Jane's
COMBAT SIMULATIONS

F/A-18
SIMULATOR

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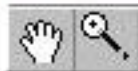
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A QUICK WORD FROM THE JANE'S® TEAM

All of us at Jane's Combat Simulations thank you for purchasing *Jane's F/A-18.* Whether this is your first Jane's product or one of many from the Jane's Team, you are in for a real treat. *Jane's F/A18* is the latest in a series of highly accurate and challenging combat simulations.

As you maneuver through the exciting world of naval aviation, hold this thought. You determine how to play *Jane's F/A-18;* it was designed with you in mind. Whether you immediately jump into The North Cape Campaign or start just a little slower by easing into the action with the Instant Action missions, you are always in the pilot's seat.

Our only desire is to provide you with an enjoyable experience – quality is our only goal. If you have questions concerning *Jane's F/A-18,* or for that matter any comments or questions about any of the Jane's products, please contact us at:

World Wide Web: Access our Web Site at **http://www.ea.com**

FTP: Access our FTP Site at **ftp.ea.com**

This product has been rated by the Entertainment Software Rating Board. For information about the ESRB rating, or to comment about the appropriateness of the rating, please contact the ESRB at 1-800-771-3772.

CHAPTER 1: FIRST LOOK

If you wish to jump right into the game with minimal fuss, this First Look mission is made to order. After just a few mouse clicks, you will bag your first MiG and be blowing up ground targets.

Although *Jane's F/A-18* includes most every detail of naval combat aviation in the Super Hornet, this mission is designed to give you a quick "First Look." For more detailed experiences, we recommend you next tackle the Training Missions.

SELECTING THE MISSION

◆ From the main menu, click SINGLE MISSION found on the right portion of the screen.

◆ Within the Single Mission screen, select the "First Look" mission from the scrollable list on the right side of the screen.

◆ To start the mission, click the airplane icon on the dial found in the lower right portion of the screen.

KILLING THE MIG

An unwary MiG is right in front of you; let's shoot him down.

◆ Press ⓪ to lock him up on radar.

◆ Once he's locked press Ⓜ to activate air-to-air attack mode, then press SPACEBAR or joystick **button 2** to launch a missile.

Shoot cue —

Target —

BOMBING THE TARGET

Now that that pesky MiG is out of the way, lets put some iron on target by destroying some fuel tanks.

◆ Press Ⓜ to activate air-to-ground bombing mode.

◆ Fly towards the label in front of you marked "Primary Target."

◆ As you near the target begin a shallow dive and line it up directly to your front. When you get close, the bomb cross appears at the bottom of the HUD. When the cross is positioned over the Primary Target, press SPACEBAR or joystick **button 2** to release a bomb.

Target (fuel tanks) —

Bomb cross —

SIGHTSEEING

After you've bombed the target, fly around a bit and enjoy the scenery. You can select the various views using the function keys. Enjoy the game!

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CHAPTER 2: INTRODUCTION

"The affairs of war, like the destiny of battles, as well of empires, hang upon a spider's thread." —Napoleon

THE WORLD IN THE BALANCE

With the demise of the Soviet Union in the last decade of the 20TH Century, the traditional ideological rivalry that had dominated the free world for nearly 50 years has ceased to exist. The cold war mentality of force maximization and massive defense spending are no longer tenable positions. The United States woke up one day to find itself in the unenviable position as the last superpower. Victory has its price.

In spite of the dramatic impact stemming from the breakup of the Soviet Union, a period of worldwide peace was in no way inevitable. The localized and regional conflicts, held in check for many years by the looming superpowers, were now free to rear their ugly heads. These nationalistic, religious, and ethnic rivalries, while seemingly non-issues, had in reality continued to churn just below the surface. Once unfettered from their shackles, they were free to pursue individualistic goals.

For the United States, far reaching economic interests mandate international stability. The time of waging war for purely political, religious, or geographic gain is no longer good business. In the world of today, the capacity to capture and maintain regional or global dominance is predominately grounded in economic supremacy. Wars are astronomically expensive. Conflict is now based more on profit and loss rather than ideological conviction.

While the United States struggles to remain neutral on these regional issues, the threat of war, while not on a global scale, remains a real and ultimately an unavoidable consequence of man's unquenchable need to possess more and more.

Quick reaction to active or potential hot spots is clearly the purview of the Navy. The Air Force will certainly argue this point, but they unquestionably lack the ability to transport their airfields along with their aircraft. They require forward deployment areas within the range of the conflict. This necessitates the cooperation of allied or non-allied nations – never a guarantee. Fixed forward bases are also much more vulnerable to preemptive or in-conflict strikes – it is still much harder to hit a moving target.

The Navy is the only military arm possessing the wherewithal to quickly project the required force against an aggressor. Oceans cover nearly three-fourths of the earth's surface. Those nations having the potential to threaten, or for that matter act out their aggression, typically occupy or are in close proximity to the coastal regions of the world. The U.S. Navy's carrier forces are strategically deployed throughout the world to arrive on station within 48 hours or in rare cases 72 hours. During the 1990 Gulf Crisis, the carriers Eisenhower and Independence were both on station in range of Iraqi forces within 48 hours.

The vast majority of all products, whether finished goods or raw materials, are transported over water. The nation with the strongest navy exerts de facto control over the ebb and flow of all these goods. They need not defeat the opposition forces or for that matter exercise significant military force. Simply blockading ports, thereby preventing the inflow or outflow of goods, may be sufficient to bring most nations to their knees. Economics ultimately wins out.

It is inevitable the United States will be drawn into shooting wars – these potential conflicts have been euphemistically dubbed 'Low Intensity Conflicts' or LICs. The concept of "Global War" is now reserved for conflicts involving the unthinkable use of nuclear weapons. This does not mean that the fighting or magnitude of commitment will reflect a minimal or low level of effort on the part of U.S. forces. Given the low current level of conventional forces, any commitment will require a maximum effort. In any event, the U.S. Navy will undoubtedly play a major role in any future conflict, LIC or otherwise.
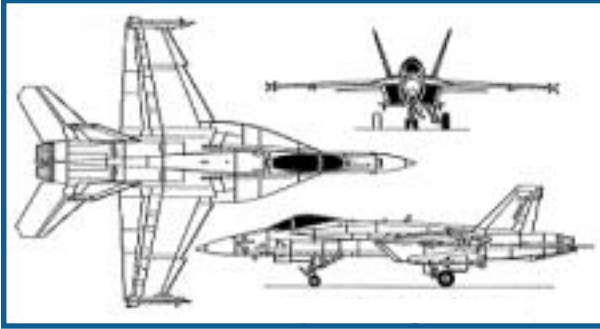
F/A-18 E Super Hornet

Jane's F/A-18 models modern naval aviation at its best, highlighting one of the U.S. Navy's most potent weapons – the F/A-18E Super Hornet. A versatile gem, the single-seat Hornet-E is equally adept at knocking enemy aircraft out of the skies as it is in delivering precision strikes against targets on land or on the sea. Jane's F/A-18 does not just stop at that, it is a highly detailed and stunningly accurate simulation of naval aviation.

What does all this mean to you? You get see all from the cockpit of the Navy's hottest new multi-role fighter!

THE FLEET'S STINGER

The F/A-18 Hornet was designed to fulfill a number of different roles, hence its F/A (Fighter/Attack) designation. In the 1970s, the Navy came to the realization that it could no longer afford to develop single-use aircraft. As conceived, the Hornet was to replace the A-7 Corsair II light-attack and F-4 Phantom air superiority aircraft, at that time in service with sea-based Navy squadrons and land based Marine squadrons – do not overlook the fact that the Navy also oversees Marine aviation.

Cost control measures also dictated the method of aircraft selection. Congress and the DOD directed the Navy to join with the Air Force on its 'lightweight' fighter program and select a common airframe for both services. Two competing designs, General Dynamics/Vought's YF-16 and Northrop/McDonnell Douglas' YF-17, were in the running (the 'Y' designates the aircraft as a prototype). In the past, the Navy and Air Force had worked together in aircraft concept, design, and development, ostensibly to control acquisition costs – buy a large quantity and the per unit cost is less. It also streamlines the flow and cost of spare parts.

Well, that is all good in theory. In reality, the Navy and Air Force seldom were of one mind on aircraft selection. Ironically, the A-7 Corsair II and F-4 Phantom were the most recent examples of inter-service cooperation. These two aircraft were originally Navy programs "shared" with the Air Force, now the scales were reversed.

A good part of this single-mindedness can be written off to service pride, but the Navy does have some legitimate arguments. They favor a twin-engine configuration due to the hazards of over-water flight. In addition, carrier landings, affectionately described as controlled crashes, place extreme stress on the landing gear and undercarriage. This requires additional structure and weight, reducing the aircraft's payload – a price the Air Force is unwilling to pay.

In the end, the Air Force selected the YF-16 and the Navy selected the YF-17. What happened to the single selection process? General Dynamics/Vought asked the same question. After much lobbying the Navy did prevail and managed to convince Congress and the DOD to support their decision. The YF-16 became the highly successful F-16 Fighting Falcon while the YF-17 evolved into the newly designated F/A-18 Hornet.

The final F/A-18 Hornet was hardly a YF-17 with a new name stenciled on its nose; it was essentially an entirely new design. This evolutionary process experienced its share of pitfalls, but what emerged was a very capable and advanced aircraft. Although, the production Hornet still had one shortcoming – limited range, or, in military parlance, "short legs". After the evaluation signoff, production started in 1978; the first operational aircraft entered service with VFA125, the Rough Raiders, in 1980.

The Hornet looks a like a smaller version of the F-14 Tomcat with its twin-engines and twin-tails. In spite of its strike role, the Hornet is a dogfighter at heart. Its nose houses the multi-mode APG-65 radar (APG-73 in late model 'C' and later versions) and the 20mm M61 6-barrel Gatling gun. AIM-120 AMRAAM ('C' and later) and AIM-7 Sparrow AAMs (or the AAS-38 Nighthawk FLIR/laser targeting pod) are mounted in two recessed wells on the fuselage; the wingtips are reserved for AIM-9 Sidewinder AAMs.

The centerline station typically carries an external fuel tank. Its wings have six weapons stations plumbed for AAMs and a variety of ordnance including Paveway LGBs, AGM-Maverick (IIR version in 'C' and later), AGM-88 Harm, AGM-84D Harpoon, AGM-84H SLAM, as well as the full series of 'iron' bombs.

That is enough about the exterior, how about taking a look where the pilot works. The cockpit is a pilot's dream. It features a true 'glass' layout with a series of computer screens replacing the traditional analog gauges. These displays are extremely versatile, allowing the pilot to configure them to suit a multitude of situations. An advanced-generation HUD complements the 'head-down' displays. It can be switched from air-to-air to air-to-ground mode with a simple flick of a switch on the HOTAS controls. All this high-tech equipment enables the single-seat Hornet to fulfill the roles previously reserved for two crewmen.

According to naval aviators, a tough audience on a good day, the Hornet is a pleasure to fly. Its FBW flight control system, the first for a carrier aircraft, makes for extremely responsive fight. Hornet jockeys boast that their bird can fly the wings off their Air Force counterparts. If that is not enough, the Hornet can even automatically touch down to a perfect three-wire landing while the pilot sits back and enjoys a day at sea.

After production of 371 F/A-18As, the Hornet continued to evolve and improve with the introduction C/D versions in 1986 (note that F/A-18 'Bs', 'Ds', and 'Fs' are the two-seat variants of the A/C/E respectively). With the new C/D version, the radar, avionics, self-protection systems, engines, and a number of additional systems were also improved and updated. This was the first of the Hornets to support the AIM-120 AMRAAM AAM and the Imaging-Infrared (IIR) version of the AGM-65 Maverick.

The new APG-73 radar markedly improved the Hornet's air-to-air and air-to-ground signal processing with its fully programmable digital architecture. In both modes the radar is used to search for targets and then lock onto and track them for attack. In fact, it was so good that there was never a thought of upgrading it for the new F/A18E Super Hornet. The C/Ds fixed the shortcomings of the initial A/Bs, with the exception of the fuel issue. Remember that was the knock against the first model. This was the aircraft envisioned by the Navy planners from the very beginning.

The Marine Corp actually focused its attention on the two-seat 'D' model. It acquired six squadrons of 72 aircraft enhanced for night precision strikes to replace the A-6 Intruder in their all-weather attack squadrons. Equipped above and beyond the normal two-seat Hornets, this improved version was originally dubbed the F/A-18D+.

The rear cockpit can be configured in one of two ways: "missionized" – where it lacks a flight control column, replacing it with two side-mounted weapon/system stick controllers; or "trainer" – where the it has full flight controls.

The E/F models promise to be the most capable Hornets yet. They were originally proposed in 1991 as a replacement for the disastrous A-12 Avenger program. The Super Hornet is a major step improvement over the previous models. This was the opportunity to produce an airframe that would serve well into the 21st Century, and the designers decided to take this to the max.

The Super Hornet took the basic 'C' airframe and stretched it an additional 34 inches. This resulted in a 25% increase in wing surface as well as an enlarged horizontal stabilizer – the tail. This size increase solved what had been the biggest knock against the Hornet since its inception – limited internal fuel. The Super Hornet can carry 33% more fuel for a whopping 40% increase in range. With the larger wing, the designers were able to attach one additional weapon station per wing just inboard of the wingtips. The Super Hornet also gets two new powerful F414-GE-400 high-output afterburning turbofans.

F/A-18 E Super Hornet
33% additional internal fuel
35% higher thrust engines
2 additional multimission weapon stations
25% larger wing
90% common F/A-18C/D avionics
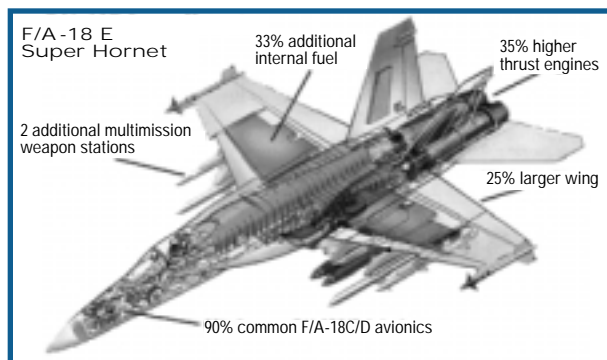
Together, the two new engines produce 35% more thrust than the F404s in the C/Ds. However, the new design retains 90% of the avionics suite from the C/Ds, anchored by the highly capable APG-73 radar.

On the self-protection side, the Super Hornet is the first naval aircraft to employ extensive radar and IR signature reduction in the form of reshaped engine inlets and radar absorbent coatings. The engine nozzles are designed to cool the jet exhaust, thereby reducing the aircraft's infrared signature. The Super Hornet is also the first to carry the new ALE-50 towed decoy system.

A proposed version of the 'F' model is earmarked to replace the four-seat EA-6B Prowler electronic warfare platform. The two-seat EF-18G 'Electric' Hornet will probably lead future strike aircraft to their targets, blinding enemy radar and suppressing enemy air defenses with AGM-88 Harm anti-radiation missiles.

CVW OF TODAY – 2001

14 – F/A-18 Super Hornet	Air Superiority & Strike
14 – F-14 Tomcat	Fleet Air Defense, Strike & Recon
24 – F/A-18 Hornet	Air Superiority & Strike
4 – EA-6B Prowler	Electronic Warfare & SEAD
4 – E-2C Hawkeye	AEW
6 – S-3B Viking	ASW, ELINT & Aerial Refueling
6 – SH-60R Seahawk	ASW
2 – CH-60C Seahawk	CSAR
74 aircraft	

CVW OF TOMORROW – 2011

36 – F/A-18 Super Hornet	Fleet Air Defense & Strike
10 – JSF	Air Superiority, Strike & Recon
4 – EF-18G Electric Hornet	Electronic Warfare & SEAD
4 – CSA AEW	AEW
6 – CSA Sea Control	ASW & Recon
2 – CSA ESM	ELINT & Aerial Refueling
6 – SH-60R Seahawk	ASW
2 – CH-60C Seahawk	CSAR
70 aircraft	

The Hornet is the cornerstone of the Navy's present and future plans. For a program once under fire from all sides, it has now emerged as the premier aircraft in the Navy's arsenal. It currently represents half of the aircraft in every Carrier Air Wing (CVW). The future holds even more promise for the Hornet and its variants.

As more and more Super Hornets enter service, the venerable F-14 Tomcat will retire from service. The Hornet will then pull double duty as the fleet defense aircraft as well as the primary strike platform. The new Joint Strike Fighter (JSF), another one of those cooperative Navy and Air Force development programs, will serve as the medium strike aircraft, though it will also possess a degree of air-to-air capability. The "Electric" Hornet will replace the EA-6B Prowler while a new design, the Common Support Aircraft (CSA), is scheduled to replace the versatile E-2 Hawkeye and S3 Viking.

Depending on the outcome of the JSF program, and there is some doubt that it will ever see the light of day, the Hornet may actually be called upon to fill all offensive and defensive roles.

The Super Hornet first took flight in late 1995. Production commenced in 1998; the first deliveries are expected in early 2001.

MAILED FIST –
THE CARRIER BATTLE GROUP

As the Navy's primary conventional weapon, naval surface warfare centers on the carrier battle group (CVBG). Today, there are ten active carrier battle groups, each with its assigned CVW. At any one time, any number of these CVBGs (CV is the military designation for a large conventional take-off and landing carrier) are strategically deployed throughout the world. As would be expected, its accompanying carrier air wing (CVW) is the primary offensive and defensive weapon system.

While certainly the most important unit, the carrier is still just one component of the battle group. It is composed of the carrier, its aircraft, and a number of escorts and support elements. Think of it in terms of trying to sit on a one or two-legged stool. The aircraft need the carrier, the carrier needs the escorts and support elements, and they need the carrier and its aircraft. Any one element is ineffective without the others – they are mutually supportive.

The battle group's CVW is commanded by the "CAG," short for commander, air group. This individual holds the rank of Captain, the same as the carrier's commanding officer. Do not confuse the rank of Captain and the title of captain. The rank of Captain is a Navy 'four-striper', equivalent to the rank of Colonel in the Army or Marines. The title of captain is bestowed upon the individual, regardless of rank, who commands a naval vessel.

The "CAG" and the carrier's captain work together as peers reporting to the battle group's commander, a two-star Rear Admiral. Right about now you are probably wondering why is an air group commander commanding an air wing. The "CAG" is a traditional title, held in the highest of regard, which has carried over from the time when the air wing was called an air group. The air group became an air wing in 1975 with the addition of integrated support and ASW helicopter squadrons.

The typical CVW includes about nine squadrons of combat and support aircraft including the helicopters. Over fifty of the seventy-four aircraft are found in the four F-14 Tomcat and F/A-18 Hornet squadrons. As the predominate aircraft, the F/A-18 Hornet VFA (strike fighter) squadrons now outnumber their F-14 Tomcat VF (fighter) counterparts three to one. The remaining fixed-wing squadrons consist of the EA-6B Prowler, E-2C Hawkeye, and S-3 Viking squadrons (in both ASW and ELINT roles).

The CVW is no longer just a Navy show. A shortage of aviators necessitated a change in the once exclusive community. It is now quite common to find carrier-capable Marine squadrons serving as one of the F/A-18 Hornet squadrons or as the EA-6B Prowler squadron.

The third 'leg' of the battle group is the escorts and support elements. Here you will find much more diversity than that found in the composition of the CVW. Vessels are attached and released from the battle group depending on the immediate situation. For example, MCM (mine counter-measures) ships could be attached to a battle group if it is to operate in relatively shallow waters or must traverse a predictable track or narrow channel.

In general, a carrier battle group includes one or two cruisers, two or more destroyers, one or two frigates, one or two submarines – yes submarines – and a replenishment ship.

With the retirement of the last remaining nuclear powered-cruiser, the mantel passed to the *Ticonderoga* class of Aegis (Greek for shield) guided-missile cruisers (military designation – CG). Even though they possess a considerable offensive punch with their Tomahawk and Harpoon cruise missiles and two 5-inch guns, the CGs are there for one purpose – defense. Their highly sophisticated SPY-1 phased-array radar system simultaneously tracks and engages a multitude of airborne targets. They also automatically control the weapons from the other ships in the battle group, creating an integrated defensive umbrella. These ships are so effective that the Admiral may elect to command the battle group from the deck of a *Ticonderoga* rather than from the traditional spot on the carrier.

The destroyer element draws its force from the old and the new. The new takes form in the *Arleigh Burke* class of guided-missile destroyers (military designation – DDG). In fact, the *Burkes* are the newest class of combat ships in the Navy's arsenal. These well-designed ships also utilize the Aegis system with its SPY-1 radar. Though they are similar in capability to the Ticonderoga class, the Burkes carry fewer missiles and a single 5-inch gun.

The other destroyer option is drawn from the older *Spruance* class (military designation – DD). These ships were designed at the height of the cold war for anti-submarine (ASW) operations. As the Soviet deep-water submarine threat waned, their offensive punch was enhanced with the addition of Tomahawk cruise missiles to complement their Harpoons and two 5-inch guns.

The frigates are from the *Oliver Hazard Perry* class of guided-missile frigates (military designation – FFG). Even though these frigates hauled down their sails a long time ago, they are more than able to fulfill a number of important roles. Their size disguises very capable offensive and defensive capabilities. With a limited number of Harpoons and a single 3inch gun, they are best suited for escort duty and shallow water operations. Nevertheless, frigates are the most common class of warships in service today with the world's navies.

The last combat support element is the submarine. Now what are submarines doing in a surface battle group? They serve a very important role in keeping with their unique abilities. Their far ranging and stealth abilities make them well suited for maritime reconnaissance and strike missions. More importantly, they are the battle group's most potent anti-submarine weapon, since the best defense against a submarine is another submarine. While the surface escorts maintain relatively close contact with the carrier, the subs range far ahead and abeam of the battle group. The

SIZE DOES MATTER

During World War I and II displacement, armor and gun size were used to classify warships. The four primary classes of modern warships are loosely grouped by length since displacement is no longer a direct indication of combat strength and guns have given way to missiles as the primary armament.

Modern cruisers are 150m or longer. Destroyers are 95 to 140m long. Frigates are similar to destroyers in length but are more lightly armed. Corvettes are 60 to 100m in length.

Improved Los Angeles class, the 688Is, are the most modern boats available (military designation – SSN, note that subs are call boats). They are also able to launch Tomahawk cruise missiles from their vertical launch system and Harpoons from their torpedo tubes.

Lastly, the battle group is supported by at least one fast combat support ship. While the carrier and subs do not require fuel, the remainder of the battle group needs oil for propulsion, and in any event, everyone needs to eat. The *Wichita* and *Sacramento* classes (military designation – AO) are floating shopping centers. These ships triple their basic displacement with loads of fuel oil, aviation gas, food, spare parts, general supplies and ammunition. The only ship larger is the carrier.

Together, the battle group is much stronger than the capabilities of the individual vessels – a perfect example of the sum being greater than its parts. However, the whole carrier concept has been under extreme pressure due to its high price tag. A battle group costs nearly $20 billion to build and equip, and another $1 billion annually to operate. So expensive, few countries can afford to build or even operate such a costly weapon system.

The advent of cruise missile has applied additional pressure. The critics compare the $1 million price tag for a Tomahawk cruise missile with the $58 million for a single F/A-18E Super Hornet, and the dollars are just one part of the argument. On an even more important note, the unmanned Tomahawk does not place a pilot's life in danger.

Though, cruise missiles are great at hitting fixed points, they are limited in hitting moving targets, especially ships at sea. An aircraft's pilot is also able to evaluate a situation before dropping the bombs; the cruise missile obediently and blindly attacks its target. Even more notable, a CVW can deliver about 450 tons of ordnance in a day – the equivalent of 900 Tomahawks!

Today, the carrier and its air wing are the most mobile and flexible striking force in the United States arsenal. Whether called upon to carry the action to the enemy or hold one at bay, its ability to project military presence makes it the ultimate weapon system.

Jane's®

COMBAT SIMULATIONS

CHAPTER 3:
INTERFACE OVERVIEW

Starting the game. After completing the installation, double-left click on the Jane's F/A-18 shortcut icon on your desktop, or select *Programs/Jane's Combat Simulations/F/A-18* from the Windows START menu.

You can bypass the Introduction by pressing ESC.

GENERAL INSTRUCTIONS

EA TIP *Jane's F/A-18* utilizes a cursor-driven, mouse controlled interface. Unless otherwise indicated, "click" refers to a single left-click of the mouse on an option.

In the lower-right corner of nearly every screen, except the MAIN menu, is a circle divided into four distinct controls – three around the other edge and one smack in the middle. They include a right pointing FORWARD control, a left pointing BACK control, a HELP question mark control, and a rotating "artificial horizon" in the middle.

Think of FORWARD and BACK as if they were web controls: FORWARD moves you to the next screen in the sequence and BACK returns to where you just came from. Note on some screens the FORWARD control is "grayed-out," as there is no next screen.

HELP displays a window with information pertinent to the current screen.

In most cases, clicking on the artificial horizon displays an OPTIONS screen.

The screen may also include one or more small circular controls along the bottom.

POP-UP WINDOWS

Often, pop-up windows appear. Selections are made and information entered from these windows.

OK saves any selections or changes you've made in the window and returns you to the original screen.

CANCEL returns you to the original screen without saving *any* of the changes you made.

MAIN MENU

The first thing you see after the introductory video is the MAIN menu screen. It's divided into eight areas controlling one or more functions and a centrally located artificial horizon. You select a control by moving the cursor into its area to highlight it, and click.

Fly a Training Mission

Multiplayer Setup

The Tools
(Mission Builder, Pilot/Squadron Edit, and Jane's Reference)

Game Options

Exit the Game

Fly an Instant Mission

Fly a Single Mission

Fly in a Campaign

Notice that it is not necessary to click on the control word – click anywhere in the highlighted area to proceed.

First-time Hornet pilots begin playing using novice settings. Gameplay options can be set in the OPTIONS (the artificial horizon) menu.

TRAINING

Jane's F/A-18 includes a variety of training missions covering the basics of flying this sophisticated fighter from takeoff, through combat, to landing on the deck of a carrier.

It'll be well worth you taking some time to fly at least the first few training missions. If you're unfamiliar with carrier operations, the take-off and landing procedures are quite different from land-based operations.

Mission Summary

Mission Objective

Available Missions

Chat Control
(Multiplayer Only)

LOADING A TRAINING MISSION

The MISSIONS list is a scrollable window on the right side of the screen.

◆ Click on the mission name (listed in Missions window) to display a summary of the mission.

◆ Double-click on the mission name to immediately display the mission briefing.

◆ Or click FORWARD to display the mission briefing.

Notice that where you would expect to see the normal FORWARD indicator, a small aircraft is substituted – this is the Fly Mission control. When you are satisfied with all elements, you're ready to jump in the pilot's seat and takeoff.

◆ After the briefing displays, click FLY to begin the mission.

◆ Or after the briefing displays, click BACK to return to the initial TRAINING menu.

Mission Summary: The upper-left window displays a high-level summary of the mission. Read this information to determine if this is the mission for you.

Mission Objective: The lower-left window displays a picture of the mission objective.

TRAINING MAIN BRIEFING
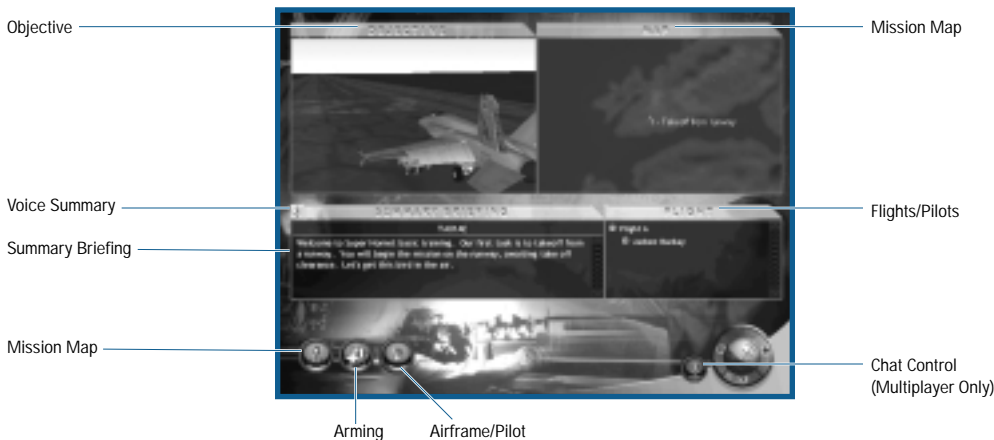
For more details on the Main Briefing, see **Single Mission: Main Briefing**, p. 3-22

INSTANT ACTION

If you're looking to quickly select a mission and get in there and mix it up with the enemy, Instant Action is just the ticket. The computer creates a stand-alone mission from the parameters you select. You determine the complexity – playing a simple one-on-one, or skew the odds either way. It's all up to you.

> **EA TIP** Instant Action is not intended as a replacement for honest to goodness training. If you're unsure how to handle the F/A-18E Super Hornet, spend some time with the training missions before strapping into the Super Hornet.

FLY MISSION

Click FLY to begin the mission.

Enemy Aircraft

Number of Enemy

Time of Day

Instant Action Options

Number of Wingmen

Target   Position

Number of Wingmen: You can go it alone or select up to seven wingmen. Wingmen duplicate your weapon package.

A/G Target: Determines the type of ground targets you must destroy, if any – you may select none for an air-to-air mission.

Enemy Aircraft: Select the type of enemy aircraft. You can select from any aircraft available in the game – from lumbering 707s to hot MiG-29s. All enemy pilots fly the same aircraft.

Number of Enemy: The default is two, but you can select as many as eight.

Position: You determine the advantage, if any, of your starting location.

◆ "Neutral" means the enemy starts at the same distance from the waypoint as you and at approximately the same speed.

◆ "Advantage" means you begin the mission on the tail of the enemy.

◆ "Disadvantage" means that you are positioned ahead of the enemy. The enemy will have the advantage of seeing you first.

Time of Day: Choose the starting time of day for the mission.

INSTANT ACTION OPTIONS

The Instant Action Options expand on the basic settings. You are not required use to these options.

Set any or all parameters in Friendly (your aircraft and wingmen), Enemy (the bad guys), and Environment (clear for miles or pea soup).

◆ Click on a parameter to display available options. Some parameters are inactivated due to previous selections. For example, if you select zero wingmen, the formation parameter is not too useful.

◆ Click on an option within the parameter.

FRIENDLY PARAMETERS

Altitude: Choose to start the mission altitude at low, medium, high or at a random selection from the three options. The F/A-18E is very comfortable at low altitude, but if you aren't familiar with the avionics and are flying in the mountains, start the mission at medium or high altitude, just to be safe.

Loadout: Select your weapon loadout from the available options.

Wingmen Skill: This parameter determines the skill level of your wingmen. A Rookie pilot is more likely to make a mistake that could place the mission in jeopardy; whereas an Expert or random pilot is more likely to deliver in a pinch.

Formation: Select the formation for you and your wingmen.

◆ "Wedge" is a V-shape, except two aircraft (you and a wingman) share the lead position.

◆ "Line" positions all your wingmen parallel to one side of you, perpendicular to the waypoint path.

◆ "Trail" positions your wingmen in a line directly behind you.

◆ "V" is V-shaped, with you at the front.

◆ "Box" positions you and your wingmen in a rectangular-shaped formation at different altitudes.

◆ "Wall" positions you and your wingmen similar to a "Line" but at different altitudes.

ENEMY PARAMETERS

Enemy Skill Level: Select the skill level of the enemy pilots. The less skilled they are, the fewer offensive/defensive maneuvers they're capable of performing. If they're flying 707s, you may want to give them a break and assign ace pilots.

Altitude: Set the enemy aircraft's altitude at low, medium, high or at a random selection from one of the three options. Keep one thing in mind: if you assigned a less maneuverable aircraft to the enemy (our old friend the 707), you may want to start them at medium altitude.

Loadout: Since the enemy can be flying any type of aircraft, "Loadout" only determines what *type* of ordnance the enemy aircraft is carrying, not the *exact* weapons. You may also select random as the option.

◆ "Empty" is naked, no weapons, only chaff and flares – not very sporting of you.

◆ "Guns Only" is only a full load of gun ammo – assuming the aircraft has a gun.

◆ "IR Only" indicates more sensitive heat-seeking missiles that track their targets regardless of the direction of launch.

◆ "SARH Only" indicates a missile with radar guidance requiring constant illumination from the firing aircraft.

◆ "Active Only" indicates a fully active "fire-and-forget" missile – long ranged and very dangerous.

◆ "Mixed Anti-Air" indicates a balanced loadout of guns, IR, and radar-seeking weapons providing the enemy aircraft can carry those weapon types.

Ground Defenses: Determines the "density" of the ground defenses along your waypoint path and around the ground target.

Ground Defenst Skill: Sets the skill level of the enemy ground defenses.

Enemy Target Distance: Determines the flight distance to the enemy targets.

ENVIRONMENT

Region: Choose the type of terrain for the mission setting.

Weather: Choose the weather for the mission. The F/A-18E is equally adept at flying under any conditions, but it's easier to fly in clear weather.

INSTANT ACTION DEBRIEFING

At the conclusion of each Instant Action mission, the Debriefing screen displays. It provides visual feedback on how well you did against the enemy aircraft and the status of the ground target, if any. A text summary also describes the mission results.

Friendly Aircraft Status

Enemy Aircraft Status

Ground Target

Mission Summary

Friendly Aircraft Status: Visually displays the status of your aircraft and up to seven-wingmen. Damaged aircraft trail smoke while an explosion covers destroyed aircraft.

Enemy Aircraft Status: Visually displays the status of up to eight enemy aircraft. Damaged aircraft trail smoke while an explosion covers destroyed aircraft.

Ground Target Status: If a ground target was included in the mission, it appears as destroyed or undamaged depending on its status.

Mission Summary: A text summary describes the status of the friendly and enemy aircraft and the ground target.

◆ Click FORWARD to return to the Menu screen.

SINGLE MISSION

Single missions are just that, missions with a very singular purpose. Here, you can focus just on the tasks at hand without worrying about the future – that comes later in the campaign. Just keep one thing in mind, these missions are not intended as training. You'd best be on your toes once the mission starts – the unrelenting action is nothing short of fast and furious.

Mission Summary — [screen]— Available Missions

Mission Objective —

Chat Control (Multiplayer Only) —

EA TIP   Any mission created in the MISSION BUILDER and saved to the MISSION subdirectory of the game, appears in the list of available missions. Note that missions still under construction also appear in the mission list. Selecting missions under construction is a good way of determining how well they work.

LOADING A MISSION

The MISSIONS list is a scrollable window on the right side of the screen. The list of missions includes both pre-existing missions and those created in the MISSION BUILDER.

◆ Click on the mission name (listed in Missions window) to display a summary of the mission.

◆ Double-click on the mission name to immediately display the mission briefing.

◆ Or click FORWARD to display the mission briefing.

◆ After the briefing displays, click FORWARD to begin the mission.

◆ Or after the briefing displays, click BACK to return to the initial SINGLE MISSION menu.

Mission Summary: The upper-left window displays a high-level summary of the mission. Read this information to determine if this is the mission for you.

Mission Objective: The lower-left window displays a picture of the mission objective.

MAIN BRIEFING

Voice Summary

Mission Map

Objective

Summary Briefing

Flights/Pilots

Mission Map

Chat Control
(Multiplayer Only)

Airframe/Pilot   Arming

The Briefing screen is where you can fine-tune any or all of the mission parameters or if you prefer, just start the mission. Click FORWARD to start the mission at any time. All of the available mission information can be reviewed, the mission map adjusted, and the mission's aircraft and pilots can be adjusted or even replaced.

Objective(s): The upper-left window displays a picture of the mission objective.

Map: The upper-right window displays a map of the mission area.

Summary Briefing: The lower-left window displays a summary of the mission's briefing.

Flight: The lower right window displays a picture of the mission's flights and assigned pilots.

Voice Summary: Missions can have voice support describing the objectives and briefing. If available, click the speaker to play or stop play.

MISSION MAP

All currently known situational awareness is graphically viewed from the Mission Map. This includes the locations of waypoints for each flight, the Mission's Bullseye, JSTARS and FACs aircraft, and any known threats. You may also move, add or delete waypoints from the Mission Map.

From this screen you can also move to a detailed description of the briefing, review available intelligence information or modify the target designations.

Flight Tab

Mission Map

Map Filters

World

Delete Waypoint

Add Waypoint

Map Controls

Targeting

Detailed Briefing

Chat Control
(Multiplayer Only)

Intelligence

MAP FILTERS

The upper-right window contains five rows of icons that control the information displayed on the Mission Map. Colors are utilized to designate ownership: green – friendly, red – enemy, gray – neutral, and blue – information. Toggle an icon to turn the item type on/off. Take time to experiment with the different map filters observing each one's effect.

Ground Units Structures   Naval Units

Aircraft

AAA Site

SAM Site

Waypoint Path

Airbases

Weapons Ranges

Ground Radar

Radar Ranges

Mission Label

Waypoint Range   Waypoint Time   World Label
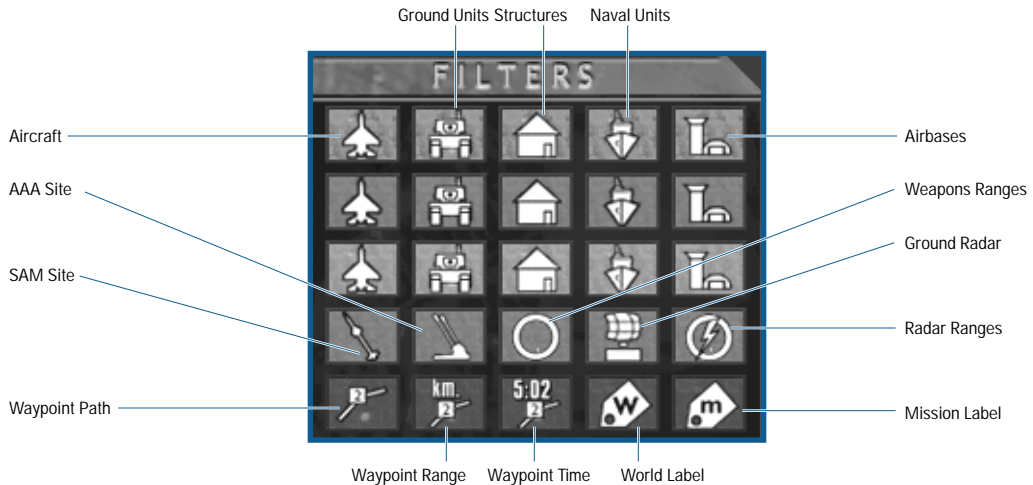
MAP CONTROLS

The middle-right window contains a single row of five green icons that control the scale and position of the Mission Map.

Zoom Out   Revert   Zoom Cursor

Zoom In

Center on Cursor
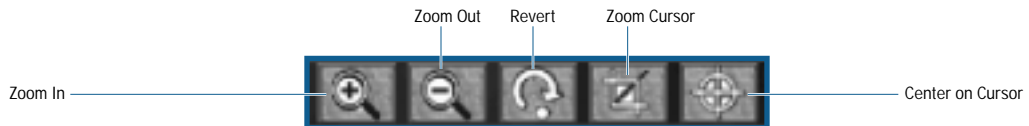
Revert: Clicking REVERT returns the Mission Map to its original view.

Zoom Area: Click ZOOM AREA to select an area to view.

◆ Click-and-drag an area on the Mission Map. A red box outlines as you click-and-drag.

◆ Release the mouse button and click again. The area described now fills the Mission Map window.

Center on Cursor: Click CENTER ON CURSOR to position the Mission Map.

◆ Click a location on the Mission Map. The Mission Map display centers on that point.

The mission map enables you to not only view mission related information but to also move, add or delete waypoints for any friendly aircraft.

ADD WAYPOINT

◆ Click ADD WAYPOINT (You move an existing waypoint by clicking-and-dragging it to a new location). You must click ADD WAYPOINT for each new waypoint.

◆ Click on the waypoint just before the waypoint you want to add. If you want to add a waypoint prior to Waypoint 1, click on the aircraft itself.

◆ Click on the location of the new waypoint

DELETE WAYPOINT

◆ Click DELETE WAYPOINT. You must click DELETE WAYPOINT for each deletion.

◆ Click on the waypoint to delete.

DETAILED BRIEFING

◆ Click DETAILED BRIEFING to view an expanded description of the mission. Clicking BACK returns to the Main Briefing.

Chat Control
(Multiplayer Only)

INTELLIGENCE

◆ Click INTELLIGENCE to view the most current intel data relating to the mission.

Chat Control
(Multiplayer Only)

TARGETING

◆ Click TARGETING to modify the target selection.

Flight Tab

Mission Map

Assign Target

Delete Target

Target List

Map Controls

Chat Control
(Multiplayer Only)

When a mission has a ground target, TARGETING is enabled on the Mission Briefing Screen. Your pilots are assigned certain targets – one target per waypoint per pilot. You may adjust these assignments as desired.

Assign Target
◆ Click Assign Target.
◆ Click the desired wingman number.
◆ Click the target's icon (if aircraft) or white dot (if other object).

Delete Target Assignment
◆ Click DELETE TARGET and click the target in the Target List.

AIRFRAME/PILOT SELECTION

You can accept assigned pilots, move them into different slots or replace pilots from the roster. You are always in the aircraft with the identification number ending in "1" of "A" Flight.

◆ Assign a pilot by click-and-dragging a name from the Roster (grayed-out pilots are unavailable) to an empty slot in the Assigned Pilots' Window.
◆ Replace a pilot by click-and-dragging another pilot to an occupied slot. The original pilot is returned to the Roster.
◆ Swap assigned pilot positions by click-and-dragging a pilot into another pilot's slot.
◆ Remove a pilot by click-and-dragging a pilot off the Assigned Pilots' Window.

Assigned Pilots

Aircraft Information
(Campaign Only)

Pilot Information
(Campaign Only)

Squadron Exit

Pilot Exit

Available Pilots

Chat Control
(Multiplayer Only)

PILOT EDIT

Through the PILOT EDIT, you acquire in-depth information about any pilot listed in the Roster. You are also able to create new pilots, edit existing pilots or delete pilots. Pilot Edit is also available from under the TOOLS Menu.

Delete Pilot

Add Pilot

Save Pilot

Chat Control
(Multiplayer Only)

The Pilot Info window lists the information about the pilot highlighted in red on the Pilot's window. The pilot's name, rank, and summary statistics for single missions and for the campaign are listed adjacent to the pilot photo. Click on a pilot in the Pilots' list to display information. Click on the scroll bar to display additional pilots.

The History tab lists specific information for each mission that the pilot flew. The Bio tab displays information about the pilot. You may also add to or modify any pilot's biographical information. Click either tab to display the respective information.

ADD PILOT

◆ Click ADD PILOT to create a new pilot in the Roster. All new pilots start at the rank of Ensign. Here you get to create the Bio information for your new pilot. Be creative as you like – after all, these are alter egos.

SAVE PILOT

◆ Click SAVE PILOT to save any new or modified pilot information.

DELETE PILOT

◆ Click DELETE PILOT to permanently remove any pilot from the Roster.

SQUADRON EDIT

Through Squadron Edit you select the active squadron for each flight in the mission and you have the ability to create new squadrons, edit existing squadrons or delete squadrons. Squadron Edit is also available from under the TOOLS Menu.

Save Squadron

Add Squadron

Chat Control
(Multiplayer Only)

Delete Squadron

The Squadron Info window lists the information about the squadron highlighted in red on the Squadrons window. Click on a squadron in the Squadrons list to display information. Click on the scroll bar to display additional pilots. You may also add to or modify any squadron's historical information.

 ADD SQUADRON

◆ Click ADD SQUADRON to create a new squadron in the list. You also get to create a stunning history for your new squadron.

 SAVE SQUADRON

◆ Click SAVE SQUADRON to save any new or modified squadron information.

 DELETE SQUADRON

◆ Click DELETE Squadron to permanently remove any squadron from the list.

ARMING

 Through the Arming Screen, you can tailor each aircraft's weapons by loading pre-designated packages or by customizing specific weapon combinations. You may even design your own packages for immediate or future use.

Flight Tab

Weapon Inventory
(Campaign Only)

Custom Arming

Available Loadouts

Chat Control
(Multiplayer Only)

Default Loadouts: A number of the most commonly used loadouts are listed in the Available Loadouts window. Clicking on a loadout in this window displays information relating to it in the Information window. These are combat-proven combinations built to maximize the F/A-18E's capabilities in a variety of situations.

Additionally, the loadouts you create through the Custom Arming process are added to this list for future use.

◆ Assign or replace a loadout by click-and-dragging a name from the Available Loadouts list to an airframe in the Flight window.

◆ Remove a Loadout by click-and-dragging the package off the airframe.

CUSTOM ARMING

Although there are several suggested packages for the various types of missions, it is possible to create your own custom packages. Every airframe in the mission may be customized.

Flight Tab

Takeoff Weight

Internal Fuel

Save Package

Delete Package

Information Window

Ordnance Window

Open Package

Chat Control
(Multiplayer Only)
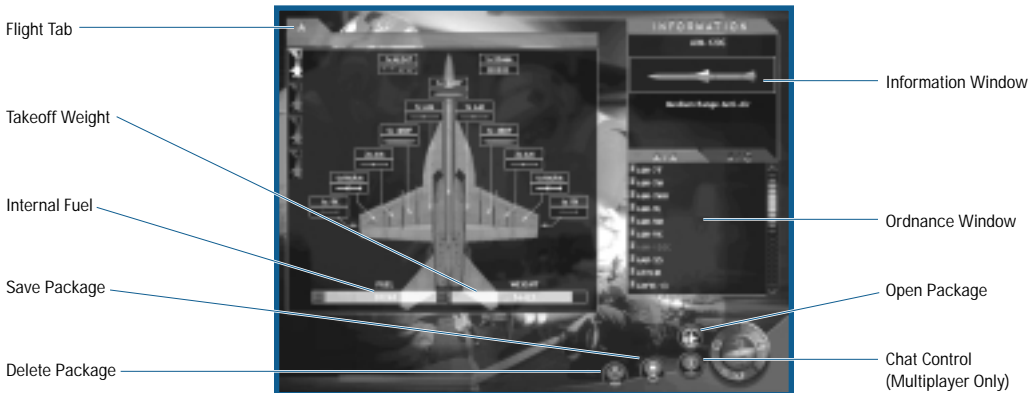
The Ordnance window has separate tabs for A/A (air-to-air) and A/G (air-to-ground); the respective weapons are listed under each tab. Note that drop tanks, chaff/flares and 20mm cannon ammunition are available under either tab.

The F/A-18E Super Hornet has eleven hardpoints, a chaff/flare dispenser and a 20mm cannon. The hardpoints support a number of different weapons, but every hardpoint may not be capable of carrying every weapon.

◆ Click on any weapon in the list to display its unique information.

◆ Click-and-drag weapons from the Ordnance window to an available hardpoint. Compatible hardpoints are highlighted when the weapon is selected.

◆ Continue until the loadout is complete.

◆ Click FORWARD to accept the loadout and return to the Arming Screen.

◆ Click BACK to cancel the changes and return to the Arming Screen.

F/A-18 Fuel/Weight: As more fuel and ordnance are loaded on the airframe it becomes heavier and heavier. The Takeoff Weight Indicator keeps a running tab on the airframe's weight status.

Normally, the weight indicator is green, indicating the weight is within the safe range. As the weight increases, the indicator turns yellow, indicating a potentially unsafe load. When the indicator turns red, the airframe is overloaded. This is not recommended as its places undue stress on the airframe.

Note that you can also adjust the amount of internal fuel by clicking on the "-" to offload fuel or "+" to increase the internal fuel. These controls are located at the left and right end respectively of the Internal Fuel Indicator. On very short missions, you can trade internal fuel for a heavier weapon load.

SAVE LOADOUT

◆ Click to save the current loadout for later use. A window opens where you name the loadout, and you can also write a description of the loadout for future reference.

EA TIP   Selecting FORWARD does not automatically save your new loadout for future use. It merely accepts the loadout for the current airframe. You are not prompted to save the current loadout.

DELETE LOADOUT

◆ Click to delete a loadout. Select the loadout to delete for those listed in the window. This action does not affect the current airframe loadout.

OPEN LOADOUT

◆ Click to open an existing loadout and apply it to the current airframe.

FLY MISSION

Notice in the Mission Briefing Screen that where you would expect to see the normal FORWARD indicator, a small aircraft is substituted – this is the Fly Mission control. When you are satisfied with all elements, you're ready to jump in the pilot's seat and take off.

◆ Click FLY to begin the mission.

DEBRIEFING

At the conclusion of each mission, the Debriefing screen displays. This includes information on how well you achieved the mission objectives, your overall performance, and the performance of the rest of your flight.
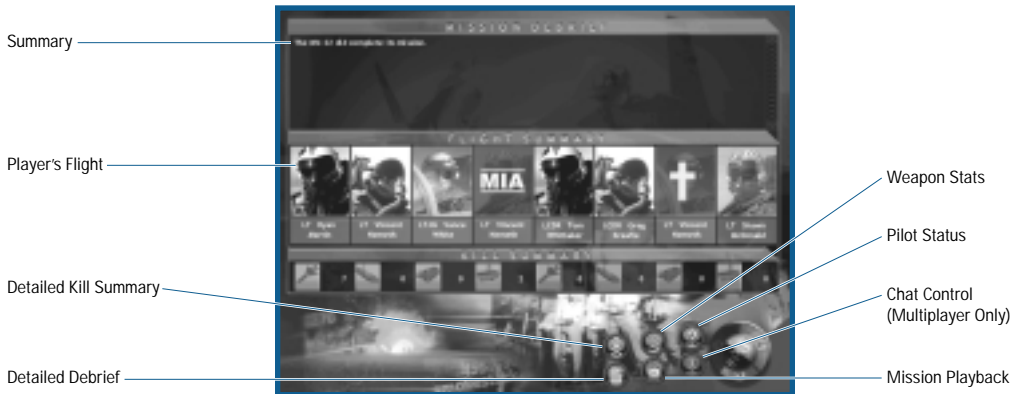
In the top section of the Debriefing is a short summary of the just completed mission.

The player and his flight are displayed in the middle section of the Debriefing screen. This provides a graphical view of the status of the pilots – indicating if the pilots returned safely or were killed or lost.

Just below the flight information is the Kill Summary, a graphical display of the enemy and friendly kills by category – aircraft, ships, ground objects and structures.

DETAILED KILL SUMMARY

Displays a summary of the mission kills on an individual pilot and summary basis.

Flight Tab ——————————————————

Pilots ——————————————————

Kill Summary

Individual Kill Types ——————————————————

Chat Control
(Multiplayer Only)

Kill Summary: Lists the total kills in the four categories: Aircraft, Ground Objects, Moving Vehicle, and Ships.

Individual Kills: Next to each pilot's name are four icons depicting the four target categories. The number in the lower left corner of each icon indicates the quantity of each type destroyed.

Ground Objects   Moving Vehicle

Aircraft ——————————————————

Ships
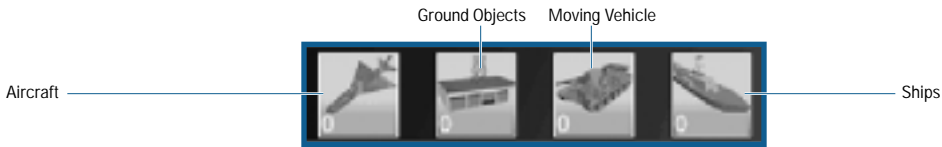
DETAILED DEBRIEF

Displays a detailed discussion of the just completed mission, expanding on the Summary displayed on the main Debriefing screen.

Chat Control
(Multiplayer Only)
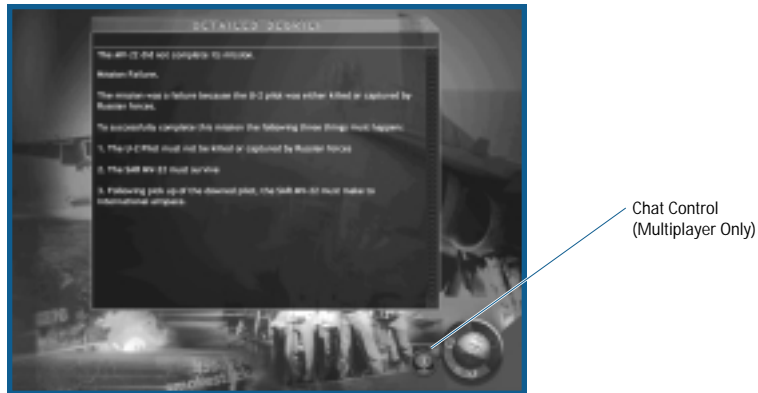
WEAPON STATS

Displays a summary of the weapon utilization for an individual pilot.

Flight Tabs

Weapon Types

Chat Control
(Multiplayer Only)

◆ Click the desired weapon type in the Weapon Types window. The number of that type fired or released, the number of hits, and the number of kills displays to the right of each pilot's name.

PILOT STATUS

Displays the post-mission status of each pilot.

Chat Control
(Multiplayer Only)

MISSION PLAYBACK

Displays the visual records of the mission. You control the display with the Map Controls and the Playback Controls.

Playback Window

Detailed Time Log

Playback Controls

Time Log

Map Controls

Chat Control
(Multiplayer Only)
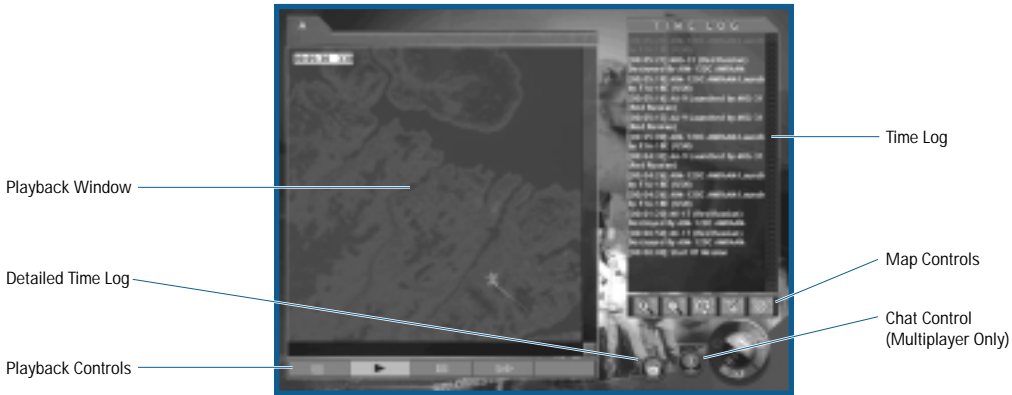
MAP CONTROLS

Just below the Time Log is a single row of five green icons that control the scale and position of the Playback window.

Zoom Out   Revert   Zoom Area

Zoom In

Center on Cursor
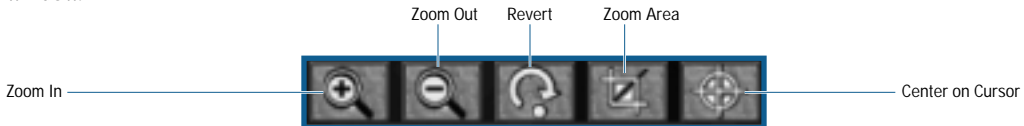
Revert: Clicking REVERT returns the Playback window to its original view.

Zoom Area: Click ZOOM AREA to select an area to view.

◆ Click-and-drag an area on the Playback window. A red box outlines as you click-and-drag.

◆ Release the mouse button and click again. The area described now fills the Playback Window.

Center on Cursor: Click CENTER ON CURSOR to position the Playback window.

◆ Click a location on the Playback window. The Playback window display centers on that point.

PLAYBACK CONTROLS

Just below the Playback window is a single row of blue icons. These are standard controls similar to those found on a VCR.

Stop   Play   Pause   Fast Forward
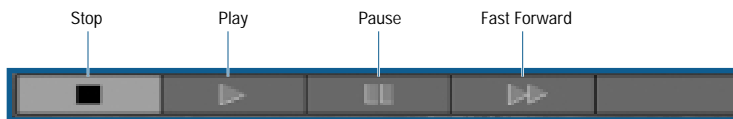
SUMMARY

Discusses the mission's accomplishments or lack of them.

TIME LOG

List the mission's key events in chronological order.

DETAILED TIME LOG

Displays a detailed time log of the just completed mission, expanding on the Time Log displayed on the main Debriefing screen.

Chat Control
(Multiplayer Only)

CAMPAIGN

Jane's F/A-18 includes the North Cape Campaign plus a series of mini-campaigns. Click on the campaign window view in the campaign summary to select a campaign.

Chat Control
(Multiplayer Only)

Squadron Selection

SELECT CAMPAIGN

◆ Click the image of desired campaign.

> **NOTE:** Your progress in a given campaign is automatically saved. If you wish to continue a saved campaign, simply scroll down and select the desired saved game.

SELECT SQUADRON

◆ Click Select Squadron.

Select your squadron from the list. This affects the aircraft and pilots available for each mission. There is a limited number of available aircraft and pilots. Once you select a squadron, you can't change it without starting a new campaign.

CAMPAIGN INTRODUCTION

After selecting the campaign, a video introduction plays. If you don't wish to view the introduction, press any key to skip it.

The flow of the campaign mission setup is exactly the same as Single Missions with a few added twists thrown in for good measure.

AIRFRAME/PILOT SELECTION

When you select an airframe you determine the actual fighters you and your wingmen are flying. All of the fighters are F/A-18E Super Hornets. All are identical until they enter combat and take damage, or worse yet, are lost. This is a real issue in the campaign setting where there are only a limited number of available airframes.

Pilots are also a limited commodity and are much harder to replace. Like aircraft, they are not immune to being wounded or lost in combat.

> **EA TIP** Different types of damage are repaired at different rates. It usually takes about two to five missions for a damaged aircraft to become available again.

AIRCRAFT INFORMATION

Information on the status of each aircraft in the entire squadron ("Active," "Damaged," or "Destroyed") appears on the screen.

◆ Click AIRCRAFT INFORMATION

PILOT INFORMATION

Information on the status of each pilot in the entire squadron (pilots are listed as "Active," "MIA," or "KIA") appears on the screen.

◆ Click PILOT INFORMATION

ARMING

Campaigns require you to exercise a degree of resource management. You can't afford to just burn up all the best weapons on the milk-run missions. You must take care and plan for the future. That could be the difference between success and failure. Remember the old axiom, "A horse, a horse, my kingdom for a horse." Don't get caught short.

◆ Click ARMING

WEAPON INVENTORY

This provides a list of the squadron's current ordnance supplies. A "-" character indicates the squadron has unlimited access to that particular ordnance.

◆ Click WEAPON INVENTORY

FLY MISSION

Notice in the Mission Briefing Screen that where you would expect to see the normal FORWARD indicator, a small aircraft is substituted – this is the Fly Mission control. When you are satisfied with all elements, you're ready to jump in the pilot's seat and take off.

◆ Click FLY to begin the mission.

MULTIPLAYER

Jane's F/A-18 is not just a single-player game with some multiplayer options attached as an afterthought. It's a multiplayer game in-and-out. You can fly any mission type as a multiplayer mission. However, don't think you must have a human opponent; the missions are equally challenging in either mode.

Jane's F/A-18 supports IPX/SPX network (LAN) play (up to eight players), TCP/IP network (Internet) play (up to eight players), and modem and direct serial play (two players).

Notice that it is not necessary to click on the control word – click anywhere in the highlighted area to proceed.

Click one of the following options:

◆ "Serial" sets up a connection by linking two computers together with a direct serial cable. See **Direct Serial (Null-Modem)**, p. 3-36.

◆ "Modem" sets up a connection between two computers over a modem line. See **Modem**, p. 3-37.

◆ "IPX/SPX Network" connects 2-8 computers over a LAN (Local Area Network). See **IPX/SPX Network**, p. 3-37.

◆ "TCP/IP" connects up to 8 players with an Internet (dial-up) connection. See **TCP/IP Network**, p. 3-38.

◆ "Main" returns to the Main menu.

If you have problems connecting with another player, refer to the **If you Can't Connect** section that follows each connection option, or consult your network supervisor, Internet service provider (ISP), or hardware/modem documentation.

You can also get information on network and modem connections by going to the Windows 95/98 START menu and clicking HELP.

◆ Click on the CONTENTS tab, then double-click HOW TO.

◆ For help with IPX/SPX connections, double-click USE A NETWORK.

◆ For help with modem setup, double-click SET UP HARDWARE, then select SETTING UP A MODEM.

◆ For help with TCP/IP connections, click the INDEX tab and type INTERNET in the box. Relevant topics are highlighted in the large box below – click on a topic to view its information.

DIRECT SERIAL (NULL MODEM)

If you and another gamer don't own modems, have heart, you can still play Jane's F/A-18 in multiplayer mode. You can use a null-modem cable to link your two computers.

STEP 1 – CONNECTING YOUR MACHINES

A. Plug one end of the connector cable into a serial port on one machine, and the other end into a serial port on the second machine. In some cases you may have to install drivers or software to use your null modem cable. Please consult your computer's documentation for more information.

B. You must know which COM port you connected to on each computer. Many computers have a label next to the COM connector. The documentation that came with your computer may have a connection diagram with the communication ports labeled. COM ports are numbered starting at "1" and up, i.e., COM1, COM2, COM3, etc.

STEP 2 – SERIAL PORT SETTINGS

A. From the MULTIPLAYER menu, click SERIAL.

B. A dialog box appears asking if you want to HOST or JOIN. The first computer selects HOST (you decide which one of the your two computers is the first) and then creates a game session (see **Hosting a Mission**, p. 3-41). The second computer then selects JOIN.

C. After clicking continue, the Serial Connection dialog box now appears. Select the correct COM port and use the default settings for the remaining boxes, e.g., 57600 baud, 1-stop bit, no parity and RTS/DTR flow control. When finished, click OK.

D. The JOIN computer will now be in the Game Sessions screen and should click ACCEPT.

> **IMPORTANT:** The HOST computer must complete Step C before the JOIN computer completes Step D.

STEP 3 – CONFIGURING THE MISSION

IF YOU CAN'T CONNECT

If you're having problems connecting, you may have a hardware conflict. Two devices may think they're occupying the same COM port.

To check for port conflicts:

A. Click the Windows 95/98 START button.

B. Highlight SETTINGS.

C. Click CONTROL PANEL, then double-click the SYSTEM icon.

D. Click the DEVICE MANAGER tab.

E. Click inside the circle next to *View Devices by connection*. Check to make sure only one device is listed next to the COM port you connect the cable to.

If your computer's settings, the game's settings and the other player's settings are identical (you may have different COM ports selected on the two computers) and you still experience problems, try selecting another COM port or lowering the baud rate (as described in **Step 2 – Serial Port Settings**).

> **EA TIP** Make sure you know exactly which COM port you're looking at and what you are deleting. You certainly don't want to delete anything important. Please contact your system manufacturer for help with port conflicts. This may take some extra time, but it's worth the effort.

MODEM

You can play another player across a 28,800-baud or faster modem.

STEP 1 – CONFIGURING THE MODEMS

Both players must verify that their modems are configured correctly to get a successful connection:

A. Exit to Windows 95/98 and click START. Highlight SETTINGS, then click CONTROL PANEL. Double-click on the MODEMS icon.

B. Click the PROPERTIES button. Make sure the maximum speed is set to the highest level for your modem (at least 57600 is recommended). Verify that the ***Only connect at this speed*** box is not checked.

C. Click the CONNECTIONS tab, then click the ADVANCED button.

D. Verify that there is not a checkmark in the ***Use flow control*** box. If there is a checkmark, remove it.

E. Verify that there is not a black dot next to ***Hardware (RTS/CTS)***. If there is a black dot, remove it.

> **EA TIP** If you've made any changes to your modem settings in the steps above, restart Windows 95/98 before trying to connect. This ensures the changes are saved.

STEP 2 – CONNECTING WITH ANOTHER MODEM PLAYER

A. From the MULTIPLAYER menu, click MODEM.

B. A dialog box appears asking if you want to HOST or JOIN. The first computer selects HOST (you decide which one of your two computers is the first) and then clicks CONTUNE and then clicks the ANSWER button.

