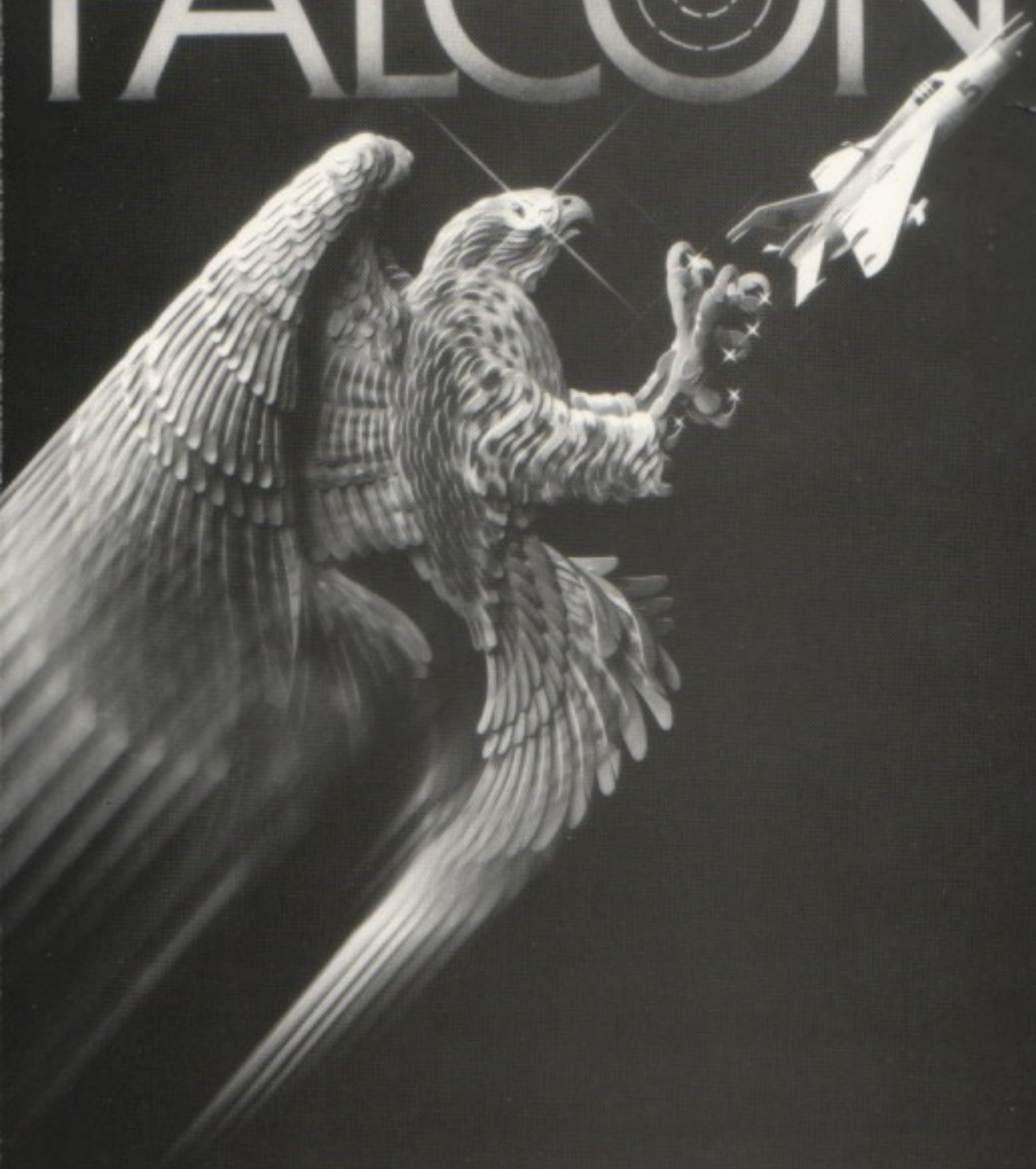


FALCON™



The F-16 Fighter Simulation

MACINTOSH™ VERSION 2

Spectrum HoloByte™

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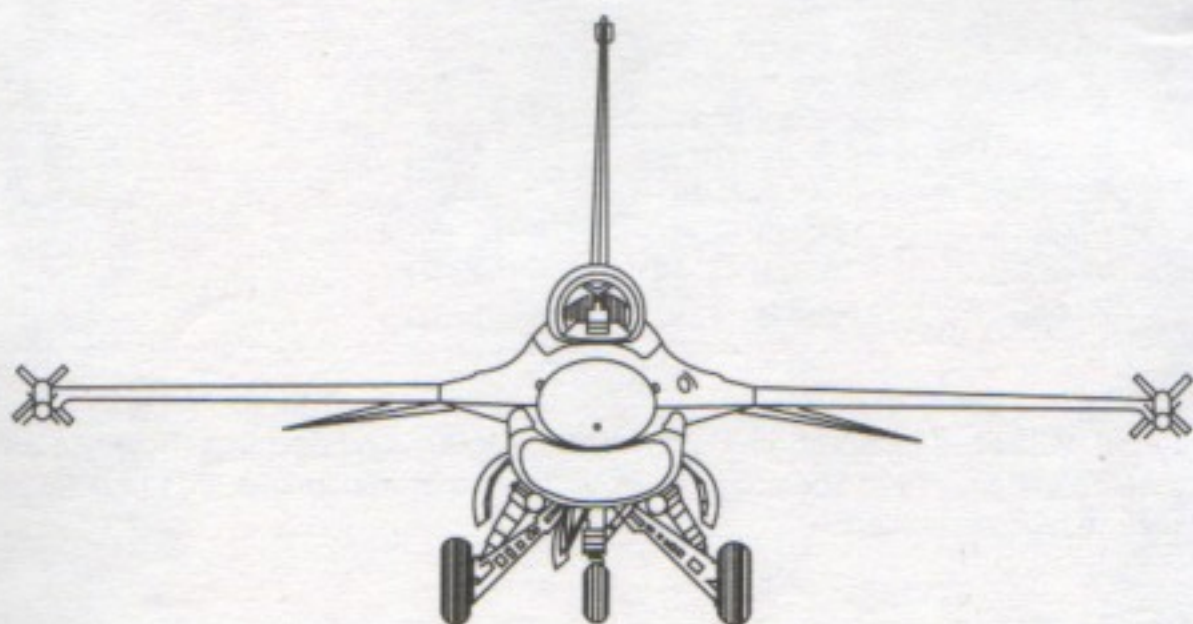
FALCON™

The F-16 Fighter Simulation Version 2

Good airplanes are more important than superiority in numbers.

Air Vice-Marshal J.E. "Johnnie" Johnson, RAF

FLIGHT MANUAL



FALCON concept and design by Gilman "Chopstick" Louie. Co-designed by Mark "Mad Dog" Johnson.

Macintosh version programmed by Gilman Louie and Gary "The Hammer" Poon. Program graphics by Bob "Man-Eater" Coston, Gilman Louie, Jody "Redhot" Sather, Jeffrey "Boomslang" Stokol and Mark Johnson.

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Special thanks to Howard "Whiplash" Bornstein, George Brooks, Steve Capps, Matt "Mr. III" Carlstrom, Anthony "MotorHead" Chiang, Skip Coghill, John "Shear Stress" Deragon, Jim "Rebel Leader" Dumont, Steve "Rent-A-Hippie" Fransen, Mark "Wall-St" Hiatt, John "Skull001" Lee, Captain John "DoppleGanger" Moore, Steve "White Knight" Perrin, Peter "Ghost Rider" Plitteris, Steve "Propellor Head" Riggins, Tom Santos and Jim "Blake 7" Sullivan.

We would like to acknowledge the invaluable help of Lt. Colonel Byron "Hook" Hukee. Without his technical expertise, Version 2 would not have been possible.

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This program is dedicated to the brave men and women of the U.S. Armed Forces and to the employees of General Dynamics, who make a heck of an airplane.

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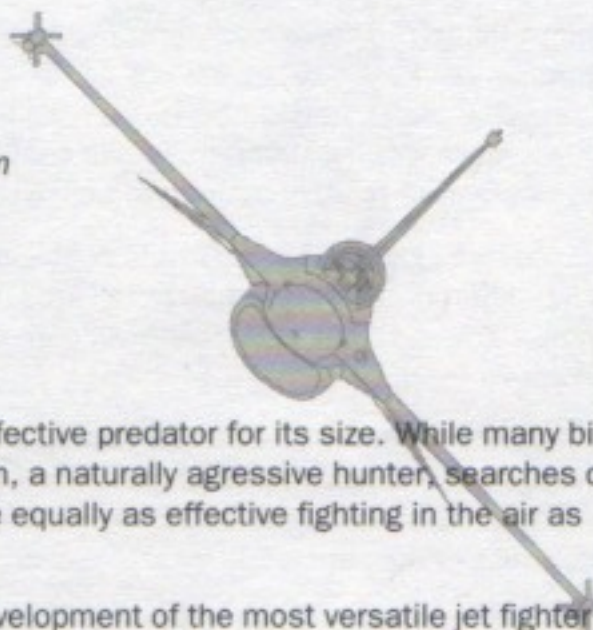
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Introduction

*Our hopes, like towering falcons, aim
At objects in an airy height;
The little pleasure of the game
Is from afar to view the flight.*

Matthew Prior



In the wild, the falcon is the most effective predator for its size. While many birds hunt for their prey at night, the falcon, a naturally aggressive hunter, searches only during the day. It is considered to be equally as effective fighting in the air as striking a target on the ground.

This natural phenomena inspired development of the most versatile jet fighter in the air today, the F-16A Fighting Falcon from General Dynamics.

FALCON was designed to be a highly realistic simulation of the F-16, but allows you the opportunity to fly this powerful jet with tremendous ease. As you progress in flying skill, the ability to utilize FALCON's detailed features will strongly test your mastery of flying in air combat and provide many hours of enjoyment.

About FALCON...

Actual fighter pilots have to spend months and years learning everything there is to know about their airplanes, the enemy's planes, and pilots they may go up against in battle. A considerable time will pass in training before they even take a seat in a fighter jet. We obviously don't plan to put you through such rigorous training just so you can fly FALCON. However, in such a thorough simulation, there is a great deal to learn over the course of playing FALCON that will determine how well you perform, especially at the upper levels.

We have purposely designed the lower levels of the program to be relatively easy to handle so you can gradually develop the skills necessary to enter combat at higher ranks. If you're familiar with how jet fighters like the F-16 operate, you may be tempted to skim over the manual and dive into the upper levels of the simulation. Be forewarned, though: at the Colonel level of FALCON, the simulation is very faithful to the operation of the real F-16, and the MiGs you will be battling are close to invincible.

We recommend that you fly at the lower ranks until you have a firm grasp of the plane's characteristics and the nature of air battle. Then you can attempt to rise in rank and fly an increasingly more realistic F-16 against more formidable opponents.

Using this Manual

In **Part I** of the manual, we're going to send you for a test flight at the lowest level of the program. This will allow you to get a feel for the basics of flying the F-16. Most of the plane's true characteristics will be toned down a bit, and it will be impossible to crash or be shot down.



After you've gone for a few introductory flights and are feeling fairly comfortable with the controls, read **Part II** of the manual to learn all the commands available to you while flying your plane. **Part II** also has a few hints about what to expect while flying at the higher levels of the program. In this section, we cover some of the basics that you would have to learn in order to be trained as a real fighter pilot.

FALCON presents game difficulty levels according to a military pilot's rank. **Part III** covers the different ranks in detail, from First Lieutenant all the way to Colonel. This section also covers the variety of air-to-air combat and ground strike missions that you can select from.

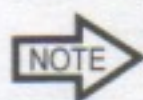
Part IV moves deeper into the strategy and tactics involved in air combat, including maneuvers that the enemy MiGs will be performing as they engage you in dogfights. Learning how to perform some basic maneuvers yourself will help your performance at upper levels of the simulation.

Appendix A is a glossary of the terms and abbreviations used in this simulation. If you are unfamiliar with one or more of the terms in this manual, you can check this section for a definition. Also included is a list of fighter jockey terminology that you can use to impress friends or when applying for Top Gun school.

Appendix B explains how to play FALCON head-to-head either by direct connect, over the phone lines, or using AppleTalk. This section details all the options available to you in this mode and describes which versions of FALCON on other computers are compatible for head-to-head play.

Appendix C is a troubleshooting section. If you are having problems with the operations of FALCON, this section may help you determine what is wrong. It contains a list of the most commonly asked questions about FALCON.

Symbols Used in the FALCON Manual:



This symbol appearing near a block (or blocks) of text indicates a helpful suggestion we'd like to make about the operation or play of FALCON. It is not imperative that you follow these instructions, but we feel they may help you understand a particular feature of our program.

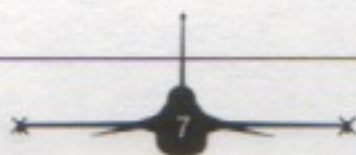


This symbol indicates that a block (or blocks) of text is very important and should not be overlooked. We highly suggest that you follow the procedures in those paragraphs so you will not accidentally cause yourself any unnecessary grief later on.

Throughout the manual, numerous references will be made to the **Backspace** key. On newer Apple keyboards, however, the name of this key has been changed to **Delete**. Although both keys operate in the same manner, the manual will refer to the two keys collectively as **Backspace**.

Part I:

Your First Flight in the FALCON



Hardware Requirements

FALCON requires:

- Any Macintosh computer **with at least one (1) megabyte of RAM**. Some newer Macintoshes require a later version of System and Finder, so the program may not run from the original disks. (An earlier version of the system software is provided with FALCON because of disk memory limitations.)
- At least one 800K or 1.4-MB (known as a FDHD or SuperDrive) disk drive.
- A hard disk drive or second floppy drive is optional, and tends to improve loading speed.
- A joystick (such as the Gravis MouseStick) is also optional.
- A Hayes-compatible modem or the appropriate cables are also optional if you wish to compete against another player head-to-head. (See **Appendix B** for a complete description of head-to-head play.)

Sound and the Use of External Speakers

We recommend you set the volume of your internal Macintosh speaker to its maximum level (7) via the Control Panel (before running FALCON) in order to effectively hear the digitized sounds.

You can also hook up your Mac to an external amplifier and speaker system designed specifically for your computer or to a standard amplifier/stereo speaker system. We highly recommend doing this, as you'll feel like you're flying the real thing. However, the Control Panel should be set no higher than 3 in this case, in order to avoid static and distortion.

Using Desk Accessories with FALCON

FALCON is so RAM-intensive by necessity that it will not allow desk accessories to be used at any time when running FALCON under Finder. Even if you are running the program from a hard disk, the program will not allow you to use the DAs that are resident on your hard disk. You can access your DAs if you run FALCON under MultiFinder.

Other Software Compatibility

INITs, CDEVs, RAM caches and other buffers such as print spoolers use a great deal of your Macintosh's memory. Because these programs take up RAM, sometimes there will not be enough memory left for FALCON to operate. If you are having problems running FALCON, try looking in **Appendix C** (the troubleshooting section) for a solution.



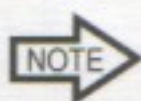
Setup and Loading Instructions

We assume you are familiar with the basic terms and operations of the Macintosh, including pointing and selecting with the mouse, and choosing commands from pull down menus. If this is the first program you have run on your Macintosh, refer to your Macintosh Owner's Manual to become familiar with how to operate your Mac.

Making a Backup Copy of the FALCON Disks



Before proceeding any further, we recommend you make a backup of your original FALCON disks. The FALCON program is provided on two 800K disks, labeled **Disk 1** and **Disk 2**. Follow the normal Macintosh procedures for copying disks, but make sure your original disks are locked (i.e., the write-protect tab has been set) before you make the backup so you don't accidentally erase the original FALCON disks. It is very important that the backup disks be named **FALCON 1** and **FALCON 2** respectively, just like the originals. *Don't forget the space between FALCON and each number!* The program is set up to ask for the disks by those specific names. Also, make sure you don't change any of the file names or create a folder on either disk for the purpose of segregating files. All of the FALCON files must remain at the same level together, and not nested in separate folders.



If you are using an SE/30, IIcx or IIci, FALCON will not run from the floppy disks because those machines require System 6.0.3/Finder 6.1 or higher to operate. We recommend you transfer all the files from **Disk 1** and **Disk 2** (except System, Finder and General from **Disk 1**) to your hard disk. (See page 9 for a detailed description of this procedure.)

Important Notes When Using MultiFinder

FALCON operates under MultiFinder if you have two (2) megabytes of RAM or more, but the size resource of the program file must be increased first. You must make sure that your backup disk is unlocked before you perform this procedure or else you will be unable to make changes. While in MultiFinder, open your backup **Disk 2** and select the file **FALCON**. Next, pull down the **File** menu and choose **Get Info**. In the box to the right of the words "**Application Memory Size (K):**" change the number from **800** to **1024**. After closing the window, your computer will have enough memory allocated to properly run FALCON. On a Mac Plus or SE, MacsBug must be installed in your System Folder.

Loading the Program

FALCON can be played on:

- 1) One or two 800K disk drives.
- 2) One or two 1.4-MB (FDHD) disk drives.
- 3) A hard drive (either internal or external).



FALCON will automatically load if you power up (or "Restart") with your backup **Disk 1** in the internal drive, except when using an SE/30, Ilcx or Ilci. The following instructions assume you are on the desktop loading FALCON via the **Start FALCON** icon on **Disk 1**.

Running FALCON from one 800K or 1.4-MB disk drive:

- 1) After the computer is powered up, insert your backup **Disk 1** into the internal drive.
- 2) Double-click the **Start FALCON** icon. When the title screen appears, you can listen to the music, or click the mouse to bypass the sound. Either wait for the music to end or click the mouse, then exchange your backup **Disk 1** with backup **Disk 2** so the program can begin to load the necessary data. It may take a little disk-swapping before FALCON is completely loaded into your system.



You need to leave the backup **Disk 2** in the internal drive for the duration of play, because there are certain files FALCON needs to access that are on that disk. As mentioned previously, don't set the write-protect tab on your backup **Disk 2**, or the program will not be able to save your name, rank and score.

Running FALCON from two 800K or 1.4-MB disk drives:

- 1) After the computer is powered up, insert your backup **Disk 1** into "Drive 1" (the lower drive if you have an SE with two internal drives).
- 2) Double-click the **Start FALCON** icon. When the title screen appears, you can listen to the music, or click the mouse to bypass the sound. Whether you wait for the music to end or click the mouse, the program will ask you to insert **Disk 2**. Place your backup **Disk 2** into the other drive so the program can load the necessary data.



You need to leave the backup **Disk 2** in the internal drive for the duration of play, because there are certain files FALCON needs to access that are on that disk. As mentioned previously, don't set the write-protect tab on your backup **Disk 2**, or the program will not be able to save your name, rank and score.

Running FALCON from a hard drive:

- 1) If you decide to run FALCON from your hard drive, create a folder called "FALCON" and copy all the files from **Disk 1** and **Disk 2** (except System, Finder and General from **Disk 1**) into that folder. **All the program files must reside in a single folder.**
- 2) Double-click the **Start FALCON** icon. When the title screen appears, you can listen to the music, or click the mouse to bypass the sound. Whether you wait for the music to end or click the mouse, the program will load the necessary data from the hard drive.

After the remainder of the program loads in, the DUTY ROSTER screen will appear.

Duty Roster

The DUTY ROSTER maintains a record for up to ten active (alive) players. The last rank achieved and total merits (points) attained are displayed along with the pilots' names. (The Duty Roster shown below lists some of the call signs that we use here at our office, just to give you some examples. Since no one has played from your disk as yet, all pilot name lines show a call sign of "ROOKIE" at First Lieutenant rank with zero merits.) If you expect to have several people playing the game and want to make sure that someone's name isn't accidentally erased, we suggest designating one of the name slots as the "floater" for newcomers and occasional players to use.

On this first entry, highlight the topmost "ROOKIE" name line by moving the arrow cursor over the word "ROOKIE" and clicking the mouse or joystick button. A box will appear, prompting you to either type in a name for yourself or accept the generic term of "ROOKIE." Every great fighter jock has a call sign. Be as creative as you like; just keep the name within twenty characters. (You can use the **Backspace** key to correct any errors.) When you're finished typing, click on **OK** or press the **Return** key to accept. Click on **CANCEL** to select a different name line or start over.

DUTY ROSTER		
Rank	Pilot	Merits
COLONEL	Chopstick	2246
COLONEL	Snake	2246
LT COL.	No. 19	1991
MAJOR	MotorHead	1024
MAJOR	Red Two	916
MAJOR	White Knight	812
CAPTAIN	Skull001	425
CAPTAIN	Blake 7	322
1ST LT.	Scorpion	145
1ST LT.	ROOKIE	0

You can override a listed pilot's name at any time if you want to add a new person or name to the game. You might even want to keep separate "names" of yourself for practice reasons. Just make sure not to overwrite an active pilot for whom you want to maintain a record. If you overwrite an existing pilot's name, you have effectively "retired" them.

The DUTY ROSTER includes pilots who are still alive and aren't either missing in action (**MIA**), court-martialed (**BUSTED**) for unacceptable actions or retired (**RETIRED**) from active duty. This list is different from the SIERRA HOTEL, which contains the top ten FALCON pilots who have ever played from your disk, whether they're alive, dead, declared missing in action, retired or court-martialed.



















File REM Scenery Control Options Communications

SIERRA HOTEL			
Rank	Pilot	Status	Merits
LT COL.	Whiplash	RETIRED	4208
COLONEL	Chopstick	ACTIVE	2246
COLONEL	Snake	ACTIVE	2246
LT COL.	Hook	RETIRED	2144
LT COL.	Bent-A-Hippie	KILLED	2024
LT COL.	No. 19	ACTIVE	1991
MAJOR	Wall-St	MIA	1530
CAPTAIN	DoppleGanger	KILLED	1282
MAJOR	Ghost Rider	BUSTED	1170
MAJOR	Shear Stress	KILLED	1065

You'll see the Sierra Hotel screen after missions are completed. It'll be easy to achieve a spot on the list at first. Over the long run, new additions will have to be pretty special "drivers."

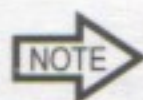
After you've selected a name for the DUTY ROSTER, the next screen allows you to select the level of difficulty at which you will fly, along with the specific mission and number of MiGs you could encounter in a simultaneous engagement.

File REM Scenery Control Options Communications

RANK	MISSIONS
	 Milk Run
	 Black Bandit
	 Rattlesnake Roundup
	 Double Trouble
	 Dragon's Tail
	 Dragon's Jaw
	 Hornet's Nest
	 Bear's Den
	 Venus Flytrap
	 Strike Palace
	 Double Dragon
	 Grand Slam
	 MAXIMUM # OF MIGS
	REMARKS

RANK

Select from a listed rank to determine the difficulty level. The order is from First Lieutenant (easiest) all the way to Colonel (highest difficulty).

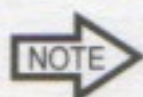


Part III of the manual discusses the differences between ranks, plus how they affect your plane's performance and that of the enemy. You select a rank by simply moving the arrow cursor over the desired rank box and clicking the mouse or joystick button.

Leave the selection at **1st (First) Lieutenant** for your initial flight.

MISSIONS

This is where you choose from any of twelve different missions involving air-to-air combat, air-to-ground strikes, or both. There is a ribbon to the left of each mission name, which will be awarded to you if the mission is completed successfully.



Part III of the manual describes the details of the different missions. Just like rank, you select a mission by moving the arrow cursor over the desired mission box and clicking the mouse or joystick button.

Leave the selection at **Milk Run**, which is a simple flying and bombing exercise.

MAXIMUM NUMBER OF MiGS

You can choose between **zero**, **one**, **two** or **three** as the total number of enemy MiG-21 planes possible to be onscreen at any particular time.

Program speed degradation may occur with more than one plane onscreen at a time, depending on your hardware. We recommend the following guidelines:

- Macintosh Plus: **one or two MiGs**
- Macintosh SE or Portable: **one or two MiGs**
- Macintosh SE/30, II, IIfx or IIfx: **one, two or three MiGs**

These are only guidelines and you may vary them if you feel the computer's performance is satisfactory. You select the total number by moving the arrow cursor over the MiG selection box and clicking the mouse or joystick button until the desired number of plane images appear (or disappear if you want zero planes).

There are no MiGs present in the **Milk Run** area (if you stay in the mission boundaries, that is). Simply accept the default selection, which is the image of **one** plane.

After you've finished making selections on this screen, move the arrow cursor over to the **ARMAMENT** box and click.

Armament Selection

Because you're flying at First Lieutenant level for the first flight, you have unlimited armament available. Therefore, you won't make any choices from the Armament selection screen like you would at other ranks. Even though this is the case, take a look at the Armament selection screen and read the following information just to get familiar with the procedure for future use:



This is where you make selections to outfit your F-16 for a particular mission or exercise. Actually, what happens is you make requests to the crew chief ("Sarge"), and he will inform you whether the armament requested is available. There may be times when certain arms are out of stock for one reason or another. On busy days at the base, other planes taking off on the adjacent runway may have taken the last of the items you've requested. Situations like these will test your mettle as a pilot, depending on the mission that you've selected. Like most fighter jocks, you realize how important the Sarge and his crew are to your job as a pilot, and you treat them with the utmost respect. (Remember the unspoken law: You're only borrowing "his" plane.) There's no room for ego trips around here simply because you're an officer.

Because of the good relationship, Sarge will warn you if he thinks you're arming the plane with too much weight. He'll make sure that your load is symmetric (weight equally distributed) and won't allow the placement of more weapons on a station than is structurally possible; but within these guidelines, the total weight is up to you. Any decisions you make here in arming your F-16 will affect how well the plane performs in the sky (at higher ranks). If you carry too many missiles and bombs on a particular flight, your plane isn't going to maneuver very well, and you can expect a lecture from the Sarge before you take off. You must make your decisions based upon the mission you are embarking on and the armament in stock.

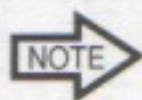
Selection Procedure (all ranks except First Lieutenant)

Click on the up or down arrows to the right of each weapon to increase or decrease the number you wish to carry on your mission. If you request an additional item of any type and the Sarge has it available for you, he'll say so and the tally number to the right of the weapon will increase accordingly. If you change your mind about any piece of weaponry and decide to decrease the amount carried, click the down arrow to decrease the number for that particular item. On any mission that you embark upon (except those at First Lieutenant rank), the program defaults to a basic configuration of two (2) AIM-9J Air-to-Air Missiles. Of course, you don't have to accept this basic configuration if you don't want to take these weapons along and the Sarge has other weapons available. *(At First Lieutenant rank, nines (9) will appear beside all weapons to show that your armament is unlimited. The ALQ-131 ECM Pod and External Fuel Tanks show a one (1), but they are unlimited as well.)*

Before flying at Captain rank or higher, you should take a look at the armament configuration drawing on page 57 to see how weapons are placed onto your F-16.


At this point, you may have noticed that the Menu Bar at the top of the screen has become completely activated. You'll learn about all the selections in due time, but for now the only menu selection you need to make is the device you will be using as your F-16's directional ("stick") control.

Go to the **Control** Menu and select **Mouse**, **Key**, **Joy** or **Mouse II** depending on whether you want to use the mouse, your keyboard, or a joystick as your respective input device for directional control of your plane.



Fighter pilots have told us that they get a little rusty at using their "stick" if they haven't been inside a plane for some time. It takes them a while to get the feel back. Because we've tried to simulate the F-16's handling characteristics so closely, you might want to start off using the **keyboard** for "stick" control because it tends to be a little more forgiving at first.



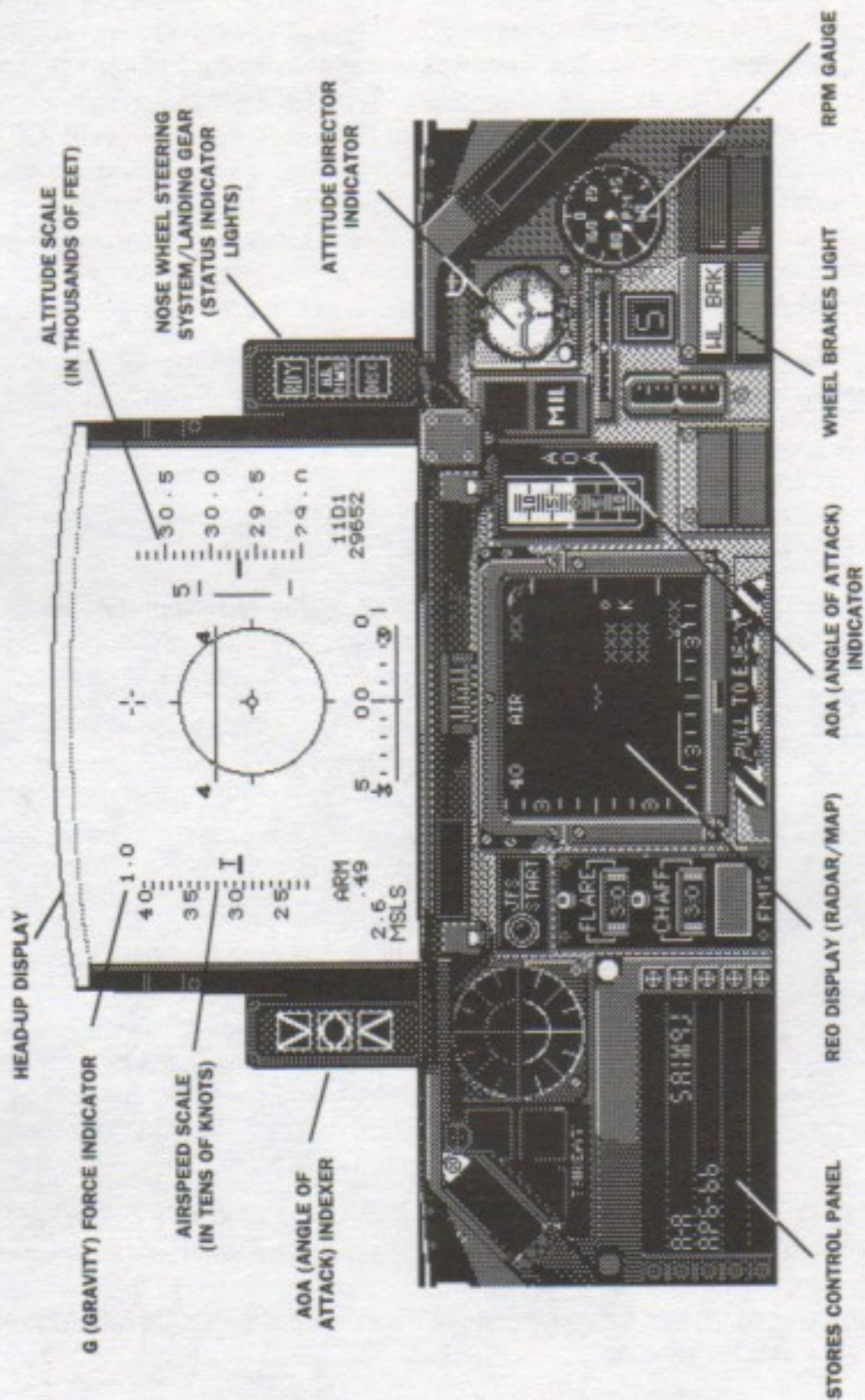
Don't make any selections from the **ACM** Menu at this time or you will go immediately into a training mode for learning Air Combat Maneuvers when you enter the cockpit. These maneuvers require some previous experience with the program for you to use effectively. If you make a selection from this menu by accident and go off into one of the maneuvers, press the  key to bring the Menu Bar back. Go to the **File** menu and select **Abort Mission** to return to the DUTY ROSTER screen. Make the same choices as before to return to this point.

When you've completed your selections, click in the **TAKEOFF** box to accept the armament and proceed to "takeoff ready" position. The Sarge will have a few words to say before the armament selection screen disappears. Get in the habit of reading any messages he has for you, because they may save your life later on when you are flying at a higher rank.

You won't exactly be alone in the air after the Sarge signs off. Your ground support crew will contact you occasionally (via messages along the top of your front cockpit view) when MiGs are sighted as well as confirming your successful hits in air battle. They will also notify you when you're flying off course.



The FALCON Cockpit (Main Features)



Cockpit Orientation

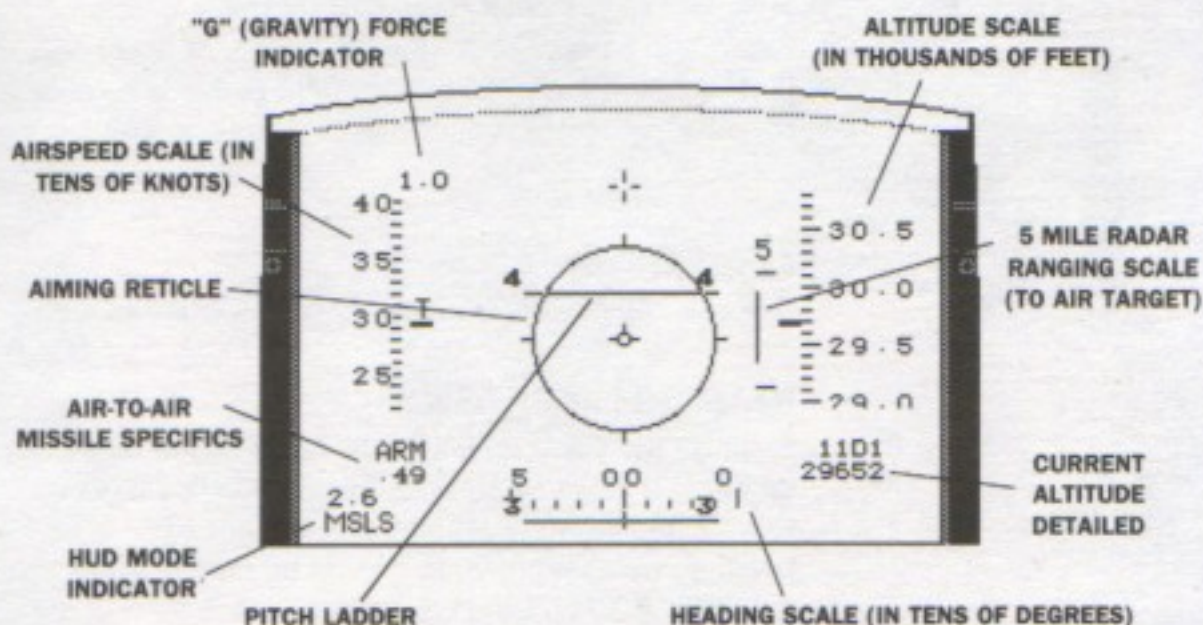
After the Sarge signs off, the next screen has you seated in the FALCON and ready for takeoff. Your plane is resting on Runway #36.

Take some time to get familiar with your F-16. Inside the plane, you are facing the front of the cockpit, which contains the most important displays and controls to be used in the simulation. Look at the components of the cockpit, and compare them to the illustrations in your Flight Manual and foldout reference sheet. You don't need to know what every item represents just now, since all the F-16's characteristics aren't activated at First Lieutenant rank. (All cockpit features are discussed in detail in **Part II** of the Flight Manual.)

Now, let's discuss the ones you *do* need to watch on your first flight.

Head-Up Display (HUD)

The most prominent feature of the cockpit is the **Head-Up Display (HUD)**, which is located in the upper middle of the screen. The HUD is a piece of glass (separate from the canopy) upon which important data is displayed electronically. By having vital information displayed directly in front of your eyes, you don't have to look around the cockpit as much, which helps to maintain your concentration in battle. Although there are several different HUD types, it starts off in "**Air-to-Air**" Mode and displays essential items such as airspeed, heading, gravity forces, altitude and the pitch ladder.



HEAD-UP DISPLAY (HUD) IN "AIR-TO-AIR" MODE

Brief Description of HUD Components

Let's examine the main features of the Air-to-Air HUD.



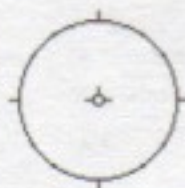
Pitch Ladder

Represents your plane's angle of climb. When positive numbers (0 through 9) are showing, the plane is in an upward climb. Negative numbers (-0 through -9) signify a dive. Each number represents an increment of ten degrees, from 0° to 90° in either direction. When your plane is climbing, the ladder is a solid line and when your plane is diving, the ladder is a gray line. The ladder displayed here shows the F-16 in a 38 degree climb.



Air-to-Air Missile Specifics (Discretes)

Data relating to the specific HUD mode, in this case "Air-to-Air." Here, the status of the weaponry is displayed. You'll learn more about this later.



Aiming Reticle

This represents the effective aiming area for missile hits when battling enemy MiGs. **Part II** will explain its usage.

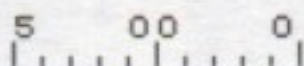


"G" (Gravity) Force Indicator

Shows the amount of centrifugal force that is acting upon you and your plane at any time due to a number of factors including turning (banking) rate and air-speed.

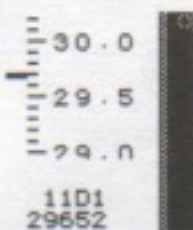
Airspeed Scale

Displays the plane's true speed in tens of knots.



Heading Scale

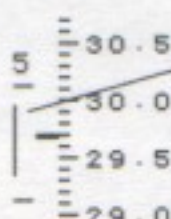
Displays the direction (magnetic scale and in tens of degrees) that your F-16 is heading. You should note that the plane starts off on the runway at a 0° heading, which represents due north. East is 90°, south is 180°, and west is 270°.



Altitude Scale

Displays your plane's altitude in thousands of feet. Note that the current altitude is always detailed at the bottom of the HUD, directly below the Altitude Scale.





5 Mile Radar Ranging Scale

Specific to Air-to-Air HUDs, this scale's pointer starts to slide downward when an enemy plane approaches within five miles of your F-16. More on this later.

To glance at the other HUD modes, press the **[Return]** key repeatedly to look at other Air-to-Air Modes (used for dogfighting enemy planes), or press the **[Backspace]** key in succession to examine Air-to-Ground Modes (used for ground strike missions). The **[V]** key brings up a special landing HUD.

The Rest of the Cockpit

The **AOA Indexer** (left of the HUD) and **AOA Indicator** (beneath the HUD) are used when landing your plane and during battle. They display your "angle of attack." They aren't essential at lower ranks. You should, though, become adept at using them because it's a necessary skill for landing the F-16 at higher ranks.



The **JFS** (Jet Fuel Starter) button will light up when you start your engine.



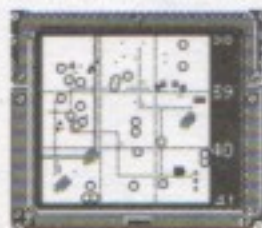
Directly underneath the HUD glass is a combination Radar/Map screen, called the **REO** (Radar/Electro-Optical) Display. It will be the second most-watched item in your cockpit after the HUD. In **Boresight** radar mode, you obtain a view of the enemy as if you were looking down the barrel of a rifle. When you are in **Tracking** radar mode, your plane is in the bottom center of the display, and you are looking at the enemy planes from a top view. **Map** mode shows your current location in the FALCON world, along with landmarks to guide you during missions. Press the **[C]** key to toggle between the **Radar** modes and the **Map** mode. Press the **[<]** key to enter **Boresight** radar mode and the **[>]** key to enter **Tracking** radar mode. The default **REO** mode is **Boresight** radar.



BORESIGHT RADAR MODE



TRACKING RADAR MODE



MAP MODE



The **MIL/AB Indicator** shows whether you are currently invoking the engine's afterburner (**AB**) for extra acceleration or standard power (**MIL**). Military Power is a term that means 100% RPM (thrust). Press the ☐ key (or ☐ on the numeric keypad) to toggle between the two settings. The default setting is **MIL**.



The **Attitude Director Indicator (ADI)** aids in orienting your plane to the horizon while pitching and rolling. Use it in combination with the "waterline" (your plane's position parallel to the horizon) and visual contact with the real horizon to orient the plane directionally.



The **RPM Gauge** represents the percentage of power (thrust) that has been applied with the Throttle ☐ key. This example shows just over 70% thrust being applied.



The **Stick Centering Indicators** help you orient your plane's direction when using a joystick or the mouse for directional control.



The **Wheel Brakes** light is on, signifying that your wheel brakes are set. This keeps the plane from rolling when the engine is started.

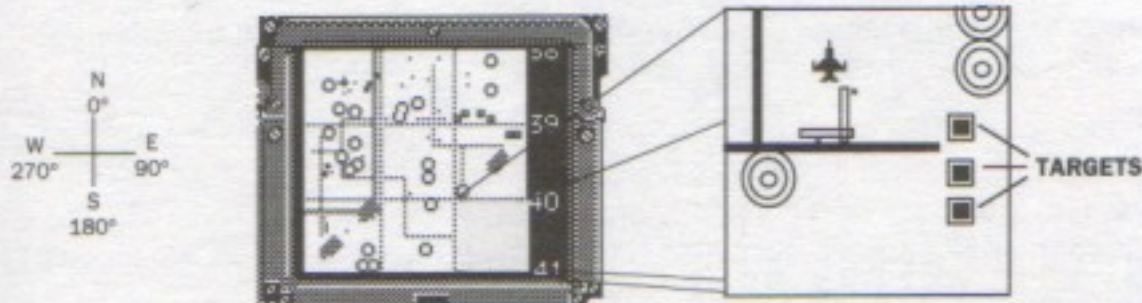


Before taking off, take a look out the other views from your cockpit, specifically the **Left View** ([4] key-top row or [7] on the numeric keypad) and **Right View** ([6] key-top row or [9] on the numeric keypad). You'll learn more about the additional gauges and panels later. For now, you might note the initial compass heading in the **Left View** (due north) and how it matches up to the degree heading in the HUD as well as your current location in the REO Map mode. These indicators can help you find your way back to the landing strip whether you're lost or returning home from a long-distance mission.



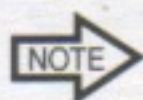
About the Milk Run

The objective of the **Milk Run** mission is to destroy one or more of the buildings located 5 miles east of your home base.



Takeoff Procedure and First Flight

You'll probably want to have your quick reference card close by during the takeoff procedure.



Even though we've tried to pattern this initial flight instruction for a first-time user, the FALCON cockpit has so many features that, even at First Lieutenant rank, things may seem overwhelming at first. This is reason enough for including a "pause" key in the game. If you're at a certain point in the procedure and want to read ahead to prepare for the next action, simply press the **[P]** key to pause the simulation. When you're ready to continue, press the **[P]** key again to resume flying. After a few flights, everything will become second nature to you.

At times in this section, we'll discuss a procedure in light of what the same situation might require in skill at upper ranks. However, since you selected First Lieutenant on the Rank/Missions screen, your plane will perform according to those characteristics. You might want to look at the charts in **Part III** that cover what performance differences occur between the various ranks.

Directional Control (Flying with the "Stick")

Fighter pilots control the directional movement of their planes with a hand control commonly known as the "stick." The following images show the ways you can control the same directional movement of your F-16, depending on whether you prefer to use the keyboard, mouse or a joystick.

Throughout the rest of the manual, we will use an "operation" with the stick as a common way to describe a needed directional change at a particular time. For example, "pull back on the stick" is equivalent to pressing the **[M]** key on the keyboard, sliding the mouse toward you or moving the joystick handle backwards, depending on the input device you're using.

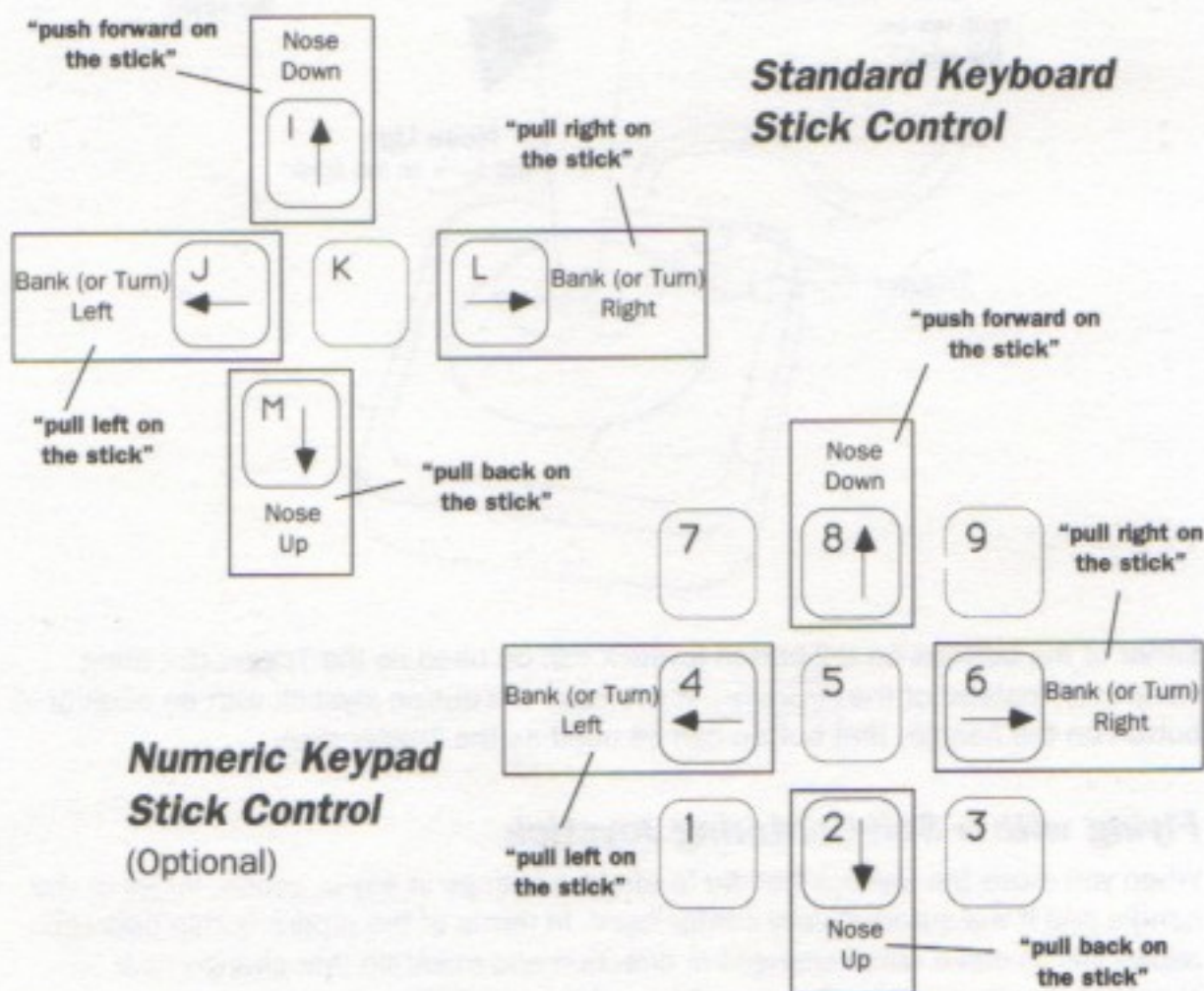
There are four different modes of controlling the directional movement of your F-16: Keyboard, Mouse, Joystick or Mouse II. If you are planning on using a Gravis MouseStick with FALCON, you should choose either **Mouse** or **Mouse II** from the **Control** menu.

