

The Most Dangerous Game

by ex-U.S. Air Force Capt. Norman Cosand ('69-'76)



The Hunter Killer mission was, without a doubt, one of the toughest and most dangerous missions flown over North Vietnam in 1972. The Hunter Killer "team" (term used by Fighter Pilots) was comprised of two elements: 1. The Hunter element — two Wild Weasel F-105G's in the lead armed with AGM 78 missiles (an air-to-ground missile designed to home in and destroy SAM site radar vans); 2. The Killer element — two F-4E's armed with CBU 52 (cluster fragmentation bombs designed to destroy metallic SAM missiles, transportation vehicles and radar vans) ready to roll in on an moment's notice on the exposed SAM site. The aircrew members who flew the mission were all individually selected by the F-105 and F-4E Squadron Commanders because of the severe hazards associated with multiple SAM sites. Each SAM site was ringed with hostile 23mm and 37mm AAA gun sites. North Vietnam (in particular Hanoi) was considered to be one of the most heavily defended enemy countries ever known to aerial warfare. SAM sites, MiG bases and AAA gun sites carpeted the entire breadth of North Vietnam with an extra abundant concentration of defenses protecting the cities of Hanoi and Haiphong. Flying over the far reaches of North Vietnam was a daily "fireworks show" for the aircrews from Korat AFB in Thailand who flew the Hunter Killer missions. "First in and last out" was a standard operating procedure — Time on target was longer, the defenses more intense and survival rate reduced. The Hunter Killer team was no picnic.

It was dark and humid at 4:18 AM when I arose from a restless sleep in my Hootch at Korat AFB. I rapidly threw on my flight suit, put on my jungle boots and made my way to the Squadron Briefing room by 4:30 AM (via our reliable air crew van). Tension was written on the faces of the Captains and Lieutenants who were scheduled for today's Hunter Killer mission deep into North Vietnam. Our target was two SAM sites just southwest of Hanoi. With maps, classified photographs, weapon settings and enemy defense updates, I join the other team members for a comprehensive target briefing at 0500. Briefing synopsis: "The weather is marginal en route (thunderstorms) but improving over Hanoi; the main target for the Strike Force (F-4s from bases in Thailand and South Vietnam) is the Thai Nguyen Steel Plant north of Hanoi; all MiG bases, SAM sites and AAA gun sites are active and operational; our Hunter Killer teams (call sign "Eagle") are to suppress two SAM sites prior to the Strike Force's arrival and then remain in the target area to back up friendly forces — fuel permitting!" Breakfast at the Officer's Club was gulped down and barely

digested. Takeoff occurs at 7:00 AM (exactly on time); we fill up with fuel from a KC 135 at 7:30 AM and drop off the tanker at 8:20 AM. "Eagle flight topped off," radios the Hunter lead as we ingress to the target area with full fuel tanks and weapons checked for readiness. As we approach the target area I can hear the heavy breathing of the pilot in the front seat of my F-4E as we receive "Bandit" calls from MiG-19 and MiG-21 aircraft launching from several MiG bases surrounding Hanoi. I quickly discover that we are now 15 miles from two approaching MiG-19 aircraft. "Eagle Flight, Bandits attacking," radios the flight lead of another Hunter Killer team off to my left. Two Atoll missiles zip under my aircraft and disappear in the clouds behind me. We are still 100 miles from our target; the pulse rate picks up; it is going to be one of those rare days when both MiGs and SAMs are in joint defense of North Vietnam.

As we approach Hanoi from the Southwest, the lead F-105 launches an AGM78 and quickly eliminates a SAM radar van from a site just east of the city. Travelling at 480 nautical miles per hour, I scramble in the back seat with my North Vietnam maps and target photos directing my element of two F-4Es to the first targeted SAM site, while the F-105G element pulls off to our left to provide coverage. I concentrate on the detail of my map and compare the map to rivers, roads and canals below; again I cross-check my map for landmarks. The target photo on the first SAM site is finally matched to a section of road near a small canal below.

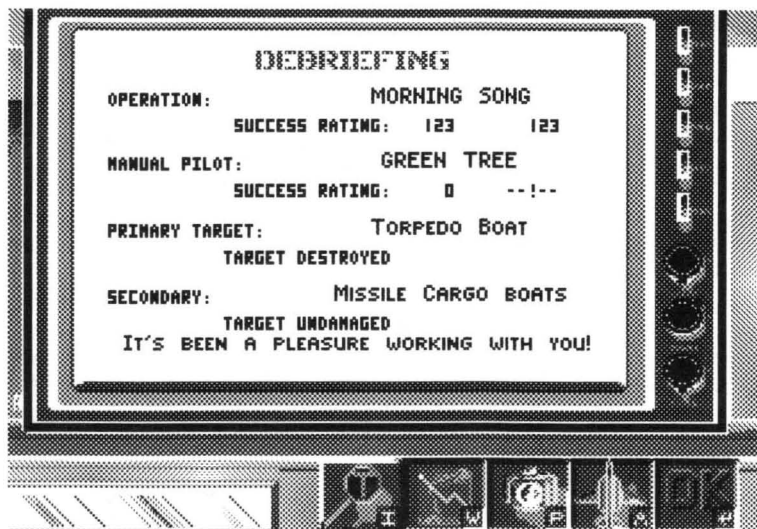
A sigh of relief — no time or fuel was wasted, we are here to do the job we came for. The first SAM site is identified, we are ready to roll in at 60° of dive and supersonic speeds. My throat is dry and sweat races down my face as we pull 7+ g's coming off the first target. Half of our CBU 52 bomb load was just deposited on the SAM site below with thousands of pieces of shrapnel flying in every direction ensuring destruction of multiple surface-to-air missiles and radar equipment. As the second F-4E pulls off the target and tucks close to my right wing, I pull my North Vietnam maps from a large clamp fastened to my G-suit and begin to immediately identify new landmarks below in order to expedite our ingress to the second target SAM site. Clouds partially obscure the second SAM site as we visually acquire the target. The ground below is suddenly lit up like a Christmas tree as AAA gun barrel flashes send a thousand rounds of 23mm and 37mm directly at our flight. Large red and orange silver dollar-sized tracers are close to my canopy; I can hear the "snap, crackle and pop" of the tracers as we point our nose at the second SAM site. "Eagle 3, SAM at 6:00 (six o'clock), break now," radios the lead F-105. My vision is gone; however, my mind is clear, I have "blacked out" as we pull nearly 9 g's to avoid the SAM (travelling at 3 times the speed of sound) that was homing in on our tailpipe. With vision now restored and our nose pointed skyward, we turn back toward the target for a second round. That SAM was alone, there

would have been no way out had we been hit, diving at the ground and travelling at supersonic speeds. "Snap, crackle and pop" as dozens of tracers surround my F-4E while again diving at the second SAM site. "Thump," I feel the aircraft shake and lighten up as our last half of CBU 52 bomb load is released on top of the target. The second F-4E in our element also drops his CBU 52 and rejoins on our wing. Two SAM sites destroyed, all aircraft and aircrew are safe! We are critically low on fuel as we rejoin the F-105 element. Our heading is 220° (southwest heading) as we egress back to Thailand. A KC 135 tanker is waiting for us over the border of Thailand and vectors north over Northern Laos to meet us. We are thankful for the tanker aircrews who risk 57mm and 86mm over hostile territory to refuel our empty tanks.

It has been a memorable day for the aircrews of Eagle Flight as well as other flights who flew the Hunter Killer mission deep into North Vietnam that day. We are all thankful to be alive. We are also thankful that soon we can see an end to the war with North Vietnam, have our prisoners of war returned and set our feet once again on fertile American soil.

Captain Normand Cosand flew for the U.S. Air Force between 1969 and 1976. He was the Guy In Back in an F-4E and a Bomber/Navigator on an F-111. He flew 82 missions over North Vietnam including 41 missions over Hanoi as part of a Hunter Killer Team. He received 4 Distinguished Flying Crosses, 11 air medals and 1 Vietnam Cross of Gallantry.

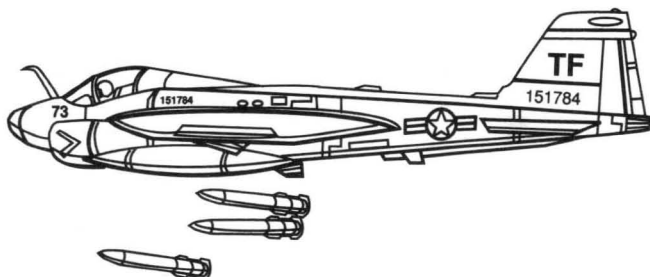
PART V: DEBRIEFING



OPERATION STATISTICS

Each time you complete a mission and successfully land your aircraft, you are taken to the Debriefing Room, where you can view your statistics for the current operation as well as the overall average for the entire Tour. To start a new Tour of Duty, delete from the working floppy (not the master) all files with the extension .PLY.

The important statistic is the success rating. You get a score for each mission you attempt. If your total exceeds 100, you earn the right to wear the Operation Badge. The scores for the various events are added together to provide the Air Wing's SR. Your Success Rating is calculated by totalling the scores associated with those events which were directly attributable to you. For instance, you only get credit for the primary if you were in control of the aircraft which dropped the bomb that destroyed the target.



Here is how the Success Rating is calculated:

Primary target destroyed	100
Secondary target destroyed	50
SAM destroyed	25
MiG destroyed	25
AAA destroyed	10
PT boat destroyed	10
Guided missile on target	14
Unguided missile on target	12
Truck destroyed	5
Train destroyed	5
Player's landing	
green	10
black	0
red	-10
Carrier destroyed	-1000
Hospital destroyed	-1000
U.S. aircraft destroyed	-50
Guided missile released	-4
Unguided missile released	-2

Explanation of Icons

Information  This displays the cumulative scores for the air wing and the individual pilot.

As the duty pilot your landing record is displayed in the form of a set of colored disks:

Red Dangerous
Green OK
Black No comment

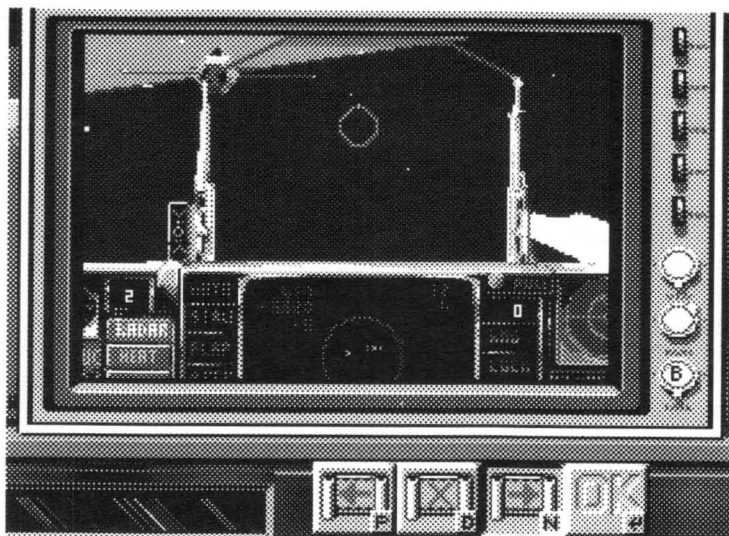
STATISTICS		AIR WING	MANUAL PILOT
OP SUCCESS RATING	Ave:	123 82	0 41
ORDNANCE USAGE	Ave:	50 52	50 63
AIRCRAFT LOST		0	0
MIG KILLS:	TOTAL:	0 11	0 10
GROUND TARGET KILLS:	TOTAL:	2 7	1 3
DUTY PILOT LANDINGS:			

Waypoint Review  Every few seconds the position of every aircraft is recorded. This information is used to show the aircraft track in review. It is possible to compare the ideal track following waypoints against the actual track. As the positions are being recorded relatively infrequently, it will not always be possible to completely review the track during a dogfight when direction changes are fast

and furious.

Camera **[P]**

This provides a record of your activities as if taken by a camera. Use the keys given to review the snapshots of your mission you took by using the Photograph option in the File Menu (see Part VII Reference; Menus) or pressing **[PrtSc]** while the game is playing. Select **[P]** to see the previous photo, **[N]** to see the next photo, and



[D] to delete the photo currently on the screen.

Airplane **[A]**

The Video Recorder reviews the videotape you took by using the Video option on the FILE Menu. Select **[P]** to look at the current tape, **[→]** to move to the next sequence, **[S]** to save the videotape to disk, and **[L]** to load a previously saved video.

Aside from using the FILE Menu option, you can also activate and deactivate the video recorder with **[V]**. You can record more than one sequence per flight, but there is a finite length. However, if you find yourself with a sequence you just have to save and your tape has run out, you can select **[○]** to reset the recorder. This will, however, wipe out all your previous records for that mission.

BADGES AND MEDALS

Badges

Every time you successfully complete an operation, a badge is sewn onto your flight suit. Occasionally you will see a picture of yourself in your flying suit. As you progress through the simulation, you may see your suit become gradually more colorful, when you earn the right to wear the badges.



Medals

Medals had their beginnings in such knightly orders as the Knights of the Bath of England. They are a way of saying, this person is among the greats. In Vietnam, some flyers began to feel that they were getting their medals just for waking up in the morning. To some, it seemed as if they only got a medal if they fouled up a mission and thereby took damage. If they did it right, no one noticed.

In this game we give you medals for doing it right, though the Purple Heart might be considered an award for blowing it big time. If you deserve an award, the Award Screen will appear and show a pilot displaying:

Purple Heart:

Injured in action

Air Medal:

Every ten missions completed

Distinguished Flying Cross:

In one mission: destroying two SAM sites, one MiG and three gun sites

Air Force Cross:

Downing one MiG which was attacking another aircraft

Medal of Honor:

Personally destroying the primary and secondary targets for an operation

Sierra Hotel:

Once you have attained an Awards Screen, press any key to view the Sierra Hotel display. This screen lists the top ten pilots who have ever played from your disk — the “best of the best.” Press any key from the Sierra Hotel screen to return to the Duty Roster. From there, you can start another mission or exit the game.

The Sierra Hotel screen appears after every mission.



PART VI: REFERENCE

This section contains detailed information about all aspects of this simulation. It includes instruction on using the menus, a summary of the keyboard commands, specifications of the aircraft (both friendly and otherwise), a summary comparison of the five aircraft involved, a full description of the cockpits of the Intruder and Phantom and hints on what to look for, carrier takeoff and landing instructions (both real and for the game), flying and fighting instructions, a summary of the armaments involved, and a glossary of technical terms and ever-present military abbreviations for your information and amusement.

Don't try to read this section in one sitting; we do recommend that you refer to it whenever you need more information about any part of the simulation. The Reference section is organized under the following headings:

MENUS

AIRCRAFT SPECIFICATIONS

COCKPITS

LANDING

FLYING AND FIGHTING

ARMAMENT

HISTORY OF THE AIR WAR IN VIETNAM

GLOSSARY AND ABBREVIATIONS

KEYBOARD COMMAND SUMMARY

INDEX

MENUS

Press **[F10]** at any time to display the Menu Bar at the top of the screen. Each of the six menus in the Menu Bar contains a number of options or selections. These options remain hidden until you activate them using any of the following methods, depending on the input device you are using:

Mouse or Joystick: Move the pointer to the menu you wish to activate, and press the left mouse button or the joystick's fire button. The menu options pop down, remaining displayed for as long as you hold the button down. To select a menu option, move the pointer down to highlight the option of your choice and release the button.

Keyboard: Press **[←]** or **[→]** to highlight the menu you wish to activate. Press **[↑]** and **[↓]** to highlight the option of your choice, then press **[Enter]**.

Once you display the Menu Bar, the game is stopped. It remains paused until you use the Return option from the File Menu. The following is a description of the menu options within each of FOTI's six menus:

ABOUT Menu

This provides information about the game itself. It displays the credits, the version number and other information about the simulation.

FILE Menu

The File Menu lets you manipulate the simulation (or "file") at hand. By selecting from the following options, you can abort, postpone or end an operation, as well as return to the operation you accessed the File Menu from. You can also end the game and return to DOS.

Abort Mission: Return to Corridor Scene. This is otherwise known as "giving up," and achieves nothing but the scorn and contempt of your friends and family. Needless to say, you are awarded no points for an aborted mission.

End Mission: This takes you immediately to the end of the mission, whether or not you have attained the objective. Its primary use is for eliminating the tedium of a return-to-carrier trip and the anxiety of a carrier landing. The mission is over; you go immediately to Debriefing and get your scores (minus any score for not making a landing).

Return: Return to the operation without change.

Exit: This exits the game into DOS. No score is recorded.

Photograph: This allows you to take a photograph of what is on the screen at the moment you choose the option. This comes in handy for later reference during Debriefing.

Video: This turns on the "videotape camera" to record action sequences during a game.

LEVEL Menu

Use the Level menu to choose the level of difficulty of the simulation, from Lieutenant j.g. (the easiest) to Captain (the most difficult). When you first start the simulation, the rank is set to Lieutenant j.g. You can select the more difficult levels as you become more proficient. You earn more points for completing a mission at a higher level of difficulty. See the **OPTIONS Menu** for more information about ranks and levels of difficulty.

Lieutenant j.g.
Lieutenant
Lt. Commander
Commander
Captain

CONTROL Menu

Use the control menu to select or change input device, select sound options and control the detail of the simulation visuals.

Input Device

Selecting one of the following three input devices places a checkmark next to that option:

Keyboard: This is the default unless you have a mouse or joystick installed. It allows you to operate the plane entirely from your keyboard.

Joystick: This allows you to operate the actual piloting and fighting of the plane with a joystick, though you will still have to use the keyboard for several functions. Follow the directions on the screen to calibrate your joystick.

Mouse: Like the joystick, this allows you to fly and fight the plane with a mouse but leaves several functions to be done on the keyboard. Follow the directions on the screen to calibrate your mouse.

Recalibrate: Allows you to recalibrate the sensitivity of your mouse or joystick.

Sound Options

All Sound Off: Turns all the sound in the game off. Ideal for playing at work or when the rest of the family is sleeping.

Engines Off: Turns off the sound of the engines, thus relieving a major source of irritation (for real pilots as well as players), and leaving on all the important sounds such as guns and rockets firing.

All Sound On: For those who have to hear the sound of the engines as well as all the rest of the sound. Not recommended for households where anyone at all has sensitive hearing.

Scale Control

Large Scale: Choosing this option makes all the objects in the game four times as big as they normally would be in relation to the land and sea. This is a benefit because it makes spotting things easier.

Detail of Simulation Visuals

Minimum Detail, Low Detail, Medium Detail, High Detail, Maximum Detail: These options control the detail of the simulation. The more detail chosen, the better the detail of the visuals, but the slower the game moves because of the extra time necessary for the computer to draw detailed pictures.

Weather

Bad Weather: Putting a check mark next to this options means that you will be fighting (or perhaps enjoying) bad weather throughout the mission. Some missions are set to Bad Weather as a default. The main effect of bad weather is that it grounds the MiGs. You still have to worry about SAMs and pattern-fired AAA.

OPTIONS Menu

This menu sets your game preferences. For example, you can choose to limit the armaments you have available, to equip your aircraft with Super Engines, or to make mid-air collisions possible. By manipulating both Level and Options, you can achieve a wide range of difficulty levels (however, see Note below). For example, you can choose to go up against an aggressive enemy, but retain the advantage of super engines to give you that extra edge.

Choosing an option places a checkmark next to it in the menu, so you can tell the state of an option at a glance. The following choices are available:

Super Engine: Choose Super Engine to make your flying job a little easier. For example, with Super Engine selected, you can assume that the ASI needle is directly connected to the RPM gauge. This is not necessarily the case with Normal Engine (see below).

Normal Engine: Choose Normal Engine if you want to make your life a little more difficult. Normal Engine is closer to real-life.

Limited Arms: Choose Limited Arms to limit the armaments and ammunition you have available during a mission. This is the more difficult setting and closer to a real-life simulation. Choosing this option a second time toggles it off, giving you an easier game with unlimited arms.

Limited Chaff & Flares:

Choose Limited Chaff and Flares to limit the chaff and flares you have available during a mission. This is the more difficult setting and closer to a real-life simulation. Choose this option a second time to toggle it off.

Collisions:

If Collisions is turned ON, the piloted aircraft will be destroyed if it collides with another object (eg. another aircraft, missile, house, carrier, bridge). If Collisions is turned OFF, then the piloted aircraft can fly through anything without being damaged. Collisions ON is the more difficult setting and closer to a real-life simulation. Choosing this option a second time toggles it off.

Ground Crashes:

If Ground Crashes is set to ON, then the piloted aircraft will be destroyed if it hits the ground too heavily (during a heavy landing, for example). If Ground Crashes is turned OFF, then a heavy landing will not result in the destruction of the aircraft. You can turn Ground Crashes OFF by selecting it a second time.