C. The other computer selects JOIN, enters the host's phone number, and clicks CONTINUE.

D. The Modem Connection status box now appears. The missions should connect, allowing the host to setup the mission.

CONFIGURE

As long as your modem is configured through Windows 95/98, you should not have any trouble. If you do have difficulties, you can access the Windows 95/98 (Modem) Properties by clicking CONFIGURE on the Modem screen.

If your modem is not configured properly, please consult your modem and Windows 95/98 documentation.

STEP 3 – CONFIGURING THE MISSION

IF YOU CAN'T CONNECT

A. Make sure your modem is set up correctly under Windows 95/98 and that you don't have multiple modem drivers loaded.

IPX/SPX NETWORK

Two to eight players can "join" a specific game. Multiple sessions of *Jane's F/A-18* can run concurrently on a network without disrupting normal network activity (during peak network hours, however, the game may run more slowly).

> **IMPORTANT:** You must have an IPX/SPX-compatible protocol loaded under Windows 95/98 (such a protocol ships with Windows 95/98). To check, go to the START menu, highlight SETTINGS, then click CONTROL PANEL, and double-click the NETWORK icon. Scroll down in the box to see if any kind of IPX/SPX-compatible protocol is listed.

◆ From the MULTIPLAYER menu, click IPX. This takes you directly to the Game Sessions screen.

STEP 1 – CONFIGURING THE MISSION

IF YOU CAN'T CONNECT

If your computer can't find other players on the network, verify you have an IPX/SPX protocol loaded (see **Important** in **IPX/SPX Network**, just above).

TCP/IP NETWORK

You must have an account with an Internet service provider (ISP), LAN with TCP/IP protocol, or other access to the Internet to play *Jane's F/A-18* through a TCP/IP connection.

All players need to exchange IP addresses with the host once they're logged on to the Internet. It's easiest to do this if everyone logs on to a chat zone. If you do not know how to get into a chat zone, contact your Internet service provider, or check their on-line help, if available.

If you have a web browser (e.g., *Netscape Navigator* or *Microsoft Internet Explore*), you can meet in the chat room of the Jane's Combat Simulations web page at **http://www.janes.ea.com**. To reach this room, click the Community switch on the left side of the Jane's home page. Click CHAT ROOM to get to the chat room.

STEP 1 – SETTING UP FOR INTERNET PLAY

A. Contact the other players (via chat board, telephone, etc.) and determine who has the fastest computer. This person should be the host.

◆ Also decide the number of players connecting.

B. The host needs to log on to the Internet. Find his IP address and communicate this address to the other players. Remember, in most cases, each time you log on the Internet you'll have a different IP address, so the host must check this each time. This is a very important point, you can't just check the first time, and then assume it remains the same each time you log on to the Internet.

◆ Without logging off of the Internet, double-click on *My Computer.* Typically, this is the icon that looks like a computer on your desktop.

◆ Double-click on the c: drive icon, then double-click on the Windows folder.

> **NOTE:** You may see a message warning you about modifying the contents of the Windows folder. To continue past this message, click "Show Files".

◆ Double-click on WINIPCFG.EXE (Windows IP Configuration).

◆ Write down the number in the box next to IP ADDRESS.

C. Once the host knows his IP address, he must communicate this to the other players.

STEP 2 – CONNECTING WITH OTHER PLAYERS

> **NOTE:** All participants must know the IP address of the host before setting up a TCP/IP game. (See Step 1, above)

A. Log on to the Internet. Minimize or close your browser window and load Jane's F/A-18 if you haven't already done so.

B. From the MULTIPLAYER screen, select TCP/IP. Then select JOIN.

C. Type in the host's IP address. Click CONTINUE.

STEP 3 – CONFIGURING THE MISSION

IF YOU CAN'T CONNECT

You must have a TCP/IP-compatible protocol loaded under Windows 95/98 (such a protocol ships with Windows 95/98). To check, go to the START menu, highlight SETTINGS, then CONTROL PANEL, and double-click the NETWORK icon. Scroll down in the box to see if any knd of TCP/IP-compatible protocol is listed. If one isn't listed, you probably won't be able to connect to your Internet service provider either. This is a good indication that something is wrong with this connection option.

If you do have a TCP/IP-compatible protocol and are having no difficulty connecting to the Internet, but you are unable to connect with other players:

◆ Follow the steps for TCP/IP Network again, designating another computer as the host. (Try using the computer with the fastest Internet connection – this may not be the fastest computer.)

DISCONNECTING

If you disconnect in any of the following ways, the game continues, even if you're the host.

◆ Pressing any key during the connection process. (Returns you to *Jane's F/A-18's* Main menu.)

◆ Exit the mission. Pressing ⎡ESC⎤.

CHATTING WITH OTHER PLAYERS

CHAT

During multiplayer missions, the CHAT control is active. It is used to send messages to the other human players in the mission. You can keep the Chat screen open while you peruse or set up the mission, thus keeping in constant communications with the other pilots.

You find this control on most screens – no searching required.

◆ Click CHAT to send a message.

◆ Type your message in the area provided.

◆ Select the players to receive the message by placing a "checkmark" next to their name.

◆ Press ⎡ENTER⎤ to send your message.

◆ Click the "x" to close the Chat window.

WHO'S THE HOST?

You have now decided if you're going to host the upcoming game or join someone else's game.

As you proceed, whether hosting or joining, the BACK button always returns you to the beginning of the process.

Host — Join

◆ Click HOST to host a mission.

◆ Click JOIN to join a mission.

HOSTING A MISSION

First thing, you must get some housekeeping chores out of the way. Your mission needs a name and the players will need to know this name so they can find the mission. You also need to indicate your pilot's name and the mission squadron. Finally, you mark whether to pass or receive files.

This may seem like a great deal of information at first, but it's actually quite simple to create.

◆ Click FORWARD to proceed.

The Player and Game names are limited to no more than 19 characters each.

Note that the PILOT and SQUADRON names are selected from a drop-down list of the available choices. This information is not typed in a text box.

You now proceed to the Main Menu screen where you select the type of mission for the upcoming multiplayer game.

Single Mission or Campaign may be selected as the type of multiplayer mission. You're not limited to any particular type of mission.

You now select the mission options just as you would if you were playing by yourself. However, in this case, you're determining the mission parameters for not only yourself, but for all the players in the mission.

Remember that the Chat function is active, so if you wish to check with another player on any issue, you can just ask.

◆ Click FLY when you are satisfied with the mission parameters.

When the mission files have been transferred from the host to each joining player, they will have the opportunity to preview the mission. Typically, the mission will begin as soon as each of the players hit the FLY button. A courteous host will provide the joining players with the opportunity to review the mission objectives and aircraft loadout. If for some reason a joining player neglects to click the FLY button within a reasonable amount of time, the host has the ability to start the mission immediately.

DISCONNECT PLAYER

Clicking Disconnect player during chat immediately disconnects any selected player from the game.

CLOSE

Clicking Close removes the chat window.

JOINING A MISSION

This is a lot easier since you can sit back and watch the host do all the work. On the other hand, the down side is that you don't get to decide the mission parameters. There are always tradeoffs.

◆ Click FORWARD to proceed.

Just like the Host screen, this screen requires a little housekeeping. The other players need to know your name so they know who is out there. You also enter the telephone number or the IP address, if any. You need to indicate your pilot's name and the mission squadron. Finally, you mark whether to pass or receive files.

Your Player name is limited to no more than 19 characters.

Note that the PILOT and SQUADRON names are selected from a drop-down list of the available choices. This information is not typed in a text box.

The IP address is not required, but if you know it, it's best to enter the information as it may save you from inadvertently joining the wrong game.

WHAT TO PLAY?

You now have the option of selecting what game to join from the list of available games the players signed up for action. The game names correspond to those entered by the hosts.

◆ Click FORWARD after making your selection.

THE PARTY LINE

While you're waiting for your connection, the Party Line screen displays. You can chat with the other players while you're waiting.

You now proceed to the mission screen where you follow along with the host as the mission parameters are selected.

You can make a few of your own selections, such as loadouts, but in most cases the host decides what to select.

Remember that the Chat function is active, so if you wish to check with the host, or any other player for that matter, on any issue, just ask.

◆ Click FLY when you are satisfied with the mission parameters.

Note that the mission doesn't actually start until all players click the FLY button. Until then, you get to wait in the Ready Room. Chat is fully functional while you are waiting.

TOOLS

The Tools menu includes three very important options that will enhance your enjoyment of Jane's F/A-18.

The Squadron/Pilot Edit option enables you to add, edit, or delete squadron and pilot information without having to first start a single or campaign mission.

Jane's Reference is an invaluable tool that provides detailed information on the air, land, and sea units and their weapons included in Jane's F/A-18. Garnered from Jane's vast bank of military data, Jane's Reference contains the most accurate and up-to-date information. If you have any questions on what something is, or what is its primary function, this is the place to look.

The Mission Builder is one of the most impressive features you'll find in *Jane's F/A-18*. This isn't just some hacked together afterthought to fill space on the CDROM. You have access to the same tool that the designers of *Jane's F/A-18* use to develop the missions included in the game – now that's one powerful tool. Simple or complex, you control all facets of the mission design. Exchange them with friends or save that "special" mission for that guy who's always bragging about his flight prowess – you decide.

MISSION BUILDER

See **Chapter 6: Mission Builder**, p. 6-147.

SQUADRON/PILOT EDIT

See **Single Mission: Squadron Edit**, p. 3-26 and **Single Mission: Pilot Edit**, p. 3-26 for a complete explanation of these functions.

JANE'S REFERENCE

This reference screen provides information on all the planes and weapons included in *Jane's F/A-18*. It includes the actual 3D models you'll see out in the flight world and specifications and text describing each of the objects.

Reference Tab

3D Object Viewer

Zoom In

Zoom Out

Rotate Heading

Rotate Pitch

Rotate Roll

Autorotate

Reset Orientation
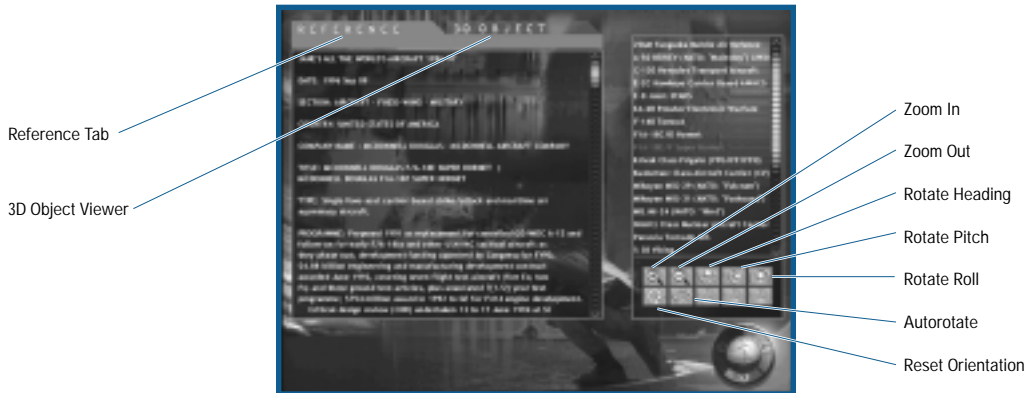
◆ Click the item you wish to view from the Object List.

Object List: A scrollable list of all the planes, objects, and weapons in the game.

3D Object Viewer: Click this tab to display an image of the object as it appears in the game. Use the green object controls to adjust the position and view.

Reference: Provides the Jane's Information Group's data on the highlighted object.

Zoom In: Moves your point-of-view closer to the objects.

Zoom Out: Moves your point-of-view away from the object.

Rotate Heading: Rotates the object counter-clockwise (from a top-down perspective). This is primarily used when Autorotate is off. Right-clicking rotates in a clockwise direction.

Rotate Pitch: Pulls down the object's nose. Right clicking pulls the nose up.

Rotate Roll: Rotates the object along its axis, so that it rotates clockwise (from a nose on perspective). Right-clicking rotates it counter-clockwise.

Autorotate: Toggles object rotation on/off.

Reset Orientation: Returns the object to its original pitch.

CHAPTER 4: FLIGHT

Whether twisting in a nose-to-tail dogfight with a MiG or guiding a PGM (Precision Guided Munitions) through the porthole of an enemy destroyer, air combat is often a one-on-one fight to gain the advantage over your opponent. Understanding how and why your aircraft functions and maneuvers is key to success.

WINGS OF THE HUNTER

THE FCS

The F/A-18E's flight control system (FCS) is a state-of-the-art fly-by-wire full authority control augmentation system (CAS) – that's certainly a mouth full.

What it means is that you're in the seat of one hot aircraft. Its computerized flight controls enable you to put this bird through its paces with little fear.

The FCS provides four basic functions: aircraft stability, aircraft control, departure resistance, and structural load management. It continually monitors aircraft stability since the basic airframe is normally slightly unstable. Inherently unstable aircraft respond more quickly to control inputs, resulting in a more maneuverable aircraft.

The FCS also provides full control of the aircraft by implementing the basic flight control laws in response to your inputs. The stick and rudder pedals are not directly linked to the flight control surfaces such as the ailerons or the twin tails. Instead, the controls send electrical impulses to two quad-redundant, digital flight control computers. You have two in case one fails or suffers battle damage.

The computers instantaneously interpret your inputs and send commands to the appropriate flight control surfaces to pitch, roll or yaw the aircraft as necessary. The FCS keeps an eye out for inputs from you that would cause the aircraft to depart safe flight or would place undue stress on the airframe. If necessary, it may actually override or modify your inputs.

All this activity takes place behind the scenes, without you ever noticing anything out of the ordinary. That's the beauty of the system. It works hand-in-hand with you, maximizing flight response to your inputs.

THE CONTROLS

The F/A-18E has a traditional center-mounted stick controlling pitch and roll. Since there isn't any mechanical linkage between the stick and the flight control surfaces, stick feedback is simulated by feel-spring assemblies and eddy current dampers. The stick is also mass balanced to minimize longitudinal movement resulting from acceleration during catapult launches.

Two rudder pedals provide directional inputs for yaw and roll control. Feel-spring assemblies also provide feedback for rudder input.

In the F/A-18F's trainer configuration (the two-seat version of the "E" model), a control stick is fitted in the rear cockpit that is mechanically linked to the pilot's stick. Rudder pedals are also fitted in the rear cockpit, but are not mechanically linked to the pilot's rudder pedals. The inputs from both sets are combined and fed to the FCS.

FLIGHT CONTROL SURFACES

The F/A-18E has 14 primary flight control surfaces: including leading edge flaps (LEFs), trailing edge flaps (TEFs), ailerons, twin tails, horizontal stabilizer, spoilers, and LEX vents. It's more than one person could manage on a good day. That's why you have the two computers to crunch all the data.

For pitch and roll control, the LEFs, TEFs, ailerons, and stabilizers can move symmetrically (one complements the other; e.g., when the left aileron deflects up, the right aileron deflects down a corresponding amount) or asymmetrically (fully independent of the corresponding controls).

Pitch is controlled with the stabilizers and, in some conditions, with rudder toe-in or rudder flare. Roll is controlled with combinations of aileron, asymmetrical stabilizers, LEFs and TEFs. The twin rudders deflect symmetrically for yaw control.

The aircraft is not fitted with a traditional speedbrake. Depending on the mode, the "speedbrake function" is achieved by partial deflection of several of the aircraft's primary flight control surfaces.

FLIGHT ENVELOPE

Lift is a function of the aircraft's speed, altitude, and angle-of-attack, and all of these factors work together to produce flight. All three must be considered together when talking about how airplanes maneuver. Their limits are graphically described by an aircraft's flight envelope.
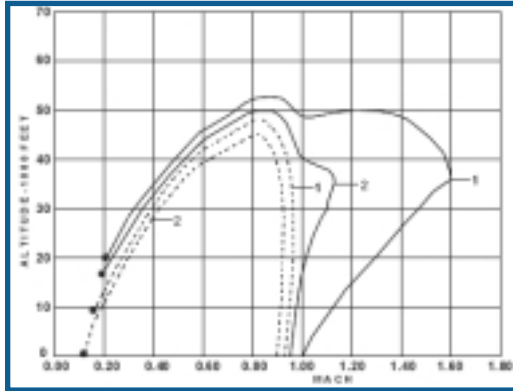
Above is the F/A-18E Super Hornet's flight envelope diagram. The vertical scale represents altitude, in thousands of feet, while the horizontal scale represents speed, in Mach Number. The solid line curves represent maximum power thrust, while the dotted line curves represent military power thrust. Curve #1 describes an aircraft fitted with 2-AIM-9 Sidewinders, 2-AIM-120 AMRAAMs and 60% fuel for a total weight of 42,200 pounds. Curve #2 describes an aircraft fitted with 4-AIM-9 Sidewinders, 2-AIM-120 AMRAAMs, a centerline fuel tank, an ATFLIR pod and 75% internal fuel for a total weight of 46,500 pounds. As the Mach Number changes with altitude, the position of the curve adjusts accordingly. Notice the huge amount of difference between these two curves. Also note that the aircraft is only supersonic above 15,000 feet, even with a relatively light loadout, and only reaches maximum speed at around 35,000 feet.

CAS OPERATING MODES

The Control Augmentation System operates in two basic modes: Powered Approach (PA) and Up-Auto (UA). Mode selection is dictated by the position of the Flap switch and your aircraft's airspeed.

With the flaps in the HALF or FULL position and airspeed below 240 kts, CAS sets flight controls tailored for takeoff and landing conditions – PA mode.

With the flaps in the AUTO position, CAS sets flight controls tailored for up and away flight – hence the designation Up-Auto.

If the flap switch is still in the HALF or FULL position when your airspeed increases above 240 kts, the CAS automatically transitions from PA to UA. This is known as "auto flap retract."

As a pilot aid, UA mode is constantly trimming the aircraft when the flight stick is in the neutral position. This enables you to fly a steady-state, hands-free flight profile without having to constantly trim the aircraft.

The CAS also closely monitors pitch, roll and yaw states, applying stabilization or near departure commands to the control surfaces to maintain the current flight profile or quickly respond to your inputs.

Either mode's flight controls are maximized for maneuverability while maintaining predictable handling qualities and departure conditions. This is no place for surprises; predictable responses are the rule, not the exception.

THE WORLD OF GS

The aircraft is designed to sustain a g-limit of +7.5G or -3.0G at or below a designed weight of 42,097 lbs. At higher gross weights, the g-limit is reduced to keep from overstressing the airframe, such that at the aircraft's maximum gross weight (66,000 lbs.) the g-limit is only +4.8G to -1.9G.

The F/A-18E's g-limiter essentially "limits" the amount of positive and negative G that you can command based on the aircraft's gross weight. Once you push the stick to the g-limit, further inputs are ignored. This is commonly called "being on the limiter."

Due to the aerodynamic phenomenon know as transonic pitchup, the g-limiter incorporates a "g-bucket" designed to prevent over-g during transonic deceleration. The g-limiter only allows +5.8G to be commanded while in "the g-bucket."

You can enable the g-limiter override feature to allow a 33% increase in the g-limit for emergency situations – allowing 10G at the 7.5G limit.

THE COCKPIT – THE PILOT'S OFFICE

The F/A-18E Super Hornet has a single cockpit, but what a cockpit. The most modern in the Navy arsenal, this cockpit enables you to perform all the functions where most other aircraft require two crewmen.

Not that you're overwhelmed with double the workload, it's just that the F/A-18E is so sophisticated, you can accomplish so much more in half the space.

Jane's F/A-18 utilizes a 3D virtual cockpit, not a just a flat 2D image with unrealistic components pasted together. Many cockpit functions are mouse "clickable" within this virtual environment. The remaining functions are keyboard controlled or accessed through your joystick.

> **EA TIP** In this chapter, all keys are referred to by their names as they appear in the Custom Mapping screen. Keyfunction names are in bold-caps, for example **MASTER_MODE_CYCLE**.

COCKPIT OVERVIEW

The cockpit features a Head-Up Display (HUD), an Up Front Controller (UFC), two monochrome Multipurpose Display Indicators (MDI), a Multipurpose Color Display (MPCD), an Electronic Fuel Display (EFD), and several conventional standby instruments.

HUD

Angle of Attack Indexer

Left Warning/Cautions/ Advisory Light panel

Master Caution

Left Engine Fire Warning Light

Fire Extinguisher

Master Mode Pushbuttons

Master ARM Switch

Right Warning/Caution/ Advisory Light Panel

AFU Fire Warning Light

Right Engine Fire Warning Light

Right MDI

IR Cooling Switch

Spin Recovery Switch

Left MDI   UFC   HUD Control Panel   EMCON Switch

◆ **HUD:** The HUD consists of flight, targeting, and weapon information that is projected on a specially coated sheet of glass located directly in front of the pilot. The various HUD modes are described separately in the Head Up Display (HUD) section. See **HUD** p. 4-55.

◆ **Angle of Attack (AOA) Indexer:** The AOA indexer displays the AOA during landing approach using lighted symbols. The indexer operates when the landing gear is down and weight is off the gear.

Airspeed: Slow AoA: 9.3 to 90.0 degrees

Airspeed: Slightly Slow, AoA: 8.8 to 9.3 degrees

Airspeed: On speed, AoA: 7.4 to 8.8 degrees

Airspeed: Slightly Fast, AoA: 6.9 to 7.4 degrees

Airspeed: Fast, AoA: 0 to 6.9 degrees

◆ **Warnings/Cautions/Advisory Lights:** The Warnings/Cautions/Advisory lights on either side of the HUD have the following meanings:

Left Panel

L BLEED / R BLEED	A bleed air leak has been detected on the left / right engine. If you don't shut down the engine, you run the risk of an engine fire.
SPD BRK	The speed brake function is active.
BRAKES	The wheel brakes are engaged.
L BAR	The launch bar is extended and connected to the carrier's catapult system.
DUMP	The Fuel Dump is open and fuel is being vented from the aircraft.
REC	The ASPJ internal jammer is in receive-only mode (EMCON limited).
XMIT	The ASPJ internal jammer is transmitting.
AUTO	The autopilot is active.

Right Panel

LASER	The targeting FLIR laser designator is active.
DPLY	An ALE-50 decoy is deployed.
AI	A threat Airborne Interceptor has been detected.
CW	Continuous Wave illumination from a threat missile guidance radar has been detected.
DISP	The ALE-47 CMDS is dispensing chaff / flares.
DCOY ON	The ALE-50 Decoy is transmitting.
SAM	A threat surface to air missile system has been detected.
AAA	A threat anti-aircraft artillery system has been detected.

◆ **Master Caution Light:** The Master Caution light comes on when any new system failures are detected by the aircraft's Built-In-Test (BIT) system. Depressing the Master Caution light resets the light. Holding the button down for more than three seconds brings up the BIT MDI page to be displayed in the left MDI.

◆ **Engine Fire Lights:** The left or right engine fire light illuminates whenever a fire is detected in the left or right engine bay, respectively. Each light is also a guarded pushbutton. Initially clicking on a fire light raises the guard. Clicking on the button again with the guard up shuts off main fuel valve of that engine and arms the fire extinguishing system (see below).

◆ **APU Fire Light:** The APU fire light illuminates whenever a fire is detected within the auxiliary power unit (APU). The APU fire light is also a pushbutton, and when clicked on it arms the fire extinguishing system (see below).

◆ **Fire Extinguisher:** The Fire Extinguisher pushbutton is used to activate the aircraft's onboard fire suppression system. When the system is armed, the READY light is on. Clicking on the pushbutton releases the contents of the fire extinguisher bottle into the selected engine / APU bay(s). If more than one Fire light is depressed,

extinguishing agent is distributed evenly to all selected bays, but the concentration may be insufficient to extinguish all fires. Once the bottle has been discharged, the DISCH light comes on. Note that the extinguisher can only be used once.

◆ Master Mode Pushbuttons: The controls, displays and avionics equipment are tailored to operate in one of three specific modes: Air-to-Air (A/A), Air-to-Ground (A/G) or Navigation (NAV) – the **Master Modes**. Master Modes tailor the F/A-18's avionics for specific functions. These pushbuttons indicate the current Master Mode. If A/A Master Mode is selected, the A/A pushbutton illuminates. If A/G Master Mode is selected, the A/G pushbutton illuminates. Notice that NAV Master Mode has no pushbutton; it is selected when neither A/A nor A/G Master Modes are selected. Master Mode can be changed either by clicking on the appropriate button, or by using the **MASTER_MODE_CYCLE** [Ⓜ] keyfunction to cycle through each of the Master Modes.

◆ Master Arm switch: The Master Arm switch enables or disables the release of weapons.

◆ Left / Right MDI: The Multipurpose Display Indicators are used to display various flight, targeting and weapons information. Twenty clickable pushbuttons surround each MDI. They are grouped in banks of five and are numbered starting at the lower left, moving clockwise around each display.
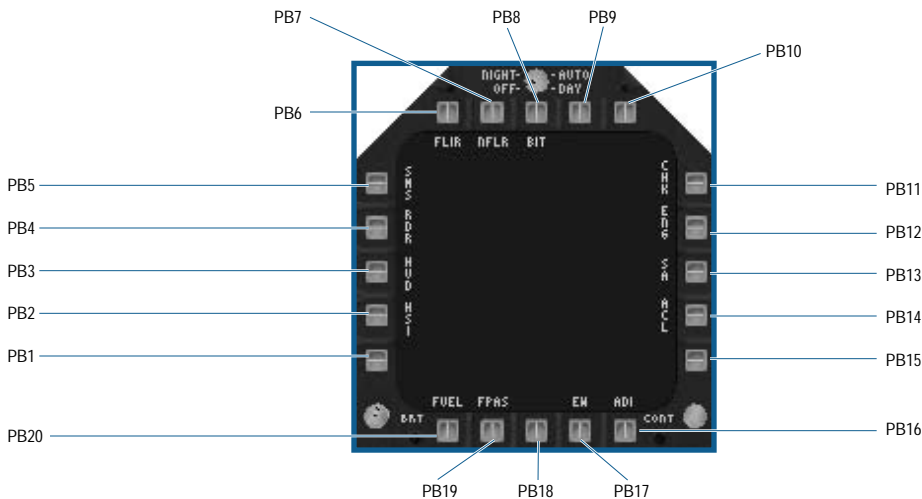
The various MDI pages are described separately in the MDI/MPCD section. See **MDI/MPCD**, p. 4-60

◆ UFC: The Up Front Controller is a programmable, touch sensitive display that is used to control certain avionics systems. The various UFC formats are described separately in the UFC section. See Up Front Controller (UFC), p. 4-81.

◆ EMCON Pushbutton: The EMCON (short for Emissions Control) pushbutton is used to limit / allow any emission that might give away the position of your aircraft. When EMCON is selected, the radar is placed in Silent mode and both the ASPJ and the ALE-50 decoy are placed in Standby. When EMCON is deselected, the radar and jammers may transmit freely.

◆ HUD CONTROL PANEL: The HUD control panel is used to control various HUD functions.

Symbol Reject Switch   Symbol Brightness Control Knob   Altitude Switch   NAVFLIR Video Switch
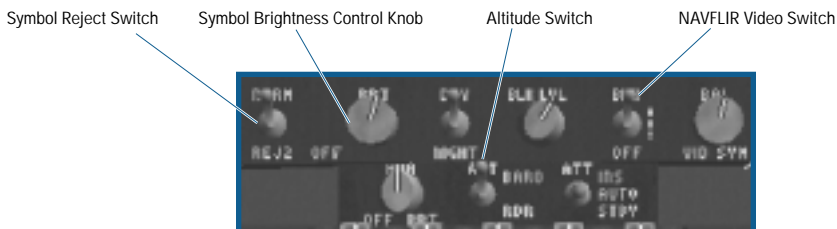
- **Symbol Reject Switch:** A three-position switch, clicking cycles between NORM, REJ 1 and REJ 2 positions.
  - NORM: normal HUD format.
- REJ1: removes the following symbology from the HUD (if present):
  - Aircraft Mach number
  - Aircraft G's
  - Peak positive Gs
  - Bank Angle scale and pointer
- REJ 2: Removes REJ 1 symbology plus the following (if present):
  - Heading scale
  - Command heading
  - Heading caret
  - NAV range
  - ETA / TOD Timer / Clock
- **Symbol Brightness Control:** Clicking on the knob cycles between each HUD color. The HUD_COLOR [H] keyfunction is also used to select the HUD color.
- **NAVFLIR Video Switch:** Clicking toggles between OFF, WHT, and BLK.
  - BLK: Selects black-hot for the NAVFLIR video on the HUD.
  - WHT: Selects white-hot for the NAVFLIR video on the HUD.
  - OFF: Removes NAVFLIR video from the HUD.
- The keyfunction **NAVFLIR_MODE** [N] is also used to control the display of NAVFLIR video on the HUD.
- **Altitude Switch:** Clicking toggles between BARO and RDR positions.
  - BARO: Sets barometric altitude on the HUD.
  - RDR: Sets Radar Altitude on the HUD, if valid and less than or equal to 5,000 feet AGL.

◆ **Spin Recovery Switch:** The Spin Recovery switch is not used on the real F/A-18E and has no function in the game.

◆ **IR Cooling Switch:** The IR cooling switch is not functional in *Jane's F/A-18.*

MPCD — EFD — Jettison Initiate Pushbutton — Station Selection Pushbuttons — Landing Gear Handle — Flap/Landing Gear Status Lights — External Stores Jettison Selection Knob — Heading Select Switch — Course Select Switch — Attitude Reference Indicator — Tailhook Handle — Vertical Speed Indicator — Standby Altitude Indicator — Standby Airspeed Indicator — Refueling Probe Switch — Anti-collision Lights Switch — Formation Lights Switch — Flaps switch — Analog Clock

◆ **MPCD:** The Multipurpose Color Display (MPCD) is a larger, full color version of an MDI and is used to display the same type of information. Twenty clickable pushbuttons surround the MPCD, which are numbered in the same manner as the MDI. The various MPCD pages are described separately in the MDI/MPCD section. See **MDI/MPCD**, p. 4-60.

◆ **EFD:** The Electronic Fuel Display (EFD) is the primary Fuel/Engine display in the cockpit. It is described separately in the EFD section. See **EFD**, p. 4-54.

◆ **Jettison Initiate Pushbutton:** The Jettison Initiate pushbutton releases external stores based upon the settings of the External Stores Jettison selection knob and the Station Selection pushbuttons.

◆ **Station Selection Pushbuttons:** The seven Station Selection pushbuttons are used to select individual weapons stations for jettison. Any number of these stations can be selected at a time. The seven pushbuttons are CL (Centerline), LI (Left Inboard), LM (Left Middle), LO (Left Outboard), RI (Right Inboard), RM (Right Middle), and RO (Right Outboard).

◆ **External Stores Jettison Selection Knob:** The External Stores Jettison selection knob is used to select the function of the Jettison Initiate pushbutton. The knob is rotated to select EMERG, SAFE, L FUSE MSL, R FUSE MSL, or STORES settings.
  • EMERG: Selects all external stores for Jettison. Note that the following stores cannot be jettisoned: wingtip AIM-9's, FLIR pods, and the Data Link pod.
  • SAFE: Deactivates the Jettison Initiate pushbutton.
  • L FUSE MSL: Selects the Left fuselage missile station (Station 5) for jettison.
  • R FUSE MSL: Selects the Right fuselage missile station (Station 7) for jettison.
  • STORES: Enables the selective jettison of stores in conjunction with the Station Selection pushbuttons.

◆ **Landing Gear Handle:** The landing gear handle raises or lowers the landing gear. The LANDING_GEAR [G] keyfunction is also used.

◆ **Landing Gear / Flaps Status Lights:** The Landing Gear / Flaps status lights display the current landing gear and wing flaps status. The top three lights (NOSE, LEFT and RIGHT) illuminate when the landing gear is down and locked. The FLAPS light illuminates when the trailing edge flaps are deployed in Auto Flaps Mode. The HALF and FULL lights illuminate when either Half or Full flaps, respectively, are selected.

◆ **Heading Select Switch:** The Heading Select switch is used to change the heading bug on the HSI MDI/MPCD page. See **MDI/MPCD: HSI page**, p. 4-60.

◆ **Course Select Switch:** The Course Select switch is used to change the course line on the HSI MDI/MPCD page. See **MDI/MPCD: HSI page**, p. 4-60.

◆ **Refueling Probe Switch:** The Refueling Probe switch is used to extend or retract the airborne refueling probe. The keyfunction REFUELING_PROBE [Q] is also used to control the probe.

◆ **Anti-Collision Light Switch:** The Anti-Collision light switch is used to turn the external anti-collision lights on and off. The LIGHTS_ANTICOLLISION [K] keyfunction is also used to control these lights.

◆ **Formation Light Switch:** The Formation light switch is used to control the external formation lights. The switch is toggled between OFF, DIM, and BRT (bright) settings. The LIGHTS_FORMATION [SHIFT-K] keyfunction is also used to control these lights.

◆ **Analog Clock:** The analog clock is provided as a backup. It requires no electrical power to operate.

◆ **Standby Airspeed Indicator:** The Standby Airspeed Indicator operates off of pitot-static pressure and requires no power. It registers indicated airspeed between 0 and 800 knots.

◆ **Standby Altimeter:** The Standby Altimeter operates from a static pressure source and requires no power. This altimeter indicates the current barometric altitude of the aircraft.

◆ **Vertical Speed Indicator:** The Vertical Speed Indicator registers the current rate of altitude gain or loss. When the needle is horizontal, the aircraft is level. If the aircraft is climbing, the needle deflects upwards. If the aircraft is descending, the needle deflects downwards.

◆ **Tail Hook Switch:** The Tail Hook switch is used to raise or lower the aircraft's tail hook. The keyfunction TAILHOOK [T] is also used to raise or lower the tail hook.

◆ **Attitude Reference Indicator:** The Attitude reference indicator is a self-contained, electrical gyro-horizon instrument that indicates the aircraft's attitude relative to the horizon.

◆ **Lock / Shoot Lights (not shown):** The Lock / Shoot lights are located on the canopy frame directly above the HUD. When the radar has locked on to a target, the LOCK light illuminates. When the Shoot cue is displayed on the HUD, the SHOOT light illuminates.

ENGINE FUEL DISPLAY (EFD)

The Electronic Fuel Display (EFD) is the primary Fuel/Engine display in the cockpit. The amount of onboard fuel is displayed in addition to key engine parameters. The only interactive control on the EFD is the Bingo level selection, which is adjusted via a rotating knob on the upper left side of the display.

The Bingo level is adjusted (in 500 lbs. increments) using either the Bingo knob (clicking the "-" under the knob decreases the value, while clicking the "+" increases it).

Total Fuel

Bingo Setting

External Fuel Total

Left/Right Engine N2 RPM

Left/Right Engine EGT Temperature

Left/Right Fuel Flow

Left/Right Engine Oil Pressure

Bingo Bug Setting

Internal Fuel Tank Display

Internal Fuel Total
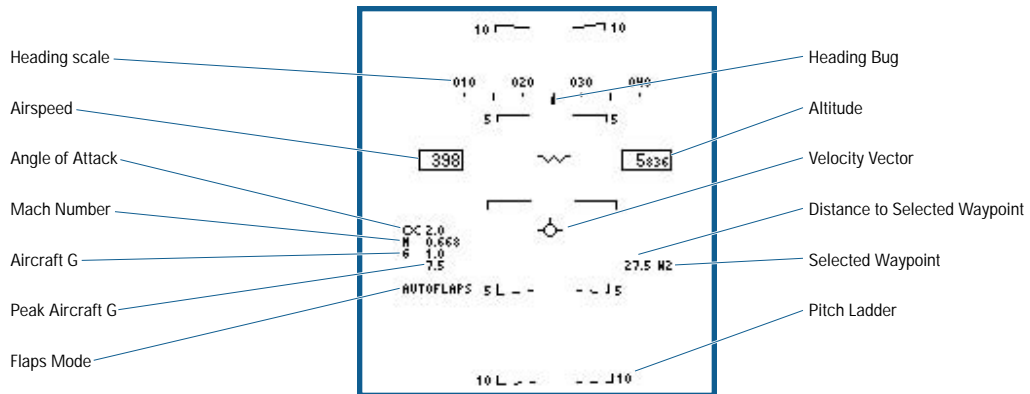
External Fuel Tanks Display

Engine Nozzle Position
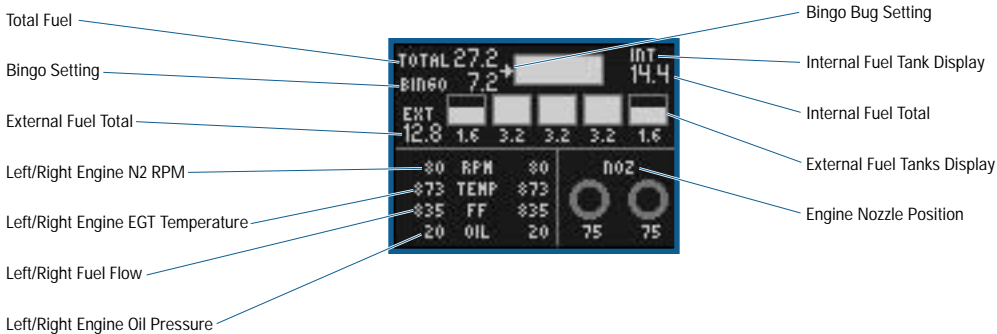
- ◆ **Total Fuel:** Displays the total (internal + external) fuel currently loaded on/in your aircraft in thousands of pounds, to the nearest hundred pounds.
- ◆ **Bingo Setting:** Displays the current low fuel "bingo" warning in thousands of pounds, to the nearest hundred pounds. The bingo level is set as described above.
- ◆ **External Fuel Total:** Displays the total external fuel currently loaded on your aircraft in thousands of pounds, to the nearest hundred pounds.
- ◆ **Left/Right Engine N2 RPM:** Displays N2 compressor RPM (expressed as a percent) for each engine. The left column represents the left engine, while the right column represents the right engine.
- ◆ **Left/Right Engine Exhaust Gas Temperature (TEMP):** Displays exhaust gas temperature for both engines in degrees Celsius.
- ◆ **Fuel Flow (FF):** Displays Fuel Flow to each engine in hundreds of pounds per hour.
- ◆ **Oil Pressure:** Displays left and right engine oil pressure in PSI.
- ◆ **Engine Nozzle Position (NOZ) Area:** Graphically (circles) and digitally (percent) displays the current positions of each engine's exhaust nozzle. As the nozzles close, the circles progressively fill.
- ◆ **External Fuel Tanks Display:** Graphically displays the five potential external tanks as individual boxes in the EFD. The amount of fuel in each tank is indicated both as a number below each box (in thousands of pounds to the nearest hundred pounds) and graphically by the amount each box is filled.
- ◆ **Internal Fuel Total:** Displays the total amount of internal fuel currently loaded on your aircraft.
- ◆ **Internal Fuel Tank:** Graphically displays all internal fuel as a single box on the EFD. The amount of fuel is indicated by the amount the box is filled.
- ◆ **Bingo Bug Setting:** Graphically displays the current setting of the low fuel "bingo" warning as an arrow on the left hand side of the total internal fuel box.

HEAD-UP DISPLAY (HUD)

The HUD consists of computerized flight, targeting, and weapons information projected onto an eye-level sheet of specially coated glass at the front of the cockpit. It's designed to keep the pilot from having to constantly look down at his instruments (hence the name "head-up") for flight and combat information. It is a good thing to have when locked in a wild dogfight.

BASIC HUD SYMBOLOGY

The basic HUD symbology is common to all three Master Modes.

Heading scale
Airspeed
Angle of Attack
Mach Number
Aircraft G
Peak Aircraft G
Flaps Mode

Heading Bug
Altitude
Velocity Vector
Distance to Selected Waypoint
Selected Waypoint
Pitch Ladder

◆ **Heading Scale:** Displays your current heading. The Heading Scale is basically a digital compass laid out on a horizontal tape. North is 000, east is 090, south is 180 and west is 270. The heading numbers are displayed every 10 degrees over the large tick marks. A total of 30 degrees is displayed at one time on the moving tape.

◆ **Airspeed:** Displays your current indicated airspeed.

◆ **Angle of Attack:** Displays your current angle of attack in degrees.

◆ **Mach Number:** Displays your current mach number.

◆ **Aircraft G:** Displays the number of Gs you're current pulling.

◆ **Peak Aircraft G:** Displays the maximum attainable G the aircraft is allowed to generate based on correct weight and the G-override limiter.

◆ **Flaps Mode:** The current Flap mode (Auto, Full, or Half) is displayed here.

◆ **Pitch Ladder:** The Pitch Ladder lines are drawn every five degrees and angle in towards the horizon at an angle half that of the flight path angle. For example, in a 40° climb, the pitch lines are angled 20° toward the horizon.

  • Positive pitch lines are solid, and negative pitch lines are dashed. Each line is numbered, and the numbers rotate with roll so that inverted flight is easily recognized.

◆ **Velocity Vector:** The velocity vector (also called the flight path indicator) points to the actual direction the aircraft is flying. For example, with heavy rudder use, the nose of the aircraft may point in one direction while the aircraft side-slips in another direction.

  • The velocity vector is limited to an 8° radius circle, so if it reaches this limit during flight, it flashes rapidly denoting it is no longer accurately indicating the flight path.

◆ **Selected Waypoint:** Displays the currently selected waypoint.

◆ **Distance to Waypoint:** Displays the current distance, in nautical miles, to the currently selected waypoint.

◆ **Altitude:** Displays either the barometric or radar altitude depending on the setting of the ALT switch on the HUD control panel. When the switch is in the BARO position, barometric altitude displays; in the RDR position, radar altitude displays and is indicated by an R next to the altitude.

- RDR is only valid at or below 5,000 feet AGL. If the radar altitude is or becomes invalid when selected for display, barometric altitude displays and a "B" flashes next to the altitude to indicate that barometric altitude is displaying rather than radar altitude.
- The current Vertical Velocity, in feet per minute, displays above the altitude box only in NAV Master Mode. Negative values indicate descent.

◆ **Heading Bug:** The heading bug indicates the bearing to the currently selected waypoint, target, or TACAN station, depending upon which steering mode is selected on the HSI.

HUD – NAV MASTER MODE SYMBOLOGY

In addition to the basic HUD symbology, the NAV Master Mode adds Landing and Steering symbology.

HUD LANDING & STEERING SYMBOLOGY

With the NAV Master Mode set and the landing gear down, the HUD displays the landing information. The Mach Number, Aircraft Gs and Peak Gs are deleted.

The steering information can display on the basic or landing HUD formats. The current steering mode is selected on the HSI page. See **MDI/MPCD: HSI page**, p. 4-60.
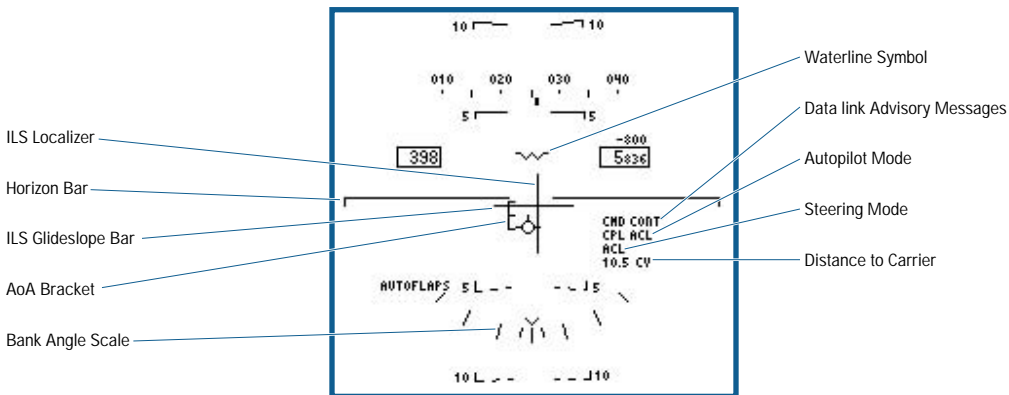
◆ **Horizon Bar:** Extends across the HUD.

◆ **Angle-of-Attack (AOA) Bracket:** The AOA Bracket displays adjacent to the left of the Velocity Vector. It's in addition to the normal digital AOA. The center of the bracket represents the optimum approach angle-of-attack (8.1° true). The length of the bracket is about ±1.2°. The bracket moves lower than the Velocity Vector as AOA increases; it moves higher as AOA decreases.

◆ **Bank Angle Scale:** Indicates your current bank angle in degrees from the horizontal. Tick marks represent 5, 15, 30, and 45 degrees of roll.

◆ **ILS Glideslope Bar:** It's a "fly-to" symbol linked to the Velocity Vector that displays aircraft position above, on or below the Glideslope when landing. The ILS Glideslope bar is only displayed when the ILS is turned on.

◆ **Distance to Carrier:** When ACL steering is selected, the distance to your home aircraft carrier in nautical miles is displayed here.

◆ **Steering Mode:** The current steering mode selected on the HSI is displayed here.

◆ **Autopilot Mode:** If the autopilot is engaged, the current autopilot mode selected on the UFC is displayed here.

◆ **HUD Data Link & Advisory Messages:** HUD data link advisory messages can appear on the HUD when ACL steering is selected in NAV master mode. These messages are:

- NOT CMD: Indicates you're not within the ACL control area (i.e. you're too far from the ship) or your aircraft is not capable of ACL landings (probably as a result of battle damage).
- LND CHK: Indicates you're within the ACL control area but not configured for landing (gear and hook down).

- • ACL RDY: Indicates you're within the ACL control box, configured for landing, and ready to be coupled (via the autopilot).
- • CMD CONT: Indicates the ACL system is in control of your aircraft.
- • W/O: Indicates you're to terminate the approach and go around. When this message is received, the ACL system uncouples from the autopilot, and control of the aircraft reverts back to you.

◆ **ILS Localizer Bar:** It's a "fly-to" symbol linked to the Velocity Vector that displays aircraft position left of center, on centerline or right of center when landing. The ILS Localizer bar is only displayed when the ILS is turned on.

◆ **Waterline Symbol:** The aircraft waterline position is indicated on the HUD (4° above the optical center) by displaying the flying W symbol. The waterline symbol is displayed when the landing gear is down.

HUD – A/A MASTER MODE SYMBOLOGY

The A/A HUD has its own weapon independent symbology that is described here. This section is not intended to show all of the A/A HUD symbology; rather, it is meant to give you a basic idea of what to expect in A/A Master Mode. In addition to this common A/A HUD symbology, radar target acquisition and weapon specific symbology can be displayed on the HUD (described in the A/A Radar and A/A Weapon sections in Chapter 5 – Combat).

WEAPON INDEPENDENT HUD SYMBOLOGY

Weapons independent symbology is symbology that is common to all A/A missiles. The A/A HUD gun modes also use some of this symbology.
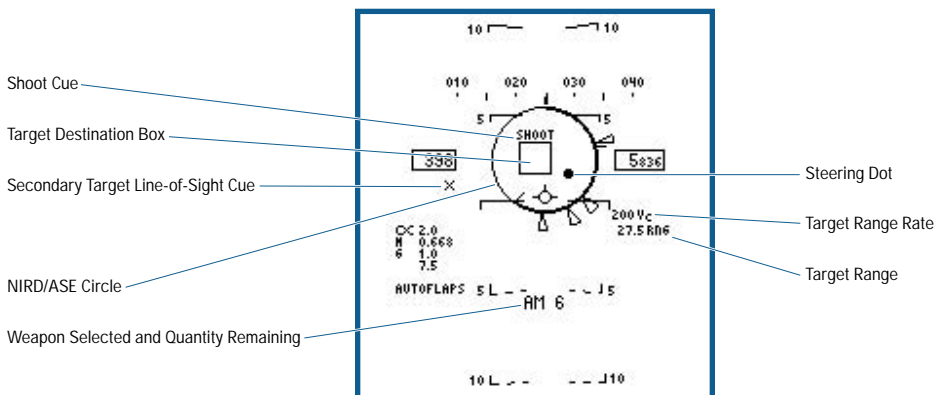
◆ **SHOOT Cue:** The SHOOT cue displays above the target designator (TD) box when all shoot conditions for the selected weapon are met. The shoot cue flashes when the target is within "no escape" range and weapon intercept is optimal.

◆ **Target Designator Box:** The target designator (TD) box is a square that identifies the line of sight (LOS) to the Launch & Steering (L&S) target. The TD box flashes when the L&S target LOS is outside the HUD FOV. Targets identified as friendly will have an X through the center of the box.

◆ **Secondary Target Line-of-Sight Cue:** In the Track-While-Scan radar mode, it is possible to track both a primary and secondary target at the same time. If a secondary (also known as a DT2 target) exists, a small X is displayed to represent the DT2 target LOS.

◆ **Normalized In-Range Display (NIRD) / Allowable Steering Error (ASE) Circle:** The NIRD/ASE circle consists of a 6° diameter circle centered at the aircraft waterline. The individual elements of the NIRD circle are described separately below. The NIRD circle will not appear unless there is a L&S target.

◆ **Weapon Selected and Quantity Remaining:** Indicates the currently selected weapon, followed by the number of the selected weapon remaining. When the gun is the selected weapon, the number of gun rounds remaining is displayed underneath the "GUN" text. An X through the selected weapon indicates that Master Arm is set to SAFE.

◆ **Target Range:** Target range displays whenever there is an L&S target. The target range is displayed to the nearest tenth of a nautical mile.

◆ **Target Range Rate:** Target range rate (VC) in knots displays whenever there is an L&S target. A closing velocity (target getting closer to you) is a positive number and an opening velocity (target getting further away from you) is a negative number.

◆ **Steering Dot:** A steering dot displays whenever an A/A missile is selected, an L&S target is designated and is it located within 76° of aircraft boresight. The steering dot, in conjunction with the NIRD circle, provides lead angle steering. Flying the aircraft so that the steering dot is inside the NIRD circle satisfies the lead angle computation. The steering dot flashes when the target is within 15° of the A/A radar azimuth limit of ±70° or within 5° of the elevation limit of ±60°. When AIM-9 is selected and the AIM-9 is tracking a target other than the L&S, the steering dot is removed.

◆ **Breakaway X (not shown):** The breakaway X is displayed when the range to the target is less than R_{MIN} for the selected weapon. You must either change weapons or increase the range between your aircraft and the target.

NORMALIZED IN-RANGE DISPLAY (NIRD) CIRCLE

- Minimum Range (R_{MIN})
- Relative Range Bar
- Gun Maximum Range
- Maximum Aerodynamic Range (R_{AERO})
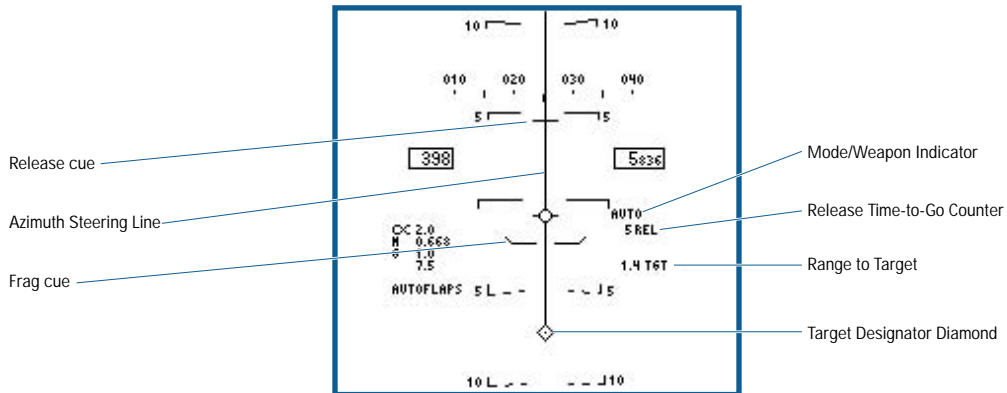- No Escape Range (R_{NE})
- Maximum Range (R_{MAX})
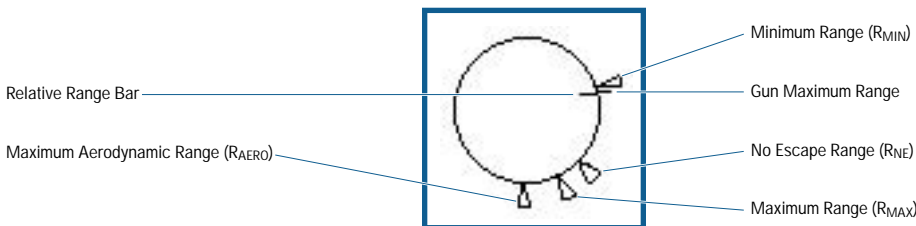
◆ **Relative Range Bar:** The relative range of the target is displayed by the bar just inside the NIRD circle. It starts at the 12 o'clock position and rotates clockwise as target range increases. It's scaled relative to R_{AREO} and R_{MIN}.

◆ **Maximum Aerodynamic Range (R_{AERO}):** R_{AERO} is the absolute maximum straight-line range of the missile. Hitting the target at this range is only possible if the target flies completely straight and level during the entire time of flight of the missile.

◆ **Maximum Launch Range (R_{MAX}):** R_{MAX} is the maximum range of the missile against a target that flies straight and level during most of the missiles time of flight, and then performs a terminal escape maneuver just before the missile reaches it.

◆ **No Escape Range (R_{NE}):** The estimated no-escape range represents the optimal firing range against a maneuvering target. You are much more likely to get a hit if you wait until the target is within this range.

◆ **Minimum Launch Range (R_{MIN}):** The minimum launch range for the missile; a missile fired within this range will probably not hit the target. Once the target is within R_{MIN}, a large flashing Breakaway X will appear on the HUD (and on the radar MDI).

◆ **Gun Maximum Range:** When the radar is in STT, the gun R_{MAX} tab displays on the NIRD circle to indicate the maximum effective range of the gun. The gun R_{MAX} marker only displays when in STT, an A/A missile is selected, and target range is less than 12,000 ft.

HUD – A/G MASTER MODE SYMBOLOGY

When the A/G Master Mode is selected, target location and weapon release cues are added to the HUD. Much of this symbology is common to all A/G weapons and is described here. Again, this section is not intended to show all of the A/G HUD symbology; rather, it is meant to give you a basic idea of what to expect in A/G Master Mode. Along with this common A/G HUD symbology, additional weapon specific symbology can display on the HUD. This additional symbology is described in the A/G Weapon section of Chapter 5 - Combat.

HUD BASIC A/G SYMBOLOGY

Release cue

Azimuth Steering Line

Frag cue

Mode/Weapon Indicator

Release Time-to-Go Counter

Range to Target

Target Designator Diamond

◆ **Release Cue:** The release cue is a small line perpendicular to and centered on the Azimuth Steering Line (ASL). It displays when a target is designated in the AUTO bomb mode or the HARM pre-briefed (PB) mode. Initially, the release cue appears on the ASL above the velocity vector. As the weapon release point is approached, the release cue moves with the ASL. When the release cue intersects the velocity vector, which is positioned on the ASL through aircraft steering maneuvers, and the pickle button is depressed, automatic weapon release is initiated. If steering error exceeds 20°, the release cue is blanked and release is inhibited in the AUTO mode.

◆ **Azimuth Steering Line (ASL):** The ASL provides a steering cue to the designated target. The ASL displays after target designation in the AUTO mode. The ASL always displays perpendicular to the horizon and provides an azimuth steering reference with respect to the velocity vector.

◆ **Target Designator (TD) Diamond:** The TD diamond is used to identify target line of sight in all A/G weapon delivery modes. It contains a pipper in its center as an aiming reference whenever the TDC is assigned. The TD diamond is used in conjunction with the TDC to designate targets and is movable over the total HUD field of view. After designation, this symbol displays the computed position of the A/G designated target. The initial HUD TD designation is performed by assigning the TDC to the HUD, moving the TDC to the desired position on the HUD, and selecting the designate keyfunction.

• If the computed line of sight to the designated target lies outside the HUD field of view, the TD diamond is limited on the HUD along the edge to the designated target and flashes indicating the limit condition. The TD diamond is blanked when the bearing to the designated target exceeds 90°.

◆ **Range to Target:** When there is an Air-to-Ground designated target and TGT steering is selected, the range to the target is displayed here.

◆ **Frag Cue:** The frag cue represents the edge of the predicted fragmentation envelope for the selected weapon. To avoid the fragmentation envelope (and the possibility of severe aircraft damage), make sure this line is below the velocity vector when the weapon detonates. During low altitude weapon deliveries, you may be below the frag cue when you release your weapons. In this case, make sure you are flying very fast (above 600 knots is a good rule of thumb) or get above that altitude before the weapon goes off.

◆ **Release Time-To-Go (REL):** When a target is designated in AUTO mode or in HARM PB mode, this two-digit readout indicates the number of seconds remaining until weapon release occurs (## REL). REL is blanked when the steering error exceeds 20° in AUTO mode.

• For guided weapons such as Walleye and Maverick, the Time To Maximum Range (## TTMR) is displayed instead of TTG. If the computed TTMR exceeds 99 seconds, the display is limited until the TTMR becomes less than this value.

• In the A/G gun and rocket modes, the number of rounds remaining displays in this location rather than the TTG or TTMR (GUN ### or RKT ###).

◆ **Mode / Weapon Indication:** When any weapon except Walleye, Maverick, Harpoon, HARM, SLAM, JSOW, or JDAM is selected, the selected delivery mode (AUTO, CCIP, or MAN) indicates on the HUD.

• When a Walleye, Maverick, Harpoon, HARM, SLAM, JSOW, or JDAM is selected, the MDI weapon abbreviation identifying the weapon is displayed in this location. For the AGM-65E Laser Maverick, an additional indication displays when it is locked on (MAV LKD).

Displayed Impact Line

CCIP Cross
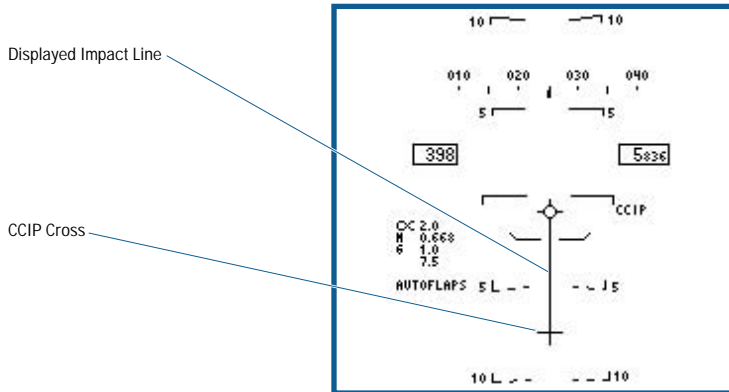
◆ **Displayed Impact Line (DIL) (CCIP bombing mode only):** The solid line DIL displays in CCIP bombing mode. The DIL extends between the velocity vector and the center of the CCIP. It provides a steering reference to aid you in maneuvering the aircraft to position the CCIP cross on the target. If the CCIP cross is not present, the DIL extends to the HUD FOV.

◆ **Continuously Computed Impact Point (CCIP) (CCIP bombing mode only):** This symbol displays only in the CCIP bombing mode. It indicates the impact point of the selected weapon if the weapon release button were immediately pressed. If the current weapon impact point is not in the HUD FOV, the CCIP cross is not displayed, and a reflected cue displays on the DIL. In this case, the DIL displays to the HUD FOV limit in the direction of the computed impact point, and the reflected cue displays. The reflected cue is a line displayed along the DIL at the same distance above the bottom of the DIL (HUD limit point) as the actual distance the CCIP is below the HUD limit point.

If the flight profile is flown so as to keep the target above the reflected cue, then a solution is ensured. During a dive, the reflected cue moves down the DIL and is blanked when the CCIP cross appears. If the actual CCIP is so far below the HUD that the reflected cue would be at or above the velocity vector, then the reflected cue is blanked from the display.

MULTIPURPOSE DISPLAY INDICATORS (MDIS) / MULTIPURPOSE COLOR DISPLAY (MPCD)

The Multi-Purpose Display Indicators (MDIs for short) along with the HUD are your primary sources of information. They display interchangeable information on a series of screens called "pages". From the MDI Main menu, you can click on any of series of 20 buttons (called pushbuttons – PBs) surrounding the MDI to display the different pages.

Some pages are only available under certain circumstances. Unavailable pages have their labels removed (and associated pushbutton disabled) from the top-level menu page. The format of a page may also change based on the selected Master Mode (radar is an example of this).

The center MPCD is simply a full color MDI that is also slightly larger than a normal MDI. It's otherwise identical to the left and right MDIs. The only MDI page that makes full use of its color is the HSI page.

TARGET DESIGNATION CONTROL (TDC)

Because there is a limit to the number of controls that can be in the cockpit, some controls are shared by different systems. Think of the Target Designation Controls (TDC) as the aircraft equivalent to your computer mouse. The TDC allows targeting cursors or cameras to moved up, down, left and right on the MDI/MPCD displays. In order to determine which display (MDI/MPCD) the TDC controls are active on, a display must have the TDC assigned to it. TDC assignment is indicated on a MDI or the MPCD by a small diamond located in the upper right corner of the display. Only one display can have the TDC assigned to it at a time. TDC assignment is made by either clicking on the desired display with the mouse, or by using the **TDC_CYCLE** [▢] keyfunction.

MDI – MAIN MENU PAGE

The Main Menu MDI page is the top-level page. From this page all other MDI pages are selected. It is a text only display with no sub-pages. When a pushbutton is selected, the MDI page changes to the selected page.

PB 18 of any MDI page is always assigned the MENU function. If selected it returns you to the Main Menu page. The Main menu page options are listed below:
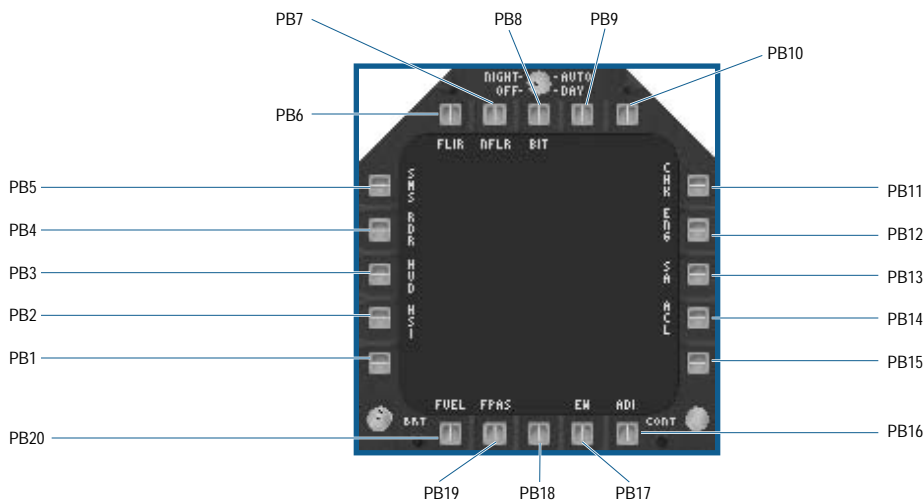
- ◆ MDI PB 1: No function.
- ◆ MDI PB 2: Horizontal Situation Indicator (HSI) page
- ◆ MDI PB 3: Head-Up Display (HUD) repeater page.
- ◆ MDI PB 4: Radar page (RDR), A/A Radar if in A/A or NAV Master Mode, A/G Radar if in A/G Master Mode.
- ◆ MDI PB 5: Stores Management System (SMS) page.
- ◆ MDI PB 6: ATFLIR (FLIR) page if the advanced targeting FLIR pod is loaded. Otherwise, no function and no label will be displayed on the Main Menu page.
- ◆ MDI PB 7: NAVFLIR (NFLR) page if the navigation FLIR pod is loaded. Otherwise, no function and no label will be displayed on the Main Menu page.
- ◆ MDI PB 8: Built-in Test (BIT) page.
- ◆ MDI PB 9: No function.
- ◆ MDI PB 10: No function.
- ◆ MDI PB 11: Checklist (CHK) page.
- ◆ MDI PB 12: Engine Data (ENG) page.
- ◆ MDI PB 13: Situational Awareness (SA) page.
- ◆ MDI PB 14: Automatic Carrier Landing (ACL) page.
- ◆ MDI PB 15: No function.
- ◆ MDI PB 16: Attitude Director Indicator (ADI) page.