The following images have the corresponding "stick" operation printed in boldface next to the particular movement control.



Keyboard

Those with newer Mac keyboards (or a separate numeric keypad) have the option of choosing between the **I J L M** setup and the numeric keypad for stick control. Other control functions are duplicated on the numeric keypad for a faster reaction time.

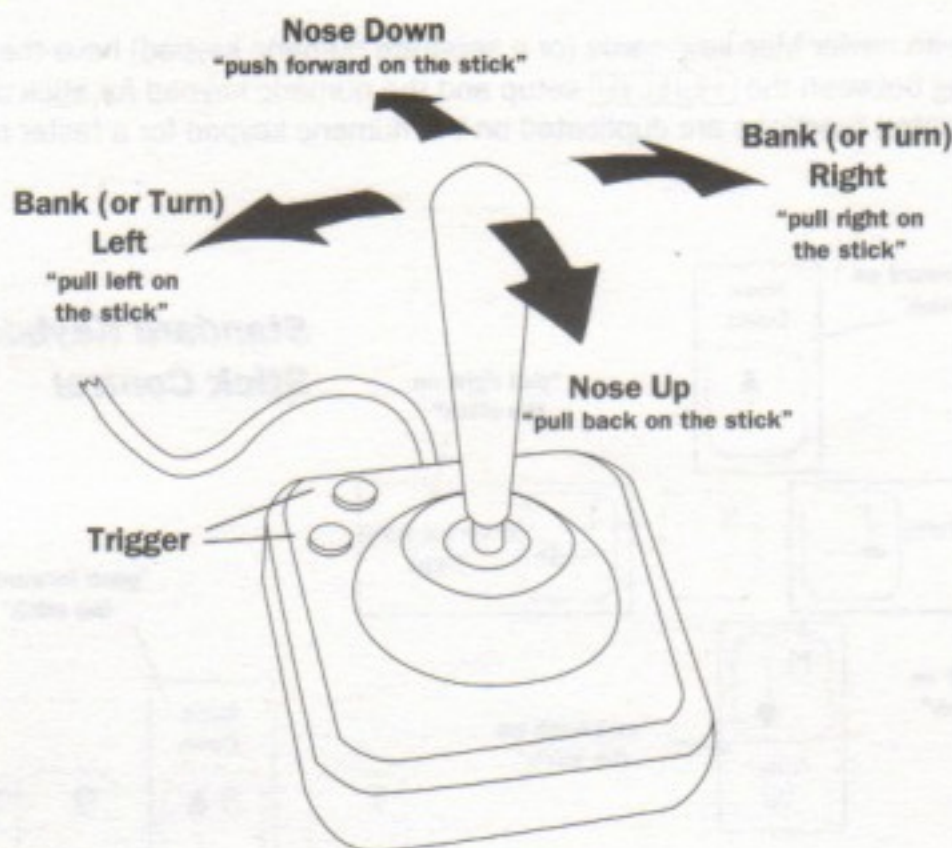


When you use the keyboard to control directional movement of your plane, the F-16's "stick" automatically centers itself after each keypress. This allows you to easily maintain a constant rate of turn. In other words, if you press the **J** key once, your plane will bank left at a small constant rate and continue to do so until you make another directional change.

NOTE If you want to increase the degree of turn (or any other directional change), you need to hold the particular key down for a longer period of time. Also, the longer you hold the particular key down, the faster the rate of change will take place (all other things being equal).

This is always true at lower ranks (with "super engine"). However, at higher ranks, where your "normal engine" has many factors operating on it, things may not be quite so predictable. Refer to **Part III (Ranks)** on the differences between "super engine" and "normal engine."

Joystick

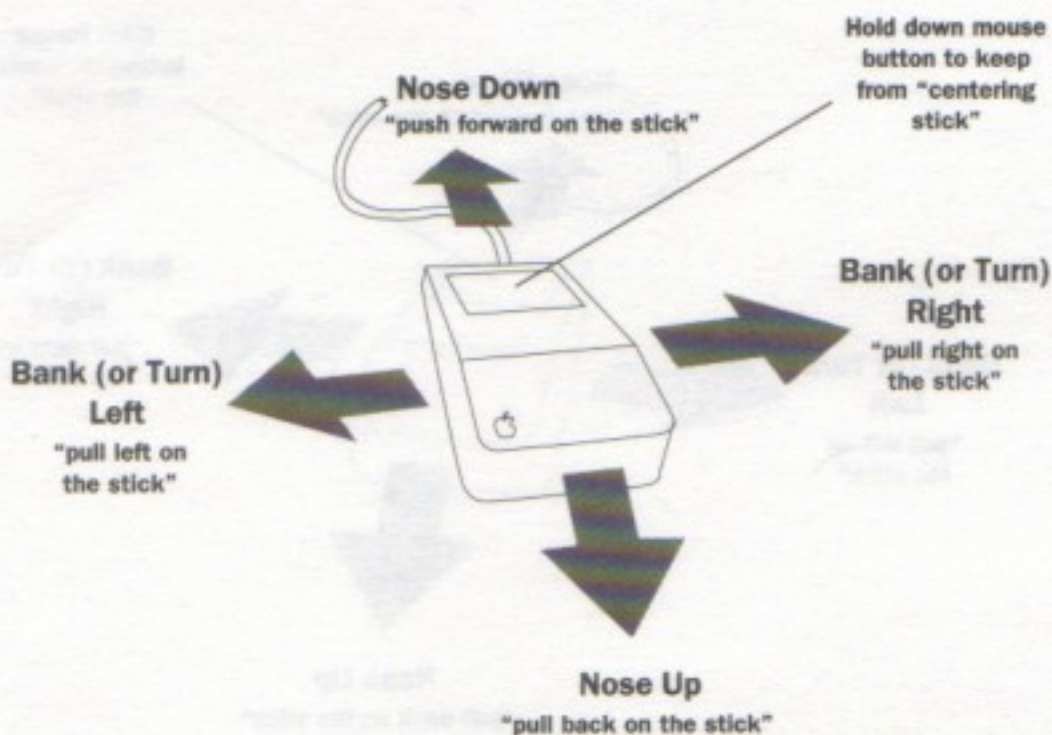


Either of the buttons on a 2-button joystick can be used as the Trigger (for firing weapons), instead of the `Spacebar`. If you have a 3-button joystick with an additional button on the handle, that button can be used as the Trigger also.

Flying with a Self-Centering Joystick

When you move the joystick handle to effect a change in any direction, let go of the handle and it will automatically center itself. In terms of the program, this operation allows you to make small changes in direction and maintain that change as a constant. In other words, if you want to make a small bank to the left, tap the handle to the left and let it return to center by itself. Every time you tap the handle in a specific direction, the plane will make a small directional change, and maintain that angle until you make another movement with the stick (all other things being equal). If you want to continue to increase the angle of turn, etc. in a specific direction, simply keep the handle held in that direction. When you let go of the handle, it will center itself as before and the plane will once again maintain a constant direction. (See page 61 for a discussion of the Directional Indicator in the HUD, which gives feedback on the directional change being made when you move the joystick handle. The Stick Centering Indicators also give useful information on directional change when you're flying with a joystick.)

Mouse



Flying with the mouse in Mouse mode:

Sliding the mouse in a particular direction to change the pitch or bank of your plane is not so different from using the keyboard or joystick. When you slide the mouse to effect a change in any direction, the plane responds by changing its direction until you stop sliding the mouse, which "centers the stick." When the mouse stops moving and the "stick" is therefore "centered," your plane continues on the same path until the mouse is moved again.

Without holding the mouse button down:

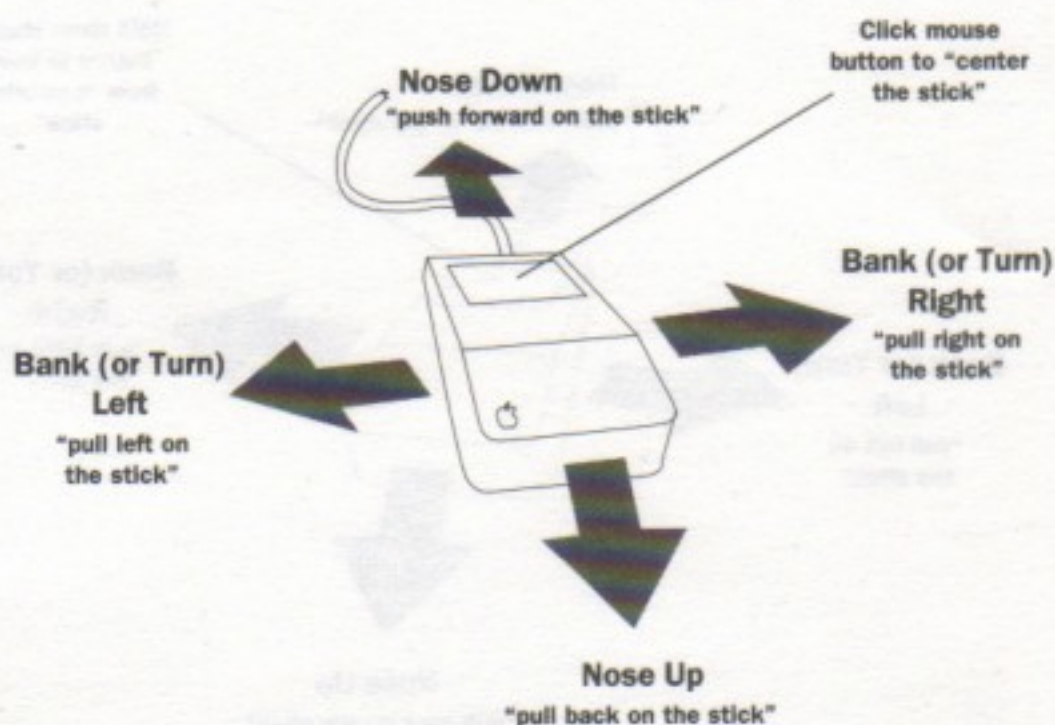
Move the mouse slightly and slowly to effect small changes in direction. Remember, every time the mouse stops moving, you "center the stick."

Slide the mouse faster and over a longer distance to cause larger and more accelerated changes in direction.

With the mouse button held down:

With the mouse button held down, the "center stick" routine is interrupted, allowing you almost virtual movement. You should employ this method when making sudden and sustained changes in direction.

Mouse II



Flying with the mouse in Mouse II mode.

Flying in Mouse II mode is not much different from flying in regular Mouse mode. When you slide the mouse to effect a change in any direction, the plane responds by changing its direction. The only way to "center the stick" in Mouse II mode, however, is to click the button. This mode allows you almost virtual movement (similar to holding the mouse button down in Mouse mode).

Clicking on the mouse button:

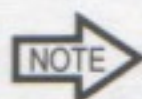
Clicking the mouse button in Mouse II mode "centers the stick." Using Mouse II mode may be a little tricky at first, but more agile "mouse pilots" may prefer this option.

Flying in either mouse mode takes some getting used to for most people. Take a look on page 61 at the Directional Indicator, and use it to help you learn how to fly with the mouse. After you get the hang of it, you may find that you prefer the mouse because of its ability to change to any direction almost instantly.

On the Ground

If you haven't done so already, press the ☐ key to bring up the FALCON Menu Bar, then go to the **Control** Menu and select either **Mouse**, **Keyboard**, **Joystick** or **Mouse II** as your stick control. Then, press the ☐ key on the top row (or ☐ on the numeric keypad) to return to the **Front View**.



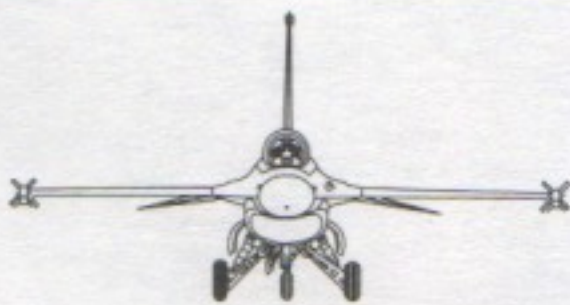


On both of the Keyboard Command Charts there are two different sets of keys controlling the throttle. This is meant to accommodate both left-handed and right-handed players. For the purposes of this manual, we will only mention the $\boxed{+}$ and $\boxed{-}$ keys the rest of the way, but the $\boxed{1}$ and $\boxed{2}$ keys on the top keyboard row are also available for throttle control. (In addition, if you have a numeric keypad, you can use the $\boxed{+}$ and $\boxed{-}$ keys located there for throttle control.)

How to Taxi Your Aircraft

Even though it's not necessary to taxi the aircraft, you may want to in order to get familiar with the Nose Wheel Steering (NWS) System. To the right of the HUD you'll see the NWS System/Landing Gear Status Indicator. The RDY "ready" light at the top should be lit, indicating that your Landing Gear (which includes the NWS system) is in "down" position and operational.

To taxi, start your engines by pressing the Throttle Increase key ($\boxed{+}$) and hold the key down until your RPMs reach 65%.



NOSE WHEEL

The engine may or may not start the first time, and you may hear it rev and then die as it fails to turn over. (Even an F-16 isn't perfect!) Keep trying until you hear an ascending whine as the engine kicks in.

Release the Wheel Brakes key (\boxed{W}) and your plane should start rolling. *Never exceed 80% RPM with the Wheel Brakes engaged, because your aircraft will be damaged.* Your Nose Wheel Steering light (AR/NWS: the one in the middle) will illuminate once the plane is moving. At this point you can use the stick controls to steer your F-16 on the runway.



WHEEL BRAKES LIGHT "OFF"



To turn left, pull the stick to the left. To turn right, pull the stick to the right. The faster your taxi speed, the wider your turns. Keep taxi speed under 50 knots while varying your throttle to control the speed of the aircraft.



Takeoff



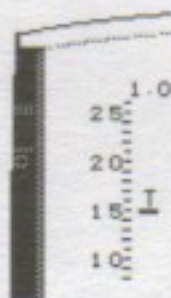
Get in the habit of keeping your plane on the runway. Grass takeoffs are fine for whirlybirds, Harriers, insects and other assorted creatures, but not for your F-16. *At upper ranks, you must stay on the runway unless you want to be permanently grounded!*

If you haven't already done so (by using the instructions on how to taxi your plane), release the wheel brakes by pressing the **[W]** key.

Next, hold the Throttle Increase key (**[+]**) down until your engines have reached 100% RPM (Military Power).

Continue to roll straight down the runway until your airspeed has reached 150 knots (15 on the HUD Airspeed Scale). You'll notice that the NWS System light (AR/NWS) will disengage once your speed has exceeded 90 knots. This means that you will no longer be able to steer your aircraft.

**150 KNOTS
TAKEOFF SPEED**



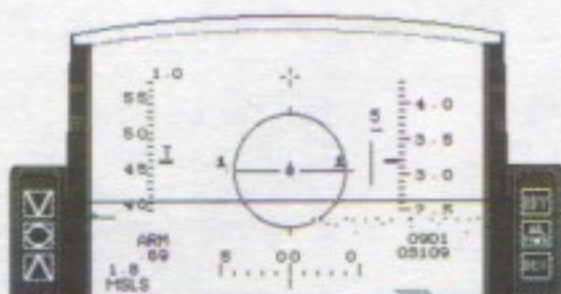
**NWS SYSTEM
DISENGAGED**

For faster takeoffs and to compensate for heavier payloads, light your afterburner for that extra needed power (at the expense of using more fuel). Afterburner (AB) is engaged by pressing the **[/]** key. After you press the **[/]** key, the AB light on the front panel will turn on.



When your airspeed reaches the takeoff speed of 150 knots, gently pull back on the stick until you reach a climb angle of 8 to 12 degrees. As your plane leaves the ground, the 10 degree step of the Pitch Ladder on the HUD should cross the HUD center point, indicating a 10 degree climb angle.





10 DEGREE CLIMB UPON TAKEOFF



Trying to lift off at speeds less than 150 knots can result in skipping, stalling or crashing into the runway.

Note that the DISC (disconnect) light on the NWS System/LG Status Indicator illuminates once your plane has left the ground. This serves as a signal to raise the landing gear.

After takeoff, you need to retract your landing gear by pressing the **L** key. Switch to the **Left View** (**4** key-top row). Look at the Landing Gear (LG) Indicator. All three lights should be off if you've successfully raised the landing gear. Switching back to the **Front View** (**3** key-top row), you'll also notice that all lights in the NWS System/LG Status Indicator turn off once the gear has been raised.



ALL LIGHTS OFF



Faster Climb Rate

You should continue on an 8–12 degree climb angle until reaching 400 knots airspeed. At this point you may increase the rate of climb. A climb angle of 30 to 40 degrees is ideal. Afterburner will also increase your climb rate.

Don't allow your airspeed to fall under 125 knots. There are four ways to increase your airspeed: increase throttle, light the afterburner, dive or reduce the rate of climb.



Moving into Position and Finding the Target

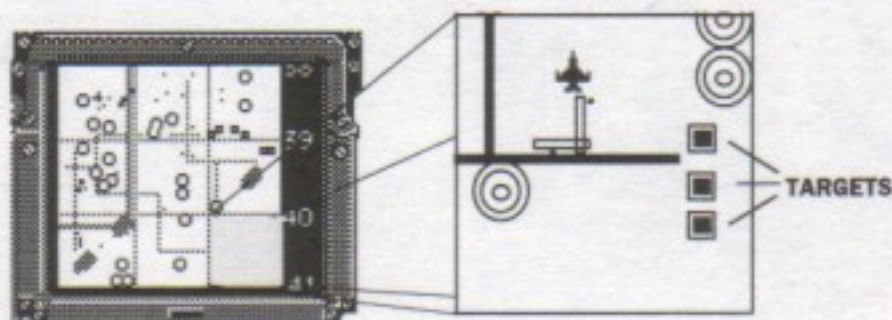
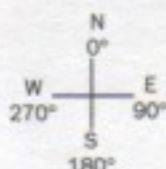
Climb to an altitude of 25,000ft using a 30 degree climb at 450 knots. Your engine should be at 72% thrust. Level off the plane by pushing the stick forward until your Pitch Ladder crosses the center of the HUD at the 0 (zero) degree step.

The most trustworthy navigational aid you have is your own pair of eyes. As you fly, look around at the different views. Try to identify natural and man-made landmarks such as mountain ranges, bridges, lakes and buildings.

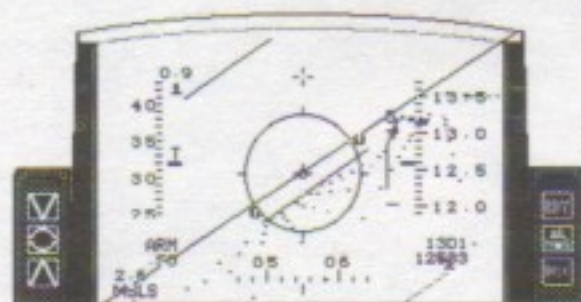
Invoke the Map mode on your Radar/Electro-Optical (REO) display by pressing the **C** key. The Radar mode will be replaced with a 2-D reduced map of the FALCON landscape.

Note your current position on the map (moving black square) in relation to those objects around you. After you've played FALCON for a while, you'll become familiar enough with the landscape to identify where you are without using the REO. This will be a very important skill, especially if your navigation system is damaged during combat.

Since you took off from Runway #36, your plane should be heading due north. Use your compass on the **Left View** panel or check your Heading Scale on the HUD. The heading should be 0 (zero) degrees.



Slowly bank your F-16 to the right until the plane is at a 45–50 degree angle. The F-16 should begin a nice easy turn at this bank angle. The steeper the bank, the faster the turn. Speed also affects your rate of turning. It's just like driving a car: the faster you travel, the wider your turn radius. Travelling at 450 knots, the turn radius will be a little over a mile (6,288 feet to be exact), but at 900 knots your turn radius is a staggering 5 miles.



50-DEGREE BANK TURN



You'll need to fly toward a new heading of 135 degrees (halfway between 13 and 14 on the Heading Scale) to intercept the targets. Ease out of the roll once you've achieved the new heading. Take a look at the map and outside the **Front View**. You should be heading directly toward the buildings. If you happen to get lost, you can use the autopilot (**[Option][D]** key combination) to fly you toward waypoint D1 (your first target in the **Milk Run** mission).

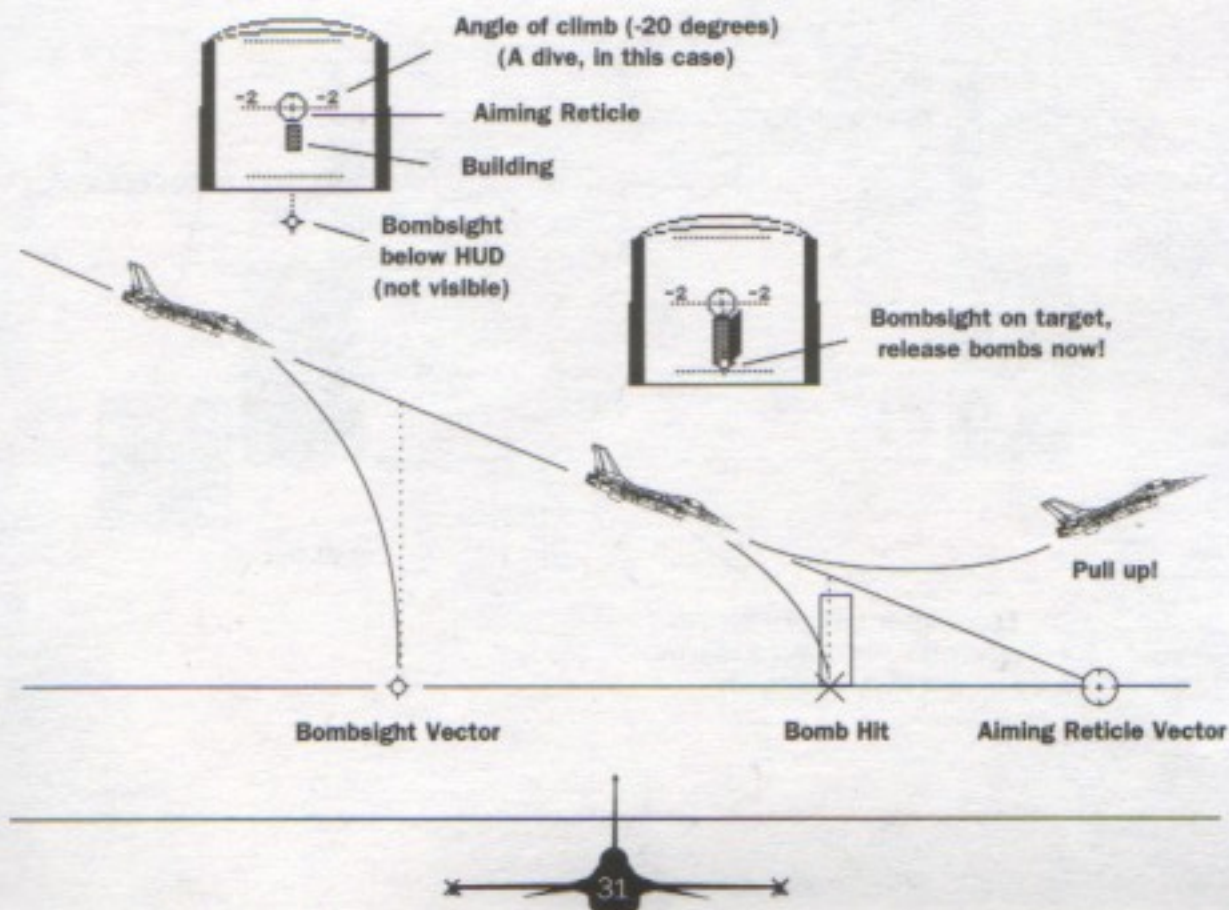
Dive-Bombing

Dive-bombing has been the most common bombing technique used by fighter pilots for the last 70 years. (FALCON also employs pop-up, or "fling," bombing. You'll learn that method later.)

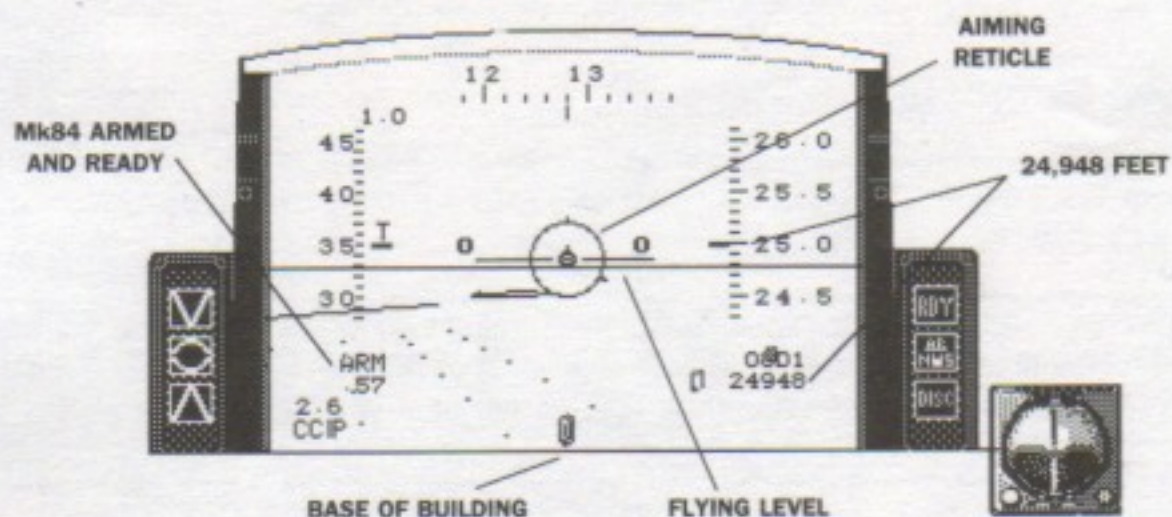
Switch your HUD into Air-to-Ground mode by pressing the **[Backspace]** key. The Stores Control Panel will indicate which Air-to-Ground (A-G) weapon system is active. If the current weapon is not Mk84, tap the **[Backspace]** key until Mk84 appears in the Stores Control Panel.



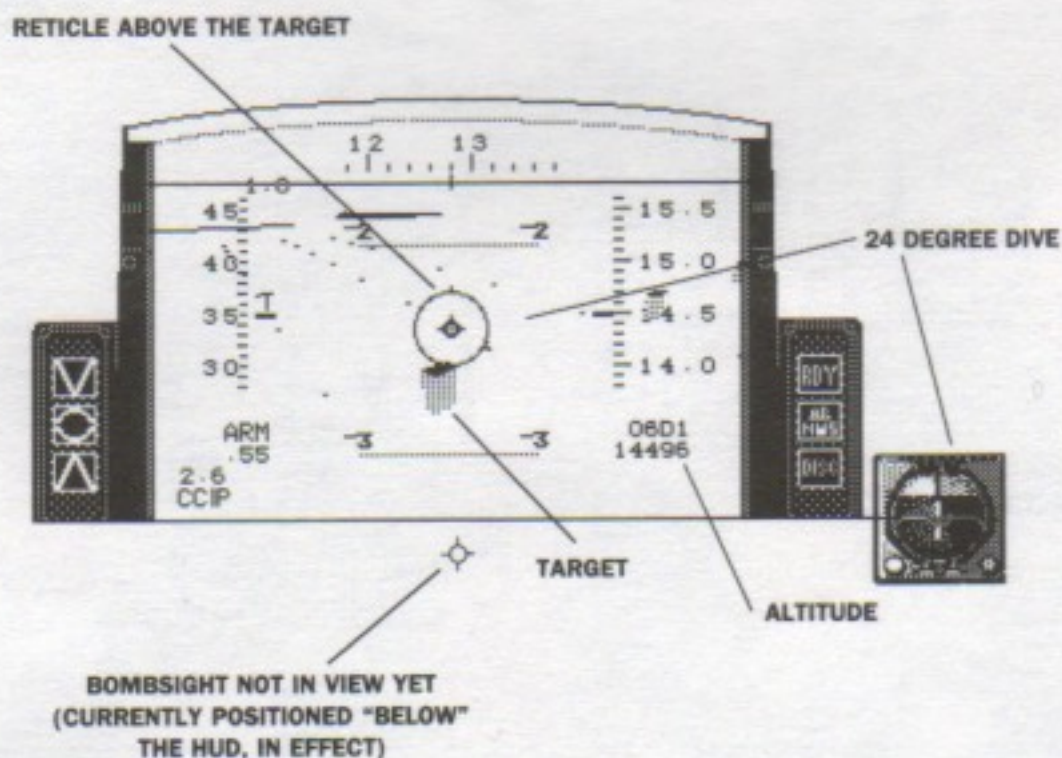
Here's an overview of the upcoming bombing attempt.



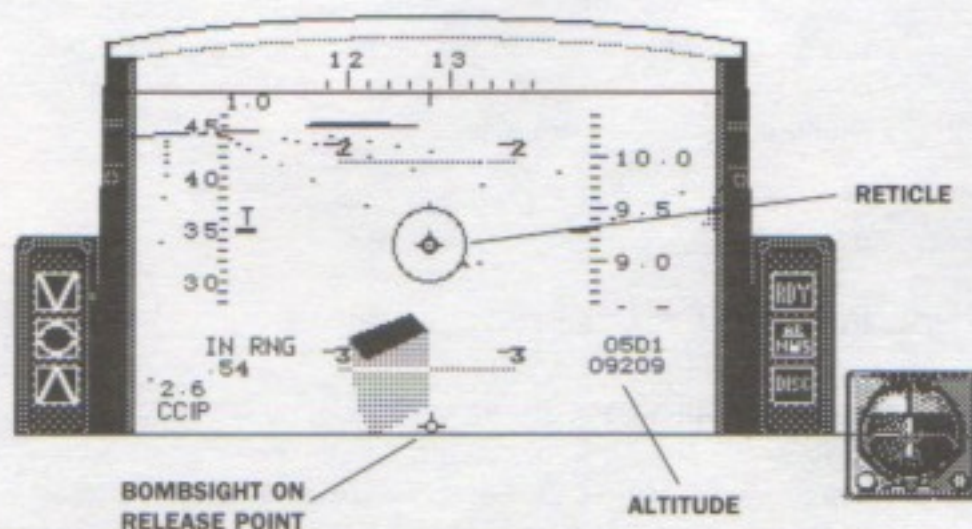
Once you've visually acquired your target (one of the three buildings), fly straight and level heading directly toward it. When the base of the building touches the bottom of the HUD, begin a shallow dive of about 20 to 30 degrees toward the target so that the Aiming Reticle is slightly above the target. Your bombsight may not be visible from this distance and dive angle because it's below the HUD.



As you move closer to your target, the Bombsight will begin to move up. Once you see the Bombsight, hit the Trigger (**Spacebar** or joystick button) once to clear the automatic sighting system. (This is used for pop-up bombing which is explained later.) Continue flying toward the target, making minor adjustments in bank and climb angle to keep the target in front of you.

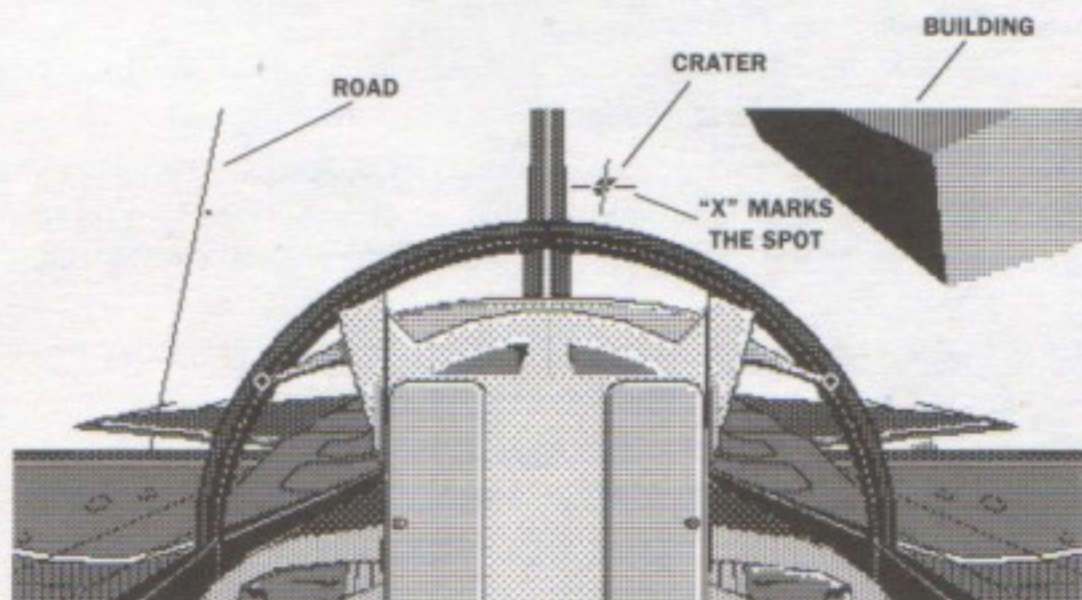


When the Bombsight reaches the base of the building, press your Trigger (Spacebar or joystick button) again to release a pair of Mk84 bombs.



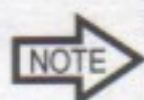
Pull back on your stick to execute a steep climb, in order to clear the debris area and avoid crashing into the ground. It'll take a few seconds for your bomb to reach the ground and detonate. You'll hear the explosion and an "X" will mark the location where your bomb hit. If you hit the target, the building image will appear damaged. Otherwise, you'll see a crater in the ground.

Here's how a miss would look like out the **Rear View**:



When you try to pull up into a climb at upper ranks, you're going to need all the power you can muster to avoid stalling. Therefore, practice revving the engine to Military Power (100% RPM) then kicking in your afterburner. Remember: at First Lieutenant rank, you really don't crash even if you hit the ground.





It's very tempting to go back and get a visual confirmation of hitting the target. At First Lieutenant rank this doesn't pose a problem, but at higher ranks it can be extremely dangerous. You give the enemy more time to get a bearing on your position. Let Intelligence confirm your hits and tell you about them after your mission is completed. Good pilots don't fret about merits and medals. They just want to return their "rented" planes in one piece to the crew chief.

Landing

Getting into the Proper Frame of Mind

Remember, the mission isn't over until your bird is on the ground. Landing takes skilled flying, a steady hand and a calm state of mind. The worst thing you can do is panic and accidentally slam your plane into the ground. A good landing feels as if your plane has floated down onto the runway. Never be afraid to abort a landing and come around for another try. It's better to be a little embarrassed than end up as a picture on the wall of an airfield cantina.

Since the First Lieutenant rank doesn't allow your plane to crash, use this level to practice your landing skills. At upper ranks, being able to shoot up things is only part of being a "complete" pilot.

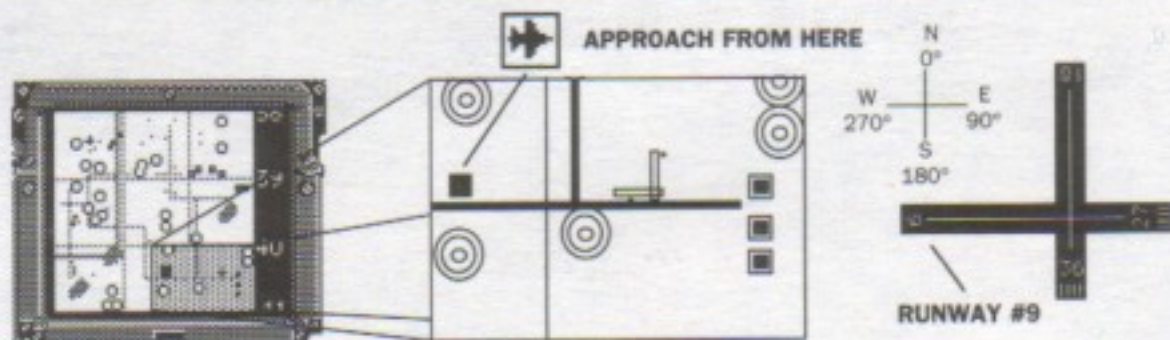
Setting up the Landing

Half the process of landing is getting your plane into approach position. You're going to land on Runway #9 making your approach from the west. It's important that you give yourself plenty of airspace for the approach.

If it isn't already on, switch to Map mode on the REO screen (C key).

Fly to the position indicated in the diagram below (10 miles from base) and turn to a heading of 90 degrees at an altitude of 9,000 ft. (You can tell how far away from base you are by setting the waypoint to D0 (Y key) before starting the landing procedure.)

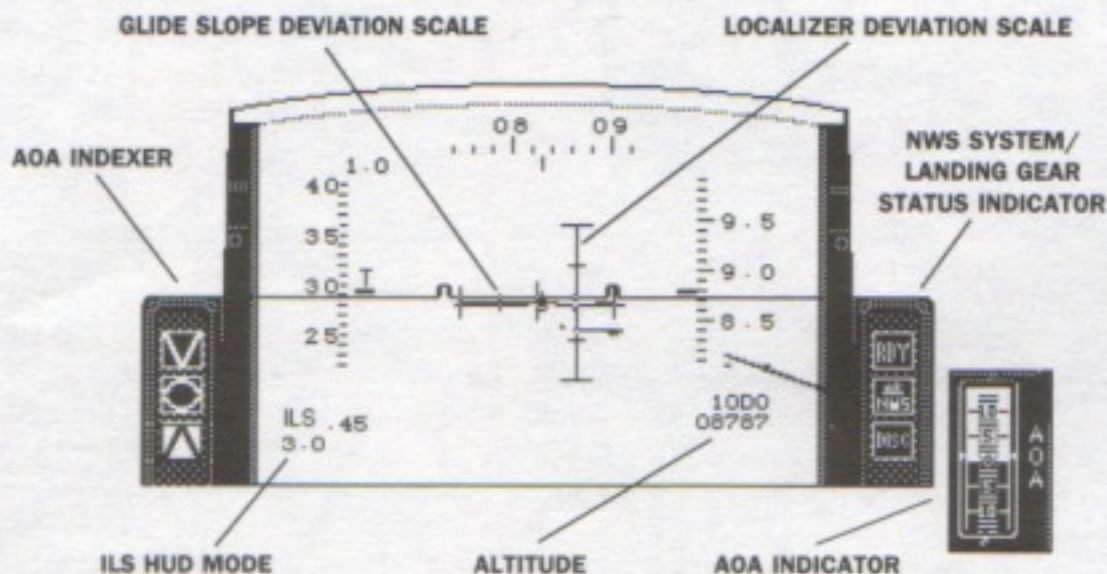
Reduce your speed by throttling down with the - key to about 300 knots.



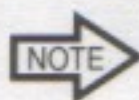
The illustration on the following page points out all the important components of your landing (ILS) Head-Up Display, AOA Indexer and AOA Indicator.



Instrument Landing System (ILS) HUD Mode

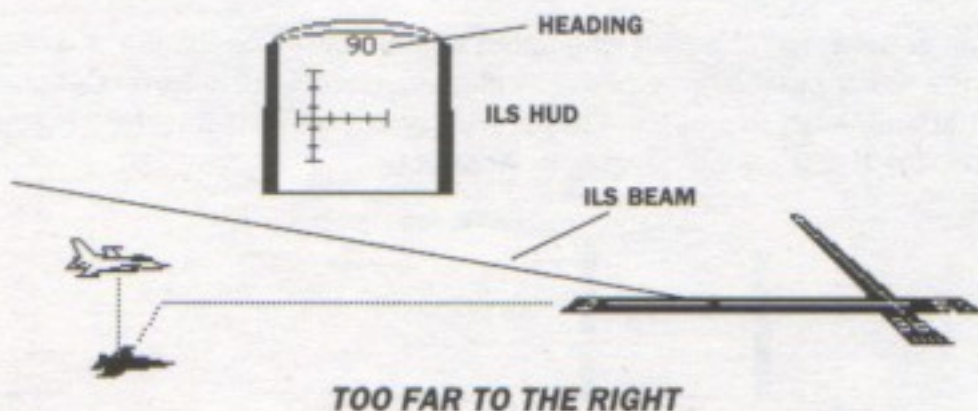


From here you can start a downward approach. Switch on your Instrument Landing System (ILS) HUD mode by pressing the **[I]** key. We suggest you press the Pause key (**[P]**) here and read about the landing procedure before continuing.



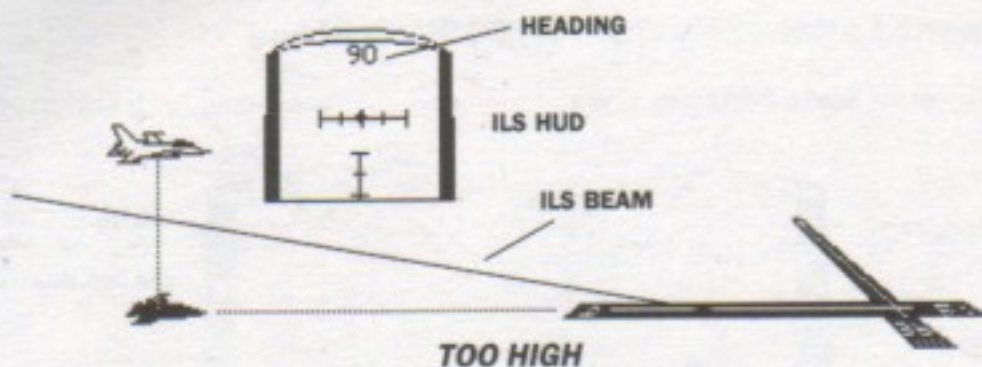
The ILS is designed to assist a pilot in making a smooth landing. The whole idea behind the ILS is that an imaginary beam is projected from the runway. A pilot must "ride down the beam" to make a perfect approach. Runways have to be specially equipped to handle ILS landings. In FALCON, only Runway #9 is set up to handle ILS landings.

The ILS Hud has two principal components: the Glide Slope Deviation (GSD) Scale and Localizer Deviation (LD) Scale. The LD Scale displays angle variance between the correct heading approach angle (90 degrees in this case) and the angle between your current position and the runway. The higher above the ILS beam you go, the lower the LD slides down the HUD, and vice versa.



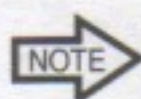
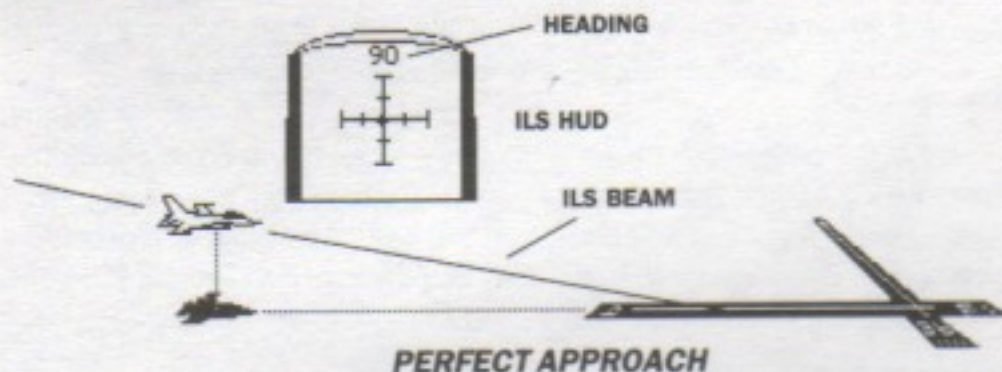
The Glide Slope Deviation Scale displays the angle offset between the beam and your intercept angle to the runway. The further you are to the right, the further the GSD Scale slides to the left, and vice versa.





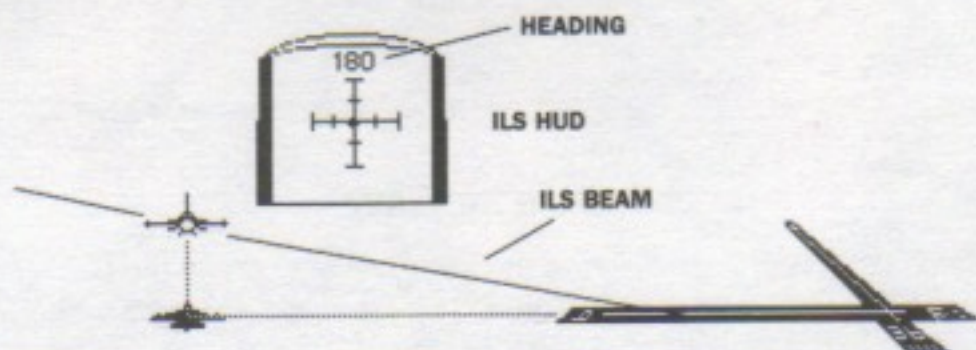
To get in perfect position for landing, steer the plane toward the LD and GSD scales. (This is called "following the needle.") If you are too high, the GSD scale will be below the center of the HUD. You should decrease your altitude until the GSD scale is in the center of the HUD. If you are too far left of the runway, the LD scale will be to the right of the HUD's center. Bank your plane to the right so that the LD scale is in the center.

A perfect approach angle will show the GSD and LD coming together so that the middle of each scale crosses at the center point of the HUD to form a perfect cross.



It's important to understand that your heading has nothing to do with where the GSD and LD are placed on the HUD. The ILS only checks for deviation between the current intercept of the aircraft with required approach angle. That's why you still need to monitor the heading scale during landing.

Following is an example of a pilot who failed to monitor his heading. For a brief moment, the ILS appeared to be perfectly aligned, because the current aircraft position just happened to cross the ILS at the correct point. Notice how everything is aligned in the HUD, yet the heading is incorrect.



INCORRECT HEADING, YET SEEMS TO BE PERFECT INTERSECTION WITH ILS



Start your downward approach, making sure that the GSD and LD are kept in alignment. Your Glide Slope should be 2.50 for landing on Runway #9 (which means you should be diving at approximately -2.5°). Use small movements to make course and altitude correction, but be sure not to over-compensate. Once you are 5 miles away from the airstrip, reduce your airspeed to 200 knots using the throttle (\square key). Make sure your airspeed doesn't fall below 100 knots. At higher ranks, falling below 100 knots can result in a stall, followed by a funeral.