Red/Black Out:

If Red/Black Out is ON, the possibility exists for pilot blackout or redout under circumstances of excessive g forces during flight. Positive g forces, usually the result of sharp and climbing high-speed turns, can cram the pilot into his seat and push his blood supply downward. Forces in excess of 8 g's create a risk of pilot blackout, characterized in this simulation by a screen fade-out. Negative g forces, which tend to "pull" the pilot from his seat during a sustained high-speed dive, are equally dangerous. Forces in excess of -2.5 g's can result in pilot redout, characterized by the screen turning progressively black. If either situation should occur in the game, you can recover from it by reversing or stopping the current action. Turning Red/Black Out OFF avoids this altogether.

Enemy Activity:

Choose from Low, Medium and High Enemy Activity. These determine whether the enemy's MiGs carry armaments, as well as the effectiveness of their flares and their SAM and AAA missiles. The following table summarizes the relationship between the Enemy Activity settings and the effectiveness of the enemy's ordnance.

	MIGs	Flares	SAM & AAA
Low	No Guns No Missiles	Ineffective	Ineffective
Medium	Guns No Missiles	Partially Effective	Partially Effective
High	Guns Missiles	Fully Effective	Fully Effective

Targets:

You can choose from Easy, Medium and Hard. This determines how close the bomb has to be to the target to register a hit. With Easy Target selected, you score a hit when the bomb falls within an area four times the size of the shape of the target. Medium Target scores a hit if the bomb falls within an area two times the size of the shape. Hard Targets must be hit on the target itself.

Fuel:

Unlimited Fuel: There is no fuel consumption by the plane. You can stay in the air as long as someone doesn't shoot you down.

Half Fuel: Your plane consumes fuel at half its normal rate, giving you much more air time.

Full Fuel: This is the regular rate of fuel consumption. You have to manage your fuel just like a real pilot does.

Indexing Preferences to Rank

The above preferences allow you to tailor the game to your requirements. Your selected rank provides a broad customization. For example, if your selected rank is Captain, the preset options are set for the maximum reality. You can alter them all to "easy," but this gains you nothing, as your score depends on the options selected, not your rank.

The following table shows the relationship between rank and the availability of the "easy" options. The letters in the body of the table refer to the state of the option (Yes/No, Low/Medium/High, or Easy/Medium/Hard); the numbers refer to the multiplier to the base score you receive for taking the harder options.

	Lt. jg	Lieut.	Lt. Com.	Comm	Capt.
Super Engine	Y 1	Y 1	N 3	N 3	N 3
Limited Arms	N 1	N 1	Y 3	Y 3	Y 3
Limited Chaff/ Flares	N 1	N 1	Y 1	Y 3	Y 3
Collisions	N 1	Y 7	Y 7	Y 7	Y 7
Ground Crashes	N 1	N 1	Y 3	Y 3	Y 3
Red/Blackout	N 1	N 1	N 1	Y 4	Y 4
Enemy Activity	L 2	L 4	M 4	M 4	H 4
Targets	E 1	E 1	M 5	H 8	H 8
Limited Fuel	E 1	N 3	N 3	N 5	N 5
Totals	10	20	30	40	50

Rules:

Some operations default to being restricted by Rules of Engagement. Some do not. This option can be used to change the default for each mission.

COMMS Menu

Use the Comms menu to fight the game head-to-head with another player to join another player on the same mission, using a cable or modem hookup.

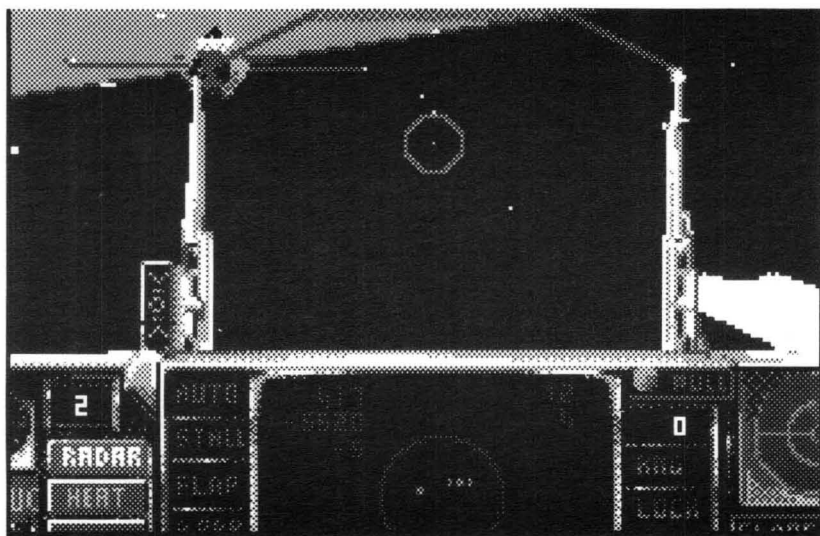
Consult the Personnel/Communications Manual for detailed instructions for setting up two person play for Flight of the Intruder.

Single Player: This is the default. It means you are playing against the machine alone.

U.S. Host: This is the default when you are playing with or against another player. The player with the fastest machine (which will be doing most of the work) should select this line. The host machine is always flying a U.S. plane.

Terminal: The player with the slower machine should select this option. When he makes this selection, he will be presented with the U.S. Host's callsign. Using  and  the Terminal player can cycle through all the American callsigns and pick a section to lead on the same mission. You should divide up the planes in the mission ahead of time, so that one of you does not jump to a plane controlled by the other player!

If you do not choose an American callsign, you can cycle through Bandit 1, Bandit 2, etc. and pick a North Vietnamese plane to fly. From the outside your plane will look like a MiG, though, of course, the cockpit and handling characteristics will be those of an F-4 Phantom.



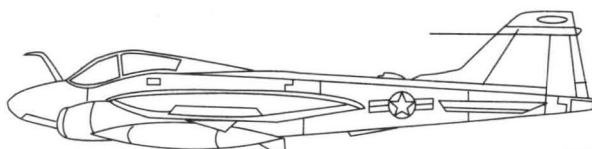
AIRCRAFT SPECIFICATIONS

The A-6 Intruder

The A-1 SkyRaider and A-4 SkyHawk were very successful attack aircraft, but even before it had to deal with the storm-tossed seas and cloudy skies of Vietnam, the United States Navy realized that it needed a heavy carrier-based bomber that would carry a bigger bomb load and be able to make blind passes at a target in any weather and at any time.



The Grumman A-6 Intruder first flew in April 1960. The airframe was so successful that it was adapted to the

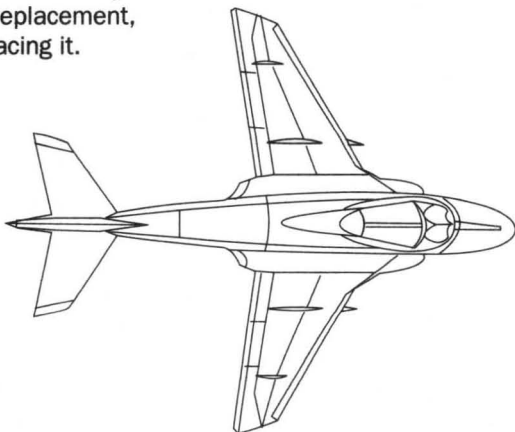


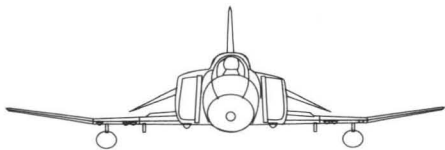
KA-6D aerial tanker and the EA-6B Prowler electronic warfare plane.

Initially, the electronics suite of the Intruder was too fragile for its mission. The plane spent most of its time in maintenance. However, the then new science of microelectronics in the 1960s led to a complete replacement of its original avionics into a much smaller and more efficient setup capable of sustained missions.

The A-6A was the first operational version of the Intruder. It was followed by the A-6B (a Shrike-carrying SAM suppression craft) and A-6C (specially configured to interdict the Ho Chi Minh trail) as well as the aforementioned tanker. In this simulation you fly the A-6A, which was replaced in service by the A-6E right after Linebacker in 1972. The A-6E is still in operation with and being built for the United States Navy and Marine Corps, though its replacement, the A-6E TRAM is steadily replacing it. Current versions can carry the Harpoon anti-ship missile.

The Intruder is just barely subsonic; its builders concentrated on a plane capable of flying low and and bombing accurately. They got it.





F-4 Phantom II

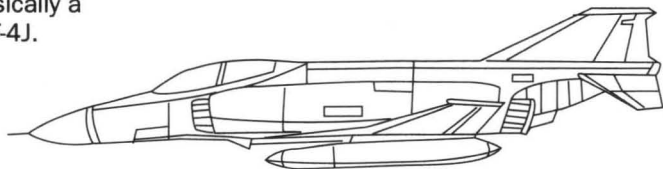
The F-4 Phantom was a long-ranged fighter capable of bursts of speed over Mach 2. Though not an agile aircraft, in the hands of a

good pilot it could, and did, give a good account of itself against the far more agile MiGs employed by the North Vietnamese. It was used by both the U.S. Air Force and the U.S. Navy in the Vietnamese war. The basic Navy fighter was the F-4B and then the F-4J. The basic Air Force fighter was the F-4C and the F-4D, and later the gun-armed F-4E.

The Phantom you fly in this simulation is basically a version F-4B or F-4J.

This is the Navy F-4 available during the Linebacker

campaign. However, there are some modifications similar to those for the Air Force F-4E, also present during Linebacker. For instance, an M61 20mm cannon and self-aiming Paveway smart bombs have been fitted.

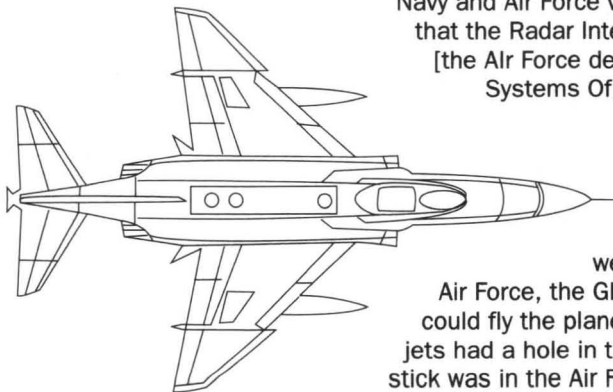


One interesting difference between the Navy and Air Force versions of the F-4 is that the Radar Intercept Officer (RIO), [the Air Force designation is Weapon Systems Officer (WSO or WIZZO)]

also called the GIB (Guy In Back), in the Navy plane was a dedicated radar watcher and

weapon shooter. In the

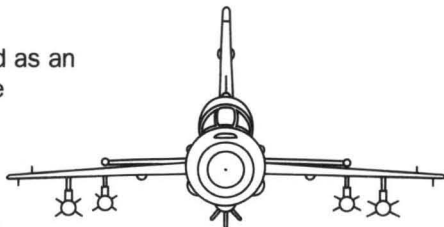
Air Force, the GIB had a stick and could fly the plane in a pinch. The Navy jets had a hole in the deck where the stick was in the Air Force plane.



The Phantoms had a long career as the principal fighter of the U.S. Navy, though they have now been phased out in favor of the F-15 Tomcat and F/A-18 Hornet. Some Marine reconnaissance units still use the RF-4B recce fighter, but most of these have been retired. There are still many Phantoms in use by various foreign air forces.

MiG-21

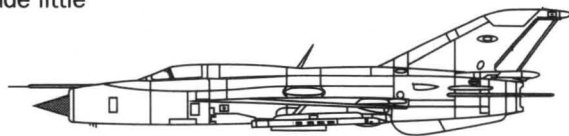
The MiG-21 was originally developed as an interceptor to meet the threat of the American B-47 and B-52. It was the first Soviet Mach 2 fighter. The first of the Soviet fighters to use a delta wing instead of the swept wing of the MiG-17 and 19, it was a durable fighter that is still used in various configurations in many airforces today.



The design requirements called for a small fighter (actually smaller than the MiG-19), and this caused a reduction in endurance as the plane just had no room for large internal fuel tanks. The first operational design, the MiG-21F, was found to be deficient in radar efficiency. To accommodate a larger radar system, the designers had to relinquish the initially-required aircraft cannon.

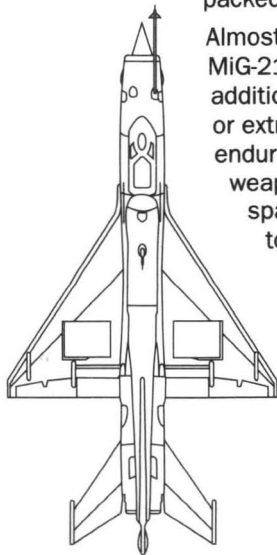
The MiG-21PF was sent to North Vietnam and met its first real operational test. They rapidly discovered that it suffered from a deficiency in armament. The radar made little difference.

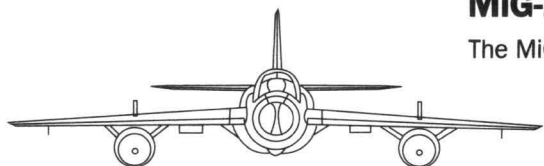
Its total offensive weaponry consisted of four air-to-air missiles of dubious utility. Once



they were fired, the plane was useless. In many ways, the MiG-17, despite its relative antiquity, was more successful in its basic mission of stopping bomber raids because it had greater endurance and packed a couple of rapid-fire cannon.

Almost immediately, the Soviets began a remake of the MiG-21 which was designated the MiG-21PFMA. The major additions were two extra pylons that could carry missiles or extra fuel tanks (thus increasing either firepower or endurance), and an internal gun, a 23mm two-barrelled weapon that takes up an amazingly small amount of space. Unfortunately, its lack of barrel length seemed to reduce its range and accuracy. The additional missile carrying capacity and gun increased the MiG-21's kill ratio, but not by a significant amount. This was the fighter used in North Vietnam (along with its retrofitted relatives) from 1968 through the rest of the war.

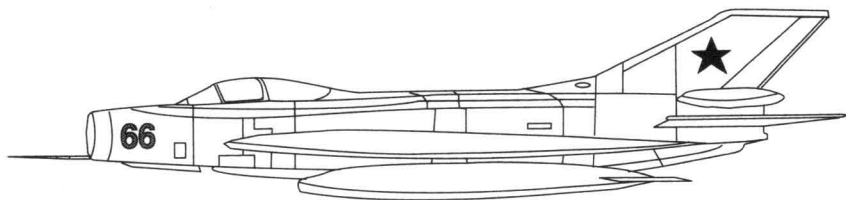




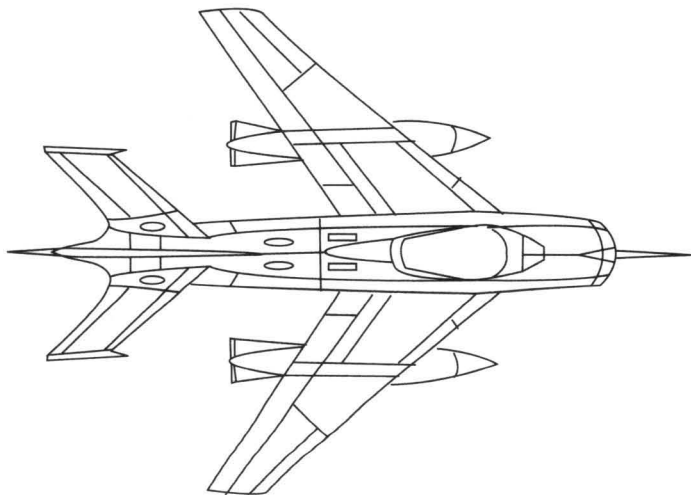
MiG-19

The MiG-19 was developed to provide a truly supersonic fighter for the Soviet air force. It became the first such fighter in the world.

It was equipped with missiles and a limited-performance radar and was among the last fighters given to the People's Republic of China before their split with the Soviet Union in 1960. The Chinese reverse-engineered the fighter into their highly successful Shenyang J-6, which they have imported in one form or another all over the world.

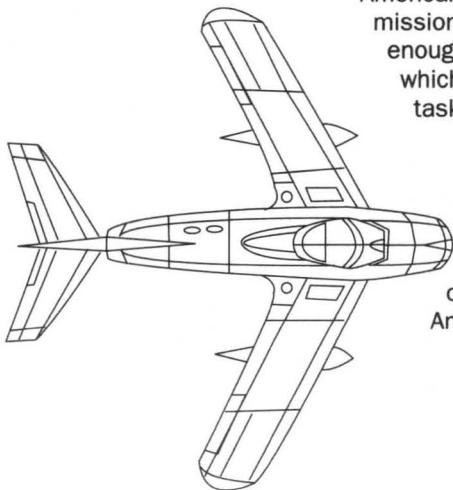
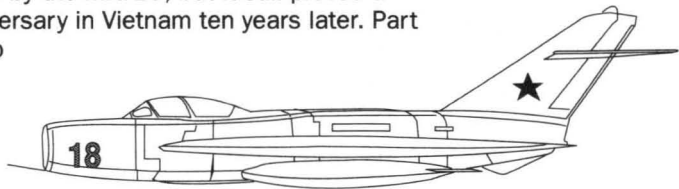


The MiG-19 in North Vietnam was no more maneuverable than its predecessor and its radar gave it away, so it was little improvement over the MiG-17 in the air against the American forces.



MiG-17

Production of the MiG-17 was authorized in mid-1951. It was a modification of the MiG-15 that gave many United Nations pilots fits in Korea. By 1960 it was considered obsolete and was being replaced in the Soviet air force by the MiG-19, but it still proved a dangerous adversary in Vietnam ten years later. Part of its danger to opposing aircraft was in its obsolescence. Its minimal radar (completely missing in many of the North Vietnam fighters) meant that it did not show up on RWR, and its maneuverability let it turn inside of any American fighter in the sky. Since all it had to do was force American bombers to abort their bombing missions, its very presence was sometimes enough to complete its primary mission, which means it was very successful in its task.



The MiG-17 also has the distinction of being the first missile-armed Russian fighter. This was the favorite aircraft of the notorious “Colonel Toon,” who was credited with shooting down 13 American planes.

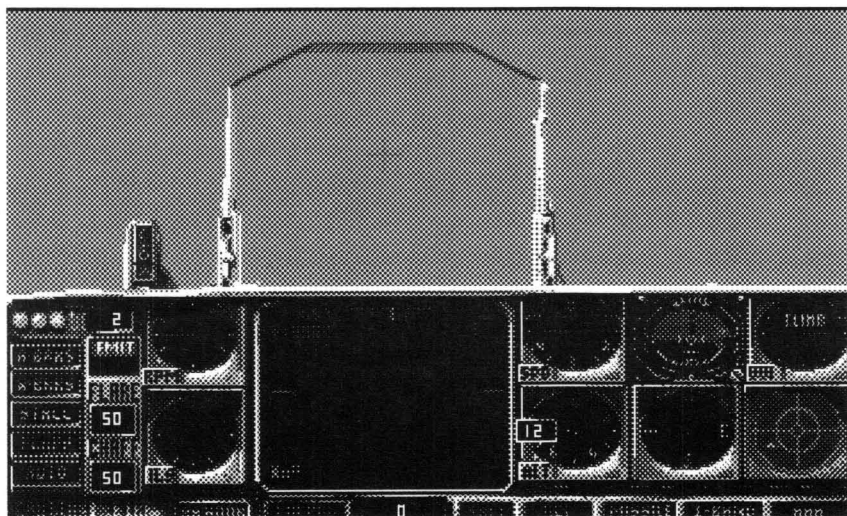
SUMMARY COMPARISONS

	<u>Intruder</u>	<u>Phantom</u>	<u>MiG-21</u>	<u>MiG-19</u>	<u>MiG-17</u>
Max Speed (mph)	644	1,500	1,385	902	710
Max Ceiling (feet)	42,400	55,000	60,000	58,725	52,500
Full Weight (lb)	60,400	58,000	20,725	19,180	14,440
Max Ordnance (lb)	18,000	16,000	3,307	2,200	1,650

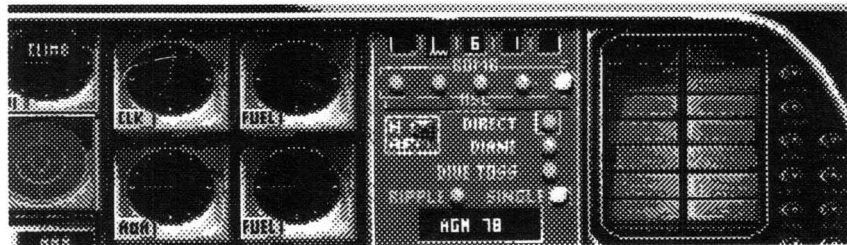
COCKPITS

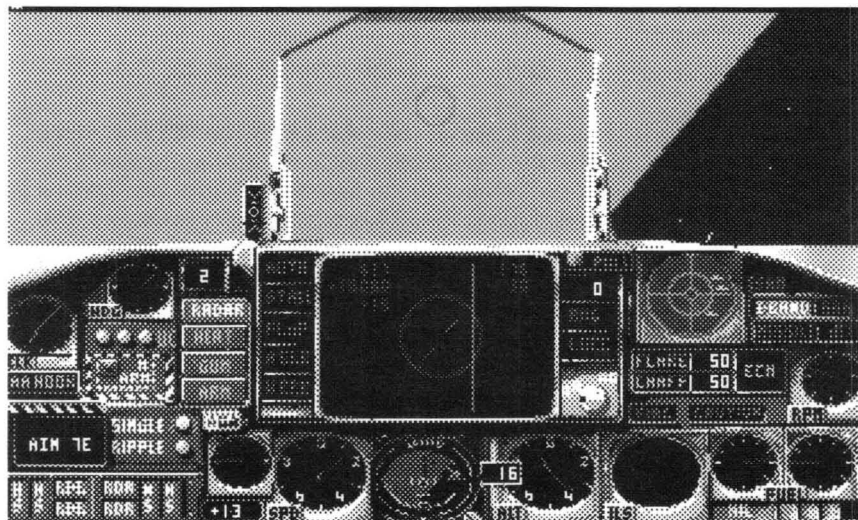
The following is a description of the instruments found in the Intruder and the Phantom. As you might expect, the two aircraft have many instruments in common. In particular, you will find that the important flight instruments are arranged in the traditional "T" on both aircraft. This makes it easier to change from one aircraft type to the other. Nonetheless, you should be aware that there are important differences between the two aircraft types, and it's a good idea to take the time to familiarize yourself with them.

