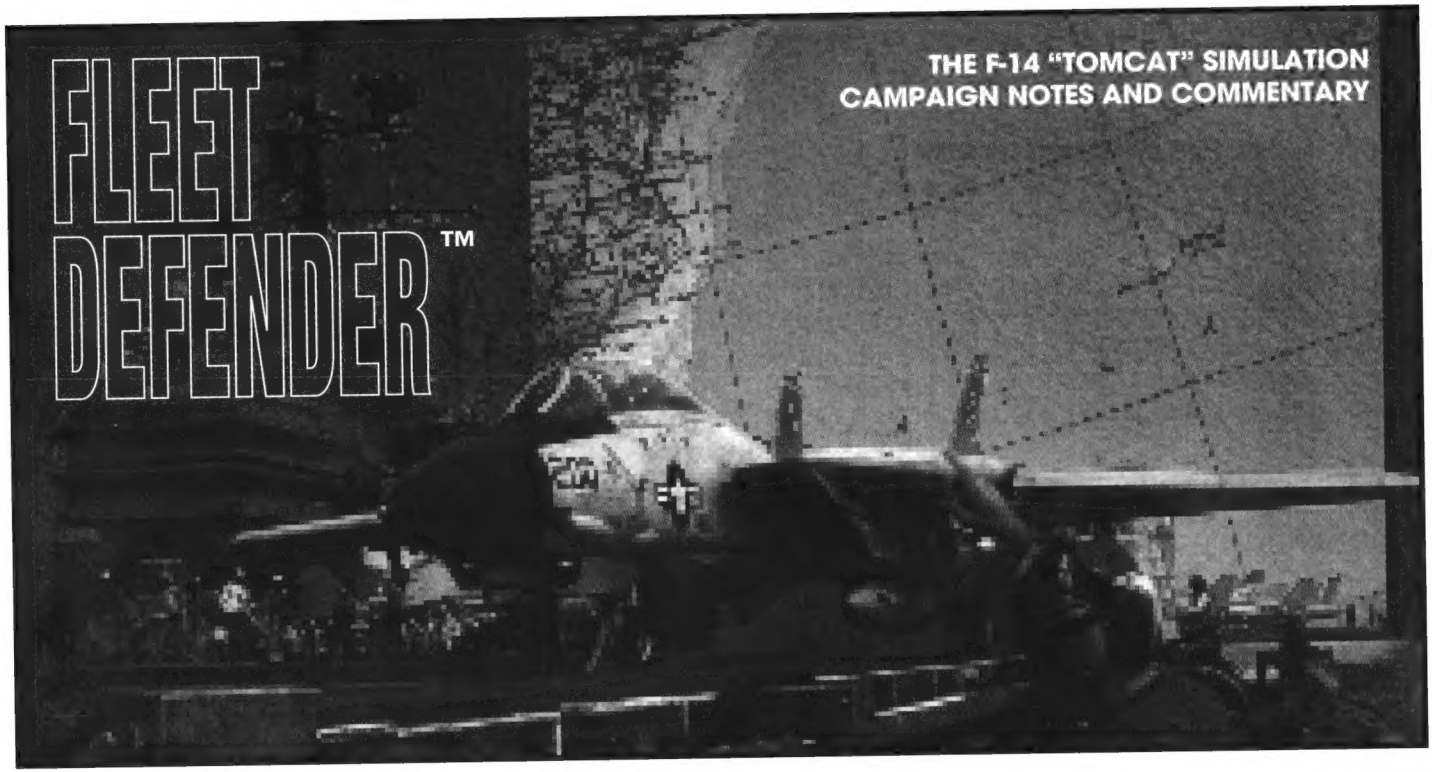
FLEET DEFENDER

SIMULATION

THE F-14 TOMCAT SIMULATION

CAMPAIGN NOTES AND COMMENTARY



F-14 FLEET DEFENDER
Campaign Notes and Commentary

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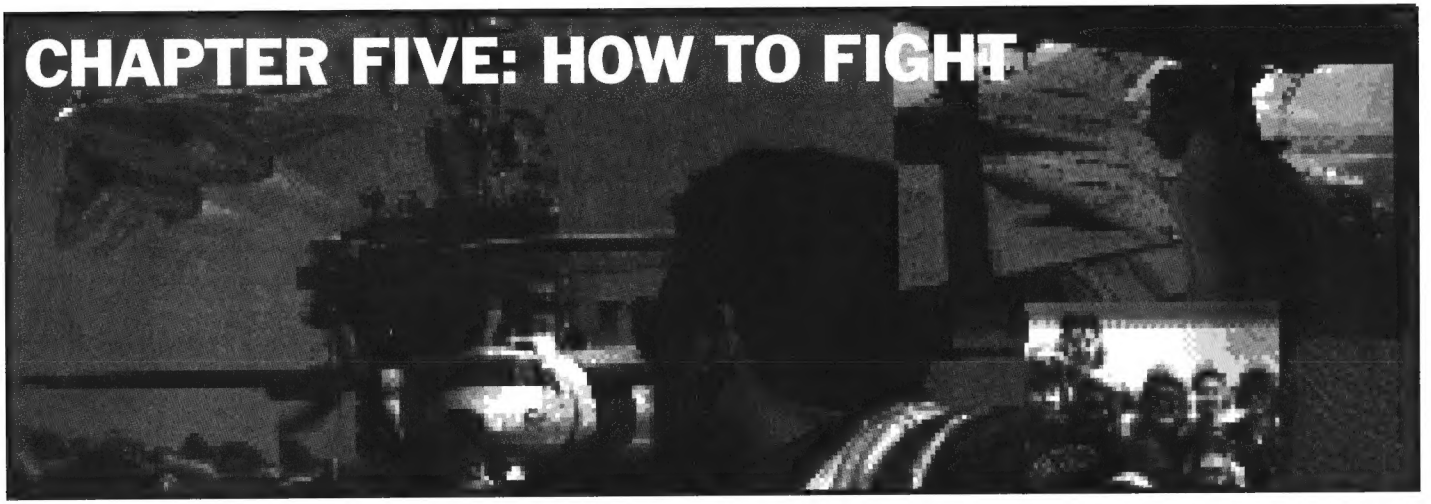