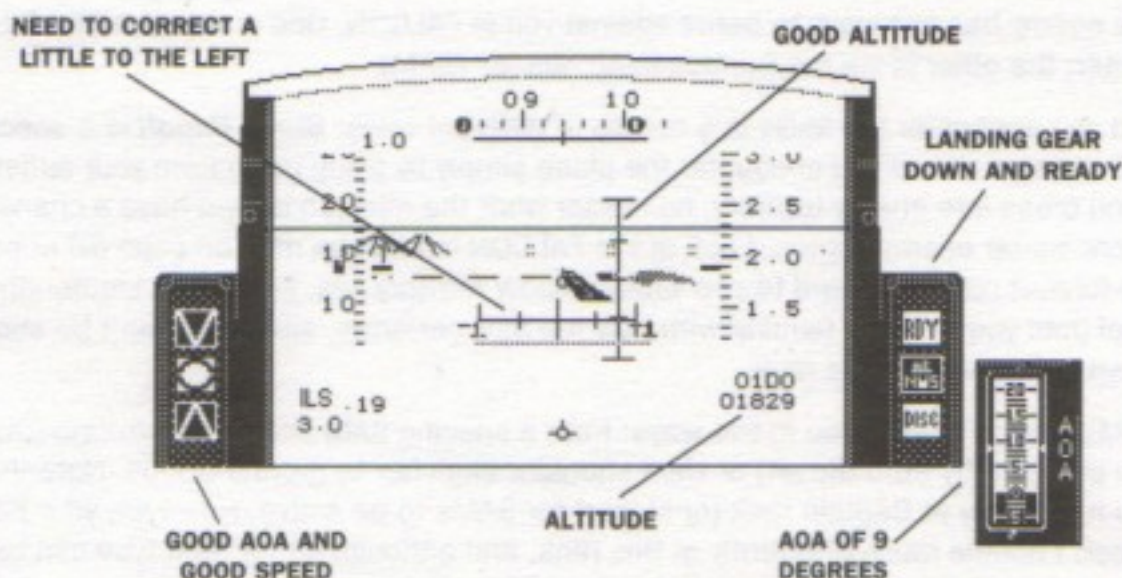


At upper ranks, a correct Angle of Attack (AOA) is extremely important to the success of your landing. A plane's AOA should lie between 8 and 13 degrees (on the AOA Indicator). Dropping airspeed will increase your AOA.

Take a look at your AOA Indexer on the left side of the HUD. If the top light is on, then your AOA is too high because you are coming in too slowly. If the bottom light is on, then your airspeed is too high and your AOA is too low. A center light indicates that your airspeed and AOA are perfect. (You'll learn more on how to fine tune your AOA later.)

When you reach a point 2 miles from your base, reduce your airspeed to 150 knots. Next, drop your Landing Gear by pressing \square . Your NWS System/Landing Gear Status Indicator "RDY" (ready) light should be illuminated. Check the **Left View** to make sure all three wheel lights are lit. If not, you'd better prepare for a crash landing (except at First Lieutenant rank).

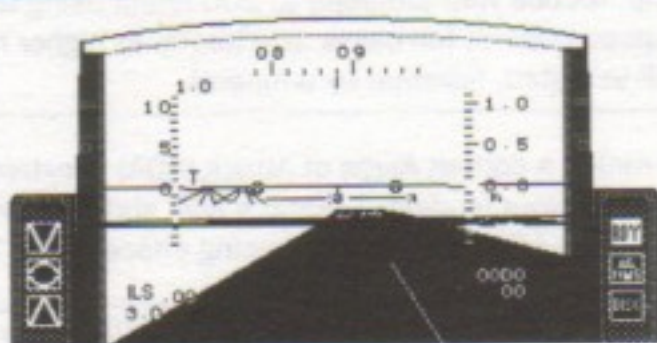
Here's a typical view at 1,829 ft:



At this point, it's important that you monitor your altitude, airspeed, GSD and LD. Use throttle and speed brakes to adjust your speed. If you're going too slow, turn off your speed brakes and increase throttle or drop your nose a little. (Don't get in the habit of dropping below 8 degrees AOA.) Use Trim Control (\square key in conjunction with keyboard "stick" control) to make small adjustments in your climb angle and bank. Just before touching down (altitude under 100 ft), make sure that your climb angle is not less than -8 degrees and your airspeed is 110–125 knots.



As soon as you touch down, reduce throttle to 60% thrust, and apply Speed Brakes, Flaps (F) and Wheel Brakes until you come to a complete stop. At this point, you may exit by pressing ☐. Select **End Mission** from the **File** Menu to collect any ribbons and merits that you earned. Congratulations!



SAFE LANDING!

It takes a little practice, but with time you'll get the hang of flying your F-16 and feel comfortable firing at the practice buildings in the **Milk Run**.

You can take different approaches from this point in order to experience more of FALCON and increase your flying, shooting and bombing skills. Continue to perform the **Milk Run** (or just fly around) at higher ranks to become adept at controlling an F-16 with more realistic handling characteristics. You may also opt to try some of the other missions while remaining as a First Lieutenant.

The Enemy's Resources

The enemy has two ways to battle against you in FALCON. One is with the MiG-21 jet fighter; the other is via the Surface-to-Air Missile (SAM).

You can encounter the MiGs in a couple of different ways: **Black Bandit** is a specific MiG mission where you encounter the plane simply by flying north from your airfield. If you cross into enemy territory, no matter what the mission is, you have a chance to encounter enemy planes. Look at the FALCON landscape map on page 98 or on the foldout reference card to see where enemy territory lies. Fly at First Lieutenant level until you become familiar with how the MiG performs, since you can't be shot down by the MiG at this rank.

SAMs can be fired at you in two ways: from a specific SAM site on the ground (that you can identify from the air) or via a shoulder launcher by ground troops. Note that you have to fly at Captain rank (or higher) for SAMs to be active. However, your F-16 doesn't handle much differently at this rank, and although either SAM type can be launched at Captain level, they are unable to shoot you down.

On the next few pages, we'll give you an idea of what a typical MiG encounter would be like and how to down an enemy plane. Afterwards, we'll do the same for the SAMs. To be truly effective against either MiGs or SAMs, you need to become familiar with all the F-16's characteristics and features in **Part II**. Study the differences in rank and mission guidelines in **Part III** to see how and where events will tend to occur. **Part IV** goes over advanced knowledge that will help you be successful in battles over the long run.



Encountering the Enemy

These examples are intended to give you an overview of the process involved in encountering the enemy. Details of your F-16's features used in these examples are covered in **Part II**. You can try the different HUD modes while you're in the air. If you want a description of an unfamiliar feature that occurs during the process, simply press the Pause key (**P**) and read about it in **Part II**. (Specifications for the enemy's MiG-21 jet fighter are on page 143.) Just like the procedures involved in the previous orientation and flight, everything will soon be second nature to you.

The MiG-21

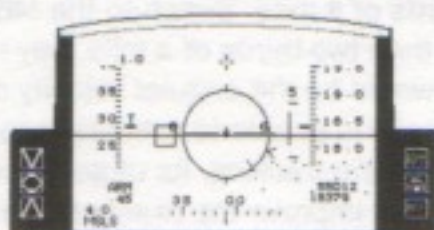
If there are any MiGs in the area, you'll usually know fairly quickly because a square blip (one per MiG) will show up on your Threat Indicator (if the MiG's radar is turned on). In addition, if your REO screen is in one of the radar modes and a MiG is in front of you, the data displayed will give specifics on the targeted MiG's distance from you, its airspeed and its relative heading to your F-16.

Radar and the Threat Indicator

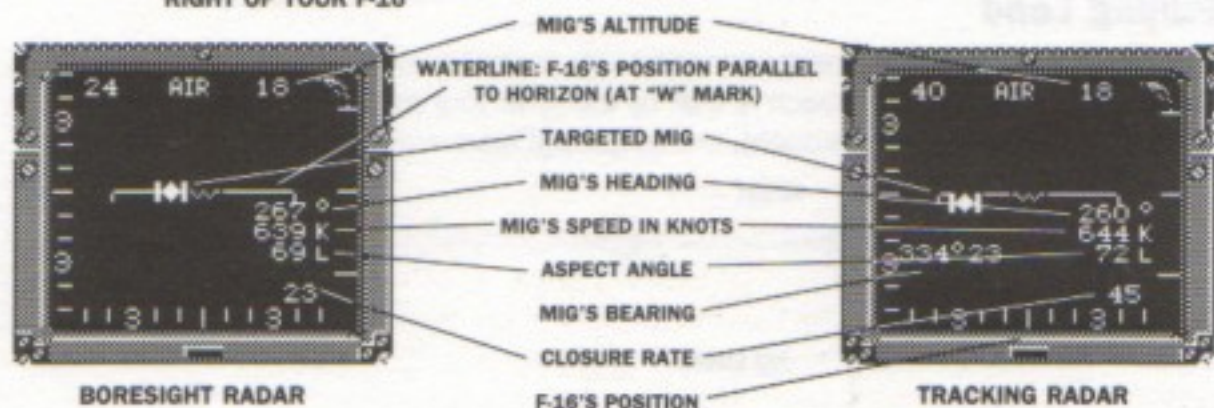
As mentioned previously, there are two different radar modes: Boresight Radar and Tracking Radar. The major difference between these two radar modes (shown below) is that Boresight Radar takes the perspective from the cockpit of your F-16, while Tracking Radar utilizes an overhead view with your fighter in the bottom center of the display. The targeted MiG shows up on either radar screen as a symbol resembling a diamond with vertical bars on its left and right. *Radar always targets the first MiG to appear.* If any additional MiGs show up on Radar, they will appear as square



MIGS TO THE FRONT LEFT AND FRONT RIGHT OF YOUR F-16



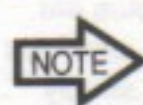
TARGET DESIGNATOR IN HUD



DATA ON TARGETED MIG



symbols identical to those on the Threat Indicator. If there's more than one MiG around, you can alternate between which one is targeted by pressing the Air Target Select (T) key. The radar screen displays specific data on whichever MiG is targeted.



When a MiG is behind you, you'll have to rely on the Threat Indicator and your own eyes (by looking out the different views) to determine its position. *Radar can't detect anything to the sides or rear of your plane.*

Whenever possible, you want to maneuver your plane into position behind the MiG (commonly termed "moving in on his six," where the nose of the MiG represents 12 o'clock on a clock face and the rear signifies 6 o'clock). It's certainly possible to hit the MiG with a head-on shot using well aimed AIM-9L's or gun bullets, but the law of averages favors the rear approach. When the MiG is in front of your plane but out of visual range, the Target Designator box will map the MiG's position onto the HUD. Continue to turn and maneuver the F-16 until you're in a favorable position relative to the MiG.

Improving Missile Hit Rate

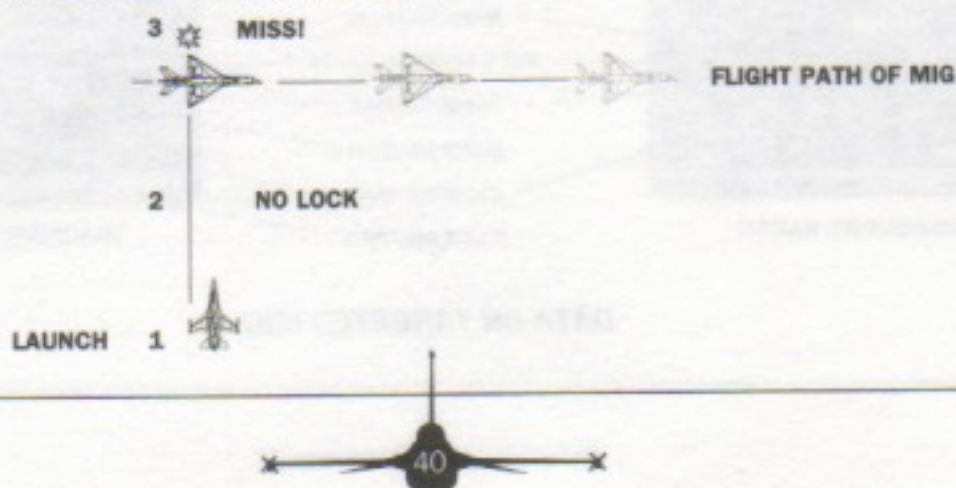
Use the later model AIM-9L "All Aspect" Missile whenever possible. This model has three advantages over the older AIM-9J:

- 1) The AIM-9L can track an enemy plane regardless of the direction the target is facing. The AIM-9J requires that you fire at the rear of the target to provide an adequate heat source to track on.
- 2) The AIM-9L is less susceptible to being fooled by enemy flares.
- 3) The AIM-9L is far more lethal.

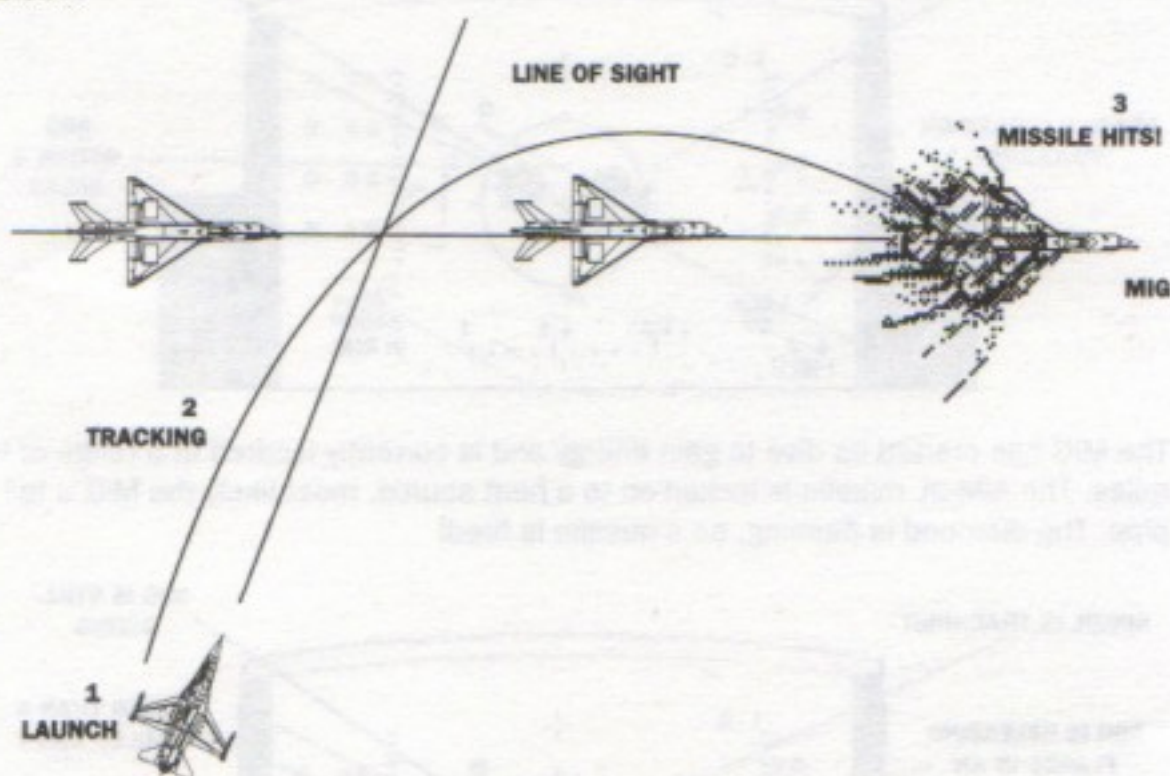
Don't fire missiles if you're too close to the target. An ideal minimum distance is two-thirds of a mile. Switch to the M61A1 gun when in tight, because anything closer than two-thirds of a mile may result in a miss from the Sidewinders. One cause would be the angular velocity of the plane relative to yours is too great and the missile is unable to turn fast enough. The other cause is that by the time the missile starts tracking, its target is out of position. "Pulling lead" (pronounced "leed") will improve the chances of a missile hit.

Pulling Lead

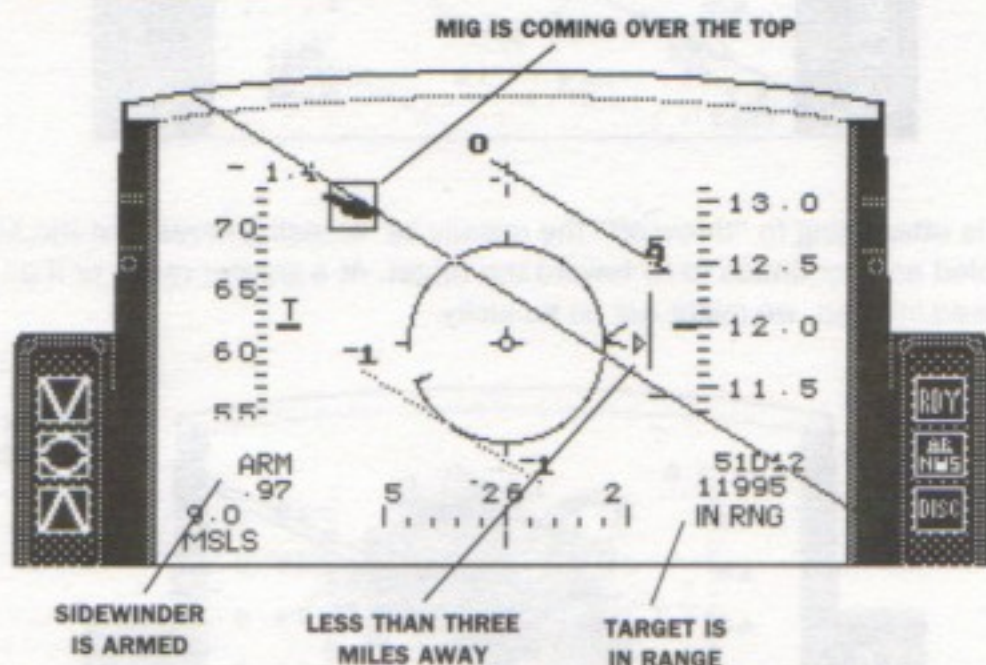
A common error made by inexperienced pilots is that they fire *directly* at their target. The problem with this approach is that by the time your missile starts tracking (about 2-3 seconds after launch), the target will have already moved out of position.



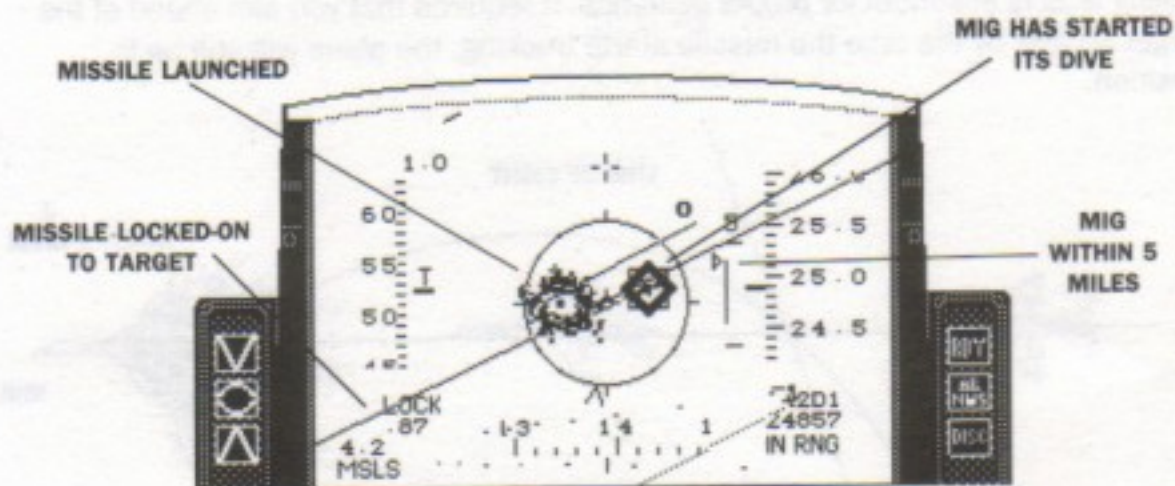
Pulling lead is essential for proper guidance. It requires that you aim ahead of the target so that by the time the missile starts tracking, the plane will still be in position.



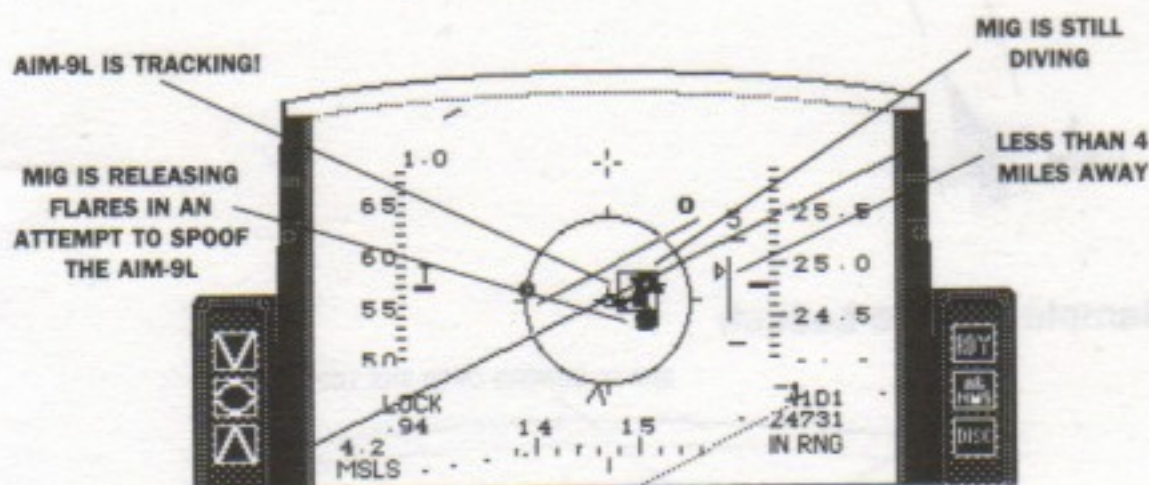
A Sample Missile Launch



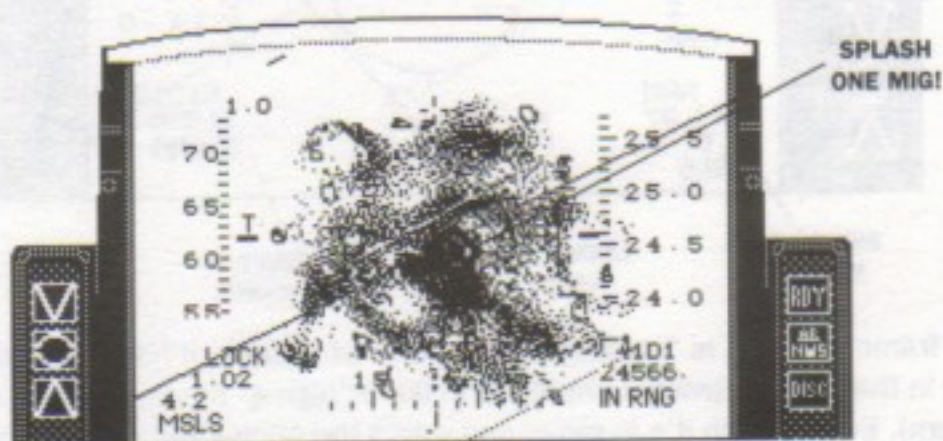
In this frame, the MiG is "coming over the top" of a climb. It has lost considerable energy in the climb, leaving it unable to make a "high g" maneuver (i.e., make a hard turn). Even though it's in range and within the Aiming Reticle, we hold off firing because of the angle and because we aren't "pulling lead."



The MiG has started its dive to gain energy and is currently located at a range of two miles. The AIM-9L missile is locked-on to a heat source, most likely the MiG's tail pipe. The diamond is flashing, so a missile is fired!



The MiG is attempting to "throw off" the missile by releasing flares, but the AIM-9L is not fooled and continues to fly toward the target. At a greater range or if an AIM-9J was used instead, we might not be so lucky.



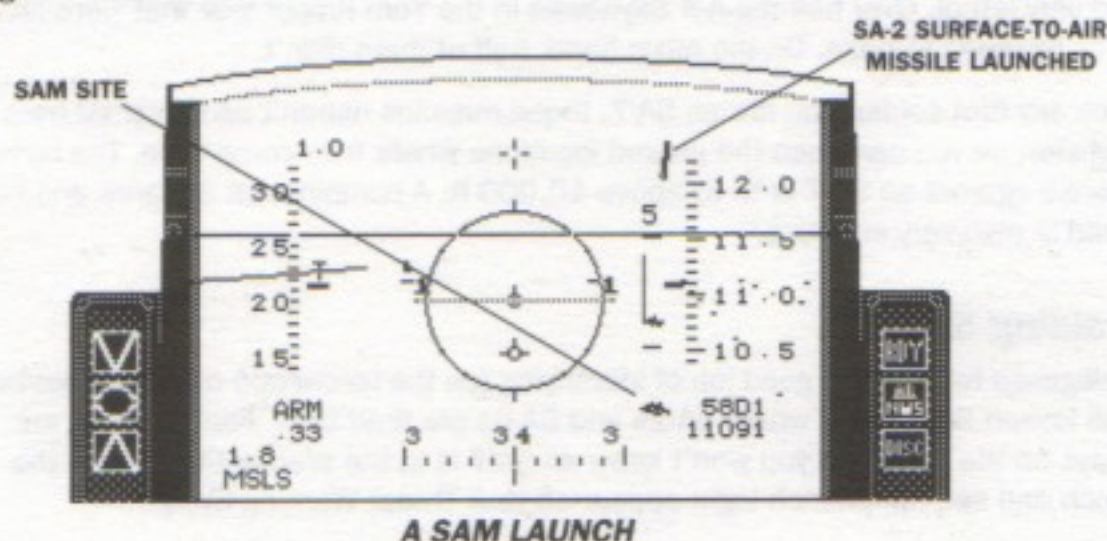
As we close in on the MiG, it suddenly erupts in a fireball. Splash one MiG!



Surface-to-Air Missiles (SAMs)

If you take a look at the FALCON landscape map, you'll notice quite a few locations in enemy territory that are set up for firing Surface-to-Air Missiles (SAMs) at your F-16. SAMs are used primarily for defending ground strongholds from air incursions. They can be fired at you in two ways: from a specific SAM site on the ground (that you can identify from the air) or via a shoulder launcher.

Ask any pilots who flew in Vietnam or the Middle East about SAMs, and they'll tell you that nothing is as frightening as the sight of a SAM launching off its pad, leveling off, and heading at Mach 3 directly toward your plane. A SAM launch has been described as watching a telephone pole explode from the ground with fire coming out its rear.



The jamming pod will usually do a good job against the SA-6. Chaff is minimally effective, but it's better than nothing. This missile (like the SA-2) is launched from SAM sites only, and is all too effective against aircraft flying at medium altitudes.

SA-7 Grail Missile

Guidance:	Heat-Seeking	Max Speed:	Mach 1.5
Range:	6-7 Miles	Service Ceiling:	4,921 ft

The SA-7 is a shoulder launched heat-seeking missile which was designed to be used against low-flying targets. The published service ceiling of the Grail is 4,921 ft, but a Hunter-class aircraft in 1974 was hit at 11,500 ft. The missile is not considered very lethal. Over half the A-4 Skyhawks in the Yom Kippur War that were hit by SA-7s returned to base. On the other hand, half of them didn't.

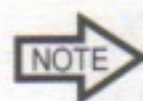
Since any foot soldier can fire an SA-7, these missiles needn't be launched from a SAM site, so you can't see the ground locations where they come from. The best defense against an SA-7 is to fly above 10,000 ft. A combination of flares and high speed is also very effective.

Avoiding SAMs

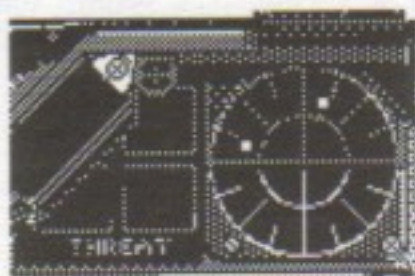
Intelligence has done a good job of identifying (on the landscape map) the locations of all known SAM sites, where SA-2s and SA-6s are fired from. Foot soldiers are always on the move, so you won't know an SA-7 is in the area until you hear the launch and see the Launch Light appear on your Threat Warning System.

SA-2 and SA-6

Carrying the ALQ-131 ECM (Electronic Countermeasure) Jamming Pod can greatly improve your chances against these SAMs. When activated and "emitting," the ALQ-131 completely jams SA-2 missiles to the point where they won't even launch. The enemy may still launch an SA-6 in an attempt to burn through the jamming.



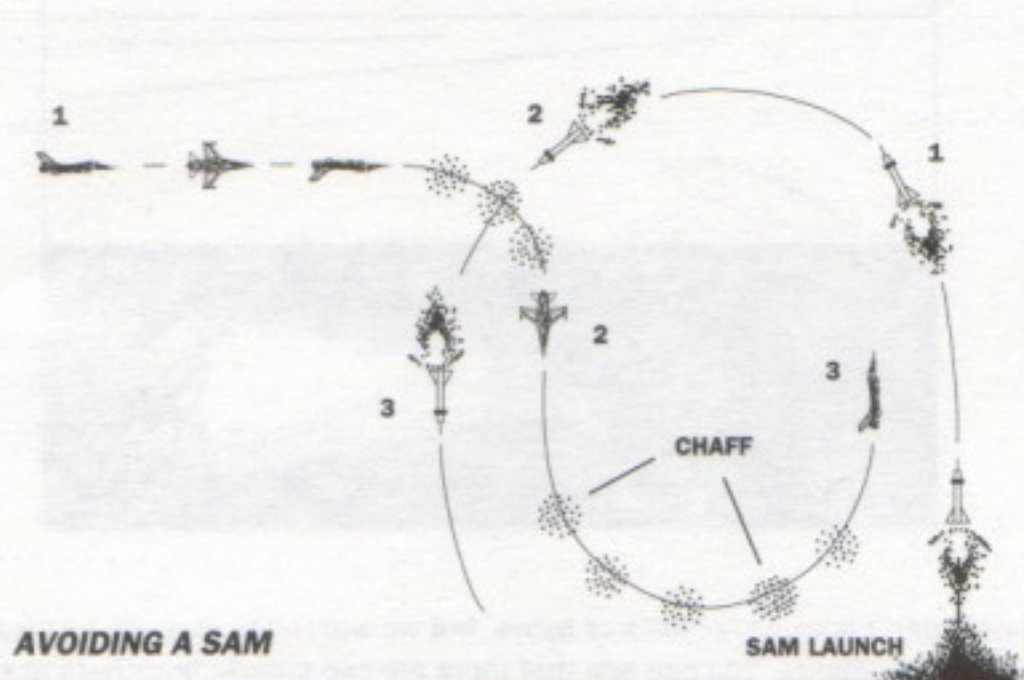
The only downside of using the ALQ-131 is that it broadcasts to the enemy that you're around. Expect to see some MiGs appear in the near future.



Since SA-2 and SA-6 missiles are radar-guided, your Threat Warning System will pick up the specific site that launches one and display it as a small blip on the Threat Indicator. (The site itself projects the radar beam that the missile follows.) This blip is smaller than the one that represents an enemy plane.



If you don't have an ALQ-131 pod, chaff combined with hard maneuvering can defeat the SAM.



The first thing you must do during a SAM launch is visually spot the launch. Remember: look for an airborne object that resembles a telephone pole with flames coming out the rear. Turn your plane toward the missile. Wait for the missile to begin leveling off. At this point, roll your plane upside down and pull several g's into a dive. Head directly toward the ground and at the same time, start releasing chaff. Continue to dive for several seconds or until the SAM starts to dive. (You may have to look out the side or rear views to relocate the missile.) At this point, release some more chaff and pull back hard on the stick. Kick in the afterburner and start a steep climb. Because of the small fins that guide a SAM and its high velocity, it can't turn with an F-16 and will eventually run out of gas.



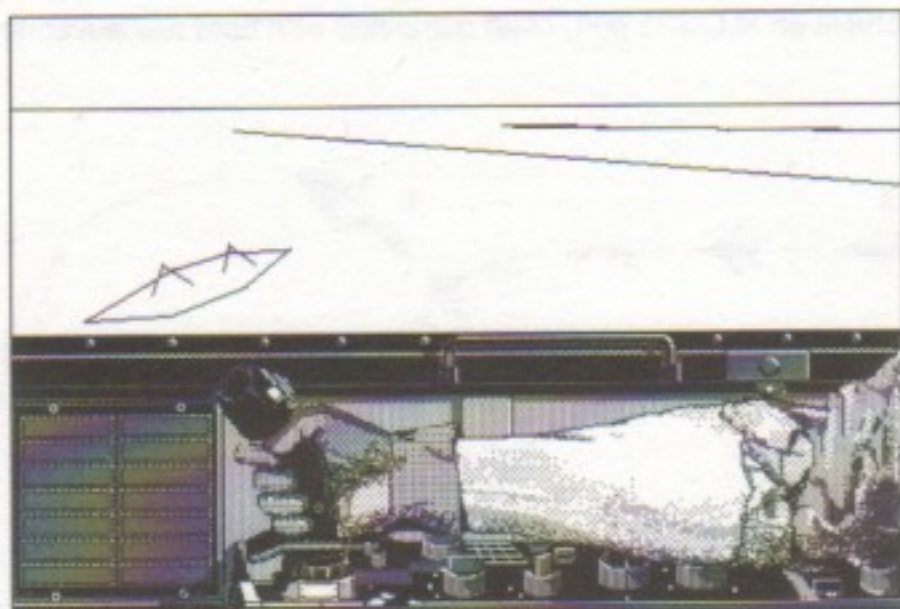
Another way to avoid SA-2s and SA-6s is to fly low and close to the ground. Unfortunately, this tactic makes you very vulnerable to SA-7 launches.

SA-7

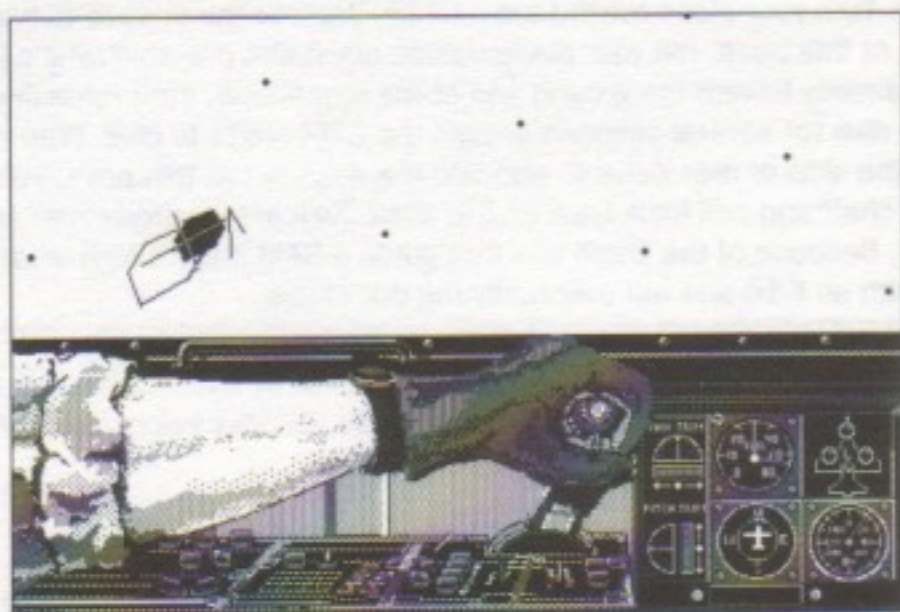
Since these missiles are shoulder-launched, there's no SAM site to identify. The SA-7 looks like a smaller version of the SA-2 or SA-6 when it's in the air. They're not as lethal as the other SAMs, but they *can* shoot you down. Flying fast and launching flares are a secondary defense against the SA-7. The *best* defense is to fly high (above 10,000 feet), beyond the SA-7's service ceiling.

You can use the same air-to-ground weapons against SAM sites that are used to attack other ground targets. Following are before and after close-up views of a typical SAM site that gets destroyed by an AGM-65B Air-to-Ground Missile.





SAM sites aren't normally objects of flybys, but we wanted to give you an idea of what you're up against. You can see that there are two missile launchers at each site, set and aimed towards the sky.

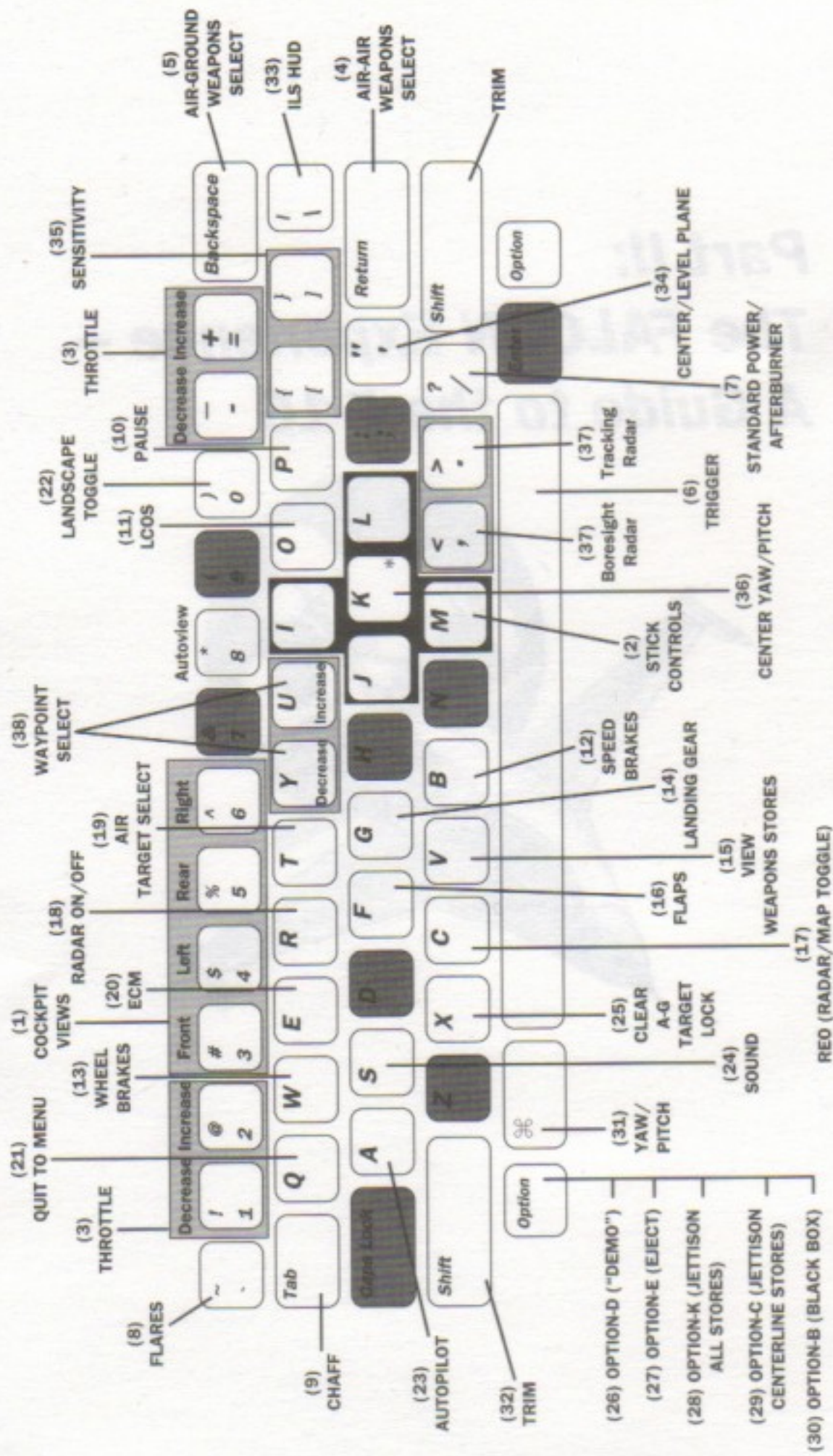


The same site has been effectively put out to pasture with a well-aimed Maverick missile from your Fighting Falcon. Good riddance!

Part II: **The FALCON Experience –** **A Guide to the F-16**



Keyboard Command Layout (Standard Macintosh Keyboard)



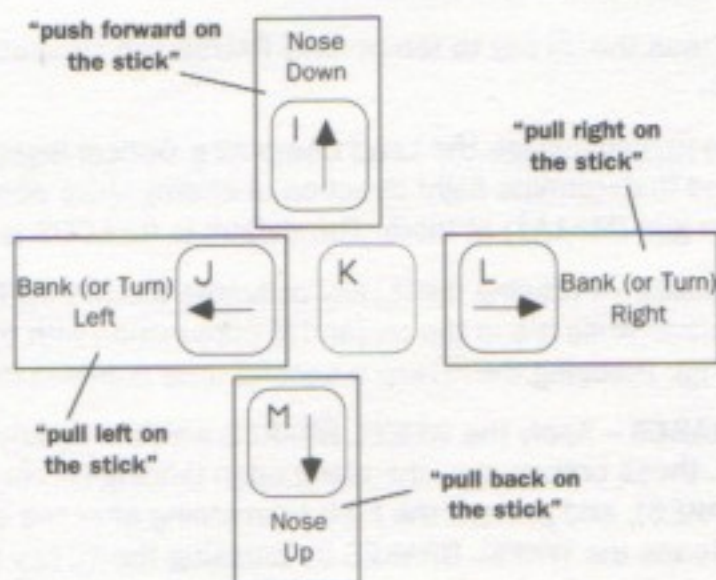
Note: If you have a Macintosh Plus keyboard or later model, some keys may appear in different locations on your keyboard.

Keyboard Command Descriptions



These command descriptions and the facing layout are applicable to the older Macintosh keyboard without a numeric keypad. If you have a keyboard with a numeric keypad onboard (or a separate keypad), you have all the following functions plus the option of running some of the commands from the keypad itself. Because there are several functions available on the numeric keypad, a special description of it is at the end of this section. If you wish to use the mouse or joystick for stick control, refer back to pages 24–26 for detailed information describing their use.

- 1 COCKPIT VIEWS** – Press any of these keys (top row number keys only) to change the view looking out of your cockpit:
 - 3 Front
 - 4 Left
 - 5 Rear
 - 6 Right
 - 8 Autoview (If you press the 8 key, the view will automatically switch to the direction of an approaching plane, and subsequent passes by enemy planes will cause views to change *automatically* so as to follow the paths of the particular planes as they fly by. You can stop Autoview simply by selecting one of the other views.)
- 2 STICK CONTROLS** –



Those with newer Macintosh keyboards (or a separate numeric keypad) have the option of choosing between the [I][J][L][M] setup and the numeric keypad for stick controls. There are other duplicate functions grouped around the numeric keypad (for shorter reaction time) that you may prefer if you have a pad. See the end of this section for an in-depth look at the numeric keypad.

- 3 **THROTTLE** – Press either **[+]** key to increase engine throttle, reflected by an increase in RPM and (normally) airspeed. Press either **[-]** key to decrease throttle and RPM.

You'll note that the **[1]** and **[2]** keys on the top row are also available for decreasing and increasing throttle, respectively. This is meant to accommodate both left-handed and right-handed players who may prefer a specific hand for monitoring the directional controls and don't want to reach over that hand to work the throttle. (If you have a numeric keypad, you can also use the **[+]** and **[-]** keys located there for throttle control.)
- 4 **AIR-TO-AIR WEAPONS SELECT** – Pressing the **[Return]** key once activates the Air-to-Air HUD mode (if not already activated). Subsequent taps of the **[Return]** key toggle through the different missile and gun formats of the Air-to-Air HUD.
- 5 **AIR-TO-GROUND WEAPONS SELECT** – Pressing the **[Backspace]** key once activates the Air-to-Ground HUD mode (if not already activated). Subsequent taps of the **[Backspace]** key toggle through the different missile, bomb and gun formats of the Air-to-Ground HUD.
- 6 **TRIGGER** – The **[Spacebar]** is used to fire all weapons and to drop bombs.
- 7 **STANDARD POWER/AFTERBURNER** – The **[/]** key toggles between STANDARD POWER and AFTERBURNER (when you need to "put the pedal to the metal!").
- 8 **FLARES** – Press the **[~]** key to release FLARES when *heat-seeking* missiles are being fired at you by enemy SAM sites or MiGs.
- 9 **CHAFF** – Press the **[Tab]** key to dispense CHAFF and avert *radar-guided* missiles fired at you by enemy SAM sites or MiGs.
- 10 **PAUSE** – Press the **[P]** key to temporarily PAUSE the simulation. Press **[P]** again to continue.
- 11 **LCOS** – The **[O]** key toggles the Lead Computing Optical Sight (LCOS), a HUD feature used to determine flight direction of enemy MiGs when you're aiming the air-to-air gun (M61A1) at them. The default is for LCOS is "on."
- 12 **SPEED BRAKES** – Pressing the **[B]** key activates the SPEED BRAKES, used to slow your plane while it's in the air (and in conjunction with the WHEEL BRAKES upon landing). Pressing the **[B]** key a second time releases the SPEED BRAKES.
- 13 **WHEEL BRAKES** – Apply the WHEEL BRAKES with the **[W]** key. Used solely on the ground, these brakes slow the plane upon landing (in conjunction with the SPEED BRAKES), and prevent the F-16 from rolling after the engine is started. You can release the WHEEL BRAKES by pressing the **[W]** key a second time.
- 14 **LANDING GEAR** – The **[G]** key is a toggle for raising and lowering the LANDING GEAR.
- 15 **VIEW WEAPONS STORES** – Press and hold the **[V]** key to view a list of all the weapons that are presently on your plane.