◆ **MDI PB 17:** Electronic Warfare (EW) page.

◆ **MDI PB 18:** Always Main Menu (MENU) page. (No function on Main menu page)

◆ **MDI PB 19:** Flight Performance Advisory System (FPAS) page.

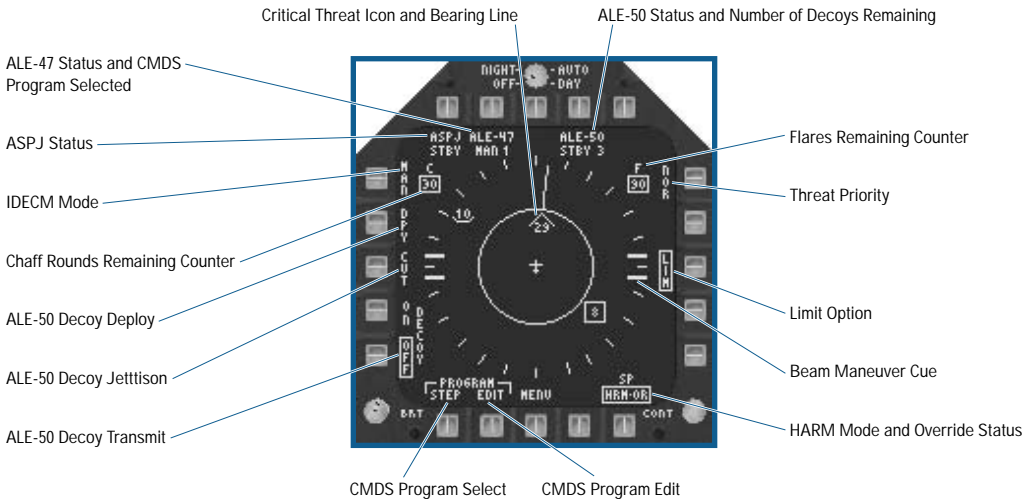◆ **MDI PB 20:** Fuel System (FUEL) page.

MDI – ELECTRONIC WARFARE (EW) PAGE

The Electronic Warfare (EW) MDI page is used to control the aircraft's Integrated Defensive Electronic Countermeasures system (IDECM). The IDECM is comprised of the ALR-67(v)2 Radar Warning Receiver (RWR), the ALE-47 Countermeasures Dispensing system (CMDS), the ALE-50 Countermeasure Decoy Dispensing system (CMDDS) and the ALQ-165 Airborne Self Protection Jammer (ASPJ).

The ALE-47 dispenses chaff or flares either singly or in a predefined sequence. This sequence is known as the CMDS program. The ALE-50 controls the deployment and operation of the radar decoy that is towed behind your aircraft. The ASPJ is your internal radar jammer system. The EW MDI page also displays the current status for each of these systems.

The EW MDI displays "emitters" (an emitter is anything that is transmitting a radar signal) in a top-down view with your aircraft in the center of the display. Emitters are positioned on the display based on how lethal that emitter is judged by the ALR-67.

◆ Non Lethal threats are emitters that have not "locked on" to your aircraft and are displayed just inside the outer ring of the display at their relative bearing to the aircraft.

◆ Lethal threats are emitters that have locked on to your aircraft and are displayed just outside the inner circle.

◆ Critical threats are emitters that have fired one or more missiles at your aircraft and are displayed within the inner circle.

Critical Threat Icon and Bearing Line | ALE-50 Status and Number of Decoys Remaining

ALE-47 Status and CMDS Program Selected

ASPJ Status

IDECM Mode

Chaff Rounds Remaining Counter

ALE-50 Decoy Deploy

ALE-50 Decoy Jettison

ALE-50 Decoy Transmit

Flares Remaining Counter

Threat Priority

Limit Option

Beam Maneuver Cue

HARM Mode and Override Status

CMDS Program Select | CMDS Program Edit

◆ **ALE-50 Decoy Transmit:** Turns the decoy transmitter ON or OFF.

◆ **ALE-50 Decoy Jettison (CUT):** Permanently severs a deployed decoy from your aircraft. You should only use this option when a decoy has been damaged and won't retract using the DPY command.

◆ **ALE-50 Decoy Deploy (DPY):** Deploys or retracts the ALE-50 decoy.

◆ **IDECM Mode:** Toggles between the following:

• MAN: The ALE-47 is set to MAN (manual) mode, and the ALE-50 and ASPJ are set to standby.

• S/A: The ALE-47 is set to S/A (semi-automatic) mode, and the ALE-50 and ASPJ are set to standby.

• AUT: The ALE-47 is set to AUT (automatic) mode, and the ALE-50 deploys a decoy (if one isn't deployed). Both the ALE-50 and ASPJ automatically attempt to jam threats.

◆ **Chaff Rounds Remaining Counter:** Your current number of chaff rounds remaining.

◆ **ASPJ Status:** One of the following displays:
  • STBY: the ASPJ is in standby (inactive).
  • REC: the ASPJ is in receive mode, and attempts to jam a detected threat automatically.
  • JAM: the ASPJ is transmitting.
  • EMCON: ASPJ operation is inhibited by EMCON.

◆ **ALE-47 Status and Program Selected:** One of the following messages displays followed by the currently selected program number.
  • MAN: The CMDS program must be selected and initiated manually.
  • S/A: An appropriate CMDS program is selected but must be initiated manually.
  • AUT: An appropriate CMDS program is selected and run as long as the threat remains in the critical band.
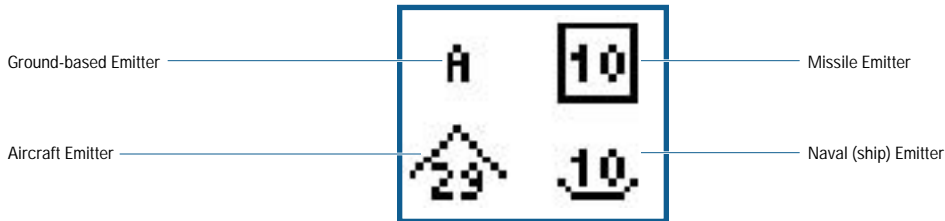
> **EA TIP** Leaving your ALE-47 in automatic mode uses up your supply of chaff and flares at a rapid pace!

◆ Single chaff/flares are released manually at any time using the **CHAFF** [DELETE] or **FLARE** [INS] keyfunctions. The currently selected CMDS program are initiated in manual or semi-automatic modes using the **CMDS_PROGRAM_INITIATE** [HOME] keyfunction.

◆ **Critical Threat Icon and Bearing Line:** Critical threat icons are displayed within the inner circle at their relative bearing to your aircraft. A bearing line drawing from the threat icon to the outer ring of the display, and can be used to help position a threat to either side (the "beam") of your aircraft. To place a threat in the beam, turn your aircraft until the threat bearing line is within either of the beam maneuver cues located on either side of the display.

◆ **ALE-50 Status:** The ALE-50 status is displayed here. The number following the status is the number of decoys remaining.
  • STOW: the ALE-50 decoy is stowed (inactive).
  • STBY: the ALE-50 decoy is in transit (inactive).
  • DPLY: the ALE-50 decoy is deployed (not transmitting).
  • JAM: the ALE-50 decoy is transmitting.
  • EMCON: ALE-50 decoy operation is inhibited by EMCON.
  • NO DCY: no ALE-50 decoys remain, system is unusable.

> **EA TIP** Since the ALE-50 decoy is towed behind the aircraft by a thin wire, using your afterburner while it's deployed could damage it or even cause its loss.

◆ **Flares Remaining Counter:** Your current number of flares remaining.

◆ **Threat Priority:** Allows you to give certain types of threats a higher priority on the EW display. This is very useful when using the LIM option to reduce the amount of clutter on the display. Threat priority are toggled through the following settings:
  • NOR: Normal operation (no priority set).
  • AIR: Airborne threats are given priority.
  • LND: Land based threats are given priority.
  • SEA: Shipboard threats are given priority.
  • EW: Early warning threats are given priority.
  • FRN: Friendly threats are given priority.

◆ **Limit (LIM):** When boxed, the EW display is limited to the top 8 threats instead of the normal maximum of 32 threats.

◆ **Beam Maneuver Cues:** The heavy double lines at the 3 and 9 o'clock positions on the display are used to help you put a critical threat on your beam (side), which degrades the ability of most threats to remain locked on to you.

◆ **HARM Override (HRM OVRD):** Allows for the override of the HARM Self-Protect pullback mode. See **AGM-88 HARM Anti-Radiation Missile**, p. 5-140.

◆ **CMDS Program EDIT:** Brings up the CMDS programming sub-page, described below. You can only edit CMDS programs when the IDECM mode is set to MAN (manual).

◆ **CMDS Program STEP:** Toggles between each CMDS program. When S/A or AUT IDECM modes are selected, programs are selected based upon the threat type, and this option has no effect.

◆ **Emitter symbols:** The following symbols are used to mark threat emitters on the EW page. If a symbol is flashing, it is passing missile guidance commands to a missile. In addition, critical threats have a line drawn from the symbol to the outer edge of the display. You can use this line in conjunction with the beam maneuver cues when attempting to avoid a threat.

Ground-based Emitter ⸺⸺⸺⸺⸺⸺⸺⸺⸺ A |10| ⸺⸺⸺⸺⸺⸺⸺⸺ Missile Emitter

Aircraft Emitter ⸺⸺⸺⸺⸺⸺⸺⸺⸺ 29   .10.   ⸺⸺⸺⸺⸺⸺⸺⸺ Naval (ship) Emitter

THREAT ID CODES

AIR THREAT EMITTER CODES

Code	Air Emitter	Radar System
14	F-14B	AWG-9
15	F-15C/E	AN/APG-70
16	F-16C	AN/APG-68
18	F/A-18C	AN/APG-65
18	F/A-18E	AN/APG-73
21	MiG-21	Spin Scan
22	Tu-22M	Tail Gun Radar
27	Su-27, Su-33	Slot Back 2
29	MiG-29	Slot Back 1
31	MiG-31	Flash Dance
35	Su-35	Zhuk-PH
50	A-50U	Shmel-M
72	Tornado IDS	Doppler 72
E2	E-2C	AN/APS-145
E3	E-3	AN/APY-1/2

SURFACE THREAT EMITTER CODES

		Ground		Sea		
Code	**NATO ID**	**Missile**	**Illuminator**	**Missile**	**Illuminator**	**Platform**
8	Gecko	SA-8	Land Role	SA-N-4	Pop Group	Slava, Krivak
10	Grumble	SA-10B	Flap Lid	SA-N-6	Top Dome	Slava
	SA-10C	Tomb Stone	N/A	N/A	N/A	
11	Gadfly	SA-11	Fire Dome	SA-N-7	Front Dome	Sovremenny
SD	Snow Drift	SA-11	(Acquisition)	N/A	N/A	N/A
13	Gopher	SA-13	Snap Shot	N/A	N/A	N/A
15	Gauntlet	SA-15	Gauntlet	SA-N-9	Cross Sword	Kuznetsov
S6	2S6	SA-19	Hot Shot	SA-19	CADS-N-1	Kuznetsov
23	Shilka	AAA	Gun Dish	N/A	N/A	N/A
AA	AAA	AAA	Fire Can	N/A	N/A	N/A
HA	I-HAWK	I-HAWK	HPI (Illuminator)	N/A	N/A	N/A
HA	I-HAWK	I-HAWK	PAR (Acquisition)	N/A	N/A	N/A
TS	Tin Shield	N/A	Search Radar	N/A	N/A	N/A
55	55K6-3	N/A	Search Radar	N/A	N/A	N/A
TI	SPY-1D	N/A	N/A	N/A	Search Radar	Ticonderoga
SP	SPS-40D	N/A	N/A	N/A	Search Radar	Spruance
NI	SPS-48E	N/A	N/A	N/A	Search Radar	Nimitz, LPD-17
PY	SPS-49(V)2	N/A	N/A	N/A	Search Radar	Perry
KU	Sky Watch	N/A	N/A	N/A	Search Radar	Kuznetsov
SL	Top Pair	N/A	N/A	N/A	Search Radar	Slava
SV	Top Plate	N/A	N/A	N/A	Search Radar	Sovremenny
KR	Head Net	N/A	N/A	N/A	Search Radar	Krivak
SS	Sea Sparrow	N/A	N/A	RIM-7	TAS Mk 23 (Acq)	Nimitz
				RIM-7	Mk 91	Nimitz
				RIM-7RTC	SPQ-91	LPD-17
				RIM-7M	Mk 95	Spruance
SM	Standard	N/A	N/A	SM-2ER	SPG-62	Ticonderoga
	N/A	N/A	SM-1MR	Mk 92	Perry	
SU	Surface Search	N/A	N/A	N/A	Surface Search	All

CMDS PROGRAMMING SUB-PAGE

Return to EW page

Edit number of chaff rounds to be released in a cycle

Edit number of flares to be released in a cycle

Number of cycles that the program will repeat

Time between each repeat cycle

Current CMDS Program Settings

CMDS Program Step

CMDS Program Save
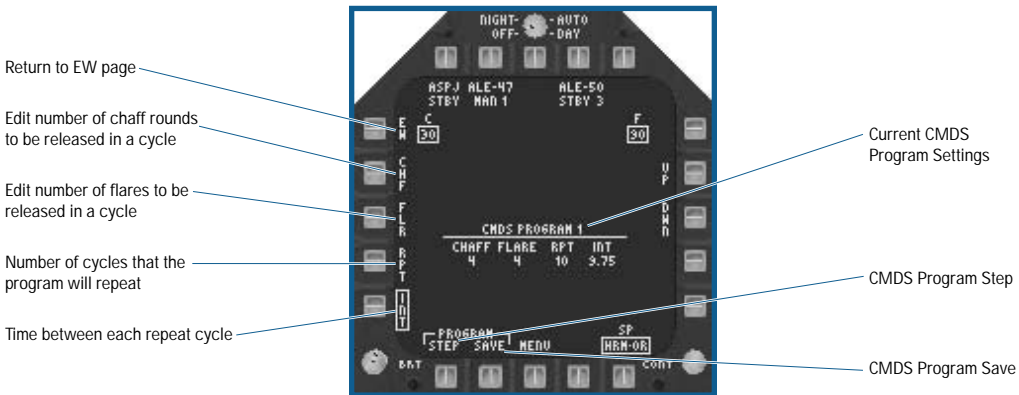
◆ **Interval (INT) Length:** When boxed, the UP and DWN options (PB 12 and 13, respectively) are used to increase or decrease the amount of time in .25 second segments that elapse before the program repeats itself.

◆ **Repeat (RPT) Value:** When boxed, the UP and DWN options are used to increase or decrease the number of times the program repeats at the specified interval.

◆ **Flare (FLR) Quantity:** When boxed, the UP and DWN options are used to increase or decrease the amount of flares to release during one cycle of the current program.

◆ **Chaff (CHF) Quantity:** When boxed (selected), the UP and DWN options are used to increase or decrease the amount of chaff to release during one cycle of the current program.

◆ **Return to EW Page:** Returns the display to the EW page format.

◆ **Current CMDS Program Settings:** The current program number and settings are displayed here.

◆ **CMDS Program Save Option:** Saves the current CMDS program settings.

◆ **CMDS Program STEP:** Toggles between each CMDS program.

IDECM WARNING TONES

The IDECM system also has 5 alert / warning tones associated with it, as follows:

◆ **New Ground Threat:** (low pitched single tone) Played whenever a new ground- or sea-based threat appears on the display.

◆ **New AI Threat:** (medium pitched single tone) Played whenever a new airborne interceptor threat appears on the display.

◆ **AAA Radar Lock:** (medium pitched tone alternating on and off rapidly, continuous) Played whenever an Anti-Aircraft Artillery radar has locked on to your aircraft.

◆ **Missile Alert:** (alternating low/medium pitched tones, continuous) Played whenever a threat exists in the Lethal Threat band, unless a Missile Launch condition exists.

◆ **Missile Launch:** (rapidly alternating low/medium pitched tones, continuous) Played whenever a threat exists in the Critical Threat band.
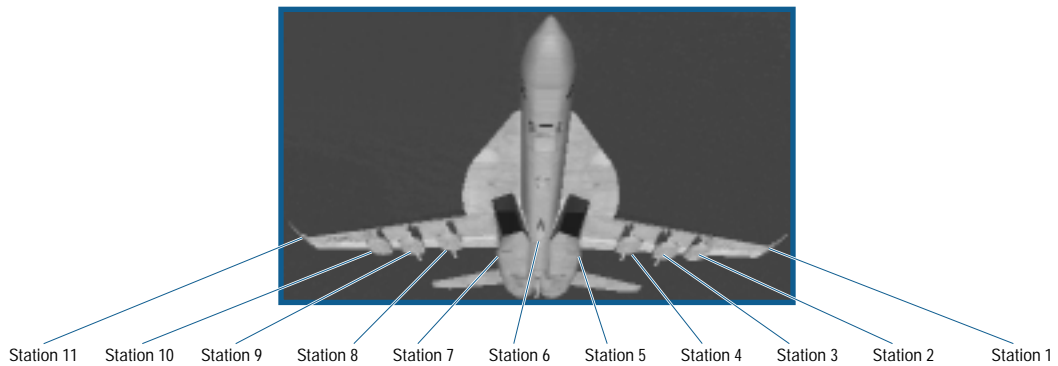
MDI – HUD BACKUP (HUD) PAGE

The HUD backup MDI page simply repeats the current HUD symbology. This is useful to you if the HUD is damaged and no longer functions. Only the HUD symbology displays on the MDI because unlike the HUD, it is not a window to the outside world.

The only active MDI control is PB 18, MDI Main menu.

MDI – STORES MANAGEMENT SYSTEM (SMS) PAGE

The Stores MDI page displays all weapons currently loaded on the aircraft in a top down wing plan form view. The aircraft has eleven separate weapon stations, numbered from right to left.
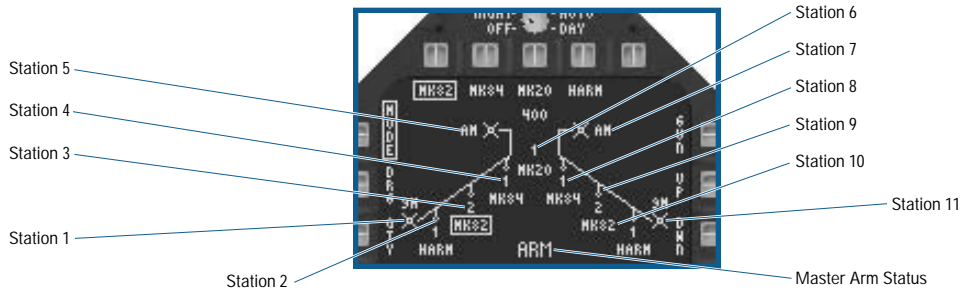

Station 11   Station 10   Station 9   Station 8   Station 7   Station 6   Station 5   Station 4   Station 3   Station 2   Station 1

The type and number of weapons that are loaded on any specific weapons station is summarized in the following table:

WEAPONS SUMMARY TABLE

	MDI ABRV	Aircraft Weapons Station										
		11	10	9	8	7	6	5	4	3	2	1
Air-to-Air Missiles												
AIM-7F Sparrow	7F		1	1	1	1		1	1	1	1	
AIM-7M Sparrow	7M		1	1	1	1		1	1	1	1	
AIM-7MH Sparrow	7H		1	1	1	1		1	1	1	1	
AIM-9L Sidewinder	9L	1	1	2	2				2	2	1	1
AIM-9M Sidewinder	9M	1	1	2	2				2	2	1	1
AIM-9X Sidewinder	9X	1	1	2	2				2	2	1	1
AIM-120 AMRAAM	AM		1	2	2	1		1	2	2	1	
Air-to-Ground Missiles												
AGM-65E Laser Maverick	MAVE		1	1	1				1	1	1	
AGM-65F IR Maverick	MAVF		1	1	1				1	1	1	
AGM-65G IR Maverick	MAVG		1	1	1				1	1	1	
AGM-84A Harpoon	HRPN			1	1				1	1		
AGM-84H SLAM-ER	SLAM			1	1				1	1		
AGM-88 HARM	HARM		1	1	1				1	1	1	
AGM-123 Skipper	SKPR			1	1				1	1		
Air-to-Ground Unpowered Guided Bombs												
AGM-62 Walleye I (requires AWW-13)	WE			1	1				1	1		
AGM-154A JSOW	JSWA			1	1				1	1		
AGM-154C JSOW	JSWC			1	1				1	1		
GBU-12D Paveway II (Mk82)	82LG		1	1	1				1	1	1	
GBU-16B Paveway II (Mk83)	83LG			1	1				1	1		
GBU-24A Paveway III (Blu109)	P24A			1	1				1	1		

|	MDI	Aircraft Weapons Station										
	ABRV	11	10	9	8	7	6	5	4	3	2	1
GBU-24B Paveway III (Mk84)	P24B			1	1				1	1		
GBU-29 JDAM (Mk84)	JD29			1	1				1	1		
GBU-30 JDAM (Mk83)	JD30			1	1				1	1		
GBU-31 JDAM (Blu109)	JD31			1	1				1	1		
Air-to-Ground Unguided Bombs												
Mk 82 (500lb general purpose)	MK82		1	2	2		2		2	2	1	
Mk 82R Retarded (ballute)	82R		1	2	2		2		2	2	1	
Mk 82SE Snake eye (retarded)	82SE		1	2	2		2		2	2	1	
Mk 83 (1000lb general purpose)	MK83			2	2		1		2	2		
Mk 83R Retarded (ballute)	83R			2	2		1		2	2		
Mk 84 (2000lb purpose)	MK84			1	1				1	1		
Mk 84R Retarded (ballute)	84R			1	1				1	1		
Mk 20 Rockeye II (CBU anti armor)	MK20		1	2	2		2		2	2	1	
Mk 77 Fire bomb (napalm)	MK77		1	2	2		2		2	2	1	
CBU-59B (CBU anti personnel)	APAM		1	2	2		2		2	2	1	
CBU-72 (fuel air explosive)	FAE		1	2	2		2		2	2	1	
Air-to-Ground Unuided Rocket Pods												
LAU-10 (4x5" rockets)	R10		1	2	2				2	2	1	
LAU-68 (19x2.75" rockets)	R68		1	2	2				2	2	1	
Anti-Ship Mines												
Mk 60 CAPTOR	CPTR			1	1				1	1		
Mk 65 Quickstrike	QSTK			1	1				1	1		
Sensors-and-Datalink Pods												
AAR-50 NAVFLIR	NFLR					1						
ATFLIR (Advanced Targeting FLIR)	FLIR							1				
AWW-13 (Datalink)	DL13						1					
Air-Launched Decoys												
ADM-141 TALD (Decoy)	TALD		1	2	2		2		2	2	1	
External Fuel Tanks												
330 gallon tank	330F			1	1		1		1	1		
480 gallon tank	480F			1	1		1		1	1		

The Stores page displays the weapon you've selected and allows for changing of certain weapon options. While the basic format is the same regardless of current Master Mode, different options are available based on the selected weapon. The options available for each weapon type are discussed in Chapter 5.

Station 5
Station 4
Station 3
Station 1
Station 2

Station 6
Station 7
Station 8
Station 9
Station 10
Station 11
Master Arm Status

The Master Arm Status displays either ARM or SAFE depending upon the current status.

MDI – ATTITUDE DIRECTOR INDICATOR (ADI) PAGE

The Attitude Director Indicator (ADI) page displays information about your flight profile. The symbology is the same or similar to what appears on the HUD.
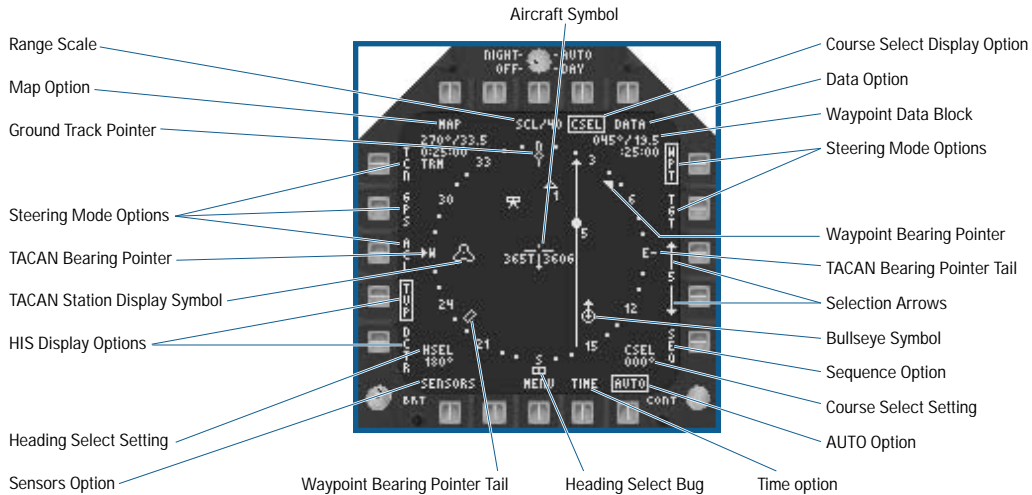

ADI Ball

ADI Roll Angle Reference Marks

Turn Indicator
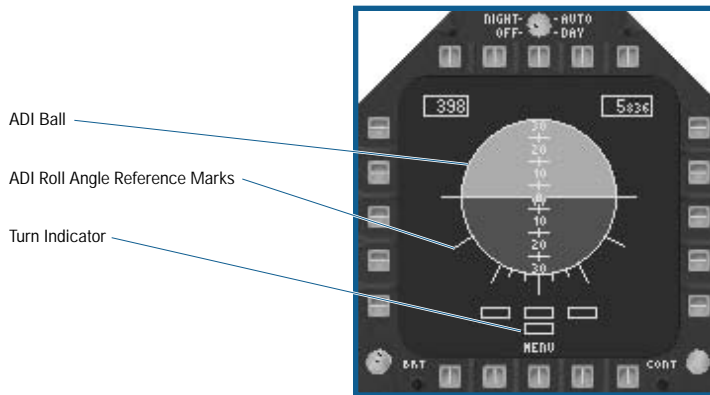
◆ **ADI Ball:** "Rotates" to indicate your pitch and roll. The colored-in area represents the ground, while the open area represents the sky.

◆ **ADI Roll Angle Reference Marks:** Located at the 0°, 30°, 60° and 90° points (left and right). Minor reference marks are located every 10° between 0° and 30° (left and right).

◆ **Turn Indicator:** Displays below the ADI ball and indicates your yaw rate. The top three boxes are fixed, while the bottom box moves left or right representing the current yaw rate. The top center box represents 0° of yaw, while the outer boxes represent 3° per second yaw rate left or right. Indicated when the lower box is centered below either box. Lower box displacement is limited to 10° per second (left or right).

MDI – HORIZONTAL SITUATION INDICATOR (HSI) PAGE

The HSI MDI page is top-down view of the current navigation situation with your aircraft located in the center of a compass rose. Your aircraft remains fixed in display always facing the top of the page. The compass rose rotates around your aircraft. This takes some getting used to, as the top of the display does not always face North.

The HSI symbology can overlay a moving map. You may display it on either of the MDIs, the MPCD or on the UFC. The map is monochrome on the MDI's, and full color on the MPCD.

This is a complex display where a lot of information is being provided to you, but once you get the hang of it you'll find it an invaluable navigational tool.

Aircraft Symbol

Range Scale

Map Option

Ground Track Pointer

Steering Mode Options

TACAN Bearing Pointer

TACAN Station Display Symbol

HIS Display Options

Heading Select Setting

Sensors Option

Course Select Display Option

Data Option

Waypoint Data Block

Steering Mode Options

Waypoint Bearing Pointer

TACAN Bearing Pointer Tail

Selection Arrows

Bullseye Symbol

Sequence Option

Course Select Setting

AUTO Option

Waypoint Bearing Pointer Tail

Heading Select Bug

Time option

◆ **Range Scale:** The range scale increments from 5, 10, 20, 40, 80 to 160NM range scales. The range scale is the distance from the aircraft symbol to the inner edge of the compass rose.

◆ **Ground Track Pointer:** This symbol is always at the top center of the page and represents your current heading.

◆ **MAP Option:** When active, the moving map displays under the HSI symbology. The map never displays at the 80 or 160 NM range scales.

◆ **TACAN Station Data Block:** This area contains the bearing, range (in NM to the nearest tenth of a mile), estimated time to overfly the TACAN station (in hours: minutes: seconds) and the three letter TACAN station ID. Ranges greater than 999.9 NM display as 999.9. Times greater than 9:59:59 display as 9:59:59. The current TACAN station is selected from the UFC.

◆ **Steering Mode Options:** (PB 3-5, 11-12) The TCN (TACAN), GPS, ACL (ACLS), WPT (Waypoint), and TGT (Target) options are radio-buttons such that only one are selected at a time. WPT is the default. The steering mode controls the navigation data on the HUD and determines which coupled steering mode is available to the autopilot.

  • TCN: Selects the current TACAN station as the steering point.
  • GPS: Selects a GPS target point as the steering point. The current GPS target point is treated exactly like a waypoint. GPS target points cannot be changed in flight. If there are multiple GPS target points, the selection arrows are used to step through these points.
  • ACL: Selects your home aircraft carrier as a steer point. The home aircraft carrier's location is treated exactly like a waypoint. The carrier steer point symbol is a "homeplate" (not shown in the example).
  • WPT: Selects the current waypoint as the steering point. The current waypoint is changed using the selection arrows.
  • TGT: When TGT is selected, the designated A/G target is treated exactly like a waypoint. If the designated target is lost, normal WPT steering resumes.

◆ **TACAN Station Symbol:** The current TACAN station is indicated on the display if it is within the HSI range scale.

◆ **TACAN Bearing Pointer:** This small triangle is located outside the compass rose display and indicates the bearing to the current TACAN station.

◆ **HSI Display Options:** (PB 1-2) The look of the HSI display is controlled by the Top-up (TUP) and De-centered (DCTR) options. In TUP, the display is drawn with a full compass rose and the aircraft symbol positioned in the center of the display. In DCTR, only a 60° arc displays across the top of the page, with the aircraft symbol positioned at the bottom center of the page. TUP is the default display mode.

◆ **Heading Select (HSEL) Setting:** The current heading select value displays in this location. The heading select value is changed to the HSEL switch in the cockpit (located to the left of the MPCD).

◆ **Sensors Option:** (PB 20) When active, the current center point of the Targeting FLIR FOV is shown as an "F" on the page if it falls within the HSI range scale. The center point of the radar scan is shown as an "R" if it falls within the HSI range scale.

◆ **Waypoint Bearing Pointer Tail:** This symbol is drawn within the compass rose at a point 180° from the Waypoint bearing pointer and moves as the waypoint bearing changes.

◆ **Heading Select Bug:** The Heading Select Bug is located on the outside of the compass rose and is located at the current HSEL position.

◆ **TIME Option:** (PB 17) It adds or removes the current time from the HUD. The default is inactive (not displayed).

◆ **AUTO Option:** (PB 16) When active, the current waypoint automatically sequences to the next waypoint when you overfly the current waypoint. Active is the default.

◆ **Course Select (CSEL) Setting:** The current course select value displays in this location. The course select value is changed using the CRS switch in the cockpit (located to the left of the MPCD).

◆ **Sequence (SEQ) Option:** (PB 15) When active, the waypoints are connected in sequence by a dotted line (0-1-2-3-4…). Active is the default.

◆ **Bullseye Symbol:** The Bulleye's location is indicated on the display if it is within the HSI range scale. The arrow on the Bullseye always points to North.

◆ **Aircraft Symbol:** The symbol representing your aircraft is positioned in the center of the HSI format in TUP mode and at the bottom center of the format in DCTR mode. True airspeed (xxxT) is on the left side of the aircraft symbol, and ground speed (xxxG) is on the right side.

◆ **TACAN Bearing Pointer Tail:** This symbol is drawn outside the compass rose at a point 180° from the TACAN bearing pointer and moves as the TACAN bearing changes.

◆ **Selection Arrows:** (PB 13-14) The arrows display only when WPT or GPS steering is selected. The currently selected waypoint or GPS target point number is between the two arrows. Selecting the up arrow increments the number by one, while the down arrow decrements the number by one.

◆ **Waypoint Symbol:** The current waypoint is indicated on the display if it is within the HSI range scale. The waypoint number displays at the bottom right of the symbol.

◆ **Waypoint Bearing Pointer:** This triangle is located inside the compass rose and indicates the bearing to the selected waypoint.

◆ **DATA Option:** (PB 10) When active, the DATA HSI format (see below) displays. Inactive is the default.

◆ **Ground Target Symbol:** The A/G target (either designated or GPS) displays if it is within the HSI range scale. If the target is a GPS target, the target number displays at the bottom right of the symbol.

◆ **Course Select CSEL Display Option:** (PB 9) When active, the course select line is drawn though either the current waypoint symbol (if WPT steering is selected) through the current TACAN station symbol (if TCN steering is selected) or through the selected target symbol (TGT steering selected). The orientation of the course select line is based upon the current course select value. If the waypoint /TACAN station/target is not within the current HSI range scale, the course select line does not display. The course select line is not displayed with ILS or ACL steering selected.

◆ **L&S MSI Target Symbol:** The current L&S MSI target displays if it falls within the HSI range scale setting.
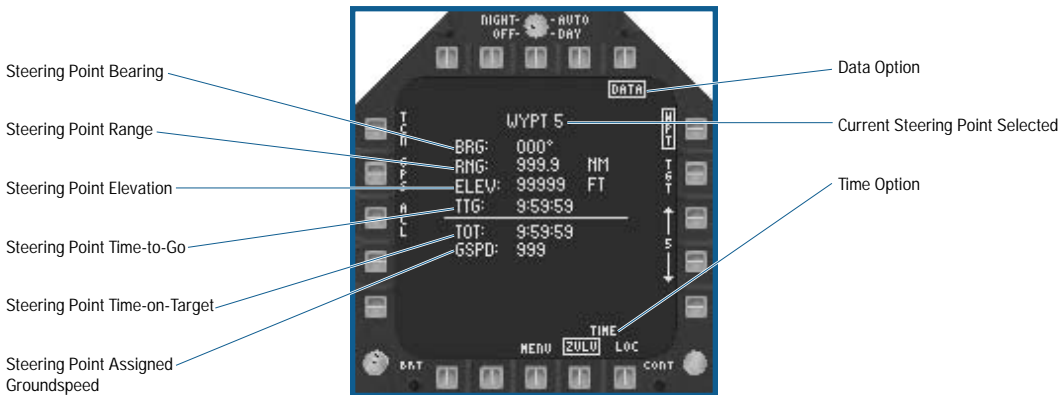
MDI – HSI W/COUPLED AUTOPILOT

Coupled autopilot indication ────────── CPL.WPT
                                         365T↓3606 ────────── Auropilot mode indication

◆ **Coupled (CPL) Autopilot Indication:** The CPL indication displays at the upper left of the aircraft symbol when any coupled autopilot mode is selected on the UFC.

◆ **Autopilot Mode Indication:** The current autopilot mode displays at the upper right. They include the following:
   • WPT
   • TCN
   • GPS
   • HDG
   • TGT
   • BNK
   • ACL

MDI – HSI DATA

Steering Point Bearing
Steering Point Range
Steering Point Elevation
Steering Point Time-to-Go
Steering Point Time-on-Target
Steering Point Assigned Groundspeed
Data Option
Current Steering Point Selected
Time Option

◆ **Current Steering Point Selected:** The selected waypoint number displays when WPT steering is selected. With TCN steering selected, the label is "TACAN 99" where "99" represents the current TACAN channel (set on the UFC). With TGT steering selected, the label is "TARGET" or "TARGET 9", depending on whether or not the selected target was a GPS target.

◆ **Bearing:** The bearing from the aircraft to the current Waypoint, TACAN station, or Target.

◆ **Range:** The range (in MN) from the aircraft to the current Waypoint, TACAN station, or Target.

◆ **Elevation:** The elevation (in feet) of the current Waypoint, TACAN station, or Target.

◆ **Time To Go (TTG):** The estimated time to reach the current Waypoint, TACAN station, or Target (in hours: minutes: seconds format) based on the your current speed.

◆ **Time On Target (TOT):** The estimated TOT.

◆ **Speed (GSPD):** (Waypoint only) The speed assigned to the current waypoint.

◆ **TIME Option:** (PB 17) The time option determines the format for time display on the HUD. Either Zulu or Local (LOC) time is selected. Zulu time is 3 hours behind (-3) local time. Local time is the default. When Zulu time is displayed on the HUD, it is followed by the letter "Z".

◆ **DATA Option:** A second selection unboxes the option and returns the HSI to the normal display.

MDI – CHECKLIST (CKL) PAGE
The MDI Checklist is a text-based summary of important takeoff (TO) and landing information. It's there just as reminder. After all, you wouldn't want to forget to put your landing gear down.

MDI – FUEL SYSTEM (FUEL) PAGE
The MDI Fuel system page is a text and graphical representation of the amount of fuel in each of the aircraft's internal and external fuel tanks.

When the aircraft's engines are running, fuel "burns" from the tanks in a set order that mimics the real aircraft. The order in which fuel tanks are depleted is as follows:

- Left and Right Outboard External tanks (together)
- Left and Right Inboard External tanks (together)
- Centerline External tank
- Left and Right Internal wing tanks (together)
- Tank 4
- Tank 1
- Left and Right Internal feed tanks (Tanks 2 & 3, or together)

Fuel is loaded along with weapons in the loadout screens. When less than 100% internal fuel is loaded, the internal tanks are "filled" in the reverse order they are depleted by the engines. For example, the Feed tanks are totally filled first, then Tank 1, Tank 4 and lastly the Wing tanks. External fuel tanks are always 100% full when loaded and do not effect the status of the internal tanks.

The maximum capacity of each fuel tank:

INTERNAL TANKS

Tank 1	2,340 lbs.
Left Feed tank (Tank 2)	2,560 lbs.
Right Feed tank (Tank 3)	2,580 lbs.
Tank 4	3,720 lbs.
Left Wing tank	1,640 lbs.
Right Wing tank	1,640 lbs.
TOTAL maximum internal fuel	14,480 lbs.

EXTERNAL TANKS

330 gallon tank	2,210 lbs.
480 gallon tank	3,120 lbs.
TOTAL maximum external fuel (5x480 gal tanks)	16,050 lbs.
TOTAL maximum amount of fuel (internal + external)	30,530 lbs.

NOTE: Maximum Gross Takeoff weight is 66,000 lbs.
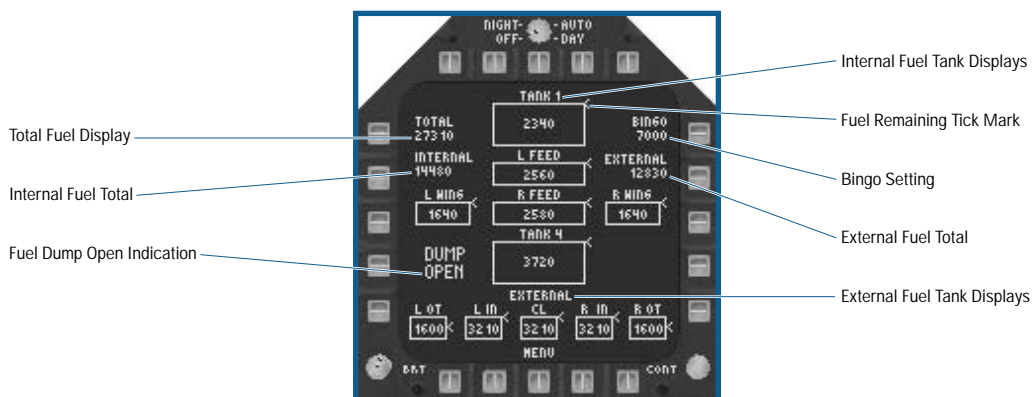
◆ **Total Fuel Display:** The total (internal + external) amount of fuel loaded on/in the aircraft.

◆ **Internal Fuel Total:** The total amount of internal fuel loaded in the aircraft.

◆ **Fuel Dump Open Indication:** When the **DUMP_FUEL** keyfunction [D] is selected, fuel is vented from the fuel dump vents located near the top of each vertical tail. Fuel is dumped at a rate of 1300 pounds per minute, and is dumped from fuel tanks in the same order that it would normally be burned. The fuel dump automatically will close when the bingo level is reached. Normally, you should only dump just enough fuel to get below the maximum carrier landing weight (or Max Trap weight) of 46,000 lbs.

> **EA TIP** Fuel is life for your aircraft. Without it, your aircraft becomes a very poor glider. Be very careful when dumping fuel, and dump only the minimum needed to get below Max Trap weight, and no more.

◆ **External Fuel Tank Displays:** The external tanks are graphically represented as individual boxes along the bottom of the fuel system page. The amount of fuel in each tank displays as both a number inside the box and as a tick mark on the side of the box.

◆ **Internal Fuel Tank Displays:** The internal tanks are graphically represented as boxes in the same manner as the external fuel tanks.

◆ **Fuel Remaining Tick Mark:** This tick mark is positioned on the side of each graphical fuel tank box at the upper right corner of the box when the tank is full. As the tank empties, the tick mark moves down the right side of the box. When the tank is empty, the tick mark is at the bottom right hand corner of the box.

◆ **Bingo Setting:** The current "bingo" low fuel setting. The bingo level is set on the Electronic Fuel display.

◆ **External Fuel Total:** The total amount of external fuel loaded on the aircraft.

MDI – ENGINE DATA (ENG) PAGE

The Engine Data page is a text-based display. A center-displayed column lists the engine data parameters; the data on the left and right represents each engine, respectively. With the exception of the ENG STATUS parameter at the top, all other data displays numerically. This MDI page is only an informational, non-interactive display.

The following parameters display:

◆ **ENG STATUS:** Represents the highest achievable level of performance. The levels of performance are listed in descending order:
  • NORM: No degradation in performance.
  • PERF90: Some degradation in performance up to 10% loss of thrust.
  • AB FAIL: The afterburner has failed.
  • THRUST: Maximum engine thrust is limited to 90% due to FADEC failure.
  • IDLE: The engine is limited to idle power.
  • SHUTDOWN: The engine is shut down.

◆ **INLET TEMP:** Ambient outside air temperature in degrees Celsius.

◆ **N1 RPM:** N1 compressor RPM as a percent
  • Idle power = 50% ± 1%
  • Mil/Max power = 100 ± 1%

◆ **N2 RPM:** N2 compressor RPM as a percent
  • Idle power = 70% ± 1%
  • Mil/Max power = 100 ± 1%

◆ **EGT:** Exhaust Gas Temperature in degrees Celsius
  • Idle power = 350° ± 8°
  • Mil power = 800° ± 8°
  • Max power = 925° ± 8°
  • Maximum allowable EGT = 950°

◆ **FF:** Fuel Flow (varies with altitude, example values are for sea level)
- Idle power = 750 pounds per hour (pph)
- Mil power = approximately 11,000 pph
- Max power = approximately 47,500 pph

◆ **NOZ POS:** Exhaust nozzle position in percent (range 0-100%)
- Idle power = 80% ± 3%
- Mil power = 30% ±(5%
- Max power = 50-100% (scaled to afterburner setting)

◆ **OIL PRESS:** Engine oil pressure in psi
- Idle power = 35-85
- Mil/Max power = 80-150

◆ **THRUST:** Engine thrust level, in percent (range 0-100%)
- Idle power = 0%
- Mil power = 75%
- Max power = 100%

◆ **FAN VIB:** Fan section vibration level in inches per second
- Engine off = 0.0
- Undamaged engine limits = 1.0 ± 0.3

◆ **EPR:** Engine Pressure Ratio
- Idle power = 1.0 ± 0.1
- Mil power = 1.5 ± 0.2
- Max power = 1.8 ± 0.2

◆ **CDP:** Compressor discharge pressure in psi
- Idle power = 60 ± 2
- Mil/Max power = 120 ± 5

◆ **CPR:** Compressor pressure ratio
- Idle power = 1.0 ± 0.2
- Mil/Max power = 1.8 ± 0.2

◆ **THA:** Throttle handle angle (in degrees). Zero degrees is off/idle.

◆ **AMAD OIL TEMP:** AMAD oil temperature, in degrees Celsius
- Normal (any power setting) = 60° ± 5°

◆ **ENG OIL TEMP:** Engine oil temperature, in degrees Celsius
- Idle power = 60° ± 5°
- Mil/Max power = 115° ± 10°

MDI – FLIGHT PERFORMANCE ADVISORY SYSTEM (FPAS) PAGE

The Flight Performance Advisory System (FPAS) provides calculated range and endurance data calculated on current or optimum operating conditions. This MDI page is only informational, a non-interactive display.
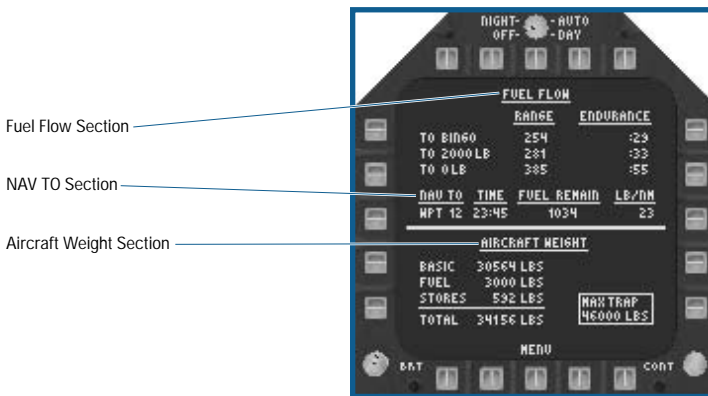
- ◆ **Fuel Flow Section:** Range (NM) and Endurance (hour:minutes:seconds) to the current bingo setting, 2000 lbs. and 0 lbs. fuel remaining at the current altitude and Mach number.
- ◆ **NAV TO Section:** If WPT or TCN steering is selected on the HSI, the waypoint number or TACAN channel selected displays along with the arrival time at current conditions, the fuel remaining at that point, and the amount of fuel burned per nautical mile along the way. If the calculated fuel remaining is less than zero, the number is shown in red indicating a negative value.
- ◆ **Aircraft Weight Section:** The Basic aircraft weight is the weight of the aircraft minus all fuel and any stores. The Fuel weight is the total internal and external weight of the onboard fuel, and the Stores weight includes all weapons, pods, gun ammunition, and expendable countermeasures.

MDI – SITUATIONAL AWARENESS (SA) PAGE

The Situational Awareness (SA) page displays all downlinked targets from the E-2C Hawkeye. In addition to the data linked targets from the E-2C, targets detected by the aircraft's own radar and TFLIR are displayed. This is one-stop shopping for targets.

The basic format is a "birds-eye" or top-down view with your aircraft in the center of the display. In addition to the targets, cues indicating the sensors' (radar and FLIR) FOV and the attack region also display.
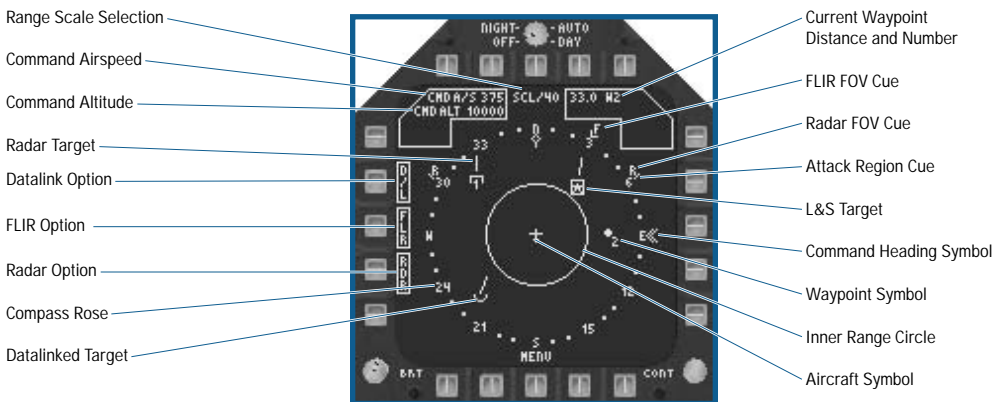
◆ **Range Scale Selection:** (PB 8) The range scale increments from 10, 20, 40, 80 to 160NM range scales. The range scale is the distance from the aircraft symbol to the inner edge of the compass rose.

◆ **Command Airspeed Window:** Displays the command Mach for the current waypoint.

◆ **Command Altitude Window:** Displays the command Altitude for the current waypoint.

◆ **Radar Targets Display:** If the RDR option is boxed, not X'd out, and the radar is in TWS, all MSI targets display exactly as they are on the A/A radar formats. If any target falls outside the range scale, it displays along the compass rose at the correct bearing and flashes.

◆ **Data Link (D/L) Option:** (PB 4) If the E-2C is communicating with you, the D/L option is available and toggles the display of targets that have been detected by the E-2C.

◆ **FLIR (FLR) Option:** (PB 3) If the TFLIR pod is on your aircraft, the FLIR option is available. Displays the TFLIR autotrack target (if one exists) as an "F." If the TFLIR is not in autotrack, the TFLIR FOV displays.

◆ **Radar (RDR) Option:** (PB 2) The RDR option always displays, and is set by default. Displays the L&S target (if one exists). If the Radar is in the TWS sub-mode, all the current targets display (up to the limit of 16, same as the A/A radar).

◆ **Compass Rose:** Displays at all times and represents 100% of the selected range relative to the Aircraft Symbol. The compass rose rotates so that the current aircraft heading is always at the top of the display. The pointer at the inside top of the compass rose remains fixed at the top of the display, indicating your current heading.

◆ **Data-Link Target Display:** If the D/L option is active, displays targets provided by the E-2C using an up-side down radar symbol. Targets outside the selected range display flash at the compass rose edge at their correct bearing.

◆ **Aircraft Symbol:** The symbol representing your aircraft always displays in the center of the page facing the top of the display.

◆ **Inner Range Circle:** Represents 50% of the selected range.

◆ **Waypoint Symbol:** If waypoint steering is selected, the current waypoint displays if it is within the area covered by the range scale.

◆ **Command Heading Symbol:** The command heading displays with the double chevron symbol. If waypoint or ACL steering is not selected, the command heading symbol does not display.

◆ **L&S Target Display:** Displays if there is an L&S target exactly as it is on the A/A radar formats. Note that in the example above, the E-2C datalinked the same target (indicated by the upper and lower HAFU symbol on the target). If the L&S target falls outside the selected range, it flashes along the compass rose edge at their correct bearing.

◆ **Attack Region Cueing:** The attack region is indicated by small tick marks at the ±70° azimuth locations relative to the nose of your aircraft.

◆ **Radar FOV Cue:** Displays along the compass rose indicating the radar FOV. Arcs indicate the radar azimuth coverage when the radar is in a scanning mode. An "R" is placed at each end of the arc. The length of the arc is the same as the selected radar azimuth scam width. If the radar is in a pointed mode of operation (STT or BST acquisition), the arc is replaced by a caret outside the compass rose similar to the TFLIR caret. An "R" displays within the caret indicating the radar sensor.

◆ **FLIR FOV Cue:** Displays along the compass rose to indicate the TFLIR LOS. When the TFLIR is in A/A mode (A/A Master mode), a caret displays outside the compass rose indicating the TFLIR pointing angle. Within the caret, an "F" displays indicating the TFLIR sensor.

◆ **Current Waypoint Distance / Number:** If waypoint steering is selected, displays the current waypoint number and the range to that waypoint in NM (to the nearest tenth of a mile).

MDI – BUILT-IN-TEST (BIT) PAGE

The MDI Built-in-Test page is the principle failure/damage display in *Jane's F/A-18.* The MDI BIT page has a top-level display and up to eight sub-pages, all of which are simple, text-based displays. The top-level BIT page lists all failures in reverse chronological order; i.e., the latest failures are at the top of the list. From the top level, system specific sub pages are displayed, which list the overall status of the selected system.

The MDI BIT page is accessed in two ways. The first is by selecting the BIT MDI page from the top level MDI menu.

The second displays the MDI BIT page in the left MDI when the Master Caution button (or the associated keyfunction **MASTER_CAUTION** [Ⓒ]) is pressed.

> **EA TIP**   While it appears that the left MDI can be damaged since it is listed in DISPLAYS BIT sub-page, the left MDI is always functional in the game.

Failure List Area

Flight Control System/Mission Computer Systems Status

Sensors System Status

Stores Management System Status

Engine System Status

Airframe Mounted Accessory Drive System Status

Additional Failure Page Indication

Displays System Status

Miscellaneous Systems Status

Electronic Warfare System Status

Additional Failure Page Option

◆ **Failure List Area:** Displays any systems that are damaged or otherwise inoperative, along with a failure message. Possible failure messages include:
  • NO GO: The system is destroyed or damaged to the point it's inoperable.
  • EMPTY: The listed countermeasure has run out (expendable countermeasures only).
  • DEGD: The listed system is damaged and may not function correctly.
  • NOT RDY: The listed system is not installed on your aircraft (FLIR pods only).
  • EMPTY: The indicated expendable countermeasure is exhausted.
  • OVRD: The G Limit Override has been selected.
  • The NO GO, EMPTY, and NOT RDY messages display in red, while the DEGD message displays in yellow. The GO message is green.
  • If there are more than 14 failures, the MORE and PAGE options display.
  • From any sub-page, PB 8 returns to the top-level BIT page.

◆ **Flight Control System (FCS)/Mission Computer (MC) System Status:** (PB 5) The overall status of the FCS and MC sub-systems displays. Selecting this option displays the FC/MC BIT sub-page, listing all of the sub-systems (not just the failed ones like the top-level page) and their status. The FCS MC sub-systems and NO GO impact are:
  • FCS: Control Augmentation System inoperable.
  • AUTOPILOT: Autopilot System inoperable.
  • MC1: If both MC1 and MC2 fail, all your displays (MDI, MPCD, UFC and EFD) fail.
  • MC2

◆ **Sensor System Status:** (PB 4) Displays the overall status of the Sensor sub-systems. The Sensor's sub-systems and NO GO impact are:
  • RADAR: Inoperable.
  • TARGET IR: Inoperable.
  • NAVFLIR: Inoperable.

◆ **Stores System Status:** (PB 3) Displays the overall status of the stores sub-system. The Stores sub-systems and NO GO impact are:
  • SMS: Weapon release impossible, except by jettison.
  • GUN: Inoperable.

◆ **Engine System Status:** (PB 2) Displays the overall status of the engine sub-systems. The Engine sub-systems and NO GO impact are:
  • L/R BLEED AIR: Bleed air leak in the left (L) or right (R) engine. If you don't immediately shut down the engine, you run the risk of starting a fire.
  • L/R FADEC: Left or right engine control inoperative. Afterburner inoperative and maximum thrust reduced.
  • L/R OIL PRESS: Left or right engine oil pressure low. If you don't immediately shut down the engine, you run the risk of starting a fire.
  • L/R BURNER: Left or right afterburner inoperative.

◆ **Airframe Mounted Accessory Drive (AMAD) System Status:** (PB 1) Displays the overall status of the AMAD sub-systems is. The AMAD sub-systems and NO GO impact are:
  • L/R AMAD: (new, if set, all other failures for the affected side are set as well).
  • L/R FUEL PUMP: Left or right fuel pump inoperable. If both DEGD or NO GO, descend below 30,000 ft and do not exceed military power or you risk flaming out your engines.
  • L/R GEN: Left or right generator inoperable. If both DEGD or NO GO, you'll lose most of your displays and also lose control of the speed brake.
  • HYD 1A/2A/1B/2B: Inoperable. If any three HYD circuits are inoperable, you'll experience reduced flight control. With all four circuits inoperable, your aircraft becomes totally uncontrollable in a minute or less.

◆ **Additional unlisted failures indication:** "MORE…" indicates if there are more than 14 total failures.

◆ **PAGE Option:** (PB 16) Used to display each subsequent page of failures if there are more than 14 total failures.

◆ **Electronic Warfare (EW) System Status:** (PB 13) Displays the overall status of the EW sub-system. The EW sub-systems and NO GO or EMPTY impact are:
  • RWR: Radar Warning Receiver inoperative. You can still manually drop chaff and flares.
  • ASPJ: ASPJ jammer inoperative.
  • CMMDS: ALE-50 towed jammer inoperative.
  • CHAFF: Store depleted.
  • FLARES: Store depleted.
  • DECOYS: Store depleted.

◆ **Miscellaneous (MISC) System Status:** (PB 12) Displays the overall status of miscellaneous sub-systems that do not fall into any of the other categories The MISC sub-systems and NO GO impact are:
  • OBOGS: Your on-board oxygen generation system has been damaged. You eventually black out if you do not reduce altitude below 10,000 feet.
  • ADC: You lose pitch ratio, autopilot altitude hold and all HUD symbology except for the heading scale.
  • G LIMIT: Advisory only, displays a "OVRD" message whenever the G Limit override is selected.

◆ **Displays System Status:** (PB 11) Displays the overall status of the displays sub-system. The Displays sub-systems and NO GO impact are:
  • L/R MDI: Inoperative.
  • MPCD: Inoperative.
  • HUD: Inoperative.
  • UFC: Inoperative.

MDI – NAVIGATION FLIR CAMERA (NAVFLIR) PAGE

The MDI NAVFLIR page displays the same NAVFLIR video image as is on the HUD. This FLIR image is fixed along aircraft boresight and is not slewable. It does not have the ability to magnify the HUD FLIR image. If the NAVFLIR pod isn't loaded, the HUD and MDI NAVFLIR displays are unavailable.

NAVFLIR Operating Status

Video Level Adjustment

HUD Symbology

NAVFLIR Polarity

NAVFLIR Declutter
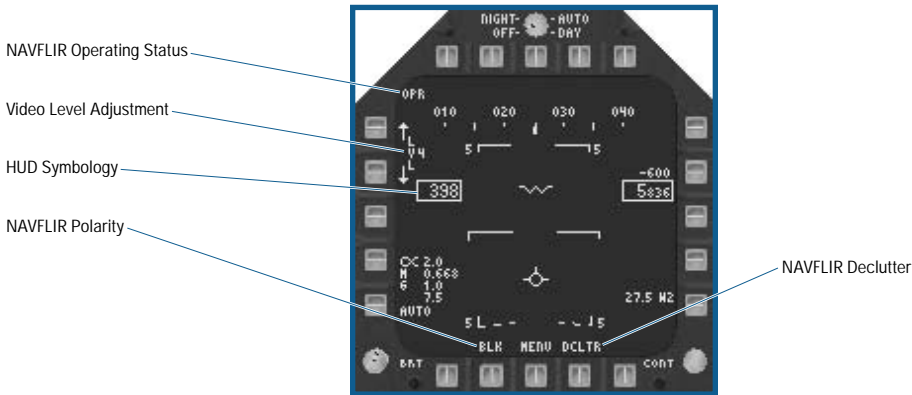
- ◆ **NAVFLIR Operating Status:** One of the following displays based on current TFLIR status:
  - • OPR: Operating normally.
  - • RDY: Damaged or not loaded on the aircraft.
- ◆ **Video Level Adjustment:** (PB 4-5) Adjust the level by selecting the up or down adjustment arrows. The value of the level is indicated next to the LVL option. The range is 0 (minimum) to 9 (maximum). The default value is 4.
- ◆ **HUD Symbology:** By default, HUD symbology is displayed on top of the NAVFLIR camera view.
- ◆ **NAVFLIR Polarity:** (PB 19) Selects white-hot (WHT) or black-hot (BLK) video polarity. The PB toggles between the two options.
- ◆ **Declutter Option:** (PB 17) Enables you to remove the HUD symbology from the NAVFLIR page.

MDI – TARGETING FLIR CAMERA (TFLIR) PAGE

The Targeting FLIR in Jane's F/A-18 is based on the Navy's ATFLIR (Advanced Targeting FLIR), which is still in developmental testing but is scheduled to equip the F/A-18E. The ATFLIR is a more advanced version of the USAF's LANTIRN system. This may seem obvious, but don't forget, the ATFLIR pod must be loaded on your aircraft in order to use it.

The ATFLIR (TFLIR) has two main modes, Air-to-Air (A/A) or Air-to-Ground (A/G). Operation of the ATFLIR in A/A Master Mode is covered in the A/A Targeting FLIR section of Chapter 5. See **Combat: A/A Targeting FLIR**, p. 5-110. The A/G ATFLIR modes are covered in the A/G Targeting FLIR section of Chapter 5. See **Combat: A/G ATFLIR**, p. 5-124.

MDI – AUTOMATIC CARRIER LANDING (ACL) SYSTEM PAGE

The ACL MDI page uses a variation of the SA MDI page available only in NAV Master Mode. You select it when inbound to the carrier. It provides speed, altitude and bearing cues. When ACL steering is selected on the HSI, the autopilot may be coupled to this system to provide a totally hands-off landing capability. The command airspeed (CMD A/S), command altitude (CMD ALT) and command rate-of-descent (CMD ROD) cues display on the MDI ACL page along with various status messages. Additional ACL information also displays on the HUD.

ACL has two modes of operation, mode 1 and mode 2. The difference between these modes is whether or not the autopilot is coupled to the ACL system. ACL mode 1 is the coupled, automatic landing mode, while in ACL mode 2 you manually land the aircraft by following the ACL command messages.
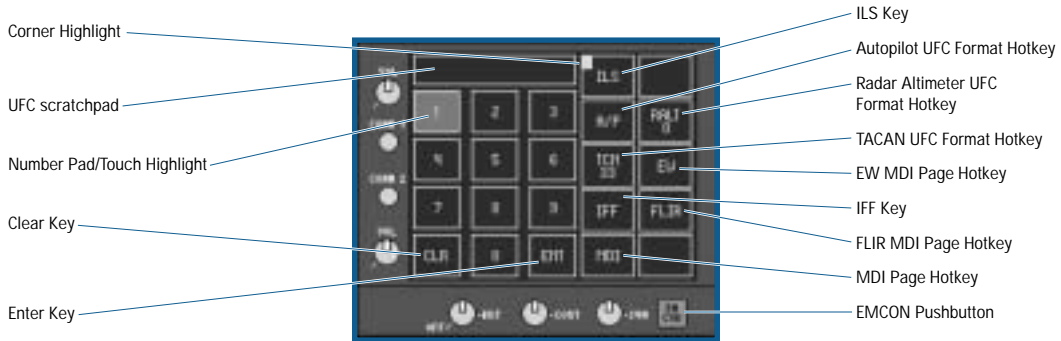
Command A/S wiindow
Command Altitude Window
Command A/S Window

ACL group 1 message window
Tilt Cue
Second Cue
ACL System Status/Mode Cue
Command Heading Cue
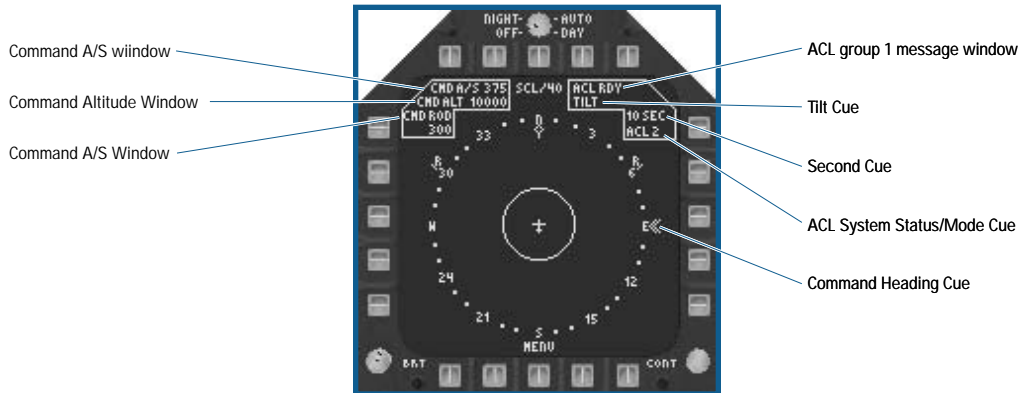
◆ **Command Airspeed (CMD A/S) Window:** Displays the up-linked command airspeed. This is the speed required for you to maintain your aircraft's position in the landing pattern.

