flight line to the left.

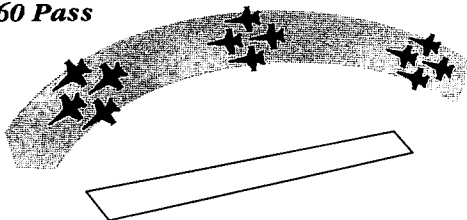
# Blue Angels

## *Diamond Fleur-de-lis*



With the two solo pilots joining the diamond fliers, a new formation – the double vee – takes place. The formation begins to climb into a loop and all six aircraft separate and perform individual 360 degree rolls, with No. 5 and No. 6 performing horizontal rolls and exiting to the right and left. Down the backside of the loop the three wingmen join the No. 1 aircraft, and the Blue Angel diamond exits the area to the right.

## *Diamond 360 Pass*



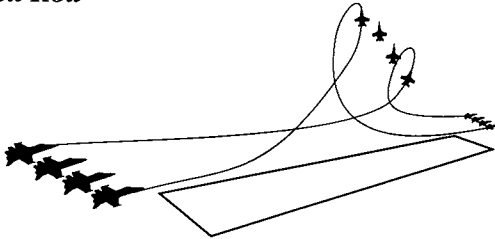
The Blue Angel diamond approaches from the right. In relatively slow-speed flight at an altitude of 150 feet, the four aircraft pass in a banked 360 degree turn at 350 mph to give the audience a close look at the minimum wingtip-to-canopy separation flown by the Angels (sometimes as close as 12 inches!).



### ***Ripple Roll***

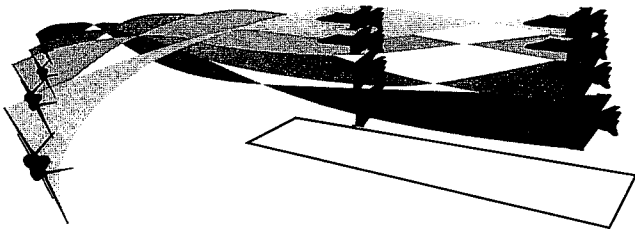
From the diamond the Blue Angels reform into echelon formation. They then individually perform a 270 degree roll followed by a 180 degree turn.

### ***Left Echelon Roll***



Blue Angel No. 1 positions his wingmen in a left echelon. In this formation, the wingmen are stacked down and aft of the leading aircraft on a 45 degree bearing line. Then they begin to perform a maneuver the books say cannot be done – a 360 degree roll to the left.

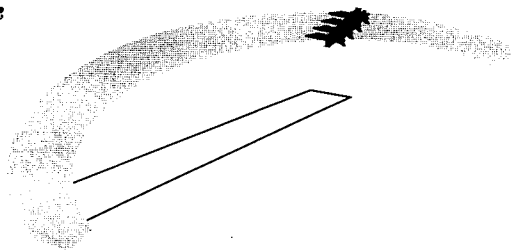
### ***Tuck Under Break***



The diamond formation approaches from either the left or the right (depending on wind conditions) to set up their break for the landing. As they pass over the center point, they roll 330 degrees in ripple fashion while separating as they enter the downwind leg to set up for landing.

# Blue Angels

## *Fan Break*

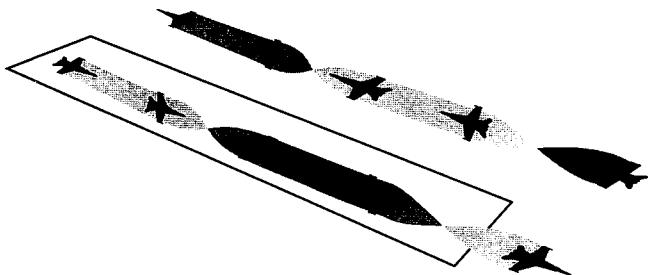


Blue Angel No. 1 positions his wingmen in a right echelon set, stacking his wingmen down and aft of the flight leader. As all four aircraft pass in front of the crowd at 300 mph at an altitude of 150 feet, they appear to be superimposed on one another. This formation is also known as the Blue Angel Echelon Parade.

## *Solo*

These maneuvers are performed by one or both of the solo aircraft.

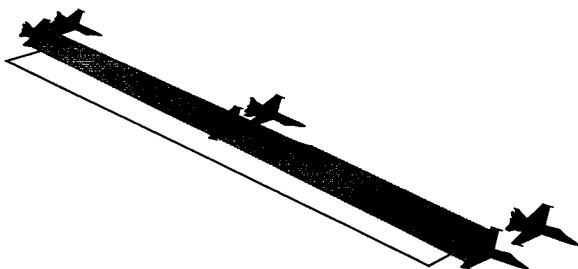
## *4 Point Hesitation Roll*



The two solo pilots approach one another, roll their aircraft 360 degrees, pausing after each 90 degrees of roll. They cross at a center point in inverted flight.