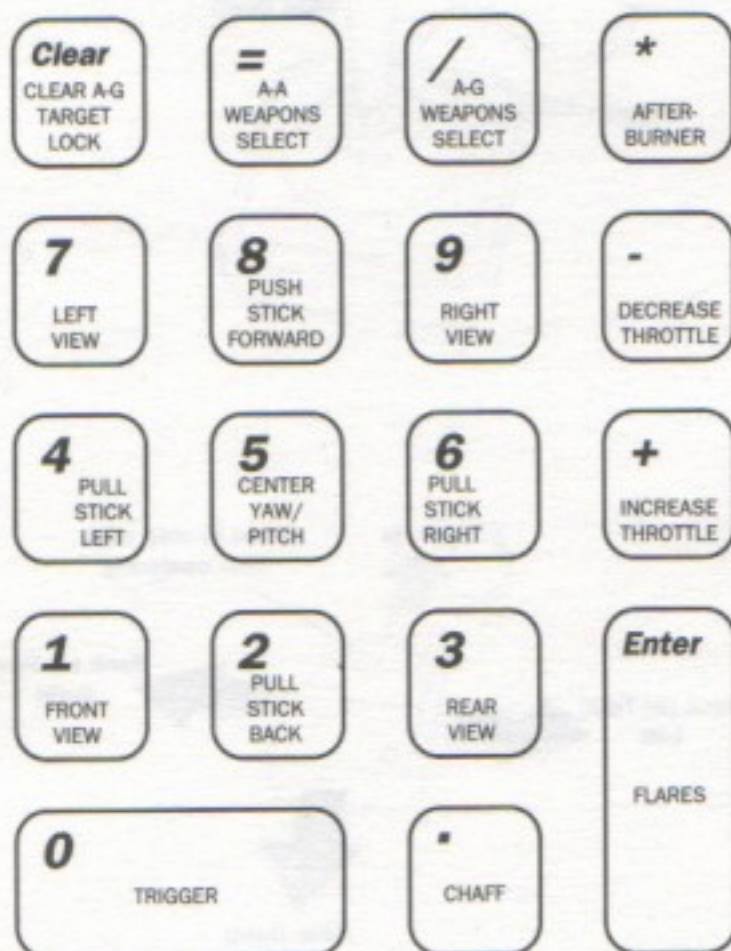
- 16 **FLAPS** – Toggle the **[F]** key to activate or deactivate your wing flaps for speed control.
- 17 **REO (Radar/Electro-Optical)** – The **[C]** key flips this display screen back and forth from a MAP detailing the mission landscape to the last RADAR mode selected. (The two different radar modes are discussed under #37.)
- 18 **RADAR ON/OFF** – Press the **[R]** key to turn off your radar display if you're trying to avoid being detected by enemy planes during play at upper ranks. Pressing the **[R]** key again turns the radar back on.
- 19 **AIR TARGET SELECT** – Pressing the **[T]** key in succession allows you to switch between different enemy planes to aim at, if more than one enemy plane is in the air at a time.
- 20 **ECM** – Pressing the **[E]** key turns on the **ALQ-131 ECM (Electronic Counter Measures) Pod** (if you're carrying one) as a defense against *radar-guided* SAMs. Press **[E]** again to turn it off.
- 21 **QUIT TO MENU** – Hit the **[Q]** key to bring up the Menu Bar. From here you can make various menu choices, or leave the program entirely.
- 22 **LANDSCAPE** – The **[0]** (zero: top row) key permits you to toggle between the four different landscape settings. The default option is Automatic if you did not choose an option from the **Settings** menu.
- 23 **AUTOPILOT** – If you hold down the **[A]** key during a dogfight, the plane's AUTOPILOT mode takes over and tracks the MiG for you automatically.
- 24 **SOUND** – Press the **[S]** key to toggle the program sound on and off.
- 25 **CLEAR A-G TARGET LOCK** – During an Air-to-Ground mission, if you make an unacceptable attempt at locking-on to a target, simply press the **[X]** key to clear the "lock" and try again.
- 26 **"DEMO"** – This function combines the features of the AUTOPILOT and AUTO-VIEW options, while still giving you control over your weapons. Press the **[Option][D]** key combination to invoke this command. While you are in DEMO mode, a light will appear in the lower right of your cockpit just below the WHEEL BRAKES light. All characteristics particular to the current rank apply, so it is possible to be shot down. Tap the AUTOPILOT key (**[A]**) once to exit DEMO mode.
- 27 **EJECT** – When all else fails, press the **[Option][E]** key combination to eject from your plane. Remember that ejection is not necessarily the safest or smartest option to take in a particular situation, and should be invoked only as a last resort.
- 28 **JETTISON ALL STORES** – If you fly into a predicament where you need to add some maneuverability to your plane, press the **[Option][K]** key combination to jettison everything *except your missiles*. We don't want you to be left *totally* defenseless!

- 29 **JETTISON CENTERLINE STORES** – You can separately jettison the **ALQ-131 ECM Pod** and **any centerline-installed external fuel tank** by the [Option][C] key combination if you want added maneuverability or acceleration and need to get rid of excess weight.
- 30 **BLACK BOX** – Press the [Option][B] key combination to invoke the BLACK BOX. The BLACK BOX is a device used to view an “instant replay” of your plane’s most recent maneuvers. Use this option if you wish to analyze a recent dogfight before continuing with your current mission.
- 31 **YAW/PITCH CONTROL** – Use the [36] key in combination with the KEYBOARD STICK CONTROL directional keys to make fine tuning adjustments in your plane’s PITCH and YAW. This allows the F-16 to point in different directions while travelling in an otherwise straight line. (See pages 60–61 for more info on YAW/PITCH CONTROL.)
- 32 **TRIM CONTROL** – If you hold down the [Shift] key in combination with the KEYBOARD STICK CONTROL directional keys while diving, climbing, or banking left and right, the combination will produce a more gradual change in direction than would take place with the STICK CONTROL keys alone.
- 33 **ILS HUD** – Press the [I] key to activate the Instrument Landing System (ILS) HUD, a special HUD mode designed just for landing purposes.
- 34 **CENTER/LEVEL PLANE** – Whenever you feel the plane is flying out of control, press the ['] key to force the F-16 to resume a straight and level path. This feature is available at any rank.
- 35 **SENSITIVITY** – You can vary the F-16’s sensitivity to banking, climbing or diving on a scale from 0–9 with the [I] key (to decrease sensitivity) and [J] key (to increase sensitivity). For example, you might want to start learning how to make bombing runs at “0” (zero) sensitivity but eventually progress to “9” sensitivity in an aggressive dogfight battle.
- 36 **CENTER YAW/PITCH** – Pressing the [K] key (or [5] key on the numeric keypad) provides a quick way to bring your F-16’s yaw or pitch back in center alignment, rather than making repetitive keypresses with the [36] key and the KEYBOARD STICK CONTROL keys.
- 37 **RADAR MODE SELECT** – Pressing the [C] key activates the Boresight Radar mode, while pressing the [D] key activates the Tracking Radar mode.
- 38 **WAYPOINT SELECT** – Pressing the [U] key increases the Waypoint number, while pressing the [Y] key decreases the number. (See page 98 for a description of the Waypoint feature.)



Numeric Keypad Controls

If you have a numeric keypad either as part of your main keyboard or installed separately, you can control both the stick movement and other commonly invoked commands of your F-16 from here. This gives you a compact area for major function control and shortens reaction time.



Some newer Apple keyboards (Model No. M0116, for example) have the locations of the **+** and **-** keys reversed on the numeric keypad. Take this into account when flying your F-16, because you wouldn't want to accidentally reduce speed when a MiG is coming in on your six!

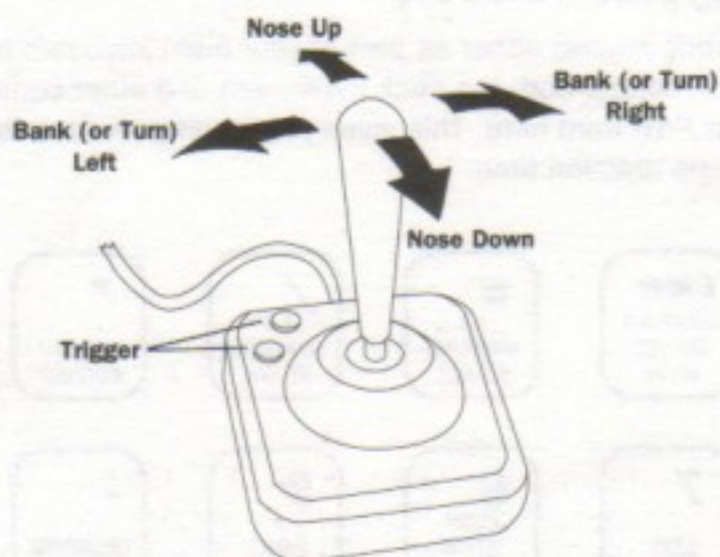
Using the Mouse or a Joystick

If you wish to use the mouse or a joystick for directional control, refer to the drawings on the following page and detailed information on pages 24-26.

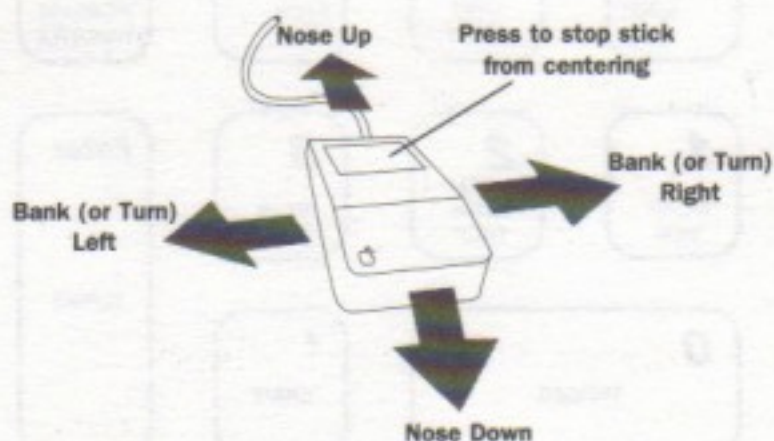
Note that if you use a joystick, you can use any of the joystick buttons as the Trigger. However, when using the mouse for stick control, the mouse button is used as an aid in that control, so continue to use the **Spacebar** as the Trigger. If you are using the Gravis MouseStick, the joystick buttons are programmable.



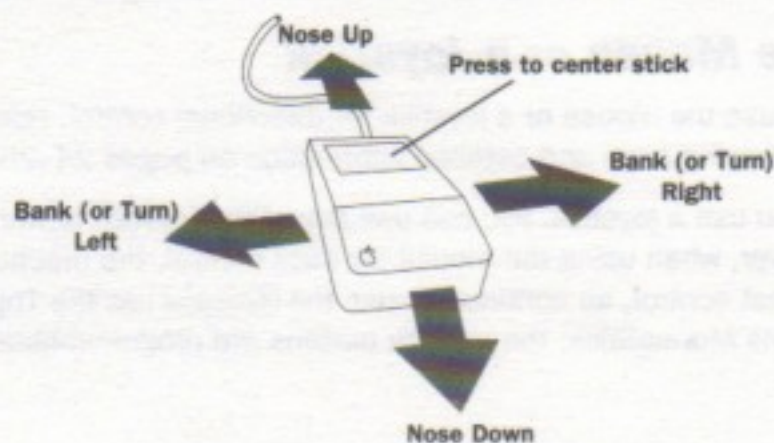
Joystick



Mouse



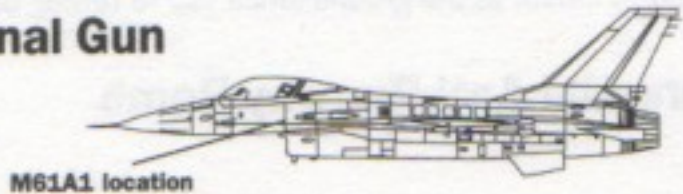
Mouse II



The **FALCON** Armament

The F-16 can carry a wide assortment of weapons for different purposes and missions. Following are the weapons available in FALCON and a diagram of how they are placed onto your plane.

M61A1 Vulcan Internal Gun



The M61A1 is also referred to as a cannon because of its large 20mm barrel. Since the gun is an internal weapon, your F-16 automatically starts with 5,000 rounds of ammunition. The M61A1 may be used in either air-to-ground strafing runs or close air-to-air combat.

AIM-9J Sidewinder Missile



The AIM-9J Sidewinder is a heat-seeking missile used in air-to-air combat with an average effective range of 5 miles. It is possible for the AIM-9J to hit a plane as far as 11 miles out, but the likelihood of that happening is very slim. It needs a strong heat source to track and should be aimed at the rear quarter of an enemy plane to be effective.

AIM-9L Sidewinder All Aspect Missile



The AIM-9L Sidewinder is similar to the the AIM-9J in that it's a heat-seeker for air-to-air combat. It's termed "all aspect" because it contains filters that screen out extraneous heat sources. Because of these filters, it's not as easily fooled by enemy flares, and a hit can be made without having to aim directly at the MiG's rear exhaust. The effective range is equal to the AIM-9J.

AGM-65B Maverick Missile



The AGM-65B is an optically-guided missile used for air-to-ground missions only. In theory, an AGM-65B can be fired when a target is within 14 miles, but its most effective range is 7–8 miles. Although it can be fired from any altitude, we recommend firing it when you are below 20,000 ft. Since it's optically guided, you need to gain a good sight on the target. Besides, the enemy's long range SAMs (surface-to-air missiles) will be very happy to see you above 20,000 ft...and you don't want that.



Mk84 2000lb Low Drag Bomb



The Mk84 (pronounced "Mark" 84) is a high quality, general purpose bomb. It is used for any air-to-ground bombing run where you want to make maximum impact. Bombs can be dropped from any altitude, but your accuracy increases dramatically as you fly closer to the ground since you're relying on visual contact.

Durandal Anti-Runway Bomb

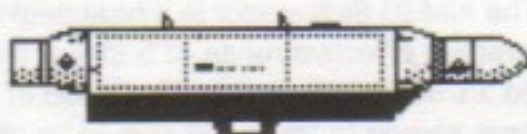


The Durandal is a bomb that's especially destructive to airstrips. Whereas conventional bombs (like the Mk84) create large craters where they hit, the Durandal drives itself into the airstrip, blowing a hole from under the pavement. This makes repairs much more difficult.



Although you want to fly as close as possible to the ground on bombing runs, don't move in below 2,000 feet or your bombs may eliminate you as well.

ALQ-131 ECM Pod



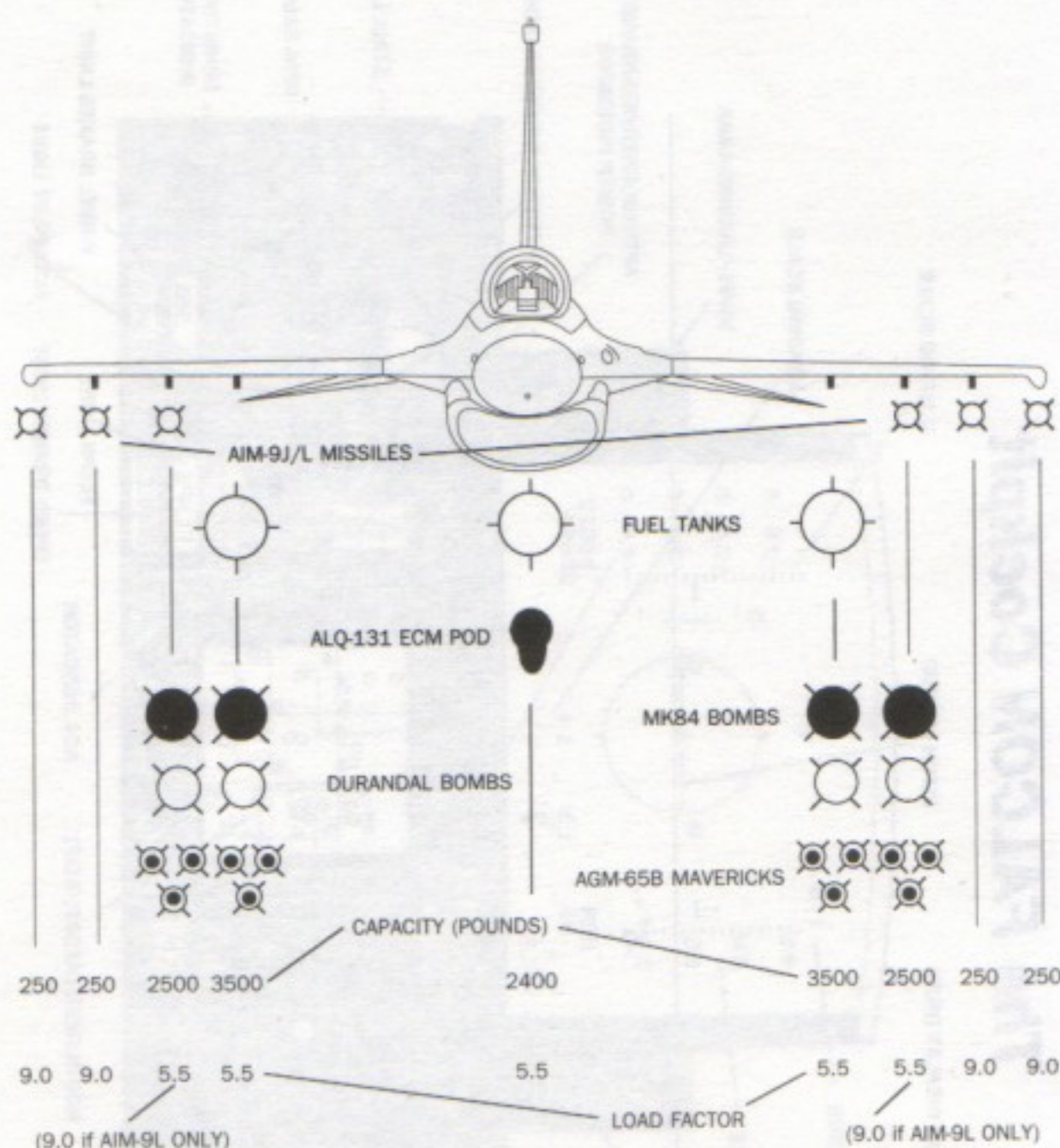
The ALQ-131 pod should be carried (if available) on air-to-ground missions. It is an ECM (Electronic Counter Measure) device that emits signals to jam enemy radar, preventing SAM sites from getting missile lock on your F-16.

Fuel Tanks



Your F-16 has an automatic internal fuel capacity that averages 6,950 pounds. You can add external 2,304 lb. fuel tanks (up to three) if you wish to have added fuel capacity. Remember that afterburner usage will eat up your fuel quickly, but don't get in the habit of adding so much fuel (instead of armament) that you're flying a fat cow with no protection or maneuverability.

ARMAMENT CONFIGURATION



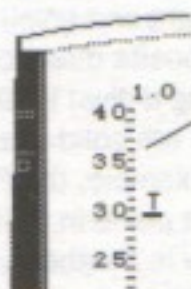
Note the numbers for CAPACITY and LOAD FACTOR. You are shown the total weight of your armament as selections are made via the Sarge. The LOAD FACTOR represents the highest amount of g's that you should pull if weapons are installed on that particular station. At the lower levels of the simulation, you will have few limitations on your armament, but at upper levels you must adhere to the rules for placing weapons onto the F-16. When you select and load your armament at the beginning of the game, the Sarge will alert you as to what configurations are possible or not. He will also place the weapons on your plane so that you maintain a symmetric (balanced) load.



Head-Up Displays (HUD)

The most prominent item in the F-16 cockpit is the HUD, or Head-Up Display. The HUD is a piece of glass separate from the canopy that displays electronic data on altitude, airspeed and heading. It also shows information specific to weapons usage, such as aiming sights and distance to target. Following is a list of items that exist on every HUD mode, as well as discussion of the specific HUD types and their uses.

Items That Are in Every HUD



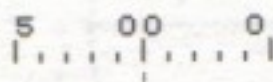
Airspeed Scale

The Airspeed Scale runs up the left side of any HUD mode and displays the F-16's true airspeed in tens of knots. In other words, the number 20 represents 200 knots. The wider hash mark in the middle of the scale with the "T" over it denotes the true airspeed.



Mach Indicator

The Mach indicator shows the current airspeed as a percent of the speed of sound (Mach 1).



Heading Scale

The Heading Scale runs along the top of most HUDs and displays the direction (in tens of degrees) that your F-16 is heading. The longer hash mark in the middle of the scale displays your current heading. (In the Air-to-Air HUD, the Heading Scale is at the bottom.)



G Force Indicator

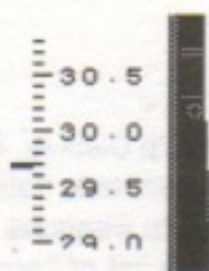
Located just above the Airspeed Scale, the G Force Indicator displays the "g" forces (of gravity) that are acting on you and your plane at any time. G forces are discussed in detail in **Part IV** of your Flight Manual.



Max G Force Indicator

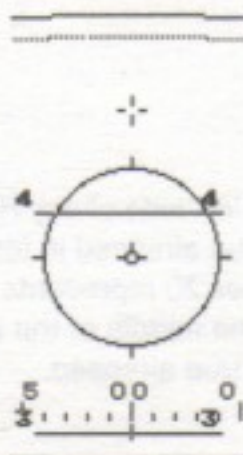
This indicator, located just below and to the left of the Mach Indicator, tells you (and the engineers on the ground) the greatest number of g's you have pulled. Pressing ☐ resets this to zero.





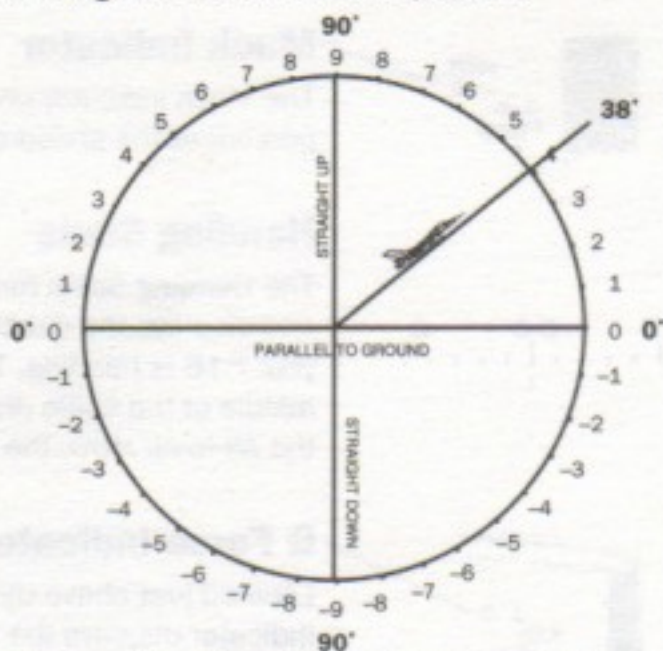
Altitude Scale

Located on the right side of every HUD mode, the Altitude Scale displays your plane's altitude in thousands of feet. The wider hash mark in the middle denotes the current altitude. Note how the current altitude is detailed in the lower right corner beneath the Altitude Scale.



Pitch Ladder

The Pitch Ladder gives an electronic representation of your F-16's angle of climb (or dive) at any point in time. The numbers go from 0 (straight and level) to 9 (90° climb straight up) or in the opposite direction (with negative numbers representing a dive) to -9 (90° dive straight down). (Also, the lines are solid when climbing; dotted when diving.) For example, the Pitch Ladder shown opposite illustrates a plane in a 38° climb. The figure immediately below is another way of illustrating what the numbers represent.



Distance to Target and Waypoint Indicator

1101
29652



Displayed on every HUD just beneath the Altitude Scale is the Distance to Target and Waypoint Indicator. The first number is your current distance from the target specified in your mission. Following the "D" is a number that corresponds to that target. You may change the Waypoint by pressing **[Y]** to increase the number, or **[U]** to decrease the number. (See the **Missions** chapter for more details.)



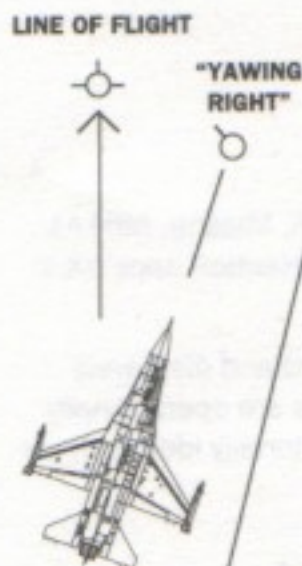
Velocity Vector

The Velocity Vector represents the degree of yaw and/or pitch that your F-16 is incurring. You have the capability of pointing the plane to a certain degree in a direction that varies from the general direction you are travelling. In the opposite example, the F-16 is flying straight and level, but the plane is pointed slightly to the left. You'll use this feature primarily in bombing runs when you want to aim at a target without having to travel directly towards it.

To point your plane in the manner of this example, you would hold down the **[⌘]** key while pressing **[L]** (or **[6]** on the numeric keypad). Your plane would then point itself to the right while continuing to fly straight ahead. If you wanted to point the plane back to the left (completely lined up with your flight path again, if you wish), you would hold down the **[⌘]** key again and "pull left on the stick." When you perform these actions, you are "yawing right and left."

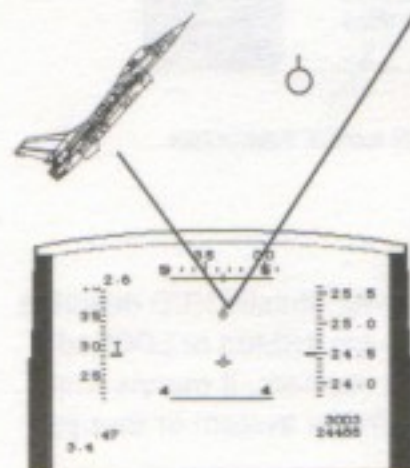
"Pitching" is the same idea as "yawing" but is used to point the plane up and down while you fly straight ahead. The only difference is that you "push forward or pull back on the stick" using the keyboard controls while you hold down the **[⌘]** key. For example, if you were going to fire at a ground target at a low altitude, you might need to pitch the plane downward while you aim, so you wouldn't have to dive any further.

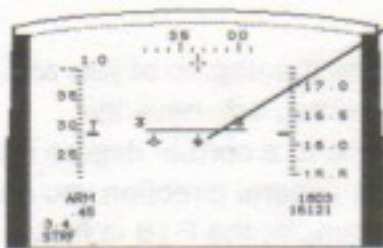
If you need to realign your plane quickly, pressing **[⌘][K]** (or **[⌘][5]** on the numeric keypad) automatically centers the yaw or pitch so the plane will be both pointing and flying in the same line again.



Directional Indicator

Represents any directional change that you make either in bank or pitch. Primarily designed as an aid for joystick and mouse users to orient themselves while changing direction, this indicator serves as an additional feedback for keyboard users as well. The Directional Indicator always represents where your plane's nose is pointing.



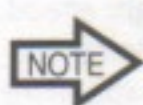


Center Point

Represents the exact center of each HUD type. The Center Point helps to focus your eye-hand coordination when things get hot and heavy up there.

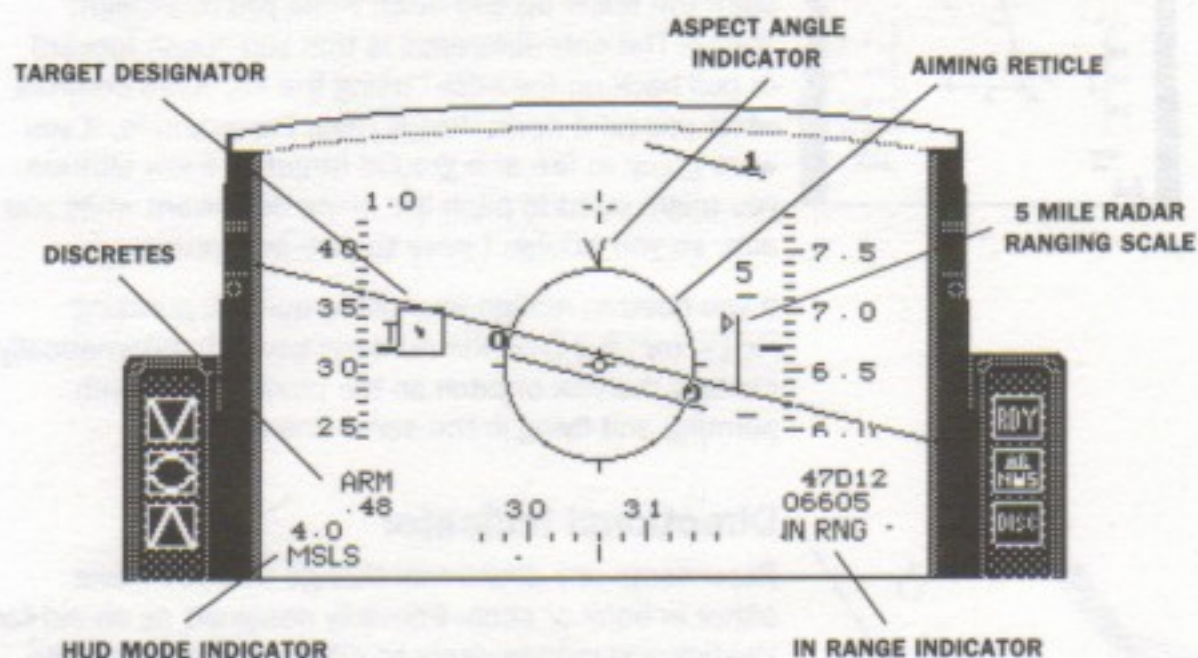
Air-to-Air HUDs

To select a particular Air-to-Air HUD mode (AIM-9J Missile, AIM-9L Missile, M61A1 Gun), tap the Air-to-Air Weapons Select key (**Return**) until your selection appears in the HUD glass.

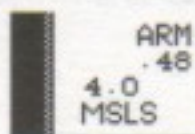


HUDs for the AIM-9J and AIM-9L missiles are selected and displayed separately during the simulation since these missiles are operationally and physically different. Because the HUDs are functionally identical, we will discuss them together in one section.

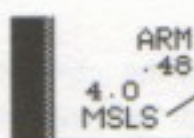
Air-to-Air Missile HUD (AIM-9J or AIM-9L)



Discrettes

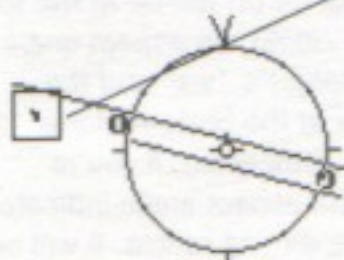


The discrettes on either Air-to-Air Missile HUD describe whether or not your missiles are ARMED or LOCKED onto a target. If no message appears, it means that there is something wrong with the system or that you are out of missiles.



HUD Mode Indicator

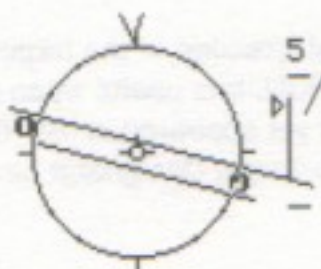
MSLS indicates that you're in Air-to-Air Missile HUD mode. Look at the Stores Control Panel to see which type of missile is currently selected.



Target Designator

The target designator will follow the target that your radar is tracking. If you are in a dogfight with multiple bogeys, use the Target Select key (**T**) to track another plane. If the Target Designator has a flashing diamond in the middle of it, your missile has locked on to a heat source.

When the target leaves the HUD, the Target Designator appears as a diamond with an "X" across it. Look in this direction to find the bogey.



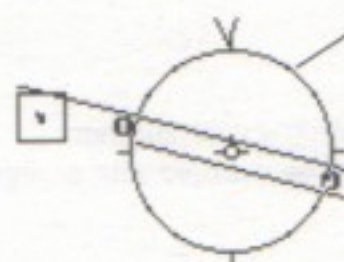
Five-Mile Radar Ranging Scale

The Five-Mile Radar Ranging Scale graphically represents the distance between you and the target you are tracking. A triangle will appear on the vertical bar when your target is within optimum missile range. The higher the triangle is on the scale, the further away from the target you are.



In Range Indicator

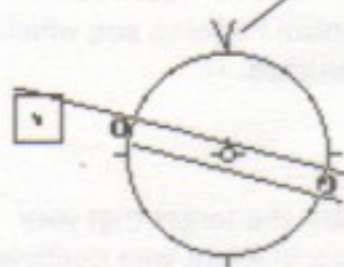
The In Range Indicator will light up (IN RNG) when the lock-on diamond flashes. This will tell you that the target is in range of your air-to-air missiles.



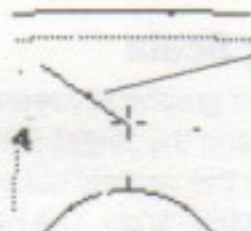
Aiming Reticle

This is a visual aid to help improve your probability of hitting a target. If the target is inside the circle of the reticle, you have a good chance of hitting the target—assuming that you already have a lock on (flashing diamond) and the target is in range (check the In Range Indicator).

Aspect Angle Indicator

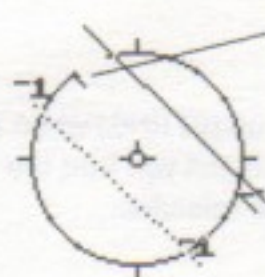


Aspect angle is the angle formed by the intersection of two imaginary lines: the line through the target's longitudinal axis and the line from the F-16 to the target (the "position line"). If the MiG is coming at you head on, the aspect angle is 180° , and the aspect angle indicator ("v" symbol; or caret) will be at the top of the aiming reticle (at 12 o'clock). An aspect angle of 0° means you are on the target's "six" and the aspect angle indicator will be at the bottom of the aiming reticle (at six o'clock). Otherwise, if you're facing the MiG's right side, the aspect angle indicator will be on the right side of the aiming reticle. It will be on the left if you're facing the left side of the target. Note: Aspect angle is determined in relation to your F-16's *position*, not *heading*.)



Target Locator Line

This line points in the general direction of the targeted MiG if it is not visible in the HUD. It is useful when the Target Designator box hasn't yet appeared in the HUD. The line disappears when the Target Designator box appears.



Distance Ranging Scale

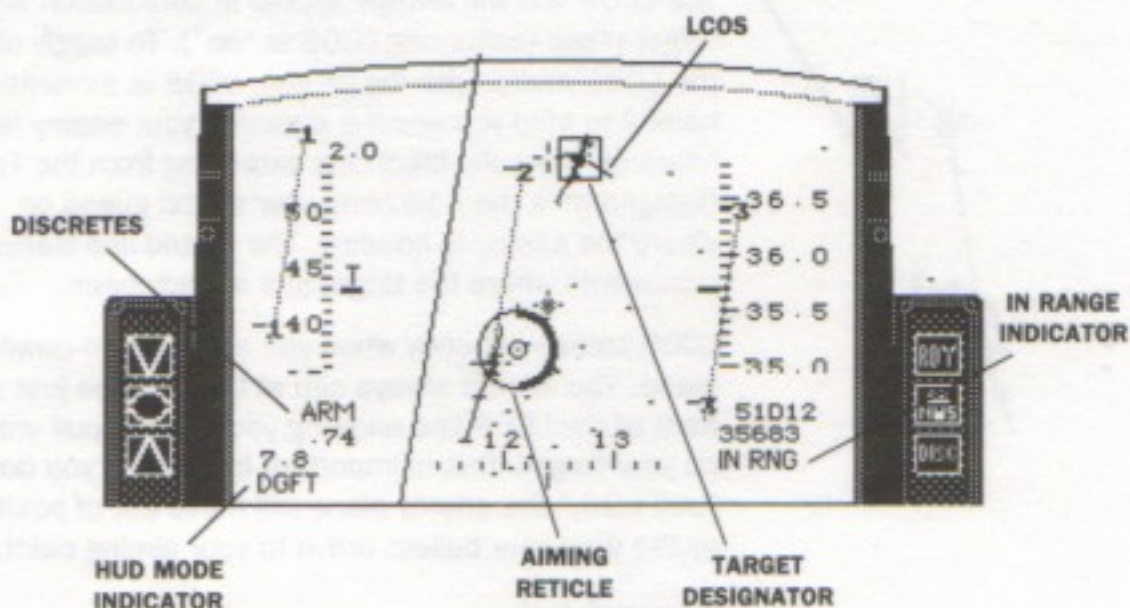
A line will appear on the inside edge of the Aiming Reticle when a MiG is within 12,000 feet. As the MiG moves closer, the line will move in a counterclockwise direction around the reticle. Each "o'clock" the indicator moves equals 1,000 feet. (Movement of 90° represents $3/4$ of a mile.)



Break X

When you are in danger of colliding with another aircraft, the Aiming Reticle will be overlaid with a large "X."

Air-to-Air Gun HUD (M61A1)



Discrettes

The Discrettes on the M61A1 HUD indicate if the gun is ARMed and ready. If this light doesn't come on, then your gun is either jammed or out of ammo.



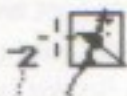
HUD Mode Indicator

DGFT indicates that you're in Air-to-Air Gun HUD mode.

Target Designator

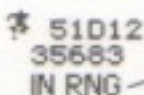
The Target Designator will follow the target that your radar is tracking.

When the target leaves the HUD, the Target Designator appears as a diamond with an "X" across it. Look in this direction to find the bogey.



Aiming Reticle

Your F-16 firing control system automatically computes where fired bullets would be by the time they reach target range. The firing control system then plots the Aiming Reticle at the precise place the bullets would land if you fired at that time.




In Range Indicator

Appears (IN RNG) when the target is within 2 miles of your plane.





LCOS (Lead Computing Optical Sight)

The LCOS line will always appear in conjunction with a target plane (assuming LCOS is "on"). To toggle on the LCOS mode, use the  key. LCOS is extremely helpful to help you see the direction your enemy is heading. The solid black line extending from the Target Designator is the F-16 computer's best guess on where the enemy is heading. The dotted line trailing represents where the target has already been.

LCOS comes in handy when you are trying to down a plane. You should always aim at the position just in front of the LCOS line allowing yourself to "pull lead" on your target. This is important because if you don't "pull lead," the enemy plane will move out of position by the time your bullets arrive to your aiming point.



Snapshot

The Snapshot (nicknamed the "Snake") is an undulating tracer line that extends from the Aiming Reticle. It indicates what the historical bullet path would be if your gun were being fired continuously. Because you're not always travelling in a straight line, it's difficult to know where your gun bullets would actually end up when you're firing the gun and making a hard turn at the same time. The harder your rate of turn when the gun is fired, the longer the Snake will extend from the Aiming Reticle. The Snake is very lively, and its position and length change continuously as your F-16 changes direction. You should continue to use the theory of "pulling lead," but amend it to have the trailing end of the Snake making contact with the leading end of the LCOS. An optimal firing condition exists when the trailing end of the Snake is on top of the MiG and positioned within the Aiming Reticle.

HOW TO FIRE YOUR GUN

Once you have lined up the Aiming Reticle with the LCOS, squeeze your trigger in short bursts until the enemy plane explodes.



Air-to-Ground HUDs

To select from Air-to-Ground HUD Modes, tap the A-G Weapons Select key (**Backspace**) until your selection appears on the HUD Mode Indicator section of your HUD.

Air-to-Ground Bombing HUD (Mk84 or Durandal)

The Mk84 2000lb Low Drag Bombs and Durandal Anti-Runway Weapons use the same HUD sighting system.

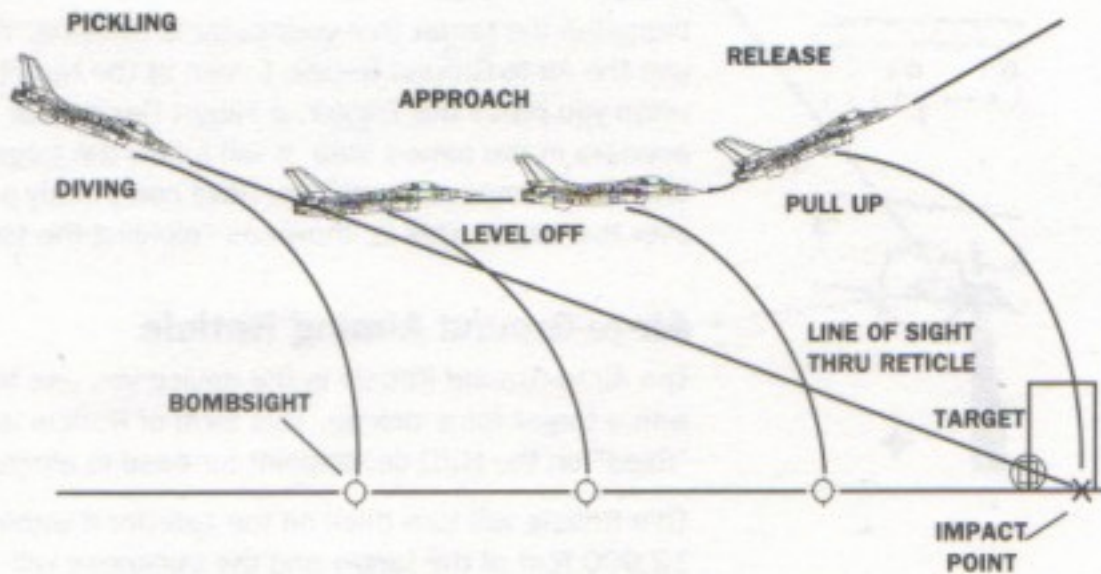
Pop-Up (“Fling”) Bombing

Unlike Dive Bombing described in **Part I**, the actual impact point in Pop-Up Bombing is below the HUD. There are three major phases to Pop-Up Bombing, and in each phase the Bombing HUD changes:

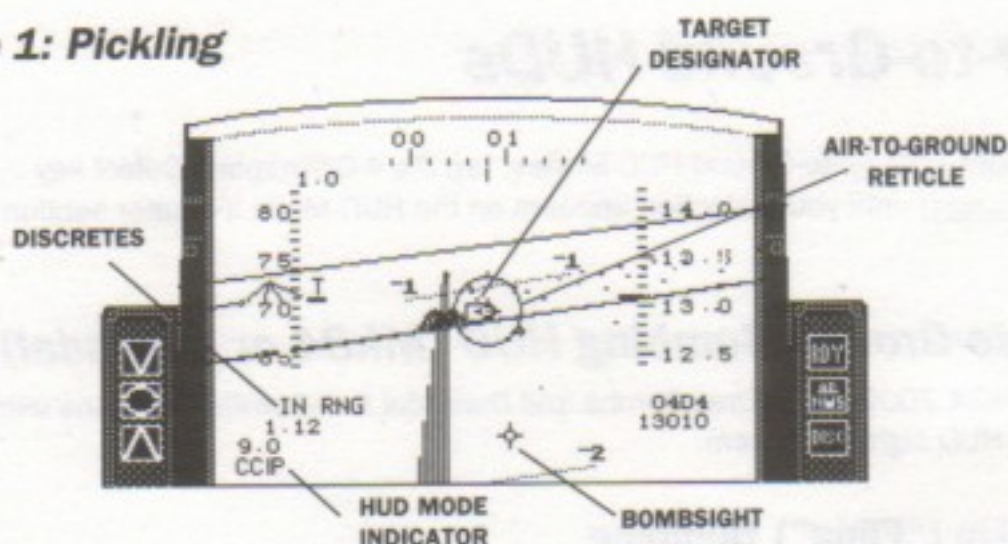
Phase 1 is called “pickling.” This is where you lock onto the target with your visual sighting system.

Phase 2 is the approach. This is where you level off and approach the target.

Phase 3 is the climb and release phase of the bombing. Pop-up bombing is effective at altitudes between 2,000 and 10,000 feet.

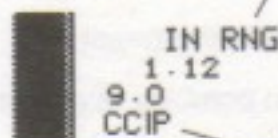


Phase 1: Pickling



Discrettes

The Discrettes on the Bomb HUD indicate the status of your bombing. IN RNG indicates that you are in range of your target. ARM means that your bombs are armed. LOCK means that the target has been acquired and that your trigger is "pickled" (bombs ready to be released). REL signifies that bombs have been released.

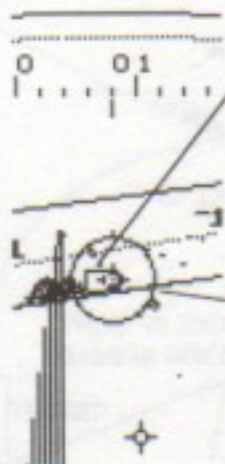


HUD Mode Indicator

CCIP (Continuously Computed Impact Point) appears on the HUD when you have Mk84s armed, while DUR appears when you are using Durandal bombs. Both of these indicate that you are in Air-to-Ground Bombing HUD mode.

Target Designator

Indicates the target that your radar is tracking. You use the Air-to-Ground Reticle to aim at the target, and when you press the Trigger, a Target Designator appears in the aimed area. It will follow the target up until bomb impact or until you have completely passed over the target. This is known as "pickling the target."



Air-to-Ground Aiming Reticle

The Air-to-Ground Reticle is the device you use to align with a target for a lock-on. This form of Reticle is "fixed" on the HUD centerpoint for ease in aiming.

This Reticle will turn thick on the exterior if within 12,000 feet of the target and the thickness will diminish counterclockwise as you approach.



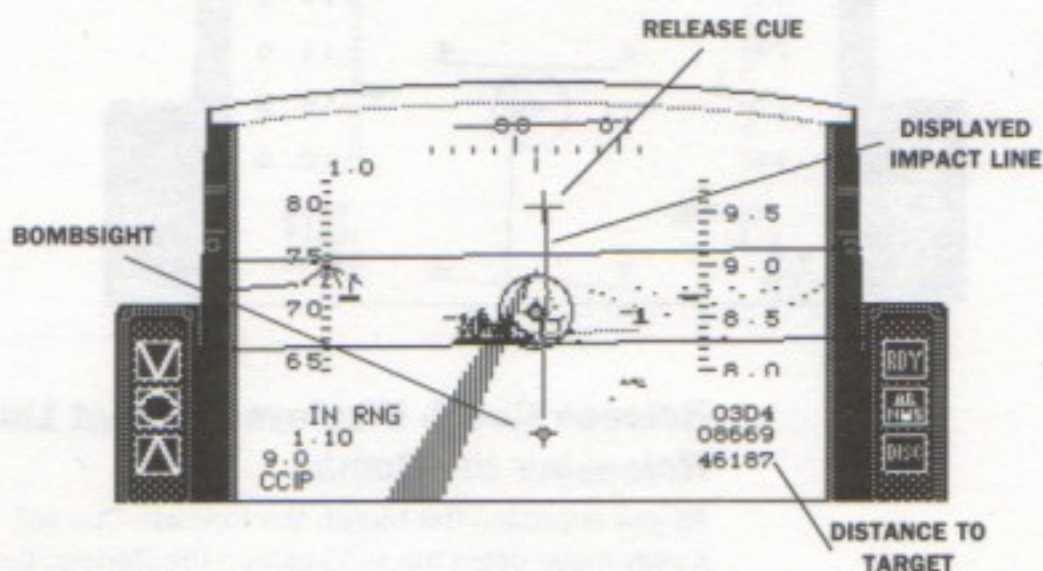
HOW TO LOCK ON TO YOUR TARGET

Maneuver your plane so that the Air-to-Ground Reticle is perfectly aligned with the target you intend to bomb. This usually requires that you bring your plane into a shallow dive. Press the Trigger once to "pickle," or "target designate" whatever the Reticle is pointing toward. The Target Designator will appear within the Reticle and the LOCK discrete will appear on your HUD.