Assuming that you have taken the time to read the instruction manual, you are now ready to "have a go" at the opposition. Well- it's a cruel world out there. You don't get any points for second place. The taxpayers have paid a lot of money for that aircraft of yours, so before you take on your first bandit there are a few more things you should know.

This chapter is designed to mold flying skills into practical combat techniques because it takes more than just fancy flying to make a fighter pilot. You have to be able to make snap decisions in the heat of combat, and live with the consequences. A wrong decision could ultimately cost you (and your RIO) the farm.

MISSILE COMBAT

Before the invention of the air-to-air missile (AAM), air combat was always "up close and personal". Combat was so close, in fact, that opposing pilots could often see each other seated in their cockpits. Pilots were truly knights of the sky, engaging in aerial jousts. Ideally, a dogfight was supposed to be a chivalrous contest between gentleman. Soon, very soon, all that changed.

The air-to-air missile revolutionized aerial warfare in the late 1950s by allowing a pilot to engage a target in any type of weather, day or night, without ever actually seeing it. Theorists were quick to conclude that the "human element" was no longer necessary in this "push-button" type of warfare. They surmised that, given the ability to destroy one's opponent outside of visual range, the last trappings of glory and honor surrounding the mystique of personal combat would disappear.

The theorists were wrong. Technology did not remove the pilot from the cockpit, in fact, it proved to do just the opposite. High-tech equipment made having a thinking, decision-making human onboard, all the more necessary.

Although this section is primarily concerned with missile technology and hardware, it attempts to focus on the decision making going on inside the cockpit.

MISSILE GUIDANCE

Modern air-to-air missiles come in two basic flavors: radar-guided missiles, such as the AIM-54 Phoenix and the AIM-7 Sparrow, and heat-seeking (or Infrared) missiles such as the AIM-9 Sidewinder. It is important to remember that tactics which work well with one type of missile may be entirely inappropriate for another.

The enemy has access to the same type of missiles as you do. Therefore, once you detect an incoming missile you must make an effort to identify how it is being guided. There are big rewards if you guess right but even bigger consequences if you guess wrong. *It doesn't make sense to dump flares out the back when you're trying to defeat a radar-guided missile!*

Radar-Guided Missiles

Radar-guided missiles come in three sub-categories: beam riders, semi-active radar-homing (SARH), and active homing.

Beam-riders are generally surface-to-air missiles (SAMs) launched from either fixed sites or mobile launchers. The missile follows the path of a laser beam directed from the designator and aimed at the target aircraft. In order for the missile to score a hit, the beam must be held on the target throughout the missile's flight.

Semi-active radar homing (SARH) missiles require that the firing aircraft keep the target continually illuminated (painted) on radar. The missile guides itself using radar energy reflected back off the target. Like the beam-rider, a SARH missile requires the firing aircraft (or SAM site) to maintain a radar lock on the target aircraft. This means that the firer is essentially stuck with having to track the target aircraft while the missile remains in flight.

The third type of radar-guided missile is active homing. These missiles transmit and receive their own radar signals which allows them to track a target without help from the firing aircraft. Because of this, active homing missiles are the most deadly. They are also known as "fire and forget" because after they are launched, the firing aircraft can forget about them and is free to maneuver.

Being able to escaping from a radar-guided missile primarily depends upon being able to break the controlling radar's lock. An aircraft may accomplish this by passive means, like flying out of the radar's envelope, or by relying on active measures like radar jamming. Once a radar lock is broken, the missile simply heads off in a straight line along its current trajectory. This is known as *going ballistic*. The missile is essentially unguided at this point.

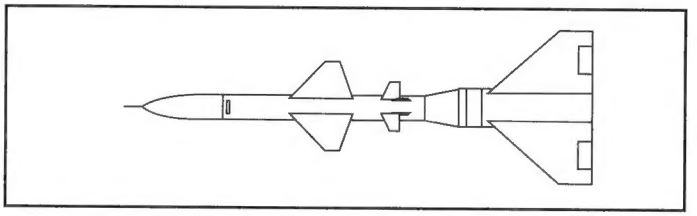


Figure 5-1: The SA-2 "Guideline" is a prime example of a beam-riding surface-to-air missile.

Infrared (Heat-Seeking) Missiles

Infrared (IR) missiles use radiated heat as a means of guidance rather than reflected radar energy. These missiles are equipped with very sensitive cryogenically-cooled detectors able to distinguish minute differences in temperature. They are light-weight, compared to radar-guided missiles, and carry considerably smaller warheads.

In order for a pilot to use a heat-seeker, the missile's detector must first locate a heat source. This generally requires that the firing aircraft face the enemy aircraft so that there is a direct line of sight between the missile's seeker-head and the intended target. Once the seeker-head has "acquired" the target (known as "un-caging" the weapon) it is then fired. The seeker-head guides the missile toward the target by sending course corrections to moveable fins on the missile's fuselage.