◆ **Command Altitude (CMD ALT) Window:** Displays the up-linked command altitude. This is the altitude required for you to maintain your aircraft's position in the landing pattern.

◆ **Command Rate-of-Descent (CMD ROD) Window:** Displays the up-linked command rate-of-decent, which is the rate-of-decent required for you to maintain your aircraft's position in the landing pattern.

◆ **Command Heading Cue:** Displays the up-linked command heading cue is via the double chevron symbol on the outside of the compass rose. The heading required for you to maintain your aircraft's position in the landing pattern.

◆ **ACL System Status/Mode Window:** Displays the current ACL mode or system status. The following mutually exclusive messages are possible:
  • ACL 1: ACL mode one (autopilot coupled, hands-off landing) engaged.
  • ACL 2: ACL mode two (autopilot not coupled, positional cues only) engaged.
  • ACL N/A: ACL not available (most likely due to aircraft damage).

◆ **10 Second Message Window:** Displays the "10 SEC" message when your aircraft is approximately 12.5 seconds from touchdown. At this point in the landing pattern, ship motion is added to the ACL cues.

◆ **TILT Message Window:** Displays the TILT message if your aircraft flies outside the ACL control area or if your aircraft is no longer capable of ACL operation (typically due to aircraft damage as described above).

◆ **ACL Group 1 Message Window:** Displays the following mutually exclusive messages:
  • NOT CMD: Indicates you're not within the ACL control area or your aircraft is not capable of ACL landings.
  • LND CHK: Indicates you're within the ACL control area but not configured for landing (gear and hook down).
  • ACL RDY: Indicates you're within the ACL control box, configured for landing, and ready to be coupled (via the autopilot).
  • CMD CONT: Indicates the ACL system is in control of your aircraft.
  • W/O: Indicates you're to terminate the approach and go around. When this message is received, the ACL system uncouples from the autopilot.

UP-FRONT CONTROLLER

The Up-Front Control (UFC) is located below the HUD in the center of the cockpit. The real UFC in the F/A-18E is an active matrix liquid crystal display with an infrared touch screen used for operator input. In addition, the UFC is used to display any MDI format. We simulate the touch screen in the game using the mouse, and we allow the UFC to display MDI formats exactly like the real UFC. The UFC is also used to set the various auto pilot modes, both in the game and in real life.

The UFC has four possible formats: the top level (default) Communications, Navigation, and IFF (CNI) format, the Auto Pilot sub-page format, the TACAN sub-page format, and the MDI sub-page format.

TOP LEVEL CNI FORMAT

Corner Highlight

ILS Key

Autopilot UFC Format Hotkey

Radar Altimeter UFC
Format Hotkey

UFC scratchpad

TACAN UFC Format Hotkey

EW MDI Page Hotkey

Number Pad/Touch Highlight

IFF Key

FLIR MDI Page Hotkey

Clear Key

MDI Page Hotkey

Enter Key

EMCON Pushbutton

◆ **UFC Scratchpad:** Displays numbers entered via the keypad until either cleared or until ENT is pressed.

◆ **Number Pad/Touch Highlight:** When any touch screen keypad item is "touched" (left mouse button held), the selected "button" highlights.

◆ **Clear Key:** Removes the last digit entered in the scratchpad.

◆ **Enter (ENT) Key:** Functions as the enter key.

◆ **Emission Control (EMCON) Pushbutton:** Illuminated when active. It's a push on/push off button. When on, all emissions (radar transmitter, ASPJ, ALE-50 Decoy) are inhibited.

◆ **MDI Page Hotkey:** Selects the UFC MDI page display.

◆ **Targeting FLIR MDI Display Hotkey:** Displays the MDI Targeting FLIR page on UFC MDI.

◆ **IFF Key:** Manually interrogates air targets. Note that the L&S radar target is automatically interrogated if it is not already identified. Pressing this key identifies all other air targets currently displayed on the A/A radar MDI after an approximately 2-second processing time.

◆ **EW MDI Display Hotkey:** Displays the MDI EW page on the UFC.

◆ **TACAN (TCN) Display Hotkey:** Displays TACAN UFC format.

◆ **Radar Altimeter (RALT) Low Altitude Warning Select:** Sets the low altitude warning level. When the RALT keypad option is selected, it's border is highlighted, a numeric value between 0-9,999 can be entered into the scratchpad via the numeric keypad, and when ENT is selected, that value becomes the new low altitude warning value.

◆ **Auto Pilot Display Hotkey:** Displays the A/P UFC.

◆ **Instrument Landing System (ILS) Key:** Turns the Instrument Landing System (ILS) on or off.

◆ **Corner Highlight:** Signifies a system is "on" or operating, and is displayed on the ILS and A/P keypad options on the top level CNI UFC format.

UFC MDI

SMS MDI Hotkey

EW MDI Hotkey

HUD MDI Hotkey

Targeting FLIR MDI Hotkey

Radar Altimeter
Low Altitude Warning Set

CNI Option

Up Arrow

Down Arrow

◆ **SMS MDI (Stores) Hotkey:** Displays the MDI Stores page.

◆ **HUD MDI Hotkey:** Displays the MDI HUD page.

◆ **Radar Altimeter (RALT) Low Altitude Warning:** Toggles between highlighted and un-highlighted. When highlighted, the up and down arrows are active.

◆ **Up Arrow:** Increases the low altitude warning level in 50-foot steps.

◆ **Down Arrow:** Decreases the low altitude warning level in 50-foot steps.

◆ **CNI Option:** Returns to the top level CNI format.

◆ **Targeting FLIR MDI Hotkey:** Displays the MDI Targeting FLIR page.

◆ **EW MDI Hotkey:** Displays the MDI EW page.

UFC TACAN

Selected TACAN Station

Selected TACAN Channel Highlight Bar

TACAN Channel Listing

"More" Indication

Up Arrow

TACAN Option Active

Down Arrow

◆ **Selected TACAN Station:** Displays the selected TACAN channel number to the UFC scratchpad area.

◆ **TACAN Channel Listing:** Dispays the TACAN channels and their associated text IDs as defined in the Mission Builder. Up to nine separate channels display, and if there are more than nine TACAN channels defined in the mission, the list scrolls up or down as required.

◆ **Selected TACAN Channel Highlight Bar:** Highlights the selected TACAN channel, which is also displayed in the scratchpad.

◆ **"More" Indication:** If more than nine TACAN channels are defined in the mission, the "MORE…" label appears as required, indicating additional TACAN channels are currently scrolled off the top, bottom or both top and bottom of the list.

◆ **Down Arrow:** Moves the Highlight bar down the TACAN channel list.

◆ **TACAN (TCN) Option Active:** The border is highlighted in the TACAN UFC sub-page.

◆ **Up Arrow:** Moves the Highlight bar up the TACAN channel list.

UFC AUTOPILOT

The autopilot has two modes: aircrew relief and data link. The Aircrew Relief mode consists of basic autopilot, roll attitude hold, ground track hold, barometric altitude hold, radar altitude hold, and coupled steering (waypoint, TACAN, and Target). The Data Link mode is used for Automatic Carrier Landings (ACL). The A/P is corner highlighted if any autopilot mode is active.

Before any autopilot mode can engage, the aircraft's bank angle must be less than or equal to 70°, pitch must be less than or equal to 45°, and a mode must be selected from the autopilot sub-page. There are two axis of control: the pitch axis and the roll axis. The pitch axis options are FPAH (Flight Path Angle Hold), BALT (Barometric altitude hold), and RALT (Radar altimeter hold). The roll axis mode options are HDG (heading), Roll (Roll attitude hold), and CPL (Couple). The UFC highlight indicates the engaged modes.

The autopilot is engaged or disengaged (turned on or off) using the AUTOPILOT [Ⓐ] keyfunction.

Barometric Altimeter Altitude Hold — (left label)
Radar Altimeter Altitude Hold — (left label)
Flight Path Angle Hold — (left label)

Couple Option — (right label)
Roll Attitude Hold — (right label)
Heading Hold — (right label)
CNI Option — (right label)
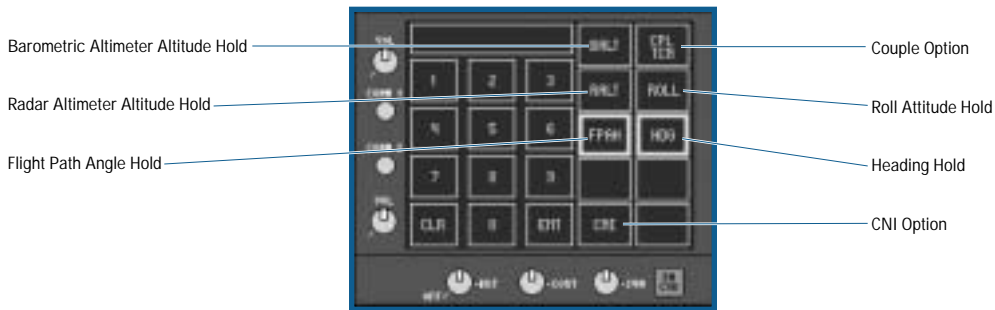
◆ **Barometric Altitude Hold (BALT) Option:** When active, your aircraft maintains the barometric altitude it was at when the autopilot was engaged.

◆ **Couple (CPL) Option:** The CPL option also has a second label below the CPL depending upon the current steering mode selected on the MDI HSI page. Valid options are:

• WPT: Waypoint steering selected.
• TCN: TACAN steering selected.
• TGT: Target steering selected.
• ACL: Automatic Carrier Landing steering selected.

When this option is selected, it is highlighted. When active, coupled steering flies the aircraft to the selected point (current waypoint, TACAN station, etc.). If coupled ACL is selected, the aircraft attempts an ACL mode I (hands-off) automatic landing aboard the carrier.

◆ **Roll Attitude Hold Option:** When active, your aircraft maintains the same roll attitude it was at when the autopilot was engaged.

◆ **Radar Altitude Hold (RALT) Option:** When active, your aircraft maintains the same radar altitude it was at when the autopilot was engaged.

◆ **Heading (HDG) Hold Option:** When active, your aircraft steers a constant course based on its course when the autopilot was engaged.

◆ **Flight Path Angle Hold (FPAH) Option:** When active, your aircraft maintains the same pitch angle it was at when the autopilot was engaged.

◆ **CNI Option:** Returns the UFC to the top level CNI format.

TAKING OFF AND LANDING

This section introduces you to basic flight concepts and teaches you to take off and land from carrier and land bases.

Remember one thing – easy does it. Don't over control since a little bit goes a long way. The F/A-18E's electronic flight control system is extremely responsive to your input.

The Training Missions provide a number of missions for you to test your takeoff and landing skills. It's highly recommended that you spend some time flying these missions, as it certainly saves you some frustration later on.

Landing is a more challenging skill than taking off. It's a rewarding finale to a successful mission but shouldn't be minimized. There's nothing worse than meeting all the mission objectives only to blow it on the landing.
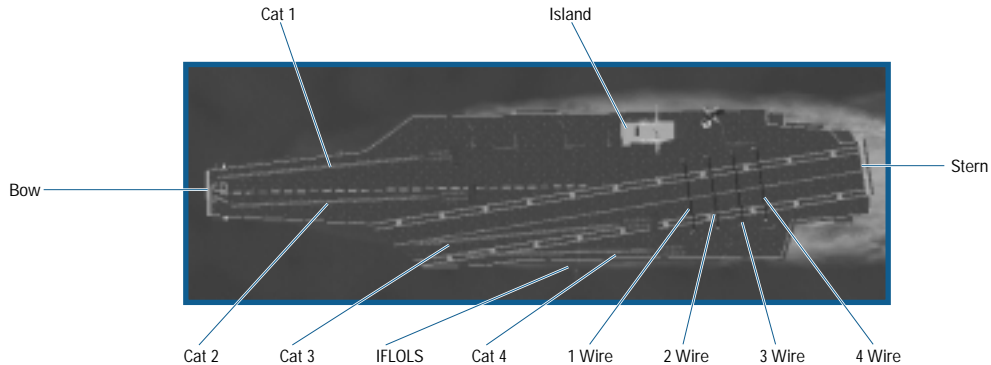
Whenever preparing for a takeoff or landing, keep these key points in mind.

◆ Always refer to the MDI Checklist page. It displays a list of important settings and reminders.

◆ Maximum Gross Takeoff weight is 66,000 lbs.

◆ When in NAV Master Mode with the landing gear down, the HUD is optimized for takeoff and landing.

◆ Takeoff speed (land-based) varies according to your maximum load. Lightly loaded aircraft require less airspeed, while heavier aircraft require more.

◆ A safe landing begins with a good approach to the carrier or base.

◆ The heading bug on the HUD provides TACAN or waypoint steering to the selected course.

CARRIER TAKEOFF

The F/A-18E has a very sophisticated automated takeoff system. You basically sit back and the aircraft jumps off the deck into the air.

Follow these guidelines to achieve a successful carrier takeoff:

◆ You start on the catapult ready for launch. Your engines are running and your flaps are set to their proper takeoff position.

◆ Press [SHIFT][.] to increase the throttle to Mil (**THROTTLE_MIL**).

◆ When your aircraft has reached full military power, press [B] to release your brakes (**WHEEL_BRAKES**) and signal the catapult officer that you are ready for launch.

◆ Sit back, but don't touch the fight stick unless an emergency occurs. You also have full power available if required.

◆ Immediately after takeoff, your aircraft automatically rotates to capture a 12° pitch angle.

◆ Once you're at a safe altitude, press [G] to retract the landing gear (**LANDING_GEAR**).

◆ Take control of the aircraft's flight stick.

◆ When you gain sufficient altitude, press [.] to decrease your speed (**THROTTLE_DWN**) and push the flight stick forward to level the aircraft.

◆ Press [F] to set the flaps (**FLAPS**) to AUTO.

◆ Press [.] to reduce the throttle (**THROTTLE_DWN**) to your desired cruising speed. You're now ready to tackle the mission objectives.

LAND-BASED TAKEOFF

Follow these guidelines to achieve a successful land-based takeoff:

◆ You normally start at the end of the runway. Your engines are running and your flaps are set to their proper takeoff position.

◆ Press B to release the wheel brakes (**WHEEL_BRAKES**).

◆ Press ⊔ to increase the throttle to full (**THROTTLE_AB**).

◆ When you gain sufficient airspeed, somewhere between 125 and 150 knots depending upon your loadout, pull back on the flight stick.

◆ Apply sufficient aft stick to maintain a pitch angle of about 12°.

> **EA TIP** Be careful not to over-rotate (past 15°) or your engine nozzles may contact the ground and suffer damage. Extreme over-rotation can cause catastrophic engine bay fires if the main fuel couplings are ruptured.

◆ Once you've reached a safe altitude, press G to retract the landing gear (**LANDING_GEAR**).

◆ When you gain sufficient altitude, press ⊡ to decrease your speed (**THROTTLE_DWN**) and push the flight stick forward to level the aircraft.

◆ Press F to set the flaps (**FLAPS**) to AUTO.

◆ Press ⊡ to reduce the throttle (**THROTTLE_DWN**) to your desired cruising speed. You're now ready to tackle the mission objectives.

ILS – INSTRUMENT LANDING SYSTEM

One of your most important tools is the ILS. It assists in aligning your aircraft with the carrier or runway. Essential at night or during reduced visibility conditions, it's also very useful during clear conditions.

The ILS superimposes vertical (Localizer Bar) and horizontal (Glideslope Bar) "needle" indicators on the HUD, ADI and HIS. You activate the ILS when you're about 10-20NM from the landing site. You must be in NAV Master Mode to display the ILS.

ACTIVATING THE ILS

◆ Press M to select NAV Master Mode.

◆ Fly to within 10-20NM of the landing site.

◆ Press L to activate the ILS.

The trick to the ILS is to maneuver your aircraft so that the Localizer Bar and the Glideslope Bar align to form a cross-positioned directly over the Velocity Vector.

Glidescope Bar

Localizer Bar
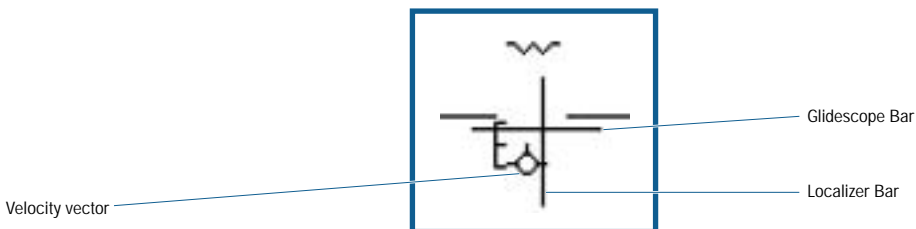
Velocity vector

Velocity Vector: Indicates the direction your aircraft is actually flying, which is often different from the direction your aircraft's nose is pointing.

Glideslope Bar: Indicates your altitude relative to a 3° glideslope. If you are above the glideslope, the Velocity Vector is above the Bar. If you are below the glideslope, the Velocity Vector is below the Bar.

Localizer Bar: Indicates your horizontal position with the landing site. If you are left of the runway, the Velocity Vector is to the left of the Localizer. If you are right of the runway, the Velocity Vector is to the right of the Localizer. It indicates your position relative to the center of the runway and has no relationship to your heading.

To fly an ideal approach, keep the Velocity Vector centered on the lined-up Glideslope and Localizer Bars. Steer toward the center of the cross.

CARRIER LANDING

To avoid stopping short at takeoffs, the F/A-18E also has a very sophisticated automated landing system – the Automatic Carrier Landing System (ACLS). When ACL steering is selected on the HSI, and the autopilot is coupled to the system it provides a totally hands-off landing.

> **EA TIP** The F/A-18E's maximum carrier landing weight is 46,000 lbs. If your weight is greater than this limit, dump excess fuel until your weight is 46,000 lbs. or less.

ALL CARRIER LANDINGS

When you are returning to the ship following your mission, you need to contact the carriers Strike controller and declare "inbound" using the comminications menu. You should do this when you are between 50-100NM from the ship. At the 50NM point, you should request landing, again using the communications menu. From that point, the Marshal controller will assign you a Marshal, or holding point at a certain bearing and number of miles from the ship and at a specific altitude. It is important for you to orbit this point at your assigned altitude, as other returning aircraft may be holding above and below you. You will also be told when you can expect to "push" or leave the Marshal stack and begin your final approach. The basic carrier landing pattern from Marshal to touchdown is shown in the following illustration.

5 miles – ACLS lockon, couple autopilot for ACL 1 landing

3/4 mile – call the ball

Bolter pattern

Approx. 2 miles – turn when directed

Marshal

Platform – passing 5000 ft., reduce descent to 1200 fpm

10 miles – level at 1200 ft., set landing configuration

6 miles – 1200 ft. altitude, check landing configuration

Turn downwind when directed
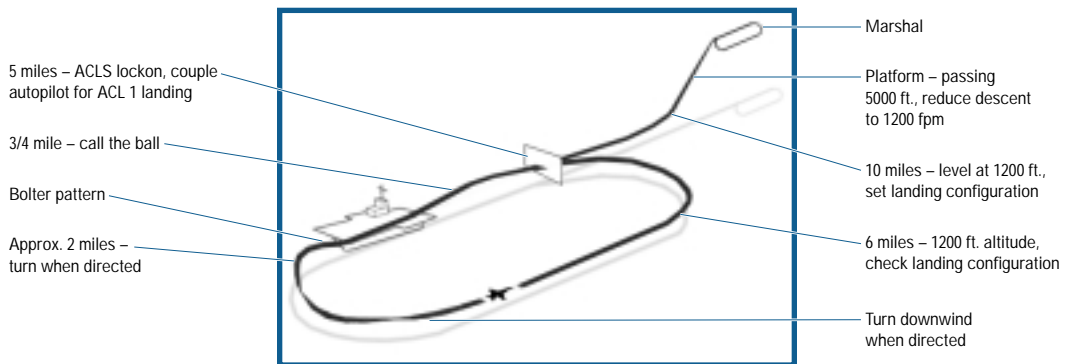
MODE 1 ACL LANDING (HANDS OFF)

Once you've been cleared to approach, follow these steps on final approach:

◆ Select ACL (PB 3) steering mode from the MDI – HSI page.

◆ When told to "push", depart the marshaling stack and descend 5,000 ft at 250 kts at a rate of 4000 feet per minute (fpm).

◆ Once at 5,000 ft reduce your rate of decent to 1200 fpm.

◆ Monitor your descent to 1,200 ft and then level off.

◆ At 10NM, things start to happen quickly:
  • Activate the ILS system [L key].
  • Set your autopilot mode to CPL ACL on the UFC but don't engage the autopilot yet (that will come later).
  • Press G to lower the landing gear (**LANDING_GEAR**).
  • Press F to set the flaps (**FLAPS**) to FULL.
  • Press T to lower the tailhook (**TAILHOOK**).

◆ At 5NM, the ships ACLS radar will lock on to you and you'll be able to turn on your autopilot by pressing the ⒶＡ key.

◆ At 3/4 of a mile you will be prompted by the Landing Signal Officer to "Call the Ball". If you see the IFOLS, press ⌷CONTROL⌷ ⒷＢ (**CALL_BALL**) to call the ball. If you do not see the IFOLS, press ⌷CONTROL⌷ ⒸＣ (**CALL_CLARA**) to inform to LSO that you can't see the IFLOLS.

◆ Sit back and enjoy a (hopefully) perfect touchdown. No system is perfect, however, so be alert in case your hook misses the wires and you end up "boltering".

> **EA TIP**   Even under ACL Landing control, your aircraft can still bolter. Be ready to take control if your aircraft misses the arrester wire.

MODE 2 OR MANUAL LANDING

Once you've been cleared to approach, follow these steps on final approach:

◆ Select ACL (PB 3) steering mode from the MDI – HSI page.

◆ When told to "push", depart the marshaling stack and descend 5,000 ft at 250 kts at a rate of 4000 fpm.

◆ Once at 5,000 ft reduce your rate of decent to 1200 fpm.

◆ Monitor your descent to 1,200 ft by following the ACL MDI cues.

◆ At 10NM, things start to happen quickly:
  • Activate the ILS system (Ⓛ key).
  • Press Ⓖ to lower the landing gear (**LANDING_GEAR**).
  • Press Ⓕ to set the flaps (**FLAPS**) to FULL.
  • Press Ⓣ to lower the tailhook (**TAILHOOK**).

◆ At 6NM lower your speed to maintain proper Localizer and Glideslope position.

◆ Monitor the Angle-of-Attack Indexer (AOA) mounted to the left of the HUD. Its illuminated symbols provide angle and speed cues. Use your throttle controls for both minor airspeed and altitude adjustments. See **Cockpit Overview: Angle Of Attack (AOA) indexer**, p. 4-49.

◆ Maintain centered ball approach all the way to touchdown. "Ball" is short for meatball, the yellow disc indicator of the Fresnel lens system that provides visual guidance for carrier landings. It becomes visible at about 3/4 from touchdown.
  • If the "meatball" is higher than the horizontal row of green lights, then you're too high and need to reduce power.
  • If the ball is lower than green lights, you're too low and need to add power.
  • If the ball is red, you're dangerously low and need to add more power or risk a ramp strike.

◆ At 3/4 of a mile you will be prompted by the Landing Signal Officer to "Call the Ball." If you see the IFOLS, press ⌷CONTROL⌷ ⒷＢ (**CALL_BALL**) to call the ball. If you do not see the IFOLS, press ⌷CONTROL⌷ ⒸＣ (**CALL_CLARA**) to inform to LSO that you can t see the IFLOLS.

Glidescope Indicator Lights
Waveoff Lights
Datum arms
Waveoff Lights
Datum arms
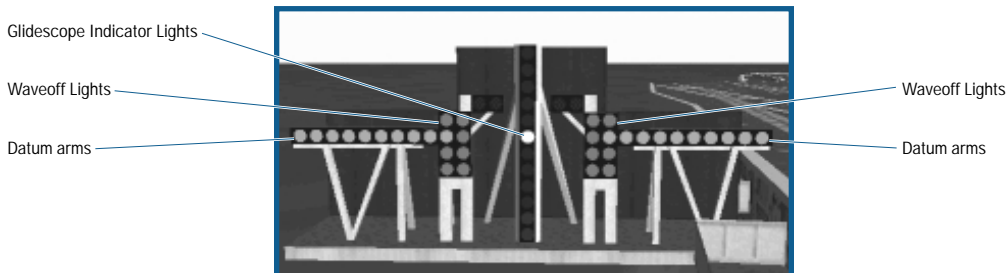
◆ Follow the LSO's guidance calls

◆ On touchdown press ⌷SHIFT⌷ ⌷·⌷ to increase the throttle to Mil (**THROTTLE_MIL**).

WAVE-OFF

If your approach just doesn't meet the landing criteria, the LSOs wave you off to go around and try again:

◆ Press ⎵ to punch the throttle to full (**THROTTLE_AB**) (move your throttle device all the way forward), but don't swerve off course.

◆ Press ⎇S to retract the speed brake (**SPEED_BRAKE**).

◆ Press ⎇F to set the flaps (**FLAPS**) to AUTO.

◆ Press ⎇SHIFT⎇ ⎇·⎇ to increase the throttle to Mil (THROTTLE_MIL).

◆ Climb to a safe altitude.

◆ Make a wide 180° turn to the left (never to the right), straighten out, and try a second approach.

◆ Follow the cues on the MDI – ACL page. Voice cues from the carrier also aid in your new approach.

BOLTER-BOLTER-BOLTER

If your tailhook misses the arresting wire (that's why you push the power up on touchdown), you'll fly off the end of the angled deck and go around and try a second approach.

LAND-BASED LANDING

250 kts – landing gear down, flaps full

On speed AOA

Verify landing checklist complete

Base Leg – maintain on speed AOA

Speedbrake (as required)

Touchdown – throttles idle

Enter Pattern (master arm off)

Final Approach – maintain on speed AOA
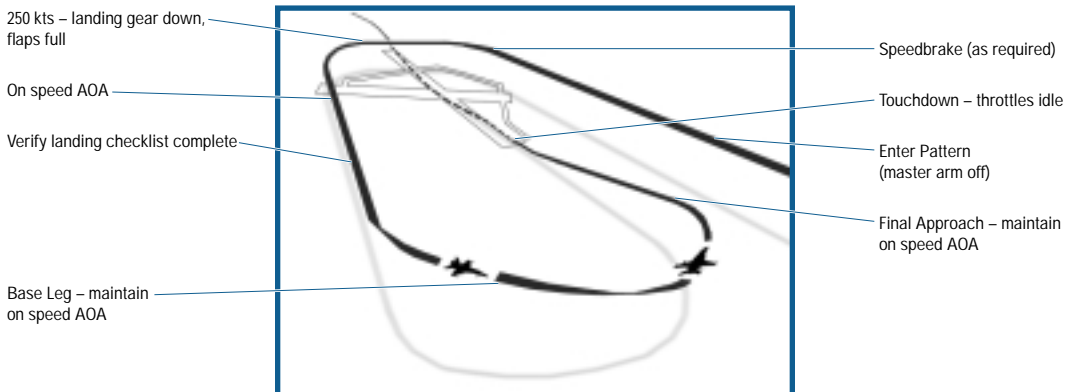
Follow these steps on final approach:

◆ Press ⎇SHIFT⎇ ⎇1⎇ to set Master Arm (**MASTER_ARM**) to OFF.

◆ Press ⎇-⎇ or ⎇·⎇ so that your airspeed is about 300 kts (**THROTTLE_DWN** or **THROTTLE_UP**). If the throttle is about 25% and you're still going too fast, press ⎇S to deploy the speed brake (**SPEED_BRAKE**) to bleed off some airspeed.

◆ At 250 kts and 10NM from the base, press ⎇G to lower the landing gear (**LANDING_GEAR**).

◆ Press ⎇F to set the flaps (**FLAPS**) to FULL.

◆ Make slight throttle adjustments to gain or reduce airspeed and lift as necessary. Press the ⎵ key for left rudder (**RUDDER_LEFT**) or the ⎵ key for right rudder (**RUDDER_RGT**) if you need to make slight yaw adjustments to maintain your line with the runway.

◆ Align the Velocity Vector with the Glideslope and Localizer Bars.

◆ Follow cues from the AOA Indexer (see above).

◆ Pitch your aircraft s nose slightly up just prior to touch-down.

◆ At touch-down, press ⎇SHIFT⎇ ⎇-⎇ to reduce the throttle to idle (**THROTTLE_IDLE**) (move your throttle device all the way back).

◆ As your speed drops below 100 kts, drop the nose down onto the runway.

◆ Press ⎇B to apply the Wheel Brakes (**WHEEL_BRAKES**).

ABORTING A LAND-BASED LANDING

If anything goes wrong, you may not be able to correct your landing in time to avoid a crash. If you are unsure about the landing, abort it and try again:

◆ Press ⟨\⟩ to punch the throttle to full (**THROTTLE_AB**) (move your throttle device all the way forward), but don't swerve off course.

◆ Press ⟨S⟩ to retract the speed brake (**SPEED_BRAKE**).

◆ Press ⟨F⟩ to set the flaps (**FLAPS**) to AUTO.

◆ Press ⟨G⟩ to raise the landing gear (**LANDING_GEAR**).

◆ Climb to a safe altitude.

Make a wide 180° turn to the left (the landing pattern is never to the right), straighten out, and try a second approach from your original heading.

NAVIGATION

Basic navigation is central to any successful mission. Every mission requires you to navigate to the target and then return safely to home base.

BASIC TERMS

Waypoints & Target Points: A coordinate designating a geographic location. Waypoints and Target points are stored in the aircraft's computer and collectively form your flight route.

Heading: Direction relative to true north measured in degrees from 0° to 360°. If you're flying north, your heading is 0°; due south and your heading is 180°. You can always determine your current heading from the Heading Scale on the HUD.

Bearing: Lateral direction relative to your aircraft's nose; measured in degrees from 0° to 360°. An enemy aircraft directly to your right has a bearing of 90° regardless of your heading.

TACAN: Tactical Aid to Navigation refers to signals broadcast by your carrier, airbases, and aircraft. These signals act as beacons and aid in navigation.

TACAN SIGNALS

TACAN channels provide you with positional information. Each TACAN station, such as the carrier or a tanker, has a different ID and operates on a unique TACAN channel.

In missions that have TACAN stations, you activate the different channels through the UFC in the TACAN submenu.

Initially, the selected channel defaults to the initial TCN channel, if one is available. See **Up Front Controller: UFC TACAN**, p. 4-83 on selecting a TACAN channel.

FOLLOWING A TACAN SIGNAL

◆ Select a TCN station.

◆ Switch to NAV Master Mode, if not already active.

◆ Display the MDI – HIS page, and select TCN (PB 5). This activates TACAN steering; the navigation system is now tracking TACAN signals instead of the other options.

The MDI – HSI page displays a number of TACAN aids to support navigation.

> **EA TIP** With TCN steering active, you can set the autopilot to automatically follow the active TACAN signal. See Up Front Controller: UFC Autopilot, p. 4-83.

NAVIGATING WAYPOINTS & TARGET POINTS

All Waypoint and Target Points are numbered starting at "0", your base or start point, to the maximum number included in the mission. Typically, you follow the points in order. Once you overfly a particular point, the navigation system automatically selects the next point in sequence.

You can manually change the active point:

◆ Press W to select the next point in sequence (**WAYPOINT_NEXT**).

—or—

◆ Press SHIFT W to select the previous point in sequence (**WAYPOINT_PREVIOUS**).

The HUD and MDI HSI page provide steering cues that aid in navigating to the active point.

AUTOPILOT MODES

The F/A-18E's autopilot is a complex subsystem offering a number of modes. You activate the Autopilot from the UFC or by pressing A (**AUTOPILOT**).

The available modes:

• WPT: Waypoint steering selected.

• TCN: TACAN steering selected.

• TGT: Target steering selected.

• ACL: Automatic Carrier Landing steering selected.

Before any autopilot mode can engage, the aircraft's bank angle must be less than or equal to 70°; pitch must be less than or equal to 45°.

REFUELING

If you're on a long mission, chances are that you'll need to refuel at least on the return leg of your flight, and maybe even on the outbound leg.

Tanker aircraft are positioned along your flight path for refueling. By locating a tanker (via TACAN) you approach and link up to replenish of your fuel supply in mid-air.

Be forewarned, mid-air refueling takes a great deal of practice. As a consequence, you can use the game's **Auto Refuel** option to automatically refuel.

AUTO REFUEL

◆ Press ALT F to automatically refuel (**AUTO_REFUEL**); no tanker is necessary.

MID-AIR REFUELING

If you enjoy a challenge, go for the mid-air refueling option. Follow these steps:

◆ Display the MDI HSI page, if it s not displayed, and select TCN (PB 5).

◆ Locate a tanker to get its bearing. You can locate tankers in one of two ways.

• From the UFC, scroll through the list of TACAN stations until you locate a TANKER description in the list. When selected, the TCN signal is locked in.

• Activate communications SHIFT TAB (**RADIO2_AI_TRANSMIT**) to call up a menu of commands for the AWACS. If available, select REQUEST CLOSEST TANKER. The AWACS transmits the bearing and distance of the closest tanker, if any.

◆ Once you have the tanker s bearing information, adjust your heading to fly towards the tanker. You can also activate TCN steering and let the autopilot guide you to the tanker. Be sure to deactivate the autopilot when you re within 5 NM.

◆ When you re within 5 NM or so, activate communications SHIFT TAB (**RADIO2_AI_TRANSMIT**) and send a TANKER REQUEST message.

The tanker acknowledges your request and changes its holding pattern to match your current heading. It will relay its new bearing, current speed, and refueling altitude in thousands of feet. For example, "Angels 10" means 10,000 feet.

◆ Look for the tanker on your MDI – A/A Radar page.

◆ Once you're about 2 NM from the tanker, press Ⓡ to toggle your radar to SILENT (**RADAR_SILENT**). The radar won't transmit and existing data on the display is not updated. Pressing Ⓔ (**EMCON**) accomplishes the same thing.

◆ Adjust your altitude and heading as necessary to approach the tanker's position. The TCN display on the UFC provides up-to-date bearing information.

◆ Approach the rear of the tanker. Your altitude should be slightly lower than that of the tanker. Navy aircraft refuel through a drogue streamed 10-15 feet behind the tanker. Press Ⓠ to extend the refueling probe from the right nose of the aircraft.

◆ Continue your current flight path to maintain the connection. After a few moments, you'll receive a refueling success message and your fuel indicator reads full.

◆ Pull back to disconnect from the drogue and press Ⓠ to retract the refueling probe. Good job, you're now on your way.

MANAGING YOUR FLIGHT

You are the flight leader for a flight of up to eight aircraft. Depending on the task at hand and expected level of resistance, you may want all eight aircraft to play similar roles in the mission, or (for example) you may direct some to take up escort duties while the others perform a strike. Whatever you decide, you need to arm all of the aircraft in your flight accordingly. Once the mission is underway, your flight's ability to carry out their part of the mission hinges in large part on your ability to effectively communicate with them.

THE STRUCTURE OF A FLIGHT
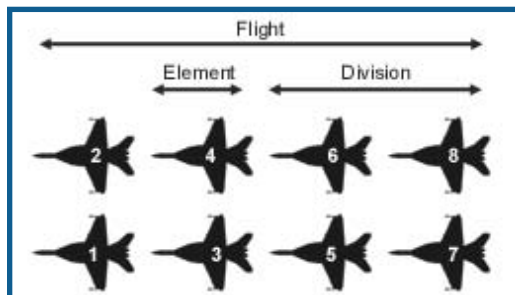
Before you can successfully manage a flight, you need to understand its structure.

A flight can consist of up to eight aircraft. You, as flight leader, are always in aircraft 1, and your wingman is in aircraft 2. When you issue flight (FLT) commands, all aircraft in the flight respond (see below).

An "eight-ship" or "six-ship" flight consists of two divisions. You are division leader of one of these, which consists of aircraft 1, 2, 3, and 4. Aircraft 5 is the division leader of the other, which consists of the remaining aircraft. You do not have control over the individual aircraft in aircraft 5's division, but his entire division responds as a unit to any division (DIV) commands you give (see below).

Each division consists of one or two elements. As division leader, you also have control over your element, and the element comprised of aircraft 3 and 4. When you issue element commands (ELM), only aircraft 3 and 4 respond (see below). Your wingman waits for direct wingman (WN) orders from you, and aircraft 5 has control over the elements in his own division.

FLIGHT COMMANDS

The general key commands listed in the table below are used to control your wingman, the element, the division or the entire flight, depending on its prefix. **FLT_ENGAGE** tells the whole flight to engage, whereas **ELM_ENGAGE** orders only aircraft 3 and 4 to engage.

- WN: Command controls aircraft 2 (wingman).
- ELM: Command controls aircraft 3 and 4 (element).
- DIV: Command controls aircraft 5,6,7 and 8 (division).
- FLT: Command controls entire flight.

Alternatively, you can access any of these commands by pressing the **RADIO1_AI_TRANSMIT** ⌨TAB key.

A menu appears in the upper left corner of the screen. Each of the menu options calls up a submenu, press the key corresponding to the number listed in front of an option to select it. Unavailable options are grayed out.

1️⃣ **Wingman Submenu:** Commands for aircraft 2.

2️⃣ **Section Submenu:** Commands for aircraft 3 and 4.

3️⃣ **Division Submenu:** Commands for aircraft 5-8.

4️⃣ **Flight Submenu:** Commands for all aircraft.

GENERAL COMMANDS

The following list of commands are used to direct your wingman, element, division or the entire flight, depending on the keyboard command prefix or what menu the command is chosen from.

Menu Option: Lists the command options as they appear on the WINGMAN, ELEMENT, DIVISION and FLIGHT submenus described above. Press the key corresponding to the number listed in front of an option to select the option.

Key Command Suffix: Lists the keyboard function name suffixes for the same commands as they appear on the keyboard-mapping screen. (The prefix to the commands WN, ELM, DIV, and FLT indicates who responds to a command, while the suffix indicates the actual response).

Action: Describes what the selected aircraft does when you press the key command or choose the menu option.

MENU OPTION	KEY COMMAND SUFFIX	ACTION
ENGAGE BANDITS	ENGAGE	Engage any enemy air targets they find. If they can't find anything, they radio you and continue normal flight. If they have acquired targets and want to engage, but you haven't given the OK, they ask you for it.
SANITIZE RIGHT	SANITIZE_RIGHT	Fly out 90 degrees to the right of your flight path, using air radar to search for targets. They radio back the position of any they find. If they don't find any, they return to formation. (Not available for FLT or from FLIGHT submenu)
SANITIZE LEFT	SANITIZE_LEFT	Fly out 90 degrees to the left of your flight path, using air radar to search for targets. They radio back the position of any they find. If they don't find any, they return to formation. (Not available for FLT or from FLIGHT submenu)
COVER ME	COVER	Do one of three things A) begin a CAP, if a CAP was assigned to them for this steer point; B) begin their escort, if escort is assigned to them for this steer point; B) begin their escort, if escort is assigned for this steer point; C) cover you, otherwise. See Steering Data, for an explanation of steer point assignments (Not available for FLT or from FLIGHT submenu)

MENU OPTION	KEY COMMAND SUFFIX	ACTION
ORBIT HERE	ORBIT	Circle the area until you ask them to return to formation. They do not follow you if you go elsewhere. You can combine this command with another like ENGAGE to order aircraft to remain in one place and carry out a specific task. (Not available for FLT or from FLIGHT submenu)
INTERCEPT		Calls up the INTERCEPT submenu (see below)
GROUND ATTACK		Call up the GROUND ATTACK submenu. (see below)
REJOIN FLIGHT	REJOIN_FLIGHT	Break off attack and return to formation
RETURN TO BASE	RETURN_TO_BASE	Return to the airfield where you began your mission.

INTERCEPT SUBMENU
None of these options are available for FLT or from the FLIGHT submenu.

MENU OPTION	KEY COMMAND SUFFIX	ACTION
BRACKET RIGHT	BRACKET_RIGHT	Pull to the right (while you pull to the left) of the group of enemy fighters currently targeted (See diagram). If an element or division leader does not have a target, he asks the aircraft under his control for a target. If no one under his control has a target, he tries and determines which target you wish him to bracket. If he cannot, he radios this to you and continues normal flight.
BRACKET LEFT	BRACKET_LEFT	Pull to the left (while you pull to the right) of the group of enemy fighters currently targeted. Targets are chosen as described above.
SPLIT HIGH	SPLIT_HIGH	Climb above (while you dive below) the group of enemy fighters currently targeted. Targets are chosen as described for BRACKET RIGHT. (See diagram)
SPLIT LOW	SPLIT_LOW	Dive below (while you climb above) the group of enemy fighters currently targeted. Targets are chosen as described for BRACKET RIGHT.
DRAG RIGHT	DRAG_RIGHT	Lead your target away to the right of you so you can get a better shot at him. Targets are chosen as described above. (See diagram)
DRAG LEFT	DRAG _LEFT	Lead your target away to the left of you so you can get a better shot at him. Targets are chosen as described above.
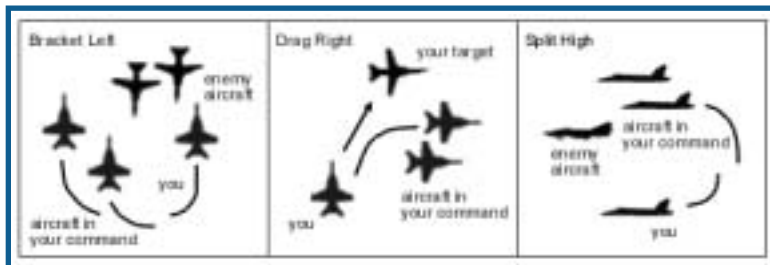
GROUND ATTACK SUBMENU

MENU OPTION	KEY COMMAND SUFFIX	ACTION
ATTACK PRIMARY GROUND TARGET	ATK_PRIMARY	Attack the primary mission objective (usually a ground target) as defined in the mission briefing.
ATTACK AIR DEFENSES	ATK_AIR_DEF	Attack any detected Surface-to-air missile sites, radars, or triple-A emplacements
ATTACK SECONDARY GROUND TARGET	ATK_SECONDARY	Attack the secondary mission objective (usually a ground target) as defined in the mission briefing.
ATTACK GROUND TARGETS OF OPPORTUNITY	ATK_ANY_GRND	Attack whatever ground targets they find.

ATTACK WITH WINGMAN-SPECIFIC COMMANDS

In addition to the general commands listed above, the following commands will help you work more closely with your wingman in a dogfight.

MENU OPTION	KEY COMMAND SUFFIX	ACTION
TACTICAL (SUB-MENU)		Calls up TACTICAL submenu (see below)
ATTACK MY TARGET	WM_ATK_MY_TARGET (CTRL A)	Engage your designated air or ground target. If you don't have a target designated, he continues normal flight.
HELP ME	WM_HELP (CTRL H)	Drop what he's doing and come to your aid unless he's in hot water himself, in which case he tells you you're on your own.

TACTICAL SUBMENU

MENU OPTION	KEY COMMAND SUFFIX	ACTION
BREAK RIGHT	WM_BREAK_RIGHT	Turn hard right
BREAK LEFT	WM_BREAK_LEFT	Turn hard left.
BREAK HIGH	WM_BREAK_HIGH	Turn hard up (vertical turn)
BREAK LOW	WM_BREAK_LOW	Turn hard down (vertical turn)

FLIGHT-SPECIFIC COMMANDS

In addition to the general commands listed above, there are several formation commands and information requests that you can only issue to the flight as a whole.

MENU OPTION	KEY COMMAND SUFFIX	ACTION
RADAR ON/OFF	FLT_RADAR_TOGGLE	Enable/disable radar emission. Note that an aircraft does not disable its radar if it is tracking a target.
MUSIC ON/OFF	FLT_JAMMER_TOGGLE	Enable/disable jammer emission.
REPORT CONTACTS		List off all contacts they see, without attempting to sort (see below)
SORT BANDITS	FLT_SORT_BANDITS	List off their targets. They attempt to describe the targets in a way that helps you determine which blips on your radar screen they are referring to, using cardinal directions relative to your aircraft and lead, trail and middle 1, 2, 3, etc. to describe relative range within a group of fighters. If the situation is confusing, they list the type of aircraft they are targeting, Striker, CAP, etc.
STATUS (SUB-MENU)		Calls up the STATUS submenu (see below)
CHANGE FORMATION (SUB-MENU)		Calls up the CHANGE FORMATION submenu (see below)

STATUS SUB-MENU

MENU OPTION	KEY COMMAND SUFFIX	ACTION
FLIGHT SYSTEMS CHECK	FLT_STATUS (CTRL S)	Radios in just their flight numbers (if undamaged) or their flight numbers and amount of damage they've taken
FLIGHT WEAPONS CHECK	FLT_WEAPON_CHK (CTRL I)	Lists off their air-to-air ordnance.

CHANGE FORMATION SUB-MENU

MENU OPTION	KEY COMMAND SUFFIX	ACTION
LOOSEN CURRENT FORMATION	FLT_LOOSEN_FORMATION	Move further apart in formation – doubling the current spacing.
TIGHTEN CURRENT FORMATION	FLT_TIGHTEN_FORMATION	Move closer together in formation – halving the current spacing.
V FORMATION	FLT_V_FORMATION	Form a "V" formation (See diagram)
WEDGE FORMATION	FLT_WEDGE_FORMATION	Form a wedge formation (See diagram)
LINE ABREAST FORMATION	FLT_LINE_FORMATION	Form a line formation. (See diagram)
ECHELON FORMATION	FLT_ECHELON_FORMATION	Form an echelon formation (See diagram)
TRAIL FORMATION	FLT_TRAIL_FORMATION	Form a trail formation. (See diagram)
WALL FORMATION	FLT_WALL_FORMATION	Form a wall formation. (See diagram)

CHAPTER 5: COMBAT

COMBAT – INTRODUCTION

This chapter is designed to familiarize you with the F/A-18E's advanced sensor and weapons systems. Since the Super Hornet is a strike fighter, both air-to-air and air-to-ground systems are covered. This information should provide you with the basic tools you need to complete any type of mission you may encounter in the game.

Basic Fighter Maneuvers (BFM) are not covered, as we felt it was more important to cover the aircraft's systems in depth within this manual. There are many excellent books on BFM available for those that seek more information of this topic. Two examples are Robert L. Shaw's superb *Fighter Combat: Tactics and Maneuvering* and Mike Spick's equally superb *The Ace Factor: Air Combat and the Role of Situational Awareness.*

AIR-TO-AIR COMBAT

The primary role of fighter aircraft has always been to hunt down and destroy other aircraft. Your F/A-18E has a host of advanced systems to help you accomplish this task. The Super Hornet may not be the fastest or most maneuverable aircraft in the sky, but it has the most sophisticated avionics and carries the some of the most lethal air-to-air weapons of any of its contemporaries.

Since the Air-to-Air radar is your primary means of detecting and tracking targets, it is described first. Your Targeting FLIR pod also has the ability to track targets, and is described next. Finally, the HUD and MDI pages for each Air-to-Air weapon are described.

AIR-TO-AIR RADAR

The APG-73 Radar is a coherent, X-band, multiple PRF, multi-mode attack radar with sophisticated electronic counter-countermeasure features. It provides rapid acquisition of short-range targets and has an excellent capability against long-range, high closing rate targets. For those of you that are now saying "huh?", the Advanced Topics paragraphs at the end of this section should help you better understand some of these features.

RADAR ANTENNA SCAN VOLUMES AND TIME

One of the first concepts you must understand to effectively use your radar is how to control your radar antenna. The antenna is an electrically powered device located in the nose of your aircraft, scanning both back and forth and up and down. A maximum of 70° is scanned to either side, so obviously the radar cannot see targets located behind you. The antenna can also scan vertically in set steps known as "bars"; the radar scans across one bar, moves up several degrees, and then scans the next bar in the opposite direction. Finally, the center point of the scan is adjusted up and down to a maximum of ±60°. Again, this means that your radar cannot see targets directly above or below you because they are outside of the antenna's scan area.

Where does time fit into all this? It's simple, really. The antenna is scanned at a set speed, which is optimized to provide the best target detection under all circumstances. Since the antenna scan rate speed is fixed, scanning a large area takes longer than scanning a small area. Scanning a smaller area also provides faster updates on any targets detected in that area than would a larger scan. Things can happen quickly in air-to-air combat, and you always want to balance how much area you are scanning against how quickly the greatest threats are closing on your aircraft.

In *Jane's F/A-18,* antenna side to side, or azimuth, scan setting is usually controlled by MDI PB 19. Some A/A radar sub-modes have azimuth scans that are fixed and not adjustable. For those A/A sub-modes that allow the elevation bar setting to be changed, this is located on PB 6.

The elevation scan angle is important to consider as well. By default, the radar scan is centered on the horizon and stabilized so that aircraft climbs or dives keeping the antenna scanning back and forth along the horizon. This works great for detecting targets that are close to your altitude, but targets that are greatly above or below your altitude might fall outside your scan and be missed. In this case you might want to adjust your antenna up or down a degree or two. A couple of degrees may not sound like much, but as range increases it can have a dramatic

difference on what you see or don't see on your display. The Elevation scan angle is changed using the following keyfunctions:

- RADAR_ANT_UP [**SHIFT** **8**]: Increases the antenna angle by one degree
- RADAR_ANT_DWN [**SHIFT** **0**]: Decreases the antenna angle by one degree
- RADAR_ANT_CENTER [**SHIFT** **9**]: Centers the antenna elevation on the horizon (default)

MULTI-SENSOR INTEGRATION (MSI) TRACKFILE SYMBOLOGY

The MSI concept used on the F/A-18E takes target information from various sensors, correlates them and displays the result to you as fused MSI trackfiles. MSI trackfiles are displayed on the A/A Radar page and the Situational Awareness (SA) page. Sensors that contribute to MSI trackfiles are the Radar, Targeting FLIR, and Data Link (Targets passed from an E-2C, or AWACS).

TRACKFILE SYMBOLS

The radar supports up to 16 MSI targets. The first eight targets display as HAFU (Hostile, Ambiguous, Friendly, Unknown) symbols.

Hostile   Ambiguous   Friendly   Unknown
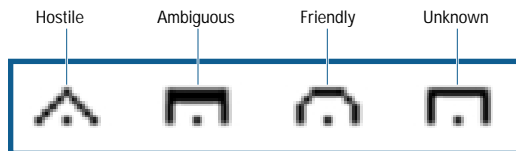
The remaining eight MSI targets display as Low Priority Targets (LPT), which looks like a + symbol.

HAFU symbols for datalink identified targets display inverted. For example, if both your aircraft and the AWACS identified the same target as Friendly, the symbol would look more like a completed circle. Additional data for a target displays around the HAFU.

Target Mach — 0.8 [2] 33 — Target Altitude (x 1000 ft)

Target Ranking — — Target Heading

LAUNCH & STEERING TARGET DESIGNATION

In Range-While-Search (RWS) and Track-While-Scan (TWS) sub-modes, a target is designed (selected) as the Launch & Steering (L&S) target. This offers certain advantages to you, since weapon attack and target symbology is generated for the L&S target on the HUD and on the Radar page exactly as if the radar were in Single Target Track (STT). This can allow you to maneuver your aircraft to the optimal firing position without alerting the target by "locking him up" (going to STT) too soon.

A specific target is designated as the L&S target using one of two methods. The most obvious way is to assigned TDC control to the Radar page and slew the radar acquisition cursor over a target blip. The **TARGET_DESIGNATE** [**ENTER**] keyfunction is then used to create the L&S target. The second and easiest method is by using the **TARGET_UNDESIGNATE** [**BACKSPACE**] keyfunction. When there is not an L&S target, initial selection of **TARGET_ UNDESIGNATE** causes the target closest to your aircraft to be designated the new L&S target. With an existing L&S target, selecting **TARGET_UNDESIGNATE** causes the L&S target to step to the next undesignated target.

The only way to completely delete the L&S target is by using the radar Reset (RST) option on the Radar page. If the L&S target is manually designated a second time, or if Auto Acquisition (AACQ) mode is enabled (using the AACQ keyfunction), the radar enters STT mode.

RADAR "IRON CROSS" DISPLAY

The Iron Cross appears in the lower left corner of the radar page in either A/A or A/G modes whenever the radar transmitter is not operating. Situations that display the Iron cross include the following:

- Weight-On-Wheels
- EMCOM
- Radar Silent (SIL)
- Radar not operational (OPR), typically due to battle damage
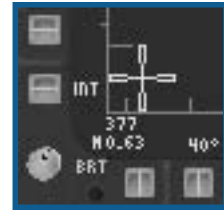
A/A RADAR SUB-MODES

The A/A Radar page is the primary sensor you use to detect, identify, track, and attack airborne targets. There are three categories of sub-modes: search, track-while-scan (TWS), and single target track (STT). Each of these sub-modes uses elements of the basic A/A radar display.

BASIC A/A RADAR PAGE SYMBOLOGY

Basic radar target symbology on the MDI A/A radar page:
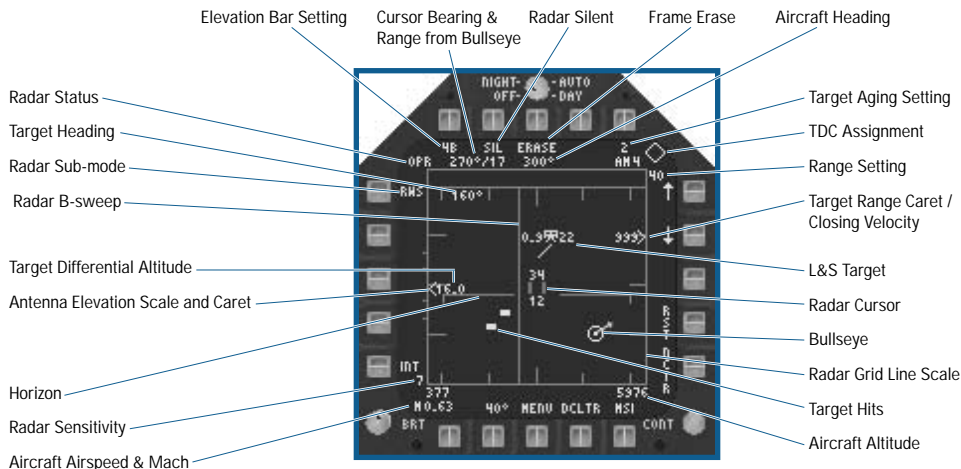
◆ **Aircraft Airspeed & Mach:** Your aircraft's current airspeed and mach.

◆ **Radar Sensitivity Indicator:** Lower values indicate reduced target detection, acquisition and tracking ranges. The sensitivity indicator decreases in high clutter areas such as when flying at low altitude or in the presence of noise jamming.

◆ **Horizon Line:** Displays a repeat of the horizon line on the HUD.

◆ **Antenna Elevation Scale and Caret:** The antenna elevation scale indicates ±60° of antenna elevation. The scale is graduated in 10° increments in the range of ±30° of antenna elevation, with the full ±60° range being displayed over the entire tactical region of the radar display format. The elevation caret moves on the scale to indicate the current antenna elevation.

◆ **Target Differential Altitude:** The altitude of the target above (positive) or below (negative) your aircraft, in thousands of feet.

◆ **Radar B-sweep:** The B-Sweep line denotes the current azimuth position of the antenna, and moves back and forth across the display as the radar antenna scans from side to side.

◆ **Radar Sub-mode:** (PB 5) Available in RWS, VS and TWS sub-modes only (not STT) and provides the means to select the radar sub-mode. Defaults to RWS.

◆ **Target Heading:** Displays the target heading for the L&S target.

◆ **Radar Operating Status:** One of the following displays, based on current radar status:
  - STBY: SIL mode commanded, radar in standby (not transmitting)
  - OPR: Operating normally
  - RDY: Radar damaged (not ready)

◆ **Elevation Bar Setting:** (PB 6) Toggles through each available radar antenna elevation bar setting.

◆ **Cursor Bearing and Range from Bullseye:** Displays the bearing (in degrees) and range (in nautical miles) of the cursor relative to the Bullseye point.

◆ **Radar Silent:** (PB 7) Toggles between Radar Silent (non-transmitting) and normal operation.

◆ **Frame Erase:** (PB 8) Commands the radar to erase the current target history. Any radar blip currently displayed is immediately erased.

◆ **Aircraft Heading:** Your aircraft's current heading in degrees.

◆ **Target Aging Option:** (PB 10) Selects the number of radar "sweeps" that raw radar targets will be displayed. Targets will fade out as they age and will be removed once the selected number of frames has elapsed. Higher settings can result in significant display clutter when there are a lot of targets.

◆ **TDC Assignment Indicator:** Indicates that TDC control is assigned to the radar page. The TDC is assigned either by the mouse (clicking on the display) or by using the **TDC_CYCLE** [⬚] keyfunction. When assigned to the radar page, slewing the TDC causes the radar cursor (acquisition gates) to move on the display.

◆ **Radar Range Scale:** The current range setting of the radar, in nautical miles. The radar range is changed using the up or down arrows next to PB 11 or 12, respectively.

◆ **Target Range Caret / Closing Velocity:** Current target range is indicated by the caret symbol. The symbol moves vertically along the right edge of the radar page and each large tick mark represents one-forth of the current radar range. Target closing velocity (VC) in knots is displayed to the left of the range caret. It represents the closing rate of your aircraft and the target along the target line of sight vector. If the number is positive, the target is getting closer to you, and if it is negative, the target is moving further away from you.

◆ **Launch & Steering (L&S) Designated Target:** The L&S target is identified by a HAFU containing a star in place of the rank number. Mach and altitude information display adjacent to it as described above.

◆ **Radar Acquisition Cursor:** The Radar Cursor is a set of two vertical parallel lines displayed at all times in RWS, VS, TWS, and STT. The cursor moves in response to up/down/left/right commands from the TDC. The numbers displayed above and below the cursor indicate the altitude coverage limits (in thousands of feet) of the radar scan pattern for the indicated range. Targets that are located above or below these altitudes are outside the current scan of your antenna and won't be detected.

◆ **Bullseye Point:** The Bullseye reference point is displayed if one was designated in the Mission Builder and it is within the radar field of view. The small arrow always points North.

◆ **Radar Grid Line Scale:** The horizontal lines are velocity reference lines in the VS sub-mode and range reference lines in all other sub-modes. These grid lines represent a quarter increment of the selected range or velocity scale. The vertical lines are the azimuth grid lines. The center azimuth grid line represents zero degrees (straight ahead) and each smaller line to the left or right represents 30° of bearing.

◆ **Target Hits (blips):** Raw hits (blips) detected by the radar are displayed as small solid rectangles. These hits age (fade) based on the current radar age setting.

◆ **Aircraft Altitude:** Your aircraft's current altitude above sea level.

## RANGE WHILE SEARCH (RWS) SUB-MODE

The Range While Search sub-mode is your basic search mode. It provides good detection of targets during both high-closure rate, head-on attacks, and low-closure rate, tail attacks. Range scales of 5, 10, 20, 40, and 80 nautical miles are available. The antenna scan is set to 20, 40, 60, 80, and 140 degree azimuth scan settings, and 1, 2, 4, and 6 elevation bars. RWS targets display as raw radar hits except for the L&S target (if one is designated), which uses a HAFU symbol.
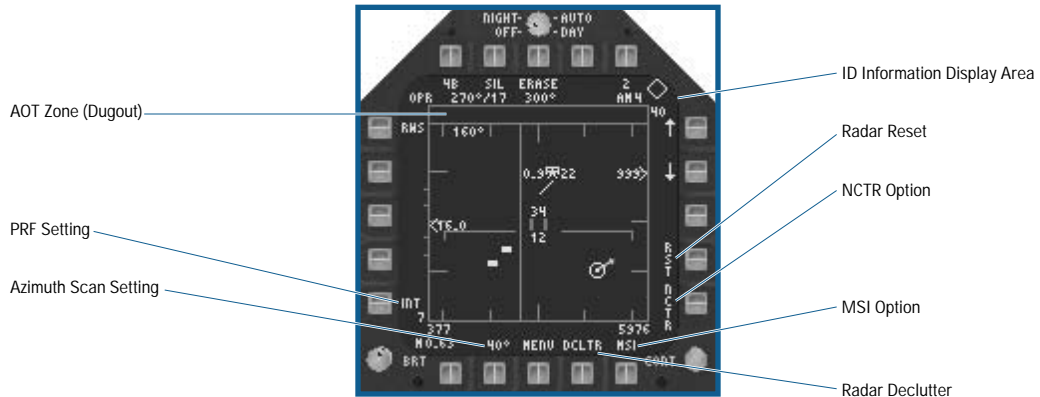
- **Azimuth Scan Setting:** (PB 19) Toggles through each available azimuth scan width.

- **Pulse Repetition Frequency (PRF) Setting:** (PB 1) Toggles through HI (high), MED (medium) and INTL (interleaved) PRF settings. The effects different PRF settings have on target detection are discussed in the A/A Radar Advanced Topics section. See **Combat: Air-to-Air Radar: Advanced Topics: Radar PRF**, p. 5-106.

- **AOT Zone (dugout):** This area is used to display Angle-Only-Tracks (AOT). An AOT is a created when the radar cannot determine target range (typically as a result of jamming). Only AOT trackfiles display in this zone. The display of normal targets and associated symbology within this zone is inhibited.

- **ID Information Display:** Target ID information is displayed here when the NCTR option (see below) is enabled.

- **Radar Reset (RST):** (PB 14) Undesignates the L&S target.

- **NCTR Option:** (PB 15) Toggles Non Cooperative Target Recognition (NCTR) on or off. When enabled, the radar attempts to identify the L&S target by analyzing the radar returns of the target. The principles and limitations of NCTR are discussed further in the A/A Radar Advanced Topics section. See **Combat: Air-to-Air Radar: Advanced Topics: NCTR**, p. 5-108.

- **MSI Option:** (PB 16) When enabled (boxed), Data link targets (supplied by the E-2C) and the current A/A FLIR target (if the ATFLIR is autotracking an airborne target) are added to the radar display as described above in the Multi-Sensor Integration section.

- **Radar Declutter (DCLTR):** (PB 17) Allows for the selective decluttering of the radar display. There are two levels that is toggled through:
  - DCLTR1: Removes the horizon line and velocity vector
  - DCLTR2: Removes the DCLTR1 symbology plus target differential altitude, target heading, and the target closing velocity.

VS (VELOCITY SEARCH) SUB-MODE MDI PAGE

Velocity Search (VS) is a secondary radar search mode that detects and displays targets based on their relative closing speed and azimuth to your aircraft. It is very good at detecting even small targets at long range, provided they have a high closure rate to your aircraft. VS sub-mode uses the same antenna settings (azimuth scan size and elevation bar setting) as RWS sub-mode.

Velocity scale
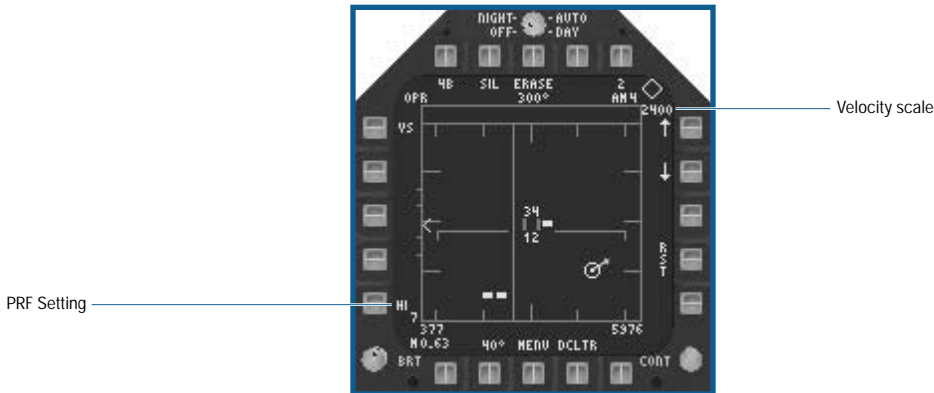
PRF Setting

◆ **PRF Setting:** The PRF is locked at HI and cannot be changed in VS sub-mode.