In real life, both the Intruder and the Phantom rely on a crew of two. In the Intruder the crew sit side by side, while in the Phantom the RIO sits behind the pilot. In one of our few departures from reality, we have designed this simulation so that the aircraft can be flown by one person. We have attempted to do this while still maintaining as realistic a cockpit as possible.

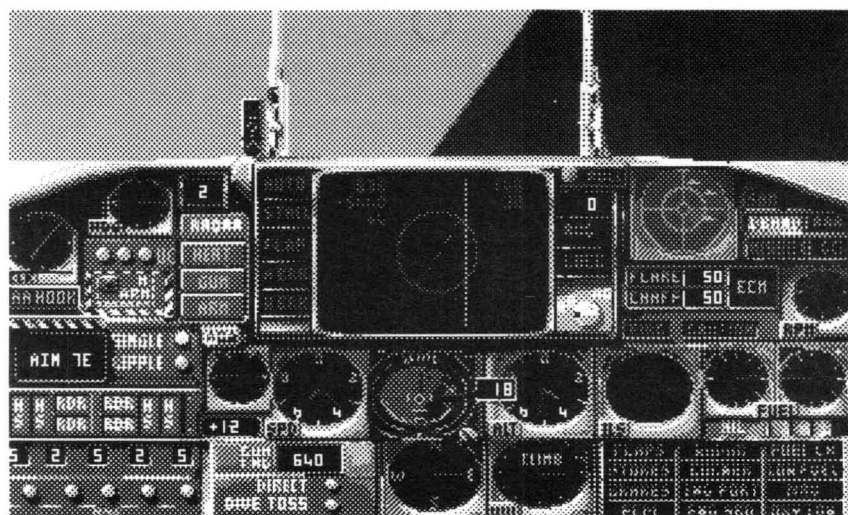


Intruder: As the pilot you sit on the left side of the cockpit. On your front view you can see the flight instrumentation. On your left 45 degree view, you look over the side of the aircraft. On your right 45 degree view, you look into the B/N's side of the cockpit at the stores and warning lights.





Phantom: The front view displays the flight instrumentation. Both the left and right 45 degree views can be used to look over the side of the aircraft. Stores and warning lights are available on a lookdown front view. This arrangement reflects the narrow but high front panel fitted onto the Phantom. The look down at the instruments view should be selected only for brief periods. You should have your head up and looking out of the cockpit 90% of the time. Your instruments are not trying to kill you, but lots of unfriendly objects outside the plane are.

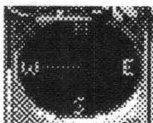


Instruments In Common

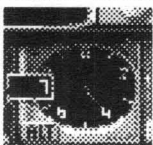
The following descriptions apply to both the Intruder and the Phantom:



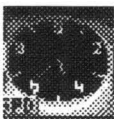
Attitude Director Indicator (ADI) The ADI (sometimes called the “level ball”) helps register your plane’s position relative to the horizon as it rolls and pitches in any direction. The ADI is of vital importance in a dive because you use it to get your dive angle. Remember for manual dive bombing everything must be right: dive angle, speed and height. See table below.



Compass The compass shows your aircraft magnetic directional heading. For the purposes of this simulation, you can assume the compass has no problems with deviation and variation.



Altimeter The altimeter’s small needle rotates 360 degrees for every 1,000 foot change in altitude. The large needle rotates 360 degrees for every 100 foot change in altitude. The digits display the altitude in 1,000’s of feet.



Airspeed Indicator (ASI) The ASI consists of a dial calibrated in knots TAS (see Glossary). The zero position is at 12 o’clock. One revolution represents 1,200 KTS on the F-4 and 600 KTS on the A-6.



Vertical Velocity Indicator (VVI) This dial measures climb and descent rate in 1,000s of feet per minute. The zero position is at 9 o’clock. Climb is represented by a clockwise movement of the needle. Three o’clock represents 6,000 ft/min.



Angle of Attack Indicator (AOA) Measures angle of attack in degrees. The zero position is at 9 o’clock, 30 degrees at 12 o’clock. Increased AOA is represented by an counter-clockwise movement.



Fuel When the tank is full (16,000 lb. of fuel) the needle points to 6 o’clock. The needle moves counter-clockwise as fuel is depleted, to the zero position at 9 o’clock.



Clock Standard analog 24 hour display (“military time”).



Tachometer Measures the engine RPMs in percentages of the maximum: 0% at 12 o'clock and 100% at 9 o'clock.

Threat Indicator and Panel

The Threat Indicator Panel lets you know about enemy activity through warning lights.



Empty diamond
Filled Diamond
Filled Red Box
Empty Red Box
Grey Hat

Friendly Aircraft
MiG
Missile Radar
AAA radar
Ship

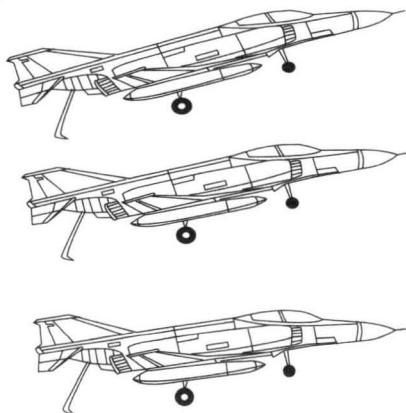


Missile Light flashing
Missile Light constant
AAA
I-Band
GCI

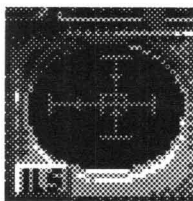
SAM site engaging
SAM on the way
AAA radar detected
MiG radar detected
NV Intercept Station detected



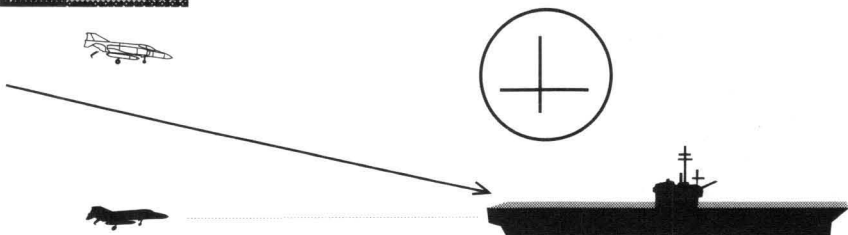
Angle of Attack (AOA) Indexer The AOA Indexer is used primarily to assist in landing the plane. As the following illustration shows, the plane needs to approach the runway at the right angle and speed when landing.



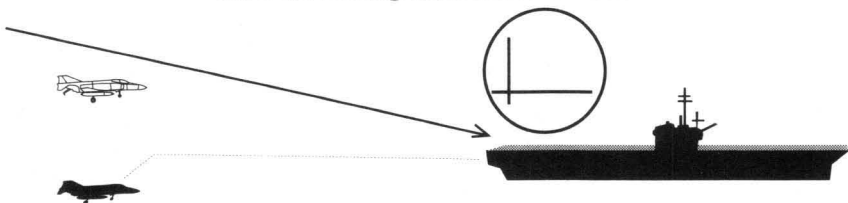
If the top light is on, it means that the approach is too slow. If the bottom light is on, it means that the approach is too fast. The middle light on means that the approach is ideal.



Aircraft Landing System (ACLS) Indicator The ACLS Indicator assists you when making an instrument landing (called “following the needle”). The ACLS has two principal components: the Glide Slope Deviation (GSD) scale, and the Localizer Deviation (LD) scale.

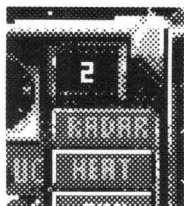


The GSD scale indicates the extent to which you are above or below the “landing beam” (an imaginary beam projected from the flight deck) The higher you are above the beam, the lower the GSD scale. The scale is centered when the landing approach is correct.

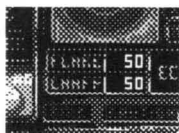


The LD scale indicates the extent to which you are to the left or right of the runway. If you are left of the flight deck, the LD scale will be to the right of center, and vice versa. The scale is centered when the landing approach is correct.

Note that you need to control two additional parameters for a perfect landing: Angle of Attack and Heading. These are discussed above.



Sensitivity Indicator Indicates the degree of sensitivity of your aircraft to turning, diving and climbing. Sensitivity varies from a low of 0 to a high of 3. At setting of 1, the plane is less sensitive to directional changes, and is easier to control. At a setting of 3, the turn, dive and climb characteristics of the simulation is virtually identical to those of actual aircraft. (The most realistic setting is a sensitivity of 3 while flying at the rank of Captain). The default sensitivity is 2.



Chaff and Flare Indicators Chaff are packages of tiny foil strips designed to confuse radar-guided missiles. The Chaff Indicator shows how much chaff you have remaining on your plane. Each plane starts off with 50 packages of chaff. You can turn Limited Chaff off (see Options menu, above) for an easier game.

Flares are designed to confuse heat-seeking missiles by providing extraneous sources of heat for them to follow. The Flare Indicator shows how many flares you have remaining on the plane. Each plane starts off with 50 flares. You can turn Limited Flares off (see Options menu, above) for an easier game.

Lights — Phantom

In most cases, the lights shown below indicate that the particular system is in operation.

Automatic Pilot Light

Stall Warning

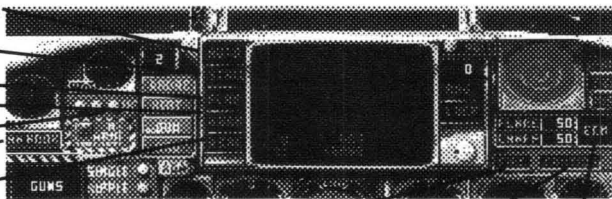
Flaps

Air Brakes

Landing Gear

Hook Down

Wheel Brake

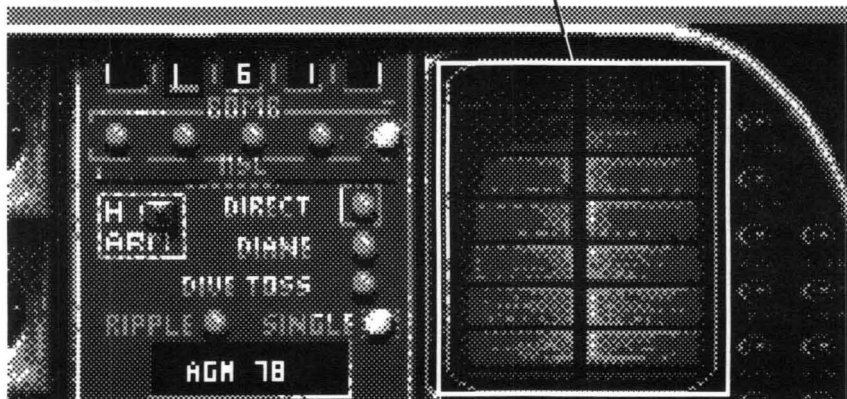


FIRE MASTER CAUTION ECM

Warning Lights — Intruder Only

Warning Light Panel

A highlighted word in one of these panels indicates something is wrong.



1. Flaps

The wing flaps have been damaged and are frozen in their present state. For example, if they were up when the damage occurred, they stay up. Because flaps help curb excessive speed, the plane may be much harder to land. On the other hand, if the flaps were down when they were damaged, they stay down. This hampers the plane's maneuverability and prevents it from reaching top speed. To attain a needed speed takes more thrust, and therefore uses more fuel.

2. Stores

Weapons cannot be released from external stores.

3. Brakes

The Brakes light indicates a failure in the airbrake system. If the airbrakes were open when the damage occurred, they stay open. This is similar to Flaps damage (see above) and seriously threatens your planes maneuverability, forcing it to fly at reduced airspeed. If the airbrakes were closed when the damage occurred, they stay closed, making the plane harder to land in some situations.

4. ECM

The threat indicator is out and ECM (Electronic Counter-Measures) is unavailable. You will have to rely on visual sightings and messages from friendly forces.

5. Radar

The radar display is inoperable.

6. DIANE

The DIANE display is inoperable.

7. Engine Port

Partial or complete loss of power in the port engine.

8. Engine Strbd

Partial or complete loss of power in the starboard engine.

9. Fuel Leak

You will have to judge how serious this is. Do you have to turn back immediately?

10. Low Fuel

When this light comes on, you have a full scale emergency. You need first clearance onto a green deck.

11. Nav

The map display is not functioning.

12. Oxy Low

Indicates a drop in cabin pressure, usually caused by a bullet hole. Don't fly above 27,000 feet or you will black out, even when flying straight and level.

Phantom Only**Warning Light panel**

Refer to the Warning Light Panel diagram for the Intruder, above. The Phantom F-4 panel is identical to that of the Intruder except for the Afterburner light in place of the DIANE light. The Afterburner light comes on when you can no longer select the afterburner.

The following displays are unique to the Phantom

Optical sight

When shooting guns or rockets, fill this circle with the target and pull the trigger.

Pull Up Light

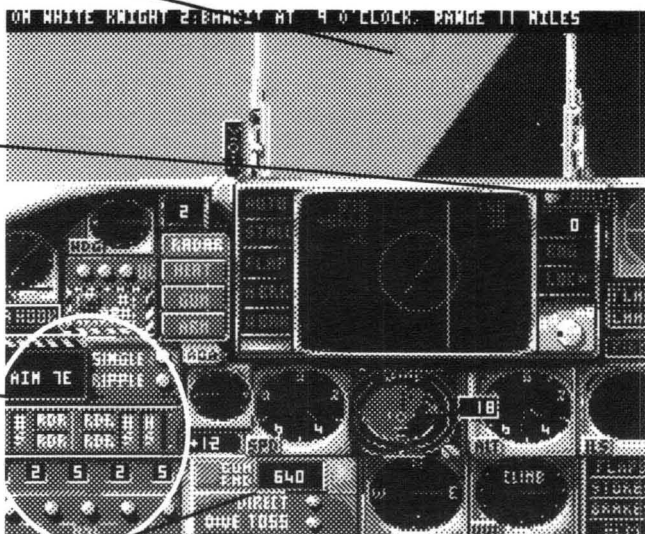
This is a warning light that tells you when you are about to hit the ground.

Multiple Weapons Control Panel

This shows you what weapons you are currently using.

Rounds remaining

This shows how many rounds you have left to fire from your gun.



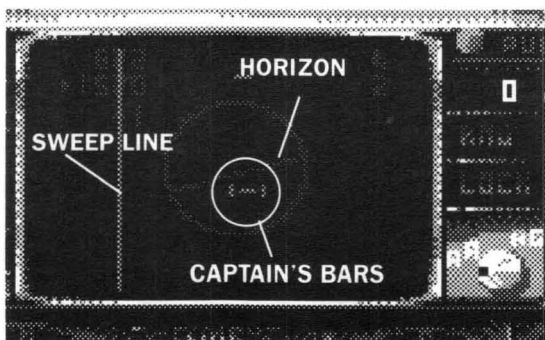
THE PHANTOM RADAR SCREEN

The F-4 in this simulation has a radar screen that very closely simulates the radar used by Phantoms over Vietnam.

The radar has two modes, an air-to-air mode that is shown to the right and an air-to-ground mode that is essentially a green screen with TV-like images.

In the air-to-air mode, we see a sweep line that updates the picture as it passes, a cone that changes size when a target is within Sparrow range, and a horizon line that lets you know where you are in relation to the world.

When the radar has locked onto a target, "captain's bars" show up around the radar image of the target, as shown in the image here.



CARRIER LANDING

Landing on an aircraft carrier is a difficult task at best. It requires alertness and concentration — just the thing at the end of a trying mission.

Some say it doesn't matter where the bombs go, but you'd better get the landing right. Everybody is watching and you get marked.

In this simulation, you get real marks for each manual landing. (There is no mark for taking the easy way out and using End Mission from the FILE Menu or the autopilot to land the plane.) If you land the plane manually and go to the Debriefing screen, you get one of three marks:

Green	OK	Speed and orientation good on touchdown
Black	No comment	Speed and orientation not dangerous
Red	Dangerous	Hook or gear up on touchdown

If you are having a bad day or if your aircraft is damaged, call for the net (**Shift** **H** for Help). This is a barrier erected over the wires to stop an aircraft which cannot hook an arrestor wire.

If you go for the net, you do not get a landing mark.

Instrumentation to Help with Landing

Meatball

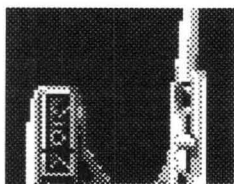
This is a column on the port (left) side of the carrier with two fixed horizontal green lights and one movable vertical yellow light. If the yellow light is in line with the green lights, then you are on the glide slope and you are descending at the required pitch of 3°.

If the yellow light is above the green ones, then you are above the glide slope.

If the yellow light is below the green ones, then you are below the glide slope.



Indexer



This is a column on the left of the aircraft optical sight. There are three lights: a downward arrow at the top, a circle in the middle, and an upward arrow at the bottom. The circle is illuminated if your approach speed is correct.

F-4 156 kts

A-6 118 kts



If the top light is illuminated, then you are going too slow. If both the top and center lights are on, then your approach speed is a little too slow. This means that your angle of attack (closely related to speed) is out by half a unit.

The bottom light indicates that speed is too high.

Digital Readout

On the top left of the radar, the following readings are available:

Speed in knots

Vertical speed in feet/min

Pitch of flight path in degrees



On the top right of the radar screen, the following readings are available:

Bearing to next waypoint in degrees and range to waypoint in nautical miles. The range is rounded down, and when the figure goes from two to one, you know that the range has just dropped below two miles.



On autopilot the waypoints are automatically updated. On manual whenever you pass a waypoint, select the next one using the  key.

Practice Landings

Select CAG Briefing and load the target TESTLAND. This is a shortened mission which takes you away from the carrier and then brings you back to do the required circuit before automatically landing.

- First, play this mission through on automatic to see the circuit. Put the aircraft on accelerated mode until it is heading back towards the carrier. (You should see the carrier at about 8 miles.) The aircraft will fly over the carrier, drop the landing gear and break left.
- A course of 270 is then achieved, and the carrier should be seen on the left.
- When the starboard escort frigate is just still visible in the left side view, the flaps are lowered and the aircraft turns again toward the carrier.
- When the aircraft has lined up the approach, the hook is lowered.

- During the final approach on automatic, note the ACLS, the meatball, etc.
- Stay in the outside view (F5) for the landing and you should see the arrestor wire engage.
- Now try a manual landing. You can turn to manual at any part of a circuit.
- Initially, it is a good idea to just practice the final approach.
- You will need a combination of stick and RPM adjustments to:

Keep the meatball's lights in line.

Keep the ACLS lines centered into a perfect cross.

Keep the speed correct (118 for A-6 and 154 for F-4).

Keep the pitch correct.

- If the meatball lights are in line and your pitch is 3° (as shown on the AOA Indexer or the radar screen), then you are in good shape.

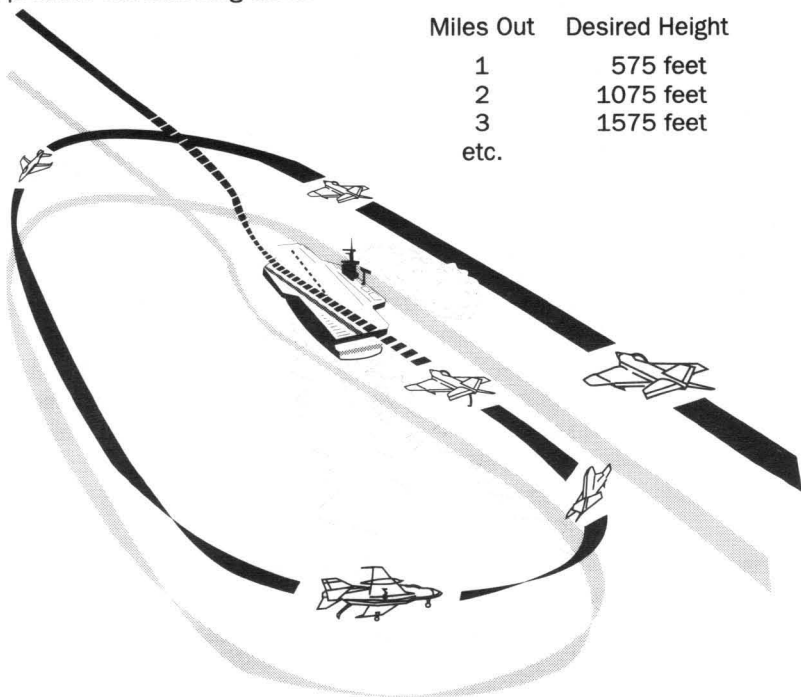
Some Useful Data

In the A-6 the landing speed is 118 kts. The carrier is moving at 40 kts (on a good day) so the relative speed is 78 kts.