Like active radar homing missiles, heat seekers are also "fire and forget". Once launched, the firing aircraft may forget about them because the missile requires no further guidance from the parent aircraft. The missile's own IR detector within the seeker-head takes over.

Heat-seekers are completely autonomous, they often seem to have a mind of their own. So use care when firing heat-seekers into a general engagement, these missiles have no friends. If a heat-seeking missile loses track of its original target, it will re-acquire the first heat generating object that enters its tracking envelope. In a twisting, turning dogfight, your wing-man could quite possibly wander into the missile's envelope by accident. Given the right conditions, your IR missile could begin to track him instead of an enemy.

Fortunately, the garden-variety IR missile is more easily countered than a missile guided by radar. Early models, developed in the 1960s, were often fooled by natural heat sources such as the sun or reflected cloud glare. They had trouble tracking targets at low altitudes because of background heat radiating from ground objects. These missiles had to be initially aimed at the hot exhaust of a target's engines. Because of this, early heat-seekers were referred to as *tail-aspect* or tail-chasers. *A few of these are still in service with Third World air forces.* Later generations of heat-seeking missiles do not have this limitation. They can acquire and track a target from any angle. These missiles are referred to as *all-aspect* heat-seekers.

Keep in mind that heat-seeking missiles are not actually tracking the target itself but rather the heat which the target is generating through friction or exhaust. Countering a heat-seeker is simply a matter of distracting the missile with a more attractive source of heat. Such sources are readily available. Generally, fighter aircraft deploy flares, hot gas balloons, or other incendiary devices. Even so, the greater IR sensitivity of missiles built during the last two decades allows them to be far more discriminating and less easily fooled by ECM.

MISSILE SELECTION

AIM-54 "Phoenix" Radar-guided Missile

At first glance, choosing the AIM-54 Phoenix missile over the Sparrow is a no-brainer. Players will instinctively load up their aircraft with these missiles 90% of the time. The Phoenix is the undisputed missile of choice for engaging targets at ranges beyond their ability to shoot back. With a maximum range of over 100 nautical miles, it easily outdistances all other air-to-air missiles. In fact, just as the A-10 tank-busting "Warthog" was built around its GAU-8 gun system, the Tomcat was really made to carry the AWG-9/Phoenix combination.

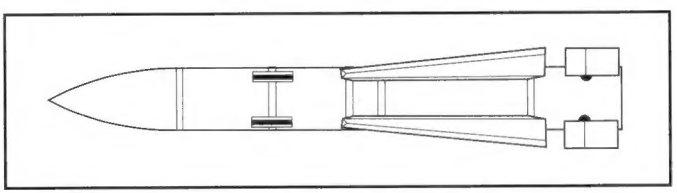


Figure 5-2: The AIM-54 Phoenix. Its long range and "fire and forget" guidance make for a deadly combination.

Putting the range advantage aside, for the moment, this mach 5 air-to-air missile has other useful benefits in combat. The AIM-54 gives pilots a tactical advantage over opponents that happen to be equipped with semi-active radar homing (SARH) missiles. It possesses an active homing radar in its nose cone which makes the Phoenix a "fire and forget" missile. Once the missile is fired, the launching aircraft is free to maneuver or even acquire a new target.

After the missile leaves the aircraft, it flies to a pre-set point in space which is determined by an onboard inertial guidance package. It then switches on its active radar, acquires the target and then tracks it on its own. The F-14 can carry up to six (6) AIM-54 Phoenix missiles. Since these missiles are able to home in on their targets independently, the F-14 could conceivably have all six in the air simultaneously.

So let's recap. The Phoenix is an autonomous "fire and forget" missile with a range far in excess of all the available missiles. What's not to like? Well, before you rush to answer first consider that selecting these missiles out of habit can lead to real problems down the road. The Phoenix does not come without it's share of disadvantages.

First of all, these missiles are very heavy. The AIM-54C weighs in at a whopping 1020 lbs., over twice the weight of the AIM-120A AMRAAM. Even though an F-14 can carry six of these missiles, a practical mission load usually never exceeds four (4). Carrying six of these missiles would be like getting into a fist-fight with a tire wrapped around your neck, the extra 6,100 lbs. is going to affect your maneuverability and speed. When six are carried, it's usually at the expense of something else (like fuel).

The second major drawback to the Phoenix is that, despite the literature, they are not designed with BFM in mind. The AIM-54 has a large minimum range (Rmin). The exact Rmin of the Phoenix remains classified however *FLEET DEFENDER* has best guessed the AIM-54's Rmin (for practical purposes) at 6 nm. If an F-14 finds itself in a tight BFM engagement, a pilot with only Phoenix missiles will spend most of the fight staring at a "Break X." These missiles are best used against level non-maneuvering targets like large strategic bombers.

The third drawback to the Phoenix missile is the enormous cost of each of these missiles, over $1,000,000 a piece. The AIM-54 must be used sparingly. In fact, these missiles are so expensive that relatively few have been built. The Navy could easily use up its entire inventory within several weeks (if not days) of combat. Fortunately the cost of these missiles doesn't adversely affect game-play. *FLEET DEFENDER* does not require players to purchase their weapons. Even so, players who use Phoenix missiles indiscriminately may soon find the carrier has run out.

AIM-7 "Sparrow" Radar-guided Missile

The AIM-7 Sparrow is the other type of radar-guided missile carried by the F-14. It is a semi-active, radar-homing (SARH) missile which means that the missile requires continual updates from the aircraft's radar. The distinction between a SARH missile and a "fire and forget" missile like the Phoenix is an important one. The Sparrow requires that the launching aircraft keep its radar focused on the target throughout the missile's entire flight time. A pilot who launches a Sparrow is committed to that single target. He cannot maneuver freely, drop his radar lock, or even acquire a new target until his first missile hits.