◆ **Velocity Scale:** Since VS sub-mode is a speed vs. azimuth display instead of the range vs. azimuth display of all other A/A radar sub-modes, the range setting is replaced by a velocity scale. Two scales are selected using the up or down arrows (PB 11 or 12, respectively), either 800 knots or 2400 knots. The top of the display represents the selected velocity, and each major horizontal tick mark represents one quarter of that velocity. For example, if the 2400 knot scale is selected and a target is detected with a closure speed of 1200 knots, that target displays in the middle of the display at the proper azimuth.

TRACK WHILE SCAN SUB-MODE

Track While Scan (TWS) sub-mode enables you to maintain awareness of the airspace nearby a primary target of interest with less chance of alerting the target to your intentions than in STT sub-mode. In TWS sub-mode, the radar scans a much smaller area in order to maintain a high update rate (every two seconds) on the primary target. As a result, the antenna azimuth scan and elevation bar setting combinations are limited to 20° / 2 bar, 20° / 4 bar, 20° / 6 bar, 40° / 2 bar, 40° / 4 bar, 60° / 2 bar and 80° / 2 bar.

Up to eight targets are tracked, and ranked MSI HAFU symbols represent the targets. The L&S target is the primary (DT1) target, and a second primary target (DT2) may be designated. Additional targets in the area are represented as radar blips, although a radar blip temporarily changes to a HAFU symbol if the cursor is moved over it. If there is no L&S target when TWS sub-mode is entered, the highest ranked MSI trackfile is designated the L&S target.

Ranked Targets

RAID Option

Secondary Designated Target (DT2)

Primary Designated scan (DT1)

Antenna Scan Centering

Radar Reset

Missile Attack Symbology
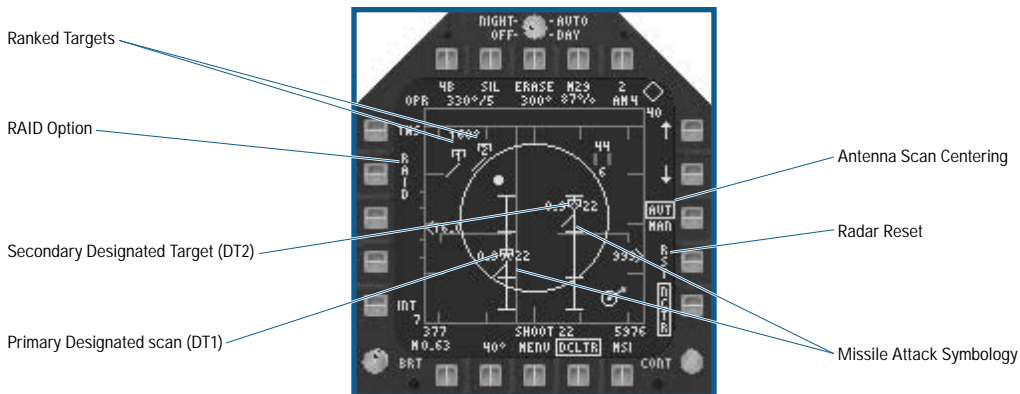
◆ **Primary Designated (DT1) Target:** In TWS, the L&S target is also known as the primary designated target or DT1. If a second target is manually designated using the TDC and designate keyfunction, that target becomes the new DT1 target and the previous DT1 target becomes the DT2, or secondary target. Selecting **TARGET_ UNDESIGNATE** when both a DT1 and DT2 target exist causes them to swap designations.

◆ **Second Designated (DT2) Target:** A second designated target (DT2) is designated to allow for improved multiple target attacks. The DT2 target is indicated by a HAFU containing a diamond in place of the rank number. Selecting Radar Reset (RST) deletes the DT2 target.

◆ **RAID Option:** (PB 4) Toggles between normal and RAID TWS sub-modes. TWS SCAN RAID is a "zoomed" TWS display, centered on the L&S target. It uses a high data rate scan that increases the probability of separating and displaying additional targets on closely spaced target groups. When TWS SCAN RAID is commanded, the radar enters a special 3 bar 22°-azimuth high data rate scan mode centered on the L&S target.

◆ **Ranked Targets:** Up to eight targets display on the TWS radar page as HAFU symbols containing their associated rank number. The rank number is not displayed for L&S and DT2 targets since the star and diamond cue are indicated within the target symbol.

◆ **Antenna Scan Centering:** (PB 13) Selects automatic or manual antenna scan centering. With AUT selected, the azimuth and elevation scans and scan center are changed to keep as many radar targets as possible in the scan volume. The scan volume and scan center are continually adjusted so that all or most of the radar targets are maintained on the display.

With MAN selected, the scan volume is manually positioned. Initially, the scan center is positioned at the previous AUT scan center position. The radar elevation control is used to change the scan center in elevation. To change the scan center in azimuth, the Acquisition cursor is placed at the desired scan center (no targets under the cursor) the designate keyfunction is selected. Note that the radar does not reposition its scan center until end of frame. If the commanded scan center is less than one half of the selected scan width from the antenna gimbals limit, the radar automatically re-centers the azimuth scan so that the entire scan pattern is used. The azimuth scan width and elevation bar selection is changed to any valid TWS setting.

◆ **Low Priority Trackfile (LPT) (not shown):** If there are more than eight targets displayed (including the L&S and DT2), the remaining targets are represented by small + symbols.

SINGLE TARGET TRACK (STT) SUB-MODE

When the radar is in STT sub-mode, the radar individually focuses or "locks on" to the L&S target; no other targets display. The B-sweep line is fixed at the target's azimuth. Since the radar is tracking a single target, manual control of the antenna settings is disabled. STT sub-mode provides the fastest target updates possible; however, your target likely is alerted to you as well because your radar is concentrating all it's power on that single point.

STT sub-mode is entered by either manually designating the L&S target using the TDC controls, or by using any automatic Acquisition sub-mode (described below). STT is switched back to RWS simply by selected the **TARGET_UNDESIGNATE** [BACKSPACE] or STT is transitioned to TWS by selecting the RTS TWS (Return To Search TWS) option at PB 5.

AUTOMATIC ACQUISITION SUB-MODES

Automatic Acquisition sub-modes are designed to allow you to rapidly lock on to targets, in some cases by simply pointing your aircraft's nose at the target you wish to lock on to. The various sub-modes differ mainly in the size, shape, and maximum range of their scan volumes. If successful in locking on to a target, each of these sub-modes transitions the A/A radar to STT sub-mode.

AACQ (AUTO ACQUISITION)

Automatic Acquisition (AACQ) allows you to rapidly transition from any search or TWS sub-mode to STT sub-mode. Selecting AACQ (**ACQ_AUTO** [0]) does one of two things depending upon whether or not there is currently an L&S target. If there is an L&S target, that target is locked on to. If there is not an L&S target, AACQ attempts to lock on to the target closest to the current radar cursor position.

BST (BORESIGHT ACQUISITION)

Selecting Boresight (BST) Acquisition (using the **ACQ_BST** [8]) commands the radar to lock on to the first target it encounters within a narrow 3.3° circle centered on the aircraft's waterline. BST sub-mode can lock on to targets within a maximum of 10 NM from your aircraft.

VACQ (VERTICAL ACQUISITION)

Vertical Acquisition (VACQ) is designed for use during turning engagements where the target is located well above the nose of your aircraft. The radar antenna scans vertically up and down instead of the normal side-to-side motion. The maximum range of VACQ is 5 NM. VACQ is toggled on or off using the **ACQ_VERTICAL** [9] keyfunction.

GACQ (GUN ACQUISITION)

Gun Acquisition (GACQ) sub-mode is entered automatically any time you select the Gun in A/A Master Mode when you are not in STT. GACQ uses a 200 scan centered on your aircraft's waterline and locks on to the first target encountered within 5 NM.

WACQ (WIDE ACQUISITION)

Wide Acquisition (WACQ) is toggled on or off using the **ACQ_WIDE** [7] keyfunction. WACQ uses a 6 bar, 600 scan setting centered on your aircraft's waterline and locks on to the first target encountered within 10 NM.

AUTOMATIC ACQUISITION SUB-MODES HUD SYMBOLOGY

The HUD displays unique symbology during the different radar acquisition sub-modes.

BST Radar coverage

VAQC Radar coverage

GAQC Radar coverage

Acquisition sub-mode
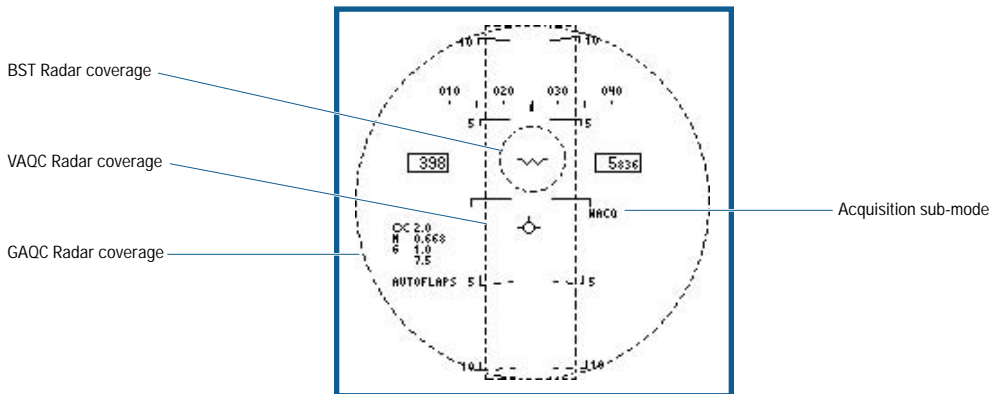
◆ BST Radar Coverage: When Boresight (BST) acquisition sub-mode is selected, a 3.3° diameter dashed circle displays with its center at the radar boresight position (aircraft waterline).

◆ VACQ Radar Coverage: When Vertical acquisition (VACQ) sub-mode is selected, two vertical dashed bars (5.2° apart, centered in azimuth) display. The vertical coverage of VACQ is +47° to -13°.

◆ GACQ Radar Coverage: When Gun acquisition (GACQ) sub-mode is selected, a 20° diameter dashed circle displays to indicate that the radar scan coverage encompasses the total HUD field of view.

◆ Acquisition Sub-mode: The currently selected acquisition sub-mode displays here.

ADVANCED TOPICS

Explaining even the basics of a modern radar system is a task that could fill this manual many times over. However, in order to give you a better understanding of how best to use your radar, we felt that some additional details would be very helpful, and perhaps give a better appreciation of all the behind-the-scenes modeling that that takes place within *Jane's F/A-18.*

RADAR PULSE REPETITION FREQUENCY (PRF)

The choice of PRF is perhaps the most critical parameter any real life radar designer must deal with. All other conditions remaining the same, the PRF choice determines how well the radar can measure range and closing velocity as well as how well it can reject ground clutter. There are three generally accepted categories of radar PRF: Low, Medium, and High. Unfortunately, there is no one magic solution among these three, as each has it's own strengths and weaknesses, as summarized below.

Low PRF
- Good for air-to-air look up and ground mapping
- Good sidelobe rejection
- Good range resolution capability
- Poor air-to-air look down as targets are rejected with ground clutter
- Maximum range limited to antenna size

Medium PRF
- Good all aspect target detection capability
- Good ground clutter rejection
- Limited maximum range (but greater than LPRF modes for the same sized antenna)

High PRF
- Excellent nose aspect target detection at long range
- Excellent ground clutter rejection
- Reduced range resolution capability
- Reduced detection capability against low closing rate targets
- Zero or low closing rate targets (at any altitude) may be lost

The APG-73 radar in the Super Hornet uses Medium and High PRF's. Interleaved PRF is also available in some sub-modes, and what this means is that for one antenna scan the radar uses Medium PRF, and as it scan back the other way it uses High PRF. This interleaving of PRF provides the best compromise in most situations.

DOPPLER EFFECTS

You may have noticed that High PRF has problems with low closing rate targets. This is because High PRF uses Doppler frequency shift to sort targets out of the received radar return. The less closure there is between the target and your aircraft, the smaller the target return is, and, after a certain point, a target may be lost from your display. For this reason, a MPRF setting may be a better choice when facing targets that are not at long range.

"The Notch"

You can also use the effects of Doppler to your advantage. By turning perpendicular to a threat radar system, you minimize the amount of Doppler shift they can see, and you just might be able to break a lock. Using chaff in this situation can further help you break lock, as the threat radar has a much harder time rejecting chaff when there is little or no Doppler shift. However, don't be surprised if an enemy Ace tries the same tactic on you.

RADAR CROSS SECTION

An aircraft's Radar Cross Section (RCS) is a value used to express how well that aircraft reflects energy back to the radar. The important parameter here is not so much size as it is shape and material composition. Some materials reflect radar energy very well, while others tend to absorb it. The shape is important in determining exactly what direction the maximum amount of reflected energy travels in. So called "stealthy" aircraft use a combination of materials and shaping to minimize the amount of radar energy they reflect at certain angles.

Your F/A-18E Super Hornet has a degree of "stealthiness," or most correctly "signature reduction" incorporated into its basic design. Compared to the F/A-18C Hornet, the Super Hornet's engines are almost totally buried within the airframe. Another obvious feature contributing to stealth is the "sawtooth" shape of the landing gear doors. Other less obvious treatments include various coatings and materials designed to minimize the aircraft's radar signature as much as possible.

Just as the shape of the aircraft varies between the front and sides, so does the radar cross section. In general, most aircraft have a larger cross section to the top, bottom, and sides than to the front or rear. Because of this, targets may be detected sooner or later based upon their aspect to you, particularly if you are using a Medium PRF setting.

ELECTRONIC COUNTERMEASURES

Electronic countermeasures (ECM) are typically used to defeat or at least degrade the ability of radar systems to track or lock on to a target. In the real world, ECM is as much an art as it is a science. There are three main categories of ECM that are used in *Jane's F/A-18.* These three categories are Noise Jamming, Gate Stealers, and Decoys.

Noise Jamming

Noise jamming raises the level of the background against which target returns must be detected, thus swamping out all but very strong returns. However, the jammer also serves as a beacon, revealing both the presence and the direction of the jamming aircraft. The purpose of noise jamming is to deny the radar being jammed the target range and closing rate. Most modern radar systems cope with this type of jamming by reducing the receiver sensitivity (and thus lowering detection range) while also providing an azimuth to the jamming aircraft.

In *Jane's F/A-18,* noise jammers are either standoff jammers or internal self-protection jammers. Standoff jammers (such as EA-6B aircraft carry) are large, powerful systems that attempt to degrade the effectiveness of all radar systems within a certain area and along a certain bearing. Self-protection jamming systems (such as your ASPJ) are typically used by fighter or attack aircraft to mask themselves against a single specific threat radar.

The primary difference between the two types is that the standoff jamming system is much more powerful and can affect many radar systems along a specific axis, thus potentially masking multiple aircraft from detection. The self-protection noise jamming system can only protect the aircraft that it is mounted on, and because it has lower power, it has less effective range.

Once a radar gets close enough to a target masked by jamming, it can "burn through" the jamming and once again detect the target normally.

Gate Stealers

Whereas noise-jamming systems affect mostly search and TWS radar sub-modes, the gate stealer jamming system only affects STT. A gate stealer is used to prevent a radar from usefully tracking the target. In essence, the stealer disrupts radar tracking by transmitting false target returns contrived to capture the "gate" which the radar places around the aircraft's skin return for clutter reduction and tracking. Once the "gate" is captured, the stealer "walks" the return away from the actual aircraft track and then breaks the lock by transferring the "gate" to clutter.

Decoys

There are two types of radar decoys in *Jane's F/A-18.* The simplest is Chaff, which represents bundles of metal-coated dielectric fibers. When released, they can hang in the air for long periods of time and create a sizable radar return. Upon being dispensed, the chaff rapidly decelerates and except for atmospheric effects, soon have little motion. Thus most modern radar systems can quickly reject the chaff echoes as false targets. If dispensed in conjunction with evasive maneuvering, chaff can break the radar's lock on the aircraft.

The second type of decoy in *Jane's F/A-18* is the TALD or Tactical Air Launched Decoy. This device, really a small glider, is released from the aircraft similar to a weapon and mimics a real aircraft's RCS and flight profile. Its primary use is to trick enemy ground-based radar operators into illuminating the TALD and thus pinpointing their location for SEAD aircraft to attack.

TARGET IDENTIFICATION

Properly identifying your target is vital to ensure you are engaging an enemy and not a friendly aircraft in the heat of battle. Targets may be identified visually, in conjunction with a friendly air traffic controller, through your aircraft's Identification, Friend or Foe (IFF) system, or by using your radar systems NCTR function.

Visual detection is pretty self-explanatory. Using your Mark One eyeballs, you determine what your target is by the type of aircraft and the markings on that aircraft. The main disadvantages to this method is obvious; you need to get close, and during the night or in bad weather you still may not figure out who or what you are up against.

Your friendly air traffic controller is your first source of information. Controllers can pass you target information directly using the datalink system, or you can inquire about a specific contact you have locked up by selecting the DECLARE request from the AWACS communications menu.

Your IFF system automatically attempts to identify your L&S target, and you can manually interrogate targets using the **IFF_INTERROGATE** [Ⅰ].

EA TIP   Your IFF system only identifies friendly aircraft and makes no determination between neutral and hostile aircraft.

NCTR

Our system is based on a theory supplied to us by Jane's Information Group experts. This theoretical system operates by examining the radar signature of a target and using the engine inlet blade return as a means of identification. Thus target aspect and altitude (the two main factors in determining what part of the target the radar can "see") are the critical factors in determining whether or not NCTR can identify a target.

To be identified by NCTR, the target must be within the following limits with respect to your aircraft:

- ± 30 degrees of aspect (left or right)
- ± 30 degrees of elevation (up or down)
- Within 40 nautical miles
- More than 1000 feet above the ground

It also takes time for the radar to process this data. Things that affect NCTR processing time are the current mode of the radar (attempting to identify a target in RWS takes considerably longer than in STT) and the target aspect (if a target is no longer within above limits, processing stops).

When the NCTR processing begins, confidence begins to count up from 0% and the ID label "UNK" appears on the radar MDI (example: UNK 10%). Once the confidence reaches 50%, the basic aircraft type (from the aircraft database) appears. The following abbreviations are used:

- FTR: any Fighter, or Fighter/Bomber
- HELO: any Helicopter
- ATTK: any Bomber
- LRGE: any Tanker, C3, Transport, or Civilian

When the confidence reaches 80% or greater, a best guess aircraft type displays on the radar MDI. Example: M29 87%. The below table lists the specific NCTR ID code for each aircraft or cruise missile type in the game.

AIRCRAFT	NCTR ID	AIRCRAFT	NCTR ID
AGM-84A Harpoon	ASM	A-50U	A50
AGM-84H SLAM ER+	ASM	AS-4 Kitchen	ASM
B-52G	B52	AS-16 Kickback	ASM
B-707	707	IL-76	IL76
BGM-109B Tomahawk	ASM	Mi-17	MI17
C-17	C17	Mi-24	MI24
C-130	C130	MiG-21	M21
EA-6B	EA6	MiG-29	M29
E-2C	E2	MiG-31	M31
E-3 AWACS	E3	Moskit	ASM
E-8 JSTARS	E8	SS-N-12 Sandbox	ASM
F-14	F14	SS-N-19 Shipwreck	ASM
F-15C	F15	SS-N-22 Sunburn	ASM
F-15E	F15	Su-24	S24
F-16	F16	Su-25	S25
F/A-18C	F18C	Su-27, Su-33	S27
F/A-18E	F18E	Su-35	S35
F-22	F22	Tu-142 Bear F	T142
F-117A	F117	Tu-22M	T22
MV-22	V22		
S-3B	S3		
SH-60	H60		
Tornado IDS	TORN		

AIR-TO-AIR TARGETING FLIR

In A/A Master Mode, the Targeting FLIR (TFLIR) is integrated with the A/A sensor suite. The A/A ATFLIR consists of three ATFLIR pointing modes and an ATFLIR Autotrack mode. When the FLIR is set to a pointing mode, it is slewed to the aircraft boresight angle, towards the L&S target, or to a fixed Inertial Line of Sight (LOS). In Autotrack, the ATFLIR attempts to keep the tracked target centered within the FLIR MDI page.

◆ **Boresight (BST) Slave Pointing Mode:** When the ATFLIR is in the BST Slave Pointing mode, the ATFLIR LOS is slaved to aircraft boresight. With TDC control assigned to the ATFLIR format, slewing the TDC causes the ATFLIR to revert to Inertial LOS pointing mode.

◆ **L&S Slave Pointing Mode:** When the ATFLIR is in L&S slave pointing mode, the FLIR LOS is slaved to the L&S target LOS. If there is no L&S target, the ATFLIR is slaved to aircraft boresight. If the L&S designation is changed to another target, the FLIR is slaved to the new L&S target LOS. If the L&S target is lost, the ATFLIR reverts to Inertial LOS pointing mode.

◆ **Inertial LOS Pointing Mode:** When the ATFLIR is in the Inertial LOS pointing mode, the ATFLIR maintains LOS on a fixed position in 3D space, regardless of aircraft maneuvers, within the limits of the ATFLIR gimbals. With TDC control assigned to the ATFLIR format (while the FLIR is in the Inertial LOS pointing mode), slewing the TDC causes the reference point to move (i.e., a new point in 3D space is selected).

◆ **TFLIR Autotrack Mode:** The ATFLIR is commanded to autotrack from any pointing mode using the **TARGET_ DESIGNATE** [ENTER] keyfunction. When autotrack is commanded, the ATFLIR attempts to track the object centered in the ATFLIR reticule.

BASIC A/A ATFLIR PAGE SYMBOLOGY
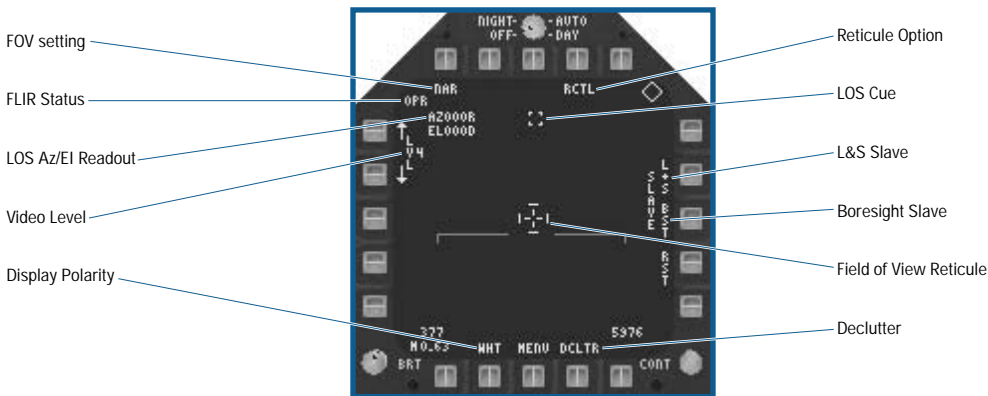
◆ **Display Polarity:** (PB 19) Toggles between white-hot (WHT) or black-hot (BLK) video polarity. With white-hot polarity selected, hotter objects appear lighter on the display. With black-hot selected, hotter objects appear darker on the display.

◆ **Video Level:** (PB 4-5): The video gain level is adjusted by selecting the up or down adjustment arrows. The value of the level is indicated next to the LVL option.

◆ **LOS Azimuth/Elevation Readout:** The azimuth readout example ("AZ012R") is the ATFLIR pointing angle left or right of aircraft boresight. An "L" indicates pointing angles to the left of aircraft boresight, and an "R" indicates pointing angles to the right. A pointing angle straight ahead is indicated by "AZ000L".

◆ The elevation readout example ("EL023D") is the ATFLIR pointing angle relative to the aircraft waterline. A "D" indicates pointing angles below the aircraft waterline, while a "U" indicates pointing angles above waterline. A pointing angle straight ahead is indicated by "EL000D".

◆ **FLIR Status:** One of the following displays, based on current ATFLIR pod status:
   • OPR: The ATFLIR is operating normally.
   • ~~RDY~~: The ATFLIR is damaged.

◆ **Field-of-View (FOV) Setting:** (PB 6) Toggles between Wide (WIDE) FOV (4° x 4°), narrow (NAR) FOV (1° x 1°), and enhanced narrow (ENAR) FOV (0.5° x 0.5) by successive presses.

◆ **Reticule (RTCL) Option:** (PB 9) Toggles the display of the FOV reticule on or off. When the FLIR is commanded to autotrack, the FOV reticule is automatically disabled, regardless of the RTCL option selection.

◆ **LOS Cue:** The small dashed box provides a quick idea of the approximate azimuth and elevation of the ATFLIR LOS with respect to your aircraft. The Pod LOS cue is displayed in a top down format where the center of the display represents the aircraft (with the nose pointed towards the top of the page). The Pod LOS box is positioned on the left or right side of the page based on the current Pod Azimuth, and the box is positioned vertically on the page based on pod Elevation.

◆ **L&S Slave:** (PB 12) Commands the FLIR LOS to the L&S target LOS as explained above.

◆ **BST Slave:** (PB 13) Commands the FLIR LOS to aircraft boresight as explained above.

◆ **Field of View (FOV) Reticule:** The FOV reticule marks the center of the current FOV. The wide FOV reticule is illustrated in the example. The end bars on the wide FOV reticule indicate the size of the narrow FOV. The narrow and ENAR FOV reticules do not have end bars.

◆ **Declutter Option:** (PB 16) Removes the mach number, airspeed, altitude, velocity vector, and horizon bar from the display.

A-A ATFLIR AUTOTRACK

Autotrack Indication

Enhanced Narrow FOV Markers
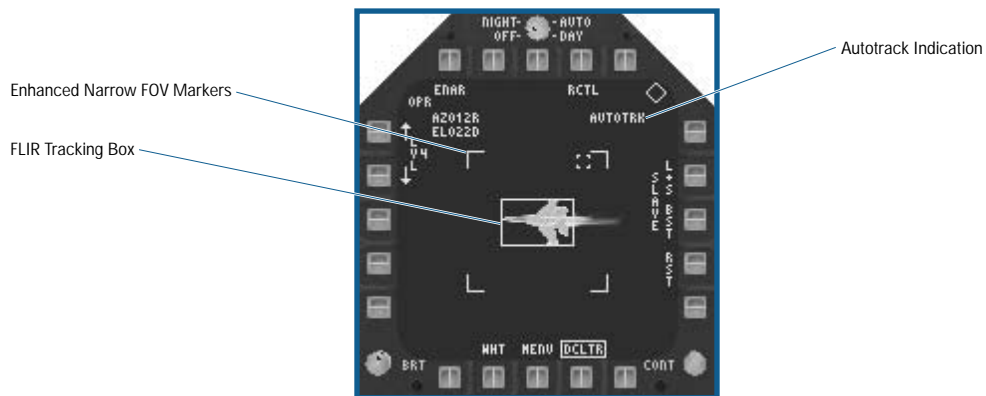
FLIR Tracking Box

◆ **FLIR Tracking Box:** When Autotrack is commanded via the **TARGET_DESIGNATE** [ENTER] keyfunction, the target tracking box replaces the reticule and the FLIR attempts to track the first object that falls within the tracking box. The initial size of the target tracking box is the same size as the ATFLIR reticule. If there is an object within the box, the box expands and contract in size. Releasing the designate keyfunction causes the FLIR tracking box to collapse around the target and that object is tracked by the FLIR. If no object is detected within the box, the reticule reappears and the ATFLIR enters Inertial LOS pointing mode.

◆ **Enhanced Narrow FOV Markers:** Indicates the display area that is visible with ENAR FOV. The ENAR FOV markers only display when NAR FOV is selected.

◆ **Autotrack Indication:** Displays when in ATFLIR autotrack.

AIR-TO-AIR WEAPONS

The F/A-18E is armed with a potent array of modern weapons, including the medium ranged advanced AIM-120 AMRAAM and AIM-7 Sparrow missiles and the short range AIM-9 Sidewinder missile. For very close range "knife fights," the M60A2 20mm gun is a devastating weapon. This section describes the HUD and stores MDI page displays associated with each of these weapons.

AIM-120 AMRAAM MEDIUM RANGE MISSILE

The AIM-120 is your "big stick" when it comes to beyond visual range (BVR) combat. It uses a combination of active and semi-active radar guidance to find its target. When launched normally, the missile is given a "wake up" point to fly to before it turns on its own onboard radar to look for a target. The reason for this is simple; the small size of the missile means that its onboard radar system is limited in power and operate time. If the target doesn't maneuver from the time the missile is launched until it reaches the "wake up" point, then the missile is able to acquire the target on it's own using its radar. This type of attack is known as "Fire and Forget" because the launching aircraft is free to break off and engage other targets once the missile is launched.

Real aircraft are rarely such willing targets however. If the target maneuvers very much at all after the missile has been fired, then the original "wake up" point is likely no longer valid. The chances of the missile even finding the target decrease rapidly as the amount of maneuvering by the target increases. However, if the launching aircraft keeps the target on its radar display, the missile is sent updated "wake up" points automatically via data link. This dramatically increases the chance of the missile finding and hitting the intended target.

The AMRAAM can be launched in a fully active mode, and in this case the missile searches for and attack the first target it locks on to. This is useful in those circumstances where you can see a target but don't have time to set up the radar for a normal AMRAAM shot.

> **EA TIP** Be careful when launching the AMRAAM in active mode when friendly aircraft are nearby, as the missile has no IFF system and can lock on to a friendly just as easily as an enemy!

AIM-120 AMRAAM STORES PAGE SYMBOLOGY

The MDI Stores page for the AMRAAM is very simple. The stations that have an AMRAAM loaded on them have a "AM" label and if more than one missile is loaded on that station, the number of missiles current present. The active weapon is "boxed" on the display. This is changed by using the STEP (PB 14), which selects the next missile in the sequence.

If you have at least one AMRAAM loaded on your aircraft, you can either press the **CYCLE_WEAPON** [1] keyfunction until AM is boxed, ("AM" also appears in the bottom of the HUD), or use the **AIM120_SELECT** [5] keyfunction to directly select AMRAAM.
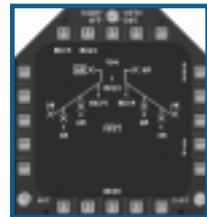
AIM-120 AMRAAM HUD SYMBOLOGY

Typical HUD symbology during an AMRAAM A/A engagement in addition to the basic A/A HUD symbology described in the previous chapter. See **Flight: Head-Up Display: HUD A/A Master Mode Symbology**, p. 4-57.

AIM-120 Missile Field of View

No D/L / NO RDR Cue

AMRAAM Launch Mode Cue

Target Closure Rate and Range

AMRAAM Timing / Lost Cues

AMRAAM Missile Selection and Quantity
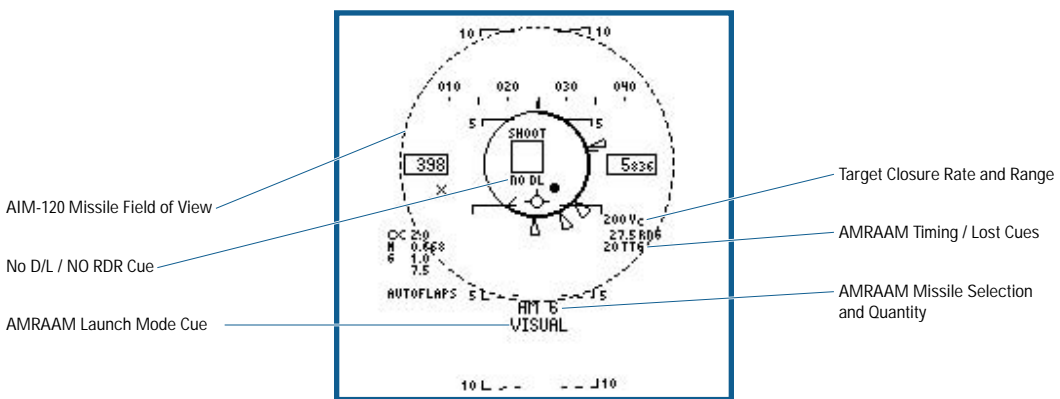
◆ **AIM-120 Missile Field of View (FOV):** The AMRAAM missile field of view circle (segmented) displays whenever the missile is set up for a boresight visual launch. When an L&S target does not exist and AMRAAM is selected, the AMRAAM is configured for a boresight visual launch. Also, even when an L&S does exist, if the **CAGE_ UNGAGE** [Ⓤ] keyfunction is depressed the AMRAAM is reconfigured for a boresight visual launch. When a boresight visual launch is commanded, a 15° diameter segmented circle displays on the HUD and the NIRD circle is removed from the display. The TD box remains on the HUD and continues to indicate the L&S target. Selecting the **CAGE_UNGAGE** [Ⓤ] keyfunction again or changing the L&S target reinitializes the AMRAAM to the normal launch mode.

◆ **NO DL/NO RDR Cue:** If AMRAAM is commanded to visual launch mode, the NO DL cue displays on the HUD indicating the missile does not receive data link updates from the radar to the targets position. The NO RDR cue displays if the radar is not tracking the L&S target.

◆ **AMRAAM Launch Mode Cue:** VISUAL is displayed when visual launch mode is selected.

◆ **AMRAAM Timing/LOST Cues:** The computed AMRAAM pre-launch or post-launch time of flight displays in this position. One of the following times may display (all times in seconds):
  • ##: Pre-launch time of flight.
  • ## TTG: Post-launch Time To Go.
  • ## ACT: Post-launch Time To Active.
  • LOST: When an AMRAAM launches outside of RMAX or the target maneuvers out of RMAX post-launch, the LOST cue flashes in this window. The missile is not likely to hit the target in this case.

◆ **AMRAAM Missile Selection and Quantity Remaining:** AM indicates that AMRAAM is the selected weapon, and the number to the right of AM indicates the number of missiles remaining on your aircraft. A "X" appears through this area if Master Arm is not on.

AIM-120 AMRAAM RADAR PAGE SYMBOLOGY AND EMPLOYMENT CONSIDERATIONS

The AMRAAM can be fired in any A/A radar sub-mode, but the primary sub-mode for AMRAAM employment is TWS or TWS RAID. This allows you to attack up to eight targets simultaneously. The first missile launched always targets the DT1 (L&S) target, the second missile targets the DT2 target. Each remaining missile fired (up to eight total) targets any remaining targets based upon their rank (the number 1 ranked target gets the next missile, and so on). If more missiles are fired than there are targets, the "extra" missiles are targeted at the DT1.

ASE Circle
Steering Dot
Shoot Cue
Weapon Type and Quantity
Launch Zones
Missile Flyout Symbol
Postlaunch Missile TTA
Prelaunch Missile TTA
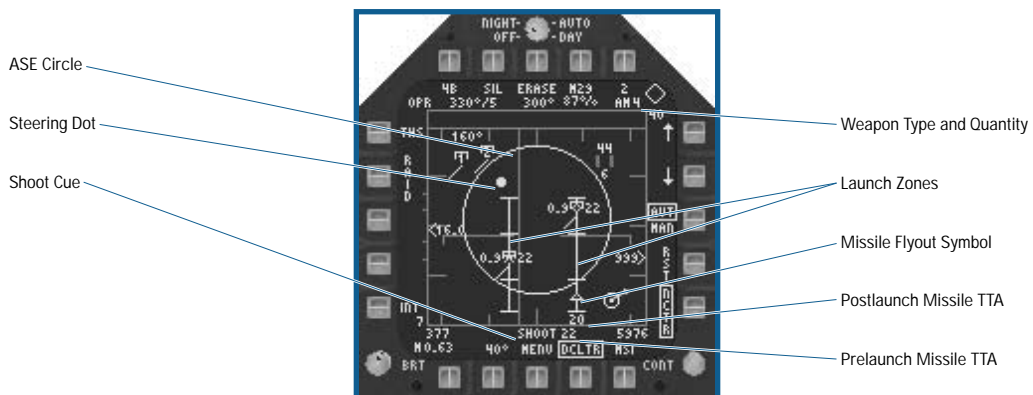
◆ **SHOOT Cue:** Displays when the shoot criteria (target between RMIN and RMAX) are satisfied. If the target is within RMIN, the Shoot cue is removed and a Breakaway X (not shown) appears centered in the display.

◆ **Steering Dot:** As a general rule of thumb, you should always try to center the Steering Dot within the ASE circle before you fire a missile. This allows the missile to start off with the best possible intercept geometry, and increases the chances that the missile reaches the target.

◆ **Allowable Steering Error (ASE) Circle:** Provides you with a steering reference in A/A missile modes when an L&S target exists. The ASE circle expands or contract as the target maneuvers. When used in conjunction with the Steering Dot, the ASE provides lead angle steering to the target.

◆ **Weapon Type and Quantity:** Displays type and quantity of missiles currently selected and available.

◆ **Launch Zones:** Launch zones are displayed on the radar page at the same azimuth position as a target symbol and are positioned at the proper range on the display. The bottom of the launch zone line represents R_{MIN}, the middle line is R_{NE} and the top line is R_{MAX}. Two launch zones may simultaneously display. Launch zones always display for the L&S and DT2 targets if they exist. Launch zones do not display in TWS RAID sub-mode or for the DT2 target if DCLT2 is selected.

◆ **Missile Flyout Symbol:** The missile flyout symbol is displayed when you fire an AMRAAM. It is initially positioned at the bottom of the tactical region (when the weapon is fired) directly under the target and travels up the display towards the target.

◆ **Postlaunch Time-To-Activate (TTA):** Provides a TTA countdown timer post-launch under the missile flyout symbol for each missile in flight. Once the counter reaches 0, an "A" indicating the missile has gone active is displayed.

◆ **Prelaunch Time-To-Activate (TTA):** Provides a TTA estimate for the missile under the trigger.

AIM-7 SPARROW MEDIUM RANGE MISSILE

The AIM-7 Sparrow is a semi-active radar guided missile that has been in use (and continuously upgraded) since the Vietnam conflict. Unlike the AIM-120, you must maintain a full radar lock on the target during the missile's entire flight or it loses the target. This is because the Sparrow lacks a radar transmitter of its own, relying instead on the reflected radar energy of your aircraft APG-73 Radar. There are three variants of Sparrow available in *Jane's F/A-18*, the AIM-7F, AIM-7M, and the AIM-7MH (referred to in the game as the AIM-7H). The AIM-7H is the latest and most up-to-date model of the Sparrow, with the other versions having slightly less range and a greater susceptibility to enemy countermeasures.

The Sparrow may be "lofted" when launched to give it a bit more range against distant targets and it has a "Home on Jam" mode that you should find very useful should you encounter heavy enemy jamming. Like the AMRAAM, the Sparrow also has a visual launch mode that doesn't require a previous radar lock on a target. This mode is known as "Flood", since the radar "floods" the area immediately in front of your aircraft with radar energy. Obviously, for this mode to have a chance of success, you need to keep your aircraft's nose pointed at the target until the missile reaches it.

> **EA TIP** Since the Sparrow is cheaper than the AMRAAM, you'll probably always have more AIM-7's available to you than AIM-120's during a campaign.

AIM-7 SPARROW STORES PAGE SYMBOLOGY

The MDI Stores page for the Sparrow is very similar to the AMRAAM's. The stations that have a Sparrow loaded on them have a "7F," "7H," "7M" label (depending upon what type is loaded) and if more than one missile is loaded on that station, the number of missiles current present. The active weapon is "boxed" on the display. This is changed by using the STEP (PB 14), which selects the next missile in the sequence.

◆ **The LOFT Option:** (PB 20) is selected. When selected, it commands the Sparrow to fly a lofted profile. Missile lofting places the Sparrow at a higher altitude for most of the missile time of flight and uses much less missile energy since it flies through less dense air, allowing extended range and/or greater available energy at target intercept.

If you have at least one Sparrow loaded on your aircraft, you can either press the **CYCLE_WEAPON** [1] keyfunction until one of the AIM-7 stations is boxed, or use the **AIM7_SELECT** [4] keyfunction to directly select Sparrow.
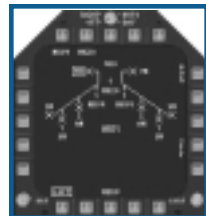
AIM-7 SPARROW HUD SYMBOLOGY

Typical HUD symbology displayed during a Sparrow engagement in addition to the basic A/A HUD symbology described in the previous chapter. See **Flight: Head-Up Display: HUD A/A Master Mode Symbology**, p. 4-57.

- AIM-7 Missile Field of View
- GO SST Cue
- Sparrow Launch Mode Cue
- Target Closure Rate and Change
- Sparrow Timing / Lost Cues
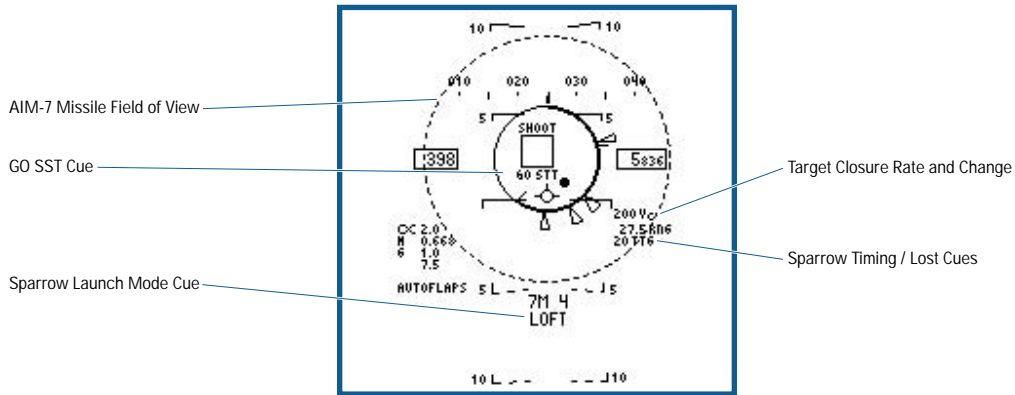
◆ **AIM-7 Missile Field of View (FOV):** The Sparrow missile field of view circle (solid) displays whenever the radar indicates FLOOD selected. If a Sparrow is launched with the radar not in STT and the Sparrow is not in Home on Jam (HOJ) mode, the radar attempts to enter STT on the L&S target. If it fails (or if there is no L&S target), FLOOD mode is commanded. FLOOD provides Pulse Doppler Illumination (PDI) illumination for the Sparrow within a 12° cone centered on the aircraft waterline. When a Sparrow is launched in this manner, it tracks towards the first target it sees within the PDI cone, similar to AMRAAM once it goes active. You must keep the target within the 12° PDI cone for the entire time of flight of the missile to the target. If the target is not constantly illuminated, the missile goes ballistic exactly as if a break lock condition had occurred.

◆ **GO STT Cue:** The GO STT cue displays in the lower TD window indicating to you to enter STT sub-mode. Unlike AMRAAM, Sparrow requires the radar to be in STT prior to launch for optimal performance.

◆ **Sparrow Launch Mode Cue:** The current launch mode for Sparrow is displayed here:
  - HOJ: Home on Jam mode enabled. This occurs automatically when the L&S target is a jammer and Sparrow is selected.
  - FLOOD: Sparrow flood launch because there is no current L&S target.
  - LOFT: Loft steering selected and is available.
  - ~~LOFT~~: Loft steering selected but is not available due to the aircraft not being within the proper attitude.

◆ **Sparrow Timing/Lost Cues:** The computed Sparrow pre-launch or post-launch time of flight displays in this position. One of the following times displays (all times in seconds):
  - ##: Pre-launch time of flight.
  - ## TTG: Post-launch time to go.
  - ## SL: Post-launch time to go using straight-line countdown. This timer is used during a FLOOD launch and is a straight countdown to zero based on the time it takes the missile to fly beyond the flood illumination zone (10 NM).
  - LOST: When a Sparrow launches outside of R_{MAX} or the target maneuvers out of R_{MAX} post-launch, the LOST cue flashes in this window.

AIM-7 SPARROW A/A RADAR PAGE SYMBOLOGY AND EMPLOYMENT CONSIDERATIONS

The primary radar sub-mode for the Sparrow is STT. If the radar is not in STT when a Sparrow is fired, it attempts to lock on to the L&S target and transition to STT. If there is not an L&S target, the radar enters Flood mode.

If the L&S target is an AOT target (located in the AOT Dugout at the top of the Radar page), the Sparrow launches in HOJ mode. The Sparrow locks on to the source of the jamming transmissions and guide towards that point. If the jamming aircraft stops transmitting, or if the range is too great, the Sparrow does not reach the target.

Unlike the AMRAAM, multiple Sparrows cannot simultaneously fire at multiple targets. Multiple Sparrows can fire at the L&S target, however.

The weapons symbology on the Radar page for Sparrow is identical to that previously described for AMRAAM. The only difference is the Prelaunch and Postlaunch TTA number displayed for AMRAAM is a Time To Go (TTG) value for Sparrow.

AIM-9 SIDEWINDER SHORT RANGE MISSILE

The AIM-9 Sidewinder is a short-ranged passive infrared guided missile. Because it uses passive guidance, it is a true "Fire and Forget" weapon; once launched it travels to the target completely on it's own, homing in on the heat generated by aircraft engines or even the friction of the air moving over the target. Flares are the typical countermeasure to heat seeking missiles such as the Sidewinder, and a very large heat source such as the sun can cause problems as well. Clouds and rain attenuate heat energy in the atmosphere rapidly, so you can expect reduced performance in bad weather or on cloudy days.

Three variants of the Sidewinder are available within the game, the AIM-9L, the AIM-9M, and the latest Sidewinder version, the AIM-9X. Each successive version of Sidewinder has increased performance over it's predecessor in areas such as maximum range, Flare rejection, and in the case of the AIM-9X, a greatly expanded capability to lock on to targets up to 90 degrees off your aircraft's boresight point. The AIM-9X, with its "staring" infrared array, is practically immune to enemy countermeasures and sun effects.

AIM-9 SIDEWINDER STORES PAGE SYMBOLOGY

The MDI Stores page for the Sidewinder is very simple. The stations that have a Sidewinder loaded on them has a "9L," "9M," or "9X" (depending upon which version is loaded) label and if more than one missile is loaded on that station, the number of missiles current present. The active weapon is "boxed" on the display. This is changed by using the STEP (PB 14), which selects the next missile in the sequence.

If you have at least one Sidewinder loaded on your aircraft, you can either press the **CYCLE_WEAPON** [1] keyfunction until a Sidewinder station is boxed, or use the **AIM9_SELECT** [3] keyfunction to directly select Sidewinder.

AIM-9 SIDEWINDER HUD SYMBOLOGY

Typical symbology displayed during a Sidewinder A/A engagement in addition to the basic A/A HUD symbology described in the previous chapter. See **Flight: Head-Up Display: HUD A/A Master Mode Symbology**, p. 4-57.

Sidewinder Seeker Circle
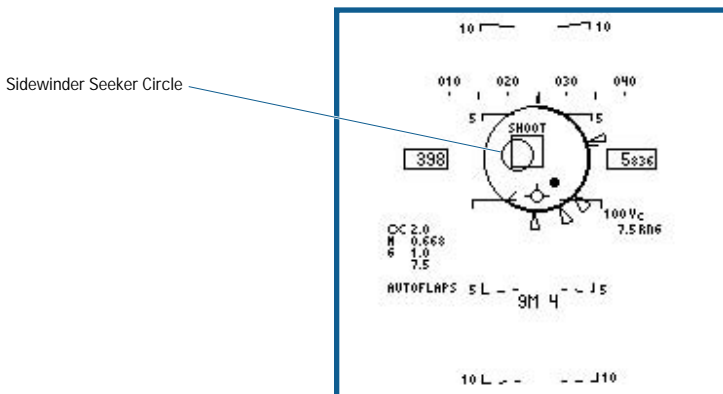
◆ **Sidewinder Seeker Circle:** The Sidewinder seeker circle indicates the direction the Sidewinder seeker head is pointing. Normally, the Sidewinder seeker is slaved, or caged, to the L&S target line of sight. If there is not an L&S target, a caged Sidewinder remains at boresight. The seeker is uncaged using the **CAGE_UNCAGE** [U] keyfunction. When uncaged, the missile seeker is free to scan for and lock on to other targets independent of the radar.

AIM-9 SIDEWINDER A/A RADAR PAGE SYMBOLOGY AND EMPLOYMENT CONSIDERATIONS

Since the Sidewinder uses passive infrared guidance, it does not rely on the A/A Radar or any specific radar sub-mode for post launch guidance. The L&S target can be used to point the caged seeker, but it is not required. If you do have an L&S target, Sidewinder launch zone and TTG symbology generates exactly as for the Sparrow missile.

The seeker in AIM-9 emits a low "growling" sound when selected. This growl increases in volume as more heat is detected. Once a certain threshold is reached, the seeker locks on the target and a lock on tone (distinctive for each type of Sidewinder) is generated. The Sidewinder Seeker circle on the HUD indicates the target that the Sidewinder has locked on to.

When uncaged, the seeker in the AIM-9L and AIM-9M are limited to an 80-degree cone centered on boresight. Targets outside this cone cannot be tracked. The AIM-9X has a much larger 180-degree cone centered on boresight for target tracking and lock-on.

INTERNAL A/A GUN

The M61A2 20-millimeter cannon is a very short-range weapon with a very high rate of fire. You aim it by lining up your entire aircraft on where the target is when the bullets reach the target and press the trigger. The bullets that you fire are completely unguided once they leave the gun barrels. Two different gun sights are available to aid you in lining up on your target, and you can also select the gun fire rate and enable a "smart" gun trigger option that only fires the gun when your chance of hitting the target is high. These last two options are important, as your aircraft only carries 400 rounds of ammunition and they can get used very quickly in the heat of combat.

The two gun sights available are the Gun Director mode, which requires the radar to be in STT sub-mode with the target locked up, and Funnel mode, which does not require the radar to have a lock on the target. If the A/A gun is selected and there is not an L&S target on the radar, the radar automatically enters Gun Acquisition (GACQ) sub-mode.

A/A GUN SYMBOLOGY STORES PAGE SYMBOLOGY

Gun Fire Rate
Gun Failure Indication
AGUN Option
Rounds Remaining
FNNL Option
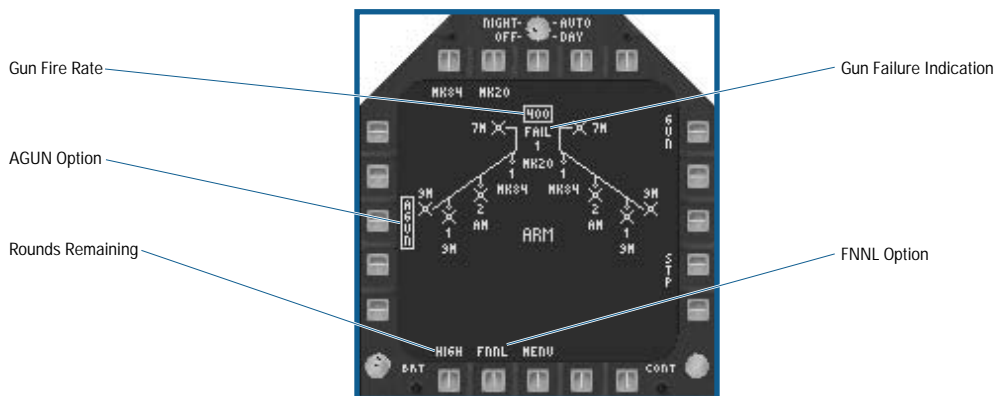
◆ **Gun Fire Rate:** (PB 20) Toggles between HIGH (6,000 rounds per minute) and LOW (4,000 rounds per minute).

◆ **AGUN Option:** (PB 3) Toggles the smart gun trigger on or off when the Gun Director gun sight is active. When selected, squeezing the trigger does not fire the gun until the SHOOT cue displays. Since the smart trigger is only available in Gun Director mode, if the AGUN option is active when Gun Director mode is not, manual gunfire is enabled when you squeeze the trigger.

◆ **Rounds Remaining:** Maximum 400 rounds. Boxed when the gun is the selected weapon. This information actually displays in all stores pages.

◆ **Gun Failure Indication:** Only displays if gun is damaged and selected as the current weapon.

◆ **FNNL Option:** (PB 19) The FNNL option selects the Funnel mode Gun sight. It forces use of the funnel mode logic regardless of current radar mode. It is the default gun sight when there is no lock on the target aircraft. Once selected, it remains selected until deselected.

HUD A/A GUN SYMBOLOGY

Symbology displayed with an internal 20mm gun A/A engagement in addition to the basic A/A HUD symbology described in the previous chapter. See **Flight: Head-Up Display: HUD A/A Master Mode Symbology**, p. 4-57.

Gun Director Mode HUD symbology

Gun Director mode is the primary Gun mode. Director mode is obtained immediately upon A/A gun selection if the radar is tracking an aerial target.
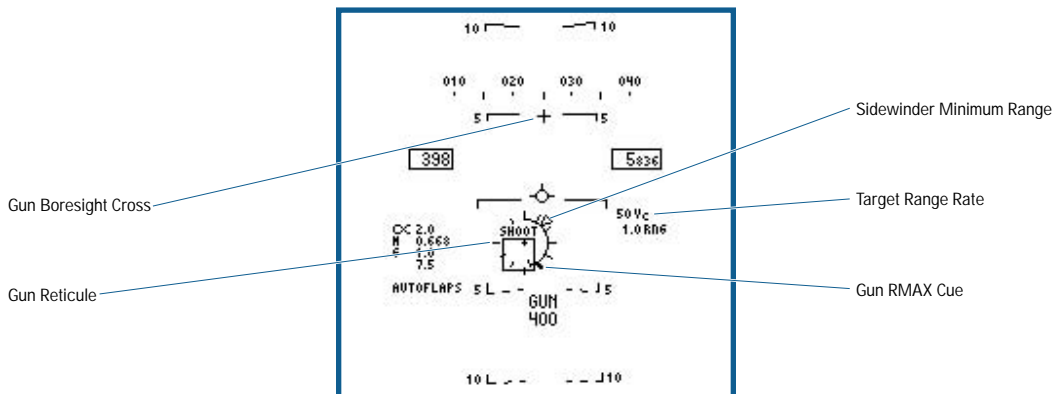
- ◆ **Gun Reticule:** The gun reticule displays in the gun mode when the radar is in STT. The gun reticule consists of tick marks around a perimeter, a pipper, and a range bar. The SHOOT cue displays above the reticule when "in solution" (meaning your chance of getting a hit is good if you fire now). The reticule position represents the lead angle steering command and can be positioned over the total HUD FOV. Each tick mark around the perimeter represents 1000 feet of range. The range bar displays around the inside of the tick marks. It rotates clockwise with increasing range and provides range from 0 to 23,000 feet.

- ◆ **Gun Boresight Cross:** The gun boresight cross displays below the static aimpoint of the gun (2° above the aircraft waterline), providing a 3,000-foot fixed aiming point.

- ◆ **Sidewinder Minimum Range:** The Sidewinder minimum range cue displays whenever the gun reticule is displayed and the radar is tracking the target. This cue indicates that a Sidewinder can be used against a target having a range greater than the indicated Sidewinder minimum range. If there are no Sidewinders loaded, this cue won't display.

- ◆ **Target Range Rate:** Target range rate (V_C) in knots is displayed here. A closing velocity displays as a positive number and an opening velocity as a negative number.

- ◆ **Gun R_{MAX} Cue:** The gun RMAX indicator displays on the outside of the reticule and is displayed at the computed maximum range the gun.

FUNNEL MODE

Funnel mode is the primary A/A gun mode without a radar lock and is an effective firing mode. Funnel mode is displayed immediately upon selecting the A/A gun if the radar is not already tracking the L&S target, or if radar lock is lost or broken. During this time the radar is in Gun Acquisition (GACQ) sub-mode, and if radar locks on to the target, Funnel mode is replaced with Gun Director Mode unless the FNNL mode option is boxed on the A/A gun Stores page.
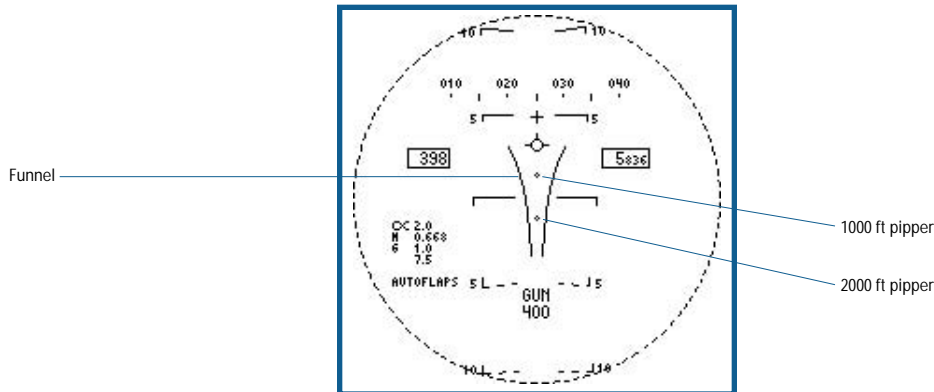
- ◆ **Funnel:** The funnel is comprised of connected pairs of dots. The distance between the dots represents a fixed 50 foot wingspan, and this distance is calculated for 500, 750, 1,000, 1,250, 1,500, 2,000 and 3,000 feet.

- ◆ **1000-ft Pipper:** The 1,000-ft pipper represents the point which bullets pass through 1,000-ft in front of the aircraft if you were to fire the gun at that instant.

- ◆ **2000-ft Pipper:** The 2,000-ft pipper represents the point which bullets pass through 2,000-ft in front of the aircraft if you were to fire the gun at that instant.

HUD A/A GUN RADAR PAGE SYMBOLOGY AND EMPLOYMENT CONSIDERATIONS

The A/A Gun has no special Radar page symbology.

The A/A gun is considered a weapon of last resort in most A/A situations. It can take a considerable amount of maneuvering to gain a firing solution on a target, and you must get very close to get within effective gun range.

Using the low rate of fire and the AGUN option to conserve your limited supply of ammunition are wise decisions.

> **EA TIP**   Remember, some enemy aircraft may have greater sustained maneuverability than your F/A-18E does. Against such an opponent, it's wise to avoid a dogfight if the gun is your only remaining A/A weapon.

AIR-TO-GROUND COMBAT

As a Strike Fighter, the F/A-18E Super Hornet is often tasked with Air-to-Ground missions. While not always as glamorous as air-to-air combat, it is no less important. Indeed, the Marine on the ground doesn't care how many aircraft kills you have to your credit. He just wants you to cover him when things get hairy.

Close Air Support isn't the only type of air-to-ground mission you might be tasked with. Your Super Hornet carries a bewildering array of weapons, and to be effective in your assigned missions, you must learn the ins and outs of each one.

The layout of this section follows the same format as the previous Air-to-Air section. The Air-to-Ground Radar sub-modes are covered first, then the Targeting FLIR pod, and finally the HUD, MDI pages, and employment notes for each major Air-to-Ground weapon type are described.

AIR-TO-GROUND TARGET DESIGNATION

Just as there can only be one L&S target at a time in Air-to-Air Master mode, you can only have one ground target designated in Air-to-Ground Master mode. When TGT steering is selected on the HSI, bearing and distance cues to the A/G designated target are provided on the HUD to help guide you. There are four separate ways to select the A/G designated target:

◆ The first and easiest method is by using the "Mission Target" keyfunctions. The **1ST_MISSION_TGT** keyfunction (⬚ key) will select the first mission-relevant target. The **NEXT_MISSION_TGT** (⬚ key) and **PREV_MISSION_TGT** (SHIFT ⬚ key) keyfunctions can be used to cycle through all the mission relevant targets. While these keyfunctions are somewhat of a cheat in that they have no direct equivalent in the real F/A-18E, they do allow you to quickly cycle through mission-relevant targets.

◆ The next means of designating the A/G designated target is by using the HUD. In reality, the pilot assigns TDC control to the HUD, slews the designation diamond using the TDC, and designates the desired point on the ground. We've simplified this somewhat in the interest of gameplay to allow you designate ground targets by left clicking the desired point (within the HUD frame) with the mouse. This method only works for ground targets, and the designation point won't follow a moving ground target such as a ship.

◆ If it is tracking a ground target, the Air-to-Ground radar automatically designates that target as the A/G designated target. Note that if the radar is tracking a target and you change the A/G designated target using the MISSION_ TGT keyfunctions, ATFLIR, or HUD, the radar lock will be broken and the radar will return to search mode.

◆ When in AUTOTRACK, the Advanced Targeting FLIR designates the target it is tracking as the current A/G designated target. As with the radar, changing the A/G target designation using any other method will cause the ATFLIR to exit AUTOTRACK.

AIR-TO-GROUND RADAR

In addition to all the previously described Air-to-Air modes, the APG-73 radar has several Air-to-ground sub-modes available within Air-to-ground Master Mode.

The A/G Radar is one of your primary sensors to detect, identify, track, and attack ground targets. The A/G Radar is also used as a navigation aid. There are four primary search sub-modes: Real Beam Map, Ground Moving Target, Sea surface search, and Terrain avoidance. There are also two tracking sub-modes: Fixed Target track and Ground moving target track. Each of these sub-modes is described below. Functions or symbology that are unchanged from the basic A/A Radar page previously described are not explained again due to manual space limitations.

REAL BEAM GROUND MAP (MAP) SUB-MODE

The Real Beam Ground Map sub-mode is the basic A/G radar mode. Terrain is displayed based upon altitude and/or type. Man-made features such as buildings tend to show as brighter dots or boxes, depending upon the range scale setting. As with all radar sub-modes, the Real Beam Ground Map can't see "through" intervening terrain, and such terrain causes a dark radar shadow to display in the area beyond the obstruction. Within this radar shadow, no targets are detected, displayed, or tracked by the radar.

To enter Fixed Target Track (FTT) from the Real Beam Ground Map sub-mode, the Radar cursor is slewed over the desired target using the TDC controls and the **TARGET_DESIGNATE** [ENTER] keyfunction is selected.

Azimuth scan widths of 20, 45, 90, and 120 degrees and 5, 10, 20, 40 and 80 nautical mile ranges are available in Real Beam Ground Map sub-mode.

The MAP MDI page consists of the following:

Expand 1/2/3 Sub-mode

Mode Select

Range and Azimuth Grid

Azimuth Scan Selection

Range Scale

Radar Freeze

Radar Silent

Radar Declutter
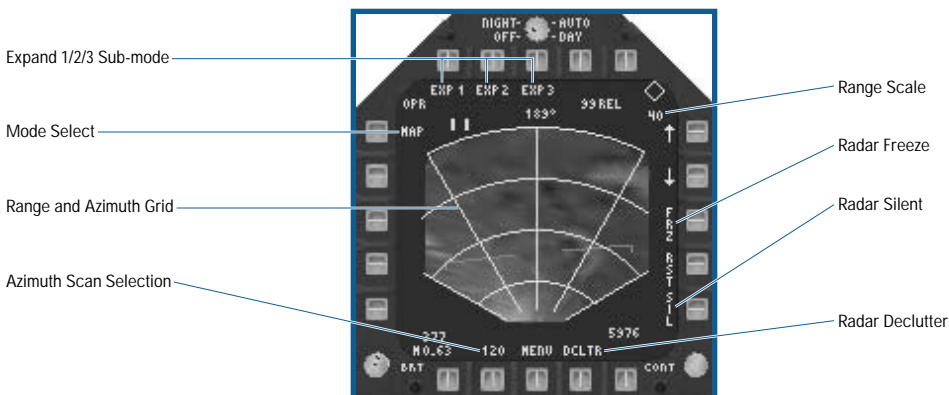
◆ **Azimuth Scan Selection:** Toggles through the radar azimuth scan options.

◆ **Range and Azimuth Grid:** The azimuth gridlines and the range grid arcs are displayed within the tactical region of the A/G radar page format. The azimuth lines are displayed at 0°, ±30°, and ±60°. The four range arcs are separated to divide the selected range scale into four equal segments, with the range arcs at one fourth, one half, three fourths and the maximum range of the selected range scale.