To achieve 118 kts, power down to 80% RPM and use airbrakes. When the desired speed is obtained, put the RPM back up to 88%. On the RPM dial, 80% is at the 6 o'clock position.

The VSI (Vertical Speed Indicator) should be 650 ft/min. From this data we can produce the following table:

Miles Out	Desired Height
1	575 feet
2	1075 feet
3	1575 feet
etc.	



FLYING AND FIGHTING

Strike Mission Tactics

Intruder Missions

The Intruder is an all-weather low-level bomber, so most of its deployment was in system drops at night and/or in filthy weather. Many of its drops were at low level (500 ft) at about 500 kts and consisted entirely of following the DIANE steering instructions.

There would usually just be a section of one or two aircraft with no covering fighters (who couldn't operate well in those conditions, anyway). These were not flown to Hanoi or the Haiphong docks but usually to Vinh or some isolated target.

If the target could actually be acquired visually, the Intruders would dive bomb in pairs.

Alpha Strike

If an Alpha Strike is called, all flyable aircraft on the carrier go to divide the enemy's fire power. These are usually day strikes, and everything is dropped in 60 seconds. All attackers dive bomb: the lead rolls, then everybody follows at two-second intervals so everybody is slightly offset.

Dive Bombing

The secret of dive bombing success is all in where you put the cross hairs or, in the case of the Phantom, the gun circle.

On the Intruder, the center is $1\frac{1}{2}$ mils diameter. The lines are $1\frac{1}{2}$ mils wide. A mil is 1 foot in 1,000 feet. So, as a rule of thumb on a 45 degree dive at 6,000 feet, you can see a ten foot diameter circle on the ground. Using this technique, you should be able to get a bomb close enough to almost any target.

Stephen Coonts' Technique:

Roll out at 15,000 feet.

40 degree dive — look at gyro.

Pickle at 6,000 feet — 500 KTS.

The aircraft datum line (ADL) indicates direction of travel. There is no instrument to show it. Optical displacement for the bomb sight would be 115 mils from the ADL.

Coming out of roll, wings level, point at the target with the ADL. Make correction for wind — no jinking from now on. Need 1g flight on release. Cross hairs track towards the target. Cross hairs on target on release — except for wind correction.

OFFICER TRAINING FOR MODERN JET AIRCRAFT

This is a section on how to fly your jets and, most important, maneuver them in air combat. But first, let's deal with some of the basics of jet flying.

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 black-out 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 just as dangerous as a blackout.

The typical fighter of the Vietnam era could only tolerate a maximum of 7g's. Even 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 carrying any external stores.

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) pull the plane into a higher angle of climb. Turns made with less than the required g's cause the plane to drop.

The Flight Performance Envelope

The ability to pull g's is dependent upon a plane's flight performance envelope. Simply put, this is a measure of how many g's the plane can pull going at what speed and what altitude. In general, the faster a plane is going, the higher he has to be to pull a high-g turn. However, the plane also needs atmospheric density for its control surfaces to "bite" into, so after a certain height (different for each plane), you simply cannot turn it tight enough to pull high g's. Flying beyond the envelope (chasing too many demons too far) can result in a stall or total loss of control of your plane.

Pulling 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.



Keep 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. Flying too slow results in lower g capabilities. Pulling g's can force your 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.

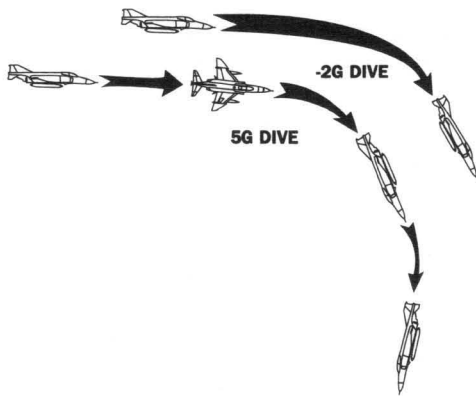
As with everything else in the world, there is a happy medium. Most dog-fights occur between 500 and 700 knots. This is the optimum speed for high g maneuvers as well as maintaining a high energy state.

When you maneuver sharply in the upper ranks of the program, expect 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.

Avoiding Negative G's

You are 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 gravity to go into a faster dive.



And So To Fight

And now that you know the basics of combat piloting, let's go on to some of the basics of plane-to-plane combat.

AIR COMBAT MANEUVERS

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

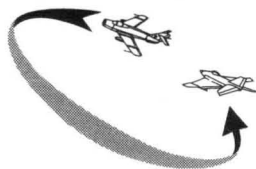
We agree with the Red Baron that a good pilot is more important than any plane. Although if he had lived to see the agility of modern-day jet fighters, he might have changed his tune about the simplicity of air combat. Being aggressive isn't the only prerequisite to success in dogfight battle today. 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.

For example, a plane's ability to pull 7–9 g's in a matter of three seconds enables it to turn in an incredibly tight arc. However, as you will learn, that same capability will cause most pilots to blackout in the process. 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.

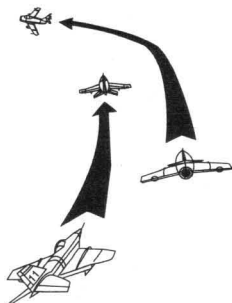
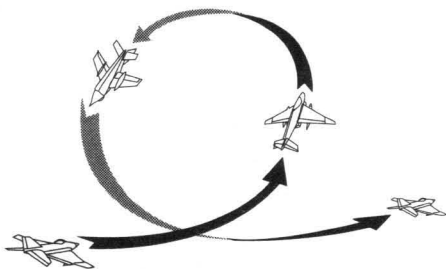
Engage

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.



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. Use this maneuver whenever you get a warning that you have a bandit or SAM "on your six."



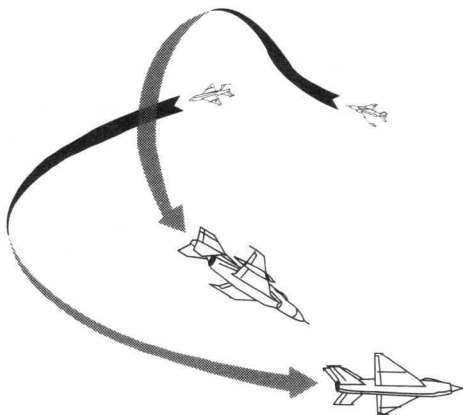
Vertical Loop

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.

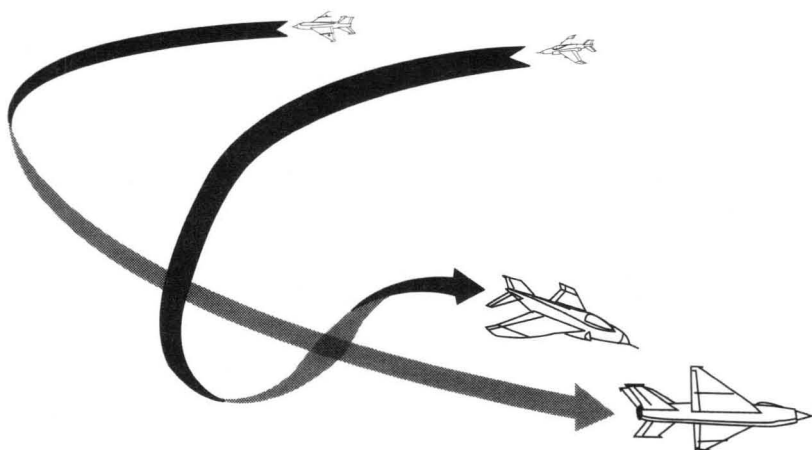
High G Yo-Yo

The High G Yo-Yo 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. 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 Yo-Yo 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.

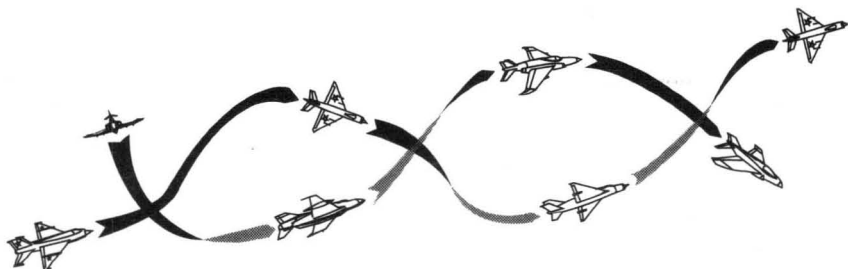


Flip Yo-Yo

This is a slight variation of the Low G Yo-Yo. 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 Yo-Yo. Take care to not overshoot the other plane due to excessive speed buildup.

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 criss-



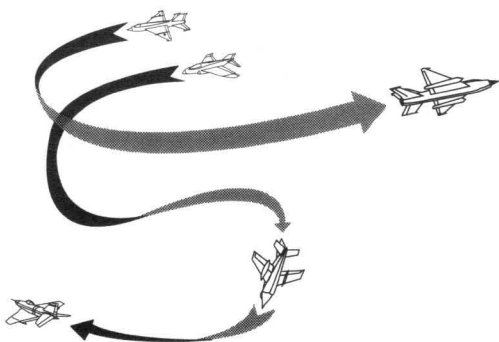
cross the other's path as each tries to gain the advantage. Your F-4 has an inherent disadvantage versus a MiG in this maneuver because the MiG has much better turning characteristics, but a skilled Phantom pilot can succeed with this maneuver versus Easy Targets (or versus Hard Targets if you are very 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

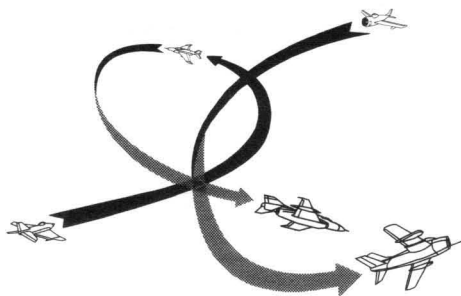
This move is a variation of the Scissors maneuver. Rather than simply making rolling reversals in a relatively flat trajectory, both fighters also climb and dive while reversing in and out of each other's flight path. This maneuver is very unlikely to end up in a stalemate because of the numerous changes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

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?).



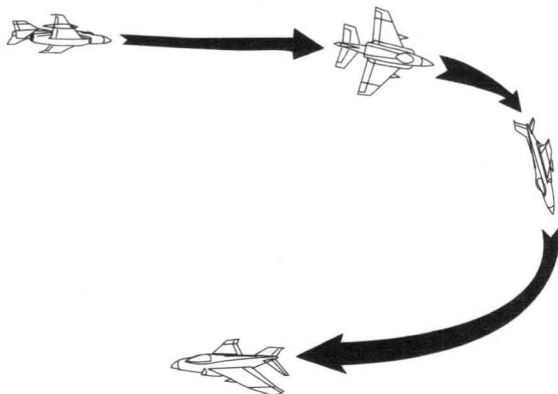
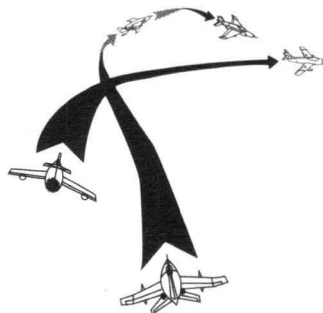
Head On



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 Yo-Yo 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.



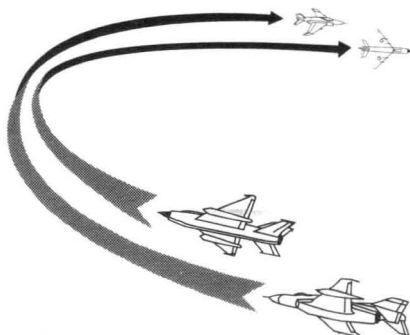
Dive Loop

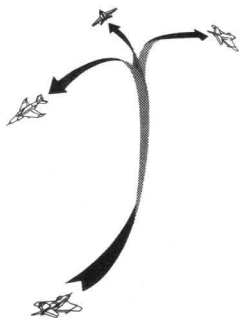
The Dive Loop is a good maneuver to perform when you are being trailed by a pursuer that is still a relatively long distance away. As is the case in some of the other maneuvers, you have a more efficient turn because of the vertical emphasis. Plus, it's more difficult for your

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.





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. A hard vertical climb is followed by a roll into whatever direction you wish to go at the top of the climb. Your Phantom is not a good jet for performing this classic move dating from the First World War; avoid using it except in the most exceptional circumstances.

Suicide Prevention

There are a few things you can do if you are determined to commit suicide in the skies above North Vietnam.



1. Attack a target twice in one mission; once you have been over a target, the gunners are ready for you.
2. Run away from a missile at full afterburner; your exhausts make a wonderful target for a heat-seeking missile.
3. Approach a target slow and low; the AAA has lots of time to track you.
4. Try to out-turn a MiG; they turn much tighter than you do.
5. Try to outrun a SAM on the straightaway; they go much faster in a straight line than you do.

FUEL MANAGEMENT

Fuel management is an important element of this simulation. If you arrive at a target too early (by flying too fast and using too much fuel), you will have to leave the scene of the action earlier to get back safely. This might mean leaving others unprotected or the operation incomplete. On the other hand, if you have the MiG CAP role and arrive late, you may find that the aircraft you were supposed to protect has already been shot down.

During the conflict, the fleet that was assigned the job of attacking North Vietnam was stationed at Yankee Station. There was no precise location for Yankee Station. Generally speaking, however, it had to be far enough off the coast to minimize the chance of attack from land-based forces, yet close enough to allow the attack aircraft to reach their target and return. In this simulation we have moved Yankee Station so that it is close to the North Vietnam coastline. This is to minimize the flight time to target.

Fuel management was an important part of mission planning, and it would weaken the simulation if we ignored that fact. So to counter the fact that Yankee Station is closer than it should be, we have excluded the option of refuelling. At first sight this might be considered to be a disadvantage, but consider how tedious refuelling would be if it had to be done twice every mission. Nobody likes to stop to fill up with gas!

If the climb requires 2,000 lb and the minimum trap is 3,000 lb, there is enough fuel to cruise for about one hour. Say a round trip of 400 nm. Now Yankee Station is at 107 degrees, 30 mins E Longitude and 19 degrees 30 mins N Latitude, so there is not enough internal fuel to get to Yen Bai. There is certainly enough for Thanh Hoa. There is barely enough for Hanoi.

You can start with unlimited fuel on the OPTIONS Menu so that fuel consumption doesn't bother you while you are thinking of everything else. You can get a taste for fuel management by selecting half fuel consumption. The real test is to complete a mission at regular fuel consumption and bring the bird back in one piece.

USING THE RADIO

Multiple aircraft friendly missions make messages very important. Messages appear as screen readouts on the top line of the screen. Messages are an important part of the game. The pilot receives messages from other aircraft and from his Bomardier/Navigator. You can tell where a message comes from by its color.

- BLUE** Chatter from other aircraft and picket ships.
- WHITE** A message directed to your aircraft.
- GREEN** A message from your Bomardier/Navigator (BN) or RIO. In CGA mode this message is colored **RED**.

An urgent message goes to the top of the queue, but it does not clear the queue.

Messages are not sent indiscriminately. For instance the sighting of a MiG is reported to MiGCAP leader. If MiGCAP leader is on auto, then the message triggers a response, e.g. engage or send out another section.

Messages have four main purposes:

- To signal position of enemy
- To request assistance
- To warn (eg. SAM or Bandit sighted)
- To give information about progress of operation

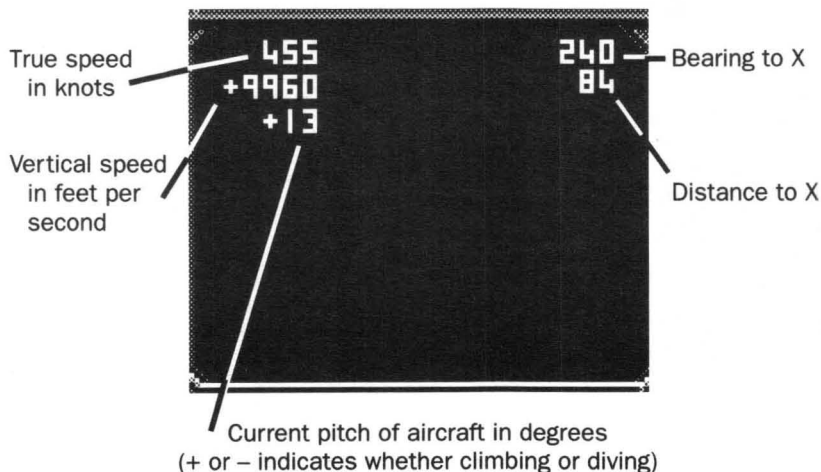
Note that each aircraft has a callsign. At the start of a mission, look at all the aircraft involved using the Outside View **F5** and you will see their callsign. Remember this or make a note, and you'll have a good idea of who is calling and how much it applies to you.



ARMAMENT

Radar-Guided Weapons

Many of the weapons available to you are radar-guided in some way. Others let you use your radar as an assist in locating the target. Unless indicated in a following weapon description, the radar screens on both aircraft will have a constant radar readout of five numbers — three on the upper left of the screen and two on the upper right. In all cases, these numbers mean:



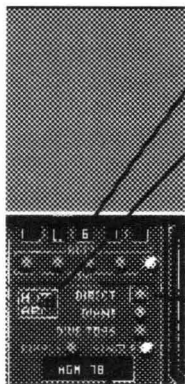
X is either your next waypoint or a target if the LOCK light is on.

WEAPON SELECTION PANELS

Selecting the weapon you want is done on a Weapon Selection Panel. This is different for each aircraft.

Intruder Multiple Weapon Selection Panel

The Intruder's Weapon Selection Panel is positioned on the right forward 45° view. Press **[7]**.



Weapons On Station: set of 5 numbers. These indicate the number of weapons on each station.

Master Arm Light: Toggled with **[Home]**. Must be on before weapons can be released.

Active Station: By pressing **[Backspace]**, the active station can be changed. The active station is indicated by activating the light below the weapons on the station number.

Direct/DIANE/Dive Toss: This option is toggled using the **[1]** on the keypad. It is not available on all weapon modes because it determines the bombing method.

Single/Ripple: Toggle using the **[9]** on the keypad. Single means that one weapon is released on each trigger press. Ripple means that all weapons on that station are released at one second intervals on pressing the trigger. Weapons on the wing stations are released in pairs to maintain a balanced aircraft. Ripple is not available on all weapon options.

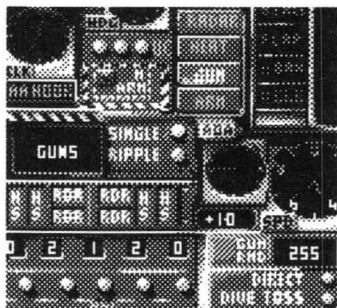
Description Panel

This displays the type of store at the selected station. Note that mixed store stations are not allowed.

Phantom Multiple Weapon Selection Panel

Positioned on the lookdown front view (press **J**). The panel is a variation of the A-6 panel. Differences account for air-to-air missiles and guns.

The weapons on station and active station panel (WOSASP) which is similar to the A-6 is situated at the bottom left of the front panel. The dive toss/direct lights are to the right, and above them the rounds remaining in the gun are displayed. Above the WOSASP we have the missiles available panel. Lights indicate the current load of air to air missiles. Above that we have the description panel and single/ripple lights side by side. The master arm light comes above the single/ripple lights. There are two more instruments/switches:

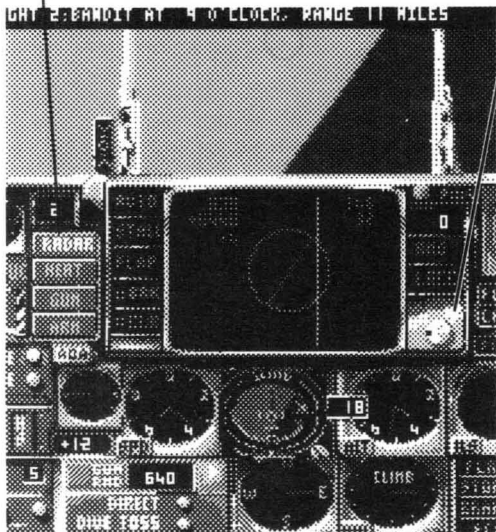


Active Weapon

To the left of the radar, there is a light panel:

Station:

Radar	Sparrow selected.
Heat	Sidewinder selected.
Gun	Gun selected.
Air	Air-to-Ground weapon selected



AA/AG switch

This is the air to air/air to ground toggle. Pressing **Backspace** changes the active AG station. If **E** is pressed, then the AA/AG switch is turned and the first AA weapon is selected. Pressing **Enter** further changes the active AA station. This station must be changed using the keyboard. The switch is on the screen for show.