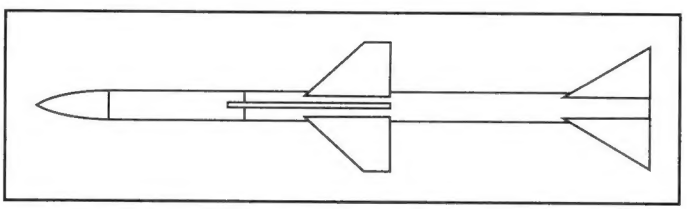


Figure 5-3: The AIM-7 Sparrow. These missiles require the radar's complete attention.

The ramifications of firing SARH Sparrows as opposed to Phoenix missiles are not apparent until the first time a pilot goes up against two bandits at once. With AIM-54s, the pilot simply "locks-up" both targets, then ripple fires two missiles at once. Both missiles seek out their targets independently. With AIM-7s, the pilot must "lock-up" the leader, fire, and then keep the leader in his beam until the missile hits. Meanwhile, the leader's wing-man has closed to within range and has probably fired a missile of his own.

Like the Phoenix, the AIM-7 possesses a significant range advantage over most, but not all, of its Soviet counterparts. With a maximum range of 21.4 nm, however, the Sparrow can only fly about one-fifth as far as the Phoenix.

So, given all the disadvantages, who in their right mind would ever choose to carry a Sparrow over a Phoenix? Well- the Sparrow is not without its own positive features.

First, the Sparrow weighs in at less than half of what a Phoenix weighs, 1020 lbs. instead of 503 lbs. This means that two Sparrows can be carried for the same aerodynamic penalty as one Phoenix. The Sparrow is also slightly faster. Granted, the extra 200 kts. might not be that significant over a long distance, but at medium ranges the difference is meaningful.

The Sparrow also has a shorter Rmin range than the Phoenix. It becomes an active missile after only two (2) nm as opposed to the six (6) nm for the Phoenix. In a close action BFM engagement a lucky pilot can usually separate, then break back into the fight and take a quick shot at just over the missile's Rmin.

Lastly, they're cheaper. Granted, this might not have meant that much back in the days of the $600 toilet seats but in *FLEET DEFENDER* there is less chance of running out of Sparrows in an protracted campaign.

AIM-9 "Sidewinder" Heat-seeking Missile (Infrared)

The AIM-9 "Sidewinder" differs from the two previously mentioned missiles. Unlike the first two, it is an *Infrared* missile, guided by *heat* rather than radar. The Sidewinder is so named because of its unique side-to-side jinking motion while in flight. During development, it was dubbed "Ground-winder" because of its tendency to track heat-reflecting objects on the ground. Early models of this missile were tail-aspect only and required that the target's heat-source (engine exhaust) be facing toward the missile's seeker head. These "tail-chasers" were eventually replaced by more capable all-aspect models like the current AIM-9M.

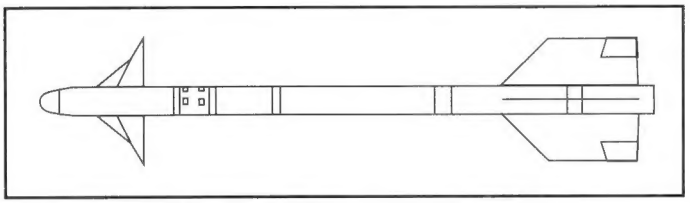


Figure 5-4: The AIM-9 Sidewinder. These missiles are inexpensive yet very efficient.

Although the modern Sidewinders are all-aspect missiles, a straight head-on engagement should rightly be considered suicide. The missile has a maximum head-on aspect range of approximately 6 nm. Given the missile's time of flight, it will be hitting the target just as you reach it. Not good. Your target always has a chance to get in a snap gunshot as it goes by. Sidewinders are best employed from a tail-aspect or at least a high angle-off deflection. Because of its severe range limitations the Sidewinder almost guarantees a BFM engagement.

The first thing you hear when placing the Sidewinder in priority is what's termed the "growl." This indicates that the missile's seeker-head is active but has not yet acquired a target. The "growl" will be replaced by a solid "tone" when the missile is ready to fire.

One of the main benefits to using the Sidewinder is that the missile does not require radar guidance. This enables you to sneak up on an unsuspecting target with your radar turned off. Your enemy, therefore, is not tipped off by a tell-tale radar spike.

No doubt you have heard actual cockpit transmissions where a pilot is saying that he "doesn't have a tone." In military jargon, "not having a tone" means that your heat-seeker has not yet acquired the target.

CHOOSING A WEAPON LOAD-OUT

The first thing you need to consider before setting out on a mission is your weapon loadout. On an actual mission, your load-out would be assigned to you by the squadron SOP (Standard Operating Procedure). *FLEET DEFENDER*, however, gives you complete control over the types and amounts of missiles you can take along.

This initial selection of AAMs (Phoenixes, Sparrows, or Sidewinders) is usually done quickly; just grab six AIM-54s and head out the door. After all, who wants to spend time in the ARMING Screen when there's a mission to fly. Right?