◆ **Mode Select:** (PB 5) Toggles through the A/G radar sub-modes.

◆ **Expand 1/2/3 Sub-modes:** (PB 6/7/8) These three pushbuttons are used to select increasingly "zoomed in" maps of a selected portion of the Real Beam Map display. The expand 1/2/3 sub-modes are entered by either selecting the sub-mode directly from the MAP sub-mode, or by selecting the sub-mode directly from another expanded sub-mode. These sub-modes are further described in the next section.

◆ **Range Scale Indication:** The selected range is indicated here. The radar range is changed using the up or down arrows next to PB 11 or 12, respectively.

◆ **Radar Freeze (FRZ):** (PB 13) Selection of the FRZ option commands the radar to freeze the video display. While frozen, the radar does not sweep back and forth, and the display is not updated. When FRZ is deselected, the video is updated normally.

◆ **Radar Silent (SIL):** (PB 15) Toggles radar silent on or off. When radar silent is on, the radar does not transmit, exactly as if EMCOM were selected, but affecting only the radar.

◆ **Radar Declutter (DCLTR):** (PB 17) Selecting the DCLTR option commands the radar to remove the artificial horizon and velocity vector from the display.

REAL BEAM MAP EXPAND 1/2/3 SUB-MODES

The EXP1, EXP2, and EXP3 options command higher resolution radar maps using either Doppler Beam Sharpening (EXP1 and EXP2) or synthetic aperture radar (EXP3) techniques. Expand 1 (EXP1), also known as DBS sector, is the lowest resolution sub-mode. Expand 2 (EXP2), also known as DBS patch, is the next higher resolution sub-mode. Expand 3 (EXP3), commonly known as medium resolution SAR, is the highest resolution sub-mode.

EXPAND 1 (EXP1) SUB-MODE

The Expand 1 map sub-mode format contains many of the same selection options and symbols described for MAP sub-mode. Since the EXP1 sub-mode has a fixed azimuth scan of 45°, azimuth scan options do not exist. Range scale options are not available because the range coverage is fixed. Additional options and symbology over that of the MAP sub-mode are explained below:
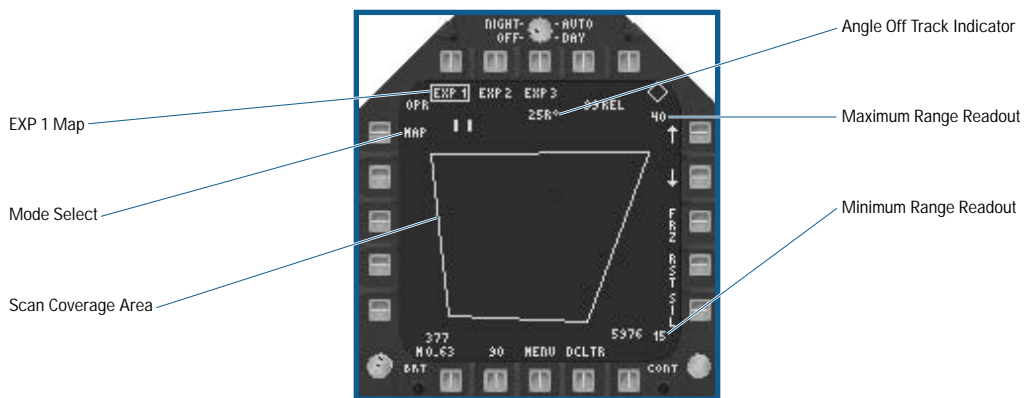
◆ **Scan Coverage Area:** These lines show the extent of the current EXP1 scan area.

◆ **Mode Select:** Mode selection is performed in the same manner as described above for the MAP sub-mode. However, initial selection of this option with EXP1 boxed commands the radar back to the MAP sub-mode (EXP1 is unboxed).

◆ **EXP1 Map Option:** Toggles the EXP1 map sub-mode display on or off. When first selected, the Radar Acquisition cursor changes to show the size of the EXP1 map area. During this time the cursor is slewed around the MAP display using the TDC controls. When the **TARGET_DESIGNATE** [ENTER] keyfunction is selected, the EXP1 map is commanded at the current cursor location. Deselecting this option returns the radar to MAP sub-mode.

◆ **Angle-Off-Track Indicator:** This is the angle between ground track and the azimuth scan center of the area being scanned in the EXP1 sub-mode. If the angle-off-track lies to the right of the aircraft ground track, an "R" follows the angle-off-track indicator on the display. If the angle-off-track lies to the left of the aircraft ground track, an "L" follows the angle-off-track indicator on the display.

◆ **Maximum Range Readout:** The maximum range of the area covered in the commanded EXP1 map.

◆ **Minimum Range Readout:** The minimum range of the area covered in the commanded EXP1 map.

Expand 2 (EXP2) Sub-mode

The EXP2 sub-mode format is similar to that of the EXP1 sub-mode and contains the options and indications described for the EXP1 and MAP sub-mode. The EXP2 sub-mode has a fixed 12.6° azimuth scan. When the EXP1 option is selected from EXP2 sub-mode, the radar is immediately commanded to EXP1 sub-mode centered on the same area that the EXP2 map was displaying.

Expand 3 (EXP3) Sub-mode

The EXP3 sub-mode is similar to that of the EXP1 and EXP2 sub-modes and contains the options and indications described for the EXP1 and MAP sub-mode. The EXP3 sub-mode has fixed range perimeter coverage giving a display of constant area and constant resolution. When EXP1 or EXP2 is selected from EXP3 sub-mode, the radar is commanded immediately to the selected sub-mode centered on the same area that the EXP3 map was displaying.

GROUND MOVING TARGET (GMT) SUB-MODE

The GMT sub-mode provides a synthetic display of actual target returns with solid rectangles on the display. The target returns displayed in the GMT sub-mode are from moving targets only. Return from the ground and fixed (non-moving) targets are not displayed unless the INTL option is selected as described below. Moving ground targets are displayed at maximum intensity. Ground moving target track (GMTT) is commanded exactly as Fixed Target Track (FTT); the acquisition cursor is slewed over the target and designate is selected.

Azimuth scan widths of 20, 45, 90 degrees and 5, 10, 20, and 40 nautical mile ranges are available in GMT sub-mode.

To enter Ground Moving Target Track (GMTT) from the GMT sub-mode, the Radar cursor is slewed over the desired target using the TDC controls and the **TARGET_DESIGNATE** [ENTER] keyfunction is selected.

The GMT page contains many of the same symbols and options described for the MAP sub-mode.

Interleaved Option

Synthetic target symbol
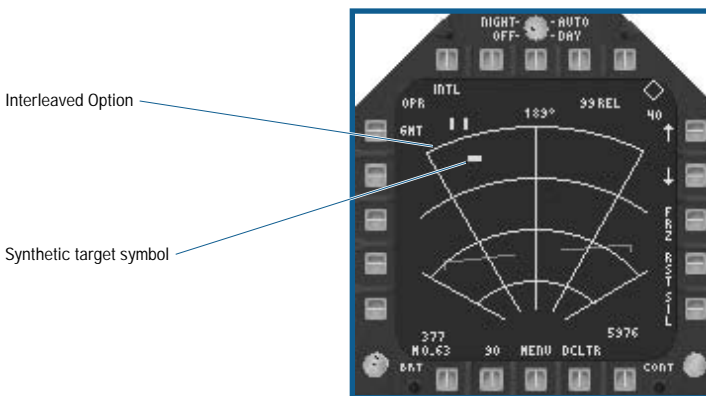
◆ **Synthetic Target Symbol:** Only moving targets are displayed using the synthetic target symbol in normal GMT sub-mode.

◆ **Interleaved (INTL) Option:** When the INTL option is selected, the radar alternately scans in MAP and GMT sub-modes. The display then consists of synthetic target symbols superimposed over MAP video. When interleaved operation is selected, INTL is boxed.

SEA SURFACE SEARCH (SEA) SUB-MODE

The radar SEA sub-mode is optimized for detecting discrete targets on large bodies of water (such as ships). Sea and return from nearby land masses are automatically rejected; however, coastlines are displayed. The interleaved (INTL) option, as described for GMT sub-mode, is also available for SEA sub-mode when both SEA and INTL are selected. The radar provides a synthetic display of sea targets when it is in the SEA sub-mode.

To enter Ground Moving Target Track (GMTT) from the SEA sub-mode, the Radar cursor is slewed over the desired target using the TDC controls and the **TARGET_DESIGNATE** [ENTER] keyfunction is selected.

Azimuth scan widths of 20, 45, 90, and 120 degrees and 5, 10, 20, 40, and 80 nautical mile ranges are available in SEA sub-mode. The SEA sub-mode symbology is otherwise identical to the MAP sub-mode.

TERRAIN AVOIDANCE (TA) SUB-MODE

Terrain Avoidance sub-mode is a special A/G radar sub-mode that is designed to help you avoid rising terrain when flying at low altitude. In TA sub-mode, the radar computes two clearance points as shown in the figure below:
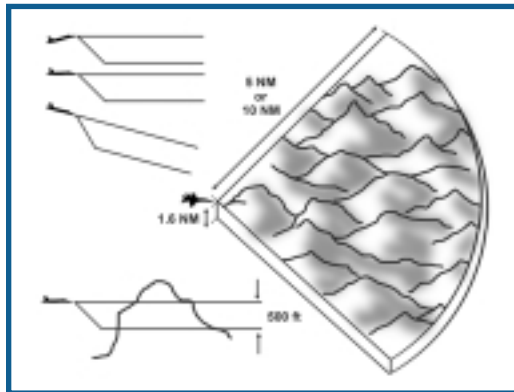
While you are in level flight or climbing the terrain that is above your aircraft's altitude is displayed as an intermediate intensity, and terrain that is within 500 feet of your aircraft's altitude is displayed at a lower intensity. Terrain more than 500 feet below your aircraft is not displayed. When you are climbing, the two clearance planes remain horizontal. When you are diving, the two clearance planes are tilted downward, parallel to the aircraft's flight path angle as shown. The TA sub-mode azimuth scan is fixed at 70° with ranges of 5 and 10 nautical miles.

The TA sub-mode format contains many of the same symbols described for the MAP sub-mode. The remaining differences in the available symbols are described below:
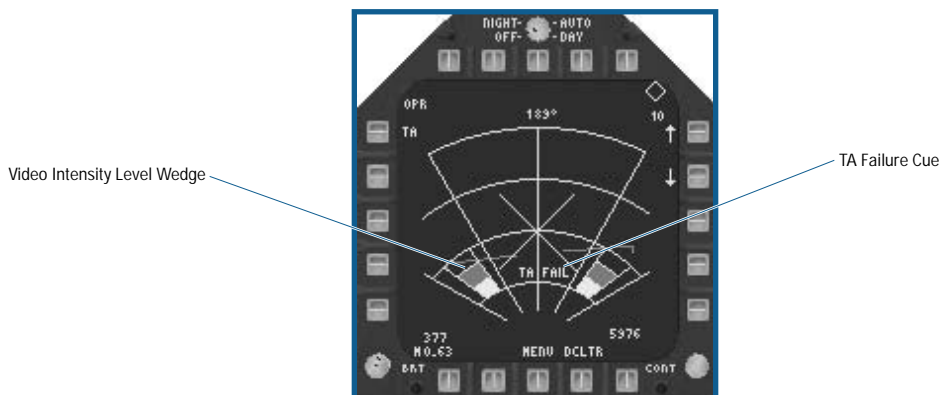
◆ **Video Intensity Level Wedge:** Two wedges of three intensity levels are always shown at the lower left and right side of the format. The brightest intensity is displayed in the top third of the wedge and an intermediate intensity level in the middle third. The bottom third of the wedge is a lower intensity level.

◆ **TA Failure Cue:** If the radar fails (i.e. due to battle damage) while in TA sub-mode, the break X and "TA FAIL" displays as shown.

FIXED TARGET TRACK (FTT) /
GROUND MOVING TARGET TRACK (GMTT) SUB-MODES

Ground targets both moving and fixed are tracked by the radar using either FTT or GMTT. When the radar is tracking a target, no other targets are displayed. FFT/GMTT are similar in concept to the A/A radar sub-mode Single Target Track (STT). If a moving target is being tracked, target course and speed data are used in A/G weapon delivery computations.

FTT/GMTT is exited at any time by using the **TARGET_UNDESIGNATE** [BACKSPACE] keyfunction.

Target Symbol

Track Status
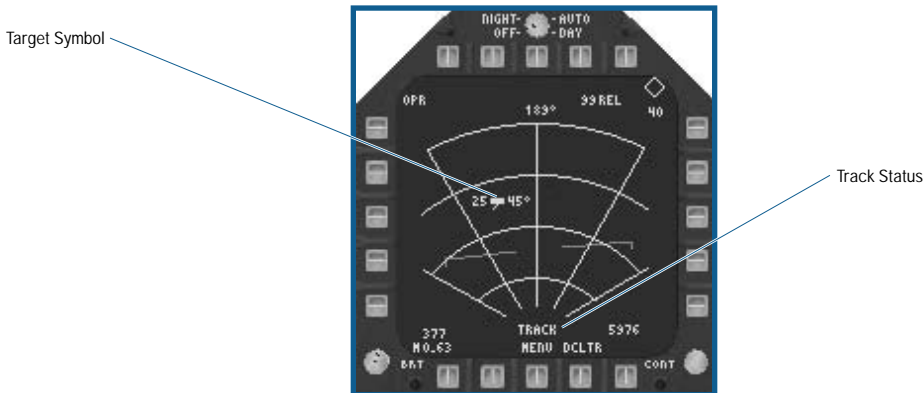
◆ **Target Symbol:** The current target being tracked by the radar displays using a synthetic target symbol. If Track is entered from SEA or GMT sub-mode, additional information is included with the target as shown above. To the left of the target symbol is the target speed in knots. To the right of the target symbol is the target course. In addition, an aspect vector (similar to A/A targets) displays from the center of the target.

◆ **Track Status:** When the radar is tracking a ground target, the label TRACK displays here.

AIR-TO-GROUND
ADVANCED TARGETING FLIR

In A/G Master Mode, the Advanced Targeting FLIR (ATFLIR) is an integral part of the A/G sensor suite. The A/G ATFLIR consists of four pointing modes in addition to an Autotrack. The target designation laser is also part of the ATFLIR pod, and is always slaved to the current FLIR image. The A/G FLIR page is very similar to the A/A FLIR page previously described. The primary differences between the A/A and A/G FLIR pages are the different FLIR pointing modes.

A/G ATFLIR POINTING MODES
GROUND VS. AIRCRAFT STABILIZATION

The four pointing modes are divided evenly between ground and aircraft stabilization. A ground stabilized display means that the ATFLIR pod tries to remain pointing at the same spot on the ground regardless of aircraft motion. Looking at the display, it seems as if the ground is not moving. Of course, there are limits to how well it can do this, since the pod does not have unlimited freedom of motion and because the airframe itself can block the FLIR view of the ground (such as when you are inverted).

An aircraft stabilized display simply maintains the current azimuth and elevation settings for the pod as the aircraft maneuvers. Looking at the display, the ground seems to rush by. This type of display is also referred to as a "snowplow" display.

◆ **Target (TGT) Slave Pointing Mode:** When TGT slave pointing mode is selected, the ATFLIR is commanded to the A/G target LOS. If there isn't an A/G designated target, the ATFLIR is commanded to the LOS of the current waypoint. Slewing the ATFLIR via the TDC while in this pointing mode causes the pointing mode to change to Ground stabilized pointing mode. The GND STAB cue appears on the display in TGT pointing mode because this mode is ground stabilized.

◆ **Velocity Vector (VV) Slave Pointing Mode:** When VV slave pointing mode is selected, the ATFLIR is commanded to aircraft boresight unless a CCIP release mode (bombs, rockets, or A/G gun) is selected. In the later case, the ATFLIR LOS slaves to the computed impact point of the selected weapon(s). If the ATFLIR is slewed via the TDC, the ATFLIR enters snowplow-pointing mode at the last commanded azimuth and elevation. Since VV pointing mode is an aircraft stabilized mode, the SNPLOW (snowplow) indication appears on the display.

◆ **Ground Stabilized (GND STAB) Pointing Mode:** Ground stabilized pointing mode is entered as described above. While in GRD STAB pointing mode, the GRN STAB indication appears on the FLIR page. With TDC control assigned to the ATFLIR, slewing the TDC causes the current ground reference point to move.

◆ **Snowplow (SNPLOW) Pointing Mode:** Snowplow pointing mode commands the ATFLIR to maintain a fixed azimuth and elevation angle with respect to aircraft boresight. Snowplow pointing mode is commanded from VVSLV as described above.

TGT Slave
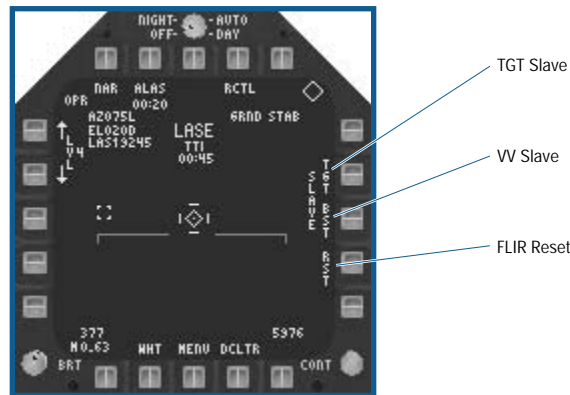
VV Slave

FLIR Reset

◆ **Target (TGT) Slave Pointing Option:** (PB 12) Toggles TGT slave pointing on/off as described above.

◆ **Velocity Vector (VV) Slave Pointing Option:** (PB 13) Toggles VV slave pointing on/off as described above.

◆ **FLIR Reset (RST):** (PB 14) Commands the FLIR to aircraft boresight in all pointing modes except TGT and when in autotrack. RST has no effect on these two modes.

A-G ATFLIR AUTOTRACK

If the **TARGET_DESIGNATE** [ENTER] keyfunction is selected in any pointing mode, the ATFLIR attempts to track the object centered in the FLIR reticule. If autotrack is unsuccessful, the ATFLIR enters ground stabilized pointing mode, which allows you to refine the FLIR image over the desired target so that you can reattempt autotrack.

AIR-TO-GROUND WEAPONS EMPLOYMENT

Now that you have a basic idea how to detect and track a target on the ground, it's time to learn how to destroy it. The following section groups related A/G weapon types together and describes what you'll see on the HUD, FLIR, and Stores pages. Weapon specific attack modes are also discussed.

UNGUIDED WEAPONS

Unguided weapons are the simplest and cheapest weapons at your disposal, but that doesn't make them any less effective. They do take more raw flying skill to successful employ, however, since their accuracy is directly a result of how smoothly you can get to the proper release point. The types of unguided weapons you can load on your

F/A-18E include iron bombs, cluster bombs, and rocket pods. Your internal 20mm gun is also used in an A/G role and is considered an unguided weapon.

IRON & CLUSTER BOMB HUD SYMBOLOGY

There are three separate bombing modes used to deliver iron and cluster bombs. The bombing mode is selected on the stores MDI and is part of the selected weapons program. They are Automatic (AUTO), Continuously Computed Impact Point (CCIP), and Manual (MAN). Manual mode is simply a fixed sight.

EA TIP   If you set up individual weapons programs using different bombing modes, you are able to rapidly change modes using the **AGARM_PROGRAM** keyfunction.

Automatic (AUTO) Mode

Auto mode is your most accurate unguided bombing mode. Steering cues are provided for you to fly to, and the weapons computer automatically releases the bombs at the proper time. However, for Auto mode to work, you must have an A/G designated target.

◆ When Auto mode is selected and a designated A/G target does not exist, the reticule displays 7.50 below the horizon or coincident with the velocity vector depending upon the dive angle of your aircraft.
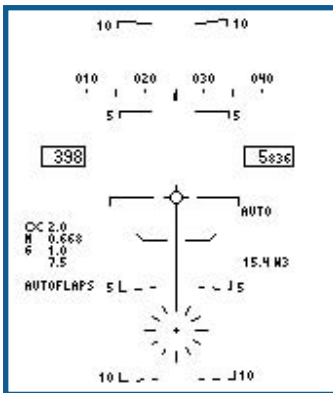
Dive Angle Less Than 7.50   Dive Angle Greater Than 7.50
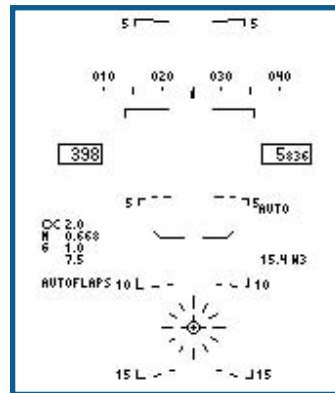
◆ When Auto mode is selected and a designated target does exist, the Azimuth Steering Line (ASL) provides a steering reference to the target (marked by the Target Designator (TD) diamond). See Flight: Head-Up Display: **HUD – A/G Master Mode Symbology**, p. 4-58.

Release Cue

ASL

Auto Mode Selected

REL Timer

TD Diamond
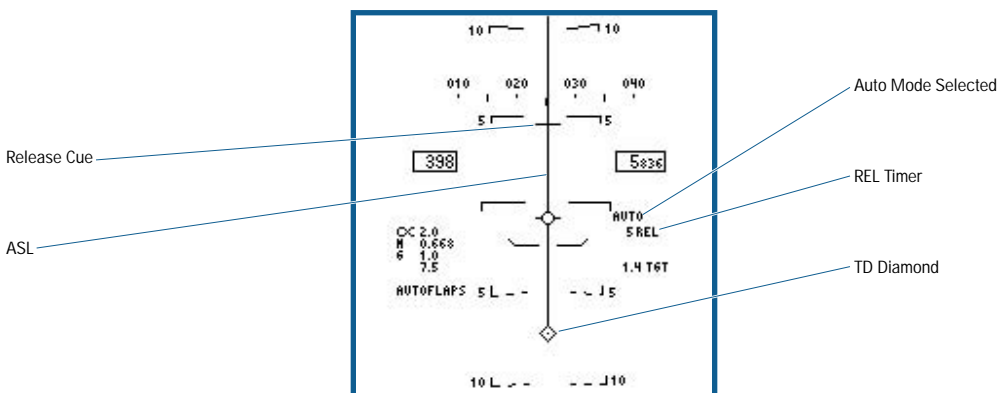
Fly the aircraft until the velocity vector is lined up with the ASL, and remain level. The REL (Release) timer on the HUD (and repeated on the A/G Radar and FLIR pages) counts down as you approach your target. As REL approaches zero, you'll see the Release Cue bar start traveling down the ASL from the top of the HUD towards the velocity vector. At this time you should press and <u>hold</u> the WEAPON_PICKLE [joystick **button 2**] keyfunction. It is important to hold the Weapon Pickle in until after all of the weapons have been released, as this is how you give the weapons computer "consent" to actually release when TTG is zero.

You can also "loft" or throw your bombs while in Auto mode by starting a 20° to 45° climb when REL is around 60 seconds or so. Be sure to have the Weapon Pickle held when you do this, as the Release cue moves rapidly downward as you climb. The advantage of lofting your bombs is that it gives you a bit of stand-off distance from your target, but it's slightly less accurate than a level or diving delivery.

Continuously Computed Impact Point (CCIP) Mode

CCIP mode is as accurate as Auto mode in certain circumstances, but it does take more skill on your part. The CCIP cross represents the impact point of your bombs if you were to press the WEAPON_PICKLE [joystick **button 2**] keyfunction at that instant. However, CCIP calculations assume that the height of the terrain at the impact point is the same as the height of the terrain directly underneath your aircraft. This can lead bombs missing long or short in hilly or mountainous areas.

◆ If the current weapon impact point lies outside the HUD Field of View, the CCIP cross does not display and a "reflected" cue displays on the DIL. In this case, the DIL displays to the HUD FOV limit in the direction of the computed impact point. The reflected cue line displays along the DIL at the same distance above the bottom of the DIL (HUD limit point) as the actual CCIP is below the HUD limit point. If the flight profile is flown so as to keep the target above the reflected cue, then a solution is ensured. During a dive, the reflected cue moves down the DIL and is blanked when the CCIP cross appears. If the actual CCIP is so far below the HUD that the reflected cue is at or above the velocity vector, then the reflected cue is blanked from the display.
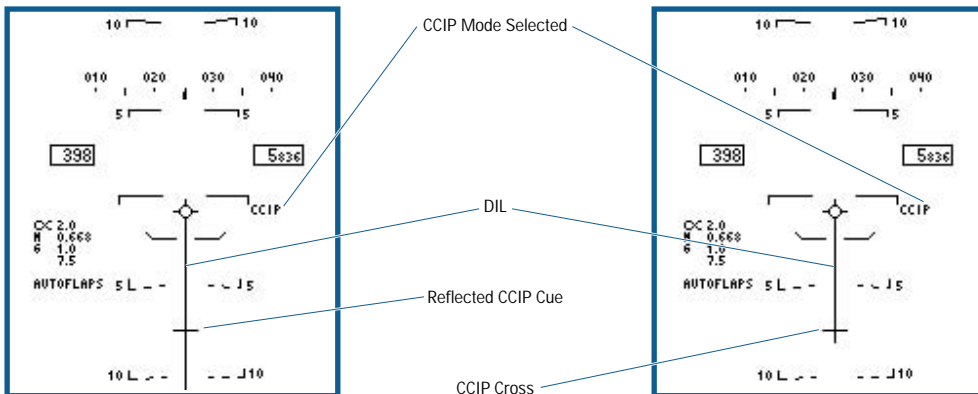
◆ When weapons are pickled in CCIP mode, the impact point becomes the new A/G designated target point, and the display format changes to AUTO bomb mode as long as the pickle is held down.

◆ Fly the aircraft so that the target is lined up along the DIL and press the Weapon Pickle when the CCIP cross is over the target.

Manual (MAN) Mode

MAN bombing is a fixed reticule, manual release mode. The reticule is fixed below the velocity vector. When the weapons release button is depressed, the weapons immediately release so long as the aircraft is within the normal pitch and roll limits.
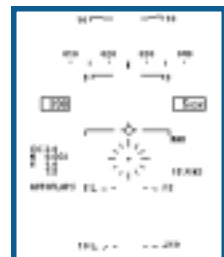
IRON BOMB SMS (STORES) MDI PAGE OPTIONS

This page is used for setting the release options for the Mk82/83/84 series unguided "iron" bombs. The Mk 77 fire bomb (napalm) uses this page, as do the Mk 60 CAPTOR and Mk 65 Quickstrike aerial mines. Finally, the Paveway series Laser Guided Bombs and the AGM-123 Skipper air-to-ground missile (actually just a rocket powered version of the GBU-16 laser guided bomb) also use this page.
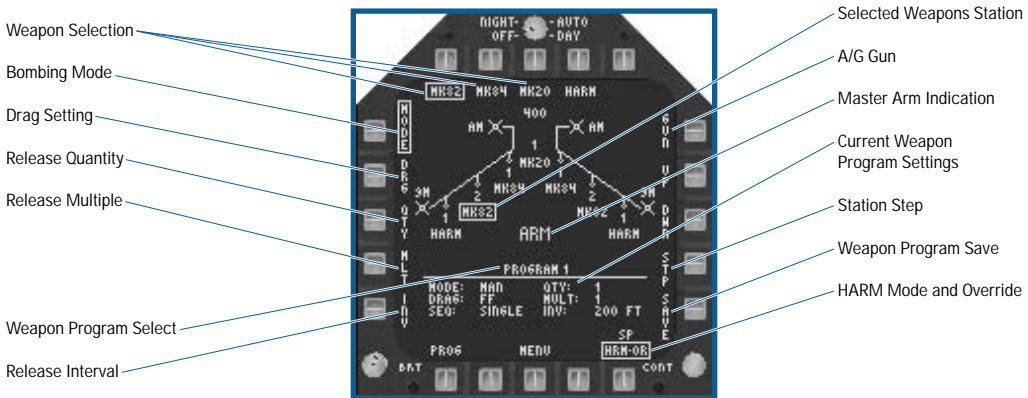
◆ **Weapon Program (PROG) Select:** (PB 20) Each weapon has up to five separate weapons programs. A weapons program is defined as all of the current MODE, QTY, MULT, and INV settings for any given weapon. Selection of this option cycles between the available programs in sequence. This allows you the ease of using different weapons release parameters without having to push a bunch of different buttons. You can modify the current program by using the MODE, QTY, MULT, and INV settings followed by the SAVE option.

> **EA TIP**   You can save any program changes for use in the current or later missions. You don't have to reprogram the changes each mission – very slick.

◆ **Release Interval (INV):** (PB 1) Represents the ground impact spacing in feet between weapons in either AUTO or CCIP, but not MAN. When active, PB 12 and 13 are used to change the release interval value up by 50 feet or down by 50 feet, respectively.

◆ **Release Multiple (MULT):** (PB 2) Indicates the number of bombs released simultaneously from the aircraft weapons stations. When active, PB 12 and 13 are used to change the release multiple value up or down, respectively.

◆ **Release Quantity QTY:** (PB 3) Quantity refers to the total number of bombs that release in a pattern (a pattern is also referred to as a "stick"). When active, PB 12 and 13 are used to change the release quantity value up or down, respectively.

◆ **DRAG Setting:** (PB 4) Toggles between FF (free fall) and RET (retarded) for retarded-capable weapons. These include the 82R/82SE/83R/84R. You should use the RET setting for very low altitude deliveries so that your aircraft can get clear of the area before the bombs hit the ground.

◆ **Bombing MODE:** (PB 5) Selects the current weapon delivery mode, either AUTO, CCIP (continuously computed impact point), or MAN (manual).

◆ **Weapon Selection:** (PB 6-10) The top row of pushbuttons is used to select the A/G weapon. The selected weapon is boxed.

◆ **A/G GUN:** (PB 11) Select the internal gun as the primary A/G weapon.

◆ **Selected Weapon Station(s):** Indicates the selected station(s) that weapons are released from.

◆ **Master Arm Indication:** ARM is displayed when Master arm is on and weapons are released normally. SAFE displays when Master Arm is off and weapon release is inhibited.

◆ **Current Weapon Program Settings:** Displays what program number is selected (1-5). The current MODE, DRAG, QTY, MULT, and INV settings are displayed to the right of their respective headings. The SEQ (sequence) setting is automatically determined from the QTY and MULT settings, based on the following criteria:

- Single (QTY = 1, MULT=1): One weapon is released for each weapon release button (pickle) depression.
- Salvo (QTY greater than 1, MULT=QTY): The weapons release simultaneously for each weapon pickle. The weapons release from multiple stations, but only one weapon is released per station.
- Ripple Single (QTY is greater than MULT, MULT=1): One weapon is released at the interval determined by the INV setting until the total quantity selected are released.
- Ripple Multiple (QTY is greater than MULT, MULT is greater than 1): The selected multiple of weapons releases simultaneously from multiple weapons stations (one weapon per station) at the selected interval until the total quantity of weapons selected releases. If release of the final multiple of weapons in the sequence would exceed the quantity of weapons selected for release, the final multiple is reduced accordingly so that exactly the selected quantity releases. For example, if QTY=5 and MULT=2, the first pair of weapons release at pickle, followed by the second pair at the selected interval, then followed by a single bomb at the proper interval.

◆ **Station STEP:** (PB 14) Selects the active weapon station when the same A/G weapon type is loaded on more than one station. Successive depressions of the pushbutton cycles the selected weapons station between ALL (all stations of the same weapon type selected) and then each station of that weapon type individually starting with station 2 and progressing in sequence up to station 10 and then back to ALL.

◆ **Weapon Program SAVE:** (PB 15) Saves the current program settings for the selected weapon.

◆ **HARM Mode and Override:** (PB 16) The current HARM mode is indicated above the HRM OR option and displays SP for Self-Protect mode, TOO for Target of Opportunity mode, and PB for Pre-Briefed mode.

The HRM OR (HARM Override) option allows you to override the HARM Self-Protect pullback mode so that delivery of the selected weapon continues without interruption. The HARM Self-Protect mode is described in the HARM section below. This option is available on all stores pages whenever a HARM is loaded on the aircraft.

SPECIAL NOTE: While the ADM-141 Tactical air launched decoy (TALD) is not really a weapon, it is loaded and released just like one. TALD stations are selected in the same manner as described for the A/G Iron bomb symbology. When the weapon release button is pickled, all selected TALD's release.

CLUSTER BOMB SMS (STORES) MDI PAGE OPTIONS

Cluster bombs stores page uses the Iron Bomb Stores page format, but the DRAG option is replaced by the Height of Burst (HOB) option. It is used for all unguided cluster bombs such as the Mk 20 Rockeye and the CBU-59.

◆ **HOB Option:** When active, PB 12 and 13 increment or decrement the current HOB setting from 2000, 1500, 1000, 600 and 300 feet possible settings.

◆ **Current Weapon Program Settings:** The HOB setting displays in place of DRAG.

A/G GUN / ROCKET HUD SYMBOLOGY

The A/G gun and rocket HUD are very similar. The A/G gun uses CCIP release mode, while the rockets can use either CCIP or Manual release mode.
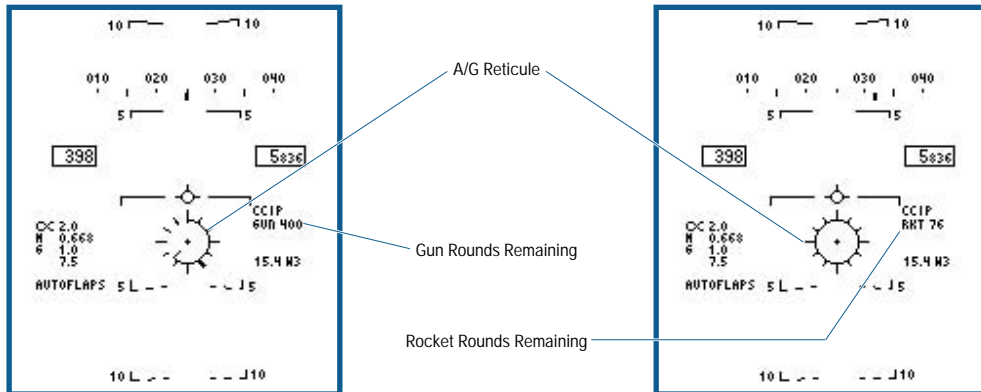
◆ **A/G Reticule:** The basic A/G reticule for the A/G gun and rocket modes. The range to the impact point is shown by the range clock display inside the reticule. Each tick mark represents 1000 feet of slant range, and the range arc is limited at the 11 o'clock position when the range to the target is greater than 23,000 feet of slant range.

◆ **Gun (or Rockets) Remaining Rounds:** In CCIP gun and rocket modes, the remaining rounds (to the nearest 10 rounds for the Gun) displays next to either GUN or RKT, depending on the selected weapon. The maximum number of 20mm gun rounds is 400.

ROCKET POD SMS (STORES) MDI PAGE OPTIONS

The rocket pods stores page is similar to the Iron bomb Stores page. Two types of rocket pods are available, the LAU-10, which holds four 5-inch ZUNI rockets per pod, and the LAU-68, which holds nineteen 2.75-inch rockets per pod. When multiple pods are carried on the same station, the total number of rockets per station displays. Rockets do not use stores programs 1-5.
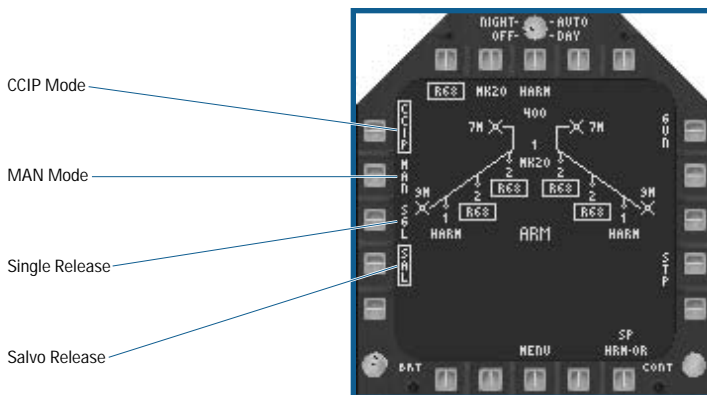
◆ **Continuously Computed Impact Point (CCIP) Mode:** Selects the CCIP release mode. When selected, the appropriate CCIP aiming information displays on the HUD.

◆ **Manual (MAN) Option:** Selects MAN release mode. When selected, a simple fixed aiming reticule displays on the HUD.

◆ **Single (SGL) Release:** When active, this option fires a single rocket from each selected weapon station for each weapon pickle.

◆ **Salvo (SAL) Release:** When active, this option fires all rockets from all pods from each selected weapons station when weapon pickle is depressed.

UNGUIDED WEAPON EMPLOYMENT NOTES

The Mk 82, Mk 83 and Mk 84 iron bombs are General-Purpose (GP) weapons that are 500, 1000 and 2000 lbs. each, respectively. They are useful against a wide range of targets such as buildings, tank farms, emplacements and airfields. In general, the larger your target, the heavier the bomb you want to use against it. The retarded versions of these bombs are excellent for high-speed low level attacks.

The Mk 20 cluster bomb is designed as an anti-armor and anti-personnel weapon. The weapon breaks open at the HOB altitude and many small bomblets are released in a roughly circular pattern. A lower HOB setting concentrates more of the bomblets in a smaller area, increasing the chance of hitting closely grouped objects, while a higher HOB setting covers more area. The CBU-59 is an anti-personnel weapon useful mainly against soft targets. The CBU-72 Fuel Air Explosive is potentially devastating against troops caught in the open, but it is less effective against even lightly armored vehicles.

A/G rockets are useful against soft targets, such as trucks, gun emplacements, and troops. Your 20mm gun is also best against soft or lightly armored targets.

GUIDED WEAPONS

So-called "smart" weapons have become the darlings of the media and in many cases the weapons of first choice for the military. Despite their high cost, guided weapons, due to their greater accuracy, tend to minimize the amount of collateral damage. Some advanced guided weapons such as the SLAM-ER offer tremendous stand off range as well.

PAVEWAY LASER GUIDED BOMBS (LGB) / SKIPPER GUIDED MISSILE

The Paveway laser guided bomb family includes the GBU-12 500lb General-Purpose (GP) bomb, the GBU-16 1000lb GP bomb, the GBU-24 2000lb GP bomb, and the GBU-24A 2000lb penetration bomb. The AGM-123 Skipper is nothing more than a GBU-16 with a rocket motor attached, as previously noted. All of these weapons are guided to their target following the reflected energy of a laser designator. If a laser designator does not illuminate the target, or if the illumination stops before the weapons reaches the target, it stands a good chance of missing.

The HUD symbology and Stores page options for Paveway LGB's and the AGM-123 are identical to the Iron bomb HUD and Stores MDI page described above. These weapons do add symbology to the A/G FLIR page, which is described below.

PAVEWAY / SKIPPER A/G FLIR PAGE SYMBOLOGY
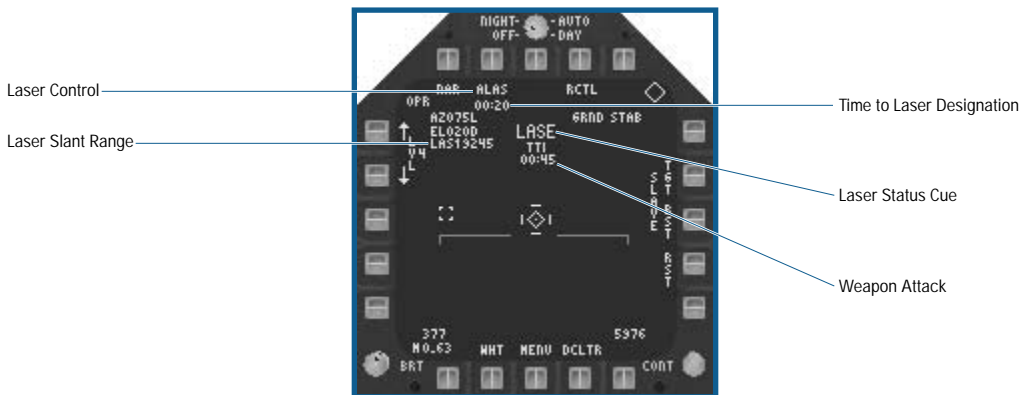
◆ **Laser Slant Range Readout:** The current laser slant range to the target displays in feet for ranges less than or equal to 5 nautical miles, and in nautical miles for ranges over 5 nautical miles.

◆ **Laser Control Option:** (PB 7) Toggles between Auto (ALAS) and Manual (MLAS) laser operation. When ALAS is selected, the laser automatically fires when the weapon time to impact (TIMPACT) reaches 20 seconds. It continues to fire until TIMPACT + 5 seconds, provided that a laser guided weapon is selected in A/G master mode and master arm is on. In manual mode, you may toggle the laser on and off using the **LASER_TOGGLE** [⌨] keyfunction.

> *EA TIP* Because designating a target too soon or too late reduces the accuracy of laser guided bombs, using the ALAS setting is a wise idea.

◆ **Time to Laser Designation:** With the ALAS selected, the time to laser designation in minutes and seconds displays following weapon release. When the counter reaches 00:00, the laser fires and the LASE cue appears.

◆ **Laser Status Cue:** Indicates the current status of the laser designator:
  • L SAFE: The laser is safe (can not fire). Master arm is off.
  • L ARM: Master Arm is on, and the laser can fire.
  • LASE: The laser is firing. Flashes when displayed.
  • L MASK: The laser is masked and cannot fire, or it has stopped firing. Flashes when displayed.

The laser can be masked by the airframe of your aircraft as you maneuver. If the FLIR image of the target is obscured, the laser is masked.

> *EA TIP* Because your ATFLIR pod is carried on the left side of your aircraft, a gentle bank to the right after you release your bombs but before they impact the target can help prevent inadvertent laser masking.

◆ **Weapon Attack Timer (TTMR/REL/TTI):** Indicates Time-to-Maximum Range (TTMR), Time to Release (REL), or Time to Impact (TTI). Only one of these timers displayed at a time. TTMR is displayed for Skipper, and indicates the time until you are within the maximum range of the weapon. REL is identical to the REL timer provided on the HUD in Auto mode and indicates the time remaining until weapon release. TTI indicates the amount of time remaining before a released weapon impacts the target.

PAVEWAY / SKIPPER WEAPON EMPLOYMENT NOTES

The Paveway series of bombs are used against the same target types you would use the Mk 82/83/84 GP bombs against. Due to their greater accuracy, you probably won't need to use as many LGB's as you would unguided iron bombs.

The GBU-24A is your premier "bunker buster" weapon; use it against hardened targets. The Skipper is used when you want the punch of a GBU-16 but also want some additional stand off range.

Any bomb mode is used for these weapons; however, it is a good idea to try and get the bombs as close to the target as possible using Auto or CCIP modes. Why "cue up" a miss when you don't have to?

AGM-62 WALLEYE TV GUIDED GLIDE BOMB

One of the first true guided weapons, the AGM-62 Walleye is a TV guided glide bomb with a 1000 lbs. GP warhead. The Walleye has a TV camera in its nose that you use to guide the weapon to its target. The video for this camera is displayed on the Walleye Stores MDI page, and if you have a AWW-13 Data Link pod loaded, you are able to continue to view this video and control the weapon even after you have released it.

WALLEYE HUD SYMBOLOGY

The Walleye uses a simplified version of the basic A/G Master Mode HUD, with the following additions:
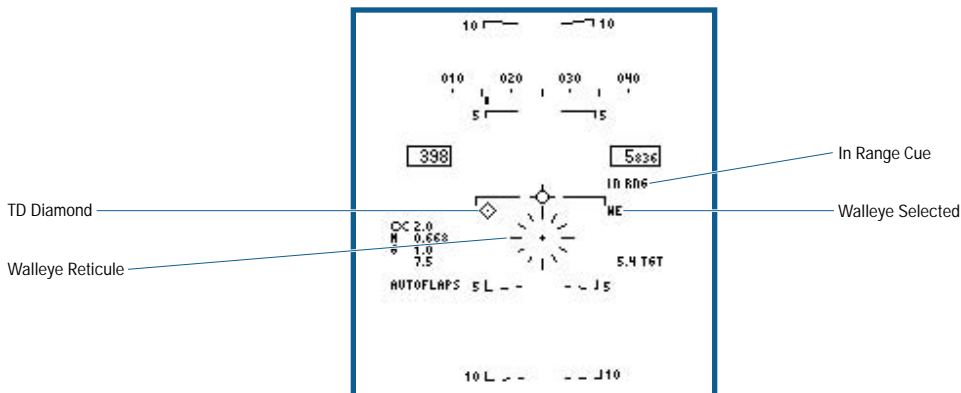
◆ **Walleye Reticule:** The A/G reticule for Walleye is positioned below the aircraft waterline, representing the nominal boresight position of the Walleye seeker. The reticule is used as a head-up sighting reference to aim the weapon at the target. After maneuvering the aircraft to position the reticule on the target, the target is located on the Walleye Stores MDI page.

◆ **TD Diamond:** If an A/G designated target exists, the TD diamond displays.

◆ **In Range (IN RNG) Cue:** When the designated A/G target is within the maximum range of the Walleye, "IN RNG" displays. If the designated A/G target is outside the maximum range of the Walleye, a counter indicating the time until maximum range (TTMR) is displayed.

◆ **Walleye Selected Cue:** WE is provided on the HUD when Walleye is selected.

WALLEYE SMS (STORES) MDI PAGE SYMBOLOGY

The stores page for the Walleye does not use the "wing" diagram of the Iron bomb format. Instead, when selected the Walleye video page displays.
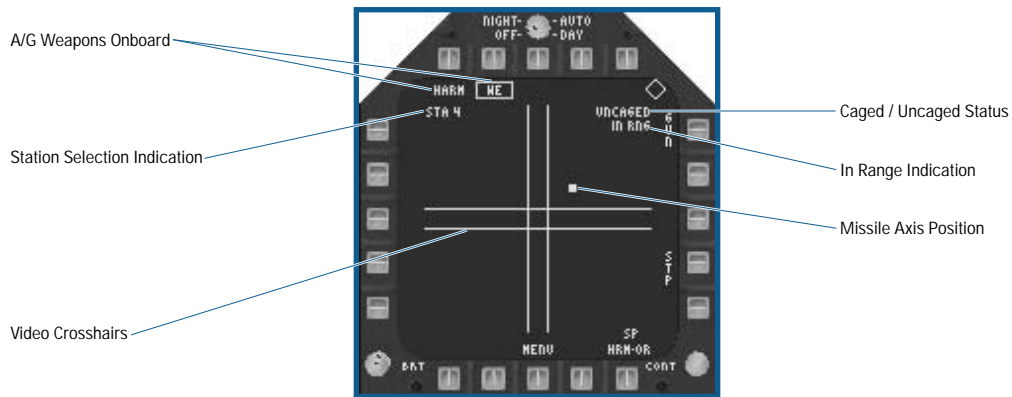
◆ **Video Crosshairs:** The intersection of the crosshairs is the target gate, and when the Walleye is caged to boresight, the center of the crosshairs matches the center of the Walleye pipper display on the HUD. When lock on is commanded using the **TARGET_DESIGNATE** [ENTER] keyfunction, the area in the center of the target gate is tracked.

◆ **Station Selection Indication:** Indicates the selected weapon station.

◆ **A/G Weapons Onboard:** (PB 6-10) All loaded A/G weapons display below PB 6-10 as in the iron bomb format.

◆ **Caged/Uncaged Status:** The **CAGE_UNCAGE** [U] keyfunction is used to cage or uncage the Walleye's TV seeker. If there is not an A/G designated target, the Walleye remains locked to its boresight position. If there is an A/G designated target, the Walleye seeker head slews to that line of sight if it is within the seeker's gimbal limits.

When uncaged, the Walleye seeker is slewed using the TDC. Once a target is centered in the video crosshairs, the **TARGET_DESIGNATE** [ENTER] is used lock the weapon on to the target.

◆ **In-Range Indication:** With a designated target within its calculated maximum range, the IN RNG cue displays on the HUD. If the Walleye is not in range, the Time-To-Max-Range (TTMR) counter displays. If you do not have a designated target, you do not get either indication.

◆ **Missile Axis Position (MAP) Indicator:** The MAP indicator displays in the weapon video page. It indicates the missile boresight axis relative to the guidance head position. The MAP does not display within the target gate portion of the crosshairs.

WALLEYE WEAPON EMPLOYMENT NOTES

The heart of the Walleye is a 1000-lb. GP bomb, and you can use it against any target that you would normally use a Mk 83 against. The glider aspect gives you considerable stand off range, and the TV seeker allows you to refine the final target aim point as the weapon closes in.

The Walleye is employed in two ways. You can lock the weapon onto a target prior to releasing it and simply let it proceed to the target on it's own. In this case, you won't need to have the AWW-13 Data Link pod loaded, but without the pod, you lose the weapon video as soon as it is released.

The second method is to launch the weapon in the general direction of the target, and then uncage the seeker in flight, use the TDC to slew the video cross hairs onto the target, and recage the seeker. The weapon's autopilot then steers the Walleye towards the new target. You must have the AWW-13 Data Link pod loaded for this method. You never directly "fly" the weapon; instead, you are instructing its autopilot where to fly.

EA TIP   Remember, you are only able to move the Walleye's seeker head when it is uncaged, and the missile won't fly to the new target until you recage it.

AGM-65 MAVERICK GUIDED MISSILE

The AGM-65 Maverick was originally designed as an infrared or TV guided fire and forget anti-tank weapon. Over the years, it has evolved into three main versions that you can employ from your Super Hornet.

The AGM-65E uses laser guidance to find its target. As such, it requires a target designated by a laser, and is therefore no longer a fire and forget weapon. The AGM-65F is the updated infrared guided anti-tank version, while the AGM-65G is similar to the 65F but has a much larger warhead.

MAVERICK HUD SYMBOLOGY

The HUD Symbology for the three types of Mavericks (AGM-65E, AGM-65F, and AGM-65G) is virtually identical. The AGM-65E (Laser Maverick) adds a "MAV LKD" status message to the HUD when the laser seeker is locked on target.
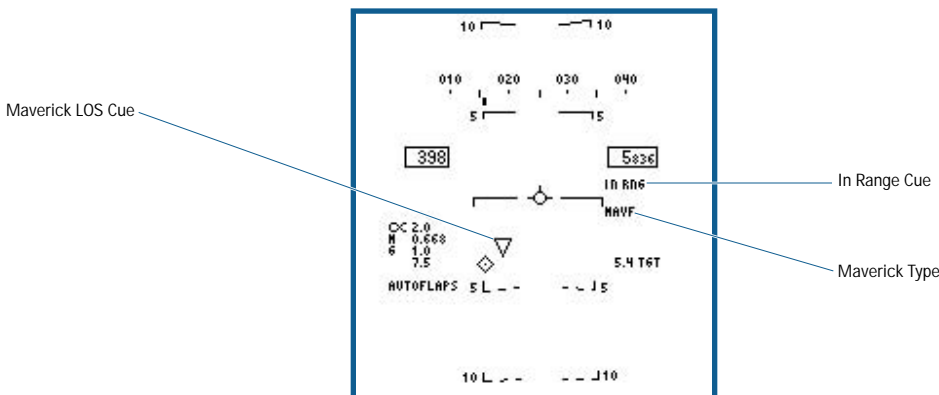
- ◆ **Maverick Seeker Line-of-sight (LOS) Cue:** The Maverick seeker LOS cue is an inverted triangle symbol indicating the current LOS of the Maverick seeker.
- ◆ **Maverick In Range Cue:** When the designated A/G target is within the maximum range of the Maverick, "IN RNG" displays. If the designated A/G target is outside the maximum range of the Maverick, the TTMR counter displays instead. If you do not have a designated target, you do not get either indication.
- ◆ **Maverick Type:** The selected Maverick type displays in this location.

MAVERICK SMS (STORES) MDI PAGE SYMBOLOGY

As with the Walleye, the stores page for the Maverick does not use the Iron bomb format. When selected, the Maverick video page displays. The AGM-65E Laser Maverick uses a simulated video display, while the AGM-65F/G both use an actual infrared display.

AGM-65E Laser Maverick Symbology

Weapon Locked

Launch Constraint Circle

Gimbal angle

Caged / Uncaged Status

In Range Indicator
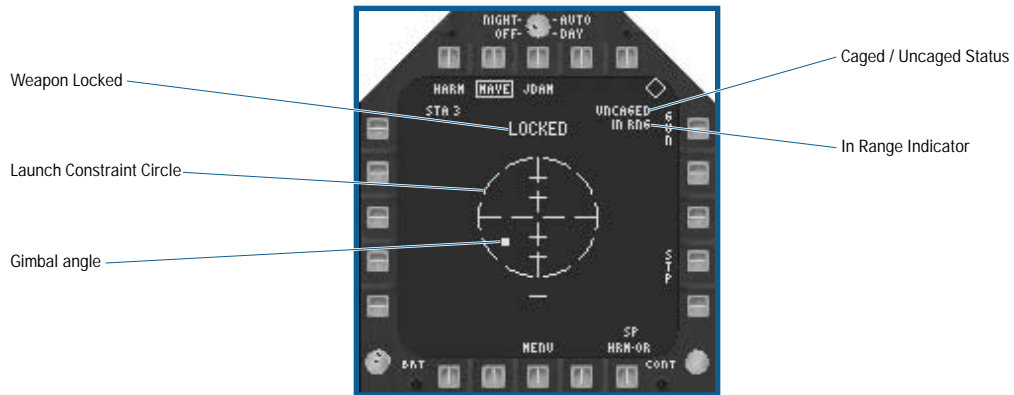
◆ **Gimbal Angle:** Either an X (not shown) or a small box (as shown) indicates the Maverick gimbal angle with respect to weapon boresight. The X changes to a box when the weapon is locked on to a target. The X or box flashes, indicating a poor lock-on angle. If you launch the Maverick while the gimbal angle box is flashing, there is a chance it will break lock at launch.

◆ **Launch Constraint Circle:** The dotted launch constraint circle is a synthetic Maverick video display. The radius of the circle is 15°. The horizontal tick marks represents 5° in elevation relative to the gimbal angle indicator (item "f").

◆ **Weapon Locked on Target Indication:** When the laser Maverick is locked on to a target, LOCKED displays, and MAVE LKD appears on the HUD.

◆ **Caged/Uncaged Status:** The missile seeker is commanded to scan for laser designated targets by using the **CAGE_UNCAGE** [U] keyfunction. If a designated A/G target exists, the seeker head is commanded to that location provided it is within its FOV when caged.

◆ **In-Range Indication:** Displayed when the IN RNG cue is displayed on the HUD.

AGM-65F/G IR Maverick Symbology
The IR Mavericks are similar to the Laser Maverick symbology with the following additions:

Weapon Video

Pointing Cross

Display Polarity

Caged / Uncaged Status

F/C Option (AGM-65G only)

Narrow FOV Brackets

Field of View Select
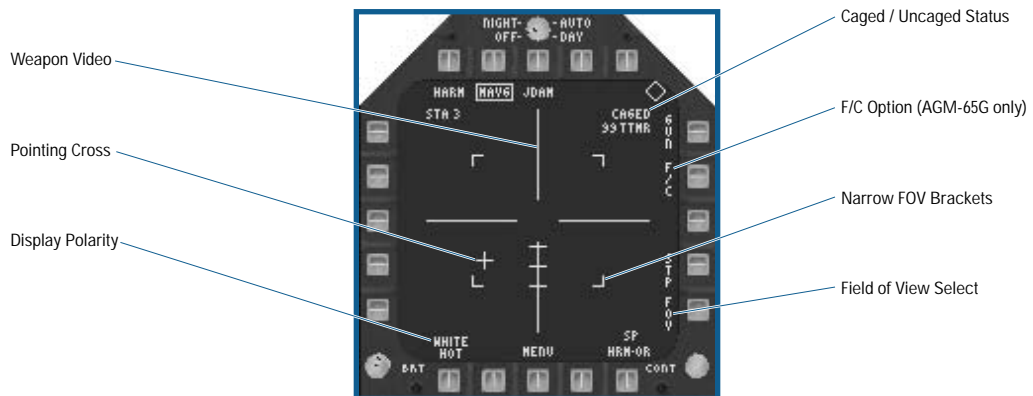
◆ **Display Polarity:** (PB 20) Toggles the IR video display between WHITE HOT and BLACK HOT.

◆ **Pointing Cross:** The pointing cross position relative to the large crosshairs indicates the seeker position. The tick marks along the vertical cross-hair are spaced 5° apart and indicate the depression angle relative to missile boresight. The pointing cross flashes to indicate a poor quality lock-on angle.

◆ **Weapon Video:** Weapon camera video displays when the IR Maverick is selected. In addition to the IR scene, the video includes the crosshair symbology. When locked on to a target, the video crosshairs collapse around the target indicating it is being tracked.

◆ **Caged/Uncaged Status:** The **CAGE_UNCAGE** [U] keyfunction is used to cage or uncage the Maverick's IR seeker. If there is not an A/G designated target, the Maverick remains locked to its boresight position. If there is an A/G designated target, the Maverick seeker head slews to that line of sight if it is within the seeker's gimbal limits.

When uncaged, the Maverick seeker is slewed using the TDC. Once a target is centered in the video crosshairs, the **DESIGNATE_TARGET** [ENTER] is used lock the weapon on to the target.

◆ **Force Correlate (F/C) Option:** This option applies to the AGM-65G missile only and does not display for the AGM-65F. The forced correlate option allows the Maverick-G to track an area rather than a single specific object. When F/C is selected, the video crosshairs retract and are replaced by a small cross in the center of the display.

◆ **Field-of-view (FOV) Select:** (PB 15) Toggles the display between wide and narrow FOV.

◆ **Narrow FOV Brackets:** They only display when wide FOV is selected and indicate the relative size of the narrow field of view display.

MAVERICK WEAPON EMPLOYMENT NOTES

The Maverick E and F are superb anti-tank weapons. Their stand-off range also makes them useful against SAM launch vehicles and mobile Triple-A guns. The larger warhead of the Maverick G gives it about the same punch as a Mk-82 GP bomb, making it useful against fast moving patrol boats and similar targets.

AGM-84 HARPOON ANTI-SHIP MISSILE

The AGM-84 Harpoon is your primary anti-ship weapon. It is a big, heavy weapon with a large warhead, sophisticated guidance system, and a long range. It has two primary release modes: Range / Bearing Launch (R/BL) and Bearing Only Launch (BOL). R/BL is the most accurate of the two, but requires you to know the bearing and range to the target before firing. BOL is a less accurate, but you only need to know the approximate bearing of the target.

HARPOON HUD SYMBOLOGY

The Harpoon HUD provides you information indicating the selected Harpoon launch mode (either Range/Bearing or Bearing only), the range to the designated A/G target (if one exists) and the time to maximum range (Range/Bearing launch mode only).

Harpoon Launch Mode
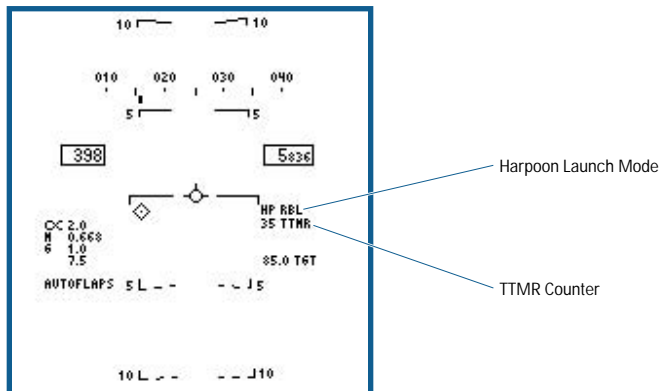
TTMR Counter

◆ **Harpoon Launch Mode:** The selected launch mode displays in this location.

◆ **Time-To-Maximum-Range (TTMR) Counter:** (R/BL mode only) If the designated A/G target is outside the maximum range of the Harpoon, the TTMR counter displays in this location.

HARPOON SMS (STORES) MDI PAGE SYMBOLOGY

The Harpoon anti-ship missile stores page is similar to the Iron bomb Stores format. It does use the stores programs 1-5, however the program options differ from the Iron bomb options.

- Launch Mode Select
- Flight Profile Select
- Terminal Mode Options
- Search Pattern Select
- Active Search Range Select
- Program Select
- In Zone Cue
- Current Program Settings
- Program Save
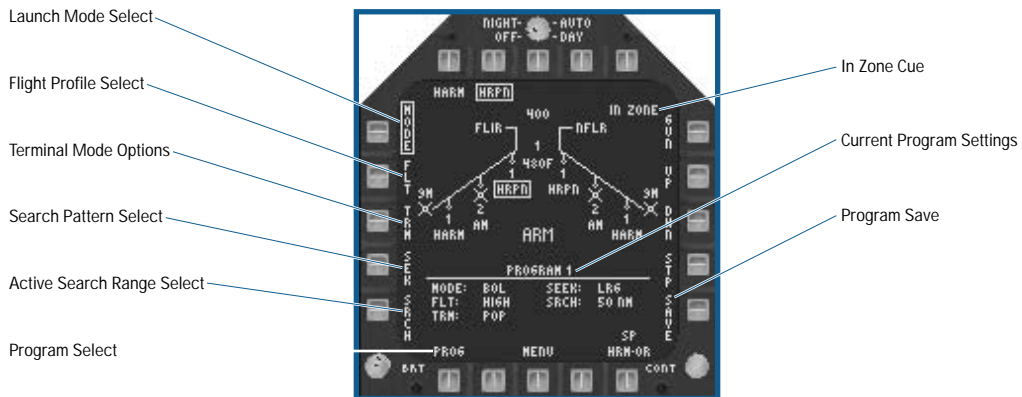
◆ **Program Select (PROG):** This option cycles between the available programs in sequence. You can modify the current program by using the MODE, FLT, TERM, SEEK, and SRCH settings.

◆ **Active Search Range (SRCH):** (BOL mode only) This option adjusts the range from the launch point that the Harpoon begins its active search. The UP and DOWN options (PB 12 and 13, respectively) are used to change the current SCRH setting in 10 NM increments.

◆ **Search Pattern (SEK) Select:** Three search pattern options are available. The UP and DOWN options (PB 12 and 13, respectively) are used to change the current SEEK option. The SEEK options are LRG, MED, and SML.
  - LRG (Large): In R/BL mode, if a target is not found at the designated point, the Harpoon begins an expanding search of the surrounding area. In BOL mode, LRG commands the maximum search to either side of the weapons flight path once the search range is reached. In general, LRG offers the greatest search area but the least target discrimination.
  - MED (Medium): MED is a compromise between LRG and SML.
  - SML (Small): SML functions similar to LRG; however, the area searched is smaller (R/BL mode) or the search angle to either side of the weapon flight path is smaller (BOL mode). SML provides the greatest target discrimination and therefore has the greatest chance of attacking the largest actual target it finds (as opposed to a decoy). It also finds targets within its search area much quicker than LRG (reducing an enemy's reaction time).

◆ **Terminal Mode (TRM) Options:** Two terminal mode options, SKIM and POP, are available. The UP and DOWN options (PB 12 and 13, respectively) are used to change the terminal mode option.
  - SKIM: After acquiring a target with its onboard radar, the Harpoon flies a minimum altitude approach to the target.
  - POP: After target acquisition, the missile commences a pop-up attack on the target.

◆ **Flight Profile (FLT) Select:** The FLT option provides three flight profiles, HIGH, MED, and LOW. The UP and DOWN options (PB 12 and 13, respectively) are used to change the flight profile setting.
  - HIGH: The Harpoon cruises to the target at high altitude. A high altitude profile provides the maximum range for the weapon and increases the effective search area of the seeker; however, the weapon is detectable at longer range and more susceptible to countermeasures.
  - MED: The Harpoon cruises to the target at medium altitude. Medium altitude provides a compromise between the HIGH and LOW profiles. Maximum range and relative search area size is greater than LOW, but less than HIGH. Similarly, enemy detection typically occurs later than HIGH, but sooner than LOW.
  - LOW: The Harpoon cruises to the target at low (sea skimming) altitude. Low altitude is also known as a sea skimming profile because the Harpoon travels to the target area at very low altitude. While maximum range is reduced, enemy reaction time is also greatly reduced.