Air-to-Air Weapons

It is assumed that you have selected the weapon type you want to fire. See the Multiple Weapon Selection Panel above. Remember that the following only applies to the F-4 Phantom. The A-6 Intruder carries no air-to-air weapons.

AIM-7 Sparrow

Purpose The AIM-7 sparrow is a radar-guided anti-aircraft missile for use at long range only. If you are expected to confirm your target before firing, you may be too close to use this weapon.

Maximum Range: 14 miles

Minimum Range: 2 miles

Selection Press until AIM7 comes up in the display box, the Radar light comes on, and the cone circle appears on the radar screen.

Aiming Steer to keep the blip on the radar screen within the circle. When you get the captain's bar to appear around the blip, then you have locked on. Press to release the missile. Continue to point at the bandit and the missile should lock and guide. The bandit must be illuminated by the fighter's radar (65° cone) the entire time that the missile is flying. Generally fire in pairs to improve PK. During a Sparrow kill you will have your head inside the cockpit for much of the time.

Notes The Sparrow was 12 ft long, had an 8 inch diameter and a 3 ft 4 inch fin span. It takes 4 seconds to lock on to a target and 1.5 seconds to release. It can accelerate to more than 1,200 mph in 2.5 seconds. It takes 40 seconds to cross 40 NM.

The Sparrow had a disappointing 10% kill rate in Vietnam. It was virtually useless below 8,000 ft.

High altitude range:

	Head-on	Stern
Maximum:	7-8.6 NM	3 NM
Minimum:	2 NM	1 NM

AIM-9 Sidewinder

Purpose Sidewinders are heat-seeking missiles used in air-to-air combat with a useful range of about two miles. Although hits have been recorded at seven mile range, this is not probable since a strong heat-source is required for tracking.

Selection Press Enter until AIM-9 comes up in the display box, the Heat light comes on, and the cone circle appears on the radar screen.

Aiming Follow the same general tactics as described for the Sparrow. However, you are fitted with an early version of the Sidewinder so you don't have all-aspect firing capability. Maneuver the aircraft to get on the bandit's tail. You should get a lock at a range of two miles. Because you will be close in during a Sidewinder kill, you will probably not want to have your head inside the cockpit. It is better to rely on the growl. The missile is guided by an infrared homing device mounted behind the glass nose of the weapon. When the detector is pointed at a source of infrared energy, it produces a growling tone into the pilot's headset. When you have heard this sound for a second, press Spacebar. Generally fire in pairs to improve PK (probability of kill).

Because of its infrared homing device, the missile is a fire-and-forget weapon. You do not need to stay lined up on the target after firing.

Notes Like the Sparrows, the Sidewinders had a disappointing kill ratio in Vietnam. Among their problems were an inclination to lock onto the sun if it was in their way and a penchant for losing targets against ground heat sources.

For this simulation, you can choose how effective your Sidewinders are with the OPTIONS menu.

Easy Targets	Sidewinder is an all-aspect weapon.
Medium Targets	Pilot must point at the bandit's rear quarter to get a lock on.
Hard Targets	Missile must continue to point at bandit's rear to maintain lock.

Gun and Rockets

- Purpose** The gun and rockets can be used for air-to-air and air-to-ground attacks, though the rockets are really meant for air-to-ground attacks. Rockets are further described under air-to-ground weapons.
- Selection** Since the gun is either an A-A or A-G weapon, you can press either **Enter** or **Backspace** until Guns comes up in the display box, the Gun light comes on, and the cone circle *disappears* on the radar screen.
- Aiming** Guns should only be selected when the target is in visible range. Find your target with the threat indicator and any reports you receive from Red Crown and your wingman. When it is within 800 yards, you have a chance of hitting it. You will have no instruments to help you. Just fill the screen with the Bandit and press **Spacebar**. Unless you are right on top of the bandit, be sure to aim where you think he will be, not where he is when you shoot.
- Notes** The Phantom you are flying is fitted with an M61A1 internally mounted rotary cannon. This gun, which fires at a rate of 100 rounds/second, was fitted to the Air Force's F-4E. Navy F-4J's carried the M61A1 in a gun pod if they carried any gun at all. However, we felt that if you are playing an air-to-air simulation, you should have the joy of blasting enemy aircraft with your gun. Certainly a lot of Navy pilots wished they had one.
- If you want the real feel of being a Navy pilot in an F-4J, just don't use the gun.

Air-to-Ground Weapons

Both aircraft carried the following weapons and could use them in the same way.

AGM-45A Shrike

- Purpose** The Shrike homes in on active radar, making it ideal for attacking AAA and SAM radar targeting and control centers.
- Selection** Press **[Backspace]** until AGM 45A comes up in the display box. On the F-4, the arm light comes on too.
- Aiming** When a light red blip appears on the threat indicator, it is a ground threat; in addition, the threat displays should have the missile or AAA light flashing. A click can be heard every time the number of dots on the threat indicator changes.
- Get the blip on the threat indicator to 12 o'clock. The Shrike will lock after about five seconds. When the LOCK light comes on use **[Spacebar]** to release the missile. The missile will guide itself to the target unless the radar station stops transmitting.
- Notes** Canny Vietnamese AA operators will turn off their radar if they think a Shrike has been launched at them (this happens at the "High Enemy Activity" setting on the OPTIONS Menu). A Shrike will not always destroy a site. It is good practice to follow up, while the site is quiet, with a Walleye or a ripple of iron bombs. You can even strafe with guns or rockets.

AGM-78 Standard

- Purpose** The Standard homes in on random radar and continues on its set flight path when the radar turns off.
- Selection** Press **[Backspace]** until AGM 78 comes up in the display box. On the F-4, the arm light comes on too.
- Aiming** See AGM-45A above.
- Notes** Canny Vietnamese AA operators who turned off their radars were very surprised when these smart bombs continued to glide in on their already-established path. Again, it is always a good idea to follow up with bombs, guns, or rockets.

AGM-62 Walleye

- Purpose** The Hughes Walleye is a small laser-guided missile. It can be relied on to hit its target if it is used correctly, but it is not particularly big and cannot be relied on to take out a large or hard target.
- Selection** Press [Backspace] until Walleye comes up in the display box and a camera view appears on the radar screen. On the F-4 the arm light comes on.
- Aiming** Point the aircraft in the direction of the target. You should see the target on the radar screen. This is a TV view, as the camera is located in the nose of the missile.

There are two modes of operation for the Walleye: (1) Fixed Sight and (2) Variable Sight. Toggle between the two by pressing [T].

Fixed Sight provides cross hairs on the TV screen that match wherever the cross hairs on the HUD are placed. The only exception is that the TV screen cross hair cannot be drawn above the horizon and so as you climb, the cross hair is pushed down the screen. This indicates that a shot should not be made as the solution is unreliable.

Point the aircraft at the target so that the cross hairs overlay the target. Press [Spacebar]. The locked light should come on and the figures on the screen show the range and bearing to the target. The cross hair on the screen will now move with the target. If you are not happy with the lock, press [X] to release the lock.

Variable Sight gives you HUD and TV cross hairs that do not match. The TV cross hair is locked to a point on the ground. As the aircraft moves, the cross hair moves to continue to overlay the point on the ground. The point the cross hair is locked to can be changed with the following keys.

Move Up Screen	[I]
Move Left	[J]
Move Right	[K]
Move Down Screen	[M]

Using [Shift] with these keys speeds up the motion.

When the cross hairs overlay the target, switch on the master arm ([Home]) and press [Spacebar] to release the missile.

LGB Paveway

- Purpose** The Paveway is a laser-guided bomb (LGB). It consists of a laser sensor attached to an Mk84. It is very similar to the Walleye except that it is a bomb, not a missile. It packs a greater punch but must be released over the target.
- Selection** Press Backspace until Paveway comes up in the display box and a camera view appears on the radar screen. On the F-4, the arm light comes on.
- Aiming** The aiming method is virtually identical to that used for the Walleye. It has the same two methods of aiming. Paveway packs a much bigger punch than the Walleye, but the Walleye is easier to aim. This is because the Paveway does not have any propulsion and therefore can only maneuver in a small envelope. Thus, you must dive more steeply over your target when using the Paveway. The harder the targets you select on the Options Menu, the higher the dive angle you must attain before releasing this weapon.
- Notes** While the method of shooting the Paveway is identical to the Walleye for shooting purposes, the actual method of target designation is different. When Paveway is selected, a friendly illuminates the target with laser light. The pilot must release the bomb so that it can pick up the reflected light from the target. This is called "getting the bomb down the chute" or "in the basket."
- The need to get a friendly to illuminate, or "paint" the target, is simulated in the game with the Lock light. If the Lock light is on, the illuminating plane has done its job and the bomb will guide. Bombs released without the Lock light act like the unguided weapons described later.

LAU-3A ZUNI Rockets

- Purpose** Rockets are meant to put a lot of firepower into a relatively small area at once. They can be used against personnel and lightly armed vehicles, but have no penetration against tanks.
- Selection** Rockets are considered air-to-ground weapons, so press Backspace until LAU3A comes up in the display box, the arm light comes on, and the cone circle disappears on the radar screen.
- Aiming** Rockets have an effective range of about one mile, so only select them when you have a target in visual range. For the purpose of shooting, rockets can be treated the same as a gun. Just aim the plane at the target and press Spacebar. If the target is moving, lead it.
- Notes** The LAU-3A rocket pod holds 19 folding fin aircraft rockets (FFAR). They are usually fired in bursts of four or five. While they are considered an air-to-ground weapon, there is nothing to stop you from letting some fly in the direction of a bandit. As an A-6 pilot you could certainly give a MiG a surprise. If a rocket hits a MiG, it can shoot it down.

Iron Bombs

- Purpose** Iron Bombs have changed little since the Second World War. The size has increased and some sophistication has been added (such as the Snakeye's retarded fall), but essentially the Iron Bomb still falls from the airplane with nothing influencing its motion but gravity and wind drag.
- Selection** Press Backspace until either Mk82, Mk83, Mk84 or Mk82 Snakeye comes up in the display box. On the F-4, the arm light comes on. Toggle 1 on the number pad to select the bombing mode of DIANE, Direct or Dive Toss. Toggle 9 on the number pad to select either single or ripple release.
- Aiming** Mk82, Mk83, Mk84 and Mk82 Snakeyes can be released singly or on ripple. Ripple means all weapons on a station are released at one second intervals. The following bomb release methods are available:
- | | |
|-----------|-------------|
| DIANE | A-6 only |
| Direct | A-6 and F-4 |
| Dive Toss | A-6 and F-4 |

DIANE — This is only available on the A-6. On the waypoint screen in the game beginning, select ripple bomb for the action over the target. In the cockpit, select Iron Bomb, DIANE and Ripple or Single. Follow the waypoints to the target. This is done by steering the aircraft so that the center steering cue line is vertical. When you are steering straight for a waypoint, the bearing figure should be zero. You should see the range figure count down. When the range is less than one mile, select the next waypoint. This is done by pressing . You should see the waypoint information change, and you will have to turn the aircraft to point at the new waypoint. The display shows the words NAV or ATTACK on the bottom left of the display. NAV indicates that you are steering to a normal navigation waypoint. ATTACK indicates you are steering towards your target.

When you see the ATTACK come up, turn on the master arm and fly straight and level toward your target at 10,000–15,000 feet. Diving towards the target is also possible. If the dive angle is over 45° when the altitude is less than about 7,000 feet, you should see the impact point display (filled circle).

The steering cue box should be filled with the target square. As you approach the release point, a bar at the top of the screen appears. This bar moves down the screen. When it just drops off the screen, press .

Direct — This is very difficult and takes a great deal of practice. The simplest method is a straight approach toward the target. See Notes for the more realistic method of circling the target.

Before starting the attack, you need to choose the release parameters: speed, height, and angle of dive.

From this selection, you can find the mil setting in the tables following. For instance, for 450 kts, an altitude of 8,000 ft and a dive angle of 60 degrees, the mil setting is 112.

In the cockpit the mil setting is achieved using the keys **[I]** and **[M]**. Shift can be used for a faster change. As the keys are pressed, you should see the aiming sight in the simple HUD (Head Up Display) move up and down. The actual mil reading is shown on the otherwise blank display below the radar screen.

Set the mils as shown in the example above. Approach the target at about 8,500 ft and a speed of 400–420 kts. If using keyboard flight controls, use the sensitivity keys, **[F3]** and **[F4]**, to change the sensitivity to maximum. When the range figure hits one mile, push the stick forward quickly and get the sights on the target.

Coordination is needed here because you must hit **[Spacebar]** when the sight is on the target, the altitude is 8,000 ft, the speed is 450 kts, and the dive angle is 60°. The dive angle should be taken care of by diving at a range of one mile. Direct attack is difficult, so it is a good idea to ripple.

Dive Toss — The setup for dive toss is very similar to manual dive bombing. Circle the target at 10,000–15,000 ft and then turn and dive towards the target. When your wings are brought level after turning towards the target, point directly at the target. The bombsight should be directly over the target. Pickle the target by pressing the trigger and pull up. The bombs are released automatically.

Notes

Mk82. The standard all-purpose free-fall 500 lb bomb still has many uses — especially in rapid-release mode.

Mk83. This 1,000 lb. bomb is standard ordnance. For best results release around 7,000 ft., diving at 45°.

Mk84. This general purpose 2,000 lb bomb is standard ordnance, giving a high PK.

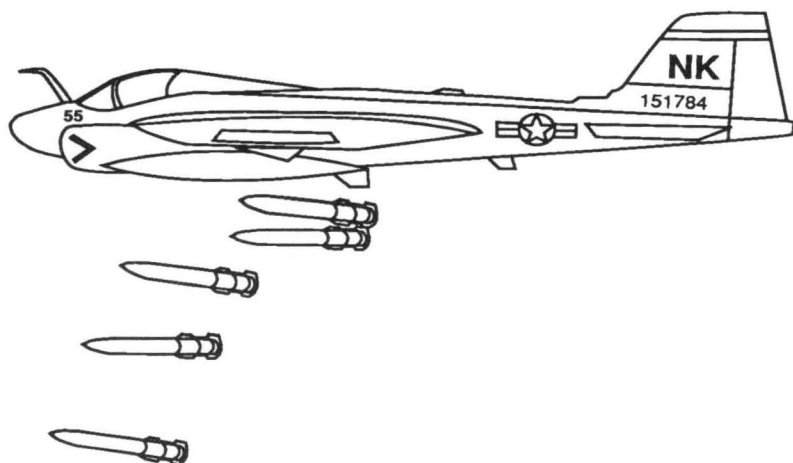
MK82S Snakeye. The Snakeye is a retarded free-fall version of the Mk82 all-purpose bomb for use in low-level attacks.

CBU52 CLuster Bombs. These bombs are actually a container of several smaller bombs that scatter and explode, making it an ideal weapon for personnel-intensive areas such as SAM sites. Commonly used by Wild Weasel attacks after a Shrike or Standard had silenced the radar installation.

Single or Ripple. Select Ripple for soft targets spread over a large area. Choose Single when pinpoint accurate bombing is required. On hearing the bombs release, press **[Q]** to go to missile view. You will then see the bombs fly towards the target.

Correct Approach. You can approach the target directly and point the nose at the target by pushing forward on the stick to drop the nose of the aircraft. In reality, this causes a negative g on the pilot's body and can cause a "redout" in which he has no control of the aircraft. This can be simulated in the OPTIONS menu.

To avoid this redout problem, a bomber pilot will normally circle the target, go into a 135° roll, pull back on the stick and then straighten up to point straight down at the target.



MIL DETERMINATION TABLES

Dive Bomb Mil Settings — Free Fall

Speed: 450 Kts

Height
(feet)

DIVE ANGLE

000's	60	55	50	45	40	35	30	25	20	15	10
1	42	48	53	58	63	67	72	78	86	98	114
2	55	64	72	80	89	98	108	119	134	152	175
3	67	78	88	100	111	124	137	153	172	194	220
4	77	90	103	117	131	146	163	182	204	228	256
5	87	102	117	133	149	167	186	207	231	258	286
6	96	112	129	147	165	185	206	230	255	283	312
7	104	122	141	160	180	202	225	249	277	305	334
8	112	131	151	172	194	217	241	268	296	325	354
9	119	140	161	183	206	231	256	284	313	343	371
10	125	147	170	193	218	243	271	299	329	359	387
11	132	155	179	203	229	255	284	313	344	374	401
12	138	162	187	212	239	267	296	326	357	388	414
13	143	168	194	221	248	277	307	338	370	400	426
14	149	175	201	229	257	287	318	349	381	412	437
15	154	181	208	236	266	296	328	360	392	423	447

Dive Bomb Mil Settings — Free Fall

Speed: 500 Kts

Height
(feet)

DIVE ANGLE

000's	60	55	50	45	40	35	30	25	20	15	10
1	39	45	49	53	57	61	65	69	76	85	100
2	50	58	65	72	79	87	95	105	117	133	154
3	60	70	79	89	99	109	121	135	151	171	196
4	69	81	92	104	116	129	144	161	180	203	229
5	78	91	104	118	132	148	164	183	205	230	258
6	86	100	115	130	147	164	183	204	227	254	282
7	93	109	125	142	160	179	200	222	247	275	304
8	100	117	135	153	173	193	215	239	266	294	323
9	106	125	144	163	184	206	229	255	282	311	340
10	112	132	152	173	195	218	243	269	298	327	356
11	118	139	160	182	205	229	255	283	312	342	370
12	124	145	168	191	215	240	267	295	325	355	383
13	129	151	175	199	224	250	278	307	337	367	395
14	134	157	181	206	232	259	288	318	348	379	406
15	139	163	188	214	240	268	297	328	359	390	416

Dive Bomb Mil Settings — Retarded Fall

Speed: 450 Kts

Height
(feet)

DIVE ANGLE

000's	60	55	50	45	40	35	30	25	20	15	10
1	98	110	120	128	134	137	140	141	143	147	155
2	110	125	138	149	159	168	176	184	194	206	221
3	121	138	153	168	181	194	206	219	234	250	269
4	130	149	167	184	200	216	232	249	266	286	307
5	139	160	180	199	218	236	255	274	294	316	338
6	147	169	191	212	233	254	275	296	319	342	364
7	154	178	202	225	247	270	292	316	340	364	386
8	161	186	211	236	260	284	309	334	359	384	405
9	168	194	220	246	272	297	323	349	376	401	422
10	173	201	229	256	283	310	337	364	391	417	437
11	179	208	236	265	293	321	349	377	405	431	451
12	184	214	244	273	302	331	361	390	418	444	463
13	189	220	251	281	311	341	371	401	430	456	474
14	194	226	257	288	319	350	381	412	441	467	484
15	199	231	263	295	327	359	390	421	451	477	494

Dive Bomb Mil Settings — Retarded Fall

Speed: 500 Kts

Height
(feet)

DIVE ANGLE

000's	60	55	50	45	40	35	30	25	20	15	10
1	96	107	116	123	128	131	132	132	131	133	139
2	106	119	131	141	150	157	163	169	176	185	199
3	115	130	145	157	169	180	190	200	212	226	244
4	123	140	157	172	186	200	213	227	242	259	279
5	131	150	168	185	201	217	233	250	268	288	309
6	138	158	178	197	215	234	252	271	291	312	334
7	144	166	187	208	228	248	268	289	311	334	356
8	150	174	196	218	240	262	283	306	329	353	375
9	156	181	205	228	251	274	297	321	345	370	392
10	162	187	212	237	261	286	310	335	360	385	407
11	167	193	219	245	271	296	322	348	374	400	421
12	172	199	226	253	280	306	333	360	387	413	433
13	176	205	233	260	288	316	343	371	399	424	444
14	181	210	239	267	296	325	353	382	410	436	455
15	185	215	245	274	304	333	362	391	420	446	465

THE NAVAL AIR WAR IN VIETNAM

The Gulf of Tonkin

The war in Vietnam began on August 2, 1964 when F-8E Crusaders from the *USS Ticonderoga* attacked North Vietnamese P-4 patrol torpedo boats off Hon Me Island. The North Vietnamese PT boats had attacked the U.S. destroyer *Maddox* (DD-731), possibly confusing the destroyer with one of the South Vietnamese patrol boats which had earlier shelled a radar station on Hon Me Island and a radio transmitter on Hon Ngu Island. After the *Maddox* fired three warning shots, the Vietnamese craft launched torpedoes. All shots missed. After taking machine gun fire, the *Maddox* radioed for air support. Four F-8E Crusaders intercepted the patrol boats and sank one of the P-4 boats with gunfire and Zuni rockets.