Make sure that the Target Designator is aligned with the object you intend to bomb. If it isn't, "clear the pickle" by pressing the Clear A-G Target Lock key (\square). The LOCK discrete will disappear when you clear the A-G Target Lock. Try to realign your Reticle and start the lock-on process again.

If the target has been properly locked-on, level your plane out and fly straight toward the target. Since your Trigger is already "pickled," a pair of bombs will be released the next time you press the Trigger.

Phase 2: Approaching



03D4
08669
46167

Distance to Target

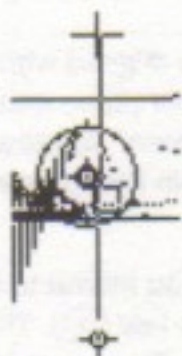
The distance to the target (in feet) will appear as you lock-on to your target. Altitude is considered in the distance computation.



Bombsight

The Bombsight may appear as you get closer to the target. This represents the location of where the bombs would hit if they were released at that instant. Don't worry if you can't see the bombsight because it's probably below your plane of view.



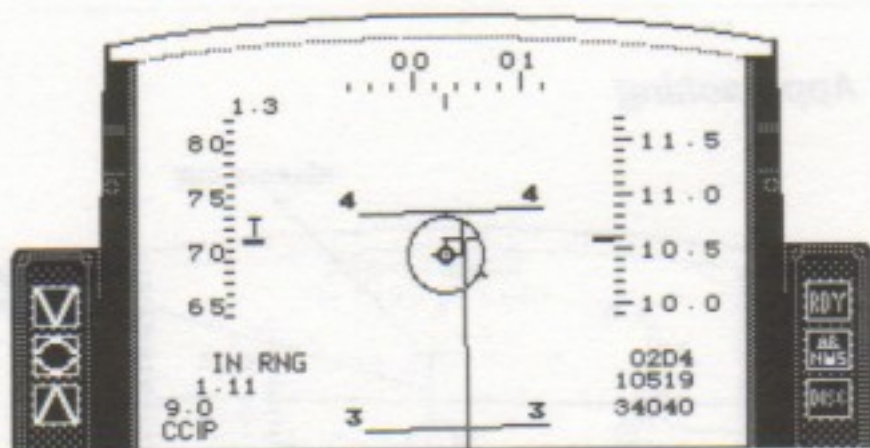


Release Cue & Displayed Impact Line

The Release Cue and Displayed Impact Line will appear right before your plane gets in range of the target. The Displayed Impact Line plots a direct line between the Release Cue and the bombsight. If the Bombsight is below your plane of view, then the Impact Line will go to the edge of the HUD.

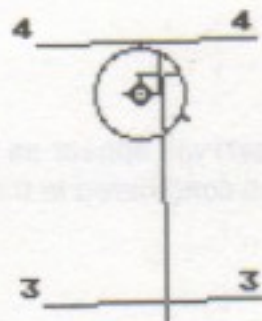
To stay on course, you must maneuver your plane so that the Displayed Impact Line intersects the Center Point and the Reticle.

Phase 3: Release



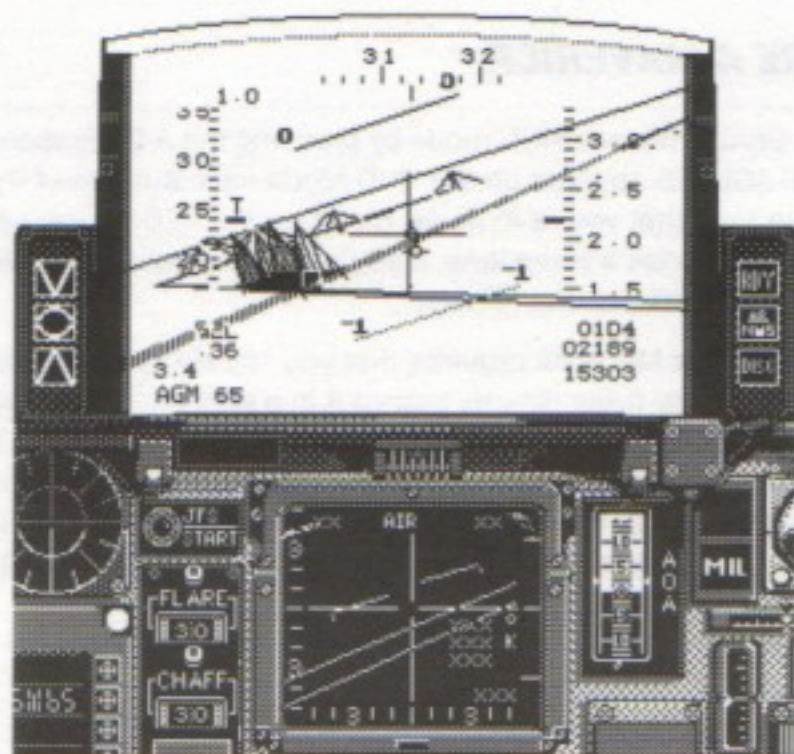
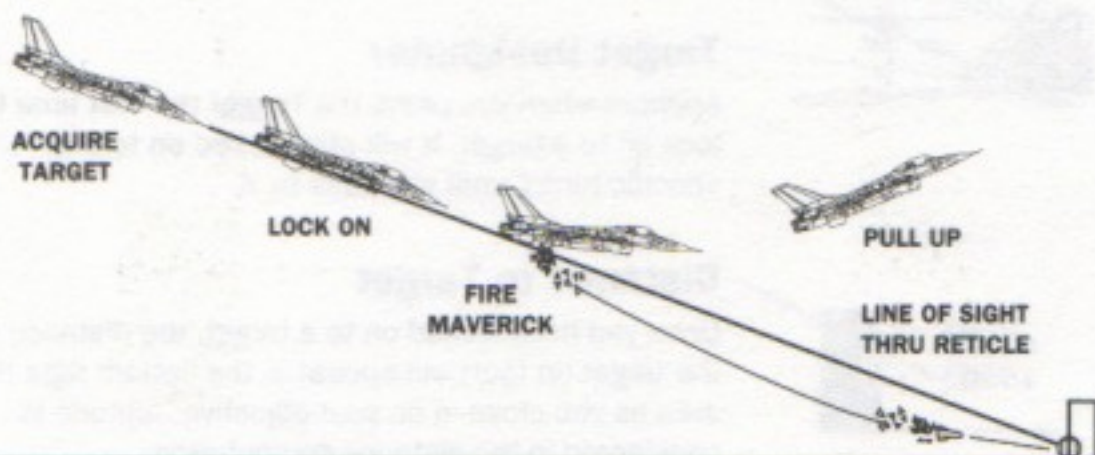
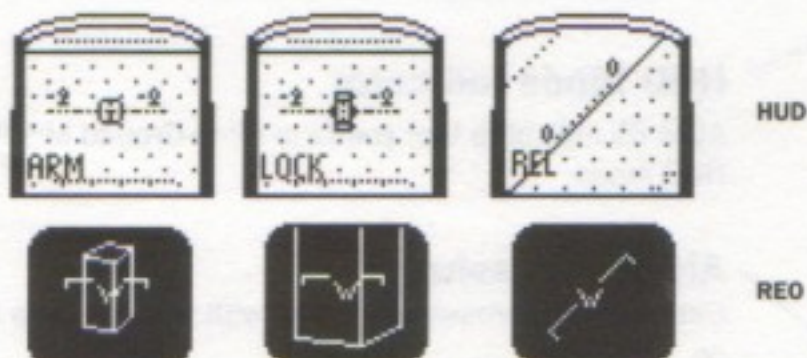
Release Cue & Displayed Impact Line: Releasing the Bombs

As you approach the target, the Release Cue will slowly move down the HUD toward the Reticle. Once the target disappears below your HUD, pull back on the stick and start a shallow climb of about 10 degrees. When the Release Cue passes through the Reticle, press the Trigger to release a pair of bombs. *The further the Release Cue is from the Reticle when you release your bombs, the greater the distance between the impact point and the target.* The REL discrete will appear once the bombs are released. After bomb release, increase to full power and initiate a 40 degree climb until you have cleared the impact area. Depending on your altitude, angle of climb and speed the time it takes from release to impact will vary.



Air-to-Ground Missile HUD (AGM-65B MAVERICK)

The AGM-65B Missile is designed to be visually locked on to a ground target by the pilot. In the front end of each Maverick missile is a TV camera with a zoom lens. The television image is fed to the pilot through the REO. This allows you to acquire your target electronically from distances beyond visual range.





Discrettes

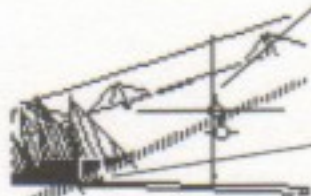
The discrettes on the AGM-65 HUD describe whether or not your missiles are ARMED, LOCKed on, in range of a target (IN RNG), or RELEased. If no message appears, it means that there is something wrong with the system or that you are out of missiles.

HUD Mode Indicator

AGM 65 indicates that you're in Air-to-Ground Missile HUD mode.

Aiming Crosshair

Use this fixed crosshair to align with a target for a lock on.



Target Designator

Appears when you press the Trigger the first time to lock on to a target. It will stay locked on to that specific target until you pass by it.

01D4
02189
15303



Distance to Target

Once you have locked on to a target, the distance to the target (in feet) will appear in the bottom right HUD area as you close in on your objective. Altitude is considered in the distance computation.

HOW TO FIRE A MAVERICK

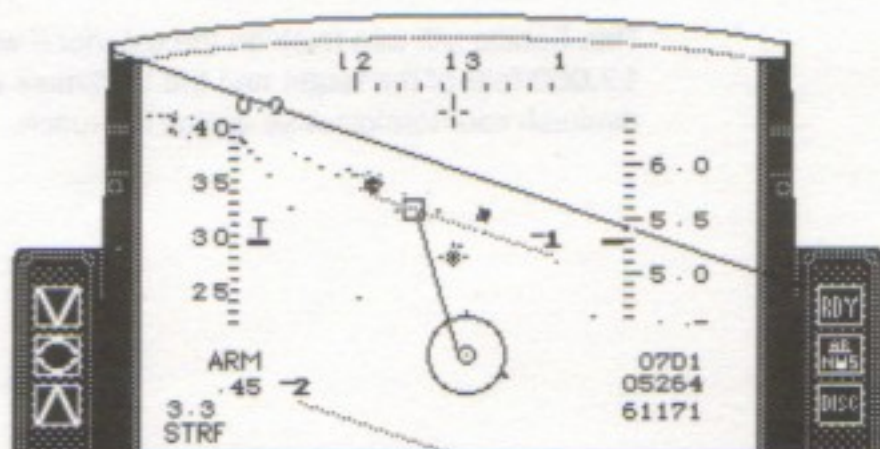
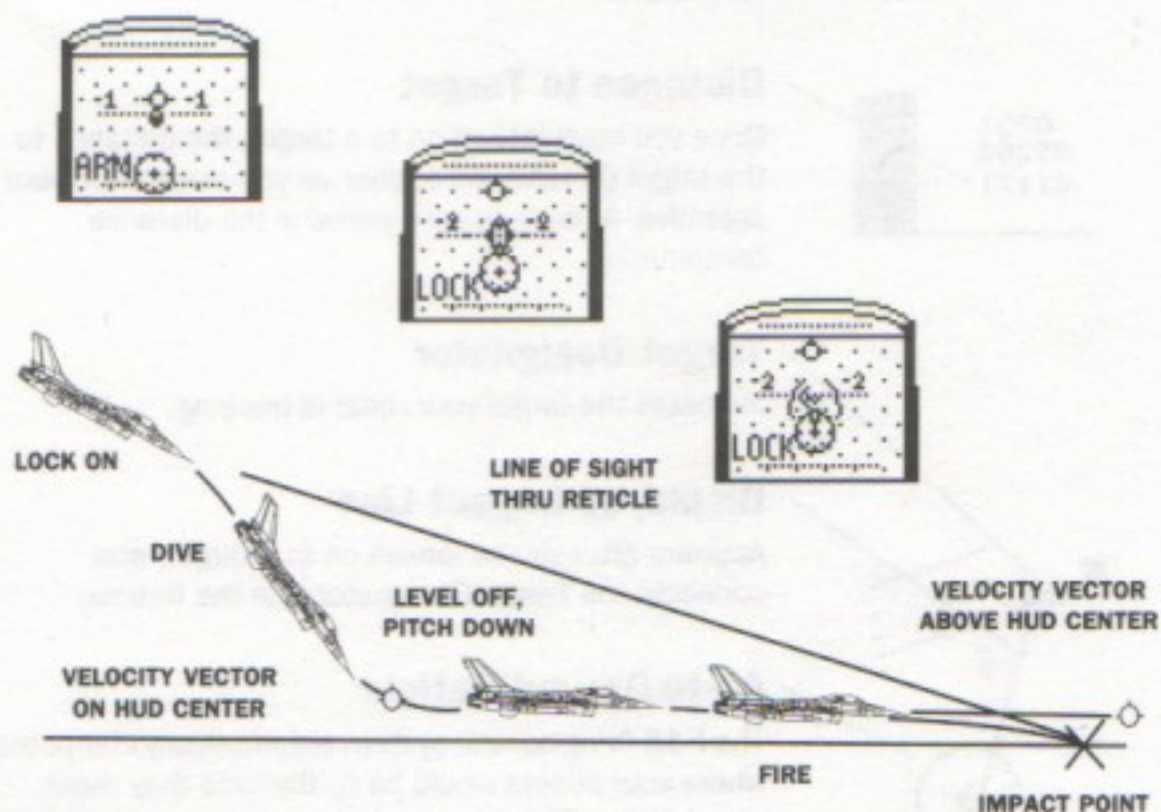
Select the Air-to-Ground Missile HUD mode by pressing the A-G Weapons Select key (**[Backspace]**) until AGM 65 appears on the HUD Mode Indicator line of the HUD. Next, you need to make sure that you're in Radar mode on the REO so you can view a target through the Maverick's zoom lens. If you're still in Map mode, switch to Radar mode by toggling the REO with the **[C]** key.

As with bombing, firing a Maverick requires that you "pickle" your Trigger. Align a target with your Reticle by flying directly toward it in a shallow dive. Once you have aligned the target with the waterline in the REO or with the crosshair in the HUD, press the Trigger once to pickle the target. Once you have pickled the target, LOCK or IN RNG will appear on the HUD discrete line. If you find that you are not aligned properly with your target, clear the lock on by pressing the Clear A-G Target Lock key (**[X]**).



Once locked on, you needn't continue to dive directly toward the target. The target will continue to be locked on as long as your plane is heading in the general direction of your target. As soon as the IN RNG light appears, you can fire a Maverick by squeezing the trigger. The target will stay locked on until you pass it or hit the Clear A-G Target Lock key.

Air-to-Ground Strafe Gun HUD (M61A1)



Discretes

The Discretes on the M61A1 HUD indicate if the gun is ARMED or if you are tracking your target (LCK). If no discretes appear, then your gun is either out of ammo or is jammed.



HUD Mode Indicator

STRF indicates that you are in Air-to-Ground Strafe Gun HUD mode.

07D1
05264
61171



Distance to Target

Once you have locked on to a target, the distance to the target (in feet) will appear as you close in on your objective. Altitude is considered in the distance computation.

Target Designator

Indicates the target your radar is tracking.

Displayed Impact Line

Appears after you've locked on to a target, and connects the Target Designator with the Reticle.



Air-to-Ground Reticle

The F-16 firing control system automatically computes where your bullets would be by the time they reach target range. The firing control system then plots the "mobile" A-G Reticle at the precise place the bullets would land if you fired instantly.

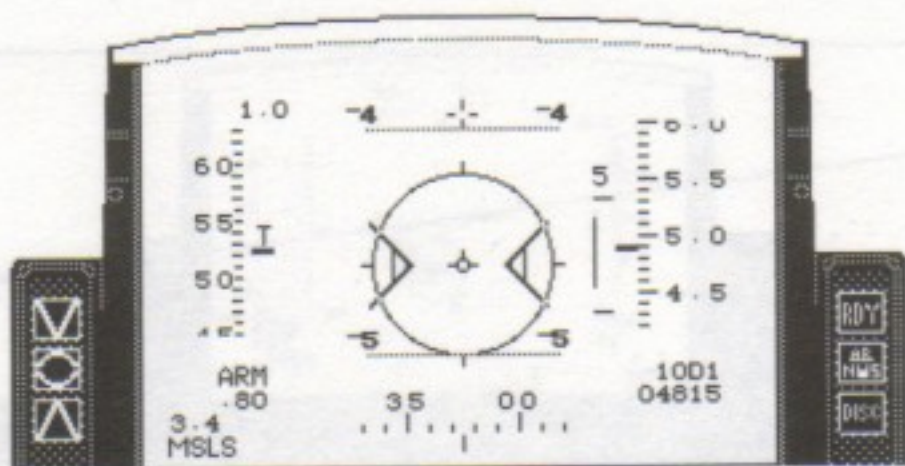
This Reticle will turn thick on the exterior if within 12,000 feet of the target and the thickness will diminish counterclockwise as you approach.



"Bitchin' Betty"

Combat aircraft researchers determined that a human female voice is much more effective in gaining a pilot's attention than conventional beeping alarms or warning lights. Unique to the most modern aircraft, this electronic voice is fondly known to fighter pilots as "Bitchin' Betty." She is used to warn the pilot of potentially dangerous flight conditions. Therefore, when the following circumstances occur, you will be prompted by Betty's voice to rectify the situation:

- During the takeoff procedure, if you forget to release your Wheel Brakes after reaching 80% RPM, Betty will say "Caution" to prevent you from damaging your Nose Wheel System.
- When you take off and have reached a speed of 300 knots, Betty will say "Caution" until you raise the gear. Likewise, if you lower the gear later when landing and your speed is above 300 knots, she will state "Caution" then as well.
- If you are in immediate danger of crashing into the ground, Betty will shout "Pull up!" until you've taken steps to maneuver your plane out of danger. At the same time that Betty speaks, a pair of "arrow heads" will converge toward the middle of the HUD to provide visual feedback as well. The closer the arrows are to each other, the greater the danger. Flashing arrows means immediate danger!












- When the HUD is in ILS mode, Betty will say "Pull up!" if your landing approach is too steep.
- If you're running out of fuel, Betty will say "Caution" three times in succession, and the word "FUEL" will appear in the center of your Head-Up Display, no matter what HUD mode you are in at the time.
- When the Master Caution Light comes on after your plane has been damaged, Betty will state "Warning" until you look at the secondary caution lights in the **Right View**. (Looking at the **Right View** stops her voice.)



Front Panel

AOA (Angle of Attack) Controls

The AOA controls display the F-16's angle of attack and are used primarily to assist you in landing the plane. As the illustration shows, the plane needs to approach the runway at the right angle when landing, and the three components of the AOA display will give feedback on the plane's attitude.

INCOMING ANGLE OF F-16	INDEXER	INDICATOR
 AOA TOO HIGH BECAUSE AIRSPEED TOO LOW		 15°
 GOOD ANGLE AND SPEED		 8°-13°
 AOA TOO LOW BECAUSE AIRSPEED TOO HIGH		 3°

ANGLE OF ATTACK (AOA) AND RESULTING FEEDBACK



AOA Indexer

The AOA Indexer is located to the left of the HUD and has three symbols that light up separately depending on your landing approach angle. If the middle light is on, you are at the perfect AOA (8 to 13 degrees) for landing. If the top light is on, your AOA is too high. When the bottom light is on, your AOA is too low.



AOA Indicator

A numeric AOA Indicator is located in the main cockpit view to the right of the REO screen, and displays the AOA in degrees.

You control the F-16's AOA by varying (1) the plane's speed with the throttle controls, (2) the rate of dive with the "stick" control, and (3) the amount of pitch with the yaw/pitch control. During normal flying, you can bleed off or reduce speed with a high AOA. The more g's the plane pulls, the higher the AOA will be. Maintaining low speed and high AOA usually proves fatal in battle.



Nose Wheel Steering System/Landing Gear Status Indicator (NWSS/LGSI)



Ready (RDY) Light

The RDY light on the NWSS/LGSI signifies that the NWS system and the landing gear are not damaged. The light will stay on while the landing gear is down, assuming there is no damage to your NWS System.



Nose Wheel Steering System Operation (AR/NWS) Light

Lights up to indicate that the Nose Wheel Steering System (front wheel) is activated and operational. This signifies that the plane's steering mechanisms have switched from the ailerons to the nose wheel so you are able to taxi the F-16 on the runway. When you start down the runway before take-off, the NWS System is automatically activated.

The AR/NWS light will go out when the plane reaches 70 knots ground speed. This means that the Nose Wheel Steering System has been locked and is unable to turn on the runway. The NWS System does not truly disconnect until the plane has left the ground, when the DISC indicator lights up.



Disconnect (DISC) Light

The DISC light turns on after the F-16 takes off. It's purpose is to verify that the plane has left the ground and that the steering functions have been disconnected from the Nose Wheel Steering System. It also indicates that the steering has been switched to the ailerons so the F-16 can bank and roll. The light will stay on until the landing gear is up.



The landing gear should be raised *immediately* upon take-off (**G** key). Don't exceed a speed of 300 knots with the landing gear down or you will risk damage to the mechanism. At the upper levels of FALCON, your plane will go into a tailspin at speeds greater than 300 knots if you haven't raised the wheels. Even though the DISC Light pertains specifically to the Nose Wheel Steering System, it serves as a reminder to raise the landing gear (or lower it during landing, as it were, when the light is off). "Bitchin' Betty" will also let you know if your landing gear is up by saying "Caution" repeatedly until you raise your gear.



Master Caution Light



The Master Caution Light will light up when damage of any kind has occurred to the F-16, whether induced by combat or random occurrence. This is a signal to look at the right side of the cockpit for the specific warning light.

"Bitchin' Betty" will also let you know of any damage by saying "Warning" until you look at the secondary caution lights in the **Right View**. Looking at the **Right View** stops her voice.



When the Caution light appears, press the [6] key on the top row of the keyboard (or [9] on the numeric keypad) to toggle to the **Right View**. The panel below the canopy line contains specific caution lights for the damage or malfunction that has occurred.

Threat Indicator and Warning System

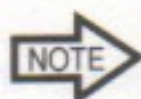


The threat warning system alerts you if:

- 1) an enemy plane has been picked up on your Threat Indicator
- 2) an enemy plane has "radar missile lock" on you
- 3) a missile has been launched towards you
- 4) a SAM site has launched a missile

Enemy planes show up as square blips on the Threat Indicator, while SAMs appear as smaller circular blips. The Threat Indicator indicates relative position only and not distance from the enemy plane to you. The inner circle of the Threat Indicator represents the perimeter surrounding your plane. (If the enemy MiG is in the 180° area in front of your plane, it will also show up on the Radar Display, and show its distance from you when within 28 miles.)

If the enemy has "missile lock" on you with a radar-guided missile, a flashing "LOCK ON" will appear on the topmost Threat Warning Light. If a radar-guided or heat-seeking missile has been launched toward you, "LAUNCH" will appear in the bottom Threat Warning Light location. Repeating "beeps" signal a missile lock on you and you will hear any launch of a missile.




At the Colonel level of FALCON, the enemy MiG's may not have their radar systems turned on. The Threat Indicator only picks up planes which emit radar signals, so you will have to make visual contact in this situation. The first indication that a MiG is in the area might be when the LOCK ON or LAUNCH lights appear. Comforting thought, huh?



Stores Control Panel



This panel displays essential information about your current HUD mode. In the example to the left, the Air-to-Air HUD is selected, radar (APG-66) is turned on and AIM-9J missiles are activated and ready.

In FALCON, one way to see all the weapons stores currently on your plane would be to toggle through the HUD modes. A more efficient way to do this is by pressing the  key, which saves you from exiting the current HUD mode. In this manner, you can monitor all the weapons you have remaining at any time, something which must be done quickly in the heat of battle.



Jet Fuel Starter (JFS) Light

This light will turn on when the engine is started. Most of the time, you will only be aware of this light for a brief time on the ground before increasing your engine to takeoff speed. Occasionally you may have to restart the engine if your plane stalls while in the air.

When starting up your engine at the beginning of the game, press either  key once to initiate the JFS. The engine RPM will increase until it reaches 60 percent, when the Jet Fuel Starter light will go out and the main engine throttle control will take over. If you suffer a rare engine shutdown due to a severe stall in the air, you'll know by looking at the RPM gauge because the needle will have dropped to zero. If the sound is toggled on, you'll hear the engine die. The best way to restart the engines in the air is to press the  key while in a controlled dive and level out once the engine is throttled up again.



AUTOPILOT

Autopilot Light

When the autopilot is engaged, this light will be lit. FALCON will track a MiG if one is present, or the autopilot will guide you toward your selected waypoint. (See the **Missions** chapter for more information about waypoints.) If you select a mission that has a corresponding waypoint number, that number will automatically be the default one shown on your HUD. The waypoint number appears in the lower right corner of the HUD, just below the altitude scale.

If you wish to increase the waypoint number in order to go to one of the other destinations, press the **[U]** key to increase the number or **[Y]** to decrease it.

ENG FIRE

Engine Fire Light

You may encounter an engine fire during battle if the enemy's bullets are well placed. When this light comes on, your only choice is to eject from the plane. Refer to the Ejection Handle paragraph following for more information.

FLARE

Flare Indicator

Your F-16 is equipped with flares which are designed to fool heat-seeking missiles. The Flare Indicator tells you how many flares you have remaining on the plane. You start with 30 flares on board at the beginning of each flight, and you can shoot them off by pressing **[]** (or the **[Enter]** key on the numeric keypad).



It's very important that you don't release your flares too soon in order to properly force the incoming missile to seek the flare instead of your exhaust pipe. Heat-seeking missiles are almost always used at close range. Remember, if your Threat Warning light shows a "LOCK ON" (enemy missile lock on) warning before the "LAUNCH" (enemy missile launch) light appears, the enemy plane has fired a radar-guided missile at your F-16 and flares won't do any good.

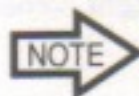


Be generous with flares. It won't make any difference if you have flares remaining when a missile flies up your six! (P.S. Heat-seeking missiles especially like planes with afterburners flaring.)

Chaff Indicator



Chaff are packages of tiny foil strips which confuse radar-guided missiles. The Chaff Indicator shows how much Chaff you have remaining on your plane. Each plane starts with 30 packages of Chaff aboard at the beginning of the game, and you can dispense them by pressing **Tab** (or the **0** key on the numeric keypad).



Chaff has no effect on heat-seeking missiles, so only use it when the "LOCK ON" light has appeared on the Threat Warning System *before* the "LAUNCH" light appears. Missiles that are fired from distances of greater than 7 miles are almost always radar-guided. The same generosity principle discussed in Flare usage applies to Chaff as well.



ECM (EMIT) Indicator

The ECM EMIT Indicator registers the use of ECM (Electronic Counter-Measures) which is employed via the ALQ-131 Pod (and the **E** key) installed on the bottom of your F-16. Use ECM to foil ground based SAM (Surface-to-Air Missile) sites and to confuse the radar of MiG planes that have locked their missiles on you. The problem with using ALQ-131 emissions is that it announces to the world that you are coming, so you should use it only after being acquired by an enemy plane or SAM site. By definition, ECM includes the Threat Warning System, Chaff and the above-mentioned ALQ-131 Pod, so you will hear it discussed as it relates to each of the different systems.

If you are going to fly a mission that involves being around SAM sites, you should request an ALQ-131 ECM Pod from the Sarge at the Armament screen sequence.

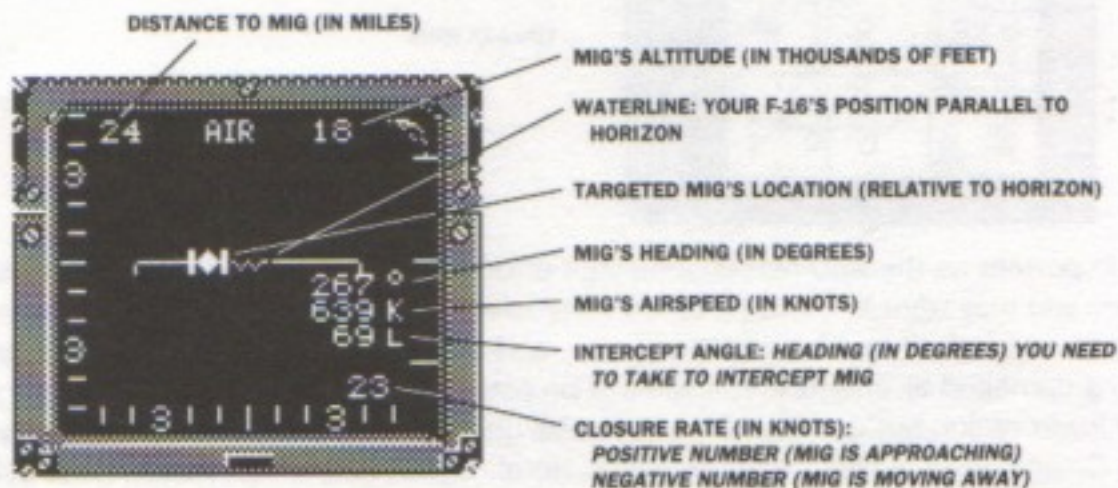
REO (Radar/Electro-Optical) Display

The REO Display is one of the most important monitors in the F-16 cockpit. The two different Radar modes constantly update the position of enemy planes relative to your F-16, along with what adjustments are taking place as the MiG maneuvers and changes position. The Map mode provides an overhead view of the FALCON landscape. You can toggle between the Radar modes and the Map mode by pressing the **C** key.



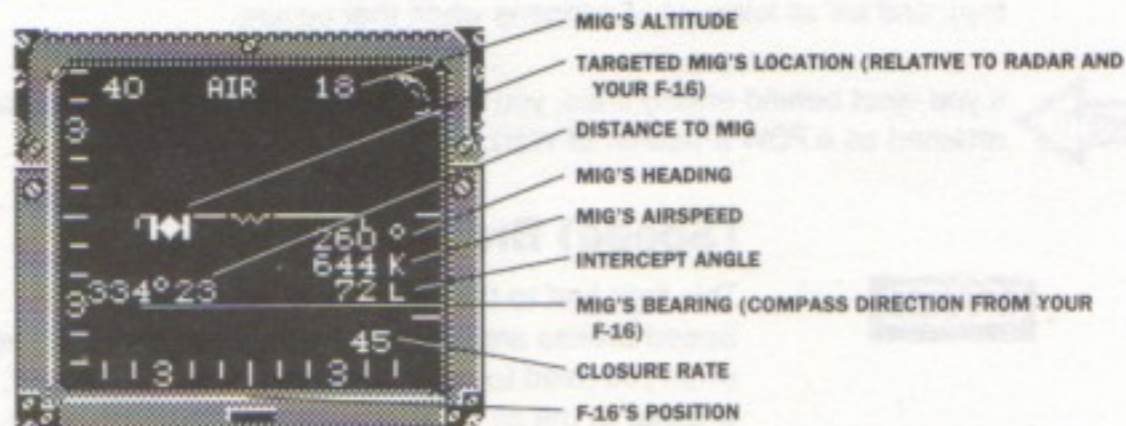
Boresight Scan Radar Mode

The view from this radar mode is as if you were looking down the sights of a rifle at a target, hence the name "boresight." Your F-16 is positioned in the center of the radar (at the waterline "W" mark) and all angles correspond to the view from your HUD (the top of the radar is up, the bottom is down, etc.). This mode is used primarily to determine how close a nearby MiG is from your gun/missile sights. Boresight Scan is the default radar mode.



Tracking Radar Mode

This radar mode differs from the Boresight Radar in that the Tracking Radar takes an overhead perspective of approaching enemy planes rather than a head-on perspective. This will help in multiple target engagements to determine which MiG is closer to your plane. Your F-16 is at the bottom center of the radar screen and the top of the screen is the maximum range of your radar's detection capability. There are three different constant miles-to-target ranges, 10, 20 and 40 miles. You can toggle between the different radar modes with the \square key (to change to Tracking Radar mode) and \square key (to return to Boresight Radar mode). The way to quickly recognize the particular radar mode is to check the miles-to-target number located at the top left of the REO screen. The Tracking Radar mode will be a constant number (either 10, 20 or 40), while the number in the Boresight Radar mode will vary depending on the proximity of the approaching MiG.

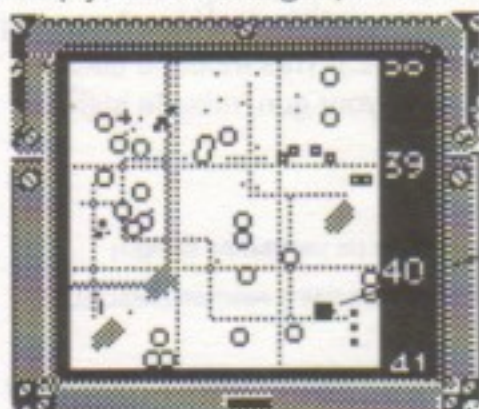


If you have more than one MiG on your screen, you can press the Air Target Select key (\square) in either radar mode to designate which one is the target.



Map Mode

This mode shows you a view of the terrain and major features in FALCON. It can also help you locate target positions or return to your home airstrip.



YOU ARE HERE

As important as the REO screen is to your effectiveness in battle, there are times when you may want to switch it off so as to avoid being detected. The Radar screen can be toggled off and on with the **[R]** key, and there is a possibility of your Radar being damaged by enemy fire. It will still be possible to win the battle, especially at the lower ranks, but any FALCON player who defeats an enemy MiG without Radar at the Colonel level is pretty special. Sierra Hotel, if you know what I mean. (Just ask any real fighter jock.)

Ejection Handle



The Ejection Handle is the last hope for a fighter pilot in distress and an option you should choose only if absolutely necessary due to severe plane damage. Press the **[Option] [E]** key combination to eject from your F-16.



Never eject when the F-16 is upside down (or more than 60 degrees from level) unless you want to be a human javelin and end up with a permanent headache. Your chances of hitting the canopy shell upon ejection are high if your plane is moving relatively slow or is in a flat spin (like a top), and we all know what happens when that occurs.



If you eject behind enemy lines, you're almost certain to be captured and retained as a POW (Prisoner of War).

(Speed) Brakes Light



This light just to the right of the REO shows when Speed Brakes are being applied. Invoke them (**[B]** key) when you need to make a quick reduction in speed, whether in the air or on the ground. They should be used in combination with the Flaps and Wheel Brakes to completely stop your F-16 after it has landed.





Flaps Light

Located immediately above the Speed Brakes Light, this light shows when (wing) flaps are down. The Wing Flaps are used both to create lift and to help slow the F-16 upon landing. They're toggled up and down with the **[F]** key.



MIL/AB Indicator

This cockpit light indicates whether you are currently using the engine's Afterburner (AB) for extra acceleration or operating under Standard Power (MIL), a term for normal engine usage and acceleration. Military Power is achieved when you reach 100% thrust.

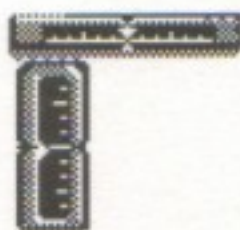
The Afterburner is engaged by pressing the **[/]** key. To return to Standard Power, press the **[/]** key again. The use of Afterburner allows your plane to go supersonic as well as improve acceleration and climb rate. It can also be used to make a faster takeoff from the runway. The trade-off is that the Afterburner uses a tremendous amount of fuel. Remember also that heat-seeking missiles just love a little extra heat to zoom in on.



Attitude Director Indicator (ADI)

The ADI (sometimes called the "level ball") is used to help register your plane's position relative to the horizon as it rolls and pitches in any direction.

When you're up in the air flying around, watch the position of the ADI change as the plane banks, rolls or changes altitude. Note how the line separating the sky from the ground matches to the "water line" on the Radar display, the lines of the Pitch Ladder and to the real horizon line itself. Most pilots use all these visual cues when flying their jets. When things get hot and heavy up there, it's nice to have several ways to orient yourself as your eyes are darting around the cockpit.



Stick Centering Indicators

These slide indicators help align your F-16's stick, providing a visual aid in addition to the cockpit items previously mentioned. When the pointer is centered in both the pitch and roll bars, the F-16's stick is "centered."

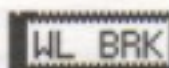


Sensitivity Indicator



Another feature specifically designed for the computer version of the F-16, this indicator sets the sensitivity of the plane to pitch and roll speed. The sensitivity varies from 0 to 9. If you select "0" sensitivity, the plane will be less sensitive to changes in direction and will be easier to control. At the "9" setting, the turn, dive and climb characteristics of FALCON are virtually identical to the actual F-16. The most realistic setting is "9" sensitivity while flying at the rank of Colonel. The default sensitivity level is "5." Press **[]** to increase the sensitivity level, or **[]** to decrease it.

(Wheel) Brakes Light



The Wheel Brakes are used to control the F-16 when it is on the ground. When this light is on, the Wheel Brakes are engaged.

When you first enter the FALCON cockpit, the Wheel Brakes are engaged. When you press the Jet Fuel Starter key to start your engine, make sure the Wheel Brakes are left engaged unless you want the plane to start rolling. You can release the Wheel Brakes at any point (by pressing the **[W]** key) if you want to taxi the plane to a specific runway. Reengage the Wheel Brakes when you wish to stop. When in position for takeoff, leave the Wheel Brakes engaged until RPM is between 60–80%, then disengage them. If you wait until after RPM has reached 80% to release the Wheel Brakes, the NWSS (Nose Wheel Steering System) and/or Wheel Brakes may be damaged, depending on what rank you are playing at. In similar fashion, the Wheel Brakes are used to stop the plane completely upon landing (within the same RPM guidelines). You should use Speed Brakes to slow down the F-16 when it's still packing a full head of steam after touching down. Wheel Brakes are designed to stop the plane only when it's moving slowly.



RPM Gauge



The RPM (Revolutions per Minute) Gauge reflects the percentage of thrust being applied with your F-16's engine. The numbers on the gauge represent increments of percentage (%) power that the F-16 engine is producing at any particular time, from zero all the way up to 100 percent. All other factors being equal, the RPM percentage relates directly to the plane's airspeed. After you play FALCON for a while, you'll know instinctively what percentage of thrust to apply to reach a certain airspeed.

As you increase in rank during the game, you'll be required to monitor the RPM Gauge more closely. The most common situation where you will be watching the RPM gauge is during the takeoff procedure.



Some percentages to remember: Your plane will start to roll at 40% RPM during start-up. From a takeoff position, the throttle should be increased to between 60–80% RPM before releasing the Wheel Brakes to proceed down the runway. If you wait to release the Wheel Brakes until after 80% RPM is reached, the NWSS (Nose Wheel Steering System) and Wheel Brakes may be damaged. Increase RPM to 100% (and invoke the Afterburner) for a shorter takeoff or to compensate for a heavy load.

Stall Light



The Stall Light illuminates when you have exceeded the F-16's engine performance envelope, causing your plane to stall. This can occur for various reasons, but the most common one is that air intake has been reduced sharply, due to performing maneuvers at either high altitudes in thin air or at too low an airspeed.

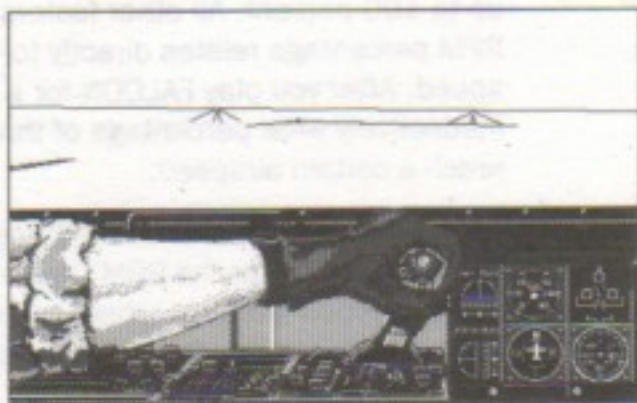


FALCON does not stall under any conditions at First Lieutenant or Captain ranks. At Major level and up the F-16 will be increasingly more susceptible to stall conditions. During a stall, your plane will begin to shake. The best action to take during a stall is to accelerate in a dive until the engine refires and stabilizes, then level off. You'll start to realize after playing the game for a while why dogfight engagements take place at middle altitudes. A plane's engine gasps for oxygen as well as fuel, and there's not much oxygen at high altitudes. You also occasionally need room to recover beneath your position, and the ground can greet you fairly quickly when you're flying at Mach 1.



Left View

Press the [4] key on the top keyboard row (or [7] on the numeric keypad) to switch to the left side view. This view looks out the left side of the canopy glass, and gives access to some very important gauges.



Yaw/Pitch Controls

Yaw Trim and Pitch Trim relate directly to the Velocity Vector discussed earlier in the HUD descriptions. Although you can visually line up your yaw and pitch changes through the HUD, there may be times when the HUD is inoperable due to damage. The Yaw/Pitch Controls on the left side serve as a backup so you can re-orient the plane for landing or targeting reasons. Each dot on the dial represents two (2) degrees.



Fuel Gauge

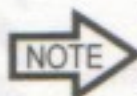
The Fuel Gauge represents the amount of remaining fuel in hundreds of pounds. Because you may not be in the habit of looking out the **Left View** on regular occasion, a prompt will appear near the center of the HUD glass if your fuel is getting low. When the word "FUEL" appears on the HUD, you should check the Fuel Gauge. If you have not yet reached the mission's destination, you may have to abort the mission.

You'll notice there are two needles on the Fuel Gauge. One represents the fuel remaining in any external tanks, while the other shows the remaining internal fuel. Any added external tanks are used up first.

Your plane starts with 6,950 points of fuel (give or take 300 pounds) in the internal fuel tank, so one needle will be initially placed between "60" and "70" on the dial. Each external tank adds 2,000 pounds, so



the other needle will be placed appropriately. If no external tanks are added, that needle will be resting at "0" (zero) before you fire up the engine.



Your Fuel Gauge will be a good indicator of how expensive Afterburner use can be. Be conservative on fuel usage: don't fly at high speeds or use your Afterburner unless it is absolutely necessary. Missions at Colonel level won't be accomplished by showboating.



Compass

The Compass shows your plane's magnetic directional heading. Although you'll orient yourself normally with the HUD Heading Scale, the Compass makes an invaluable backup if your HUD has been damaged.



Landing Gear Lights

The Landing Gear Lights will be illuminated when the gear is down. If you try to toggle "on" the gear before landing and the lights don't appear, you'll be forced to land on the F-16's belly.



Backup Airspeed Gauge

The dial is a backup for the Airspeed Scale on the Head-Up Display, and will be useful if the HUD electronics get knocked out by enemy fire. Just like their counterparts in the HUD, the numbers represent the airspeed in tens of knots.

Right View

Press the [6] key on the top keyboard row (or [9] on the numeric keypad) to switch to the right side view. This view looks out the right side of the canopy glass and gives access to the secondary caution lights. Select this view when the Master Caution Light has flashed to check for specific damage.



Caution Lights

FLAP

The Flaps have been damaged and are frozen in their current state. If they were up when the damage occurred, they stay up. Since Flaps help curb excessive speed, the plane may be much harder to land. If the Flaps were down when the damage occurred, they stay down. This will hamper your maneuverability and prevent your plane from reaching top speed.

STORES

If the STORES light appears, weapons cannot be released from external stores. However, the M61A1 cannon (machine gun) and any AIM-9J/9L missiles can still be used if available.

BRAKES

The BRAKES light indicates a failure in the Speed Brakes system. If the Speed Brakes were open when the damage occurred, they stay open. Similar to Flaps damage, this situation severely affects your maneuverability and forces your plane to fly at reduced airspeed. If the Speed Brakes were closed when the damage occurred, they stay closed. The F-16 will be harder to land in some situations without the ability to brake and slow it down.

GUN JAM

The GUN JAM warning indicates that your M61A1 cannon is jammed and won't fire. You will have to rely on any remaining external stores for combat purposes, assuming that they are functioning OK.

NWS

If the NWS light is illuminated, the Nose Wheel Steering System has been damaged due either to (1) not following proper take-off procedures, (2) not landing well on approach, or (3) being hit by enemy fire. If the NWS System is disabled, you won't be able to steer the plane once it has landed. You will also incur more severe damage if your plane doesn't land very straight and then moves off the runway.

WEP ARM

This light indicates that you are unable to arm the selected weapons. Once again, you'll have to rely on any remaining M61A1 rounds if the gun is functioning.



ECM

The Threat Indicator is out. You won't be able to detect incoming MiGs unless they show up on your Radar screen, assuming your Radar is functioning. You may also have to make visual contact. Survive this, and the Sierra Hotel may be your permanent home.

BURNER

The Afterburner cannot be turned on. This will eliminate quick acceleration, which could make the difference in completing a maneuver successfully or making a quick getaway.

RADAR

The Radar display is inoperable. You will have to rely on the ADI and visual contact to orient yourself to the horizon, and you'll be severely limited in how well you can track a MiG on the screen.

ENGINE

Signifies a partial or complete loss of power to your F-16. If you're not able to maintain any altitude or momentum, the power loss is complete and you'll have to eject using the **[Option][E]** key combination.

HUD

When this light is on, you'll probably know it already because the HUD glass will be blank. At this point, you have to rely on visual sighting and the backup gauges in the main cockpit and side views to survive. It's probably a good idea to turn tail and head for home if you can.

FUEL SYS

This light signals a leak in the Fuel System. Watch the Fuel Gauge closely to monitor the severity of the leak. If your gauge starts to drop quickly, head for home immediately and prepare to eject if necessary.

NAV

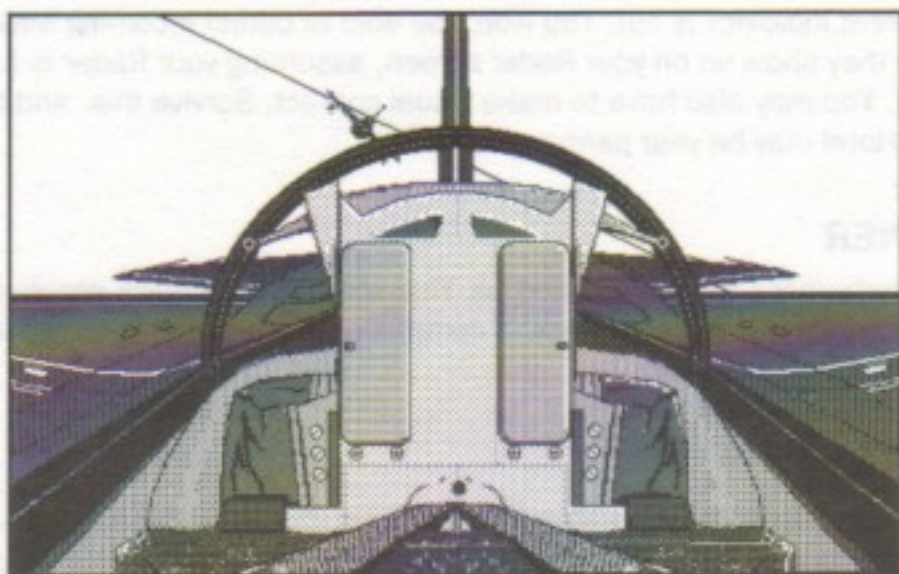
This indicates that your Map is not functioning properly. The map grid will be displayed on the REO screen, but your relative position is not shown.