EA TIP Harpoon was designed for over-water use; it lacks terrain following radar. It will impact intervening terrain if it is higher than the Harpoon's current altitude.

◆ Launch Mode Select: (PB 5) Two launch modes are available, Range/Bearing Launch (R/BL) and Bearing only Launch (BOL). The UP and DOWN options (PB 12 and 13, respectively) are used to change the current launch mode.

  • R/BL mode: R/BL is the most accurate mode, but target range and bearing must be known (i.e., an A/G target designation must exist).

  • BOL mode: BOL is less accurate, but the exact target location is not required for launch. The Harpoon travels down its initial bearing and searches for surface targets along its path.

◆ IN ZONE Cue: IN ZONE displays here and on the HUD when all aircraft position criteria for a successful launch are met. For the R/BL mode, this includes determining that the designated target is within the maximum range of the missile. When the aircraft is outside the maximum range, the ## TTMR (Time to Maximum Range) cue displays. When in BOL mode or R/BL mode and within maximum range, the following three out-of-zone parameters are checked and display in place of the IN ZONE cue if an out-of-zone condition exists:

  • ALT: Aircraft altitude is less than the recommended absolute minimum launch altitude.

  • OFF AXIS: Off-axis bearing to the target is too great (R/BL mode only).

  • NO TARGET: R/BL mode is selected but is not A/G target designated.

◆ Current Program Settings: Indicates the program number selected (1-5). The current MODE, FLT, TERM, SEEK, and SRCH settings display to the right of their respective headings.

◆ SAVE option: Saves the current Harpoon program.

HARPOON WEAPON EMPLOYMENT NOTES

The Harpoon is a ship killer. Don't waste it against other targets, since it was not designed to attack land-based targets and the chance of success is very low. Ships that are in port are a poor Harpoon target as well, because ground clutter likely confuses the weapon's radar seeker.

The choice of launch modes is based on your tactical situation. Against a well-defended enemy fleet, you may not be able to get close enough to find them on your A/G radar; in this case, BOL is your only option. Otherwise, press in and find the ships using your SEA mode radar. The Harpoon is much more accurate, and the closer you get, the lower you can set the flight profile setting. Sea skimming missiles are very hard for a ship to detect and defend against.

AGM-84H SLAM-ER / AGM-154 JSOW / GBU-29/30/31 JDAM GPS GUIDED WEAPONS

These three weapon types all use the latest Global Positioning System guidance systems and have very similar HUD/SMS displays and controls.

The AGM-84H SLAM-ER is an update of the original Standoff Land Attack Missile, which itself was based on the Harpoon anti-ship missile. The "ER" stands for Expanded Response, which in this case means much greater range and accuracy over the original SLAM.

The AGM-154 Joint Standoff Weapon (JSOW) is designed to replace the USAF's GBU-15 and AGM-130 as well as the USN's Walleye. It is a glider-type weapon that is fitted with either a 1000 lbs. GP warhead or cluster sub-munitions.

The GBU-29/30/31 Joint Direct Attack Munition (JDAM) is a family of weapons available with 1000 and 2000 lbs. GP warheads or a 2000 lbs. Penetration warhead. The JDAM is designed to supplement and perhaps one day replace the Paveway series of laser guided bombs.

GPS GUIDED WEAPON HUD SYMBOLOGY

Each of these weapon types uses the same basic HUD Symbology.
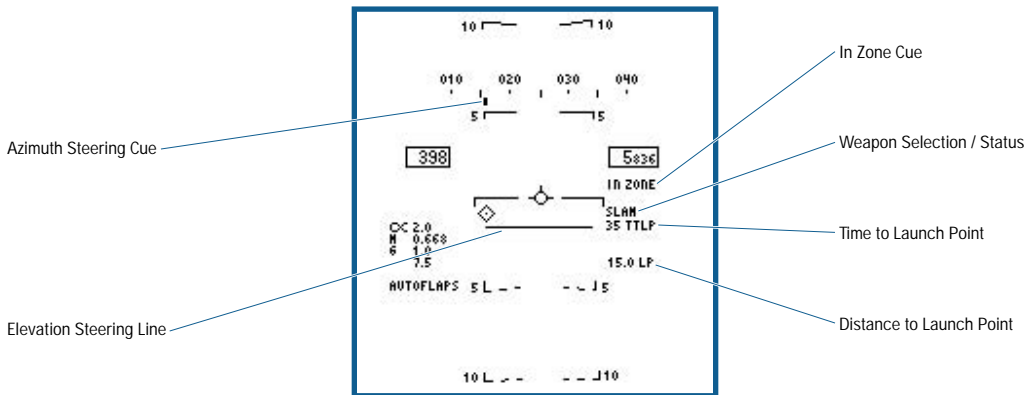
- **Elevation Steering Line (SLAM-ER Only):** The elevation steering line provides a cue to reach the selected release altitude at launch.
- **Azimuth Steering Cue:** The azimuth steering cue provides a steering cue to the optimal launch point for the designated target.
- **In Zone Cue:** Indicates that all conditions for the launch of the selected weapon have been met, as described below in the GPS Guided Weapon SMS MDI page section.
- **Weapon Selection/Status Indicator:** The selected weapon type displays in this location.
- **Time to Launch Point (TTLP):** The TTLP indicates the time to the optimal launch point range for the selected weapon. If the computed TTLP exceeds 99 seconds, the display is limited to 99 until the TTLP becomes less than 99 seconds.
- **Distance to Launch Point (LP):** The distance to the optimum launch point in nautical miles.

GPS GUIDED WEAPON SMS (STORES) MDI PAGE SYMBOLOGY

The Stores page options for each of these weapons are very similar to each other and are based on the Harpoon Store page format.
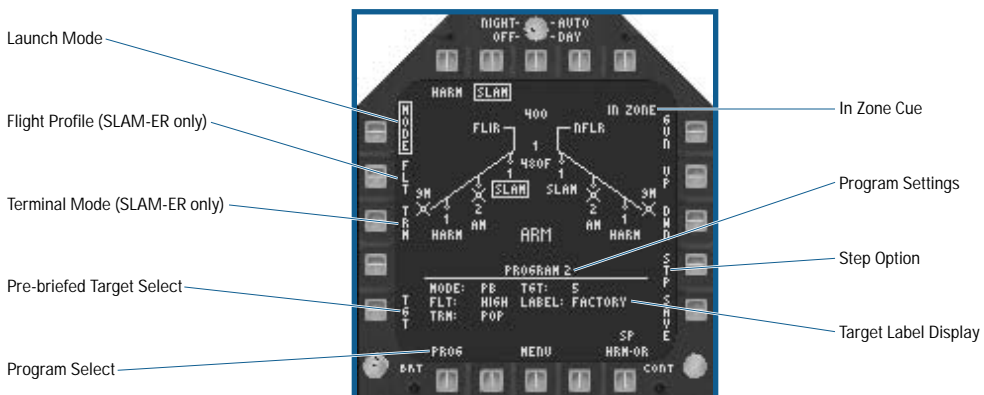
- **Program Select (PROG):** This option cycles between the available programs in sequence.
- **Pre-briefed Target Select (TGT) Option:** (PB launch mode only) Enables you to select a target from the pre-designated GPS aimpoint list. The UP and DOWN options (PB 12 and 13, respectively) are used to change the current pre-designated target option.

◆ **Terminal Mode (TERM) Options:** (SLAM-ER only) Two terminal mode options, SKIM and POP, are available. The UP and DOWN options (PB 12 and 13, respectively) are used to change the terminal mode option.
- SKIM: The SLAM-ER flies a minimum altitude approach to the target.
- POP: The SLAM-ER executes a pop-up attack on the target.

◆ **Flight Profile (FLT) Select:** (SLAM-ER only) The FLT option provides three flight profiles: HIGH, MED, and LOW. The UP and DOWN options (PB 12 and 13, respectively) are used to change the flight profile setting.
- HIGH: The SLAM-ER cruises to the target at high altitude. A high altitude profile provides the maximum range for the weapon however the weapon is detectable at longer range and more susceptible to countermeasures.
- MED: The SLAM-ER cruises to the target at medium altitude. Medium altitude provides a compromise between the HIGH and LOW profiles. Maximum range is greater than LOW, but less than HIGH. Similarly, enemy detection typically occurs later than HIGH, but sooner than LOW.
- LOW: The SLAM-ER cruises to the target at low altitude. While maximum range is reduced, enemy reaction time is also greatly reduced.

> **EA TIP** Unlike Harpoon, SLAM-ER has a radar altimeter and terrain following capability. It should avoid most intervening terrain even if the terrain is higher than its current altitude.

◆ **Launch Mode:** Two launch modes are available, Pre-briefed (PB) and Target of Opportunity (TOO). The UP and DOWN options (PB 12 and 13, respectively) are used to change the current launch mode.
- PB mode: Used to attack specific targets that have been previously designated prior to flight. PB targets can not be designated or modified while in flight. In this mode, the weapon flies to the coordinates of the selected target using the selected flight options.
- TOO mode: Enables you to employ the selected weapon against your designated A/G target.

◆ **IN ZONE Cue:** IN ZONE displays here and on the HUD when all aircraft position criteria for a successful weapon release are met. This includes determining that the designated target is within the maximum range of the weapon. When the aircraft is outside this maximum range, the ## TTMR (Time to Maximum Range) cue displays. When within maximum range, the following three out-of-zone parameters are checked and display in place of the IN ZONE cue if an out-of-zone condition exists:
- ALT: Aircraft altitude is less than the recommended absolute minimum launch altitude.
- OFF AXIS: Off-axis bearing to the target is too great.
- NO TARGET: TOO mode is selected but is not A/G target designated.

◆ **Current Program Settings:** Indicates the program number selected (1-5). The current MODE, FLT (SLAM-ER only), TERM (SLAM-ER only), and TGT settings display to the right of their respective headings.

◆ **Step Option:** Used to select the next weapon in the release sequence.

◆ **Target Label Display:** The name of each GPS aimpoint is displayed here.

GPS GUIDED WEAPON EMPLOYMENT NOTES

The SLAM-ER is the longest ranged weapon your F/A-18E can carry, but because it is so large and expensive, the numbers available to you during a campaign is small. It has a 1000 lbs. GP warhead, so multiple missiles are required to destroy larger targets, and it has no capability against hardened targets.

The JSOW is available in the AGM-154A version, which has a cluster bomb warhead, and the AGM-154C, which has a 1000 lbs. GP warhead.

The JDAM comes in the GBU-29 2000 lbs. GP, the GBU-30 1000 lbs. GP version, and the GBU-31 2000 lbs. penetration versions. They may be used against any target you would use their Paveway or Iron bomb counterparts against.

AGM-88 HARM ANTI-RADIATION MISSILE

The AGM-88 High Speed Anti-Radiation Missile (HARM) is designed to seek out and destroy enemy land- and sea-based radar systems. Even if the radar stops transmitting before the HARM reaches it, the missile still has a fair chance of hitting within lethal distance of the radar. It is a vital weapon when you have been assigned the mission of SEAD (Suppression of Enemy Air Defenses). The HARM is a complex weapon with three different launch modes. They are Target Of Opportunity (TOO), Self-Protect (SP), and Pre-Briefed (PB).

HARM HUD SYMBOLOGY

Each of the three HARM launch modes has its own HUD format:

## HARM TOO LAUNCH MODE

TOO target LOS Box

HARM Selected Indicator
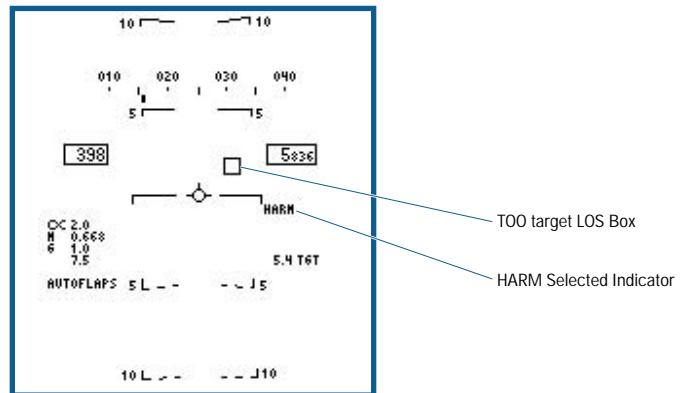
◆ **TOO Target LOS Box:** When a target is handed off to the HARM missile on the HARM stores page, the target line of sight box displays on the HUD.

◆ **HARM Selected Indicator:** With HARM selected, HARM displays in this location.

HARM SP MODE LAUNCH MODE

HARM Pullback Window
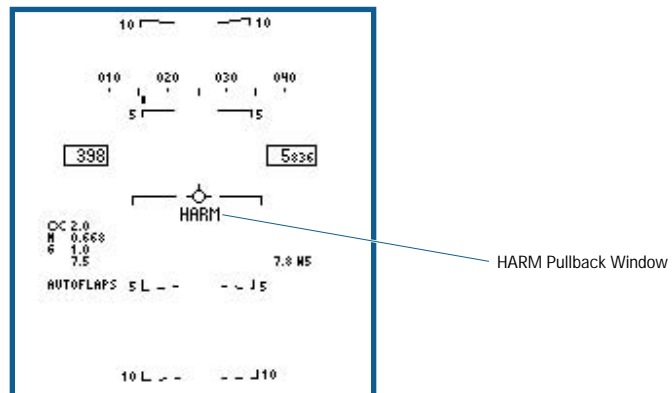
◆ **HARM Pullback Window:** This window displays the following HARM self-protect pullback cues:
  • HARM: HARM displays when a SP pullback condition exists and a HARM is ready to fire upon pickling the weapon release button.
  • HARM: HARM with an X through it displays when a SP pullback condition exists, but HARM release is inhibited by any of the following: Master arm not on, landing gear down, or the release of another weapon is in progress.
  • PLBK: Pullback (PLBK) displays when a SP pullback condition exists but you selected the HARM SP pullback override (HRM OR) option.

HARM PB MODE LAUNCH MODE
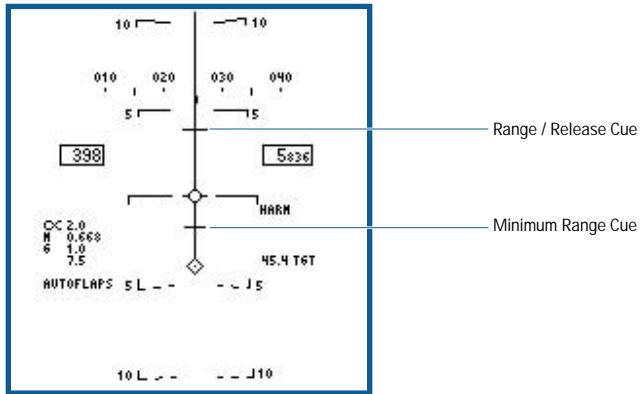
◆ **In Range/Release Cue:** The HARM in range/release cue indicates when a HARM is in-range of the selected target. When the target is outside of the maximum range of the HARM, the range/release cue is above the velocity vector. When the target is within the maximum range of the HARM, the range/release cue is on or below the velocity vector and depressing the weapon release button releases the HARM.

◆ **Minimum Range Cue:** When within 5 miles of minimum range, the minimum range cue displays. When the minimum range cue intersects the velocity vector, all range cues are removed.

HARM SMS (STORES) MDI PAGE SYMBOLOGY

The stores page format for the HARM air-to-ground missile follows one of two formats: a synthetic "missile eye" view that displays all targets within the HARM seeker FOV, or a simplified version of the basic Iron Bomb format. Which format displays is dependent upon the current HARM launch mode. HARM has three launch modes: Target-Of-Opportunity (TOO), Self-Protect (SP), and Pre-Briefed (PB). Two of these modes use the same basic format: TOO and SP share the synthetic "missile eye" view.

TARGET OF OPPORTUNITY (TOO) LAUNCH MODE

TOO is the "normal" HARM targeting mode used to select and attack threats. The TOO page is similar to the SP page, with these additional elements.
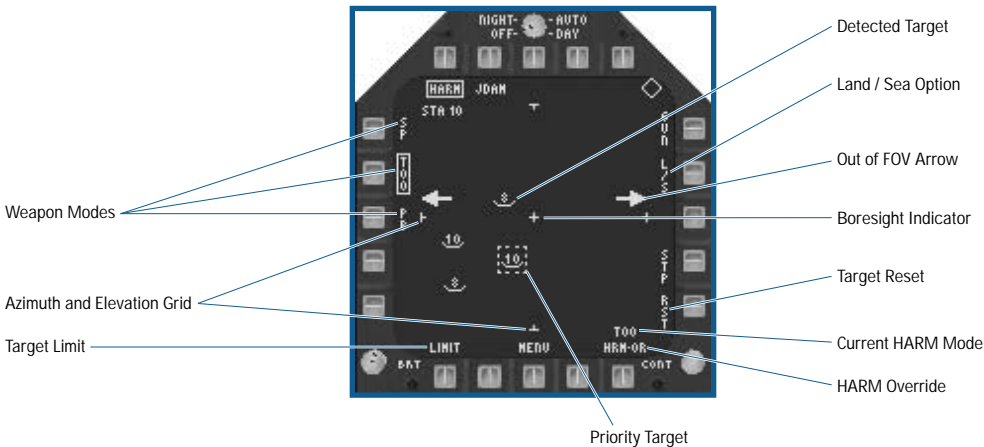
◆ **Target Limit:** When selected, the number of displayed targets is limited to the top five threats instead of the normal 15 maximum.

◆ **Azimuth and Elevation Grid:** The azimuth and elevation grid indicates the ±30° HARM FOV with respect to weapon boresight.

◆ **Weapon Modes:** (PB 3/4/5) The HARM weapon modes are SP, TOO, and PB.

◆ **Priority Target:** The current priority target has a box displayed around it when the HARM seeker is locked on. The priority target box is segmented if the HARM seeker has not yet locked on to the target. With TDC assignment to the HARM page, the **TARGET_UNDESIGNATE** [BACKSPACE] keyfunction steps through the displayed emitters.

◆ **Out of FOV Arrows:** When the radar warning system detects a threat emitter that is outside the HARM Field of View (FOV), the appropriate arrow(s) (left, right or both) display to indicate that additional threats exist but are out of the HARM FOV.

◆ **Land / Sea option:** Provides the ability to display and select LAND, SEA, or Land/Sea (L/S) threats. This limits the threats displayed on the page to the selected type.

◆ **Boresight Indicator:** The boresight position of the HARM seeker displays in the center of the page as a reference point.

◆ **Detected Target:** All detected targets within the HARM FOV display on the page using the same symbols used by the EW MDI page.

◆ **Target Reset (RSET):** (PB 15) Depressing the RSET option reselects the highest priority threat if you changed the original priority target.

◆ **Current HARM Mode:** Displayed directly above the HRM OVRD option. TOO displays for Target of Opportunity mode, SP for Self-Protect mode and PB for Pre-Briefed mode.

◆ **HARM Override (HRM OR):** (PB 16) This option is available on all stores pages whenever a HARM is loaded on the aircraft. The HRM OR option allows you to override the HARM Self-Protect pullback mode so that delivery of the selected weapon continues without interruption.

SELF-PROTECT (SP) LAUNCH MODE

SP mode runs in the background, providing a quick reaction means of targeting a HARM at a lethal or critical threat within the HARM seeker field of view. When SP mode is selected, it remains active but hidden in the background with all Master Modes.

Other weapons may be employed normally; however, if a lethal or critical threat is detected, a HARM SP pullback occurs. The HARM automatically "pullbacks" to become the selected weapon (if other than HARM) and it is locked on the threat. All without you having to toggle a single control.

When SP mode is active, it is indicated in the center of the HUD and on the following MDI pages (if displayed): Stores (all), Walleye, Maverick (all), and EW. The possible indications during a pullback are:

• HARM: HARM displays when a SP pullback condition exists and a HARM is ready to fire upon pickling the weapon release button.

• HARM: HARM with an X through it displays when a SP pullback condition exists, but HARM release is inhibited by any of the following: Master arm not on, landing gear down, or the release of another weapon is in progress.

• PLBK: Pullback (PLBK) displays when a SP pullback condition exists but you selected the HARM SP pullback override (HRM OVRD) option.

The SP Stores page format is otherwise identical to the TOO format.

PRE-BRIEFED LAUNCH MODE

PB mode uses a modified version of the basic Iron Bomb stores page format. A pre-designated target is selected and steering information to that target is provided on the HUD.
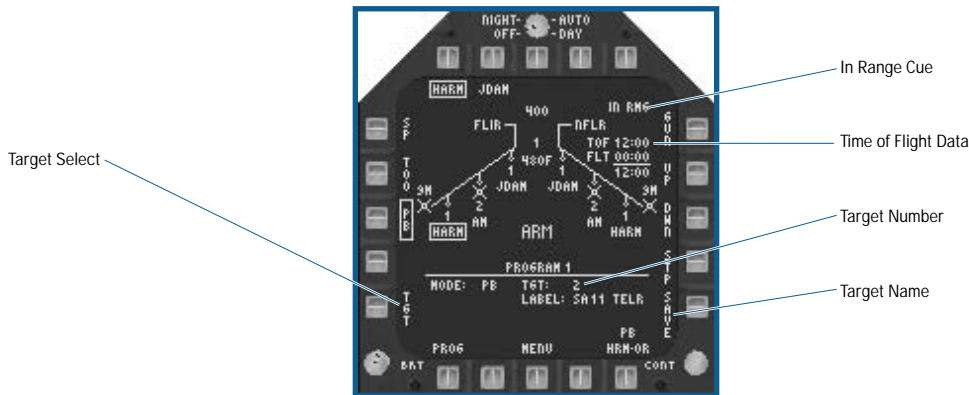
- ◆ **Target Selection (TGT) Option:** (PB 1) Enables you to select a target from the pre-designated target list, if that mission has pre-designated HARM targets. The UP and DOWN options (PB 12 and 13, respectively) are used to change the current pre-designated target.
- ◆ **IN RNG Indication:** IN RNG displays when the selected target is within the calculated maximum range of the missile.
- ◆ **Time of Flight Data:** The upper number to the right of the TOF label indicates the missile flight time (in minutes:seconds format) to the target if the HARM is immediately launched. The middle number indicates the remaining time of flight for the last launched missile (this field is blank if there are no missiles in flight). The bottom number indicates the differential time.
- ◆ **Target Number:** The number of the selected target displays here.
- ◆ **Target Label:** The target name is displayed here.

HARM WEAPON EMPLOYMENT NOTES

The HARM is only effective against radar emitting targets. The TOO mode is the primary launch mode you should use during SEAD missions unless the mission briefing specifically instructs you to attack a known target using PB mode. For all other mission types, if you have HARM's loaded you should have the SP launch mode selected to give you a quick reaction means to deal with threat radars.

> **EA TIP** When you are in the final stages of a bombing run, or about to fire an A/A missile, you might consider selecting the HRM OR to keep the HARM from pulling back and spoiling your shot.

Jane's
COMBAT SIMULATIONS

CHAPTER 6:
MISSION BUILDER

The Mission Builder is an *extremely* advanced feature – not at all for the faint-hearted. It requires a significant investment in time and effort to not only learn its functionality, but to actually create a solid and fun mission. Don't concern yourself if you never utilize the Mission Builder or just use its basic functions – that won't detract from the game. However, it's a rewarding experience to design the "perfect" mission.

Before you start to learn the nuts and bolts of mission design, take a step back for a minute and think about what you're trying to accomplish.

A great deal of time is saved if a mission's design is fully (or even partially) thought out before you place the first unit on the map. Many of the elements of design are interactive, and having an idea of what is to happen in the mission makes it easier to design events in a logical order. Let's get on with the process of mission design.

DESIGN QUESTIONS

The more that is decided up-front, the easier it is to create an effective and fun mission. It's useful to take a moment and answer the following questions before you start. Later, many of these elements become second nature, but for your first couple of missions, take the time to step through these questions.

◆ How many flights of what type of friendly aircraft?
◆ What type of weapon packages?

> **EA TIP** Allied weapons should complement yours, but not overwhelm it. You don't want the other aircraft killing all the opposition before you get there. The computer will be having more fun than you.

◆ What type of ground targets, or is this just an air-to-air show?
◆ How many?
◆ How many flights of enemy aircraft?
◆ What type?
◆ What type of weapon package will they have?
◆ Where do you want the individual enemy aircraft to arrive?
◆ When?

> **EA TIP** A common mistake is to have most of the enemies near the start of the mission, leaving the remainder of the flight empty.

◆ Will you have "non-threat" enemies, such as aircraft that ignore the player on bombing runs? Non-threat enemies require the player to evaluate the situation – it's much easier to have all the enemies attacking the player.
◆ How much thinking should the player have to do?
◆ How many "realism" details, i.e., non-mission specific aircraft and objects, do you want?
◆ How much are you going to tell the player about the mission in the briefing?
◆ What events do you want to mention in the debrief?

TESTING QUESTIONS

◆ Does the mission work under "normal" circumstances?
◆ If you start the mission and don't touch anything for 20 minutes, or so, do you get a "Mission Accomplished" message? You don't want the computer AI to win the mission without your help.
◆ Does the text work? Is it beneficial and informative? (Briefing? Debriefing? Messages?)

MISSION BUILDER INTERFACE

New Mission		Open Mission	
Add Aircraft		Remove Aircraft	
Add Ship		Remove Ship	
Add Moving Vehicle		Remove Moving Vehicle	
Add Ground Object		Remove Ground Object	
Add Waypoint		Remove Waypoint	
Add Goal		Remove Goal	
Add Goal Area		Remove Goal Area	
Add JSTAR		Remove JSTARS	
Add Bullseye		Remove Bullseye	
Briefing Summary Setup		Mission Briefing	
General Mission Information		Unavailable	

Save Mission	
Aircraft Mission	
Ship Information	
Moving Vehicle Information	
Ground Object Information	
Waypoint Information	
Goal Information	
Mission Events	
JSTARS Information	
Alternate Path	
Mission Debriefing	
Mission Checklist	

Environment		Filter Options	
Add GCI Link		Remove GCI Link	
Add TACAN		Remove TACAN	
Add FAC		Remove FAC	
Add Mission Label		Remove Mission Label	
Destroy this Object		Undestroy this Object	
Add Overview Area		Remove Overview Area	
Add GPS		Remove GPS	
Add Weapon Area Goal		Remove Weapon Area Goal	

Builder Options	
Random Group	
TACAN Information	
Rules of Engagement	
Distance Between Two Points	
Fence-In	
Unused	
GPS Information	
Unused	

Zoom In   Zoom Out   Revert   Zoom Area   Center on Cursor

User Defined Filters

INTRO TO THE MISSION BUILDER

◆ Click on MISSION BUILDER from the Tools menu.

The Mission Builder interface is straightforward, using many familiar Windows 95/98 interface conventions.

Control Panel

Mission Map

Map Controls
Filters

Screens, Windows and Maps: Throughout this section are references to *screens, windows,* and *maps*.

Maps are the image of the mission terrain that appears to the left of the icon panel.

Screens refer to the entire Mission Builder editor and include both the image of the mission terrain (map) on the left, and the control panel on the right. The screen generally remains the same, but changes to accommodate complex design situations.

Windows are "pop-up" data entry interfaces.

OK and Cancel: These appear at the bottom of every pop-up window.

Clicking OK records all the new information and returns to the previous window or screen. Pressing ENTER is usually, but not always, the same as pressing OK.

Clicking CANCEL (pressing ESC) closes the window, and ignores any new information that was input while the window was open.

Drop Down Menu: A text box with a white downward pointing "arrow" indicates a drop down menu is available for a choice selection. An example is the Select Aircraft window. Clicking on a white arrow displays the list of all possible aircraft. Use the scroll bar to view the entire list. To select an item from a list, just click it.

On/Off Toggle: A box next to an item (with or without a black checkmark) indicates elements that can either be on or off, such as "Display on Briefing Map". A box with a black checkmark is ON. Clicking on the black checkmark turns it off, and the checkmark disappears. Clicking on an empty box turns the option ON and displays the black checkmark.

Text Boxes: To make changes in a text box, click in the box and use BACKSPACE to back over the default entry. Type in the new information.

Click-and Drag: An object on the Mission Map can be moved at any time by simply left-clicking on it and dragging the cursor to the new location. If there is a discrepancy between the icon and the cursor, the icon "snaps to" the place where the cursor is when the mouse button is released.

MISSION BUILDER FEATURES

Mission Builder features are categorized into four broad categories: Builder, Placement, Function and Mission Text.

Builder: Used to create custom missions, such as New Mission and Open Mission. They aid in the development stage only; they don't appear in the final mission.

Placement: Used to place or remove objects from the mission. Nearly every item that appears in a mission, from fighters to storage sheds is put there one by one. Placing units is a straightforward process. Extreme realism can be achieved with a high density of objects, including those that have nothing to do with the mission or with no more than the minimum to complete the mission.

Function: Used to provide the action in the mission. They are essentially "scripting", a kind of language, where you designate what the situation is, how the objects are to interact, and when actions are to occur. Like Placement, Function can be more or less intense, depending on your appetite. In highly realistic missions, you'll spend most of your time working on the mission's functions.

Mission Text: Used to provide the player information on the mission, feedback during the mission, and an evaluation upon completing the mission. You must create all of the text for the mission. Although the game does not really generate text on the fly, it can vary the text the player sees by triggering certain goals during the mission. You must anticipate and plan for these "random" triggers.

BUILDER

New Mission: Creates a new mission template.

Open Mission: Opens a previously saved mission template.

Save Mission: Saves the current template.

Aircraft Information: Displays a list of the aircraft placed in the mission.

Ship Information: Displays a list of the ships in the mission.

Moving Vehicle Information: Displays a list of moving vehicles placed in the mission.

Ground Object Information: Displays a list of stationary ground objects placed in the mission.

Waypoint Information: Displays a list on the waypoints placed in the mission.

Goal Information: Displays a list of the goals placed in the mission.

JSTAR Information: Displays information on any JSTAR aircraft in the mission.

Mission Setup: Displays the Mission Setup window. This information is required for all missions.

Mission Checklist: Displays a quick reference list of the mission's key events.

Builder Options: Sets up custom settings for the Mission Builder.

TACAN Information: Displays a list of the TACANs placed in the mission.

GPS Information: Displays a list of the GPS satellites placed in the mission.

Distance Between Two Points: Displays the distance in NM.

Add/Remove Overview Area: Adds or removes the Overview Area. The outline area displays as the map on the mission screen.

PLACEMENT

Add/Remove Aircraft: Adds or removes an aircraft from the map.

Add/Remove Ship: Adds or removes a ship from the map.

Add/Remove Moving Vehicle: Adds or removes a moving vehicle from the map.

Add/Remove Ground Object: Adds or removes a ground object from the map.

Add/Remove Waypoint: Adds or removes a waypoint from the map.

Add/Remove Goal: Adds or removes a goal from the map.

Add/Remove Area Goal: Adds or removes an area goal.

Destroy/Undestroy Object: Destroys an object leaving a crater; or undestroys an object.

Add/Remove Weapon Area Goal: Adds or removes a weapon area goal.

FUNCTION

Clicking on control icons (the icon is pictured) activates some of the Functions, while others are activated by right-clicking on an object on the map.

Edit Aircraft (right-click the aircraft on the map): Provides details for the aircraft, including actions.

Edit Waypoint (right-click the waypoint on the map): Provides details for waypoints, including actions.

Mission Events: Sets up actions that occur whenever certain events are met.

Add JSTAR: Adds a target to the JSTAR "call-outs".

Remove JSTAR: Removes a target from the JSTAR "call-outs".

Add/Remove Bullseye: Adds or removes a secret reference point that the player and his allies uses to "code" secret locations.

Alternate Path: Simulates an emergency sub-mission that occurs during flight.

Environment: Selects the mission's weather.

Filters: Serves two functions. Selects what is visible on the mission map during the mission briefing, and makes certain objects "visible" or "invisible" in the Mission Builder.

Add/Remove GCI Link: Adds or removes radar station Ground Control Intercept (GCI) connections that guide players to targets.

Groups: Simulates random aircraft appearances during the mission.

Add/Remove TACAN: Adds or removes Tactical Aid to Navigation (TACAN) "homing beacons" that feed location information to the player.

Add/Remove: Adds or removes Forward Air Controllers (FAC) on the map that tells the player precisely the locations of targets.

Rules of Engagement: Sets the rules of engagement for the mission.

Fence: Sets any of four "fences", or national boundaries, triggering a notification to the player.

Add/Remove GPS: Adds or removes a Global Positioning System (GPS) marker.

TEXT

Briefing Summary Setup: Creates text that displays in the Summary Briefing window.

Briefing: Creates text that displays in the "Detailed Briefing" screen.

Debrief: Creates mission summary text that displays after the mission.

Add/Remove Mission Label: Adds or removes the mission label that the player sees as he is about to load the mission.

COMMON INSTRUCTIONS

These instructions apply throughout the Mission Builder. Rather than bore you with repeating each "Add," "Remove," or "Info" button, they're listed here just once.

EDIT OBJECT

◆ Right-click the object icon.

You may return to the object window and adjust previously entered information.

REMOVE ITEM

◆ Click the appropriate REMOVE button.

◆ Click the icon you want to remove.

◆ Confirm the removal by clicking OK.

You can only remove items you can place on the map – some items can not be deleted. It is not uncommon that the map gets quit cluttered with a variety of objects, so be sure to double check before confirming an item's removal.

> *EA TIP* You can't remove an item with an assigned role in the mission, e.g., goal marker, etc. Once you remove the role, you can remove the item.

ITEM INFO

View a list of all items assigned to the Mission Map by clicking the appropriate item INFO button.

Items are listed in chronological order; i.e., the first item added is at the top of the list. The information includes the information typed in when the goal marker was assigned.

FEATURES

NEW MISSION

Clicking the NEW MISSION button gives you a blank slate of the mission area. What actually exists in real life (what you see on the satellite photo) is already on the map. You must add anything else. Before a player is able to do so much as fly around a single F/A-18E Super Hornet, some basic elements (such as the just mentioned F/A-18E) must be added to the blank slate.

◆ Click the NEW MISSION button.

OPEN MISSION

Previously saved missions can be opened for completion or modification.

◆ Click the OPEN MISSION button.

◆ Double-click to open the desired mission.

SAVE MISSION

◆ Click the SAVE MISSION button.

◆ Click in the File name field.

◆ Type the name of the new mission.

◆ Click SAVE.

> **NOTE:** It's always a good idea to save often while you're creating a mission. You never know when the dog is going to bump the reset button on your computer.

Save As: If this is your first saved mission, the pop-up window says "Save AS". The new mission must be named at this point. Mission names can be difficult to read if they are longer than 25 characters.

> **EA TIP** Saving missions with names longer than eight characters can cause error problems if you are saving to a network drive that only supports eight-character file names. Be sure to check first.

Save: If the mission was previously saved, highlight the name and press ENTER to save the mission.

If a different name is entered before ENTER is pressed, there will now be two versions of the same mission: One with the new name and all the current changes, and one with the old name without the current changes. If this happens, be sure to see how to delete a mission.

DELETING A MISSION

To delete a mission, you must exit the game entirely and go to the F/A-18 Mission folder. Double-click MY COMPUTER, then the installation drive, probably c:\Program Files\Electronic Arts\Jane's\FA-18, and finally MISSION. Mission Builder missions have a .CMF (Mission Maker) extension.

◆ Find the name of the mission to delete.

◆ Click on the name to highlight it.

◆ Select DELETE from the File menu.

SAMPLE MISSION

Before getting to the nitty-gritty of the Mission Builder, let's step through the process to create a sample mission. The basic steps and commands are provided, but don't use this as a substitute for examining the remainder of the Mission Builder Chapter. So much more awaits.

You could select anywhere to start the builder process, but let's start just north of the label "Norwegian Sea", at the lower left of the Mission Map. We'll start this aircraft in the air, so don't worry about taking off.

1. Place the player's aircraft.

◆ Click ADD AIRCRAFT.

  • Click the Mission Map to place the aircraft.

  • Type "Player F/A-18" as the Name/Label.

  • Set "5000" as the altitude.

  • Select "Unguided Strike" as the Loadout.

  • Click OK.

2. Place the aircraft carrier.

◆ Click ADD SHIP.
  - Click the Mission Map near the player's aircraft.
  - Click OK on the Ship Information window.

3. Place a Target.

◆ Click ADD MOVING VEHICLE.
  - Click the Mission Map just between the four airfields to the right of the player's aircraft.
  - Select T-72 (Red Russian) as the type.
  - Select Enemy as the Side.
  - Type "T-72" as the label.
  - Click OK.

4. Set Goal.

◆ Click GOAL.
  - Click on the T-72 you just added.
  - Set "Must Destroy" as the Goal.
  - Type "Primary" as the label.
  - Set "Primary" as the Goal Type.

5. Plot the player's route to the target.

◆ Click ADD WAYPOINT.
  - Click the player's F/A-18.
  - Click the T-72.
  - Click ZOOM AREA.
  - Click-and-drag the waypoint so it's positioned over the T-72.

6. Plot the player's route back to the carrier.

◆ Click ADD WAYPOINT.
  - Click Waypoint 1 over the T-72.
  - Click the carrier.
  - Click ADD TACAN (this is so the player can more easily find the carrier).
  - Click on the carrier.
  - Set "1" as the Channel Number.
  - Type "Home" as the Station ID.
  - Click OK.

7. Set Action to Bomb the target.

◆ Right-click the waypoint over the T-72. This opens the Waypoint window.
  - Type "Primary" as the label.
  - Set "500" as the altitude.
  - Set "250" as the speed.
  - Click ADD to add an Action.
  - Select Bomb Target, then click OK. This opens the Bomb Target screen.
  - Click DESIGNATE TARGET (green triangle).
  - Click #1 white triangle.
  - Click the T-72.
  - Click EXIT.
  - Click OK.

8. Set Action to Land the player's aircraft.

◆ Right-click Waypoint 2 over the carrier, this opens the Waypoint window.
   • Type "Landing" as the label.
   • Click ADD to add the Action.
   • Select Land.
   • Click OK.

9. Complete the Summary Briefing.

◆ Click SUMMARY BRIEFING.
   • Type a brief description of the mission.
   • Click OK.

10. Complete the Debriefing.

◆ Click DEBRIEFING.
   • Click ADD: this opens the Debrief Logic Group window.
   • Click ADD: this opens the Debrief Logic Statement.
   • Type "Way to go!" or any other positive statement.
   • Click ADD: this opens the Debrief Item Select window.
   • Click OK (must destroy primary is already displayed).
   • Click OK.
   • Click OK.
   • Click DONE (finally).

11. Mission Information (the last step).

◆ Click MISSION INFORMATION.
   • Type any appropriate title.
   • Type your name as the author.
   • Type a short mission description.
   • Type "my first mission" in the comments.
   • Click OK.

12. SAVE MISSION! Always remember this step.

That's it. You just completed you first mission. Good job!
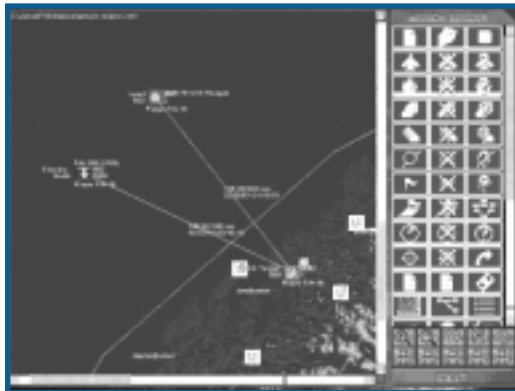
ADD AIRCRAFT

◆ Click the ADD AIRCRAFT button.

◆ Click on the map where the aircraft is to begin the mission.

◆ Adjust elements in the Aircraft Selection window.

◆ Click OK.

Repeat the above procedure for each aircraft you add.

Adding aircraft is a simple or multi-step process, depending on how much detail and realism you want in the mission.

There are 20 different elements to adding an aircraft, and although almost all of them may be skipped, the more elements that you include, the more "finished" the mission will appear.

> **NOTE:** This may seem elemental, but a mission must have at least one aircraft – the one the player flies. Most missions include enemy aircraft to fly against or add flavor to the environment. Enemy aircraft are not required, since a mission's threats could consist entirely of AAA and SAMs. However, enemy aircraft do add a real challenge to a mission.

AIRCRAFT TYPES

Please keep in mind that the F/A-18E Super Hornet is the only aircraft the player can fly. Any other aircraft type is part of the mission's environment as a friend, enemy, or neutral.

AVAILABLE AIRCRAFT

Select the aircraft type.

NUMBER IN FLIGHT

The Mission Builder supports up to eight aircraft per flight.

The aircraft in any given flight is always the same type of aircraft, but you can always have multiple flights of different aircraft flying along the same waypoints.

SIDE

◆ Select whether the aircraft is friendly, enemy, or neutral.

It's not mandatory that enemy aircraft types are aligned with the enemy forces, but it certainly makes things more obvious to the player. If MiG-29s are flying as friends (must be traitors), or F-16s are flying for the enemy (you know how those F-16 pilots are), it's a good idea to mention it prominently in the Mission Briefing.

Friendly and enemy computer aircraft attack each other on sight under the higher Rules of Engagement – after all this is war. The player need not be in the immediate area for combat to begin.

EA TIP Any aircraft regardless of model can be classified as "friendly". The computer doesn't care what kind of aircraft it is. If it's friendly in the Mission Builder, it's an ally in the game. This means you can assign MiGs to the American side, if you wish.

CALLSIGN

Callsigns are selected from the available list. If there is more than one aircraft in a flight, all aircraft use the same callsign, numbered in sequence, e.g., Cobra 1, Cobra 2, and so on. The callsign by itself (without a number) refers specifically to the flight leader. In the player's flight, the player is always #1.

SPEED (IAS/TAS KTS)

There are two ways to measure an aircraft's speed: indicated and true. Both are measured in knots.

450 knots IAS (the default) is a good cruising speed for fighter/strike aircraft. If you set the speed too high for the aircraft type, the simulation automatically adjusts it down.

ALTITUDE

The Altitude sets the aircraft's height above sea level at the start of the mission. Grounded aircraft should be placed at zero altitude, while most aircraft feel comfortable at anywhere from 5,000 to 15,000 feet.

Some care should be taken when placing aircraft in relation to the environment. If it's important that friendly aircraft appear at a certain waypoint at a certain point in the mission, don't start them off at medium altitude in the middle of a SAM corridor. Likewise, don't give an aircraft an altitude of 500 ft and expect it to make it across a nearby mountain range. The lower the altitude, the greater the risk a computer pilot can't recover from an unexpected obstacle or problem.

The default altitude of 10,000 ft is a good cruising altitude for most aircraft, although it may vary according to mission and aircraft type.

EA TIP For the F/A-18E, 200 ft or less is usually good to avoid detection. If there are AAA and light SAMs, 12,000 ft or higher is good. If there are heavy SAMs in the area, stay under 200 ft or use terrain to mask your approach.

CONTROL

There is only one human-controlled aircraft, except for multiplayer missions. In single-player missions, aircraft control is always computer controlled except in the case of the player's aircraft.

CARRIER

Carrier capable aircraft, such as the F/A-18E, can be assigned to a carrier if it's placed on the map.

LOADOUT

Loadouts vary with aircraft type. Each aircraft has its own selection of loadouts to choose from.

Loadouts assigned to the player and his wingmen are adjustable in the mission's briefing stage.

AIRCRAFT NAME/LABEL

◆ Accept default.

—or—

◆ Click in the text box.
◆ Backspace over the current label.
◆ Type in the new label.

Labeling aircraft on the mission map is an easy way of tracking everything during the complex process of mission design. Labels are worth the time it takes to type in some basic information. The most useful label information is what type of aircraft and what it's doing, e.g., F/A-18 CAP. The label needs to be short as there is only a limited amount of room.

Labels appear next to the map icon and in the Aircraft Info List.

DISPLAY ON BRIEFING MAP

◆ Toggle ON/OFF.

Displays the aircraft on the Briefing Map.

The Briefing Map isn't supposed to display everything out there – leave something for the surprise. In any event, it would clutter up the map and minimize the important objects, making them difficult to locate.

The best approach is to only display the objects key to the mission: player wingmen and waypoints, locations of known enemy units, possible backup support and, of course, targets.

DISPLAY ON THREAT LIST

◆ Toggle ON/OFF.

Displays the object on the Threat List.

ROUTE COLOR

Separate route colors for different sides or flights makes them easily identifiable. They are for design purposes only, and are visible to the player only when the objects are "Displayed on Briefing Map."

LABEL COLOR

Designated labels (see Name/Label, above) can also have different colors. In the same way color helps separate routes, label colors help identify different elements in the mission. Labels are invisible to the player and are only used in distinguishing elements of a mission.

Although labels can be set to match route colors, they are also useful for identifying types of aircraft, types of mission, or friendly vs. enemy.

BRIEFING GROUP

Corresponds to the flight tabs in Mission Briefings.

CHANCE OF APPEARING

◆ Click in the text box next to CHANCE OF APPEARING.

◆ Backspace over the text.

◆ Type the percent chance for that unit to appear.

Chance of Appearing is exactly what it sounds like – you are assigning a percentage chance of a unit appearing in the mission.

It is used primarily to give a mission a degree of randomness and replay value. Units won't appear in the same places every time a player flies through a certain area. Sometimes there may be MiGs lurking behind the mountains, and other times they may encounter nothing more that a recon flight.

Any aircraft, ship or moving ground unit with a goal attached must, of course, have a 100% chance of appearing. The same goes for the player's aircraft. For more information, see **Random Group**, p. 6-177.

When adding a Group aircraft, they already have a percentage chance of appearing assigned. This percentage appears in the Chance of Appearing box, and can't be altered – the number is grayed-out. To change a Group aircraft's Chance of Appearing, modify it in the Group window, see **Random Group**, p. 6-177

GROUP

◆ Click on the white arrow in the GROUP box to view a drop-down list of every group you've created. You probably don't have any groups at this point, so see **Random Group**, p. 6-177.

◆ Click on the name of the group you want assigned.

PACKAGE

Packages are sets of units in groups that are established during the process of creating a **Random Group**, see p. 6-177.

◆ Click on the white arrow in the Package box to view the drop-down list of available packages for the Group.

◆ Click on the name of the specific package to assign the unit.

INITIAL ACTIONS

Initial Actions is identical to Waypoint Actions, see **Add Waypoint: Actions**, p. 6-161.

Aircraft have actions assigned at each waypoint. Initial Actions are only assigned at the first waypoint. All other waypoint actions are simply called "Actions." Not all Actions are available as Initial Actions, e.g., bomb target, is not listed as an Initial Action.

ADD SHIP

◆ Click the ADD SHIP button.

◆ Click on the map where the ship is to begin the mission.

◆ Adjust elements in the Ship Selection window.

◆ Click OK.

Repeat the above procedure for each ship you add.

Ships include all sea-based objects. They can be set to stationary or moving depending on the mission requirements. Only those settings different from the aircraft selection process are covered.

Waypoints are assigned in the same manner as aircraft, see **Add Waypoint**, p. 6-160.

CHANCE OF APPEARING

A ship does not have to be assigned to a group or package, but that is the only way of assigning it a percentage chance of appearing.

LEADER

Ships can follow the path of other ships by assigning them a Leader. They then follow the path of the Leader ship.

◆ Click on the white arrow in the Leader box to view the drop-down list of available ships to follow.

◆ Click on the name of the specific ship.

TIME – STARTING CONDITION

Set the time, in minutes, to elapse before the ship starts to move to its next waypoint. Zero minutes (the default) starts it moving immediately.

FLAG – STARTING CONDITION

Select the event – see **Mission Event**, p. 6-168 that signals the ship to move to its next waypoint.

INVISIBLE UNIT START

All ships in the group stay invisible until the appropriate conditions (Starting Condition Flag) are met.

ADD MOVING VEHICLE

The same process as for adding ships is used for Add Moving Vehicles. Moving Vehicles include all land-based objects that can move regardless of whether they actually do move. The list of types also includes aircraft to simply taxi on a runway.

See **Add Ship**, above.

ADD GROUND OBJECT

Many Ground Objects are too small to be seen on the default view of the Mission Map. Zoom in three to four times until the Ground Object is visible.

Placed objects have a black border. Objects that "come with the map" can't be removed.

> **EA TIP**   There are certain types of Ground Objects that can't be placed adjacent to other Ground Objects. If you have trouble placing an object on the map, try placing it farther away from other objects.

See **Add Ship**, above.

⌕ ADD WAYPOINT

Waypoints are defined destinations for movement, whether it's aircraft, ships, or ground units. At the beginning of the mission, the unit appears where its icon was placed on the map. Unless it is given at least one waypoint, it remains in that general position for the entire mission. If one is assigned, the unit immediately proceeds to the waypoint, performing whatever actions are specified.

Waypoints serve two purposes: mid-mission destinations and locations with specific events. Pilots, whether computer or human, need specific coordinates and targets not just instructions like "go out there and find some tanks." Waypoints are a way of saying "go here, then there, and then do this."

When details are added, you program the computer pilot's actions. Altitude and speed are adjustable, and specific tasks are assigned to take place at a location. Therefore, if, for example, an aircraft is expected to bomb a tank farm, a waypoint must be placed over the tank farm.

First Waypoint:
◆ Click ADD WAYPOINT.
◆ Click the icon of the unit.
◆ Click the location on the map to place the waypoint.

Subsequent Waypoints:
◆ Click ADD WAYPOINT.
◆ Click the last waypoint of the unit.
◆ Click the location on the map to place the waypoint.

Waypoints are automatically numbered sequentially starting at "1." You can't change this manually; it automatically adjusts as you add or delete waypoints.

Once placed, you move a waypoint by click-and-dragging it to a new location.

Information about distance appears between consecutive waypoints, including the starting location to Waypoint 1. It is expressed in Nautical Miles and Estimated Time of Arrival (ETA).

Nautical Miles: The indicated distance is a straight measurement as-the-crow-flies. It doesn't take into account detours around hilly terrain or other ground obstacles. It's much more applicable to aircraft and ships, but is still a good gauge of relative distance for ground units.

ETA: Indicates when the waypoint should be reached, not the flight time to the waypoint. This way, you can coordinate arrivals without having to calculate flight time. It is calculated on the assigned speed of the unit and the total distance to the waypoint. It doesn't take into account any time delay assigned in Initial Action.

Whether the unit is an aircraft, ship or ground unit, the waypoint controls function in a similar manner. Of course, some controls apply only to aircraft.

ALTITUDE
The default is 10,000 ft. altitude above ground level. It's the target altitude at the destination. Aircraft gradually adjust their altitude on the way to the waypoint – not all at once.

SPEED (IAS/TAS)
See **Add Aircraft: Speed**, p. 6-157.

JUMP POINT
A Jump Point is like a stop point assigned to a waypoint. It tells the player's aircraft where to stop after the aircraft "jumps" to that point. It's a good idea to check JUMP POINT for each of the player's waypoints, but it's not necessary for computer-controlled aircraft.

LABEL
Labels are invisible during the mission, but help the mission designer track what activities and events are planned for what locations.

EDIT IN BRIEFING

Edit in Briefing allows the player to adjust waypoint details during the mission briefing. This is a courtesy generally extended to the player. However, there are exceptions. For example, if the mission is a combat air patrol and all the challenges could be avoided by moving the waypoints around, you might decide that the waypoints should remain fixed.

> **EA TIP**   Edit in Briefing is unnecessary for computer-controlled aircraft. Computer pilots never ask to edit their waypoints.

ACTIONS

A well designed mission gives the appearance that a human-like intelligence is guiding all the units in the mission. This is a result of careful planning and work, but is not automatically created for you when the units are placed on the map.

Without the appropriate actions, computer-controlled units blindly travel from waypoint to waypoint just checking out the scenery. Although they do defend themselves from threats, they do nothing else unless you tell them what to do and at what point to do it.

Note that the actions are assigned in a list format. The computer always performs the actions from top to bottom, exactly as they appear in the list.

ALERT INTERCEPT

Aircraft on runways only uses this action – it's specific to aircraft waiting to takeoff.

Reaction Range establishes the distance, in nautical miles, that triggers a response to an enemy threat. It can be set to any range, but 40 NM is a good average.

ALTERNATE PATH

Triggers an Alternate Path for the player.

An Alternate path is a pre-determined route for an alternative mission that overrides the original mission part way through the flight. For example, the player might be en route to bomb a runway. Part way through the mission, he is told there are downed pilots needing air support. The new waypoints that appear now mark the path to the downed pilots.

Alternative waypoints are invisible to the player until the Alternative Path is triggered. Once on Alternative Path, the player is not able to return to the primary path. In that sense, the Alternative Path is not really an alternative or optional component to the mission. It's really a secret primary path that replaces the original.

Assigning an Alternative Path is a three-stage process. There must be the original Primary Path, an Alternate Path and a flag set to indicate when the player is given the new assignment.

Even though you know the original mission won't be completed, if you want to maintain the ruse, the Primary Path needs to be complete in every way. That way they appear legitimate in the briefing. Likewise, the Alternative Path needs an ending, i.e., a final waypoint back to the carrier.

AWACS PATTERN

Assigns a patrol area to AWACS aircraft.

The AWACS Pattern is unique to AWACS capable aircraft such as the US Navy's E-2C Hawkeye. They patrol a certain area and feed information to nearby fighters. Assigning the AWACS action to an aircraft sets it on an orbital patrol centered on the waypoint.

Duration: sets the length of the AWACS patrol. When the time elapses or the flag is set, the aircraft proceeds to its next waypoint. Time is expressed in minutes. The Flag is a certain event that signals the end of the action.

◆ Indefinite – the action continues until the end of the mission.

◆ Ammo Depleted – the action ends when all ammunition is expended.

◆ User Flag – the action ends when a certain flag is set (See **User Flags**, p. 6-168).

ANTI-SHIP

Orders the aircraft to search for any enemy ships.

Search Range: The distance in NM to ship before the aircraft reacts.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

ASW

Orders the aircraft to search for any enemy submarines.

Search Range: The distance in NM to ship before the aircraft reacts.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

ATTACK SPECIFIC TARGET

Assigns the aircraft to destroy a specific target.

This guarantees that a specific object is attacked, providing an exciting environment of kamikaze effect. Assigning an ATTACK SPECIFIC TARGET Action to a Moving Vehicle provides terrorist-type attacks.

BOMB TARGET

Orders an aircraft to bomb specific targets.

Selecting Bomb Target changes the Mission Builder screen to the Bomb Target screen. When ordering an aircraft to bomb a target, it's best to first zoom in close enough so the intended target is clearly visible. The waypoint and the aircraft starting locations can always be moved to new locations after assigning the target.

Note that an aircraft can only bomb one target per waypoint. You can send in multiple aircraft, each with its own assigned targets, and can also assign multiple aircraft to bomb the same target.

The exact target must be designated for each bomber. All potential targets have a small white dot, and one of these dots must be selected to designate the target. This is much easier if the area is close enough to clearly see individual objects.

 Designate Target

◆ Click DESIGNATE TARGET.

◆ Locate the target in the Map window.

◆ Choose among the aircraft in your flight, 1 through 8 (remember the player is #1).

◆ Click on the target's white dot.

 Undesignate Target

◆ Click UNDESIGNATE TARGET.

◆ Click on the designated target to erase it as a target.

Bomb Profile

◆ Click BOMB PROFILE.
◆ Select the method of bomb delivery.
  • LEVEL is best if the bomber is approaching from a low altitude or is big like a B-52.
  • LOFT is best for stand-off attacks when you don't want to overfly the target.
  • POP-UP is best for when you're in a low-attack profile.
  • DIVE is best for high-altitude attacks.

Add/Remove Label

Use the labels to keep track of which objects are targeted by which aircraft.

◆ Click ADD LABEL/REMOVE LABEL.

Flight Position

These buttons are used in conjunction with DESIGNATE TARGET to assign targets to certain wingmen. The numbers correspond to the wingmen positions.

Map Controls

See **Single Mission: Map Controls**, p. 3-23.

CAP

Assigns an aircraft to Combat Air Patrol.

With CAP, there is no particular target, but rather a patrol over friendly territory searching for enemy aircraft. An aircraft continues this patrol for either the duration of the mission or until an event occurs that triggers it to change mission actions.

CAP aircraft fly an elliptical orbit around its starting position or waypoint. If encountering an enemy aircraft, it engages it in combat until either it or the enemy is destroyed.

Heading: Establishes the long axis of the elliptical orbit. This is typically set in the direction of the expected threat.

Range: The distance in NM to an intruding aircraft before the CAP aircraft reacts.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

CAS

Assigns an aircraft to Close Air Support.

Close Air Support is similar to a Combat Air Patrol, except that the goal is to protect allies on the ground by performing an advance sweep of the enemy, concentrating on ground targets.

On CAS, an aircraft is less likely to chase more distant enemy aircraft, concentrating instead on preventing immediate threats to the ground troops.

Search Range: The distance in NM that the aircraft is able to search for and attack enemy ground units.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

DAMAGE OBJECT
Upon reaching the waypoint, the object is destroyed.

DRONE
Orders the object to blindly move to the next waypoint while ignoring anything it encounters along the way.

ESCORT
Assigns an aircraft the task of safely escorting another aircraft through an area.

The waypoint path is double outlined showing the path of both the escort and escorted aircraft. This continues until the RELEASE ESCORT action is assigned to a waypoint for the escorting aircraft.

Escort is only available during certain conditions: at least two aircraft must be on the map, and you must assign the action to the last waypoint of the escorting aircraft. After the escort is complete, the aircraft may perform other actions.

◆ Right-click the last waypoint of the escorting aircraft.

◆ Click ACTION.

◆ Select ESCORT.

◆ Click OK.

◆ Click on the aircraft to be escorted.

◆ Confirm by clicking OK.

> **EA TIP** Escort can not be selected as an aircraft's initial action. It can only be assigned at a subsequent waypoint.

FIGHTER SWEEP
Orders the aircraft to search for any enemy aircraft in range ahead of them until the duration expires, or until they reach the next waypoint.

This action is similar to a mobile CAP, except that enemies behind the flight are not engaged.

Search Range: The distance in NM to an intruding aircraft before the aircraft reacts.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

FORM ON
Attaches aircraft to another aircraft or flight.

Form On is identical to ESCORT except the attaching aircraft will not break away to attack enemies – it only accompanies the "master" aircraft. The waypoint path is double outlined showing the path of both the attached and master aircraft. This continues until the RELEASE FORM ON Action is assigned to a waypoint for the attached aircraft.

Form On is only available during certain conditions: at least two aircraft must be on the map, and you must assign the action to the last waypoint of the attaching aircraft. After the Form On is complete, the aircraft may perform other actions.

◆ Right-click the last waypoint of the aircraft to "form on" the other's wing.

◆ Click ACTION.

◆ Select FORM ON.

◆ Click OK.

◆ Click on the aircraft to be followed.

◆ Confirm by clicking OK.

FORMATION

Assigns the formation through the waypoints.

The formation is changed upon reaching a waypoint; it is maintained until changed at a future waypoint.

Parade: Same altitude

Cruise: Same altitude

Combat Spread: Same altitude

Wall: Different altitudes

Box: Different altitudes

Ladder: Different altitudes
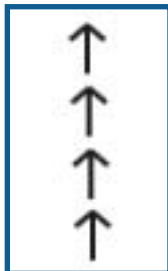
Trail: Same altitude
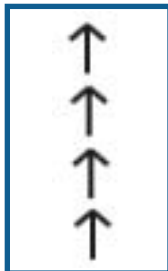
LAND

Orders the aircraft to land at the nearest airstrip or carrier on its assigned course.

Only use this Action when the aircraft's waypoint is near an airstrip or carrier.

> **EA TIP** Use this Action to give a feel of realism to the mission. Not all aircraft start their missions when the player enters the game. Some aircraft should begin in mid-mission, and other should be returning to base.

MESSAGE

Message is the only "secondary" action that can be assigned to a waypoint.

Messages may be text (maximum of 320 characters), sound (any .WAV file) or both. They are usually triggered by the player coming within range of another aircraft, but they can also be triggered by a Flag (see **User Flags**, p. 6-168).

Text Message

◆ Type the message the player sees.

Sound File

◆ Type the location of the sound file the player hears.

If the exact location of the sound file is unknown, browse for it by clicking the BROWSE button. Search through the directories until the appropriate file is found, then select it by double-clicking it.

ORBIT

Tells the aircraft to circle over a location.

Duration: See **AWACS Pattern: Duration**, p. 6-161 or until one of the following occurs.

◆ Player Arrives: orbiting enemy aircraft break and attack; orbiting friendly aircraft fly to the next waypoint.

◆ Escort Arrives: orbiting aircraft fly to the next waypoint.

◆ Form On: an aircraft assigned a Form On Action arrives at the last waypoint of its "Form On" assignment.

RELEASE CHUTES

Orders cargo aircraft to release their loadout at the waypoint location.

RELEASE ESCORT

Ends the escorting action from that waypoint on.

RELEASE FORM ON

Ends the "following" action of the attached aircraft; subsequent waypoints should have other assignments.

REFUEL

Orders the aircraft to refuel. It's assumed that a tanker aircraft is in position to refuel the aircraft.

SEAD

Assigns the Suppression of Enemy Air Defense Action.

SEAD missions are the precursors to airstrikes. Specialized aircraft are sent in to take out enemy SAM and AAA sites, clearing a corridor of relative safety for the following bombers.

Search Range: The distance in NM that the aircraft is able to search for and attack enemy SAM and AAA sites.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

SET USER FLAG

Triggers a USER FLAG to its True state.

STAND-OFF JAMMER

Tells a jamming aircraft, e.g., EA-6B Prowler, to attempt to jam ground defenses along a certain heading.

Heading

◆ Select the heading to concentrate jamming. The closer the ground defense, the more effective the jamming.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

TAKEOFF

Even during war conditions, aircraft are continuously in the air. You can place aircraft on the ground ("0" altitude) that either take off after the mission begins or in response to user Flags.

> **EA TIP**   The most realistic missions have grounded aircraft that respond to enemy activity. The level of detail is up to you. Aircraft can take off when territory is bombed, waypoints are reached or any other condition. Just be unpredictable.

When: Determines how long after the mission starts before the aircraft takes off.

◆ Time – delay in minutes before the aircraft takes off.

◆ User Flag – the action ends when a certain flag is set (see **User Flags**, p. 6-168).

Be careful when using Time, rather than a specific User Flag. If the player delays or strays from the expected timetable, the entire mission will be out of synch. It's better to use a Flag rather than time for critical take-off events.

TANKER PATTERN

This is only assigned to tanker aircraft: they orbit a certain area and provide a refuling opportunity to aircraft on longer missions. Assigning a TANKER PATTERN Action to an aircraft sets it on an orbital patrol around the waypoint.

Duration: See **AWACS Pattern: Duration**, p. 6-161.

REMOVE WAYPOINT

See **Common Instructions: Remove Item**, p. 6-152.

> **NOTE:**   When one waypoint is removed, the aircraft's path is automatically adjusted to go from the previous waypoint to the next waypoint. All subsequent waypoints are renumbered.

GOAL

A goal, or purpose, is what the mission is about in the first place. Without a goal the mission is just a sightseeing tour – it serves no purpose.

Each time the player takes off, there should be a clear understanding of what needs to be accomplished. Destroy a tank farm. Escort a bomb group. Or intercept a group of MiGs. A goal must be designated.

It's possible to designate a target without making it a goal, but in order to provide the player feedback, you need to mark it a goal.

◆ Click GOAL.

◆ Click on the individual target's icon or targeting dot.

◆ Select whether the target must be destroyed, marked as ⊠ or must survive, marked as ➕.

◆ Type in a label to describe the goal.

◆ Select the type of Goal, Primary, Secondary, or Normal.

◆ Click OK.

◆ Repeat until all desired targets are labeled.

> **NOTE:**   If a group of targets make up the goal, each must be marked with goal markers.

Goal Labels: It's important to clearly label goals. After the goals are identified, you set the Goal State Events. See **Mission Events: Goal State (Change) Event**, p. 6-170.