Wrong! Choosing the proper weapon load-out is not an easy chore, and since you have the luxury of selecting your own loadout, it's worth a moment or two of careful analysis. There's much more to it than just selecting the missiles with the longest range. Your armament selections will, to a large extent, decide which tactical approach you'll be taking in combat. Each of the three air-to-air missiles in *FLEET DEFENDER* comes with its own advantages and disadvantages *(Yes, there are disadvantages to using the Phoenix.!)*

Weapon load-outs are selected at the start of each mission from the ARMING screen menu. You are asked to choose from six different load-outs; three MiG CAP and three Fleet Defense configurations. Each of these configurations represents a slightly different mix of air-to-air missiles. *(The M61A1 gun with 675 rounds comes as a standard feature with each of these load-outs.)*

Read the mission brief before selecting your mission load-out. It is always a good idea to tailor your weapons to the specific job you are being asked to do. For example, you don't want to be "caught short" hunting Soviet "Bears" with Sidewinders or having to waste precious Phoenix missiles against lowly helicopters.

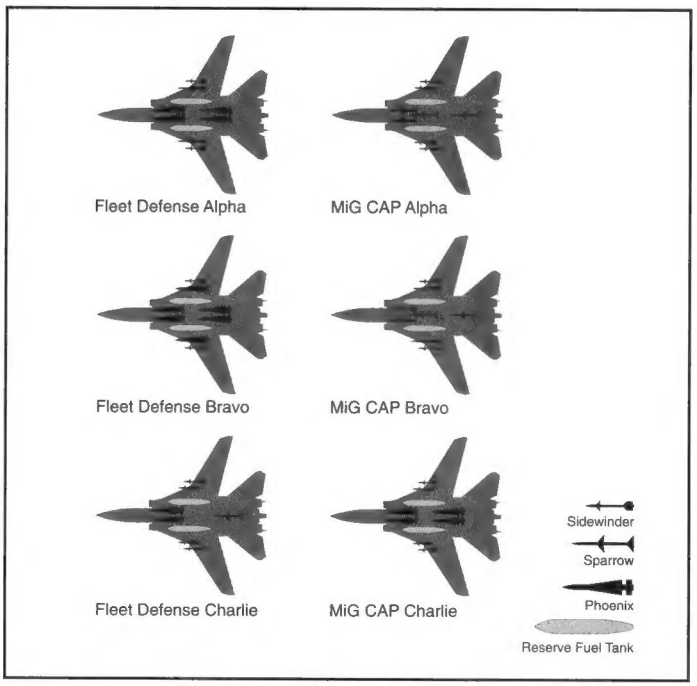


Figure 5-5: Before starting each mission, you are required to select one of six missile configurations.

MISSILE DEFENSE

Depending upon the level of difficulty, every enemy missile, be it an AAM or SAM, demands your immediate attention. Missiles are a serious threat to your aircraft. Each one is a potential show-stopper. You can't afford to let a single missile hit your aircraft. Missiles which do not destroy your aircraft outright will inflict crippling damage and knock out many of your systems. Having to fly a damaged aircraft hundreds of miles to get back to home is no fun.

There are two ways of dealing with enemy missiles: passive defense, which includes flying avoidance profiles which emphasize stealth; and active measures, such as evasive maneuvering or deploying electronic counter-measures (ECM).

Passive Defense Measures

Passive defense measures are those things a pilot can do to defeat enemy missiles that are both undetectable and effortless. These measures include flight techniques designed to limit a radar's ability to spot you (stealth) and practicing basic missile avoidance.

Obviously, you'll never have to worry about missiles being fired at you if the enemy doesn't know you're in the area. This means "keeping a low profile". In other words, don't fly directly over an enemy SAM site at 25,000 ft. in broad daylight with your afterburners on. Low and slow is the way to go to avoid being spotted. Passive measures are designed to keep SAMs on their pads and fighters in their hangars.

The best passive defense is to remain alert at all times. When it comes to flying defensively, the same rules apply as when driving the family car. Watch out for the other guy, and expect the unexpected. This requires that you maintain a high state of situational awareness. Anticipating what is going to take place 1 minute, 5 minutes, even 10 minutes from now is the key. It costs you nothing and allows you to stay one step ahead of the competition. If you're not aware of what is going on around you, how can you be prepared to react to it?

Active Defense Measures

Passive measures are not always 100% effective. Despite your best efforts, the enemy will eventually find you and get a shot off. Once the warning lights start going off in your cockpit, it is too late to devise a strategy. You must fly with an "active" defense plan already in mind. *Active* measures require that you, as a pilot, *do something*. Let's explore your options.

Figure 5-6: Your TEWS jammer is an integral part of your aircraft's ability to defend itself.

Jamming Enemy radars

The first active measure to consider is radar jamming. This is done by the Tactical Electronic Warfare System or TEWS. The TEWS jammer is tied directly into the detection equipment and is activated by pressing the *Jammer Activate* [J] Key. This key puts the jammer in a "standby" mode. Once on mode, it automatically counters any radar emissions directed at the aircraft. You do not have to press the key each time a radar lock is detected, the TEWS jammer functions independently.

Jamming interferes with radar signals in two ways; either by overloading the signal with "white noise" or by deceiving the radar with ghost images and false returns. "White noise" jamming acts much the same way as background conversation. It makes it hard to hear any one particular person talking.

For example, let's say you're at a night club and you (assuming you're a guy) spot two pretty girls talking to one another on the other side of the room. One girl looks up, notices you and immediately says something to her girlfriend. Now you're curious. You would like to know what they're saying. If the room were quiet, you'd be able to hear what the girls were saying but because of the loud music and conversation going on, you can't hear a single word.

Of course, as you move closer you're now able to pick-up bits and pieces of their conversation in spite of the background noise. If you were to go over and stand near them or even join in, you'd hear everything they were saying with little difficulty. Jamming works the same way. It is more effective the farther away the radar is from its target.