On the night of August 4, 1964, the *Maddox* and *USS Turner Joy* picked up three high-speed surface radar contacts. Two A-1 Skyraiders were launched from the *Ticonderoga* to intercept the probable boat contacts and to provide aircover. Because of bad weather, the A-1s never confirmed the presence of enemy patrol craft. This apparent hostile action against U.S. destroyers on patrol in international waters led to the passing of the Gulf of Tonkin Resolution on August 10th by Congress. This resolution gave the President the power to "take all necessary measures to repel any armed attack against the forces of the United States and to prevent further aggression."

Escalation

The Vietnam conflict started as a series of United States retaliations against the North Vietnamese government for specific actions. In retaliation for the attack on the *Maddox*, 64 aircraft were launched on August 5, 1964 from the *USS Ticonderoga* and *USS Constellation* to attack enemy PT boat bases in Operation Pierce Arrow. These aircraft carriers, part of Task Force 77, were stationed in the Gulf of Tonkin just south of Hainan. This position became known as Yankee Station.

On December 24, 1964 73 servicemen were either killed or injured when the Brink Hotel Bachelor Officers' Quarter in Saigon was bombed. The President authorized Operation Flaming Dart One, which targeted enemy barracks at Dong Hoi and Vit Thu Lu. The Communists responded by bombing the Bachelor Enlisted Quarters at Qhi Nhon on February 10, 1965, which killed or wounded 44 U.S. personnel. Again, the U.S. retaliated the next day with Flaming Dart Two which attacked the Chanh barracks.

Action brought reaction. Targets and mission profiles were approved in Washington before each mission. Targets were assigned by the Joint Chiefs of Staff (JCS) with approval from the President and Secretary of Defense. On February 13, 1965 President Johnson authorized operation Rolling Thunder. Rolling Thunder tasked both the Navy and Air Force with bombing missions north of the DMZ (Demilitarized Zone) to the outskirts of Hanoi. The goal of Rolling Thunder was to force North Vietnam to the peace table by demon-

strating U.S. fire power and threatening their capital. The object was to bomb military targets and to avoid civilian or foreign casualties. U.S. Admiral Grant Sharp said, "It [Rolling Thunder] does not seek to inflict maximum damage on the enemy. Instead, it is a precise application of military pressure for the specific purpose of halting aggression in South Vietnam."



Rules of Engagement

Rules of Engagement were established to control the conflict. Only targets that had been pre-approved could be bombed. Targets would be submitted to the Pentagon, and they would recommend the targets to the JCS and the Secretary of Defense. Only the the President could officially add targets to the list. The number of sorties and mission profiles including the type of ordnance was decided in Washington. This elaborate approval process was designed to control and limit the conflict by placing control in Washington rather than with the local commanders. This policy failed.

The rules of engagement frustrated the naval aviators. Several rules were established. Aircraft were not allowed to bomb secondary strike targets. All unexpended ordnance had to be jettisoned at sea rather than on targets. Surface-to-air missile sites could not be attacked while under construction for fear of hurting Soviet advisors. Enemy aircraft could not be bombed while on the ground unless they were taking off. No aircraft could be attacked unless positive visual identification was made, yet the Navy's principal fighter, the F-4 Phantom, was designed as a beyond-visual-range interceptor and had no internal gun. Harbors could not be mined; ships carrying war supplies could not be bombed. Aircrews also could not attack military targets such as AAA (Anti-Aircraft Artillery) batteries on farms, rice patties or dikes; military supply trucks parked on civilian sites; or SAM batteries within 10 miles of Hanoi. If a mission was canceled due to weather or a change in operations, the entire authorization process had to be repeated.

To make matters worse, ship commanders during the early phases of the war competed with each other to see which ship could launch the most sorties (missions). If one ship flew 125 sorties in one day, another ship tried to launch 130 sorties the next day. So instead of loading up planes with full loads to bomb several targets in one mission, several flights of planes would be launched with only one or two bombs in order to keep up the number of required sorties. Many pilots and Radar Intercept Officers (RIOs) lost their lives as others played the numbers game. As one pilot had put it, "it's crazy to let politicians run a war...it's like having the military run a country."

The Threat Grows

By the spring of 1965, the air war really began to heat up. Operation Rolling Thunder was under way, and the United States was dropping an average of eight hundred tons of ordnance a day. Instead of buckling under, the North

Vietnamese raised the ante by adding two new air defense weapons to its already effective AAA: the MiG and the SAM (surface-to-air missile). On April 4, 1965 the first conclusive air combat took place over Vietnam when two Air Force F-105s were shot down by MiG-17s. Then on April 5, a *USS Coral Sea* RF-8A reconnaissance plane positively confirmed the construction of the first surface-to-air missile site. The photos revealed the construction of a Soviet built SA-2 Guideline missile site 15 miles southeast of Hanoi. The SA-2 was a two stage anti-aircraft missile capable of intercepting and destroying aircraft at altitudes of over 60,000 feet.

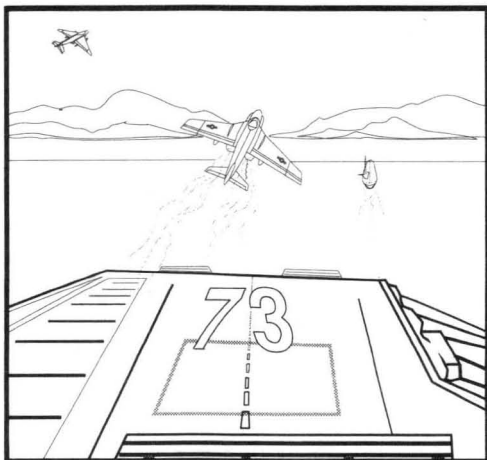
The commander of Task Force 77, Rear Admiral Edward Outlaw, along with the commander of the 7th Air Force in Saigon, wanted to strike the SAM site quickly. Because of the rules of engagement, however, he was not allowed without first going through the chain of command. A joint Air Force and Navy plan that would destroy all of the sites under construction was submitted, but permission was never given by the JCS. On July 24, 1965 an Air Force F-4C was shot down by a SA-2 while flying target combat air patrol during an attack on the Lang Chi munitions factory. The SAMs were now operational.

The President authorized a single retaliatory strike on July 27th against two specific SAM sites (sites 6 and 7) near Hanoi. One site was destroyed, but the cost was four Air Force F-105s and one RF-101C. The Navy lost its first plane, an A-4E, to a SAM on the night of August 11th. The Navy was authorized to retaliate on August 13, 1965. Seventy-six low-level anti-SAM missions ("Iron Hand") were launched on that Black Friday. Five planes were shot down by enemy guns, two pilots were killed, and seven planes were damaged. No SAM sites were discovered or destroyed.

Enter the Intruder

The Grumman A-6A Intruder is a two-seat subsonic attack aircraft capable of delivering 16,800 pounds of ordnance at ranges of over 1,500 miles in any kind of weather, day or night. Until Vietnam, the A-6 with its multimillion dollar advanced radar and computer systems, was untested. Many experts had doubts as to the ability of the A-6 to deliver its payload.

In July 1965 the VA-75 Attack Squadron aboard the *USS Independence*, better known as the Sunday Punchers, was the first Air Wing to receive the Intruder. The first mission of



the Sunday Punchers was to take the Intruder to targets south of Hanoi. This was the first Vietnam mission flown entirely by radar. Over the next several weeks, the A-6A proved its ability to hit its target in any kind of weather or time of day. The introduction of the A-6 gave the Navy its first attack aircraft that could overcome the terrible monsoons the Vietnamese weather delivered in the Tonkin Gulf.

The A-6 was so effective that Radio Hanoi claimed that American B-52 heavy bombers had attacked the Uong Bi power plants under the cover of night with 26 bombers. In reality the raid was carried out by only two Intruders. The Intruder was used not only as a bomber but also served as a SAM suppressor in the "Iron Hand" missions.

The A-6 was an effective attack aircraft, but it did come at a cost. Fifty-one Intruders were shot down in Vietnam, and the plane suffered one of the worse combat loss rates in the Navy, trailing only the propeller driven A-1 and the single-seat light attack A-4 Skyhawk in loss to flight ratio. The main threats to the A-6 were small arms and anti-aircraft automatic weapons.

Iron Hand

As the war continued, the United States began to develop new tactics to deal with the growing number of North Vietnamese threats. To counter the growing SAM threat, the Navy developed an operation called "Iron Hand" to suppress the SA-2 surface-to-air missiles. These anti-SAM sorties were first flown from July 1965 to August 1965. Initially, these missions proved very costly. Several Iron Hand planes were shot down by the SAMs and even more were destroyed by AAA fire. It wasn't until October 17, 1965 that the Navy bagged its first confirmed destruction of a SAM site near Kep Air Base.

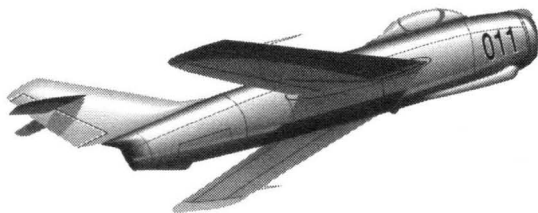
It took time for the Navy to develop adequate Iron Hand tactics. At first, planes attempted to come in below 3,000 feet to avoid the high flying SAMs. The problem was that the flights became extremely vulnerable to small arms fire and AAA. Another problem with coming in low was that the planes did not have enough energy (speed) when they had to pop-up for their attack runs. This made the attacking plane a sitting duck for AAA and small arms as the plane seemed to hang in mid-air as it popped up for its attack.

It took until March 1966 before the Iron Hand operations became truly effective. With the introduction of the AGM-45 Shrike anti-radiation missile, the Navy had its first real anti-SAM weapon. The Shrike was designed to follow the radar beam being emitted from a SAM site. The installation of radar warning equipment (AN/APR-25 RHAW) in the aircraft along with jammers (AN/ALQ-81 ECM) and chaff dispensers (AN/ALE-29A), allowed the American planes to dive in at medium altitudes. An even more effective anti-SAM missile was introduced in May 1968, called the Standard, which was bigger, had a longer range, and was less susceptible to being fooled. The Iron Hand missions greatly reduced the effectiveness of the SAMs.



MIGCAP

The air war in Vietnam was mainly an air-to-ground affair. MiGCAP (MiG Combat Air Patrol) was an operation mainly flown by F-4 Phantom II's from the larger *Forrestal*



and later class carriers and by F-8 Crusaders off of the smaller *Essex* and *Midway* class carriers. (The *Midway* and *Coral Sea* had F-4 Squadrons as well). For many, MiGCAP was a boring mission since most of the action was air-to-ground. But MiGCAP was needed to defend the attack aircraft against the MiG-17, MiG-19 and MiG-21. When the MiGs were up, things got hot.

The F-4 Phantom II was a Mach 2.5 multi-purpose interceptor and is regarded by many as the best all-around aircraft flown in Vietnam (though Navy F-8 drivers might try to argue this with you). The Navy versions, unlike the Air Force F-4E, did not have an internal gun. All of the Navy's MiG kills in the F-4 were done exclusively with missiles. The F-4 mainly carried two types of air-to-air missiles: the medium range radar-guided AIM-7 Sparrow and the short range AIM-9 Sidewinder.

The AIM-7 Sparrow was designed to intercept and destroy aircraft at distances beyond visual range (up to 14 miles). The Radar Intercept Officer (RIO), or GIB (Guy In Back), would lock onto targets with his radar and launch an AIM-7 at his prey. The F-4 must keep its radar on the target in order to guide the missile until the point of contact. Because the Rules of Engagement required aircraft to be positively identified (which usually meant visually within two miles), the effectiveness of the AIM-7 was greatly reduced. The AIM-7 accounted for only ten of the Navy Phantom's 41 kills. Only one Sparrow out of every twelve launched found its target.

The AIM-9 Sidewinder accounted for the other 31 MiG kills by Phantom drivers. The AIM-9 is a heat-seeking missile with approximately a two mile range. A pilot had to approach his target's rear end in order for the missile to lock on the heat signature of the MiG's engines. Once launched, the Sidewinder would guide itself towards the target. The Sidewinder was twice as effective as the AIM-7 with a kill every 5.5 launches.



The Navy orchestrated large attack groups consisting of bombers (A-6 Intruders, A-4 Skyhawks or A-7 Corsair II's), Combat Air Patrol fighters (F-8 Crusaders or F-4 Phantoms), Flak Suppressors (F-8s or F-4s) and Iron Hands (A-6s, A-4s or F-8s). These flights, which could contain as many as 24 aircraft, became known as Alpha Strike missions. It was this strike package which became the standard formation for hitting targets in North Vietnam.

Top Gun

From 1965 to 1968, the F-4 Phantom's kill ratio was a lousy 2.6:1. The F-4 crews had bagged 13 MiGs and lost five F-4's. The naval aviator had lost his ability to dogfight, especially against the smaller and more maneuverable MiGs. By 1968, things were getting worse with the kill ratio falling below 1:1.

In 1968 the Naval Air System Command ordered a study to find out why our aviators were being blown out of the skies. The now famous "Ault Report" pointed out three reasons why the kill ratio had suffered. First, the air-to-air missiles did not work as advertised. Second, the Rules of Engagement neutralized any advantages our aircraft had and gave limitless advantages to the enemy. Third and most important, our pilots were poorly trained in air combat maneuvering (ACM) against dissimilar aircraft and tactics.

In 1969 a class for Navy F-4 crews began to correct these deficiencies. Three years later an independent command, the Navy Fighter Weapons School, better known as TOP GUN, was established to train crews in the art of ACM.

When the air war began to heat up again in 1972, TOP GUN F-4 pilots enjoyed a 24 to 2 kill ratio. In addition, no additional Navy attack or reconnaissance aircraft were lost to enemy MiGs. TOP GUN produced the Navy's only aces, Lt. Randy Cunningham and Lt (j.g.) Willie Driscoll. On May 10, 1972, Cunningham and Driscoll in their F-4 shot down three MiGs in one mission including the dreaded enemy ace Col. Tomb flying a MiG-17. Col. Toon was credited with downing 13 American jets before meeting Cunningham and Driscoll. The dogfight that took place between these two planes is now legendary. TOP GUN had paid off.

Rolling Thunder V

The war continued to intensify through 1967 with Operation Rolling Thunder V which began on February 14, 1967. President Johnson authorized attacks against a new list of targets which included mining the Song Ca estuaries and Song Giang rivers in order to close them to barge traffic. He also ordered the bombing of the ports of Cam Pha, Hong Gai and Haiphong. In addition to this, bridges and rail networks were also destroyed, cutting off the steady supply of weapons and fuel to the North Vietnamese. Eventually, Haiphong ran out of ammunition. In 1967 the Navy alone destroyed 30 SAM sites, 187 flak batteries and dropped 955 bridges. In addition, thousands of trains, trucks and watercraft were destroyed. The Navy scored 14 MiG kills and had no less than 11 aircraft carriers on line.

Early 1968 saw the North Vietnamese striking back with two large offensives: the Tet offensive and the battle for Khe Sanh. Both efforts were repulsed. On November 1st, after feeling the pressure of the anti-war movement, President Johnson ordered the unilateral halting of bombing north of the 20th parallel except "in the areas where the continuing enemy buildup directly threatens allied forward positions and where the movement of their troops and supplies are clearly related to that threat." President

Johnson had hoped that by halting the bombing a peace dialogue between the Communists, the South Vietnamese and the United States could begin. He hoped that the cessation of hostile activity would demonstrate the United States' good faith. In reality, it eased the pressure on Hanoi and Haiphong and allowed the North Vietnamese to rearm. The Communists were committed to their cause.

After winning the 1968 presidential election, President Nixon began the gradual withdrawal of troops from Vietnam. On June 8, 1969, the U.S. withdrew 5,000 troops from South Vietnam. Peace talks began in Paris in August 1969. Bombing began in both Laos and Cambodia in an attempt to stop the steady supply of arms to the Viet Cong into South Vietnam. Principal targets were trucks and transportation routes along the infamous Ho Chi Minh Trail. This bombing effort continued through 1970 with very little success because the supplies needed to be cut off at their source, the harbors. The anti-truck campaign did not halt the transportation of arms since the Viet Cong found new ways of moving weapons under the cover of night and jungle to avoid the U.S. air raids.

Linebacker

On March 30, 1972 North Vietnam launched a massive all-out spring offensive across the Demilitarized Zone into South Vietnam. Cease-fire talks in Paris between the President's National Security Advisor, Henry Kissinger, and the North Vietnamese representative, Le Duc Tho, broke off. Tho felt he had the advantage because of the protests in the United States over the war and, with the new spring offensive, he thought that victory over the South was imminent.

In response, on April 7, 1972, President Nixon authorized the Navy, for the first time during the Vietnam war, to mine Haiphong and other North Vietnamese ports. In addition, an all-out effort was made to bomb all of the North's supply lines. B-52s began their first raids over Hanoi and Haiphong on April 17th. The Navy also launched strikes into Hanoi and Haiphong. All traffic stopped, with the exception of that across the Chinese borders. Between May and September, the Navy launched an average of 4,000 day and night sorties a month. In that same period of time, the North launched nearly 2,000 SAMs and fired thousands of rounds of AAA, resulting in the destruction of 28 U.S. aircraft. By the end of the campaign, the North ran out of ammunition. Not a single AAA shell nor SAM missile was fired at U.S. aircraft. On October 23rd the Communists asked for a cease-fire.

On October 24th the United States halted bombing above the 20th Parallel as a peace gesture (although bombing of supply lines south of the 20th Parallel continued at an unprecedented rate). Linebacker I had ended.

After the bombing stopped, the Communists refused to deal in earnest and instead used the halt to resupply and rebuild. To make matters worse, the South, after accusing the U.S. of cutting a separate deal with the North, sabotaged the peace discussions by making 69 major changes in the initial peace proposal.

Operation Linebacker II commenced on December 18, 1972 when President Nixon resumed the bombing of Hanoi and mining of Haiphong. Nixon was determined to force the North back to the bargaining tables. For the next eleven days, with the exception of Christmas and New Year's Day, aircraft from the *America*, *Enterprise*, *Midway*, *Oriskany*, *Ranger* and *Saratoga* attacked a variety of targets: petroleum, oil and lubricant (POL) storage areas, airfields, SAM and AAA sites, rail, road, shipyards, port facilities, and enemy troop emplacements. All told, the Navy flew 505 day and night sorties against the North in the 11 days. On January 15, 1973 combat operations in the North were halted.

On January 27, 1973 representatives from the U.S., South Vietnam, North Vietnam and Viet Cong signed the "Agreement on Ending the War and Restoring the Peace in Vietnam." All offensive operations ceased, the mines were removed from Haiphong harbor (Operation Endsweep), and preparations for the return of 144 downed U.S. pilots (Operation Homecoming) were made. Thirty-five aviators had died in captivity.

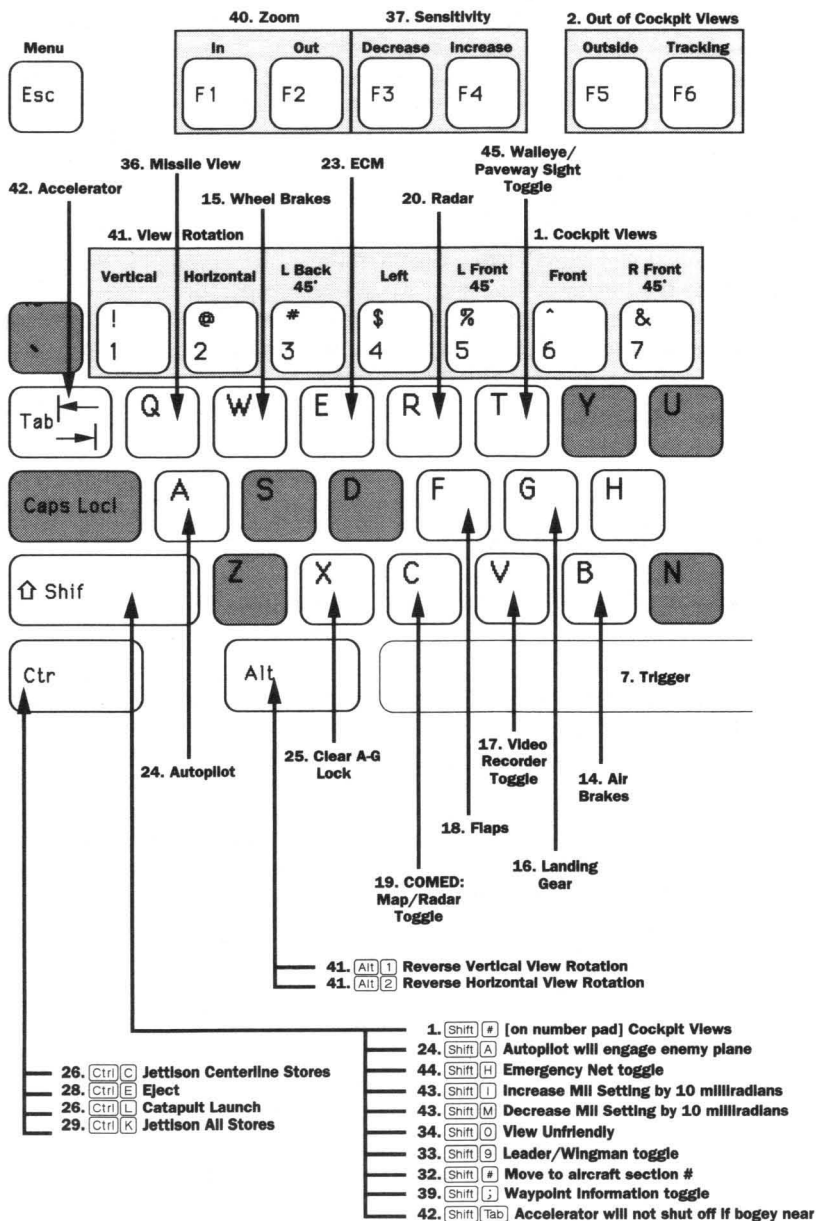
Four months after Congress voted in June 1973 to end all U.S. combat activities in or over Southeast Asia, the North Vietnamese Central Committee adopted a resolution to conduct a revolutionary war to destroy the enemy and liberate the South. Because of the War Powers Resolution Act which made it illegal to commit U.S. forces for more than 60 days without congressional approval, the U.S. did not respond.