OXY LOW

Indicates a drop in cabin pressure usually caused by a bullet hole. Don't fly above 27,000 ft or you're certain to black out, even if flying straight and level.



Rear View



AN UNINVITED VISITOR IS KNOCKING AT YOUR BACK DOOR

Press the **[5]** key on the top keyboard row (or **[3]** on the numeric keypad) to change to the rear view. The F-16 cockpit allows excellent visibility in all directions, and you will probably take advantage of the **Rear View** at Colonel level, when some of the enemy MiGs may have to be acquired visually.

Part III: Military Ranks and Missions



The Ranks

The difficulty levels in FALCON are determined according to military rank. The classifications include First Lieutenant (lowest) and continue through Captain, Major, Lieutenant Colonel and Colonel (highest). The ranks determine not only your plane's characteristics but the nature of the enemy as well.

The charts on pages 96 and 97 summarize the differences of play at each of the ranks: first for you and your F-16, and then for the enemy. Most of the rank guidelines are self-explanatory. For example, your F-16's flight performance and restrictions become more "true-to-life" as your rank increases, making the simulation more challenging. The MiGs and SAMs also become more formidable.

At First Lieutenant level, the program's realism is dampened a bit so you can easily become involved in the game and get a taste for most of its features. Flying at Colonel rank will give you a highly realistic experience and require you to be very skillful to survive. However, just as the experience will become more exciting and dramatic, the rewards will also be more substantial at the upper ranks. For example, it will be possible to receive certain medals and merits only at higher ranks. A detailed look at the scoring and awards process is included later on in **Part III**.

Now let's take a look at some of the specific rank guidelines:

Super Engine vs. Normal Engine

At First Lieutenant and Captain ranks, FALCON has what we call a "super engine." Airspeed is directly related to the percentage of RPM applied, and no other factors are involved. This engine output is easier for you to gauge because extraneous factors like climb rate are not considered. In other words, you can initiate a nose dive at 50,000 feet going 500 knots and when you hit the ground, you'll still be going 500 knots if you haven't increased or decreased the throttle. Most importantly, the engine does not stall at First Lieutenant and Captain ranks.

Weight and Drag Influence from Armament

At Lieutenant Colonel and Colonel ranks, the type and amount of weapons and accessories that you carry on your F-16 will affect its performance greatly. Your plane won't be able to pull as many g's, and certain maneuvers may render the plane uncontrollable. The F-16 is a terrific machine, but all jets have limitations.

Ground Crashes

As rugged as a jet fighter seems to be from an outward appearance, their landing mechanisms are somewhat delicate. Become adept at the takeoff and landing procedures before flying at high ranks, because your landing gear will not be able to take a lot of abuse. You won't necessarily have a fatal outcome from a faulty landing (or even a belly flop!), but your superiors and the taxpayers won't be too thrilled.

Possible Outcomes After Pilot Ejection

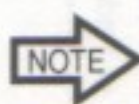
Since FALCON isn't exactly real life, you don't have to worry about not making it through an ejection sequence at the lower ranks. At Major level or above, however, you risk being captured by the enemy if you bail out behind enemy lines. The probability increases the further behind enemy lines that you eject. In FALCON, being taken Prisoner of War (POW) is a permanent condition. (If you crash behind enemy lines, you are declared MIA, or Missing In Action.) Plus, fighter pilots know that ejection even in friendly territory doesn't necessarily lead to a safe trip home because of possible complications from the ejection itself. Ejection should be treated definitely as a last resort at the upper ranks.

Possibilities of Pilot Blackout or Redout

Modern fighter jets can perform some pretty amazing maneuvers and still retain their structural integrity. Too bad the same can't be said about their pilots! Even with advances in flight suits and cockpit design, there are still limits to what a pilot's body can withstand from the force of high-speed turns.

At Major rank or above, you risk pilot "blackout" if your plane sustains a maneuver in excess of 8 g's. The excessive force crams the pilot into the seat and pushes his blood supply downward. You'll know you're in trouble because the screen will start to fade out before going completely black. (A pilot loses the ability to distinguish colors during the initial stages of a blackout, producing in effect a "whiteout".) **Part IV** discusses high g forces, which are usually the result of sharp and climbing high-speed turns.

Blackouts are the result of positive g forces. Equally as dangerous are "redouts," which are caused by pulling negative g forces. Negative g's are a result of pushing the stick forward into a dive too fast and for too long. The blood rushes to a pilot's head as he gets "pulled" from the seat. In this situation, the screen will go progressively "black," signifying the darkening effect from the blood pressure on the pilot's eyes. On the average, the human body cannot withstand a negative g force in excess of -2.5 g's before experiencing a "redout" and possible rupture of blood vessels in the upper body.



Pilots say that even when blackouts or redouts occur, they can still recover from them and regain control of their senses. What you must do in FALCON to recover from these kinds of situations is to try and remember what the most recent event sequence was that got you in trouble. When the blackout or redout starts to occur, stop your current action and reverse what you were doing. If you were diving, you should pull up; if you were rolling to the right, try moving to the left, etc. These simple instructions should alleviate most of your problems. This may not always rectify your situation, especially at Lt. Colonel and Colonel rank where the simulation is more realistic.

Effect of Rank on Your F-16

1ST LIEUTENANT	CAPTAIN	MAJOR	LT. COLONEL	COLONEL
Lowest ←	-----	Difficulty	-----	→ Highest
Easier to Fly ←	-----	Ease of Flying	-----	→ Harder to Fly
Easy to Hit MiG ←	-----	Accuracy of Gun Bullets	-----	→ Hard to Hit MiG
Super Engine			Normal Engine	
No Engine Stall			Engine Stall Possible	
Unlimited Armament	Limited Armament (No Weight and Drag Influence)		Limited Armament (Full Weight and Drag Influence)	
Unlimited Fuel		Limited Fuel (Must Monitor Fuel Usage)		
Collisions Impossible		Collisions Possible with Ground Structures (Fatal Collisions)		
No Ground Crash	Ground Crash if Angle > 60°		Normal Ground Crash	
Ejecting Pilot Always Lives and Returns		POW Chance (If Eject Behind Enemy Lines)	POW or Fatal Outcome Possible After Ejecting	
	Unlimited Flares		Normal Limit on Flares (30)	
Unrestricted Landing and Takeoff	Must Raise and Lower Landing Gear	Full Landing Gear and Nose Wheel System Requirements for Landing and Takeoff		
No Pilot Blackout or Redout		Pilot Blackout and Redout Possible		

Effect of Rank on the Enemy

1ST LIEUTENANT	CAPTAIN	MAJOR	LT. COLONEL	COLONEL
No MiG Missiles or Guns	No MiG Missiles; MiG Gun Bullets Not Very Accurate	MiG Missiles and Guns are Somewhat Accurate	MiG Guns are Very Accurate; MiG Missiles are Somewhat Accurate	Both MiG Missiles and Guns are Very Accurate
No MiG Flares		MiG Flares Exist, but Not Totally Effective	MiG Flares are Totally Effective	
		SA-2 Radar-Guided SAMs Only	SA-2 Radar-Guided and SA-7 Heat-Seeking SAMs	SA-6 Radar-Guided and SA-7 Heat-Seeking SAMs
No SAMs of Any Kind	SAMs Launch, but are Unable to Hit You			

The Missions

FALCON contains a variety of air-to-air and air-to-ground missions to test your flying skills. All missions take place in a landscape arena consisting of enemy territory as well as a "friendly" area where your airfield is located.

The individual mission descriptions will detail where you need to fly and how you need to perform the mission to be successful. The following map of the FALCON landscape gives an overall view of what the arena looks like, with the locations of individual SAM sites, bridges, airfields and other landmarks noted.

Your REO screen in the cockpit toggles to show a reduced-size version of the map to assist you in reaching your target. Even more importantly, it helps you get back home.

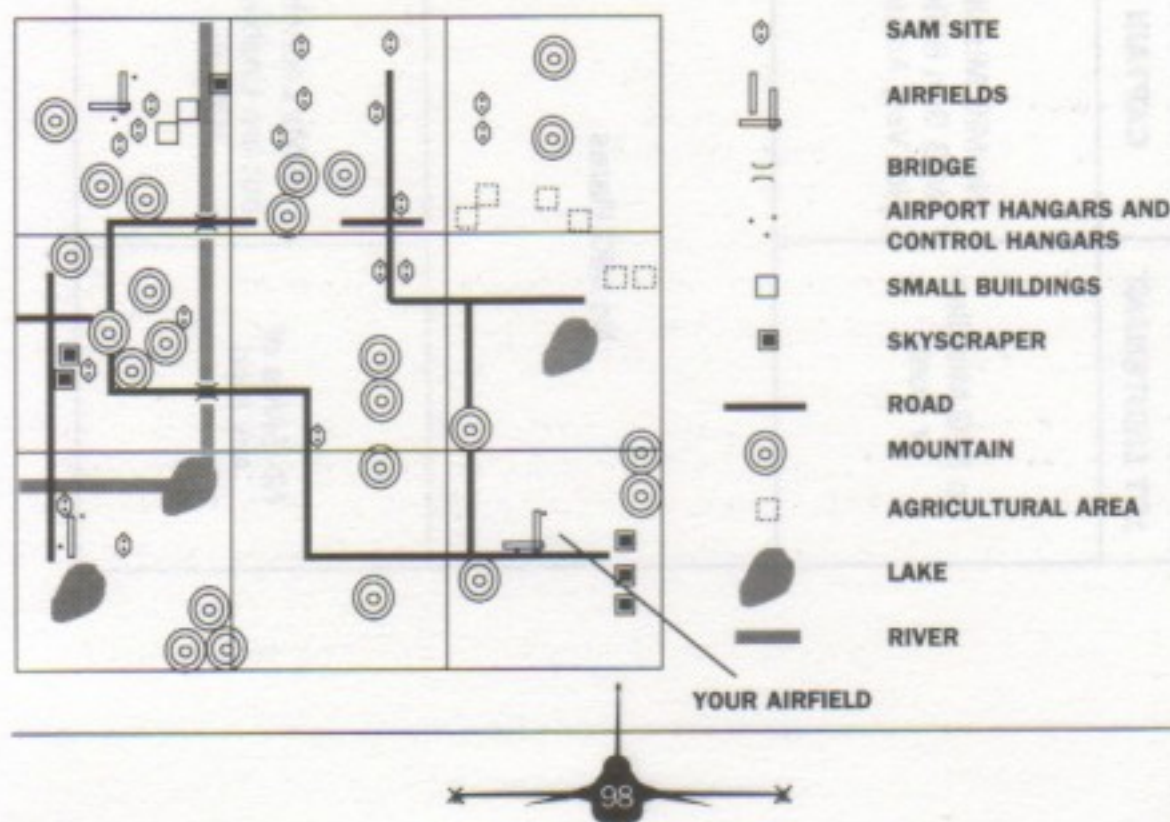
Waypoints and Target Selection

Your navigation computer has data on the locations of targets for the various missions. Each target has been assigned a number (or numbers) called a waypoint. This waypoint number is displayed in the lower right side of the HUD along with the current distance from that target. For example, the first building in the **Milk Run** mission has the waypoint D1. When you are fifteen (15) miles from this target, the waypoint indicator will be 15D1.

You may change the waypoint number by pressing the **U** key to increase the number and the **Y** key to decrease it. If you engage the Autopilot (**Option D**), your F-16 will head directly for the current waypoint (unless there's a MiG in the vicinity).

The following missions are preceded by a number or series of numbers. These are the waypoints for the particular mission. Some missions may not have a waypoint.

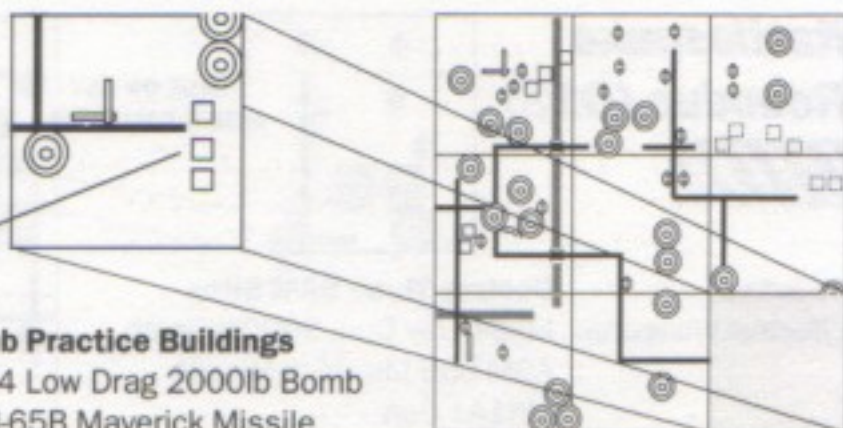
Note: Home Base has a waypoint of D0.



Milk Run (D1, D2, D3)



BUILDINGS



Objective:

Bomb Practice Buildings

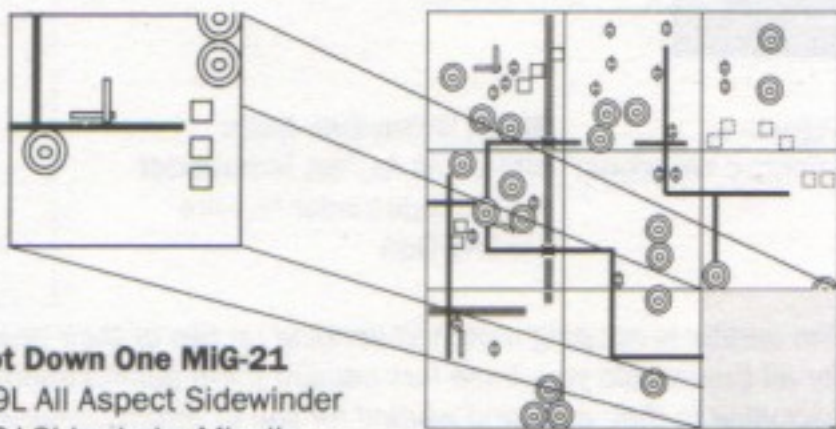
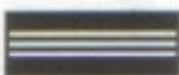
Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile

Every rookie pilot needs a confidence builder and flying the Milk Run should do just that. Use this mission to become familiar with both the Mk84s and the AGM-65B Maverick's delivery systems. The Milk Run is also an excellent choice for improving takeoff and landing skills.

Even veterans enjoy flying the Milk Run. It gives them a chance to improve their skills and explore the outer edge of the F-16's flight envelope, otherwise known as "chasing demons." Use this opportunity to get familiar with the way your plane flies at higher skill levels.

Food for thought: Many pilots have "bought the farm" while flying the Milk Run because they were too busy showing off and hotdogging. Stay alert!

Black Bandit (D12)



Objective:

Shoot Down One MiG-21

Effective Weapons: AIM-9L All Aspect Sidewinder
AIM-9J Sidewinder Missile
M61A1 Gun

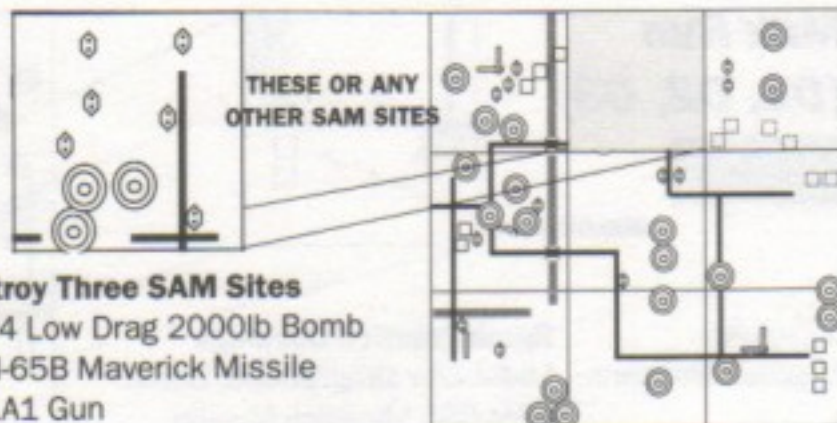
The Black Bandit has been creating havoc for months. He's the enemy's best pilot and today he's up, circling and challenging your base to send up their best. Well, kid, here's your chance to prove how good you really are.

Keep your eyes open. If you find yourself in a bad situation, get out of it. Don't try to play hero. Take your best shot first. The Sarge may be able to help out by getting you some AIM-9L All Aspect missiles. You'll have a fighting chance to take him out with a head-on shot using these. They're hard to come by, but if the Sarge can get some, use them.

The Bandit will come in from due north of your airfield. Good luck, you're going to need it.



Rattlesnake Roundup (D13)



Objective:

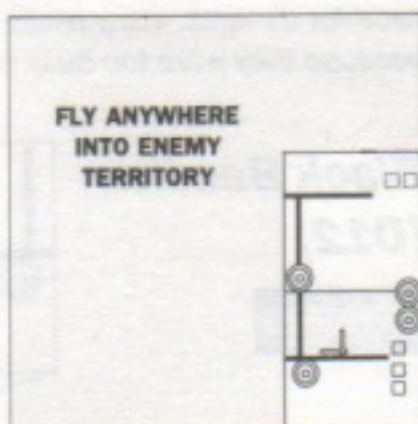
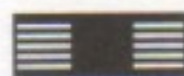
Destroy Three SAM Sites

Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile
M61A1 Gun

Your commander has just gotten word that Strategic Air Command is going to resume high altitude night bombing. The biggest threat to them are the enemy's SA-2 and SA-6 surface-to-air missiles (SAMs). You have to start knocking out the SAM sites anyway you can. To complete your mission, you need to destroy a minimum of three SAM sites.

Use your Mk84s, Mavericks, or M61A1 to take 'em out. If you can get the Sarge to let go of an ALQ-131 jamming pod, it might make your life easier at Major rank or higher. The pod will jam the SAM's guidance system and increase your life expectancy.

Double Trouble



Objective:

Shoot Down Two MiGs

Effective Weapons: AIM-9L All Aspect Sidewinder
AIM-9J Sidewinder Missile
M61A1 Gun

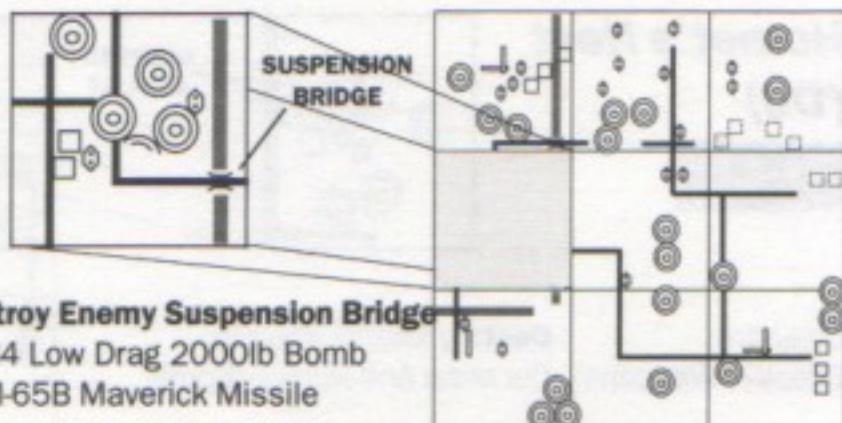
The enemy is hopping mad and sending up two of their best pilots to pay you back for all the trouble your base has caused them behind enemy lines. They are patrolling in their area and waiting for you to return. However, once you cross into enemy territory, they may not appear right away. They like to jump you when you least expect it. Keep your eyes open and monitor the Radar screen and Threat Indicator.

During multiple engagements, rookie pilots tend to make one particular mistake that all too often turns out to be fatal. They become obsessed with chasing one bogey and forget about the others. MiGs like to work in tandem. One plays the carrot, the other plays the stick...a very big stick that loves to smash you from the rear.

Load your plane with as many AIM-9Ls and AIM-9Js as possible, because you're going to need them. Keep an eye on your fuel gauge. Gas is gold. Afterburner provides needed power in a dogfight, but costs an enormous amount of fuel. You can add drop tanks if you want to increase loitering capability, but be prepared to eject them before going into battle.



Dragon's Tail (D4)



Objective:

Destroy Enemy Suspension Bridge

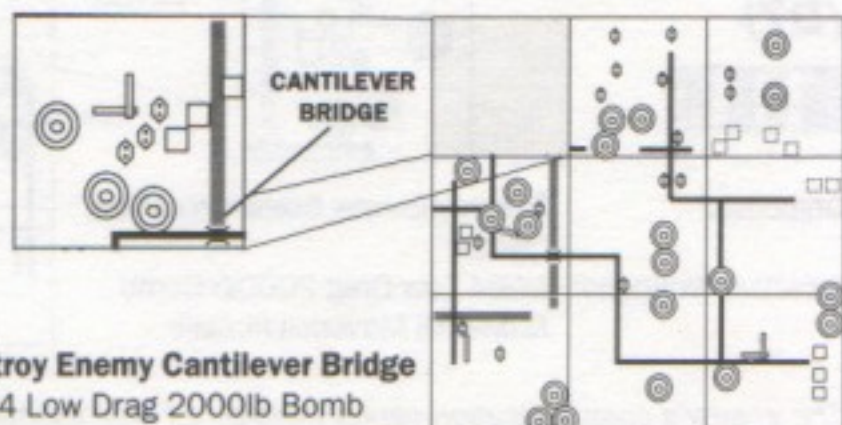
Effective Weapons: Mk84 Low Drag 2000lb Bomb

AGM-65B Maverick Missile

One principle of war is to deny enemy access to supplies by cutting off their lines of transportation. Knocking out the southern bridge is critical to your side's success in controlling the enemy. Use Mavericks or Mk84s to take out the bridge.

Since you'll be flying over enemy territory, you must keep your eyes open for either MiGs or SAMs. There's one SA-2 or SA-6 site just southeast of the bridge along the main highway. Also, if you're flying at Lieutenant Colonel or Colonel rank, be prepared for lots of SA-7 shoulder launch specials trying to nail you if you drop below 10,000 feet.

Dragon's Jaw (D5)



Objective:

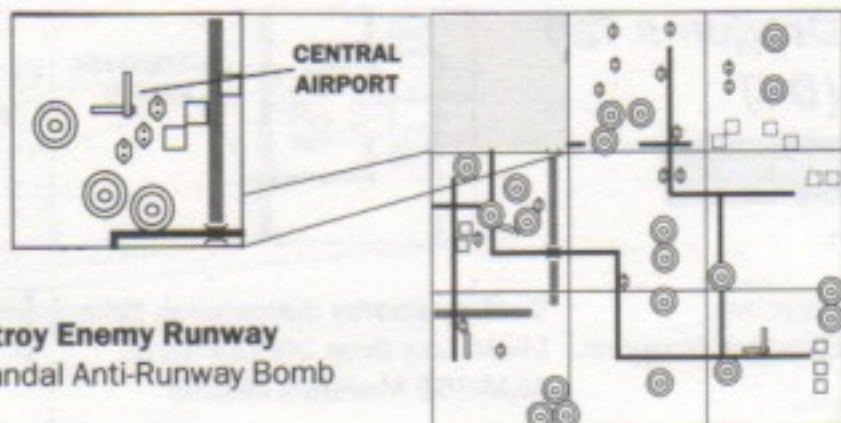
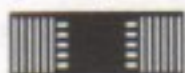
Destroy Enemy Cantilever Bridge

Effective Weapons: Mk84 Low Drag 2000lb Bomb

The Dragon's Jaw has been an elusive target for your squadron. Early on, planes have tried 1000lb'ers and Mavericks to take out the bridge, but they just seem to bounce off or scorch the paint. Arm your plane with the 2000lb Low Drag bombs. Try to avoid any dogfighting while you have any of these fat bombs dangling from under your wings, as the plane wasn't designed to dogfight with a full load.

Plan your mission carefully, avoiding SAM sites and MiGs until you deliver your package to the Dragon. If the enemy engages you and forces you to dump your load prematurely, the MiGs will have already won the battle before the first shot is fired.

Hornet's Nest (D6)

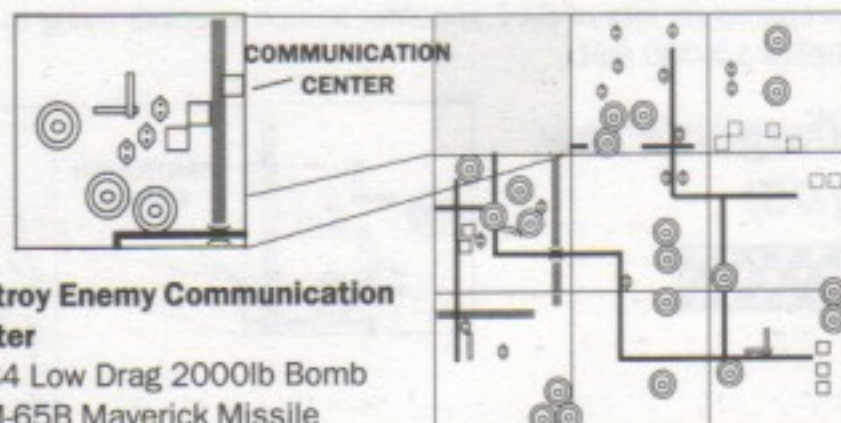
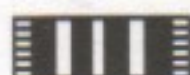


Objective: Destroy Enemy Runway
Effective Weapons: Durandal Anti-Runway Bomb

Denying the enemy use of their runway will severely cripple their ability to harass your planes. Your job is to knock out the Central Airport with the Durandal Anti-Runway weapon by hitting the airfield where the two runways intersect.

Extra fuel tanks will help extend your flight time, giving you the luxury of engaging the enemy after delivering your load. An ALQ-131 is also recommended to protect you from SAM launches. Note: This airport is heavily protected by SAMs and MiGs.

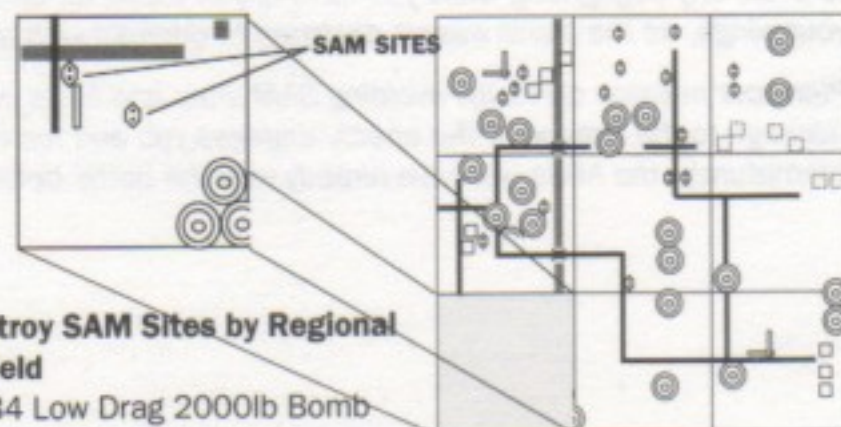
Bear's Den (D7)



Objective: Destroy Enemy Communication Center
Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile

The enemy's communication center handles all their logistics and coordinates all attacks. Operation Bear's Den requires you to destroy this hotbed of activity. The center is well protected by SAMs. Shoot at the building's base to blow it up. We recommend that you come in low and fast, deliver your weapons, and get out of there as fast as possible. Don't loiter around and become MiG chicken feed.

Venus Flytrap (D8, D9)



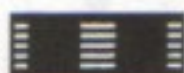
Objective: Destroy SAM Sites by Regional Airfield
Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile
M61A1 Gun



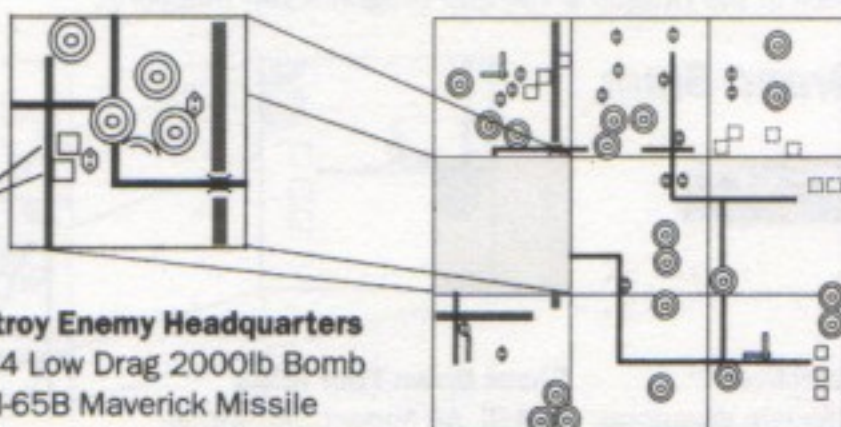
Within 24 hours, Strategic Air Command will launch a major strike to totally destroy the enemy's Regional Airfield. Before they can launch, you must destroy both SAM sites protecting the airfield. SAMs or MiGs will be up. The Flytrap is heavily protected and the enemy doesn't take too kindly to those wanting to bomb them. If you're shot down, there's a very low probability of being rescued.

Like other bombing missions, avoid engaging any MiGs until you've accomplished your primary objective. If you're successful at eliminating the SAM sites and have enough weaponry left over to take out the airfield for SAC's benefit, they will appreciate it greatly. However, you will have to decide at the time whether it's worth the extra risk.

Strike Palace (D10, D11)



BOTH
BUILDINGS



Objective: **Destroy Enemy Headquarters**
Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile

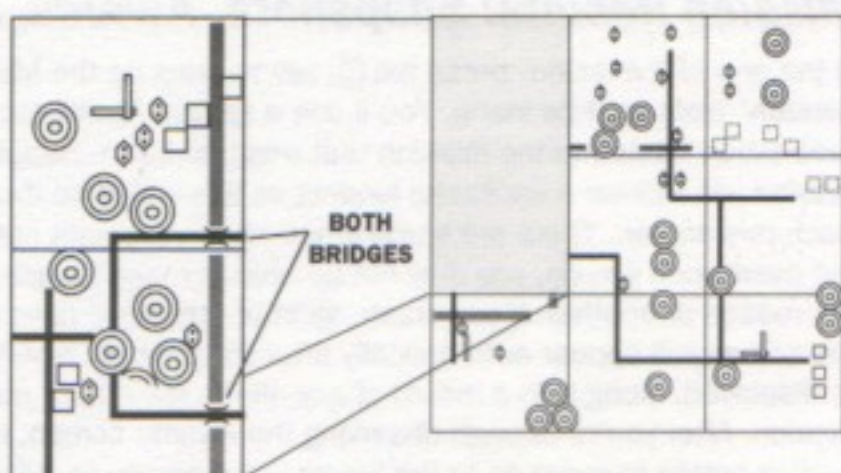
Enemy headquarters is located due north of the Flytrap and nestled in a valley beneath the foothills. Attacking their headquarters will deliver a blow to enemy morale as well as eliminate a key communications center. You need to destroy both buildings to achieve your goal.

Take an ALQ-131 and beware of the SAM site adjacent to the headquarters buildings.

Double Dragon (D4, D5)



BOTH
BRIDGES



Objective: **Destroy Both Suspension and Cantilever Bridges**
Effective Weapons: Mk84 Low Drag 2000lb Bomb
AGM-65B Maverick Missile (Suspension Bridge only)

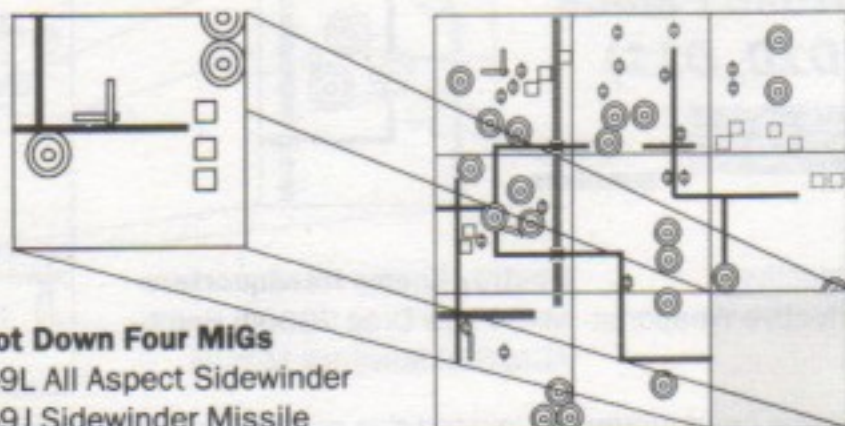


Every time we cut off one of their bridges, the enemy simply reroutes the flow of traffic to another bridge. Your task in Operation Double Dragon is to destroy both bridges.

The Double Dragon is no cake walk. It requires that you load up your plane heavily, fly deep into enemy territory, and destroy both bridges. Because of armament restrictions at any rank other than First Lieutenant, missing the Cantilever Bridge once means that you've failed in your mission. You wouldn't have enough weaponry to try a second run and still have enough bombs or missiles for the Suspension Bridge. Completion of this mission means you're one hot pilot.

Since each bridge has its own waypoint, the waypoint numbers are the same as the ones in the Dragon's Tail and Dragon's Jaw missions.

Grand Slam



Objective:

Shoot Down Four MiGs

Effective Weapons:


AIM-9L All Aspect Sidewinder

AIM-9J Sidewinder Missile

M61A1 Gun

The situation is critical. Intelligence has confirmed that the enemy is planning a full scale assault on your base today. Your job: do the impossible, which is to intercept and destroy at least four MiGs. Note: Incoming MiG heading is unknown.

Mission Results: Snapshots, Awards, and Merits

At the end of a mission, press the  key to bring up the Menu Bar and select "End Mission" from the File Menu. You'll see a special Awards screen that contains information related to the mission that was just flown. Hopefully, your completed mission will include a successful landing as this would be the most desirable way to reach this screen. There are some times when you might not complete your mission and even when you do, you may not be able to make it back to your home base for one reason or another. If you crash, eject or otherwise have your mission cut short, this screen will appear automatically after the mishap. A series of snapshots may be displayed, along with a record of any merits (points) or medals earned during the mission. After you're through observing the Awards screen, click the mouse or joystick button to move on to the Sierra Hotel screen (p. 109).

Snapshots

You may see a series of snapshots that describe the events leading up to the completion of your mission. Let's take a look at some of the snapshot sequences and see how you should interpret them.





MISSILE HIT



EJECT



GOOD "CHUTE"



RESCUED

This is a typical missile hit sequence. Frame 1 shows that an enemy missile slams into your plane. Frame 2 displays an ejection sequence as the canopy is jettisoned. The parachute opens cleanly in frame 3, and frame 4 shows the big bird coming to save you for another mission.



CRASH LANDING



A SORE NECK



COURT-MARTIALED!

Here's what happens if you mess up! If you forget to lower your landing gear, travel too fast down the runway, or take off in the grass, you'll quickly find yourself facing a court-martial.



PLANE IS HIT



**UNCONTROLLABLE
SPIN**



**EXPLOSION
AND CRASH**



**FUNERAL AND THE
MISSING MAN**

This is an example of "buying the farm." Engine fire...you black out and go into an uncontrollable spin...then the unthinkable happens. BOOOM! Crash and burn. In the end, your section flies the "missing man formation" to pay their final respects to you.

Decorations and Medals

The armed forces recognizes acts of heroism by decorating its members with medals. There are five medals that you can be decorated with during your service as a FALCON "driver." These medals are awarded at the completion of each mission where sufficient merit has been displayed.



Purple Heart

The Purple Heart decorates any member of the Armed Forces that is injured in action. The first Purple Heart decoration issued was a simple silk or cloth purple heart trimmed with white lace. Today's medal has a profile of George Washington in a field of purple.



Distinguished Flying Cross (DFC)

The Distinguished Flying Cross (DFC) is given to pilots in recognition of their outstanding achievement or heroism while flying. This medal was first awarded to Charles Lindbergh by President Coolidge for Lindbergh's historical crossing of the Atlantic in 1927.

To qualify for a DFC, you must do **one** of the following:

1. Successfully complete Dragon's Jaw, Dragon's Tail, Hornet's Nest, Bear's Den, Double Dragon, or Strike Palace **without using an ALQ-131 pod**. You must also fly at **Major** rank or higher; **or**
2. Successfully complete one of the above missions **and destroy two or more MiGs in a simultaneous engagement**. You must also fly at **Major** rank or higher.



Silver Star

This medal was authorized in 1918 for the purpose of decorating armed forces members who performed acts of heroism and gallantry against an armed enemy. It is awarded for those acts not great enough to merit the Air Force Cross or the Medal of Honor.

To qualify for a Silver Star, you must do **one** of the following:

1. Successfully complete Rattlesnake Roundup, Dragon's Jaw, Dragon's Tail, Hornet's Nest, Bear's Den, Double Dragon, or Strike Palace **without using an ALQ-131 jamming pod**. In addition, you must **destroy two or more MiGs in a simultaneous engagement and bomb your primary target and a secondary target**. You must also fly at **Major** rank or higher; **or**
2. Successfully complete one of the above missions **and destroy four or more MiGs at least two of which must be destroyed in a simultaneous engagement**. You must also fly at **Major** rank or higher.



Air Force Cross

The Air Force Cross was established by Congress in 1960 and is awarded only to those individuals who have performed outstanding acts of heroism against armed enemies in a hostile environment.

In FALCON, the Air Force Cross has the same requirements as the Silver Star with two exceptions: you must fly at **Lieutenant Colonel** or **Colonel** rank, and **return the F-16 safely to your home base (i.e. land the plane)**.



Medal of Honor

The Medal of Honor, sometimes called the Congressional Medal of Honor, is the highest award in the nation and is presented by the President of the United States. The Medal of Honor is given to those members of the Armed Forces who perform acts of gallantry "above and beyond the call of duty" against overwhelming odds and against an armed and hostile enemy. The history of this medal dates back to 1861 when Congress first authorized it for the Navy. The medal bears the head of Minerva, the Roman goddess of war.

Only by flying at **Colonel** level are you eligible for the Medal of Honor. You must successfully complete one of the following missions: Dragon's Jaw, Hornet's Nest, Bear's Den, Strike Palace, Double Dragon or Grand Slam **without an ALQ-131 ECM pod**. In addition, you must **destroy a minimum of three MiGs in at least one simultaneous engagement and bomb your primary target and a secondary target**.



Ribbons

Ribbons are awarded for successfully completing the objectives of any mission. Returning your plane safely to the base is always important but is *not* a requirement for receiving a ribbon. In the U.S. Armed Forces, an "oak leaf" is presented instead of a ribbon if the particular ribbon has already been received for previous success in a similar situation. The number to the right of the ribbons represents the number of oak leaves you have received since first appearing on the roster.

MIG Kills ★

The program will automatically tally the total number of MiGs you've shot down since your name first appeared on the Duty Roster list.

Bomb Hits



Bomb hits record the total number of targets that you've successfully destroyed since first appearing on the Duty Roster.

Merits

This represents the number of merits (points) you earned during your flight. The merit system awards points based on the difficulty of the mission and what you've accomplished.

MISSION

MERITS

Milk Run	1
Black Bandit	2
Rattlesnake Roundup	2
Double Trouble	3
Dragon's Tail	4
Dragon's Jaw	6
Hornet's Nest	10
Bear's Den	10
Venus Flytrap	12
Strike Palace	12
Double Dragon	15
Grand Slam	15

One additional merit is awarded for every target that is bombed.

Two additional merits are awarded every time you shoot down a MiG.

Two additional merits are awarded for executing a safe landing.

RANK MULTIPLES

The Wing Commander will multiply your merits by a rank factor.

Captain	merits x 2
Major	merits x 3
Lt. Colonel	merits x 4
Colonel	merits x 5

There is no multiplying factor for First Lieutenant since it is the initial rank.

BONUS MERITS

If a pilot manages to stay alive and complete all twelve missions, the Wing Commander awards an additional 3,000 merits for being one hot pilot.



MEDAL

MERITS

Purple Heart	1
Distinguished Flying Cross	15
Silver Star	30
Air Force Cross	60
Medal of Honor	200

The merits you receive for medals are *not* multiplied by your rank.

SIERRA HOTEL

This special screen lists the top ten pilots who have ever played from your disk: "the best of the best." This list may include pilots who for one reason or another are out of commission, but whose scores are still impressive enough to remain in the top ten.

SIERRA HOTEL			
Rank	Pilot	Status	Merits
LT COL.	Whiplash	RETIRED	4208
COLONEL	Chopstick	ACTIVE	2246
COLONEL	Snoke	ACTIVE	2246
LT COL.	Hook	RETIRED	2144
LT COL.	Rent-A-Hippie	KILLED	2024
LT COL.	No. 19	ACTIVE	1991
MAJOR	Wall-St	MIA	1530
CAPTAIN	DoppleGanger	KILLED	1282
MAJOR	Ghost Rider	BUSTED	1170
MAJOR	Shear Stress	KILLED	1065

Click the mouse or joystick button to return to the Duty Roster. From there, you can start another mission or exit the game.



Make sure that you go back to the Duty Roster screen before exiting to insure that your pilot's record will be updated properly. Just as with all Macintosh applications, you should exit the program properly. (Don't just turn the power off.)

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Part IV: Advanced Fighter Training



General Flight Performance of the F-16

The Nature of G Forces

The key to a jet being a good Air Combat Maneuvering (ACM) aircraft is in its ability to "pull g's" (also known as "turn g's"). G's represent the force of gravity that is being applied to the plane and its pilot, and is commonly called "centrifugal force." G's dictate how fast and how tight a plane can turn at any given speed. All other things being equal, the plane that can turn the fastest usually wins the battle.

The effects of g forces on aircraft and pilots must be understood by anyone entering the air combat arena. Strictly speaking, a force of 1g is equal to the force exerted by gravity on a body "at rest." When a jet is flying straight and level, the lift generated by the plane's wings offsets its weight, to the point that both plane and pilot are experiencing a gravity force equal to 1g. This is equivalent to what you might feel while walking along a level street. Since increasing units of g forces are used to indicate the increasing force to which a body is subjected when accelerated, a higher "positive" number of g's represents a higher force of gravity. Decreasing positive numbers (even to the point of being negative) signify a decreasing force of gravity. Whenever you pull your nose into a turn or a climb (by pulling back on the stick or increasing your bank angle), you'll pull an increasing amount of positive g's. You've probably seen the centrifuge used in astronaut training that tests a person's ability to withstand centrifugal force. Whirling a person around in a circle at increasing speeds is very similar to what a pilot feels in a banking turn, and many of these turns are performed almost instantly. You begin to appreciate not only the pilot's ability to withstand the force, but the plane's ability as well. Pushing the stick forward results in pulling less or even negative g's, since you're not opposing the force of gravity anymore per se.

Positive g's push a pilot into the seat. At 7g's, your body experiences 7 times the normal gravitational force. This means that your 25 pound head weighs 175 pounds! At forces greater than 9g's, there is so much pressure that the blood stops flowing in your head, causing you to black out. A blackout results in a loss of vision or passing out completely.

On the other hand, negative g's cause the blood to be forced into your head. Your body and plane can tolerate many more positive g's than negative g's. Excessive negative g's (greater than -3) cause the blood vessels in your eyes to rupture. This is commonly referred to as a redout, which is equally as dangerous as a blackout.

The F-16 is the first jet fighter specially designed to withstand 9g's. Before the F-16 arrived on the scene, the typical fighter could only tolerate a maximum of 7g's. This gave the F-16 a 2g advantage over older aircraft such as the MiG-21. Still, a word of caution should be noted, since between 1982 and 1987 at least ten American F-16's crashed due to pilot blackouts. In addition to pilots passing out during high g maneuvers, planes also fail. In 1985, an F-15 pilot pulled his plane into a high g

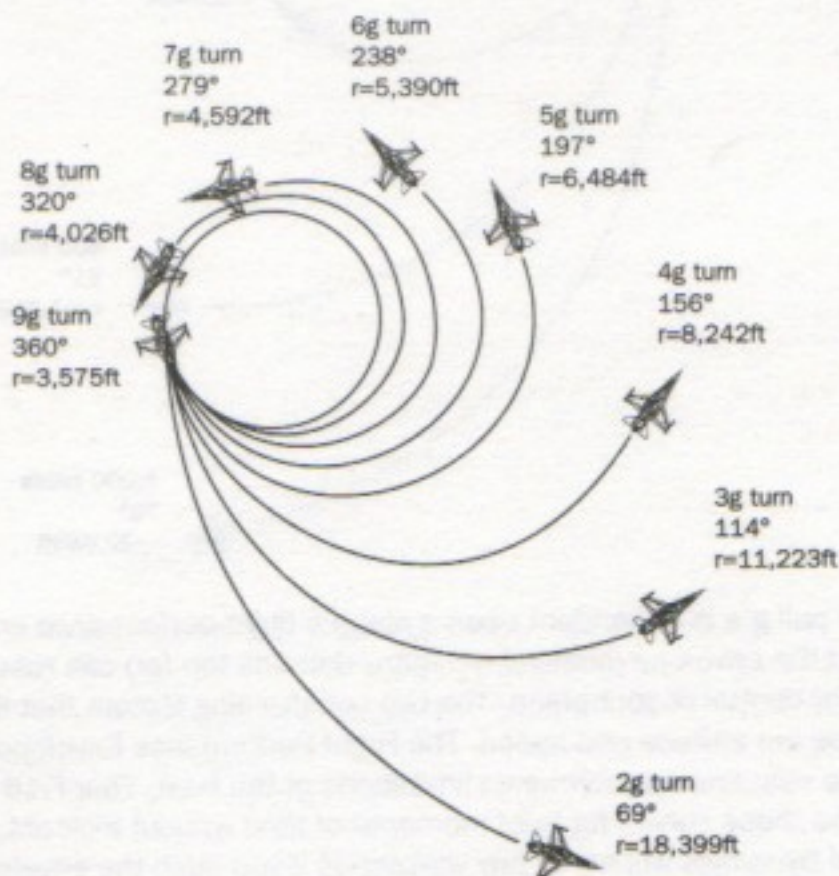


climb with a full load of missiles and external tanks, which caused his plane to go out of control and disintegrate. You should take special note of this, especially if you're flying with a Cat 3 load (carrying any external stores other than AIM 9 missiles). Planes are restricted to 5.5 g's and cannot fly inverted with a Cat 3 load.