When a radar gets so close that it is no longer bothered by jamming it is said to have *burned through.* The exact distance at which a radar is able to burn through jamming is a function of the strength of the radar signal versus the power of the jammer. Obviously, a strong radar, like the AWG-9, will *burn through* enemy jamming at a greater range than a weaker radar suite.

The other way in which jamming affects radar is through *deception.* Deception jamming takes the energy emitted by a radar, alters it, then returns it for collection. A radar can be *deceived* by the spurious images or false returns created by deception jamming. The radar "sees" a target in one location when it is actually somewhere else. A pilot may spend time chasing after a ghost return when the actual enemy aircraft is sneaking up on him from behind. A pilot may become confused, believe he is outnumbered, and waste all his precious AAMs on targets which are not there!

This method of jamming is more effective than simply saturating a wide band of frequencies with noise but it requires that the jammer be matched exactly to the type of radar encountered. This makes deception jamming a "hit or miss" affair. If the two are not properly matched the jamming will have no affect.

Regardless of which form the jamming takes there is one big drawback. The excess "noise" generated by the jammer makes it detectable at long ranges. In fact, the jammer shines like an electronic beacon and has a tendency to attract a lot of unwanted attention. Using the jammer is therefore a trade-off. It can keep enemy radars from getting a good enough fix on you to launch a missile but it gives your position away. Continuously jamming enemy ground radars just allows enemy fighters to be vectored right to your position.

Evasive maneuvering

The same BFM (Basic Fighter Maneuvers) used in dogfighting can also be used to defeat enemy missiles. The job is somewhat more difficult because a missile is faster and can withstand higher G forces. But without a human pilot onboard, a missile only has to be fooled once before it goes ballistic.

Put geometry to work for you. Just as small guys can use leverage to defeat an attacker who happens to be bigger, a pilot can use a missile's faster speed against it. Although missiles are extremely fast, they sometimes turn like a truck, especially the larger SAMs. Even so, because the closure rate is so high, you may only have time to perform one maneuver. If you are not successful, chances are you will not have time to perform another.

The best way to defeat an in-coming missile's tracking solution is to keep it at a 90 degree angle to your direction of flight. When a radar-guided missile is in-bound you are able to follow its progress on your TEWS display. Watch the small squares (indicating radar-guided missiles) and turn so that they close on you down your 3/9 axis. Only the last 5 nm of a missile's flight are important to you in terms of evasion. This is when you should begin your evasive maneuvering and combine it with active ECM.

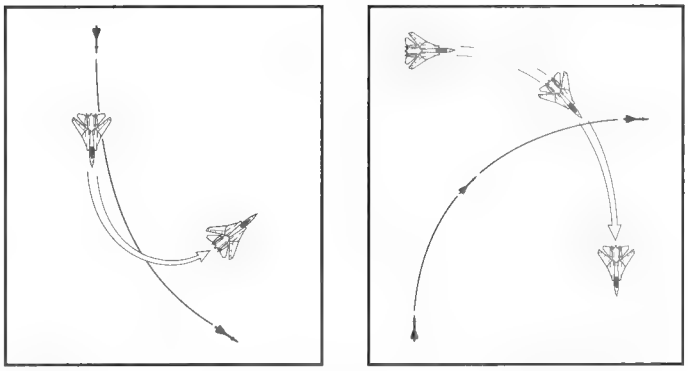


Figure 5-7: These diagrams show how playing the angles can defeat the tracking solution of an in-coming missile.

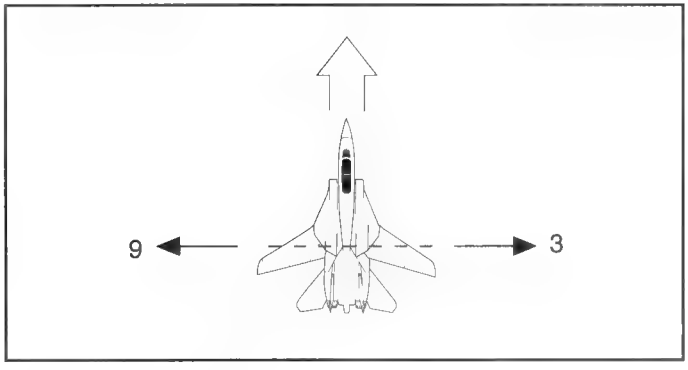


Figure 5-8: The 3/9 axis

Electronic counter-measures

Like air-to-air missiles, electronic counter-measures (ECM) come in two basic types, those designed to fool radar-guided missiles (chaff) and those used against heat-seekers (flares). It is important to identify the type of missile tracking your aircraft so that you are able to deploy the appropriate counter-measure. Your supply of electronic counter-measures is limited so use them sparingly. At the same time though, don't be shot down in an aircraft with chaff and flares still onboard. It is never a good idea to trust ECM entirely. It is always better to be maneuvering while dumping chaff and flares out the back.

Chaff is stored within dispensers located inside your F-14. It is used to defend your aircraft against radar-guided missiles. A cloud of radar reflecting metal strips is released each time you deploy chaff. The strips of metal serve to confuse the enemy's radar return by cluttering it with hundreds of false images.

The classic technique for deploying chaff is to release a bundle as soon as your RWR alarms. To release a bundle of chaff, press the Release Chaff [C] Key. With luck, the chaff has a chance of breaking the contact. If the missile continues to guide, wait to deploy additional chaff until the missile is within *three to five kilometers*.

Even if you deploy chaff be sure to alter your flight path. Missiles are ballistic and will continue to track along its last heading. If you remain on your original course, the missile may re-acquire your aircraft once it passes through the chaff.