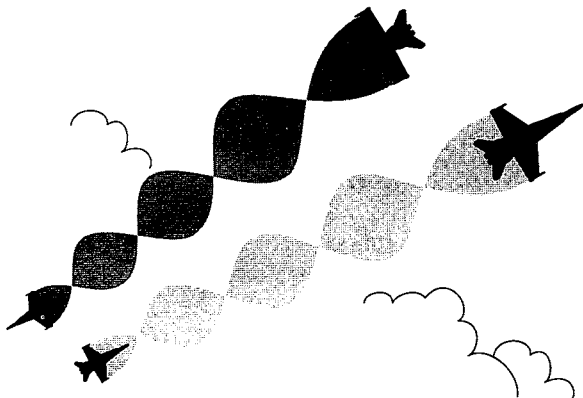


### ***Fortus***



Approaching from the left in a two-plane formation with No. 5 inverted and No. 6 below his right wingtip, the solo pilots close on the flight line at 200 mph. The landing gear of both planes is lowered and they cross center point in landing configuration. After the gear are retracted, No. 5 rolls back to normal flight and the two exit to the right.

### ***Opposing Horizontal Roll***



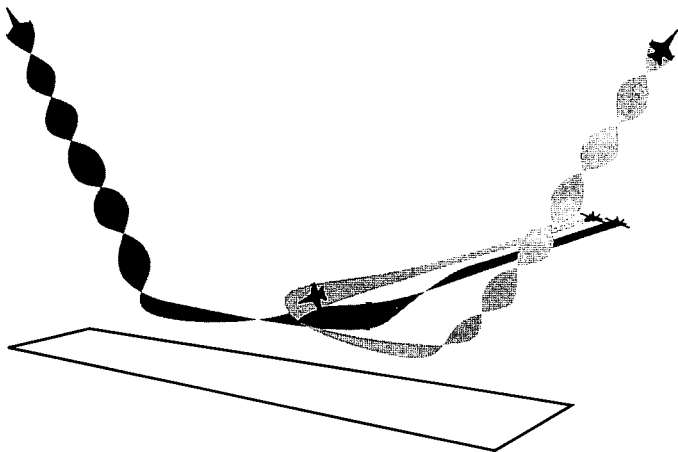
The two solo pilots, opposing each other toward the center point, execute a series of three horizontal rolls with minimum separation between them.

# Blue Angels

## ***Solo Tuck Away Cross***

Coming from behind the stands, the two solo planes cross paths, then loop in front of the stands, crossing from opposite directions with minimum separation.

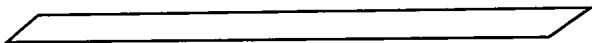
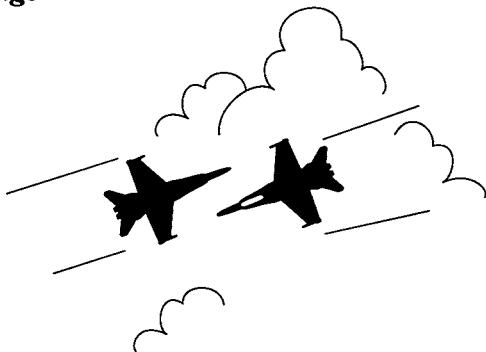
## ***Crossover Roll***



In a tight two-plane formation with No. 5 in the lead and No. 6 on his right wing, No. 6 takes nose-to-tail separation on No. 5 in preparation for a crossover roll. The two solos bank steeply toward each other, pulling to roll out in opposite directions on the flight line directly before the crowd. The illusion of flying through one another is created during the execution of the maneuver. Once their wings are on level on the flight line, both solos pull up to 80 degrees nose high and execute a series of vertical climbing rolls.



## ***Knife Edge***



The two solo pilots approach the center point from opposite directions at 100 feet of altitude. They simultaneously roll their aircraft to 90 degrees of bank, push forward on the stick, and experience weightless or ballistic flight. They pass at near collision distance.

## ***Opposing Minimum Radius Turn***

Both solo planes fly from behind the stands, breaking and crossing in front of each other about 100 feet in front of the stands. Each then performs a three-quarter horizontal loop, passing each other at minimum separation, directly in front of the stands.

## ***Afterburner Turn***

The solo performs the tightest possible turn using afterburners for maximum power.

# Blue Angels



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