Essentially, a Goal State Event dictates if the state of a specific goal is A or B. The mission responds differently depending upon which is true. For example, if the goal is to destroy a factory, you would want a message saying, "Congratulations, you succeeded!" if the factory is destroyed, or "You failed, report back to base!" if the factory is not destroyed.

REMOVE GOAL

NOTE: If a goal is used by an event or debrief condition, in can't be deleted.

ADD AREA GOAL

A mission has only one Area Goal.

◆ Click ADD AREA GOAL.

◆ Click-and-drag the area on the Mission Map.

An Area Goal is a proficiency test. The computer keeps track of the ordnance expended and compares that to how much damage is inflicted. A success ratio is calculated from that information. The differing levels of success are used to trigger different debrief.

ADD WEAPON AREA GOAL

The Weapon Area Goal is unique to the delivery of certain weapon types such as mines. The goal tracks the quantity of the designated weapon dropped in the indicated area.

◆ Click ADD WEAPON AREA GOAL.

◆ Click-and-drag the area on the Mission Map.

MISSION EVENT

Events are the very heart of the mission builder. Events make things move, make things happen at the right time and make things react to the player's actions.

An Event is a way of saying, "Make this *Action* happen, whenever this *Condition* occurs," in such a way that the computer understands.

The interactivity of events can quickly get out of hand if you don't take a few steps up front to streamline the process. Plan to take a fair amount of time setting up the mission Events, especially the first couple of times. Once you get the flow down, it'll become second nature.

Events are dependent on the mission environment – it's impossible to make an aircraft react to the destruction of a target if either the aircraft or the target are missing from the Mission Map.

The recommended order of design is:

◆ Place all aircraft, friendly and enemy, that have an active role in the mission.

◆ Assign each of them waypoints.

◆ Place the remaining objects that have an active role in the mission, particularly those used as targets.

◆ Assign the Goals (including Area and Area Weapon Goals) for the mission.

◆ Place the other aircraft and objects to flesh out the mission realism.

USER FLAGS

A user flag is simply a name assigned to an occurrence you consider important to the mission. For example, if you want a flight of MiG-29s to take off when a SAM site is destroyed, then the destruction of that particular SAM site should be labeled as User Flag 1.

Then when assigning an action to the MiGs, you select the Action TAKE OFF and then select User Flag 1 from the Flag drop-down menu. It's just that simple.

NOTE: User Flags start in the FALSE or OFF state. They can only be set to TRUE or ON.

◆ Click EVENT.

◆ Click ADD to add a Mission Event.

◆ Select the type of Event – User Flags are usually Goal State Events since they tend to hinge on whether a goal is destroyed, see **Event Types**, next page.

◆ Complete the information specific to the type of event, see **Event Types**, next page.

Action – Set Up User Flag "Name"

◆ Click ADD under Action.

◆ Click SET FLAG.

◆ Select a User Flag number

◆ Set the operator to "=".

◆ Set the Value to "True".

◆ Click OK.

The User Flag name (User Flag 1, User Flag 2, etc.) you assigned needs an event or condition assigned to it.

Condition – Set Up Event Triggers User Flag

The drop-down menu lists the possible events, see **Event Condition Types**, p. 6-171. The Mission Goals are listed at the bottom.

◆ Click ADD under Condition.

◆ Click the checkmark on the Goal/Flag menu to display a list of all possible events.

◆ Select the event that triggers the User Flag.

EVENT TYPES

TIME EVENT

A Time Event says, "When this *Starting Condition* is met, this Action takes place, if these *Conditions* are met."

For Starting Conditions, you have a choice of using Time or a User Flag.

Time: Setting time as a Starting Condition is good if you want something to happen at a certain time regardless of the player's current location.

User Flag: Using a flag to set off an event is a better way of controlling exactly when an event takes place. Of course, you must first create a User Flag before it can be assigned as a Starting Condition.

Label: The Label for a Time Event should distinguish it from other Time Labels.

Timer: Setting a Timer, in minutes, delays how long after the Flag and any Conditions are met before the action takes place.

AREA EVENT

An Area Event says, "When the player enters the Area Event box, this *Action* takes place, if these *Conditions* are met."

◆ Click AREA EVENT.

◆ Click-and-drag to establish a blue Area Event box.

◆ Enter the details including Action and Condition.

◆ Click OK.

When: An Area Event is based on the player entering or exiting the Area Event box. EVERY TIME means that as long as the conditions are met, the Action happens when the player enters or exits the box.

Do not confuse the Area Event with the Area Goal. There is only one Area Goal, but there can be many Area Events, each with one or more conditions associated with it.

Always: The Action occurs every time the player enters or exits the box.

1 Time: The Action occurs only the first time the player enters or exits the box.

GOAL STATE (CHANGE) EVENT

A Goal State Event says, "When this *Goal's* state changes (such as no damage becomes destroyed), this *Action* takes place, if these *Conditions* are met."

Condition: Choose the Condition whose state change triggers an Action. Only targets that are marked as Goals appear in the drop-down menu.

Extra care should be taken when labeling Goal State Events, as there is probably more of these than any other kind of Mission Event.

END MISSION EVENT

An End Mission Event says, "When this *Goal* or *Condition* changes (such as the player is killed), the *Mission* ends, if these *Conditions* are met."

Delay: Set the time in minutes before the mission actually ends.

Label: Type in the name of the End Mission event. It is highly recommended that you label any event that ends a mission.

End Mission Message: Choose the message the player sees when the mission ends.

Condition: Choose the Condition whose state change triggers an Action. Only targets that are marked as Goals appear in the drop-down menu.

Take care when forcing the end of a mission. Make sure that is really what you want to see happen as a result of the condition.

MOVING AREA EVENT

A Moving Area Event says, "When someone enters the Moving Area Event *circle,* this *Action* takes place, if these *Conditions* are met."

The Moving Area Event is different from the Area Event in that it moves along with the designated object, ship or ground.

Object: Select the ship or ground object.

Label: Type in the name of the Moving Area circle.

Range: The radius of the event circle.

When: A Moving Area Event is based on someone, not just the player, entering or exiting the Moving Area Event circle. EVERY TIME means that as long as the conditions are met, the Action happens when someone enters or exits the circle.

Do not confuse the Moving Area Event with the Area Goal. There is only one Area Goal, but there can be many Moving Area Events each with one or more conditions associated with it.

Always: The Action occurs every time the player enters or exits the circle.

1 Time: The Action occurs only the first time the player enters or exits the circle.

> **EA TIP** The Moving Area Event is perfect for protecting the carrier as it moves across the water. This way you need not worry it will move out from under its protective umbrella.

ACTION TYPES (EVENT ACTION TYPES)

Event Actions (Actions assigned in the Events window) are what happen when all the given Conditions are met.

Do not confuse these actions with actions set at waypoints. Event Actions take place at certain times and under certain conditions.

MESSAGE (EVENT ACTION MESSAGE)

Event Action Messages can be text, sound or both. They are triggered by a set of conditions and are usually sent from allies. They can be triggered by any condition.

Text files are limited to 320 characters. Sounds files must be in .WAV format.

ALTERNATE PATH

See **Actions: Alternate Path**, p. 6-161.

SET FLAG

This assigns a "name" to a set of conditions, User Flag 1, User Flag 2, etc. The User Flag is later named as a Condition for either a unit or Event Action.

There are two reasons to use the Set Flag to name a set of conditions.

The first and most important one is that some drop-down menus only allow selection of a User Flag. Therefore conditions must be named as User Flags before they are selected. For example, you can't assign conditions for an aircraft to end an Orbiting Action unless those conditions are part of a User Flag.

The second reason is that some sets of Conditions are reused, and it saves you the trouble of entering the same condition over and over.

FAC

FAC, as an action, turns the FAC on. It keeps the FAC from constantly talking to the player from the beginning of the mission – the player would look to target the FAC.

The FAC stops broadcasting when the mission is successful or the FAC is destroyed.

EVENT CONDITION TYPES

GOAL FLAG – USER FLAG

A set of conditions may be designated as a User Flag, see **Mission Event: User Flags**, p. 6-168 and **Action Types: Set Flag**, p. 6-166. The User Flag is then available as a Condition.

OUT OF A/G OR A/A

Out of ordnance usually signals the end of an aircraft's usefulness. Often these conditions are set to trigger a message stating the condition, see **Mission Event Action: Message**, p. 6-168.

FLIGHT 1 (PLAYER) DESTROYED

The mission may not have failed, but the game is definitely over – except for any last messages. The player can eject before the crash.

FLIGHT 2 (WINGMAN) DESTROYED

This can be accompanied by an Event Action Message of the pilot's last words, comments on life in general by other flight members or even an Alternate Path.

FLIGHT 3 THROUGH 8 DESTROYED

As in Flight 2, this can be accompanied by an Event Action Message of the pilot's last words, comments on life in general by other flight members or even an Alternate Path.

FLIGHT 1 (PLAYER) LANDED

The player lands his aircraft.

CROSSED FENCE

Crossed Fence refers to crossing national boundaries or the lines between friendly and enemy territory.

MISSION GOALS

Mission Goals are the most common conditions, as they outline the actual purpose of the mission. They are listed at the end of the Event Conditions list in the order created.

VIEW

The player's view switches to a unique cinematic scene.

EVENT OPERATOR

There are only two operators in Mission Event Conditions.

- "=" means equal to the value
- "!=" means not equal to the value

ADD JSTAR

Assigning objects to a JSTAR aircraft (pronounced jay-star) is one part of a two-step process. You must also place a JSTAR aircraft somewhere on the map within 200 NM of the furthest target. JSTAR aircraft observe moving ground objects.

◆ Click JSTAR.

◆ Click all desired ground objects.

ADD BULLSEYE

A mission has only one BULLSEYE.

The Bullseye is a location on the Mission Map, determined prior to the start of a mission and kept secret from everyone not having "need to know" clearance. It's used to help pilots refer to locations over the radio without letting the enemy know where they actually are or are going.

◆ Click BULLSEYE.

◆ Click the desired location on the Mission Map.

> **EA TIP** The Bullseye should be placed in an easily noticeable location, and don't forget to let the player know where it is during the Mission Briefing.

ALTERNATE PATH

Paths between the Alternate Path waypoints appear to you as dotted lines on the Mission Map. However, the path between the Primary Path and the Alternate Path do not appear, because many things may trigger the Alternate Path.

> **NOTE:** Alternate paths only affect the player. You can't assign an Alternate Path to a computer-controlled aircraft. Computer-controlled aircraft can respond to the events that occur during an Alternate Path mission, but their waypoints are fixed.

◆ Click ALT PATH.

◆ Click the map on the location for the first Alternate Path waypoint.

Right-click the new waypoint.

◆ Add details to the new waypoint.

◆ Continue to add waypoints to complete the mission.

— also —

◆ Create a Flag to trigger the Alternate Path.

◆ Create a Message to announce the Alternate path.

BRIEFING SUMMARY SETUP

Briefing Summary Setup allows the user to create a short, concise description of the mission. It should capture the player's attention and encourage further exploration of the mission information.

Treat the Briefing Summary as a newspaper headline, with a following tag line. At a minimum the Briefing should include what type of mission (CAP, SEAD, bombing, etc.) the player is about to fly.

◆ Click BRIEFING SUMMARY SETUP.

◆ Click in the text field.

◆ Type the summary briefing information.

◆ Click OK to save the text.

EDIT BRIEFING SUMMARY

◆ Click BRIEFING SUMMARY.

◆ Edit text field.

◆ Click OK to save the text.

MISSION BRIEFING

The Mission Briefing expands on the abbreviated information found in the Briefing Summary. The player needs to know what to expect in order to plan appropriately and select the appropriate loadout.

It should include possible enemy threats, the current military situation, and the goals the player is expected to achieve.

Of course, there is nothing to limit the amount of information you can provide to the player. Current weather conditions, time of day, recommended loadout, etc, are included at your discretion.

◆ Click MISSION BRIEFING.

◆ Click in the text field.

◆ Type the summary briefing information.

◆ Click OK to save the text.

EDIT MISSION BRIEFING

◆ Click MISSION BRIEFING.

◆ Edit text field.

◆ Click OK to save the text.

ADD OVERVIEW AREA

The Overview Area is a snapshot of the mission map that displays in the Mission Map section of the Main Briefing screen. You determine what to display by selecting a section of the mission map.

◆ Click OVERVIEW AREA.

◆ Click-and-drag the area on the Mission Map.

MISSION DEBRIEF

Creating a Mission Debrief is essentially assigning messages to some, or all, of the long list of possible events. There are many different flags and the first 50 or so are repeated for each of the eight possible flights. It's up to you to determine which of these Events warrant mention in the debriefing.

◆ Click MISSION DEBRIEF.

◆ Click ADD to create a new Debrief.

STOP DEBRIEF

◆ Click the Condition in the Condition Statement list that ends the Debrief process.

◆ Click the STOP DEBRIEF PROCESSING IF TRUE box. (Repeat for any Conditions that should halt the debriefing).

If you decide that with a certain Condition, such as the player being shot down, no more messages should display, then STOP DEBRIEF PROCESSING IF TRUE should be clicked for those Conditions.

Note that letting the debrief process continue often results in a more robust debrief message. It's not necessary to halt the debriefing process.

DEBRIEF LOGIC GROUP

◆ Name the Logic Group.

◆ Click ADD to add the Condition Statements.

DEBRIEF LOGIC STATEMENT

The is the most important section of the Debrief, where each Condition, or set of Conditions, is tagged with a message for the player to read. The debriefing occurs even in the event the player is destroyed.

NAME LOGIC STATEMENT

◆ Type the name of the Logic Statement.

A Logic Statement is the name of a certain Condition or set of Conditions that appears in the Logic Group List.

A Logic Statement name is usually the same as the Condition unless more than one Condition is selected.

SELECTING THE CONDITIONS

◆ Click ADD to create a Condition Statement.

GOAL / FLAG

Select the Condition(s) for the Condition Statement.

OPERATOR

◆ Add a message that appears to the player. Make certain the message is applicable to all conditions included in the Logic Group.

There are six possible Operators for the Debrief Conditions:

- "!=" – not equal to
- "=" – equal to
- "<" – less than
- "<=" – less than or equal to
- ">" – greater than
- ">=" – greater than or equal to

FLAG

In cases where the action is True or False, such as being killed, shot down, or crossed fence boundary, etc., Flag should be used, and TRUE or FALSE selected.

VALUE

In cases where there is a numerical value, such as number of bombs, bomb hit ratio, etc, Value should be used, and a number added to the field. For example, the Number of Bombs could be less than or equal to 4, or the Hit Ratio could be greater than 50 (percent).

MESSAGE

The messages are what the player actually sees during the debriefing; all Logic Groups and statements are visible.

All applicable Messages appear in the Debriefing in the order that the Conditions occurred.

GENERAL MISSION INFORMATION

NOTE: This step is required for each mission.

After a mission is created, it appears as a selection in the Jane's F/A-18 Load Mission list. You must create the title and supporting text for the player.

TITLE

The actual name of the mission; this appears in the Load Mission list.

AUTHOR

Your nom de plume. This is invisible to the player and is mostly used in the event someone else incorporates changes into a mission. If more than one designer adds details to the mission, the lead designer is typically listed as the Author.

MISSION SUMMARY DESCRIPTION

When the player clicks on the Mission Title in the Load Mission list, this appears in the upper left window. This is where you catch the players attention.

COMMENTS

These are really notes to yourself: future design ideas, incomplete steps, etc. These are invisible to the player.

LOAD MISSION IMAGE

You can display a BMP image of your choice in the lower left window.

Type the location of the BMP file.

If the exact location of the file is unknown, browse for it by clicking the BROWSE button. Search through the directories until the appropriate file is found, then select it by double-clicking it.

MISSION CHECKLIST

The Mission Checklist is a reminder list for the player of the key elements of the mission. This should, at the very least, include the mission goals or any other element crucial to the success or failure of the mission.

◆ Click Mission Checklist.

◆ Type the checklist items in the text box.

The style of presentation is your choice. It's basically a free form text area.

ENVIRONMENT

Time and weather not only add visual variety to the mission, but also change the mission itself. A night mission is very different from a day mission, just as a CAP with cloudy skies provides more of a challenge than one with clear skies.

TIME OF DAY

Dawn is from 5 AM to 7AM. Dusk is from 5PM to 7PM. Daylight falls between Dawn and dusk, and Night is between Dusk and Dawn. Selecting a Time of Day sets the start of the mission. Time then advances throughout the mission.

WEATHER

The four options: Clear, Partly Cloudy, Overcast and Stormy.

MAP FILTER OPTIONS

Filters are used as a design tool, enabling you to choose what objects are visible on the Mission Map at any time. By the time a mission is fully created, the map can be full of objects, icons and lines. Filtering out items makes it easier to view just the task at hand.

◆ Place/remove checkmarks in the boxes to make the respective objects visible/invisible during the design process.

◆ Click SET.

◆ Click on one of the five Filter Icons to assign it the current selection.

Click OK.

Filter Icons: There are five filter icons at the bottom of the Mission Builder Panel. These can be assigned the certain filters. For example, one icon could make only friendly aircraft and objects visible, while another would show only enemy forces.

EA TIP **Remember that all objects appear in the game. Be careful not to filter something out and then forget about it. The final mission check should be with all objects visible.**

MISSION BUILDER OPTIONS

The Mission Builder is designed to give you as much information as you find convenient. These customizations can be adjusted at any time during the design process.

AIRCRAFT & WAYPOINT LAYOUT

Each Aircraft or Waypoint can be surrounded by up to six pieces of data about that object. However, you can't customize the layouts for individual aircraft or waypoints. The layouts apply to all objects.

START OPTIONS

Load Last: Sets the Mission Builder to automatically load the last mission you had open.

Load Default: Set the Mission Builder to automatically load the default mission included with *Jane's F/A-18*.

ADD GCI LINK

Ground Control Interception (GCI) is a method of coordinating the information between one radar station and the next. It's an air control information relay system, in which one station's information is passed on to all the other radar stations in the network. CGI sites coordinate the air defenses of a side. There is no limit and no range – isn't modern telecommunications great.

First

Place a series of radar stations on the mission map, see **Add Ground Objects**, p. 6-159.

Second

◆ Click ADD GCI LINK.

◆ Click on the first radar station (or radar directed SAM/AAA site) in the link.

◆ Click on the radar station nearest to the first station to establish the link.

◆ Continue connecting the sites until the GCI network is complete.

ADD TACAN

Tactical Aid to Navigation (TACAN) is a UHF transmitter that sends out a constant message relaying distance and directional information. All military airports have them, and the signal enables the player to know his position in relation to the landing strip.

In general, TACAN stations have wide ranges and usually extend far enough into enemy territory to prevent any gaps in information. TACAN stations are assigned to those airstrips friendly to the player.

◆ Click TACAN.

◆ Click on a ground object or tanker.

CHANNEL NUMBER

Each TACAN operates on a unique channel. Assign a channel number from 1 to 123 to the TACAN.

STATION ID

Each TACAN needs an ID to make it easily recognizable to the player. The ID is either text or numeric.

FIND NEXT AVAILABLE CHANNEL

Click this button to have the computer scan through the TACAN information and offer the next available channel. Click OK to accept.

ADD GPS

Certain types of weapons utilize the Global Positioning Satellite (GPS) system to continually update their geographical position as they fly to the designated target. The GPS satellites are placed on the mission map to mark specific target locations for these weapons.

◆ Click ADD GPS.

◆ Click the map location of the GPS.

Name: Type the name of the GPS satellite.

Short Name: Type a short name for the GPS satellite.

ADD FAC

Forward Air Controllers (FAC) are essentially soldiers with good eyes and portable radios. They can be in tanks, buildings, or elsewhere. They are in enemy territory to search out ground targets and call in information for an air strike.

Placing a FAC is a two-step process. After the FAC is placed, a FAC Event must be designed to make it "work." See **Event: FAC**, p. 6-171. There's only one FAC per mission.

◆ Click FAC.

◆ Click the map location of the FAC.

FENCE

Enables or disables the fence boundaries surrounding the Countries in the North Cape area. With an active fence, you may check for crossing events.

◆ Click FENCE.

Enable or disable the desired fences.

RANDOM GROUP

Groups are composed of either aircraft or ground vehicles. In the following discussion, the groups are composed of aircraft and packages, but the same rules apply to ground vehicles.

The purpose of using groups is to add a random element to the mission. If a mission lacks randomization, there is no reason for the player to replay the mission. The same aircraft will arrive at the same place in the same way every time the mission is played. However, when a Group is created, and packages are assigned to it, only one of those packages appears in the mission. This adds a random element to the enemy forces that the player faces each time he flies the mission.

CREATE A GROUP

◆ Click RANDOM GROUP.

◆ Click ADD to create a new group.

◆ Type the name of the Group into the Name field at the top of the new window.

ADD A PACKAGE TO A GROUP

◆ Click ADD to add a Package (one or more aircraft) to the Group.

◆ Type a brief description of the Package.

◆ Assign a 1-100 percent chance of appearing.

◆ Click ACCEPT.

◆ Continue adding Packages until the Group is complete.

◆ Click DONE when the group is complete.

EA TIP   The number of Packages per Group is a designer decision. There are no limits on the number of Groups, or how many Packages per Group. Remember though, only one package per Group appears.

RULES OF ENGAGEMENT

You set the Rules of Engagement (when it's "legal" to fire) for each side in the mission. ROE is described in military terms of "alerts."

Green (Alert) – Weapons Hold: It's a non-combat situation. Don't fire on anyone unless they fire on you first or lock you up in preparation to fire a missile.

Yellow (Alert) – Weapons Tight: Fire only on confirmed enemies.

Red (Alert) – Weapons Free: Go for it, fire at will.

ADD MISSION LABEL

Important locations on the map may sometimes require a label to help the player recognize them. Bases, cities, or anything you consider important can be labeled. Labels are completely up to your discretion.

DISTANCE BETWEEN TWO POINTS

The distance in nautical miles between the two points is displayed.

◆ Click DISTANCE BETWEEN TWO POINTS.
◆ Click the first map position.
◆ Click the second map position.

DESTROY THIS OBJECT

A war zone (or my office for that matter) rarely looks clean and unblemished. If you want to place down some battle scars, use DESTROY THIS OBJECT to replace some objects with burned-out craters. This can be used on objects you added and those built-into the map.

EXIT

Leave the Mission Builder and return to the Tools menu.

NOTE: Any design information added subsequent to the last Save Mission will be lost. As such, you are prompted to confirm your decision to exit. Answer YES only if you saved your work or wish to discard the changes.

Jane's
COMBAT SIMULATIONS

CHAPTER 7: CAMPAIGN OVERVIEW

RUSSIA'S NEXT MILLENNIUM

With parliamentary and then presidential elections on the horizon, an economy in chaos and no clear vision of the future, Russia faces some hard choices and serious challenges. Dr. Mark Galeotti considers Russia's prospects on the eve of the new millennium – and whether it can survive.

In some ways the former title for this regular JIR column, " Decline and Fall," is just as apposite as when it first appeared in JIR in February 1991 – six months before the August coup and the consequent dissolution of the Soviet Union. As we move to a more neutral – if less predictive – column title, however, it provides a useful opportunity to take stock and consider not just what may face Russia next month or next year, but into the next millennium.

POLITICS: UNCERTAINTY AND CERTAINTY

From Jane's Intelligence Review May 1999

How can Russian politics be both uncertain and certain? The uncertainty lies in who will stand for the presidency in 2000, much less win. Of the present front-runners, none seem clear favorites. Prime Minister Primakov has a strong but brittle position and could conceivably not run, the Communist Party machine is doomed to be a strong also-ran and General Lebed has by all accounts made something of a mess of local politics which are rather less complex than Kremlin "wheeler-dealing". All that said, however, certainty lies in the course Russia will adopt. There seems no prospect that an ultra-nationalist of the Zhirinovsky school can win, while if a liberal wins the Kremlin – an improbable prospect – then he (Russia is a long way from electing a female president!) is unlikely to be able to stand against the prevailing political elite. Instead, the new order will resemble the old, standing for pragmatic new-conservatism run in the interests of the elite and heavily dependent upon the institutions and methods of a security apparatus still rooted in its Soviet past. This will be a democracy – but not necessarily especially liberal, pluralist or responsive to the mass of Russia's citizenry.

Taking a long view, there is no reason why such a system should not prove adequately stable and effective. Bringing more responsive democracy to such a large and varied country would be a complex and difficult task, and there is no reason to suggest that Russians would not see effective economic and political management as a higher priority that the abstract notion of a "purer" democracy. If the past decade has done anything, it has shattered a generations idealistic assumptions that Western-style democracy automatically and instantly brings with it Western-style standards of living.

Even the economy, Russia's most serious challenge, will improve in time. The uneconomic industries which Moscow dare not close down are slowly decaying. In some cases they are managing to find new roles; in others the workers, unpaid or on short weeks, are perforce developing their own alternative employment. It is not simply the case that Russia's poor, but also that the state has for years been unable to collect a credible share of the taxes it is due.

However, although a recent study has concluded that almost three-quarters of all retail cash transactions remain undeclared and untaxed, tax collection is improving. With greater revenues, the state will be able – if it so chooses – to meet more of its obligations (such as paying pensions, running hospitals and putting police officers on the beat) and thus restore to itself some of the legitimacy it has lost. This is not to say that Russia 10 years hence is likely to be rich, but that at least there is the prospect of an end to the present malaise.

For all this, however, the key tension will be between the central government with its notion of the Russian nation-state and the practical power and local authority of increasingly autonomous city and regional administrations.

SEPARATISM: THE HIDDEN CHALLENGE

In January, Primakov reportedly vowed not to "allow Russia to be lost [the way] we lost the Soviet Union" and to "smother, liquidate and root out separatism." However, the process of fragmentation of the Russian Federation predates the collapse of the USSR. Faced with economic collapse, a widespread sense that the central government is impotent or uncaring and thus a crisis in the very legitimacy of the state, the role of local, city and regional authority is becoming increasingly important. While outright defections, Chechen-style, are unlikely outside the

Caucasus region, this should not be a comfort to Moscow. Primakov himself favors a new campaign to re-establish the old 'rigid vertical system of authority,' with regional governors in effect appointed by the government rather than elected. In practice, however, the process of creeping devolution continues to erode Moscow's outright control over the regions, and where once the Kremlin ruled by decree, now it must rely upon consensus and negotiation.

Indeed, in many ways the case of the city of Moscow itself is instructive. One of the most corrosive problems Mikhail Gorbachev faced was that, with the Russian Federation presidency in the hands of Boris Yeltsin, his hopes of holding the USSR together were doomed, as its very heart was in the hands of his opponent. While Moscow is hardly likely to shatter the Russian Federation, the city authorities and mayor are not going to hand back to the Kremlin their new perks and autonomy. This is a pattern replicated across the country, and one which politicians at home and abroad have for some time acknowledged. Even the financial assistance being provided by the World Bank is increasingly being channeled directly to the regions rather than the central government.

FOREIGN POLICY: THE SAME OLD QUESTIONS

Seven and a half years of independent statehood have not been long enough for Moscow to come to terms with the end of the Soviet superpower and define a new role and identity for itself on the world stage. Should Russia seek to remain a world power, with all the commitments that entails? Should it regard itself as a member of the European/North American world community returned to the fold, or instead maintain a distinctive 'Eurasian' stance? These were all the questions being asked in 1992, and they have scarcely been answered today. Instead, foreign policy is too often a negative and conservative effort, geared towards denying the USA the 'monopolar' hegemony Moscow suspects it of seeking. For example, Moscow has since around 1997 grudgingly accepted the first wave of NATO expansion, even if it continued to complain in order to secure the maximum concessions from the West.

For the next few years, this is unlikely to change. The mentalities of this present generation of old men in the Kremlin are too close to those of successive Soviet generations. In the long term, though, new political leaders will come to address new agendas. However great its distaste for NATO, Russia is engaging with it to an unprecedented degree. With familiarity comes contentment: the very real opportunities open to Moscow for constructive collaboration and thus a good opportunity to help shape the Eurasian security architecture of the next millennium should become clearer and more attractive. Besides which, policy in Asia is still too often dominated by Soviet values, considering countries such as China and Japan as useful short-term allies or clients rather than as equal partners.

The Commonwealth of Independent States (CIS) is not so much moribund as clinically dead. Periodic attempts to revive, repackage or redefine the CIS have come to nothing. To an extent, Moscow's unwillingness finally to admit this reflects the absence of any real policy towards the post-Soviet states of the so-called 'Near Abroad' beyond a general belief that they remain within its legitimate sphere of influence. To this extent, the continued formal existence of the CIS is preventing Russia from coming to terms with its imperial legacy. Again this will pass, however, with a new generation of leaders lacking the ideological baggage of Soviet 'internationalism'. This need not mean that Russia will necessarily be a better neighbor, as those new leaders could prove to be aggressive nationalists who feel no need to pretend to comradeship with their post-Soviet neighbors. However, in the future such artificial distinctions as the "Near" rather than the "Far Abroad" will take second place to a more pragmatic and open-minded perception of Russian interests.

SECURITY POLICY: THE TWO-TIER ARMY

For all the talk of genuine military reform, Russia's army will continue to decay for as long as the economy remains fragile and the country's military and political elite continue to aspire to forces beyond their means. It is hard to know whether realism or economic stabilization will come first. For the next few years, Russia will thus be laboring under the curse of its Soviet legacy. Without the willingness to make drastic cuts, Moscow will instead maintain a largely non-operational military machine. While overall establishment strength has been reduced to 1,200,000 and is due to fall further, today only about one in four army regiments, for example, could be considered genuinely operational.

Besides which, whatever the feelings of the military, Russia will for the foreseeable future also retain a sizeable and powerful internal security apparatus, including armed paramilitary forces. The domestic threat posed by separatism the lawlessness still gripping much of the country and a traditional concern on the part of Russia's rulers to maintain multiple, counter-balancing armies will ensure the future of these security structures.

Even the Defense Ministry's own, most optimistic projections only see it beginning to receive adequate funding in 2004. Leaving aside just whose definition of 'adequate' is adopted, it still emphasizes the time any effective military restructuring will take – even were it not competing for funds with numerous parallel armed formations. By then, the Russian Army will, by default if not by design, have become a small, operational core of forces (largely based on a handful of armored, airmobile and paratroop regiments), supported by a more substantial army which is little more than a territorial militia. To an extent, this has already happened, with conscripts generally now serving in local, low-readiness units, officers rarely being rotated and most units making do with the same equipment – often half-rusted and many times repaired – as they would have had 10 years ago. In five years times, the funds will become available to modernize the smaller core forces, but the 'militia' will need to be retrained, re-equipped and reorganized: a task which will take the rest of the decade – at least. Meanwhile, the air and naval forces, while receiving a trickle of procurement funds, will largely become defensive structures, intended merely to deny an enemy access to and control of Russian airspace and sea borders.

FLASHPOINT MUTINY?

Russia's troops have proven remarkably tolerant of years of institutionalized neglect. Non-payment of wages (which have become steadily less in real terms anyway), poor or no food, inadequate housing, corrupt leadership, involvement in the Chechen war – all of these have bred demoralization, disillusionment, draft-dodging, criminality and a hemorrhaging of the most able officers. This has, however, been an essentially passive and negative process. Unfortunately, no one knows the limits of any army's patience – until they are exceeded.

THE LONG VIEW

What might face Russia in 20, 50 or even 100 years? From an historian's perspective, nations rise and nations fall. Huge, ethnically diverse, economically overstretched Russia is arguably a country whose very future is in question. The degree of hidden economic integration of Russia's Far East with the Pacific Rim is great and growing, from Chinese shuttle traders in Vladivostok and illegal immigrants through to the Russian Mafia's trades with the Japanese yakuza and legal investment along the borders. At present, the Russian Far East is to a large extent politically autonomous, and Moscow's attempts to assert its authority have failed. Eventually, Moscow will regain its strength. When it does, will it be prepared to accept this regionalism? Probably not – and then the question becomes whether the Russian Far East will surrender its new freedoms or seek a new future, looking south and east instead of towards the distant west.

And what of the Urals-Siberian region or St. Petersburg? Perhaps in the future, 'All the Russians', so painfully gathered by Muscovy in the Middle Ages and re-conquered by the Bolsheviks after 1917, will be less a nation than a cultural and historical tradition.

THE CAMPAIGN

THE BEAR IN TURMOIL – RUSSIA IN THE NEW MILLENNIUM

For years, political and economic conditions within Russia have steadily worsened, leading to ever-growing civil disorder. As the situation deteriorates, certain hard-line communist and nationalist factions blame Western nations for causing the majority of the problems within their country. The leaders of these factions agree to work together to better achieve their common goal of a resurgent Soviet state. This new federation becomes knows as the "Red Russians," or simply as the "Reds." As the Reds gain support among the desperate population, they organize ever-growing protests against both the European Union and the United States.

Fearing the rapidly growing support for the Reds political machine, the more moderate factions also organize into a common group. The moderate faction becomes known as the "Blues," or "Blue Russians." These two groups struggle to control the Russian Parliament, but neither side enjoys a clear advantage for several years.

Early in the spring of 2004, the Russian parliament is in total disarray after yet another devastatingly hard winter. The shaky political system all but collapses when the hard-line Reds win control of the Russian Duma and begin impeachment proceedings against the moderate Blue-leaning Russian president Yuri Shmernov. Refusing to go quietly, Shmernov quickly dissolves the entire Russian parliament and declares martial law "to preserve the Motherland."

The flames of unrest quickly overtake the Russian president when he, his wife Ivana, and two of his top aids are blown to bits in their own limousine by a powerful car bomb on the outskirts of Moscow. Almost immediately, the leaders of the Red Russians attempt to seize power in several key Russian cities. The United Nations officially expresses "grave concerns for the unstable political situation in Russia," but the Security Council is unable to decide on what action, if any, should be taken. Indeed, there is considerable debate over which side controls the Russian seat on the Council.

NATO has no such issues. The Alliance comes out firmly in support of the Blue Russian government. Unfortunately, this strong support serves as a catalyst within the previously neutral Russian military.

The Russian military is torn into supporting either the Reds or the Blues. After suffering for years of neglect under the now deceased Russian president's moderate policies, most of the Russian Navy joins the fledgling Red politicians along with scattered Army and Air Force units. All is not lost for the Blue Russians, however, as the bulk of Russian Army and much of the Air Force supports the legitimate government. Armed clashes occur, with Murmansk and Archangel falling to the Reds almost immediately. Heavy fighting is reported around Moscow, St. Petersburg, and several other Russian cities.

Lacking the resources to quickly regain control of the strategic Kola Peninsula and the numerous military bases located in the North Capes region, the Blue Russian government formally asks for NATO assistance. Hoping to prevent the war from spreading to neighboring countries, and fearing the large stockpiles of weapons now under Red Russian control, NATO begins a limited build-up of forces in the North Cape area. The United States contribution is a carrier battle group, a Marine expeditionary force and various USAF and US Army assets.

ARCTIC BATTLEFIELD

Red Russian military units enjoy initial success in the North, seizing territory and consolidating their gains. Virtually all of the Kola Peninsula is under their control, including all of the various weapons storage facilities in the Murmansk area. These weapons storage facilities contain vast quantities of conventional weapons as well as limited amounts of weapons of mass destruction.

Naval units attached to NATO's Allied Command Atlantic (ACLANT) are quickly moved into position to blockade the military ports near Murmansk, while both carrier- and land based-fighters set up an air blockade. In the southern Kola, NATO aircraft begin flying joint missions with loyalist Blue Russian air units.

ACLANT Intelligence has received data that suggests Red naval units are preparing to sortie, most likely to the Baltic to assist bogged down Red forces near St. Petersburg. Combat between NATO and Red forces appears to be imminent.

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APPENDICES

WILL THE F/A18 DESIGN MEETING NOW COME TO ORDER....
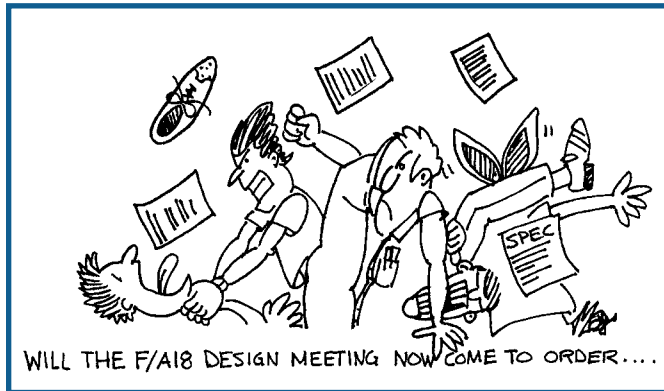
PRODUCER NOTES

First, and most importantly, I would like to thank you for purchasing *Jane's F/A-18!* Your purchase is the best compliment that our development team could receive. We realize that by selecting our product to occupy space on your computer, you have honored our efforts with two very valuable things – your leisure time and your hard-earned money. We believe strongly that as you play our "version of reality" you will realize that our commitment to you has been of equal value. We feel confident that this will be evident in the overall quality, depth, and realism of the product. This kind of commitment between developers and consumers, like yourself, is what ultimately makes for a successful product. Thank You!

I would like to take this opportunity to let you in on some of our development team's thinking as we began work on *F/A-18* over a year ago. After we shipped *Jane's F-15,* figured out where we lived again and took some much needed vacation time, our entire development team was able to sit back and identify areas of success, as well as identify areas of improvement that we felt needed to be made in our next product. As I am sure you can guess these were very exciting times! The "design meeting sketch" displayed above was drawn by Max Remington during one of our very first meetings; he should have been listening to me, but…he wasn't. When I found this sketch at the bottom of my desk after completing *F/A-18,* it struck me what makes development so rewarding. For me, it is in experiencing the transition from total chaos and nothingness at the beginning of a product, to the absolute necessity of compromise and teamwork that must take place at the end. This transition can only be accomplished when each and every team member fully realizes and respects the unique skill sets, different perspectives, and conscientiousness that each person brings to the table. Only when all of these ingredients are present do you have a chance of completing a project of the magnitude of *F/A-18.*

So what makes developing a simulation so difficult anyway? Well, simply put, simulating reality is extremely difficult! This is only compounded by the fact that our team tends to want to simulate everything. Since every team member lives in their own reality (☺), it should be easy to understand why so many different perspectives can make it difficult to define a common vision. Once this issue is partially solved (because we never fully get a handle on this one), the next big question is "where do we stop?" The "where do we stop" part is what often kills many products in development. Successful development teams understand the fine art of compromise when it comes to creating reality. Compromise is the hardest challenge that any team must face. Why? Because this involves coordination and management of something that should never be managed at all – creativity. Manage creativity too hard and you stifle innovation and motivation. Neglect to manage at all and your product will most likely not see the light of day. Our team's ability to "walk this fine line" is what makes me the most proud. As a Producer, I am very lucky to be able to lead a group of highly talented and motivated individuals – they are truly world class.

When we looked back at *Jane's F-15,* we had several things to feel good about. First, we completed one of the most comprehensive study simulations to ever hit the market. That was a major accomplishment and great source of satisfaction for us. We were able to create a comprehensive, accurate, and well rounded simulation of one of the

most advanced, "battle tried" dual-role fighters of all times – the F-15E. This product, in many ways, allowed us to pay homage to the sacrifices and victories that the many pilots of the "E" squadrons have undertaken in the name of Freedom. Although we were satisfied, the question quickly became "what do we do next and how do we make it better?" It became painfully apparent that we needed to apply some of the "guidance of creativity" that I talked about before. It also became clear to us that before we decided on a specific vehicle, we should first understand what we wanted to accomplish from a design point of view. What were our goals? Well, one goal was clear: We wanted to take our previous efforts to the next level. We wanted to provide the most compelling simulation experience possible. Great goal, but what should be our strategy to accomplish this?

In our initial design sessions, we focused on identifying areas that should be improved. We also felt that it was important that we isolate "things that worked" so as not to compromise our previous efforts. We decided that our next product should have as its foundation the following four cornerstones: World's best graphics, universal appeal, "World Class" gameplay, and strong community support. Wow, those are pretty lofty goals. What would we need to do to accomplish each of them?

World's best graphics: Our goal here was to create graphics quality that matched the level of realism in our F-15 simulation. In other words, we wanted to create graphics that were state-of-the-art and unmatched by any other product. Not just from a "pretty picture" standpoint, but also from a more comprehensive perspective relating to the function that graphics must play in fully immersing the player into the world we were creating. We decided that we would develop a completely new terrain system that was highly detailed and was centered around interesting terrain features. No more sand worlds! The new system would need to take advantage of the latest and greatest hardware, it would be capable of high color, high resolution, and so on. Finally, we would rededicate our efforts to providing the most comprehensive set of graphic special effects ever seen in one product.

Universal Appeal: All of our team members feel strongly that "jets are cool" – imagine that! What we wanted to do was match our enthusiasm with the interest that we felt many people have for aviation, and, more specifically, for modern fighter jets. It probably is our childish belief that everyone has wanted to be a fighter pilot at some point in their lives. Our goal was to provide that experience to everyone who has ever wondered if they "had what it takes." We felt that the best way to do this was by associating our product with what most people think of when they think jets – taking off from a carrier. Well, we now had our Naval theme, but what kind of world conflicts would interest most people? We felt strongly that it was important to have a credible foe, and that simply replaying history may not be as intriguing as a hypothetical scenario ripped out of tomorrow's headlines. So, we decide to center our area of conflict around the Murmansk area in Northern Russia. This fit well with our graphics goals, our naval theme, and most certainly our design goal of providing the player with the challenge of both a credible foe and state-of the-art military hardware. It seemed that our goals were starting to come together, but the big question still remained "How do we get people who were interested in the concept of becoming "a modern day cowboy" to actually play our game? Our next design goal seemed essential if we were to deliver on our commitment of showing the world that "a sim" could also be a fun and rewarding game.

"World Class" Gameplay: Some would say that this is very ambitious, but we all figured "what the hell," we have great game systems, great artists, great engineers, and great designers. Why not at least try? In order to support this goal we felt that a couple of basic improvements were in order. It was clear that we needed to redouble our efforts toward creating more action packed and compelling missions, clearer feedback and reward systems, easier access for first time players, and finally a strong commitment toward casual play. This didn't mean that we were abandoning our hard core audience by any means. As everyone will notice we were able to intertwine these basic design goals while still increasing realism across the board. We are very pleased with how both of these seemingly competitive goals turned out to work well together. Assuming that we were successful with our "world class" gameplay design goal, the questions now became "Can we do something else that would allow our community of players to experience a greater sense of commradery?" "Can we create a product that allows groups of people to interact and create their own version of 'world class' gameplay?"

Strong Community Support: Community has always been of central importance to any group or society of people. It is very clear these days that games can act as a catalyst for community building. We felt that the best thing we could do to foster a sense of community with our product was to provide comprehensive, cooperative multiplayer. Yes, we heard all of our customers loud and clear. The first thing that we did after F-15 shipped was take this input (it was actually more like a battle cry) to heart and set out creating the underlying systems that would make this goal a reality. We figured that if the first thing we programmed was cooperative multiplayer, then we would have a good chance of it shipping with the product. We were right, and we are confident that you will be pleased. We then

decided to give players the ability to create and distribute their own content – which is the main reason that we have again chosen to include a revamped and enhanced mission builder. Certainly we want people to play the "reality" that we have created, but we also want to give players the ability to create their own worlds. That is what we think gaming is all about – freedom to do what you want. We have continued, and in many cases, expanded our commitment to providing an "open" approach to game data storage. We have also included the ability for players to customize their identity within the game by providing mechanisms for customizing squadrons, pilots, and aircraft tail art.

Once we had our high concept goals, we then needed to decide which modern jet to implement. Although this may seem backwards, our team felt strongly that the game experience was of primary importance and that the plane ought to be supportive of that. Obviously, the best scenario is when both the gameplay goals and the airplane wind up being cool. We feel that this has been the case with F/A-18. All too many times teams simply pick the "aircraft of the month" and then decide what they can do based on the plane's strengths and weaknesses. We feel that this can be a limiting factor in well-executed and balanced design.

As you know, our choice was ultimately the F/A-18E Super Hornet. Why the Super Hornet? Well, for many reasons. First, it fit well within our design goal of simulating a Naval carrier environment. It was a modern jet. So modern in fact that we were able to integrate a lot of the advanced man-machine interfaces that have been developed over the last several years. This allowed us to accurately simulate what the plane does and how the pilot interfaces with it in exacting detail, yet gain gameplay advantages that allowed for a more compelling flying experience. The carrier-based F/A-18E allowed us to create a far more compelling campaign against credible Russian forces than we would have otherwise been able to. This allowed our "gameplay" to not be limited by real world friendly air base locations, governing politics, and other such obstacles. We could be the "tip of the spear." By selecting the F/A-18 as our next study product, we were able to capitalize on our team's strengths of avionics, weapons systems, and AI capability. The F/A-18 is a very capable dual role fighter that allows the player to experience nearly all of the advanced weapons systems in the US arsenal. We think you will have fun with that feature!

We are very excited about what we have been able to deliver in *Jane's F/A-18.* We feel that all of our design cornerstones have significantly added to creating a better product. Please let us know what you think. We will be listening.

Five things have always stood out in my mind as key elements for a successful product – the right company, the right team, the right concept, market acceptance, and, most importantly, family support. This business is very difficult and time consuming. Many of the greatest sacrifices that have been made on this product have come from family members of the team. They have endured countless, and I mean countless, explanations of why we need to work late, why we need to work weekends, why vacations must be postponed, and why we would not be home for dinner at a reasonable hour – again. In the end, the reason that most of us made these sacrifices is because we believed in what we were doing, and our families believed in us. So, it is important for me to say, and it is important for you to understand, that the following people have contributed to this product in ways that could never be fully described:

Nancy, Bryan, and Kevin Kreafle	Karen, Sean, and Brynn McDonald
Susan Paquin	May-Ling McKee
Michele and Ryan Martin	Laura, Max, and Samantha Remington
Pia Gomez	Kimberly, Zachary, Jesse, and Tyler Dugan
Dawn Evans	Danielle Moore
Jameson, Taylor, and Devin Hodge	

Without their support and understanding we could have never endured our very own drive, desires, and goals for *F/A-18.* Thank You!

And again, I thank you for your purchase and I sincerely hope that we are able to bring you many hours, months, and even years of entertainment value. It is our hope that we have brought you a little closer to your dream of becoming a fighter pilot.

—Greg Kreafle

ACRONYMS & ABBREVIATIONS

A

A/A	Air-to-air
A/C	Aircraft
A/G	Air-to-ground
AAA	Anti-aircraft artillery
AACQ	Automatic acquisition mode
ACL	Automatic carrier landing
ACM	Air combat maneuvering
ACQ	Acquisition
AFCS	Automatic flight control system
AGL	Above ground level
AGM	Air-to-ground missile
AIL	Aileron
AIM	Air-intercept missile
ALR-67	Radar warning receiver
AMAD	Airframe mounted accessory drive
AN/ALE-47	Countermeasure dispensing set (CMDS)
ANT	Antenna
AOA	Angle-of-attack
AOT	Angle-only track
APU	Auxiliary power unit
ASL	Azimuth steering line
ASRM	Automatic spin recovery mode
ATC	Air traffic control
ATS	Air turbine starter
ATTH	Attitude hold
AUTO	Automatic
AZ	Azimuth

B

BALT	Barometric altimeter
BIT	Built-in test
BLD	Bleed
BLK	Black
BNK	Bank
BOL	Bearing only launch
BRG	Bearing
BRK	Brake
BRT	Bright
BST	Boresight acquisition mode
BVR	Beyond visual range

C

C/F	Chaff/flare
C	Celsius
CAS	Control augmentation system
CAUT	Caution
CBU	Cluster bomb unit

CCIP	Continuously computer impact point
CDP	Compressor discharge pressure
CG	Center of gravity
CG	Cruiser, Guided-missile
CHAN	Channel
CHKLST	Checklist
CIT	Combined interrogator/transponder
CLR	Clear
CMDDS	Countermeasure decoy dispensing system
CMDS	Countermeasure dispensing system
COMM	Communications radio
CPL	Couple
CPLD	Coupled
CRS	Course
CSEL	Course select
CV	Carrier
CVN	Aircraft Carrier, Nuclear

D

D/L	Data link
DBS	Doppler beam sharpening
DCLTR	Declutter
DD	Destroyer
DDG	Destroyer, Guided-Missile
DEGD	Degraded
DIL	Displayed impact line
DME	Distance measuring equipment
DMS	Digital map set
DN	Down
DT2	Second designated target

E

EADI	Electronic attitude display indicator
ECCM	Electronic counter-countermeasures
ECM	Electronic countermeasures
ECS	Environmental control system
EFD	Engine fuel display
EGT	Exhaust gas temperature
EL	Elevation
EMCON	Emission control
EMERG JETT	Emergency jettison
ENG	Engine
ENT	Enter
EPR	Engine pressure ratio
EST	Estimated
ET	Elapse time
EXP1	Expand 1

EXP2	Expand 2
EXP3	Expand 3
EXT	External

F

F/C	Forced correlate
FAE	Fuel air explosive
FCS	Flight control system
FF	Fuel flow
FFG	Frigate, Guided-Missile
FLIR	Forward looking infrared
FOV	Field-of-view
FPM	Feet per minute
FRZ	Freeze
FT	Feet

G

G	Gravity
GACQ	Gun acquisition mode
GBU	Guided bomb unit
GEN	Generator
G-LIM	G Limiter
G-LOC	G induced loss of consciousness
GMT	Ground moving target
GMTI	Ground moving target indication
GMTT	Ground moving target track
GND	Ground
GPS	Global positioning system
GW	Gross weight

H

HAFU	Hostile ambiguous friendly unknown
HARM	High speed anti-radiation missile
HDG/SLV	Heading slaved
HDG	Heading
HELO	Helicopter
HI	High
HOB	Height of burst
HOJ	Home on jam
HOTAS	Hands on throttle and stick
HSEL	Heading select
HSI	Horizontal situation indicator
HUD	Head-up display
HYD	Hydraulic
HYD1	Hydraulic system 1
HYD2	Hydraulic system 2

I

IBIT	Initiated built in test
ICLS	Instrument carrier landing system
ID	Identification
IFF	Identification friend or foe
ILS	Instrument landing system
IMN	Indicated mach number
INST	Instrument
IR	Infrared

J / K

JETT	Jettison
KCAS	Knots calibrated air speed
KGS	Knots ground speed

L

L BAR	Launch bar
L&S	Launch & steering target
L	Left
LDG	Landing
LED	Leading edge down
LEF	Leading edge flaps
LEU	Leading edge up
LEX	Leading edge extension
LG	Landing gear
LI	Left inboard
LM	Left midboard
LO	Left outboard
LPRF	Low pulse repetition frequency
LSO	Landing signal officer
LT	Light
LTOD	Local time of day

M

MA	Missile alert
MAX	Maximum thrust
MC	Mission computer
MDI	Multipurpose display indicator
MED	Medium
MIL	Military thrust
ML	Missile launch
MPCD	Multipurpose color display
MSI	Multi-source integration
MSL	Mean sea level

N

N ACC	Normal acceleration
N1	Fan rpm
NACES	Navy aircrew command ejection seat

NATOPS	Naval air training and operations procedures standardization
NAV	Navigation
NAVFLR	Navigation forward looking infrared
NCTR	Non-cooperative target recognition
NFLR	Navigation forward looking infrared
NFOV	Narrow field-of-view
NIRD	Normalized in range display
NM	Nautical mile
NORM	Normal
NOZ	Nozzle
NWS	Nosewheel steering

O

ORIDE	Override
OVERSPD	Overspeed
OXY	Oxygen

P / Q

PA	Powered approach
PIO	Pilot induced oscillation
PLBK	Pullback
PPH	Pounds per hour
PPM	Pounds per minute
PSI	Pounds per square inch
QTY	Quantity

R

R	Right
RAERO	Range Aerodynamic
RALT	Radar altimeter
RCS	Radar cross-section
RCVY	Recovery
RDR	Radar
REC	Radar elevation control
REJ	Reject
RI	Right inboard
RM	Right midboard
RMIN	Minimum range
RNE	No escape range
RNG	Range
RO	Right outboard
ROE	Rules of engagement
RPM	Revolutions per minute
RST	Reset
RWR	Radar warning receiver
RWS	Range while search

S

SA	Situational awareness
SMS	Stores management system
SOP	Standard operating procedures
SPD BRK	Speed brake
SPD	Speed
SPN	Spin
SRM	Spin recovery mode
STAB	Stabilizer
STBY	Standby
STT	Single target track

T

T1	Engine inlet temperature
TA	Terrain avoidance
TAS	True air speed
TCN	TACAN
TDC	Throttle designator controller
TDP	Turbine discharge pressure
TED	Trailing edge down
TEF	Trailing edge flaps
TEMP	Temperature
TEU	Trailing edge up
THA	Throttle handle angle
TOT	Time-on-target
TTA	Time to arrival
TTG	Time-to-go
TTI	Time to impact
TWS	Track while scan

U / V

UA	Up-AUTO
UFCD	Upfront control display
VACQ	Vertical acquisition mode
VEL	Velocity
VER	Vertical ejector rack
VIB	Vibration
VOL	Volume
VVSLV	Velocity vector slave

W / X / Y / Z

W	Waterline symbol
WACQ	Wide acquisition mode
WARN	Warning
WFOV	Wide field of view
WHT	White
WoffW	Weight off wheels
WonW	Weight on wheels
WYPT	Waypoint
XFER	Transfer
ZTOD	Zulu time-of-day

GLOSSARY

Active	A radar missile currently using a self-guidance system to locate its target.
Airfoil	Curved wing or blade surface designed to produce lift when air passes over it.
Alamo	Enemy all-aspect radar missile.
Alpha Check	Request for/confirmation of bearing and range to described point.
Anchor	Orbit about a specific point; refueling track flown by a tanker.
Angels	Height of friendly aircraft in thousands of feet.
Angle-of-Attack (AOA)	Aerodynamic angle formed between the chord of an airfoil and the direction of the relative wind.
Archer	Enemy heat-seeking missile.
Arizona	No ARM ordnance remaining.
AS Fragged	Unit or element is performing exactly as stated by the air tasking order.
Attacking	Indicates A/S attack on a specific ground target.
Azimuth	Two or more groups primarily separated in bearing.
Backfire	Tu-22M Bomber.
Bear	Tu-95/142 Patrol/Bomber.
Bent	System indicated is inoperative.
Bingo	Fuel state needed for recovery.
Bird(s) Affirm	Fire control radar/SAM is locked on designated target.
Bird(s) Away	Friendly SAM was fired at designated target.
Bird	Friendly surface-to-air missile.
Bittersweet	Notification of possible Blue-on-Blue situation relative to a designated track or friendly.
Blank	A SEAD aircraft does not detect any emitters of interest.
Blind	No visual contact with friendly aircraft/ground position. Opposite of Visual.
Bogey Dope	Request for information as briefed/available.
Bogey	A radar or visual contact whose identity is unknown.
Box	Groups, contacts, or formations in a square or offset square.
BRAA	Tactical control format providing target bearing, range, altitude, and aspect relative to a friendly aircraft.
Bracket	Directive call to maneuver to a position on opposing sides, either laterally or vertically from the target.
Break (w/direction)	Directive to perform immediate maximum performance turn in the indicated direction. Assumes a defensive situation.
Break Away	Tanker or receiver call indicating immediate vertical and nose/tail separation between tanker and receiver.
Broadcast	Request or directive to switch to broadcast control.
Buddy/Spike	Friendly aircraft air-to-air indication on RWR. Followed by position heading/altitude.
Bullseye	An established reference point from which the position of an object can be referenced. May be cardinal/range or digital format.
Burnthrough	Point at which radar noise jamming is defeated.
Buster	Directive call to fly at max continuous speed mil power.
Candid	Il-76 Cargo Aircraft.
Chaff	Strips of metal film released to confuse and decoy radar-guided weapons.
Champagne	An attack of three distinct groups with two in front and one behind.
Chicks	Friendly aircraft.
Chord	Imaginary line passing through the leading and trailing edges of an airfoil. See Angle of Attack.

Clean-1	No radar contacts on aircraft of interest.
Cleared Hot	Ordnance release is authorized.
Closure	Relative velocity of one aircraft in relation to another.
Commit	Fighter intent to intercept a group(s) of interest.
Corner Speed/Velocity	Minimum airspeed at which the maximum allowable aircraft G is generated; i.e., the speed at which an aircraft can turn the sharpest, given current altitude and attitude.
Deadeye	Informative call by an airborne laser designator indicating the laser/IR system is inoperative.
Declare	Inquiry as to the identification of a specific track(s), target(s), or correlated group.
Defensive ( )	Aircraft is in a defensive position and maneuvering with reference to stated condition (Spike/Missile/SAM/Mud/AAA).
Designate	Use of aircraft systems to identify a ground object/aircraft as a target for weapons employment.
Dolly	Link4A/TADIL C.
Drag	Force that counteracts an object in motion through the air, such as air resistance.
Echelon ( )	(cardinal direction) Groups, contacts or formation with wingmen displaced approximately 45 degrees behind leader's 3/9 line.
Empty	No emitters of interest detected on HARM attack display.
Engaged	Maneuvering with the intent to kill. Implies visual/radar acquisition of target.
EW	Early Warning Radar.
Faded	Radar contact is lost. Termination of tract plotting is not warranted.
Fast	Target speed is estimated to be 600 knots ground speed or greater.
Feet Wet/Dry	Flying over water/land.
Fence In/Out	Set cockpit switches as appropriate prior to entering/exiting the combat area.
Fencer	Su-24 Fighter/Bomber.
Fishbed	MiG-21 Fighter.
Flanker	Su-27/33/35 Fighter.
Fox One	Simulated or actual launch of semi-active radar-guided missile.
Fox Three	Simulated or actual launch of active radar-guided missile.
Fox Two	Simulated or actual launch of IR-guided missile.
Fox	A/A weapons employment.
Foxbat	MiG-25 Fighter.
Foxhound	MiG-31 Fighter.
Friendly	A positively identified friendly contact.
Fulcrum	MiG-29 Fighter.
Gadfly	SA-11/SAN-7 SAM.
Gadget	Radar or emitter equipment.
Gauntlet	SA-15/SA-N-9 SAM.
GCI	Ground Control Interception radar.
Gecko	SA-8/SA-N-4 SAM.
Gimbal ( )	(with direction) Radar target is approaching azimuth or elevation limits.
Group	Radar target(s) within approximately 3 NM of each other.
Grumble	SA-10/SA-N-6 SAM.
Heads Up	Alert of an activity of interest.
High	Target between 25,000 ft and 40,000 ft MSL.
Hind	Mi-24 Helicopter.
Hip	Mi-8 Helicopter.

Home Plate	Home airfield or carrier.
Hostile	A contact identified as an enemy upon which clearance to fire is authorized in accordance with the theater rules of engagement (ROE).
Hotdog	Informative/directive call that an aircraft is approaching or is at a specified standoff distance from the sovereign airspace of a nation (as defined by national boundaries or territorial sea and airspace).
India	Mode 4.
Indicated Airspeed	The speed you would be traveling (given engine performance) at sea level in still air. An aircraft flying at the same true airspeed will show different indicated airspeed at different altitudes and under different wind conditions.
Jink	Unpredictable maneuvers to negate a gun tracking solution.
Judy	Aircrew has radar or visual contact on the correct target, has taken control of the intercept and only requires awareness information.
Knot	A measurement of speed equal to 1 nautical mile per hour.
Ladder	Three or more groups/contacts in range.
Lag Pursuit	Refers to pointing an aircraft's nose just behind an enemy's flight path during a turn.
Laser On	Directive or information call to start laser designator.
Lead Pursuit	Refers to pointing an aircraft's nose just ahead of an enemy's flight path during a turn.
Line Abreast	Two contacts within a group side-by-side.
Low	Target altitude below 10,000 ft AGL.
Mach Ratio	The ratio of your aircraft's speed to the speed of sound at the same altitude.
Mach	Speed of sound at sea level (760 ft/s) used to measure rapid flight (Mach 1, Mach 2, etc.). Varies by altitude.
Magnum	Launch of friendly anti-radiation missile.
Mainstay	A-50 AWACS aircraft.
Medium	Target altitude between 10,000 ft AGL and 25,000 MSL.
Midnight	Information call advising that C2 radar functions are no longer available.
Mother	Parent ship.
Mud ( )	(with direction) Indicates RWR ground threat displayed.
Music	Electronic radar jamming (electronic deception jamming).
Nails ( )	(Clock position/azimuth and threat type, if known) RWR indication of radar in search.
Naked	No RWR indications.
Nautical Mile	Aeronautical measurement of distance equal to 6,076 ft.
New Picture	Used by controller or aircrew when tactical picture has changed. Supercedes all previous call and reestablished picture for all players.
No Joy	Aircrew does not have visual contact with the target/bandit/landmark. Opposite of Tally.
On Station	Informative unit/aircraft has reached assigned station.
Ordnance	Military weapons – including expendable armament such as missiles and bombs.
Print ( )	(Type) Unambiguous NCTR reply.
Range	Two or more groups primarily separated in distance along the same bearing.
Raygun ( )	Position/Heading/Altitude) Indicating a radar lock-on to unknown aircraft. A request for a Buddy Spike reply from friendly aircraft meeting these parameters.
Rifle	AGM-65 launch.
Ripple	Two or more munitions released or fired in close succession.
SAM ( )	(with direction) Visual acquisition of a SAM or SAM launch.
Sanitize	A directive call to clear an assigned area with the radar searching for additional threats.
Scramble	Take off as quickly as possible.

Semi-Active	A missile/bomb guidance system where the missile receiver homes in on radiation/reflection from the target sent by a source other than the missile/bomb itself; i.e., an aircraft (usually) bounces radar off the target, and the missiles homes in on the reflected radar reflection.
Skunk	A radar or visual maritime contact whose identity is unknown.
Smoke	Smoke marker used to mark a position.
Sniper ( )	(type/location [range, bearing]) Directive for an aircraft to employ a range-known HARM against a specified threat at the specified location.
Sort	Directive to assign responsibility within a group; criteria can be met visually, electronically (radar), or both.
Sorted	Sort responsibility within a group is met.
Sparkle	Target marking by IR pointer. Target marking by gunshot or FAC(A) using incendiary rounds.
Spike ( )	(with direction) RWR indication of a radar threat in track and launch. Include bearing/clock position/azimuth and threat type if known.
Splash-1	A/A target destroyed.
Splash-2	A/S Weapons impact.
Stall	Loss of lift condition that occurs when the angle of attack is too steep or airspeed is too low for the airfoil to provide any lift. During a stall, the normally streamlined flow of air over the airfoil is disrupted.
Sunrise	Informative call that radar functions are available. Opposite of Midnight.
Sweet	Equipment indicated is operating efficiently.
Tactical	Request/directive to switch to tactical control.
Tally	Sighting of a target, bandit, bogey or enemy position. Opposite of No Joy.
Target	A directive call to assign group responsibility.
Targeted	Group responsibility is met.
Trailer	The last aircraft within a group.
True Airspeed	Velocity relative to the ground, taking into account additions and subtractions to your indicated airspeed due to altitude, temperature, wind direction and speed, side slippage, etc.
Tumbleweed	Indicates limited situational awareness, No Joy or Blind; a request for information.
Turn Radius	Radial distance required to complete a turn. The smaller the radius, the tighter the turn.
Turn Rate	Number of degrees per second a particular aircraft can turn. The higher the rate, the faster the turn.
Unable	Can not comply as requested or directed.
Vampire	Hostile anti-ship missile (ASM).
Very High	Target altitude above 40,000 ft.
Vic	Three groups, contacts or formations with the single closest in range and two contacts, azimuth split, in trail.
Visual	Sighting of a friendly aircraft or ground position. Opposite of Blind.
Wall	Three or more groups or contacts, primarily split in azimuth.
Warning Green	Hostile attack is improbable (all clear).
Warning Red	Hostile attack is imminent or in progress.
Warning Yellow	Hostile attack is probable.
Weeds	Indicates that aircraft are operating close to surface.
Wilco	Will comply with received instructions.
Winchester	No ordnance remaining.
Working-1	A SEAD aircraft is EOB on a designated emitter followed by signal type, (SAM/AAA/group) bearing and range, if able.

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