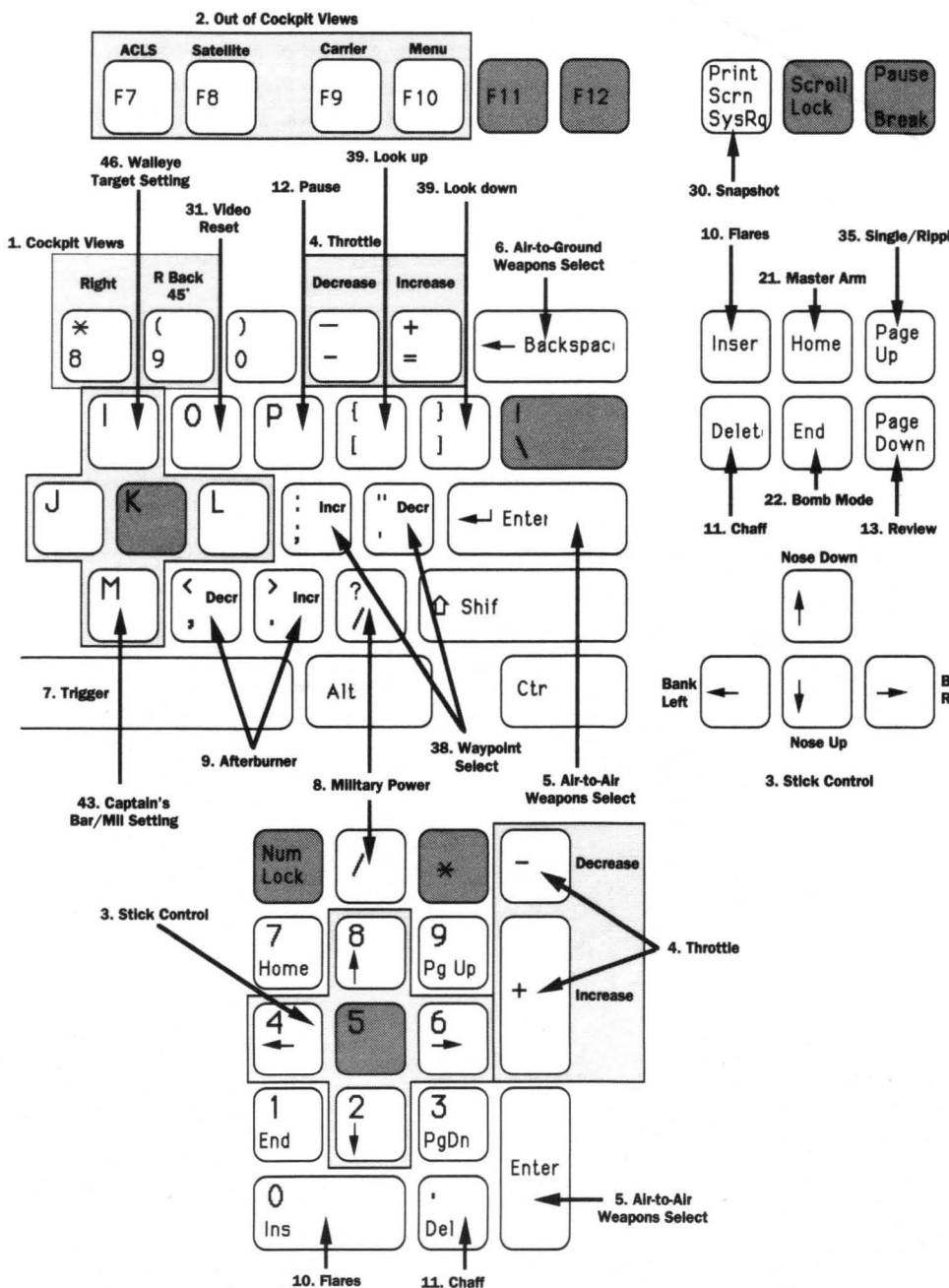
On April 30, 1975 Saigon, along with all of South Vietnam, fell to the North.

The Score

U.S. naval combat action officially terminated on August 15, 1973 when Congress mandated the end of all combat involvement in Southeast Asia. During the nine years and five days after the Gulf of Tonkin Resolution, the war had cost the Navy the lives of 377 naval aviators, 179 prisoners of war and 64 missing in action. Another 205 officers and men had also been lost during major fires aboard three carriers. Operational accidents claimed 316 planes, while 538 aircraft had been lost in combat. Anti-aircraft artillery accounted for 37% of the Navy's aircraft losses, 18% to small arms fire (machine guns and rifles), and 15% to surface-to-air missiles (SAMs). Only 2% of the Navy's losses were to MiG interceptors.

The Navy used 21 carriers during the Vietnam war and spent a total of 9,178 days in the Gulf of Tonkin. Between the Navy, Marines and Air Force, the United States dropped a total of 7.4 million tons of bombs in Southeast Asia. Between 1964 and 1973, the Navy flew a total of 785,000 fixed-wing combat sorties. The Navy and Marines shot down a total of 61 enemy aircraft of which 59 were MiGs (39 MiG-17s, 2 MiG-19s and 18 MiG-21s). The Navy enjoyed a 56 to 10 fighter vs. fighter score against the North Vietnamese.

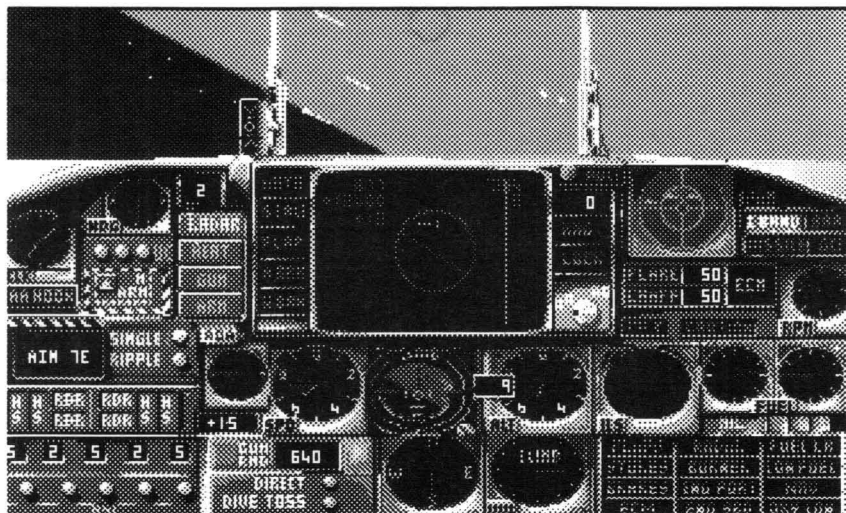




THE KEYBOARD

The keyboard is your main access to this game. Even if you are using a mouse or joystick, many commands can only be entered at the keyboard.

The following pages provide a number key to refer to the keyboard layout provided with this game. Take a plane out and play around with this keyboard without trying for scores and accomplishment. We are trying to provide as complete a simulation of Phantom and Intruder flying over Vietnam as we can. We also must somehow give you (one computer game player) the opportunity to accomplish everything that the normal crew of either of these aircraft (two highly trained people) can do. There are a lot of commands to learn here. Take your time and enjoy getting used to the aircraft.



HAVE FUN!

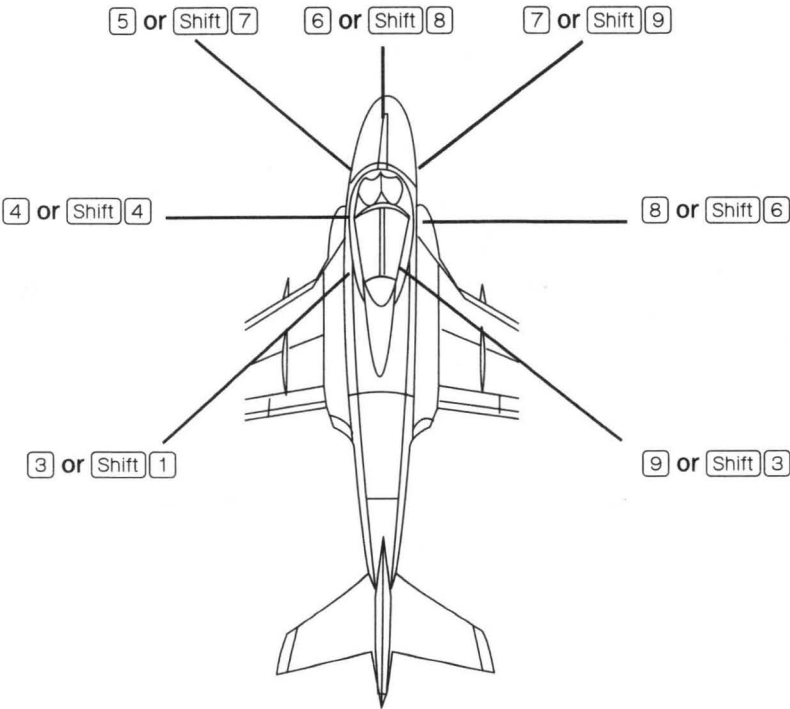
KEYBOARD

Keyboard Command Descriptions

1. Cockpit Views

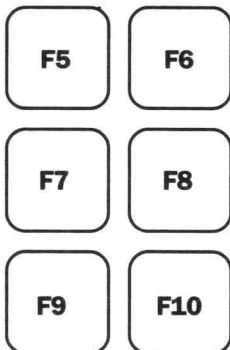
Press the following keys to change your view out of the cockpit:

View	Keyboard	Number Pad
Left Back 45°	[3]	[Shift][1]
Left	[4]	[Shift][4]
Left Front 45°	[5]	[Shift][7]
Front	[6]	[Shift][8]
Right Front 45°	[7]	[Shift][9]
Right	[8]	[Shift][6]
Right Back 45°	[9]	[Shift][3]



2. Out of Cockpit Views

The following keys provide you with views of the aircraft from outside the cockpit. Use these to see your aircraft's position relative to the surrounding geography and to other aircraft.



[F5] Outside View. View of the piloted aircraft from a tracking aircraft. The view rotation keys (**[1]** and **[2]** on the keyboard) and zoom keys (**[F1]** and **[F2]**) are available.

[F6] Tracking View. View of the piloted aircraft from the rear. The view rotation and zoom keys are available.

[F7] ACLS. Automatic Carrier Landing System. This toggle turns on the ACLS instruments.

[F8] Satellite. Looking down (from satellite) at the piloted aircraft.

[F9] Carrier. A view of the home carrier. View rotation keys are available.

[F10] Menu. This brings up the Menus described earlier and stops the game until you are done with the menus.

3. Stick control

See pages 16–17 for more information on Flying with the Stick.



4. Throttle

Press **[+]** to increase engine throttle which is normally reflected by an increase in RPM and airspeed. Press **[-]** to decrease throttle and RPM. If your keyboard has more than one **[+]** or **[-]** key, you can use either one.

5. Air-to-Air

Press **[Enter]** once to activate the air-to-air weapons select mode (if not already present). Press **[Enter]** again to cycle through the different missile and gun formats. This is not available on the Intruder.

- 6. Air-to-Ground** Press [Backspace] once to activate the air-to-ground weapons select mode (if not already present). Press [Backspace] again to cycle through the different missile, bomb and gun formats.
- 7. Trigger** Press the [Spacebar] to fire all weapons or release bombs.
- 8. Military Power** The [/] key kicks your plane up to military power (100% RPM). It also turns off the afterburner on the F-4 Phantom.
- 9. Afterburner** Four stages of afterburner power are available on the F-4, for times when you need to "put the pedal to the metal." Press [>] to increase the afterburner stage or [<] to decrease it. Note that the afterburner is not available on the Intruder.
- 10. Flares** Press [Ins] to release flares when *heat-seeking* missiles are being fired at you by enemy SAM sites or MiGs.
- 11. Chaff** Press [Del] to dispense chaff and avert *radar-guided* missiles fired at you by enemy SAM sites or MiGs.
- 12. Pause** Press [P] to pause the simulation. Press it a second time to continue. All view keys in and outside the cockpit are available when the game is paused.
- 13. Review** Press [PgDn] to toggle through the messages received by your aircraft.
- 14. Air Brakes** Press [B] to activate the air brakes and slow your aircraft down while it's in the air. Press [B] a second time to release the air brakes.
- 15. Wheel Brakes** Press [W] to toggle the wheel brakes. These are used solely on the ground and slow the aircraft upon landing or prevent it from rolling after the engine has started. When landing on a carrier, do not use the wheel brakes. The arrestor wire brings you to a stop in this game.
- 16. Landing Gear** Press [G] to raise and lower the landing gear.
- 17. Video Record** Toggle [V] to turn the video recorder on and off. You can use the camera for taking "videotape" of whatever is happening when you press the key until you press it again.
- 18. Flaps** Press [F] to activate wing flaps for speed control. Press [F] a second time to deactivate wing flaps. Flaps give extra lift and so are used in landing to allow a slower approach speed. Without flaps, the aircraft would be dangerously close to stall speed when approaching a landing.
- 19. COMED** COMED is the Combined Map/Electronic Display. Press [C] to toggle between a map detailing the mission landscape and the default radar mode.

- 20. Radar** Press **[R]** to turn your radar display off to avoid detection by enemy planes. Press **[R]** a second time to turn the radar display back on.
- 21. Master Arm** Press **[Home]** to arm all the missiles and weapons for firing.
- 22. Bomb Mode** Press **[End]** to toggle between the DIANE, Direct, and Dive Toss bomb dropping modes.
- 23. ECM** Press **[E]** to turn on the ECM (Electronic Counter-Measures) Pod (if you're carrying one) as a defense against *radar-guided* SAMs. Press **[E]** a second time to turn it off.
- 24. Autopilot** Press **[A]** to toggle the autopilot on and off. If you turn on the autopilot during a dogfight, it will track the MiGs for you automatically. A real autopilot does not do this, but this is a convenience for the player who wants to see a dogfight without participating. If there are no MiGs present, the autopilot will fly your aircraft to the target for the current mission. This means it will:
- Follow waypoints.
 - Perform actions such as dropping bombs at the waypoints.
 - Engage MiGs and radar sites if that is its duty (see Part IV).
- However, the autopilot will not release weapons normally. You must press **[Shift][A]** to allow the autopilot to actually fight the plane.
- 25. Clear A-G Lock** If you make an unsuccessful attempt at locking on to a target during an air-to-ground mission, press **[X]** to clear the lock and try again.
- 26. Cat Launch** **[Ctrl][L]** launches your plane from the carrier catapult.
- 27. Jettison Centerline Stores** Press **[Ctrl][C]** to jettison the centerline stores if you need to get rid of excess weight to give you added maneuverability or acceleration. See also **Jettison All Stores**, below.
- 28. Eject** When all else fails, press **[Ctrl][E]** to eject from your aircraft. Remember that ejecting is not necessarily the safest or the smartest option in a given situation. Invoke it only as a last resort.
- 29. Jettison All Stores** Press **[Ctrl][K]** to jettison everything *except your missiles*. This will give you increased maneuverability and acceleration in an emergency. See also **Jettison Centerline Stores**, above.

- 30. Snapshot** Use **[PrtSc]** to take snapshots of whatever is on the screen at any time. This can be replayed later during Debriefing.
- 31. Video Reset** Use **[O]** (the letter "O," not zero) to reset the Gun Camera to make videotapes of your air combats.
- 32. Move Between Sections** Some missions can have up to four American sections of aircraft with up to two aircraft in each section. Use the following key commands to move between the sections:
- | Section | Command Key (from keyboard) |
|---------|-----------------------------|
| 1 | [Shift][1] |
| 2 | [Shift][2] |
| 3 | [Shift][3] |
| 4 | [Shift][4] |
- 33. Leader/Wingman** Just as you can move between sections in a mission, you can also toggle between the leader and the wingman in your section. Press **[Shift][9]** to toggle between them.
- 34. Unfriendly** Press **[Shift][0]** (zero) to toggle between the piloted aircraft and its current unfriendly (if it has one). A Phantom on MiGCap is allocated a MiG to engage, and an A-6 on Wild Weasel duty is allocated a SAM site to destroy. You can view these unfriendlies by using this key.
- 35. Single/Ripple** Press **[PgUp]** to toggle between the two bomb release modes. **Single** releases one bomb per trigger press. **Ripple** releases one bomb every second until all bombs on the station are released, allowing you to lay a line of bombs on a long target.
- 36. Missile View** Press **[Q]** to toggle between missile view and piloted aircraft view. This lets you follow the missile down to the target. If the missile hits the ground, it explodes.
- 37. Sensitivity** Press **[F4]** to **increase** and **[F3]** to **decrease** the aircraft's sensitivity to banking, climbing or diving, on a scale of 0 to 3. You may want to learn making bombing runs at a sensitivity level of 1, and then progress to a level of 3 in aggressive dogfight battles.
- 38. Waypoint Select** On any Outside View (**[F5]**, **[F6]**, **[F8]**), press **[;]** to increase the Waypoint number and **[']** to decrease it. **[Shift][;]** toggles between the carrier, the buddy, and the waypoint information.
- 39. Look Up/Down** Press **[↑]** to look up above the usual cockpit view (a "heads up" view), and **[↓]** to look back down at the cockpit (a "heads down" view). This latter key can be used in the Phantom again to look even further down to see more instruments. The A-6 only has a "heads up" view.

- 40. Zoom** Press **F1** to zoom in closer to the aircraft, and **F2** to zoom out. Use in conjunction with the Outside View **F5** and the Tracking View **F6**. Also works with the Carrier View **F9** and the Missile View **Q**.
- 41. View Rotation** In any non-cockpit view, press **1** on the keyboard to cycle through different vertical views of your aircraft. Each key-press changes the orientation along a circle surrounding the aircraft, starting from the rear up and forward and then from the front down and back. Press **2** on the keyboard to cycle through views moving horizontally around the aircraft. Using **Alt** with either of these keys rotates the point of view in the other direction.
- 42. Accelerator** Press **Tab** to speed up the action during long flights over the sea. This speeds time up for everybody in the simulation (friendly or otherwise) and moves you toward the target at increased speed. The accelerator is automatically deactivated when you approach the target or when you are approached by a MiG or SAM. If you don't want automatic deactivation, use **Shift Tab**. You can also toggle the accelerator off by pressing **Tab** a second time.
- 43. Captain's Bar** Press **M** to move the "Captain's bars" onto the target (see Walleye delivery method).
Mil Setting. Also, the **I** and **M** keys can be used to alter the Mil Setting of the sight on the HUD (see pg. 125). This measurement is in milliradians, hence the name. **Shift I** and **Shift M** increment and decrement the Mil Setting by 10 milliradians.
- 44. Emergency Net** Toggling **Shift H** activates and deactivates the Emergency net if you are afraid you cannot land your plane normally
- 45. Walleye/Paveway Sight Toggle** Use **T** to toggle between sight modes when using the Walleye or Paveway guided weapons.
- 46. Walleye Target Setting** Use **←**, **↑**, **→**, **↓** to move the Walleye sight around on the screen.

GLOSSARY AND ABBREVIATIONS

The following entries are meant to give you a general feeling for the military and somewhat more informal jargon of being a pilot in Southeast Asia in the late 1960s and early 1970s. Game terms are not included.