Flares

For defense against IR homing (heat-seeking) missiles, the F-14 is equipped with heat producing devices, commonly known as *Flares*. Flares are used to decoy heat-seeking missiles away from your aircraft. Like chaff, your aircraft carries only a finite supply of these flares. To release a flare, press the Release Flare [F] Key.

A Flare burns for only a short time (5-10 seconds). During this time, the IR missile hopefully is lured away from your aircraft. Once the Flare burns out, however, the missile is free to re-acquire a new target. It may re-acquire your aircraft if you have not maneuvered out of its view.

Heat-seeking missiles are hard to deal with because they do not appear on the TEWS display. You do receive an audio warning, however. Since the range of most "heaters" is limited, begin kicking out flares as soon as you receive the warning. Chances are very good that the launching aircraft is already within the 5 nm envelope.

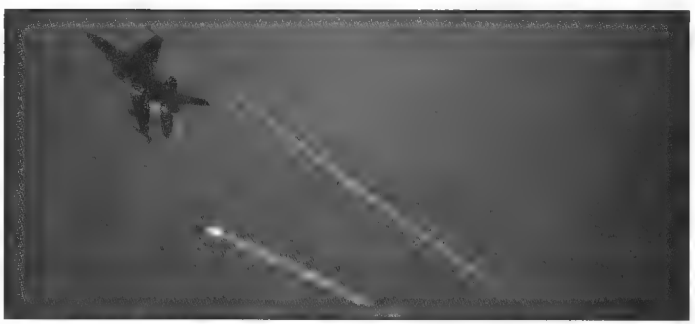


Figure 5-9: An F-16 being pursued by a heat-seeking missile, probably an AA-2 Atoll, kicks a flare out the back and begins maneuvering.

GUNS... GUNS... GUNS!

At the beginning of the Vietnam era, certain USAF fighters namely the F-4 Phantom II went to war without a cannon or gun. Believing that the missile age heralded a new era in air combat, theorists considered a gun unnecessary. To destroy an opponent, a pilot needed only to detect a target on his radar, select one of a number of missile options and push a button. The target would be destroyed moments later.

Air combat was intended to be very clean, very scientific now that pilots could carry AAMs. Missile proponents were quick to point out that guns were useless except at very close range and that the speed of modern aircraft made close engagements unlikely. Furthermore, enemy aircraft were to be kept at missile range and destroyed beyond visual range (BVR). Pilots were told not to expect the type of twisting and turning "fur-ball" engagements which were a common occurrence during Korea.

Well- history proved the theorists wrong. During the Vietnam war, MiGs proved to be very effective because our AAM technology wasn't yet good enough to insure a high first-round kill percentage. Navy pilots unlucky enough to be driving certain model Phantoms went to Vietnam without a gun and got creamed. Consequently, a gun was hurriedly redesigned back into the F-4 and since Vietnam, no front-line U.S. fighter aircraft has been designed without a gun.

THE M61A1 20 MM VULCAN GUN

The F-14B is equipped with a single General Electric M61A1 20 mm (0.8 inch) Vulcan gun mounted under the cockpit and offset slightly to the left. The M61A1 is a six barrel, Gatling-type gun able to fire up to six thousand rounds per minute or about 100 shells per second. At this rate, the F-14 will expend all its ammunition in less than seven seconds (675 rounds). Keep in mind that although these statistics seem impressive, the M61A1 is essentially 1950's technology.

The M61A1 has an effective range of 0.6 kilometers (less than half of a mile) with a maximum range of 3 kilometers (for strafing attacks). This pitifully short effective range is actually a benefit. The M61A1 gun can operate well within the Rmin range of most missiles.

Two factors which influence the relative effectiveness of an aircraft's gun are its rate of fire and the size of the round being fired. Usually these two factors are at odds with one another. Larger caliber shells (i.e. those with more mass and kinetic energy) have lower rates of fire. Guns which fire smaller bullets can get them out of the barrel faster.

Most Soviet-made aircraft you encounter are packing either a 23 mm or 30 mm gun. French-made 30 mm DEFA guns are found on Libya's F-1s. Let's make some cursory comparisons between these weapons and the 20 mm gun your F-14 is carrying.

The 20 mm M61A1 has a higher rate of fire than those carried by your opponents. The shells leave the gun quicker and travel at a higher velocity. Therefore, more of your shells will impact the target area and have a tighter dispersion (shot grouping). Many bullets will be striking in rapid succession, making the chances of scoring a hit greater than those of a larger caliber gun. However, these rounds are relatively small and often lack the individual kinetic punch necessary to inflict crippling damage.

The opposition's big 23 mm and 30 mm guns have no such problem. These larger caliber guns pack an enormous punch even though their rounds are traveling much slower. These rounds lack finesse, they simply batter down an opponent. Their pattern of dispersion is greater, however. The slower rate of fire allows too much time to elapse between firing cycles so there will also be fewer of these rounds hitting the target area.

To summarize the differences, the faster firing but smaller rounds of the F-14's 20 mm gun have a better chance of hitting the target but a lesser chance of causing critical damage. Enemy guns are completely opposite. They have less of a chance of hitting you but have a greater capacity for causing fatal damage if they do.

One thing *FLEET DEFENDER* takes into account that has not been covered in this section, is the structural ability of aircraft to absorb damage. The same materials and construction techniques that allow an aircraft to sustain multiple G forces also give it an inherent resistance to battle damage. Unlike hits from missiles which cause catastrophic structural failures, damage produced by gunfire results from the sum total of accumulated hits. An aircraft has a better chance of remaining airworthy under these conditions, when damage is being done to it piecemeal, rather than all at once.