Let's examine how much g forces play a role in your turn radius. The following is a comparison of turn radii at different g forces.

Turn Radii by G's

(Speed: 600 knots – Elapsed time: 22.14 seconds)



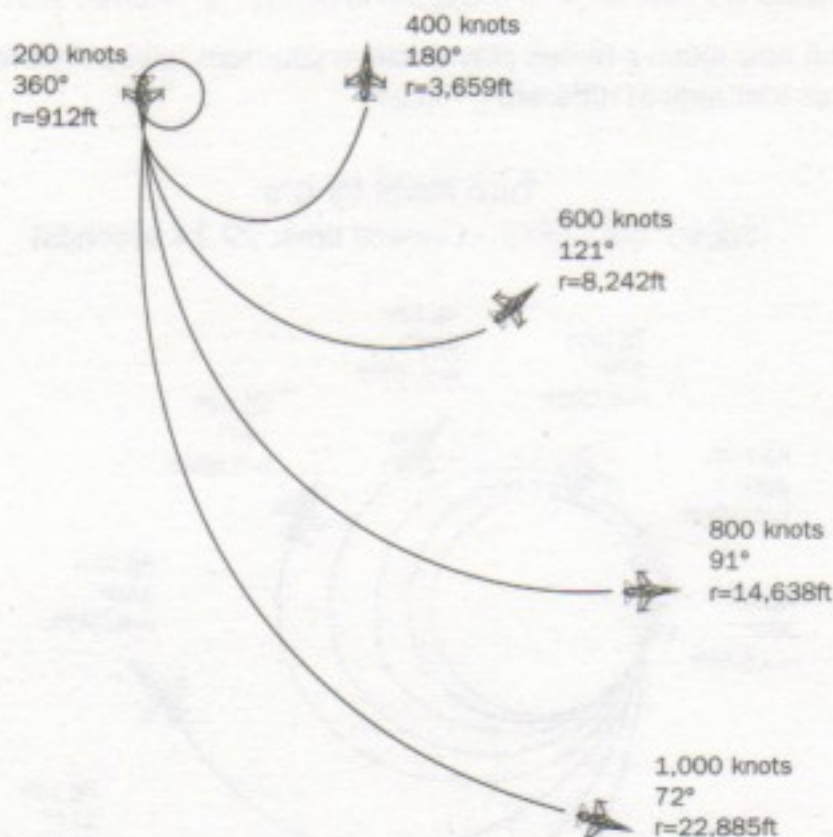
A plane travelling at 600 knots and pulling a 9g turn will have completed a full 360 degrees in 22.14 seconds, whereas a plane traveling at the same speed pulling a 2g turn will have only completed 69 degrees of its turn.

Another major factor that affects the rate of turn and size of turn radius is speed. Take a look at the following diagram. It compares planes pulling the same amount of g's but travelling at different speeds. A plane traveling at 200 knots pulling 4g's will have a turn radius of 912ft and will have fully completed a turn in 17.15 seconds. On the other hand, a plane travelling at 1,000 knots will have a turn radius of 22,885ft and would have only completed 72 degrees of its turn in the same amount of time.

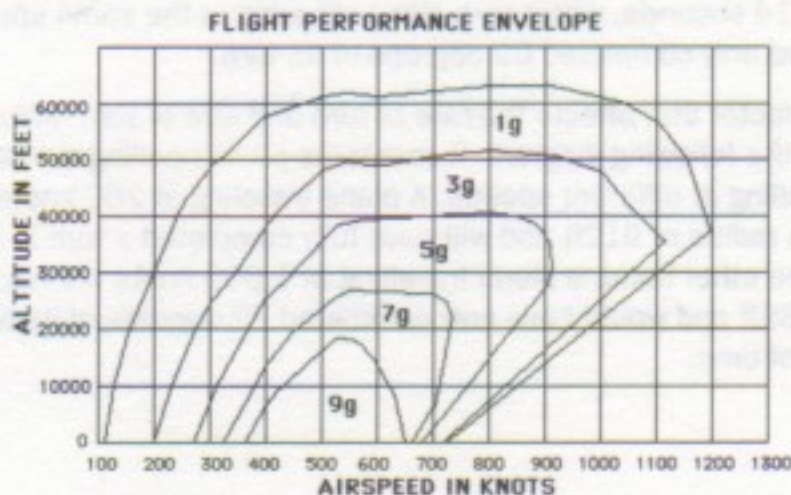


Turn Radii by Speed

(4g turn – Elapsed time: 17.15 seconds)



The ability to pull g's is dependent upon a plane's flight performance envelope. Flying beyond the envelope (chasing too many demons too far) can result in a stall or total loss of control of your plane. The two constraining factors that limit your flight envelope are altitude and speed. The Flight Performance Envelope Chart below illustrates the sustained performance limitations of the F-16. Your F-16 might be able to exceed these curves for brief moments of time without incident, but we don't think General Dynamics will honor any warranties if you push the envelope too far and crash and burn your aircraft.



Keeping Your Energy High

A common mistake made by rookies is flying their aircraft either too slow or too fast.

Those flying their planes too slow are under the false assumption that slower speeds result in tighter turns and advantage during high-g ACM environments. Pulling high g's bleeds off (reduces) airspeed. Note in the Flight Performance Envelope chart that flying too slow results in lower g capabilities. Pulling g's can force your F-16's airspeed to fall below the stall rate, resulting in an uncontrollable dive. Remember, speed is energy, and energy helps you get in and out of combat. Running out of airspeed (energy) is no fun in the heat of battle.

On the other hand, rookies have been known to carry this too far and attempt to dogfight travelling at Mach 2 (over 1,000 knots per hour). Trying to maneuver at Mach 2 is like trying to control a rocket that has gone ballistic.

As with everything else in the world, there is a happy medium. Most dogfights occur between 500 and 700 knots. This is the optimum speed for high g maneuvers as well as maintaining a high energy state.

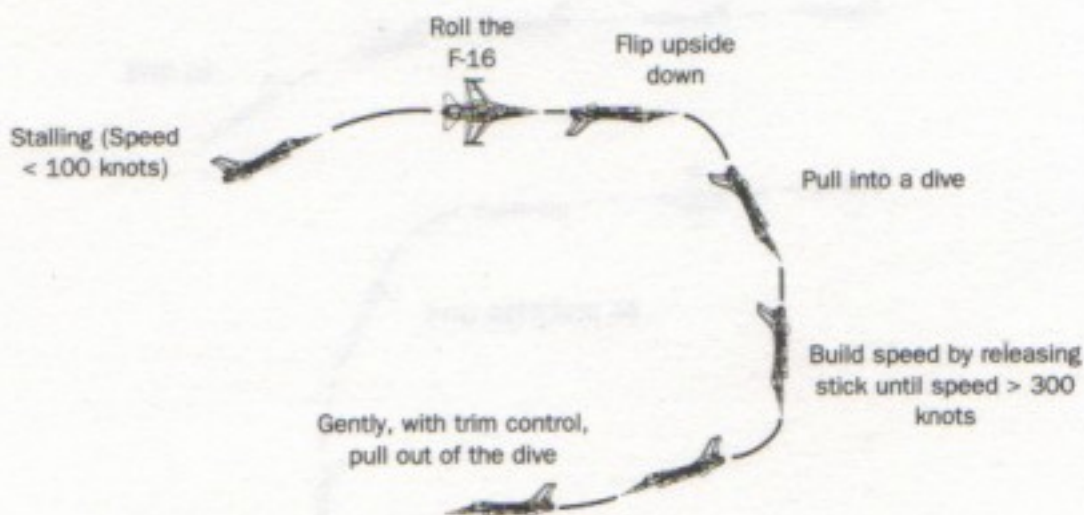


When you maneuver sharply in the upper ranks of the program, expect your F-16 to bleed off airspeed in the process. If you don't want this to happen, increase your RPMs to 100% or kick in the afterburner to minimize the effect as much as possible.

How to Pull Out of a Stall

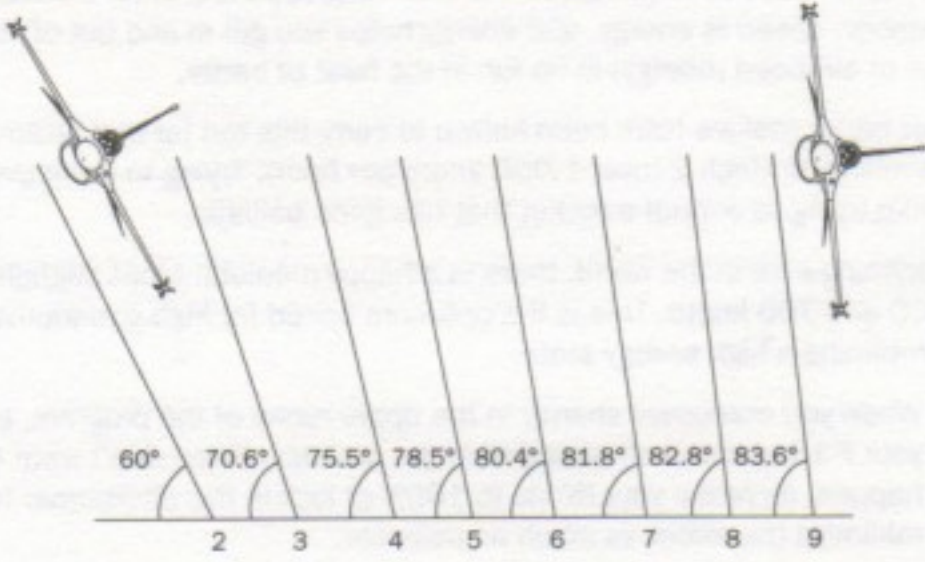
Learning how to pull yourself out of a stall can be a lifesaving matter. Flying beyond your plane's performance envelope can result in a stall. If you're flying too fast and trying to pull too many g's, all you have to do is relax off the stick.

Stalling because you've lost too much airspeed is a completely different matter. You can convert altitude into energy (airspeed) by going into a dive until you've built up enough airspeed and control before pulling out. Pulling out too soon or too hard can result in another stall so we recommend that you dampen your controls (at upper ranks) by using Trim Control as you pull out of the dive.



How to Pull G's

Pulling and pushing on your stick controls turn radius and g forces. Banking your plane at steeper angles results in an increase in g forces and a decrease in turning radius. Pulling back on your stick will add additional g's. Pushing forward will subtract g's. Turns with excessive g's (more g's than are required to maintain an angle of bank) will pull the plane into a higher angle of climb. Turns made with less than the required g's will cause the plane to drop.

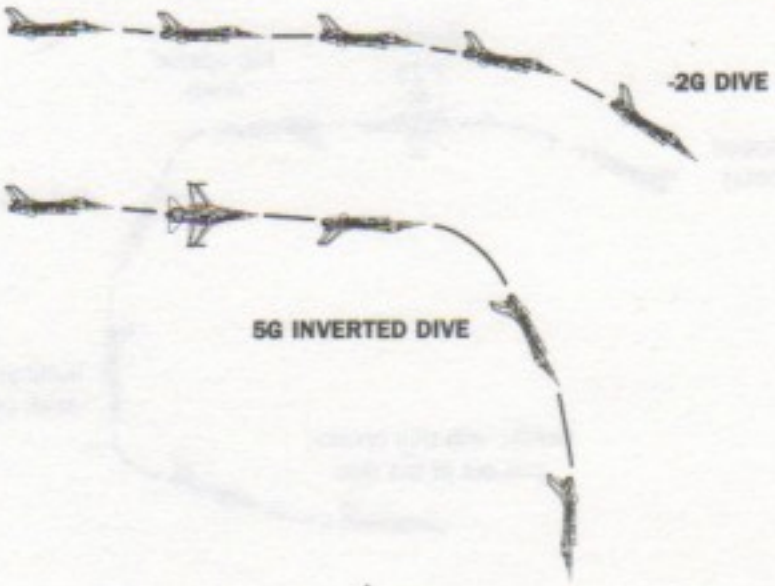


Required G Forces to Maintain Bank

Pulling Negative G's

Your F-16 is capable of pulling up to 3 negative g's, though you'll start to redout if you exceed -2.5 g's. To pull negative g's, push your stick all the way forward.

Inexperienced pilots will initiate a dive by pulling negative g's. A better approach is to roll your plane upside down and pull positive g's toward the ground. Using this technique, you'll use both gravity and the higher positive g capability of your F-16 to go into a faster dive.

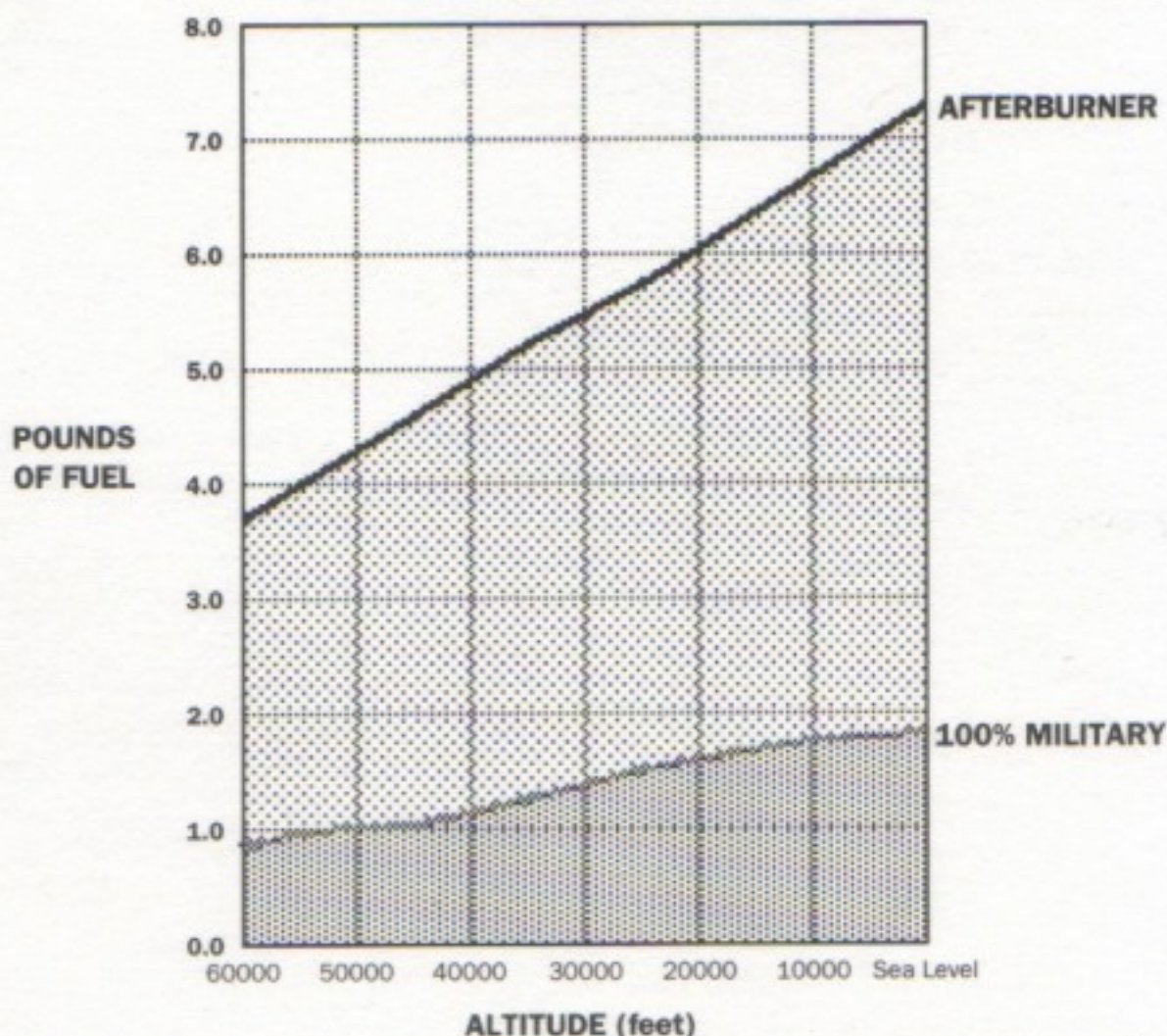


Fuel

Fuel is the life blood of your plane. Planning your missions properly is as important as flying them. The weight of your plane, its altitude, and whether or not you are using afterburner or full military power are all factors in determining how much fuel is used in the mission. The following chart shows how much fuel your plane is consuming (pounds per second) based on altitude. Two plots are shown: one for afterburner, and the other for 100% military power.

FUEL CONSUMPTION CHART

(based on a gross weight of 25,000lbs during normal conditions using 100% RPM)



(Fuel consumption based on a standard Macintosh averaging 4 frames/second)

Note that the use of the afterburner consumes four times the fuel in comparison to using military power. Essentially, an engine lights an afterburner by spraying fuel out the back of the engine. Also, notice how altitude plays a vital role in fuel consumption. These are important factors to remember, especially if you try to make it back to home base with little fuel remaining.

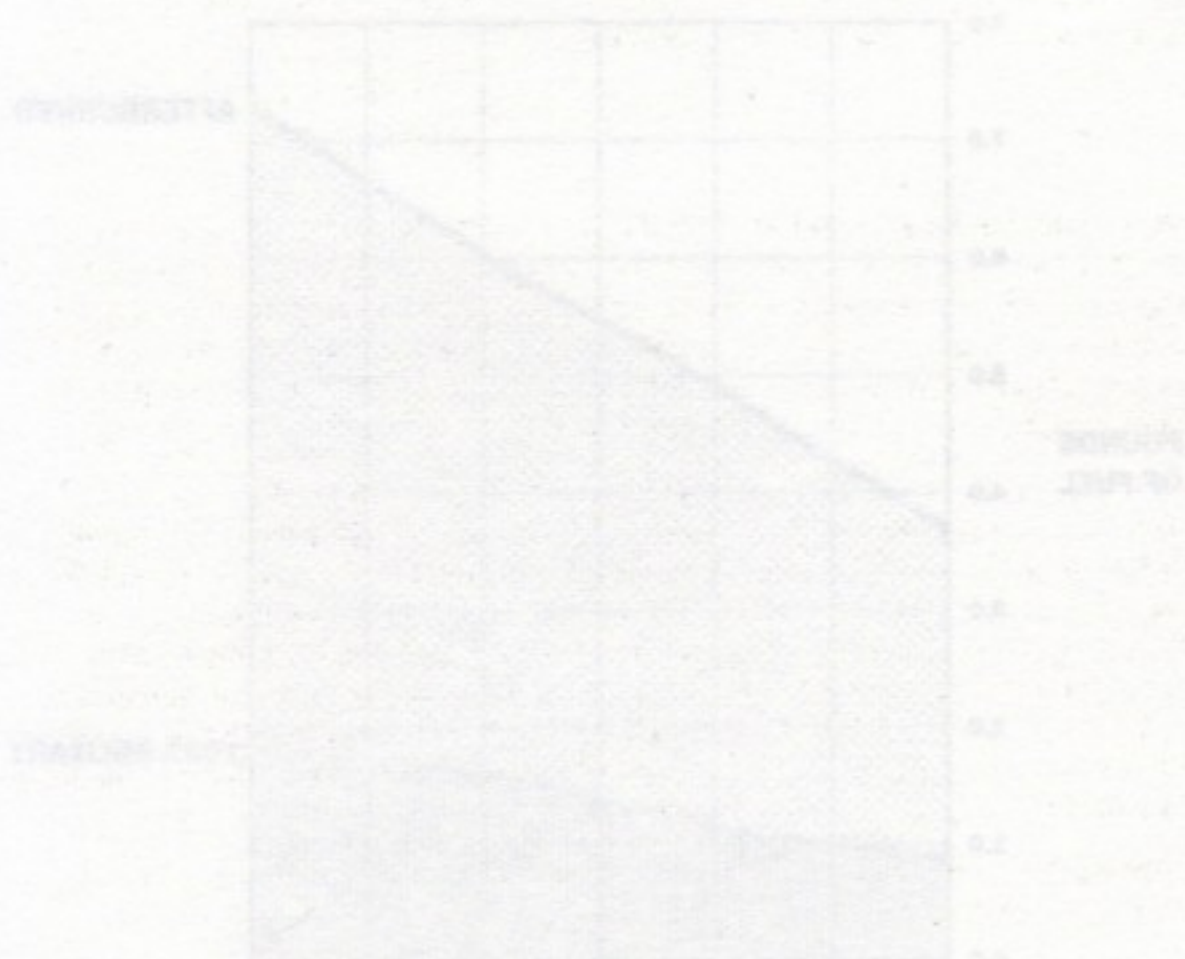


If you are carrying any external tanks of additional fuel, remember that fuel is drawn from these tanks first before the internal capacity is used. The main internal tank will automatically switch in once all the fuel from the external tanks has been exhausted.

Check your Fuel Gauge on the left cockpit to make sure the needle for any external tanks is at "0" (zero). At this point, you may jettison your external tanks (Option C) to reduce weight and drag and therefore increase your F-16's maneuverability, stability and acceleration.

FUEL CONSUMPTION CHART

Based on a gross weight of 25,000 lbs during normal operations using 25,000 lbs of fuel.



EXPLANATION

The fuel consumption chart shows the relationship between fuel flow and time.

As the fuel flow decreases, the time available for flight increases. This is because the fuel flow is a function of the engine's power setting. As the engine's power setting decreases, the fuel flow decreases, and the time available for flight increases. This is why it is important to monitor fuel flow during flight.



Air Combat Maneuvers and Training

Fighter pilots have to rove in the area allotted to them in any way they like, and when they spot an enemy they attack and shoot them down...anything else is rubbish.

BARON VON RICHTHOFEN

To be successful in the fighter business the air crew must, first and foremost, have a thorough background in fighter tactics. They must acquire an excellent knowledge of all their equipment. Then they must approach the problem with a spirit of aggression and with utter confidence.

LT. R.S. LORD
ROYAL NAVY

We agree with the Red Baron that a good pilot is more important than any plane. Although if he had lived to see the agility of modern-day jet fighters, he might have changed his tune about the simplicity of air combat. Being aggressive isn't the only prerequisite to success in dogfight battle today. Rather, the pilot must be well trained in air combat maneuvers and apply an aggressive behavior to the fighting situation in light of his particular fighter's capabilities.

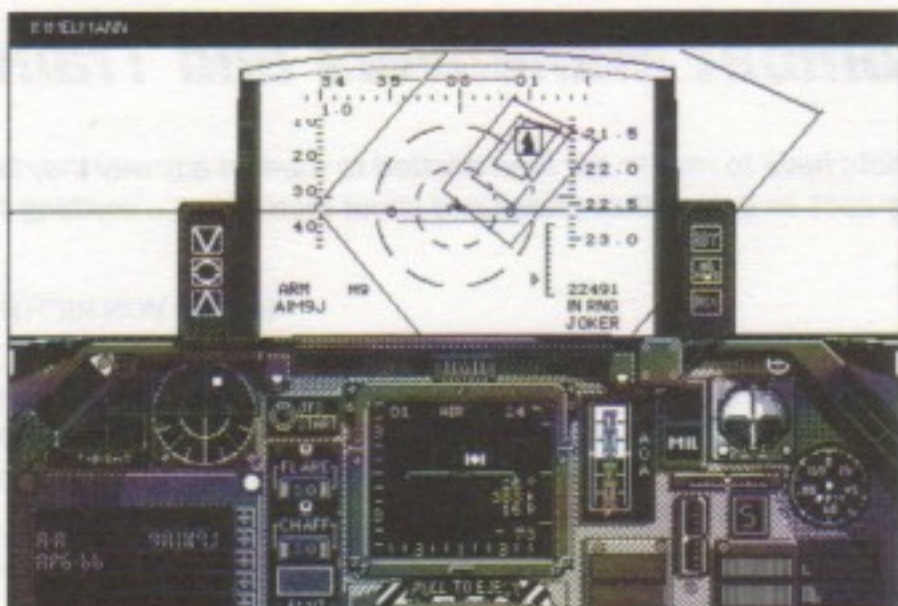
The superior agility of the F-16 enables the pilot to perform maneuvers that have been impossible in the past. In the same light, its superior capabilities can create such stress on the pilot that its agility can create a problem in itself. For example, the plane's ability to pull 9g's in a matter of three seconds enable it to turn in an incredibly tight arc. However, as you've already learned, that same capability will cause most pilots to black out in the process. At the upper levels of the simulation, FALCON is true to the F-16 in this respect. You must remember that the pilot and plane are working together, and following any series of maneuvers requires you to know exactly what your plane can do and work in harmony with it.

The maneuvers that we will be discussing are standard ones employed by fighter pilots throughout the world.

The ACM (Air Combat Maneuvers) Menu

The FALCON Menu Bar has a menu entitled "**ACM**" (Air Combat Maneuvers) that lets you watch a MiG perform any of a select list of maneuvers. This special training menu can be invoked at any time after you've entered the cockpit. We'll describe the process by which you make selections from the **ACM** Menu and follow that with individual discussions of each of the different maneuvers.





ACM MODE INVOKED; MIG PERFORMING THE IMMELMANN

As long as you're in the cockpit already and not selecting from any of the intro screens, you can access the **ACM** Menu. Simply select the maneuver you want to watch the MiG perform. When you're done and want to reenter the program, you'll need to select "**Abort Mission**" from the **File** Menu to make rank, mission and armament selections again before reentering the cockpit for normal flight.

Some standard conventions with the ACM Training Menu:

- The top of the screen will state the maneuver being performed at any time.
- A series of diamond shapes trails the MiG so you can more easily follow the maneuver.
- The MiG always starts in the selected maneuver, but it may change to another to try and regain a competitive advantage against you. For example, it will dutifully accept your request to perform a "Rollaway," but may switch to "Engage" (or another maneuver) if it senses that is the next maneuver it should make relative to your position.

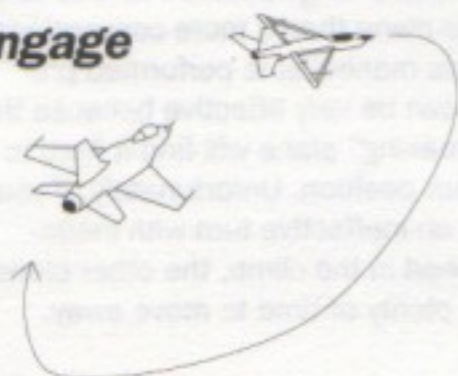
The above is true because all the simulation logic is inherent even while you're in ACM mode. All the key commands of the main program are active. You can shoot down the MiG, and it can shoot you down. However, neither occurrence counts for score, and it doesn't affect your status in the main program. If you shoot down the MiG, you need to either select another ACM to regenerate a MiG or make another selection from the Menu Bar. If the MiG shoots you down, you return automatically to the ACM starting point and can make another selection.

- You can override what's going on and select another maneuver at any time.

- The program always starts the maneuver at the same location every time: approximately 22,500 feet altitude travelling at 350 knots straight and level.
- The MiG flies according to rank selected at the time within ACM guidelines. For example, if First Lieutenant was your most recent selection, the maneuver performed won't be as tightly executed as at Colonel level. Remember, your F-16 is subject to the same rank guidelines.

NOTE Hints: Use the Autopilot key (**A**) or the "Demo mode" (**Option D**) to more easily track the MiG during its maneuvers. This creates a kind of "auto-training" mode. Try "Straight" or "Level" and fire at the MiG for immediate gratification.

Engage



This is a basic offensive maneuver, where the MiG will try to do anything in order to move in on your "six" for the kill. When you select this maneuver in training mode, the MiG will fly straight and level in front of you for a brief period. It will then make a random move in any direction to try and move in behind you.

Immelmann



The Immelmann is a defensive maneuver where the plane being chased is trying to change direction in the least amount of horizontal area by rolling in a vertical climb, rather than using the more conventional turn on a flat plane. Your F-16 is one of the few jets in the world capable of performing this move adequately, and you will find it very useful in battling the MiG. A hard vertical climb is followed by a roll into whatever direction you wish to go at the top of the climb. Because you don't have the same instinctive orientation to the ground during this maneuver, use the Pitch Ladder to determine your directional relationship to the ground.



High G Yo Yo



The High G YoYo is an offensive maneuver that is a reaction to the "Break." Because the attacking plane is unable to hold position with the plane that is "breaking," it starts to pull less of a hard turn and moves vertically as well. During the climb, it rolls in the general direction of the predominant turn, so it can make an aggressive dive at the breaking plane from what is now a more favorable position. Like the Immelmann, this maneuver is an example of using a vertical move to enable your plane to change position in less of a horizontal plane than a more conventional turn. If this maneuver is performed precisely, it can be very effective because the other "breaking" plane will find it hard to detect your position. Unfortunately, if you combine an ineffective turn with inadequate speed in the climb, the other plane will have plenty of time to move away.

Low G Yo Yo



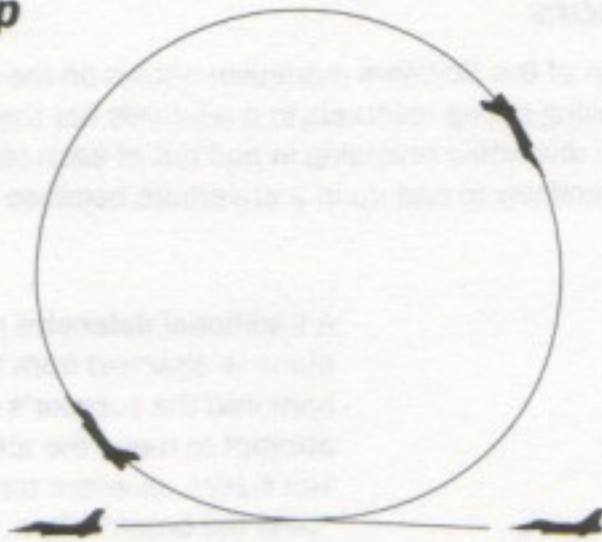
This maneuver basically takes the opposite approach from the High Speed YoYo to resolve a stalemate with a "breaking" plane. Rather than go vertical, the attacking plane goes into somewhat of a dive while maintaining as much of the turn as possible. The attacking plane then pulls up behind the other plane in a more favorable position. Don't dive too low or overturn, because the other plane will probably roll in behind you.

Flip Yo Yo



This is a slight variation of the Low G YoYo. Rather than do a pure dive and risk pulling too many negative g's, roll your plane after initiating the dive. You'll also be able to pick up speed faster in this move than the more conventional Low G YoYo. Take care to not overshoot the other plane due to excessive speed buildup.

Vertical Loop



The Vertical Loop is used as an evasive maneuver. In its purest form, you pull into a sharp climb and simply come over the top and continue in the same direction. If you complete this maneuver, you may be able to pull in behind the other plane. Otherwise, since the loop is relatively easy to perform, you can use it as a decoy while setting up another maneuver to execute immediately after coming out of the loop.

Straight

If you select this maneuver from the **ACM** Menu, the MiG will travel in a straight line, whatever its heading is (not necessarily parallel to the ground).

Level

Even more straightforward than the previous sequence, the MiG will travel not only straight, but level to the horizon as well. As we said earlier, you can use this maneuver and Straight to get the feel of firing at the MiG.

Scissors



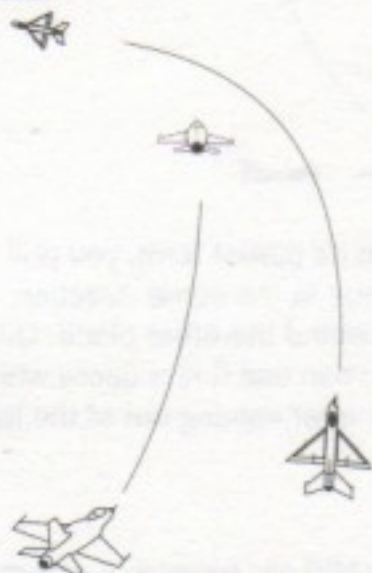
This maneuver results from a successful Break by the plane under attack. As the attacking plane overshoots its target, the other plane tries to turn the tables and move in behind the previous attacker. Both planes roll and crisscross the other's path as each tries to gain the advantage. Your F-16 has an inherent advantage over the MiG-21 in this maneuver because of its better turning characteristics, but the MiG pilot is very skilled. The Scissors can remain in a stalemate for a relatively long period of time, until one plane takes the initiative and bails out or else initiates another maneuver.



Variable Scissors

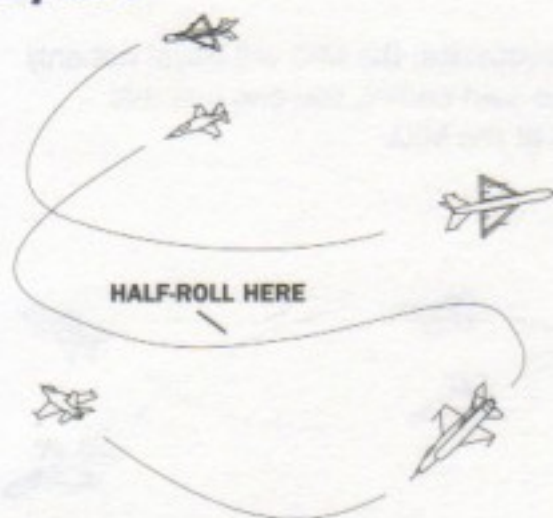
This move is a variation of the Scissors maneuver shown on the previous page. Rather than simply making rolling reversals in a relatively flat trajectory, both fighters also climb and dive while reversing in and out of each other's flight path. This maneuver is very unlikely to end up in a stalemate because of the numerous changes in position.

Break



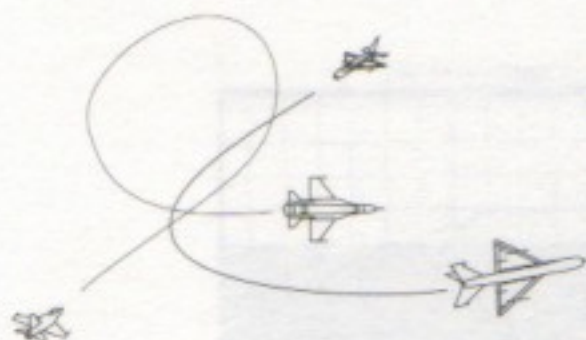
A traditional defensive maneuver. When a plane is attacked from the rear, it turns hard into the pursuer's line of attack in an attempt to make the attacker overshoot. The F-16's excellent turn rate can help you "beat the break" often. Conversely, you are able to elicit a pretty fair Break maneuver yourself, if you ever need to (and you will!).

Split S



The Split S is a defensive maneuver that comes as a result of the attacking plane moving in too close. The target plane will roll upside down and pull into an accelerated dive before the attacking plane can react. The important thing is to do the half-roll before you dive, so you'll pull positive g's when you initiate the dive. You'll accelerate better and your body will withstand the stress better (remember negative g's?).

Head On

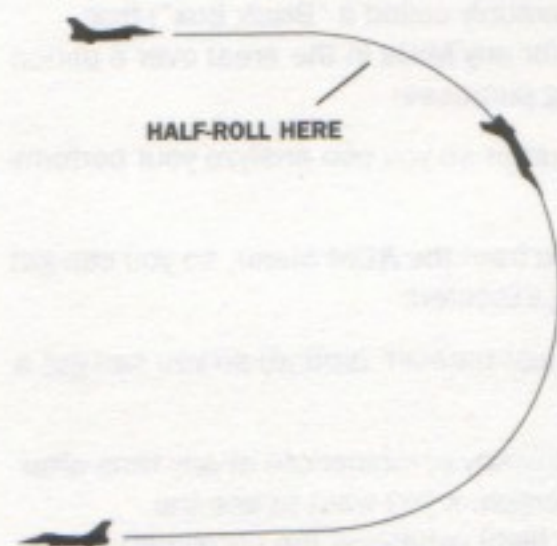


The classic confrontation, where unless either plane has been lucky enough to strike the other on the way in, the advantage is gained by the plane that can turn on the tighter arc to overtake the other. Because it's difficult to guess which way your adversary is going to turn after passing you, most pilots get used to looking over their shoulder to check on the opponent's next move, even while they're making their own.

Rollaway

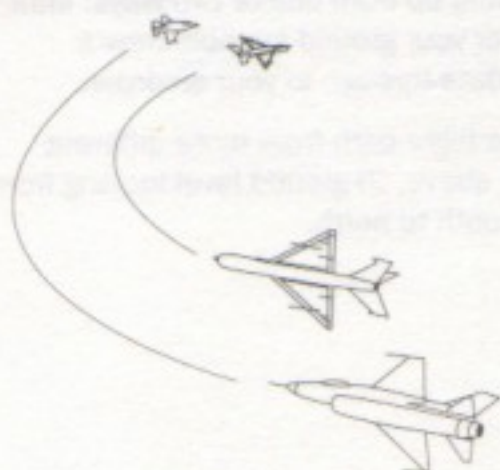
This maneuver is similar to the High G YoYo discussed earlier. The main difference is that the attacking plane rolls in the opposite direction of the predominant turn before making its dive to regain the advantage.

Dive Loop



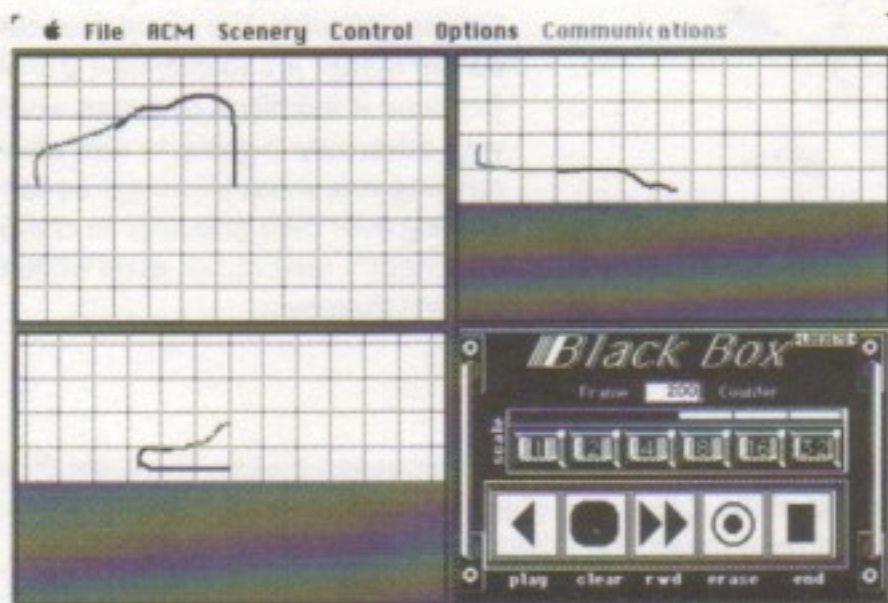
The Dive Loop is a good maneuver to perform when you are being trailed by a pursuer that is still a relatively long distance away. As is the case in some of the other maneuvers, you have a more efficient turn because of the vertical emphasis. Plus, it's more difficult for your pursuer to tell what you're doing, since there is no movement on the horizontal plane of sight. The key is to do a half-roll (invert) as you initiate the dive, so as to pull positive g's, initiate better acceleration, and achieve a tighter turn radius.

Lag Pursuit



When a plane under attack makes a Break, the tendency is for the attacker to overshoot. Sometimes though, the attacker is able to maintain its advantage by performing the Lag Pursuit, where the favorable position is held slightly behind and below the path of the target plane. Besides being able to match the target plane's turn rate, the attacking plane is able to prevent overshooting by occasionally pulling g's in a slight climb to bleed off speed.

The Black Box



FALCON contains a cockpit flight recorder (commonly called a "Black Box") that records your F-16's flight path (and the same for any MiGs in the area) over a period of time. It's primarily designed for the following purposes:

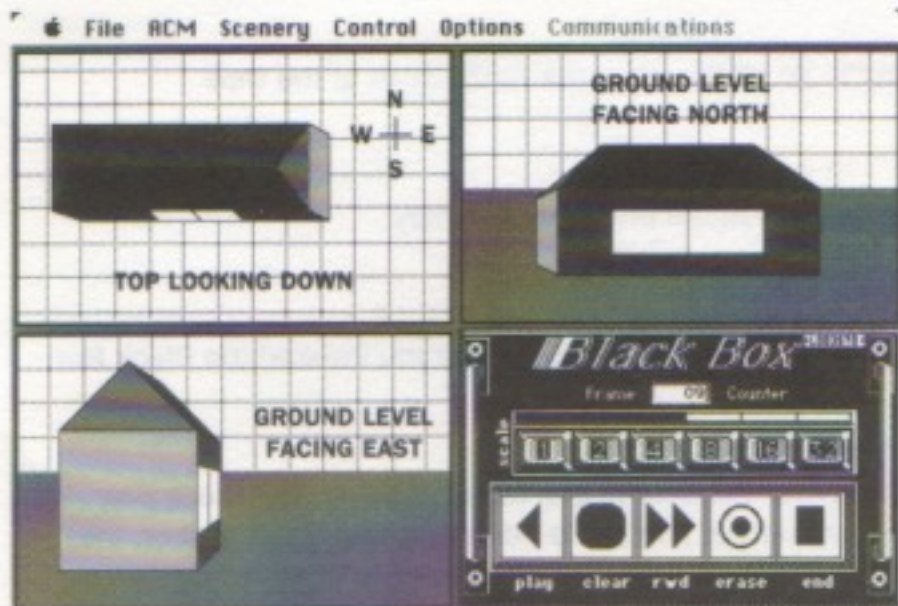
1. To show an "instant replay" of a MiG encounter so you can analyze your performance in dogfighting the enemy plane;
2. To play back any of the sequences selected from the **ACM** Menu, so you can get a better perspective of the maneuver being executed;
3. To play back any of your flight paths (even just messin' around) so you can get a different view of what your plane is doing.

You can invoke the Black Box (with the **Option** **B** key combination) at any time after you're inside the plane or during the Awards screen, if you want to see the sequence of events that led to the end of your flight (whatever the outcome!).

Your F-16's path is represented by a black line, while any MiGs appear as gray lines. Any MiG that appears on a Black Box trail is picked up from one of two ways: either because it showed up on your Threat Indicator, or your ground support crew's electronics picked it up and communicated the data through to your recorder.

As the next example shows, it keeps track of the flight path from three different views: 1) looking down on the path from directly above, 2) ground level looking from west to east, and 3) ground level looking from south to north.





This series of images may make the orientation of the Black Box views a little clearer. They represent how a common object would look from all three of the different views. The usefulness of each view (because of its direction) will depend on what's going on flight-wise at the time, which is precisely why there are three different view directions.

The Black Box starts recording from the moment you enter the cockpit and remains on for the duration of any flight. It will record up to 10 minutes of flight, with the average time being about 4–5 minutes. The total time recorded depends on the complexity of the event. For example, if there are three MiGs in the area, it will record fewer total frames because it has to keep track of the trails of four different planes. When it reaches the end of its "tape," the history of the flight starts to diminish from the beginning portion. If you fly a long distance and encounter an enemy plane before invoking the Black Box, the "beginning" of your taped path may be well after takeoff when you go to the Black Box.

Black Box Controls

Play

Move the arrow cursor over the **play** symbol and click the mouse or joystick button. Every click replays a small portion of the flight path(s). Hold the mouse or joystick button down to watch the whole sequence without interruption. When you reach the end of the tape while pressing the **play** button, the sequence automatically restarts from the beginning. Playback of the tape is sped up significantly over original flight time so you can make a quick analysis.

Clear

Clears the screen of the current trail(s) and re-centers the path(s) before showing the next section. If you have a long recording and are viewing the path from a small scale, you will have to clear the views occasionally to see the complete path. Pressing **clear** does *not* remove the path from memory. It merely allows you to clear the screen of the previous path portion, so you can better view the remainder to follow.



Rewind

Click once on this control to go all the way back to the start of the tape.

Erase

Wipes out any current flight path in the Black Box memory.

End

Takes you back to the same location you were at when you invoked the Black Box.

Frame Counter

Keeps track of frame count over the course of a taped session. The Black Box records "frames" of flight sequence, just like a video recorder. Each digit on the counter really represents two frames, because the Black Box is recording every other frame.


Scale

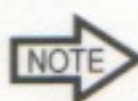
Click on the buttons to change the relative scale at which you view the tape playback. (The default is 8x magnification.) Each square on the grid represents an area of 10,000 by 10,000 feet, or approximately 3 to 4 square miles.






The Menu Bar

You will periodically make selections from the Menu Bar during the course of the simulation. Sometimes the Menu Bar will already be visible (during armament and rank selection for example). Most of the time you will need to activate it in order to make a selection. That's because FALCON uses the Menu Bar area during the course of the game to display information relative to a current operation, such as feedback on air combat maneuvers, or radio transmissions from your ground support team.

Press the  key to activate the Menu Bar when it's not visible.



If you want to save a game screen to disk as a MacPaint file or send it to your printer using the  Shift 3 or  Shift 4 system commands, you'll need to have the Menu Bar activated. When you have a scene occurring that you want to save or print, press the  key. The program will freeze the screen contents as the Menu Bar appears. You can then save or print the screen as you prefer. If the screen doesn't save or print immediately, you may need to click the mouse once. When you're done, select "**Return to Cockpit**" from the **File** Menu to reenter the simulation. You can only perform this procedure if you have a hard drive, since the FALCON disks do not have enough space to save your screen shot.

Apple Menu

About FALCON...

Contains a short message from our boss, the version number, plus a list of *some* of the people that were (and are) dedicated to making FALCON the best that it can be.

File Menu

Return to Cockpit

After you are finished using the Menu Bar, select this option to return to the game.

Abort Mission

Make this selection when you want to stop the current flight or otherwise exit from the configuration sequence so you can start over with a new mission, rank, armament, etc.

End Mission

Choose this option when you have finished with a mission and want to proceed to the Awards screen to receive any merits, ribbons or medals that you have coming.



If you select this option and have sustained no engine or HUD damage when flying at Major rank or higher, you will be court-martialed if your plane is not on the ground.



Quit

Choose this option to exit the program entirely.

ACM Menu

This menu contains a list of sixteen Air Combat Maneuvers for you to use as a training mode for dogfighting enemy planes. Most are common ACMs used by fighter pilots everywhere. A couple of the maneuvers (Straight and Level) have been added by us to enable you to more easily follow the MiG and get in some target practice. When you're finished with the ACMs, choose either "**Abort Mission**" or "**End Mission**" from the **File** Menu to return to the DUTY ROSTER screen. From here, you can resume the normal mission and flying procedures.