AAA	Anti-Aircraft Artillery.
A-A	Air-to-Air, also written as A2A or just AA.
AB	Afterburner. Acceleration over and above normal military power, achieved by spraying fuel into the back of the engine. The F-4 had this capability, as did most of the MiGs. The A-6 does not have an afterburner.
ACLS	Automatic Carrier Landing System.
ACM	Air Combat Maneuvering. Essentially the art of dogfighting.
ADI	Attitude Director Indicator. This gauge helps register your plane's position relative to the horizon as it rolls and pitches in any direction.
ADL	Aircraft Datum Line indicates direction of travel.
AGM	Air-to-Ground Missile. The designation for such weapons as the Walleye and Shrike, meant to be fired from an aircraft at a ground target.
AI	Airborne Intercept.
AIM	Air Interdiction Missile. Otherwise known as an AAM (Air-to-Air Missile). It is meant to be used by one aircraft to knock down another. In this game, the Sidewinder and Sparrow are AIMs.
Aircrew	The pilot and his teammate (RIO for the Phantom and B/N for the Intruder)
Airspeed	IAS (Indicated Airspeed). This is the speed usually presented to the pilot. It should be reasonably accurate at sea level. Since the measurement is a function of air density, however, it becomes more and more inaccurate at increased altitudes. TAS (True Air Speed). This is the air speed corrected for altitude effects.
Air Wing	A group of aircraft aboard a carrier which is led by a senior commander.
Alpha Strike	An airstrike using every available aircraft in a carrier's complement against one target or a closely related cluster of targets.
Altimeter	A gauge that tells the pilot what altitude he is at.
Angels	Altitude in 1,000s of feet. "Dead Duck is at Angels 23" means that he is at 23,000 feet.
AOA	Angle of Attack.
AOA Indexer	Used primarily to assist you in landing your plane. It consists of a bank of three lights just to the left of your 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. The zero position is at 9 o'clock and 30° at 12 o'clock. Increased AOA is represented by counter-clockwise movement of the needle.
Arrestor Net	A net strung over the arrestor wires when it is thought that the incoming aircraft may not be able to make a normal landing.
ASI	Air Speed Indicator. This dial is calibrated in knots TAS. The zero position is at 12 o'clock. One revolution represents 1,200 KTS on the F-4 and 600 KTS on the A-6.
Atoll	A Russian air-to-air missile that very similar to the Sidewinder (q.v.).
Ault Report	The report of the commission to investigate why the Navy had such a poor record in air-to-air combat in the 1960s. Reaction to the findings of this report created the Top Gun school.
Autopilot	A device that will keep the plane at the same altitude, speed, and heading it was set for. The autopilot in this game is far more sophisticated than any autopilot currently available.
Bandit	A bogey (q.v.) that has been identified as a foe.
Bank	To turn left or right in the air.
BARCAP	BARrier Combat Air Patrol. A group of fighters whose job it is to defend a carrier against intruding aircraft.
Bearing	The compass heading from one point to another.
Bingo Fuel	An indication that your plane has just enough fuel to return with an adequate safety margin.
Blackout	A loss of vision or consciousness due to pulling too many positive g's.
BN or B/N	The Bombardier/Navigator in an A-6 or A-3.
Bogey	An unidentified aircraft that may be friend or foe.
Bolter	To abort a carrier landing and circle around for another try.
Bomb Run	(1) Mission code for the actual run to drop bombs on a target; (2) The act of attacking a target with bombs.
Break	A sharp turn of 6+ g's taken to avoid a SAM or MiG on your tail.
Clag	Bad, mucky weather.
CAG	Commander Air Group.
Callsigns	These are used instead of real names for security reasons. Just about anything seems to go. However, callsigns were grouped into families, e.g.: birds (hawk, condor, bluebird, falcon), cars (Olds, etc.) and trees (oak, pine). Transmissions start with callsign and number in section, e.g.: "Oak1, Execute, Execute, Papa Orange." As well as being leader of a section, Oak1 is also the Strike Force Commander. His message indicates that the operation is on: go for the primary target.

CAP	Combat Air Patrol. Essentially the job of keeping hostile planes away. Basic CAP was originally the duty of guarding the aircraft carrier against attack. During the Vietnam war, there were several different forms of CAP. See <i>BARCAP</i> , <i>MiGCAP</i> , <i>RESCAP</i> and <i>TARCAP</i> .
Cat	Catapult.
Ceiling	The level of the clouds. A "ceiling at 3,000 feet" means there is a total cloud cover at 3,000 feet above sea level.
CBU	Cluster Bomb Unit.
Chaff	Packages of tiny foil strips dropped from a plane that confuse radar-guided missiles.
Charlie	Slang term for the Viet Cong.
Climb Rate	The number of feet a plane can climb in one minute of climbing. This is usually expressed as a positive number. As a negative number it is effectively the dive rate of the aircraft.
CO	Commanding Officer.
Cockpit	The space where the aircrew sits and manipulates their airplane.
Cobb	To open up all the way, as in "cobb the throttle."
Colonel Toon	Legendary Vietnamese ace credited with shooting down 13 American aircraft before he was shot down in turn by Lt. Randy Cunningham and his RIO, Willie Driscoll, graduates of the Top Gun school.
COMED	COMbined Map/Electronic Display. The central display on the control panel that can be toggled between a map showing target locations and your plane's location. It also displays the various air-to-ground and air-to-air weapons.
Compass	A device that always shows the current heading of the airplane.
Connie	The nickname for the aircraft carrier <i>USS Constellation</i> .
Court-Martial	A military court that tries defendants under the code of military justice. It is said that a court-martial is the best court if you are innocent and the worst if you are guilty. Those accused of breaking the Rules of Engagement were tried under a Court-martial.
CTF	Carrier Task Force.
CV	Aircraft Carrier.
CVA	Aircraft Carrier (Attack).
Debriefing	The act of being questioned after a mission so the Intelligence officers can learn everything possible about the current state of the enemy and the results of the mission.
Det.	Detachment. This refers to a small number of planes not big enough to form a squadron. They were formed primarily because of heavy combat losses in Vietnam.

DIANE	Digital Integrated Attack Navigation Equipment. This is the collection of radars and inertial guidance systems that allows the A-6 to find its targets and bomb them without ever seeing them in the darkest night or foulest weather.
Dixie Station	Sea area off of South Vietnam used by the carriers of the US Navy for attacking targets in South Vietnam, Laos and Cambodia.
DMZ	Demilitarized Zone. The border separating North and South Vietnam.
Dogfight	A fight between two airplanes, so named because the constant circling of the combatants resembled circling dogs in the eyes of some of the early writers about air combat.
"Double Ugly"	A term of derision or endearment for the F-4 Phantom II.
Driver	A person flying (rather than navigating) the plane in a two-seat aircraft.
Duty Roster	The list of which pilots are flying and what their missions are.
ECM	Electronic Counter-Measures. This takes the form of a pod that is designed to fool ground-based SAM sites and to confuse the radar of MiG fighters.
Egress	Flying out of the target area.
Enemy	Someone who is trying to kill you, possibly because you have orders to try to kill him.
Escort	Ground cover mission, meant to keep the ground-based defenses from interfering with a bomb run. Equal priority goes into covering AAA, SAM and GIC sites.
EW	Electronic Warning, as in Electronic Warning Indicator.
Feet wet/ Feet dry	Feet wet indicates that a pilot is currently over water, while feet dry refers to a pilot reaching land.
FFAR	Folding-Fin Aircraft Rockets.
Flaps	Control surfaces on the wing and tail that help you slow down your aircraft.
Flares	Magnesium-based packages dropped from a plane which are designed to fool heat-seeking missiles.
"Fly your needles"	A command to fly by your instrument readings rather than by visual sighting.
FOD	Foreign Object Damage. Something that has hit the plane. It can be shrapnel, a bird, a thrown rock or whatever. It usually refers to objects sucked into the jet intake.
Free Fall	The state of falling without power. Usually referring to the fall of a bomb after it has been released by a bomber, but it can refer to anyone or thing falling without anything to retard the fall (such as a parachute, airfoils, etc.). See <i>Retarded Fall</i> .
Friendly	As a noun, this designates another person or vehicle who is on your side, even if he is an Air Force or Marine pilot.

g	The force of gravity being applied to the plane and its pilot. 1g is equivalent to a plane flying straight and level. Too many g's and a pilot blacks out.
G-suit	A full body suit designed to compress the fat tissue on a pilot's legs and abdomen. It was created so that a pilot's blood would not pool to the bottom of his body during high g maneuvers.
GBU	Guided Bomb Unit (a laser-guided bomb).
GCA	Ground Control Approach.
GCI (or GIC)	Ground Intercept Control. The radar units that track incoming aircraft and relay the information to AAA and SAM sites. The usual North Vietnam SAM site consists of SAMs at the points of a star shape with a GCI unit at the center of the star.
Gear, Landing	The wheels you use to land on a ship or land.
GIB	Guy In Back, originally Air Force slang for the RIO (Navy title) or WSO (Air Force title) in the back seat of an F-4.
Ground Fire	Can be any attack by projectile weapons from the ground, but usually used to refer to soldiers using normal infantry weapons rather than AAA.
Grumman	The company that built the A-6 Intruder.
GSD	Glide Slope Deviation. The horizontal scale on the ACLS. When landing, the further you are to the right of the carrier, the further the GSD scale moves to the left and vice versa. See <i>LD</i> .
"Go dirty"	To lower your gears, flaps, etc. in preparation for landing your plane.
Guideline	NATO code for the Russian SA-2 SAM.
Gulf of Tonkin	Body of water between the Vietnamese mainland and Chinese-owned Hainan island.
Haiphong	Principal port of North Vietnam. For years pilots gritted their teeth as they passed over this port and saw dozens of foreign vessels unloading supplies for North Vietnam. American pilots were forbidden under the Rules of Engagement (q.v.) from attacking this shipping.
Hangfire	A failure or delay of an article of ordnance after being triggered.
Hanoi	Capital of North Vietnam and current capital of Vietnam.
Hanoi Hilton	The nickname for the Hoa Lo prison located in the center of Hanoi. Built by the French during their occupation, it was always heavily guarded and almost completely escape proof.
Heading	The compass direction any vehicle (ship, plane, tank, etc.) would move if it travelled straight ahead from its current position. It can refer to either a moving or a stationary vehicle.
Heartbreak Hotel	A pilot's first stop when brought to the Hoa Lo prison. See <i>Hanoi Hilton</i> .
Hot Start	A start that exceeds normal starting temperatures.

HSI	Horizontal Situation Indicator.
HUD	Head-Up Display.
IFF	Identification Friend or Foe.
ILS	Instrument Landing System. A HUD mode designed to guide the plane in for landing.
IN	Inches.
In-country	Within the borders of South Vietnam.
Ingress	Flying into the target area.
Intruder	The official title of the Navy's A-6 all-weather attack bomber.
IR	Infrared.
Iron Hand	Navy term for an attack mission on AAA and SAM sites. See <i>Wild Weasel</i> .
Iron Triangle	An extremely defended area located between Thanh Hoa, Haiphong and Hanoi.
Jamming	The attempt to confuse enemy radar and other electronics so that they cannot find you as a target.
Jink	Fly in an irregular flight path in order to prevent enemy gunners from targeting the plane.
JP	Jet Petroleum. The standard term for jet fuel.
JP-5	Jet fuel used by Navy, it has a density of 7 pounds/gallon. Pilots are concerned about how many pounds of fuel they have because thrust is a function based on mass of fuel, not volume of fuel.
K	The initial designation code for an airplane used as a mid-air tanker. The tanker version of the A-6 is known as the KA-6D
KIAS	Knots Indicated Air Speed.
Korat AFB	A principal Air Force Phantom base in Thailand.
Knot (KTS)	Short for speed of nautical mile per hour or, loosely, one nautical mile. A nautical mile is approximately 6,076 ft.
LD	Localizer Deviation. The vertical scale on the ACLS. The higher you are when landing on the carrier, the lower the LD slides down the scale and vice versa. See <i>GSD</i> .
LGB	Laser-Guided Bomb.
Linebacker	The code name of the last, and greatest, air attack against North Vietnam. There were actually two Linebackers, one following the other.
Lock-on	The act of acquiring a target with the radar and setting the radar to track the target.
LOX	Liquid Oxygen.
LSO	Landing Signal Officer. The officer whose job it is to guide pilots to a landing on the aircraft carrier.
Mach	Unit of speed measurement equal to the speed of sound.

Manual	To bomb a target or attack or land on a carrier without using the avionics (frequently because the avionics are not working). In essence doing everything "by hand."
Master Arm	If this switch is not thrown, the plane's weapons do not work. Under one of the Rules of Engagement (q.v.), pilots were forbidden to have their master arm switch on within a certain distance of Hanoi or Haiphong.
McDonnell	The manufacturer of the F-4 Phantom II.
Meatball	Glide slope image of mirror landing system (MLS).
MIA	Missing In Action. This is the designation for a pilot who is not known to have died in his plane but has also not been located in an enemy prison camp.
MiG	Any product of the Mikoyan/Guryevich design works which designs the majority of Soviet fighters (though not all of them). Commonly, any enemy fighter is called a MiG whether it is or not. The North Vietnamese fielded MiG-17s, MiG-19s and MiG-21s.
MiGCAP	MiG Combat Air Patrol. MiGCAP generally consisted of a group of fighters away from the target area. They were placed between the target and the nearest airfields for the purpose of intercepting MiGs before they could reach the target area.
Mil	1) Military Power – 100% thrust of an airplane's engines without using the afterburners (which the Intruder doesn't have, anyway). 2) Milliradian – An angular measurement which subtends one foot at 1,000 feet (17.45 mils = 1°).
Mission	The individual task of one element or section (usually two planes) of an operation (q.v.). Missions generally have special titles such as Wild Weasel, MiGCAP, etc.
M61A1	Official designation of the 20mm cannon mounted on some F-4s and many other American fighter and attack planes.
Multiple Weapon Selection Panel	The area on the control panel on which the pilot can select the weapons he wants to use in any situation.
Nautical mile (NM)	6076.12 feet which is equivalent to 1.15 miles.
Nuggets	Airmen on their first tour of duty.
"On your six"	Common call from a wingman telling you that you have an enemy fighter or a SAM directly behind your plane.
Operation	A number of sections of aircraft with a common objective. Usually the objective is the destruction of a primary and a secondary target.
Ordies	The men who load the ordnance onto a plane.
Ordnance	Weaponry.
Over the beach	The plane is over land. See <i>Feet dry</i> .

Paddles	Nickname for a LSO (q.v.).
Paveway	A “smart bomb” that uses a TV guidance system similar to that used by the Walleye (q.v.)
Phantom II	The official name of the Air Force’s F-4 fighter.
“PhantomMan”	A cartoon figure adopted by the Navy as a method of pointing out important information in their Phantom Flight Manuals.
Pitch	The movement of a plane on the vertical axis.
PK	Probability of kill.
POW	Prisoner of War. You become a POW if you have been shot down and captured, which is not a good position to be in.
psi	Pounds per square inch.
Pullup Light	A light on the control panel of the Phantom that warns the pilot that he must pull up or crash.
RADAR	RAdio Detection And Ranging.
Red Crown	Radar picket ship in the Tonkin Gulf. It called all MiG radar sightings and tried to cover SAMs as well. If MiGs flew “in the weeds,” then Red Crown could not always spot them. While Red Crown was very useful, it was not 100% reliable.
Reece	A reconnaissance flight. See <i>RF</i> .
Redout	A loss of vision or consciousness as the result of pulling too many negative g’s.
RESCAP	RESCue Combat Air Patrol. These are the guys whose job it is to find downed pilots and pull them out of the jungle or ocean.
rf	Radio frequency.
RF	Reconnaissance Fighter.
Retarded Fall	The fall of any object that is being slowed down for any reason. For bombing, it refers to the fall of a bomb that is slowed down by vanes or parachutes.
RIO	Radar Intercept Officer. The official title of the second man in the two-seater Phantom. His responsibility was different than the Air Force’s GIB (Guy in Back), a copilot who could, and often did, fly the plane. The RIO’s sole job was watching for threats (either enemy fighters or SAMs) and running the radar.
River Rat	A pilot who has flown in combat north of the Red River.
Rockeye	Anti-tank bomb.
Rookie	Pilot without prior combat flight experience.
RPM	Revolutions Per Minute. The percentage of power being produced by your engine. See <i>Thrust</i> .
Rules of Engagement	The specific rules that all pilots and bombardiers had to follow over the skies of Vietnam. Breaking the rules was cause for a court-martial.
SA-2	The official designation of the Russian Guideline SAM.

Saigon	Capital of South Vietnam. Now known as Ho Chi Minh City.
SAM	Surface-to-Air Missile. The SAM which the Navy had to contend with in Vietnam was the SA-2.
SAR	Search And Rescue.
Section	One or two planes which are used to perform a mission. See <i>Wing</i> .
Shrike	An anti-radar missile primarily fired at enemy SAM sites.
Shuttle	The device that attaches the front wheel of a carrier aircraft to the catapult that launches it.
Sidewinder	The AIM-9 heat-seeking air-to-air missile.
Sierra Hotel	The military identifiers for the letters "s" and "h." Pilots who were extremely good were known as being Sh*t Hot, or Sierra Hotel.
Six o'clock	The directly behind position. It's a good position for an attacker, a very bad one for the target.
SL	Sea Level.
Slats	A movable auxiliary airfoil attached to the leading edge of a wing which can act as a flap.
Sortie	A launch of several aircraft to perform one or more operations.
Sparrow	The AIM-7 radar-guided air-to-air missile.
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	The bombload and other devices carried by an aircraft.
Super Engine	When using super engine, the plane's airspeed is directly related to the percentage of RPM applied and no other factors are involved.
TACAN	TACTical Air Navigation system.
TARCAP	TARget Combat Air Patrol. A group of fighters which patrolled around the target area during an air strike.
TAS	True Air Speed. The equivalent airspeed corrected for error due to altitude and temperature (air density).
Tico	The nickname for the aircraft carrier <i>USS Ticonderoga</i> .
Threat Indicator	A found radar display on the control panel which gives the relative positions of various enemies and friendlies for about a 30 mile radius.
Thrust	RPM. The amount of power being produced by your aircraft's engine. The terms Thrust and RPM can be used interchangeably.
Top Gun	The common name of the Navy ACM school.
Trap	Arrested (by hook and arresting wire) landing.
Twelve o'clock	The straight-ahead position. Where you want an enemy to be.

UHF	Ultra High Frequency.
Up North	Slang term for North Vietnam.
VHF	Very High Frequency.
VVI (or VSI)	Vertical Velocity Indicator (Vertical Speed Indicator). This dial measures climb and descent rate in 1,000s of feet per minute. The zero position is at 9 o'clock. Climb is represented by a clockwise movement of the needle. For example, 3 o'clock represents 6,000 feet/minute.
Walleye	A TV-guided air-to-ground bomb where the pilot can see his target through the missile's TV camera.
Waypoints	Points on the map frequently associated with landmarks or ship positions, which a plane is plotted to fly between to make sure it is on course.
Wild Weasel	Originally an Air Force term for a ground attack on SAM and AAA sites. Planes flying Wild Weasel strikes generally carried ECM pods. See <i>Iron Hand</i> .
Winchester	If an airplane is "Winchester," it is depleted of weapons.
Wing	A complement of two planes used to carry out a mission. See <i>Section</i> .
Wing Leader	The lead plane in a wing.
Wingman	The following plane in a wing. He mirrors the wing leader and covers him if necessary.
Yankee Station	Sea area in the Gulf of Tonkin where the U.S. Navy stationed its carriers to launch air attacks into North Vietnam.
Zoo	A nickname for the POW camp on the southwest edge of Hanoi in North Vietnam.
Zuni Rockets	Unguided rockets carried in cannisters for attacking ground targets (though at least one MiG was brought down by a barrage of Zunis).

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A FINAL WORD

The Vietnam War tore America apart. It was an era that pitted young against old, liberal against conservative, poor against rich, and black against white. Over 58,000 Americans died. Another 153,000 were wounded. The Vietnamese lost even more. Today, there are many opinions and viewpoints about the U.S. involvement in Southeast Asia. *Flight of the Intruder* is intended to give you the Naval Aviator's point of view. The Navy lost 377 pilots in Vietnam. For many aviators, the most upsetting part of the war was not the loss of life but the loss of life without purpose. Many pilots were killed attempting to bomb meaningless targets. The Vietnam war became a war of statistics. Sortie, mission, and target counts became more important than the lives of the people who put their lives on the line every day.

This game is not intended to glorify the war but is designed to give you a better understanding of the sacrifices we asked our warriors to make. We at Spectrum HoloByte are attempting to give you a very realistic simulation of the era. We want you to appreciate the effects of the rules which we made our aviators operate under and to appreciate the effectiveness of the North Vietnamese defenses.

When you play the game, play it as if you were in a real A-6 or F-4 in Vietnam. When you are hit by a missile or shot out of the sky in the game, understand that if you were a aviator in Vietnam, you would have died. The men who flew in Vietnam did not have the ability to reset the game or turn off the computer. They did not have the ability to simply turn off the Rules of Engagement.

War, especially the Vietnam war, is not about machines and technology. It's about people and politics. It's about lives and deaths. War is not a game. It should never be reduced again to a collection of statistics. We should never take decision of war lightly and never ask our youth to sacrifice their lives without cause. Perhaps in the future we can live in a world in which we are dedicated to building rather than destroying.

This game is dedicated to all those people who sacrificed their lives and those who lost their dreams and loved ones in Vietnam.



Gilman G. Louie
CEO/Chairman
Sphere, Inc.

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