Scenery Menu

You can make choices from this menu to design the visual nature of the FALCON landscape to your personal preference.

Dots Only

Choose this option when you want to turn off the "detail" elements of the landscape, which include natural objects such as mountains and lakes, as well as man-made structures like bridges, buildings and SAM sites. You would select "**Dots Only**" when you're on a dogfighting mission and want to speed up program operation resultant from a landscape with fewer elements. Obviously, you wouldn't make this selection if you plan to attack ground targets.

Detail Only

Although the "dots" on the FALCON landscape were designed to enhance the visual relationship of the ground and provide an enhanced sense of perspective, some of you may prefer to "turn off the dots" and keep the detail of natural landmarks and man-made targets. Program speed will increase slightly when this selection is made.

Detail & Dots

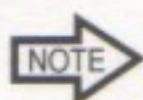
The most natural version of the landscape with natural elements and man-made structures always visible.

Automatic

This selection turns off the landscape features only when two conditions occur in tandem: a MiG has appeared on the Threat Indicator and you are not currently in one of the Air-to-Ground HUD modes. This way, you can speed up airplane movement during air-to-air combat, but have the ground dots and object detail when on a ground strike mission. If you are flying around and have an Air-to-Air HUD mode activated when the MiG appears, the landscape automatically "turns off." As soon as you select an Air-to-Ground HUD mode (either because you have defeated the MiG or simply want to perform a ground attack), the ground "dots and detail" will reappear. Ground detail will also return automatically as soon as any MiGs present have either left the picture or been destroyed, no matter what the HUD mode is.

Automatic is the default landscape setting.





No matter what landscape detail and dots selections are made, the program will always return at least the landscape "detail" when your plane is below 10,000 feet of altitude. Otherwise, you might crash into mountains that you can't see, creating the Bermuda Triangle of jet fighters.

Control Menu

Select from "**Key**," "**Mouse**," "**Joy**," or "**Mouse II**" respectively, if you choose to control your F-16's directional "stick" via the keyboard, mouse, or joystick. The current selection will have a check mark beside it.

Options Menu

Normal Scale

The default setting for the size of the enemy MiG-21 plane. This "normally sized" MiG performs in a very realistic fashion as your opponent, but isn't very easy to see until it's very close to you (just like real life!).

Large Scale

Enlarges the MiG so that it's easier to see at a distance. Note that some of the MiG's movements may look a little strange at this setting, because the new "visual contact distance" relative to "actual distance" has been effectively cut in half.

Sound

Toggles the program sound on or off. The default setting is on, with a check mark by "**Sound**." Check the Hardware Requirements page for specifics on sound volume, but be aware that you need to set the volume control of your Macintosh via the Control Panel desk accessory. Because FALCON doesn't allow DAs to coexist when the program is running (except under MultiFinder), set the volume control according to the Hardware Requirements page from the Finder before loading the simulation.

Slow Down

Some of the newer Macintoshes (the SE/30, Ilcx and Ilci, for example) have a 68030 microprocessor instead of the older 68000 (in the Plus and SE). Having this newer and faster processor will incur program speeds approaching the speed of light. Although you are certainly welcome to fly your plane under whatever conditions you prefer, selecting this option will allow you to have a more manageable plane and environment that's still relatively quick in comparison to a standard 68000 setup.



Communications Menu

This is the menu where you can make selections regarding 2-player mode.

Single Player

Use this selection when battling computer MiGs.

Mac to Mac

This selection should be chosen when playing head-to-head against another player using either a Mac, Atari ST or Amiga computer. Each player must have their own registered copy of FALCON that is compatible with their respective computer. This option is used whether you are direct-connecting or playing over a modem.

Mac to IBM

When playing against an IBM (or compatible), this option should be selected. Use this when direct-connecting from a Mac to an IBM, since you cannot play head-to-head against an IBM over the phone lines.



Only the CGA and Tandy versions of FALCON are compatible for head-to-head play. The Macintosh version of FALCON is not compatible with FALCON^{AT}.

Modem

When playing head-to-head against someone over a modem, this option **and** the corresponding connection setting (Mac-to-Mac or Mac-to-IBM) **both need to be selected**.

Network

If you are challenging someone on an AppleTalk or similiar network, select this option. As with the **Modem** setting, both **Network** and the corresponding connection setting (Mac-to-Mac or Mac-to-IBM) need to be chosen.

Appendices



Appendix A: Glossary/Abbreviations

A-A – Air-to-Air.

AB – Afterburner.

ACM – Air Combat Maneuvers. Flight tactics used to destroy the enemy.

ADI – Attitude Director Indicator. This is used to help register your plane's position relative to the horizon.

Afterburner – Acceleration over and above normal military power, achieved by spraying fuel out the back of the engine.

A-G – Air-to-Ground.

AGM – American designation for air-to-ground missiles.

AGM-65 – An optically-guided missile used for air-to-ground missions only. In the front end of each missile is a TV camera designed to feed the image directly to the REO. This term is also the HUD designation for air-to-ground missile mode.

AIM – American designation for air-to-air missiles.

Air Force Cross – A medal awarded to those individuals who have performed outstanding acts of heroism against armed enemies in a hostile environment.

Aiming Reticle – A visual aid to help improve your probability of hitting a target. If a target is inside the reticle, you have a good chance of hitting it.

ALQ-131 – A jamming pod mounted on the underside of the F-16 designed to fool enemy radar. See *ECM*.

AOA – Angle Of Attack. See *AOA Indexer* and *AOA Indicator*.

AOA Indexer – Used primarily to assist you in landing your F-16. It consists of a bank of three lights located just to the left of the HUD. If the top light is on, your AOA is too high. If the bottom light is on, your AOA is too low. If the middle light is on, you are at the perfect AOA.

AOA Indicator – This gauge displays the AOA in degrees. Numbers in the white area indicate positive AOA, while numbers in the black area indicate negative AOA.

Aspect Angle – This is the angle formed by the intersection of two lines (the line from you to the target and the line through the target's longitudinal axis). On the HUD, the aspect angle is represented by a caret on the aiming reticle. If the MiG is coming at you head on, the aspect angle is 180°, and the indicator will be at the top of the aiming reticle.

Bandit – A plane identified as an enemy aircraft.

Bank – To turn left or right in the air.

Bearing – This readout (which appears only in trackling radar mode) on the REO indicates the angle of the target from the front of the F-16. If a target has an bearing of 340°, it is 20° to the left of the F-16's nose. If the target's bearing is 15°, it is 15° to the right of your F-16.

Bitchin' Betty – An electronic female voice utilized in the F-16 to warn the pilot of potentially dangerous situations.

Black Box – The cockpit flight recorder on the F-16. It records both the F-16's flight path and any enemy planes in the area.

Blackout – A loss of vision (or consciousness) due to pulling too many positive g's.

Bogey – An unidentified plane.



- Boresight scan radar** – One of the three REO display modes. It displays the enemy as if you were looking at it down the sights of a rifle.
- Break** – A defensive combat maneuver used when a plane is attacked from the rear. It is performed by turning sharply into a pursuer's line of attack in an attempt to make him overshoot.
- Break X** – In air-to-air missile HUD mode, a large "X" will appear over the aiming reticle to indicate that you are possibly going to collide with another aircraft.
- Call Sign** – A codename for a particular fighter pilot.
- Cat 3** – Category 3; certification of plane carrying external weapons in addition to AIM-9J/L missiles.
- CCIP** – Continuously Computed Impact Point. The HUD designation for air-to-ground bombing mode using Mk84 bombs.
- Center point** – The exact center of the HUD.
- Chaff** – Packages of tiny foil strips dropped from the F-16 that confuse radar-guided missiles.
- Closure rate** – Indicates whether a targeted MiG is closing on your F-16 (positive number) or pulling away (negative number). The distance is listed in knots.
- Court-Martial** – A court decision expelling a member from the Armed Forces.
- DGFT** – The HUD designation for air-to-air gun mode.
- Discretes** – A HUD display that indicates the status of your current weapon. ARM indicates that your weapon is armed, LOCK indicates that your weapon is locked onto a target and REL (in A-G bombing mode) signifies that your bomb has been released.
- Displayed impact line** – This HUD device is a direct line between the Release Cue and the bombsight.
- Distance ranging scale** – A line that appears on the outside of the aiming reticle when a MiG is within 12,000 feet. As the MiG moves closer, the line will move in a counterclockwise direction around the reticle.
- Distinguished Flying Cross** – A medal given to pilots in recognition of their outstanding achievement or heroism when flying.
- Driver** – A pilot flying (rather than navigating) the plane in a two-seater; also used as a term for pilot in a one-seater like the F-16.
- DUR** – The HUD designation for air-to-ground bombing mode using Durandal bombs.
- Durandal** – A bomb that drives into an airstrip before exploding, making repairs much more difficult.
- Duty Roster** – The crew chief's list of available pilots.
- ECM** – Electronic Counter-Measures. In FALCON, this takes the form of an ALQ-131 pod which is designed to foil ground-based SAM sites and confuse the radar of MiG planes that have locked their missiles on you.
- Fighter Jock** – A slang term for a fighter pilot.
- Flares** – Magnesium-based packages designed to fool heat-seeking missiles when released from your F-16.
- g** – The force of gravity that is being applied to the plane and its pilot. For example, 1g is equivalent to flying straight and level.



Glide Slope Deviation (GSD) – The horizontal scale on the ILS HUD. When landing, the further you are to the right, the further the GSD scale moves to the left, and vice-versa.

Ground Control – A friendly radar station that monitors all aircraft in the area. They will inform you on the location of an enemy plane, guide you back on course if you fly off the map or give you directions for your landing approach.

Harrier – A British-made VTOL (Vertical Take Off and Landing) plane that can take off and land from any solid level surface.

HUD – Head-Up Display. The primary display in the F-16 cockpit. Most of the basic navigational information has been electronically created and displayed on the glass in front of the cockpit's forward view. When a particular weapons system is activated, this information is overlayed on the glass. In addition, there is a special mode to aid the plane in landing (See *ILS*).

ILS – Instrument Landing System. A HUD mode used to guide the F-16 in for landing. Also the HUD designation for this electronic landing mode.

Immelmann – A defensive maneuver where the plane being chased tries to change direction by rolling in a vertical climb.

Jamming – The act of confusing enemy radar systems with radio frequency noise. See *ECM*.

JFS – Jet Fuel Starter. A cockpit light that turns on to indicate that the engine has started.

Knot – Short for nautical mile. A nautical mile is approximately 6,076 ft.

Lag pursuit – A combat maneuver where the attacking plane tries to pull g's in a slight climb in order not to overshoot a plane making the "break" maneuver.

LCOS – Lead Computing Optical Sight. A solid black line extending from the target designator when in air-to-air gun HUD mode. Useful when "pulling lead" on a target.

Load factor – The highest amount of g's that should be pulled if a given weapons system or device is installed at a particular station.

Localizer Deviation (LD) – The vertical scale on the ILS HUD. The higher above the ILS beam you are on your landing approach, the lower the LD slides down the HUD, and vice-versa.

Lock on – To acquire a target with radar for the purpose of firing a weapon.

Mach – Unit of speed measurement equal to the speed of sound.

Maverick – The nickname for the AGM-65B air-to-ground missile.

Medal of Honor – The highest award in the nation. It is given to those members of the Armed Forces who perform acts of gallantry "above and beyond the call of duty" against overwhelming odds and against an armed and hostile enemy.

MIA – Missing In Action.

MiG-21 – Mikoyan/Guryevich-21 Soviet-built jet fighter, the most common fighter in the world.

MIL – Standard power and acceleration measure.

Military Power – 100% RPM (thrust).



Missing man formation – When a pilot meets an unfortunate and fatal demise, his squadron flies a pattern where one of the planes peels off away from the pattern, symbolizing their compadre's departure forever.

Mk84 – A general purpose bomb used for any air-to-ground bombing run where you want to make maximum impact.

MSLS – The HUD designation for air-to-air missile mode.

M61A1 gun – The 20mm cannon located in the front of the F-16. It is used for air-to-air combat or air-to-ground strafing runs.

NWS – Nose Wheel Steering. A plane's steering mechanism when it is moving at relatively slow speeds on the runway. See *Taxiing*.

NWSS/LGSI – Nose Wheel Steering System/Landing Gear Status Indicator.

Pickling – Setting a weapon to fire at one specific location, similar to a lock on.

Pitch – The movement of a plane on the vertical axis.

Pitch ladder – An electronic representation of an F-16's angle of climb or dive projected on the HUD.

POW – Prisoner Of War.

Pulling lead – Purposely aiming in front of an enemy plane while figuring in the distance to target and the target's speed to insure the weapon scores a hit.

Purple Heart – This medal is awarded to any member of the Armed Forces that is injured in action.

RDY (light) – This light indicates that the NWSS/LGSI is not damaged, and will stay on while the landing gear is down if there is no damage to either system.

Redout – A loss of vision (or consciousness) due to pulling too many negative g's.

Release cue – A crosshair used to determine the time to release your bombs if the bombsight is not displayed in the HUD.

REO display – Radar/Electro-Optical display. The REO has three modes, Boresight Scan Radar, Tracking Radar and Map. The first two are used to update enemy plane position relative to your F-16, while the latter is used to determine your position in the FALCON landscape.

Rookie – Pilot without flight experience.

RPM – Revolutions Per Minute. The percentage of power being produced by your engine. See *thrust*.

SAC – Strategic Air Command.

SAM – Surface-to-Air Missile.

SA-2 Guideline Missile – A SAM created in 1956 to intercept high-flying, bomb-laden aircraft. These missiles are always launched from SAM sites.

SA-6 Gainful Missile – A SAM designed in 1967, and launched from SAM sites against aircraft flying at medium heights. It is more effective than the SA-2, but can be fooled occasionally by ECM and chaff.

SA-7 Grail Missile – A shoulder-launched SAM designed to be used against low-flying targets.

Scissors – A maneuver resulting from a successful "break" by the plane under attack. The two planes roll and crisscross each other's path vying for position.

Sidewinder – The nickname for the AIM-9J/9L air-to-air missiles.



Silver Star – A medal given to Armed Forces members who perform acts of heroism and gallantry against an armed enemy.

Snapshoot – Also known as the "snake," the snapshoot is an undulating tracer line that extends from the aiming reticle. It indicates what the historical bullet path would be if your gun was being fired continuously.

Speed Brakes – Brakes utilized to make a quick reduction in speed while flying or to help stop the plane after it has landed on the runway.

Split S – A defensive maneuver that comes as a result of the attacking plane moving in too close. The target plane can then roll upside down and pull into an accelerated dive to get away.

Super Engine – At First Lieutenant and Captain ranks, the F-16's airspeed is directly related to the percentage of RPM applied, and no other factors are involved. At all other ranks, factors like climb rate and the plane's weight are considered.

Stall – A loss of control of the plane due to low airspeed or radical maneuvering in high altitudes.

Stick – A pilot's directional control.

Stores Control Panel – A section of the cockpit that displays the current HUD mode and any of the plane's onboard stores. The items that can be displayed are: air-to-air and air-to-ground missiles and bombs, M61A1 rounds, any external fuel tanks or an ALQ-131 ECM pod.

STRF – The HUD designation for air-to-ground gun mode.

Taxiling – Maneuvering your aircraft around while it is on the runway.

Target designator – A box that appears in the HUD that follows the target the radar is tracking.

Target locator line – A line that points in the general direction of the targeted MiG if it is not visible in the HUD.

Threat indicator – A cockpit device that alerts you if one of the following happens: 1) an enemy plane has been acquired by radar, 2) a SAM site has launched a missile, 3) a missile has been launched towards you or 4) an enemy plane has locked its missiles on you.

Thrust – RPM. The amount of power being produced by your F-16's engine. The terms Thrust and RPM can be used interchangeably.

Tracking radar – One of the three REO display modes. It shows the enemy from an overhead perspective, with your F-16 located in the bottom center of the display.

Velocity vector – This represents the degree of yaw and/or pitch your F-16 is incurring. It is used primarily in bombing runs when you want to aim at a target without having to travel directly towards it.

Waterline – The F-16's position parallel to the horizon.

Waypoint – Locations of targets as computed by the F-16's navigational computer. The waypoint numbers will appear in the lower right in any HUD mode.

Whiteout – The inability to distinguish colors during the initial stages of a blackout.

Yo yo – An offensive maneuver that uses vertical maneuvering to stay inside the enemy's turn radius.



Hook's Guide to Fighter Jockey Terminology

Action – The point of the initial position (IP)-to-target run where the pre-briefed pop-up maneuver is begun. Also, the Officer's Club on Friday.

Angels – Altitude in thousands of feet. "Viper is at angels 23." (The pilot is at 23,000 feet). It is also the name of the U. S. Navy demo team.

Ballistic – Used to describe someone who is mad or is off doing his own thing. "That jerk, Bob, has gone ballistic." Also used to describe a heater (Sidewinder/ AIM-9) or Maverick that doesn't guide. Never used to describe F-16 BCM. See *unload* and *extend*.

BFM – Basic Fighter Maneuvers. What you do to kill the other guy once you are in a fight—implies a single ship rather than a formation.

Bingo – Fuel level is such that immediate RTB (Return To Base) is required.

Bomb check – After dropping live bombs, a flight will rejoin to close (finger tip) formation to check for damage. This is not a good time to pass important info.

Buy the farm – Go to the big F-16 pasture in the sky.

Charlie – Cool pilot talk for "Yes." "That's a charlie."

Chasing demons – Pushing the limits of the F-16's flight envelope.

Check turn – A short, crisp hard turn of a specified number of degrees. "Viper 2, check 10 right."

Cons – Contrails. "The cons are at 35 degrees."

Cross turn – A 180 degree turn from spread formation towards each other. Also called Deep-6 or Hard-6.

Delayed 90 (R/L) – A turn of 90 degrees from spread formation, leaving the formation in spread position.

Delta Sierra – Dog Sh*t, meaning "bad." "The weather is Delta Sierra."

Egress – Flying out of the target area.

Extend – Go faster straight ahead. "Viper, extend!" See *unload*.

Extended Trail – A trail formation flown up to 3,000 feet back, usually a tactical formation. See *Trail*.

Fighting Wing – A "tactical" formation developed during the Korean War where two planes fly in a 60 degree cone behind lead from 500 to 1,500 feet back. See *Delta Sierra*.

Finger Tip – A non-tactical formation used on IP and in the weather in non-tactical situations.

Fly-by-wire – A design whereby all the controls of the plane are controlled directly by the flight computer based on input from a control stick.

Fox 1 – Training radio call that tells the opponent and friendlies that you have fired a radar-guided missile. Doesn't apply to the F-16.

Fox 2 – Training radio call that tells the opponent and friendlies that you have shot a heat-seeking missile (Sidewinder). If both Limas and Js are loaded, "Fox 2 Lima" is used to differentiate.



Fox 3 – Training radio call that tells the opponent and friendlies that you have fired your gun. Not used as much as "Tracking, tracking, tracking."

Foxtrot Uniform – F*cked Up. "My radar is Foxtrot Uniform." See *Tango Uniform*.

Good landing – One you walk away from.

Hard turn – A turn of 4–6 g's used when a break turn is not required. Used to turn while conserving energy.

I-Place 90/180 (R/L) – A 90 degree or 180 degree turn from spread leaving the formation in trail (90 degrees) or spread (180 degrees).

I'm a dot – I'm outta here, I'm gone. If my wingman says "I'm a dot" I know he's left the fight and I'm on my own. If I look for him, I'll just see a dot on the horizon. Among the fighter pilot community it has come to mean "I'm leaving" (for the O' Club, dinner, etc.)

Inter-flight – A call that says the last radio call you heard was not intended for you. "Viper, say again." "Brewery, disregard, Viper was inter-flight."

Joker – Fuel level is such that plans for egress and RTB should begin.

Knife fight – A hot and heavy fight with an enemy plane.

Locked – A call indicating a radar lock on or Maverick lock on.

Manual – To bomb without the system (computer) on. (As in "2 is going to manual.") See *Delta Sierra*. It can also refer to a manual radio frequency.

Mover – A moving target on the ground. "Viper has a mover 2 clicks west moving east." Clear him on it. He wouldn't have pointed it out if he didn't want to hit it.

No Joy – I don't see it (wingman, lead target, etc.). The opposite of No Joy is NOT "Joy!"

NORDO – No Radio. "Viper one is NORDO."

Ops Check – A cockpit check of engine, fuel, oxygen, etc. "Viper ops check, one has 34."

Overshoot – To fly outside the flight path of another aircraft. See *Delta Sierra*.

Padlocked – To look away would be to lose visual sighting. "I can't look away or I will lose tally."

Pigeons – Bearing and range of a target or location. "Brewery 20, give me pigeons to Nellis." Not used very much anymore.

Pitch (back) (R/L) – Climbing hard turn, usually 180 degrees. "Viper, pitch right."

Pitch out – A 180 degree turn to downwind executed over the end of the runway.

Puke – An insult to another pilot. An F-16 driver could call an Eagle driver a "twin-engine puke."

Push-it-up – Add power.

Reverse – Reverse the direction of the turn. "Viper 2, reverse left!"

Roger (or Roger that) – I heard and understood your last transmission. See *Wilco*.



Route – A non-tactical formation flown 2 to 4 ship-widths apart.

Shackle – A formation maneuver where flight members change sides by turning toward each other. Used to “check 6.” Sometimes called *Weave*.

Shooter-Cover – A tactic where the wingman (cover) will stay back to protect the leader (shooter).

Sierra Hotel – Sh*t Hot, meaning “good.” “The weather is Sierra Hotel.”

Slice (back) (R/L) – Descending hard turn, usually 180 degrees. “Viper, slice back left.”

Socked in – Weathered in, unable to fly. See *Delta Sierra*. “The A-10s are socked in at Nellis AFB.”

Speed of heat – Somewhere between the speed of sound and the speed of light. Often used when egressing the target area; the folks back there are no doubt angry and you’d like to put as much distance between them and your jet as quickly as possible. Also used to beat the crowd to Happy Hour at the O’ Club.

Splash one MIG – Statement commonly spoken after successfully downing an enemy.

Spoof – Slang term for “fooling” an enemy missile with flares or chaff.

Spread – A tactical formation where fighters fly 6,000–9,000 feet line abreast. It is defensive in nature and not well suited to very low altitudes (less than 200 feet).

Tactical formation – A formation flown in tactical situations.

Tac Wing – A semi-tactical formation with the wingman 2,000 feet or more line abreast.

Tally (ho) – I see it (wingie, lead target, etc.). Sometimes it refers to a bandit only. See *Visual*.

Tango Uniform – Tits Up. “My FM radio is Tango Uniform.” See *Foxtrot Uniform*.

Trail – A formation where two planes fly less than 500 feet behind the leader (and avoiding dead 6). May be either a tactical or non-tactical formation. See *Extended Trail*.

Tumbleweed – I am out of airspeed, altitude and ideas. No tally, no visual, no clue! See *Delta Sierra*.

Unload – Push forward on the stick to reduce drag in order to accelerate.

Visual – I see whatever it is you are describing. Sometimes used to mean “I see my wingie” (or lead) as opposed to *Tally* which then means “I see the bandit.” See *Tally*.

Wedge – A tactical formation where the wingman flies on a 45 degree line back from the leader. Offensive in nature and good at very low altitudes.

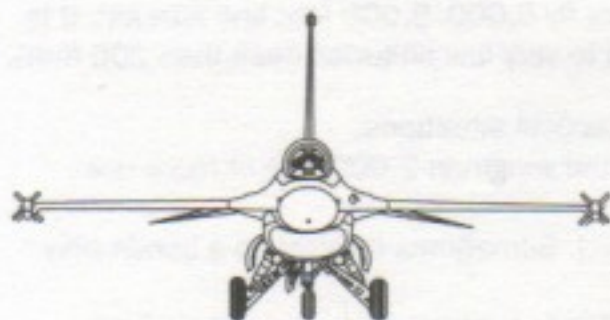
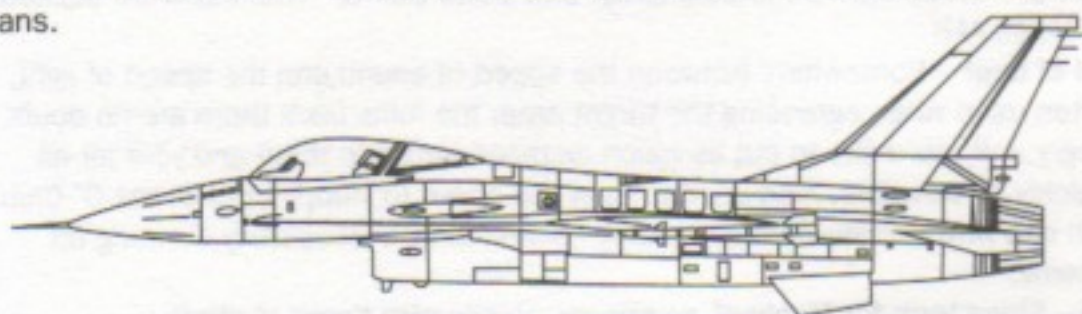
Wilco – I will comply with your instructions. See *Roger*.

Winchester – Out of ordnance (weapons).



The F-16

The F-16A Fighting Falcon is a multirole fighter jet with equally advanced air-to-air combat and air-to-ground strike capabilities. It is a highly maneuverable and relatively lightweight aircraft that was dubbed the "Electric Jet" when General Dynamics introduced it to the world in the mid-1970s. This nickname was applied because of the F-16's high dependence on computers which translate the pilot's actions to the plane in a "fly-by-wire" fashion, rather than conventional hydraulic means.



SPECIFICATIONS

Engine: Pratt & Whitney F100-PW-200 turbofan; 23,840 lb static thrust with afterburning.

Length: 49 ft 6.75 in (with nose probe).

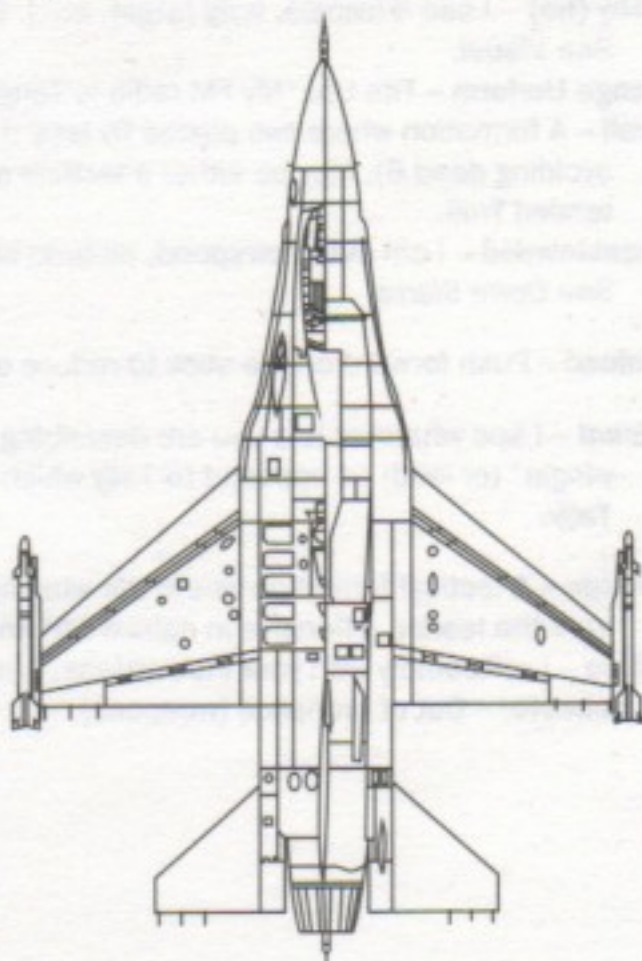
Wingspan: 31 ft 0 in (without missiles); 32 ft 10 in (with two missiles).

Height: 16 ft 8.5 in.

Weights: Empty—14,567 lb; Normal Take-Off (Air-to-Air with fuel and two missiles)—23,300 lb; Maximum Take-Off—35,400 lb.

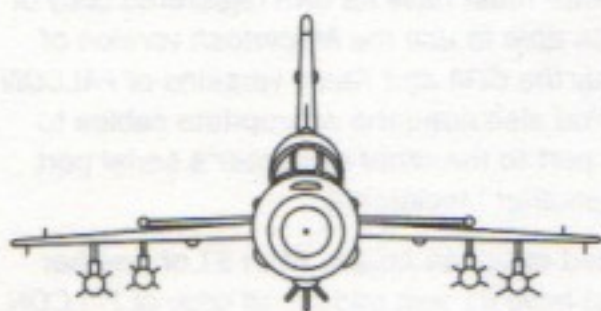
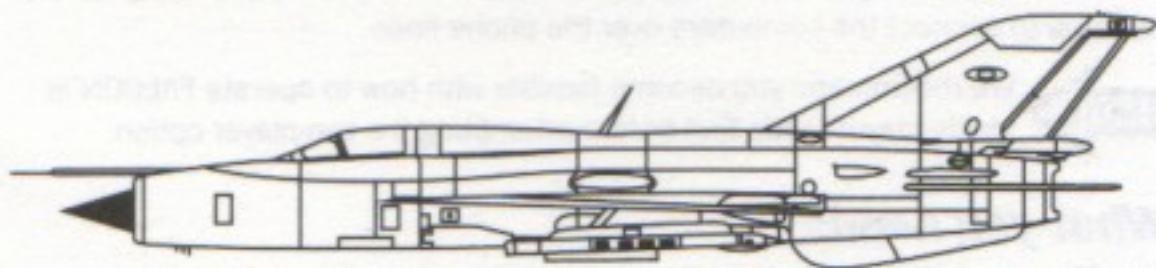
Max Speed: 795 knots/hr (Mach 1.2, or 915 mph) @ Sea Level (with two missiles); 1,172 knots/hr (Mach 2.05, or 1,350 mph) @ 40,000 ft (with two missiles).

Service Ceiling: Over 50,000 ft.



The MiG-21

The Mikoyan/Guryevich (MiG)-21 is the most common fighter jet in the world, and although it originates from the Soviet Union, its influence is felt far outside the Eastern Bloc countries. It carries AA-2-2 radar-guided Atoll missiles, AA-2 Atoll heat-seekers, and a GSh-23 Gun similar to the F-16's M61A1 Cannon.



SPECIFICATIONS

Engine: Tumanskii R-25-300 turbojet; 16,720 lb static thrust.

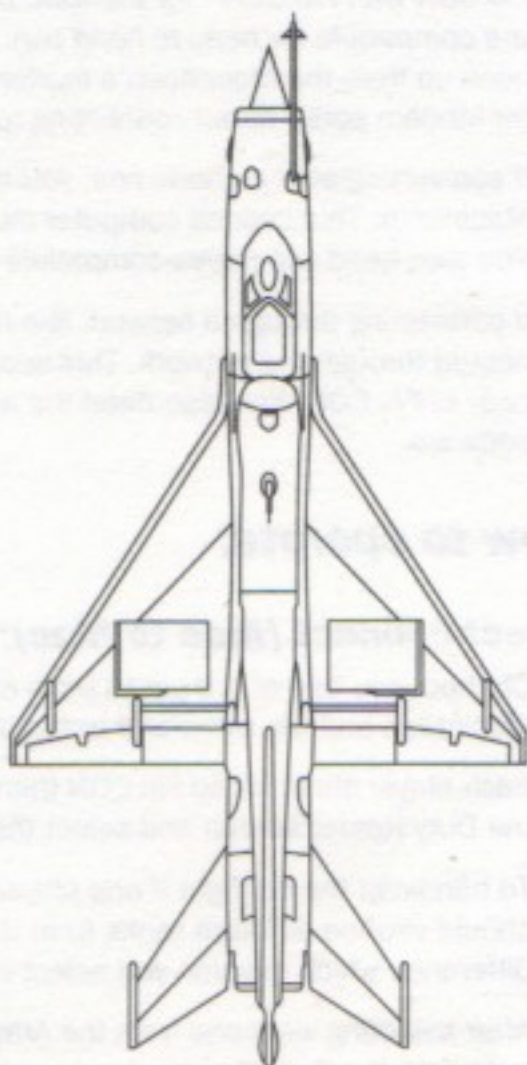
Length: 51 ft 4 in (with nose probe).

Wingspan: 23 ft 6 in (without missiles).

Height: 14 ft 9 in.

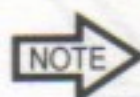
Weights: Empty 13,500 lb; Normal Take-Off (Air-to-Air with fuel and two missiles) 19,300 lb; Maximum Take-Off 22,000 lb.

Max Speed: 730 knots/hr (Mach 1.1, or 850 mph) @ Sea Level (no specifications on armament); 1,200 knots/hr (Mach 2.1, or 1400 mph) @ 40,000 ft (no specifications on armament).



Appendix B: Head-to-Head (Two-Player) Dogfight Option

FALCON allows you to compete (dogfight) against another player on a second machine. Although each player must have their own registered copy of the program, the only additional equipment needed is a cable to connect the two computers or modems to connect the computers over the phone lines.



We recommend you become familiar with how to operate FALCON in single-player mode first before attempting the two-player option.

What you need:

Your Macintosh that meets the aforementioned hardware requirements, and a registered copy of FALCON.

- If direct-connecting, you need either an Amiga, Atari ST, IBM (or compatible) or another Macintosh. This second computer must have its own registered copy of FALCON. *Important note: You will not be able to use the Macintosh version of FALCON with FALCON^{XT} for the IBM. Only the CGA and Tandy versions of FALCON are compatible for head-to-head play.* You also need the appropriate cables to hook up from the Macintosh's modem port to the other computer's serial port (or modem port if direct-connecting to another Macintosh).
- If connecting over a phone line, you need either an Amiga, Atari ST or another Macintosh. This second computer must have its own registered copy of FALCON. You also need two Hayes-compatible modems (at least 1200 baud each).
- If connecting through a network like AppleTalk, you need another Macintosh connected through the network. This second computer must have its own registered copy of FALCON. You also need the appropriate networking hardware and software.

How to operate:

Direct-connect (Mac to Mac):

- Connect one end of a 9-pin to 9-pin cable to the modem port on the back of your Macintosh and the other end to the modem port on the second Mac.
- Each player should load FALCON then pull down the **Communications** menu from the Duty Roster screen and select the option "**Mac to Mac.**"
- To handicap the dogfight if one player is not as skilled as the other, the players should choose different ranks from the Rank/Missions screen. It makes no difference which mission you select or how many MiGs there are.
- After selecting weapons from the Armament screen, click on the TAKEOFF button to initiate the dogfight.



Direct-connect (Mac to Amiga or Mac to Atari ST):

- Connect the 9-pin end of a 9-pin to 25-pin cable to the modem port on the back of your Macintosh, and the 25-pin end to the serial port on the Amiga or Atari ST.
- After loading FALCON, the Mac player should pull down the **Communications** menu while in the Duty Roster screen and select the option "**Mac to Mac.**" The Amiga or Atari ST player should pull down the **Comms** menu and select "**Amiga to Mac**" or "**ST to Mac**" accordingly. The Amiga or Atari ST player should also select **9600** baud instead of 19200, since the Mac only supports a maximum of 9600 baud when direct connecting.
- To handicap the dogfight if one player is not as skilled as the other, the players should choose different ranks from the Rank/Missions screen. It makes no difference which mission you select or how many MiGs there are.
- After selecting weapons from the Armament screen, the Mac player should click on the TAKEOFF button first to initiate the dogfight. After the Mac player is in the cockpit of the plane, then the Amiga or Atari ST player can click TAKEOFF.

Direct-connect (Mac to IBM):

- Check the IBM (or compatible) to see how many pins the serial port requires (it will be either 9 or 25). Obtain either a 9-pin to 9-pin or 9-pin to 25-pin cable to connect the two computers.
- Connect the 9-pin end of your cable to the modem port on the back of your Macintosh, and the 25-pin end (or 9-pin end, depending on the type of serial port the IBM has) to the serial port on the IBM.
- After loading FALCON, the Mac player should pull down the **Communications** menu while in the Duty Roster screen and select the option "**Mac to IBM.**" The IBM player should select **TWO** on the Hardware Configuration Screen. The IBM player should also select **9600** baud and either **COM 1** or **COM 2** (depending on which COM port the cable is plugged into) from the Communications Configuration Screen. At this point, before **[Return]** is pressed, the IBM player should wait for the Mac player to click TAKEOFF on the Armament Screen to initiate the dogfight.
- To handicap the dogfight if one player is not as skilled as the other, the players should choose different ranks from the Rank/Missions screen. It makes no difference which mission you select or how many MiGs there are.
- After selecting weapons from the Armament screen, the Mac player should click on the TAKEOFF button to initiate the dogfight. At this point, the Mac player's screen will turn black until the IBM player has proceeded through the Armament Screen and hit **[Return]** for takeoff.

Connection over the phone lines (Mac, Amiga, Atari ST):

- Each player should hook up and turn on their respective modems before entering FALCON.
- After loading FALCON, the Mac player should pull down the **Communications** menu while in the Duty Roster screen and select the options "**Mac to Mac**" and "**Modem**." If the second player is on a Macintosh, that person should also select "**Mac to Mac**" and "**Modem**" from their **Communications** menu.
- If you are dogfighting against an Amiga or Atari ST, the Mac player must initiate the call. If two Macintoshes are dogfighting, either player can initiate the call.
- To handicap the dogfight if one player is not as skilled as the other, the players should choose different ranks from the Rank/Missions screen. It makes no difference which mission you select or how many MiGs there are.
- After selecting weapons from the Armament screen, the Mac player should click on the TAKEOFF button to initiate the dogfight. When the Mac player clicks the TAKEOFF button, a dialog box will appear and prompt you for your opponent's phone number and other modem selections.

Number to Dial

When you are initiating the call, you must type in your opponent's phone number here. You must always initiate the call if connecting to an Amiga or Atari ST.

Audio Checksum

If you are having a problem with the communication setup, the computer will alert you with a beep sound.

Auto Answer

The person receiving the call should select Auto Answer. If you are connecting with an Amiga or Atari ST, ignore this checkbox.

Manual Setup

This allows you to use the Hayes AT command set. If you choose Manual Setup and click OK, a new dialog box with options for baud rate, command line entry, and audio checksum will appear.

Tone/Pulse

Select which type of dialing system you are using, touch-tone or pulse (rotary) dialling.

Baud Rate

Click on the baud rate for your particular modem. The baud rate must be the same for both computers.

SAVE SETUP

This option allows you to save these settings for future play.

- After you click on OK, you will be placed in the cockpit for the dogfight.



Connection over a network (AppleTalk):

- Connect the Macintoshes with the appropriate networking hardware and software, and install the registered copies of FALCON on the machines you will be using.
- After loading FALCON, the players should pull down the **Communications** menu while in the Duty Roster screen and select the options "**Mac to Mac**" and "**Network.**"
- To handicap the dogfight if one player is not as skilled as the other, the players should choose different ranks from the Rank/Missions screen. It makes no difference which mission you select or how many MiGs there are.
- After selecting weapons from the Armament screen, click on the TAKEOFF button.
- After clicking on TAKEOFF, a dialog box will appear instructing you to choose your opponent. Find the player you wish to battle, then click on CHALLENGE to initiate the dogfight.

Elements of the conflict:

Certain elements of the dogfight are consistent no matter which two-player mode you select. For example, once both players have made their final selections, the following conditions exist:

- Each competitor's plane performs as an F-16, even though the opponent's image is that of a MiG-21.
- You are both flying at an altitude of 25,000 feet at 650 knots directly toward each other from a distance of approximately 40 miles.
- Occasional messages will prompt you as to suggested headings for overtaking your competitor. *Stay in the map area! Any plane that moves off the map will disappear from the map mode in the competing player's REO. The plane will still appear in radar mode, but you will be unable to see them using the map.*
- Two-player battles do not affect a pilot's single-player status (Killed, MIA, etc.) or merit total on the Duty Roster.
- If you are battling against another Mac, over either a modem or a network, you can send a message to your opponent. The message will appear in a window over the game screen. To send a message press the **9** key. The game will pause while you type in your message, and return to the same point that you left it once your opponent has read the message.



If you are competing over the phone lines and your opponent is using a computer other than a Macintosh, sending a message will cause the modem connection to be broken. You will then have to start the head-to-head procedure again if you wish to dogfight with another player.

Once the battle is over:

When the battle is over, the victor will see the "Mission Complete" message displayed at the Awards screen. The vanquished will see the appropriate snapshots. To return to the Duty Roster, click the mouse button once and start over. If neither player has altered the selection from the Communications menu, you may challenge each other again by going through the Rank and Armament selections as before.

If you wish to return to single-player mode, return to the Duty Roster screen and select "**Single Player**" from the **Communications** menu.

Elements of the conflict:

- The objective of the conflict is to defeat the enemy by destroying their ships. The player who destroys the most ships wins the battle.
- Each player's ship has a health bar. The health bar is located at the bottom of the screen. The health bar is a red bar that fills up as the ship's health increases. The health bar is empty when the ship's health is at its lowest.
- You can only fire at an enemy if you are within a certain distance. The distance is indicated by a red circle around the enemy ship. The red circle is larger when the enemy ship is closer to you.
- Destroyed messages will appear on the screen. The messages will say "Ship destroyed" and "Ship destroyed". The messages will also say "Ship destroyed" and "Ship destroyed".
- Two player battles are not affected by a player's ship being destroyed. The ship will be destroyed, but the player will still be able to play.
- If you are having trouble playing, click on the "Help" button. The "Help" button is located at the bottom of the screen. The "Help" button will open a window that contains information about the game.
- You need a message to play the game. The message is a text box that appears on the screen. The message is a text box that appears on the screen.
- The game will end if you destroy the enemy's ship. The game will end if you destroy the enemy's ship.
- If you are having trouble playing, click on the "Help" button. The "Help" button is located at the bottom of the screen. The "Help" button will open a window that contains information about the game.
- Destroyer ships are a powerful weapon. They will destroy the enemy's ship.
- Destroyer ships are a powerful weapon. They will destroy the enemy's ship.

Appendix C: Troubleshooting

There may be times where FALCON doesn't operate the way you would like it to (it won't run under MultiFinder, can't connect head-to-head, etc.). In this section, we will attempt to explain some of the problems users have had with operating/running FALCON by listing some of the more common questions our customer support representatives receive.

- Q: When I'm in MultiFinder and trying to run FALCON, I sometimes get the message "The application 'FALCON' has unexpectedly quit (2)," and the program quits to the desktop.
- A: Your Mac is telling you that it is having a memory problem. If you haven't done so already, set the size resource of the file "FALCON" to 1024K (explained on page 8). If you have already done this, you may either 1) not have enough RAM to run MultiFinder properly with FALCON or 2) your INITs or CDEVs may be giving you problems. Try starting with an INIT and CDEV-free system, and add them slowly until you determine which one is the offender. We recommend you use as few INITs and CDEVs as possible when running FALCON.
- Q: FALCON doesn't want to load when I'm using an external drive (or an SE with two internal drives).
- A: When using two floppy drives, it is best to insert disk one into the internal drive (the bottom drive on an SE with two internal drives) and wait for the prompt to insert disk two *before* putting disk two into the other drive. Disk one will eject, then you can insert disk two into the other drive. After inserting disk two, you can reinsert disk one. This should solve the loading problem with two disk drives.
- Q: I can't get my modem to connect to another player when I'm playing in head-to-head mode. Sometimes it won't even dial.
- A: Try sending these Hayes AT commands using a terminal program: AT&F (to set the modem to default factory settings), AT&CO (to force the carrier detect on), and AT&W (to save these settings to non-volatile RAM).
- Q: I installed FALCON on my hard drive, and now I am unable to throw all the files away.
- A: Both "FALCON" and "Start FALCON" are locked files. To throw them away, drag both files from the folder on your hard drive over to the trash can while holding down the **Option** key.

Running other programs while in MultiFinder

When returning to FALCON from another application, the screen will not refresh. If you are in the cockpit view, you need to select **Return to Cockpit** from the **File** menu. If you are somewhere other than the cockpit, you need to progress to the following menu (or to the cockpit) for the screen to refresh.

Additional Reading

There are a number of good books on the market that explain the F-16 and jet fighter technology in greater detail than is possible in this Flight Manual. The following is a representative list of those books.

- Basel, G.I. **Pak Six (A story of the war in the skies of North Vietnam)**. La Mesa, CA: Associated Creative Writers, 1982.
- Bonanni, Pete. **Falcon Air Combat**. Berkeley, CA: Osborne McGraw-Hill, 1989.
- Bornstein, Howard. **Turn and Burn: The Authoritative Guide to Falcon**. Greensboro, NC: COMPUTE! Publications, Inc., 1990.
- Drendel, Lou. **F-16 Fighting Falcon in Action (Aircraft No. 53)**. Carrollton, TX: Squadron/Signal Publications, Inc., 1982.
- Gunston, Bill. **F-16 Fighting Falcon (Modern Combat Aircraft 16)**. Shepperton, Surrey, England: Ian Allan Ltd, 1983. Distributed in the USA by Motorbooks International Publishers and Wholesalers Inc. of Osceola, WI.
- Gunston, Bill. **Mikoyan MiG-21**. London, England: Osprey Publishing Limited, 1986. Distributed in the USA by Motorbooks International Publishers and Wholesalers Inc. of Osceola, WI.
- Gunston, Bill, and Mike Spick. **Modern Air Combat**. London, United Kingdom: Salamander Books Ltd., 1983. Published in the USA by Crescent Books, distributed by Crown Publishers, Inc., of New York, NY.
- Mason, R.A. **Air Power: An Overview of Roles**. London, England: Brassey's Defence Publishers Ltd., 1987.
- Richardson, Doug. **An Illustrated Guide to the Techniques and Equipment of Electronic Warfare**. London, United Kingdom: Salamander Books Ltd., 1985. Published in the USA by Arco Publishing, Inc. of New York, NY.
- Richardson, Doug. **F-16 Fighting Falcon (Modern Fighting Aircraft, Volume 2)**. London, United Kingdom: Salamander Books Ltd., 1983. Published in the USA by Arco Publishing, Inc. of New York, NY.
- Shaw, Robert L. **Fighter Combat: Tactics and Maneuvering**. Annapolis, MD: Naval Institute Press, 1985.
- Sims, Edward H. **Fighter Tactics and Strategy, 1914-1970**. Fallbrook, CA: Aero Publishers, 1980.
- Walker, J.R. **Air-to-Ground Operations**. London, England: Brassey's Defense Publishers Ltd., 1987.

The quote on the FALCON Flight Manual title page is taken from the above listed title *Fighter Combat: Tactics and Maneuvering*, by Robert L. Shaw. The remainder are in the public domain or have unknown origins.



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Notes

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