With this in mind, U.S. aircraft have an advantage over their Soviet counterparts. Soviet aircraft are mass produced, their quality is derived from quantity. The philosophy is that their aircraft will fly three or four missions before being shot down. The Soviets tend to factor in their eventual loss when considering operations. Materially, Soviet and western aircraft are similar. Structurally, however, Soviet aircraft have design limitations which make them more susceptible to non-catastrophic damage.

OFFENSIVE GUN COMBAT

The use of gunfire in air combat has not changed since its inception during the early days of World War I. It is still a matter of maneuvering to get in close to your enemy and then pumping lead into his aircraft until it goes down. The trick is to stay out of your opponent's forward arc so he cannot fire back.

The element of surprise is very important in gun combat situations. Sneaking up on your opponent undetected presents your best chance of inflicting critical damage before he can escape. This usually requires you to come in from behind your enemy and stay in his blind spot until you are ready to shoot. This six o' clock area directly behind the enemy is known as the "Slot position."

Once you are in the Slot position the enemy pilot cannot see you, cannot fire at you but at the same time, has to shake you off his tail before you can shoot him down. You command the fight once you reach this position of advantage.

There's another reason for getting directly behind your enemy. The Slot position also gives you an opportunity to score multiple hits on a target. By directing your gunfire along the target's line of flight the enemy aircraft remains in the path of your gunfire for a longer period of time, thus increasing the percentage chances of scoring a hit. As the following diagram illustrates, more of your rounds likely to hit the target when fired along the "grain."

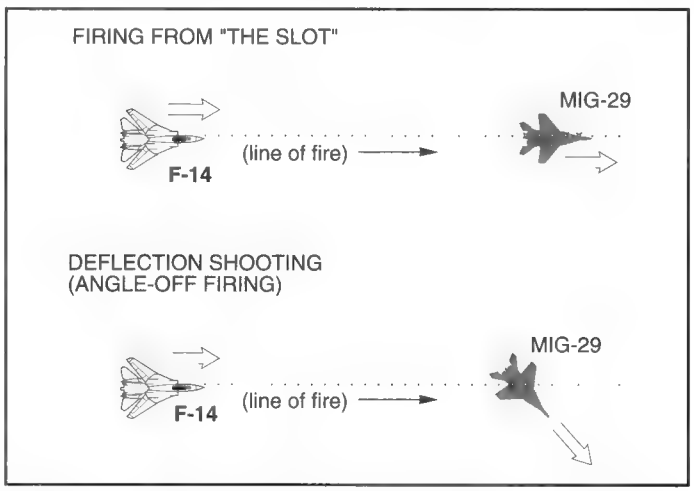


Figure 5-10: The chances of scoring multiple hits on a target are increased by shooting along its line of flight. Deflection shooting (against the grain) is much more difficult and produces far fewer hits.

Even though a head-on attack would also be conducted along a target's line of flight, this type of attack is not recommended. For one thing, the target is able to shoot back when you approach it head-on. Head-on attacks also give you much less time to aim because of the high closure rate.

The next best firing position (a far distant second) is the *deflection shot* (firing from a rear quarter). These shots are far less likely to score hits because, unlike a tail aspect shot, both the firer and the target are moving relative to each other. Since the line of fire in a deflection shot runs against the target's grain, fewer bullets have a chance to hit. Deflection shooting allows a target to fly between the bullets like a child running between raindrops.

Deflection shooting, *also known as high angle-off shooting,* gives you less time to line up the shot. Often it is best just to fire a stream of rounds ahead of the enemy. This way you are creating a wall of shells for him to fly into. While effective, this technique is also wasteful and you only have 675 rounds to play with.

On the positive side, gunfire has an almost instantaneous effect on the target. Rather than having to wait up to half a minute for a missile to hit, 20 mm shells begin striking your target in miliseconds. This feature cuts down on a target's ability to escape.

For best results, the enemy aircraft should fill your canopy windshield before you open fire. Unfortunately, because of the speed and maneuverability of modern aircraft, waiting this long to open fire could easily cause you to overshoot. If this happens, be sure that you have carefully studied the following section on defensive gun combat.

DEFENSIVE GUN COMBAT

Basically, defensive gun combat is a repetition of the tactics used in offensive gun combat- only now the roles are reversed. Instead of you being concerned with lining up on an enemy, he's lining up on you. The object of defensive gun combat is to make the job of shooting you down more difficult. Skillful maneuvering is the essence of close-quarter combat, try to avoid being shot down while seeking an opportunity to turn the tables on your opponent.

There is a simple and fool-proof way to keep from being shot down by gunfire. All you need to do is stay more than 3 kilometers away (the maximum gun range) from enemy aircraft. That's all there is to it, just stay out of range. If you can manage to do this, you'll never need have to worry about being shot down by a gun. With all the airspace available to you in each theater, this should be easy, right?

Okay, maybe not. Some enemy aircraft are faster than your F-14 so staying out of their reach may be difficult. There may be times when you are taken by surprise or forced into a defensive fight with multiple bandits. Under these circumstances, staying more than 3 km away may present a problem. Well, if you can't stay away from them, you're gonna' have to fight 'em.

If you find yourself on the defensive in a guns engagement you must constantly look for an opportunity to transition to an offensive stance. Even a temporary neutral position of parity with your opponent is better than remaining strictly defensive throughout a fight. The longer you remain defensive the greater chance you have of making that one fatal mistake.

Having an enemy tucked neatly in your "six" is not a good way to start a dogfight. Depending upon your opponent's level of expertise, it may take you awhile to turn the tables on him. In the meantime, if you can't shake him, at least force him into taking difficult shots with low hit percentages. Never fly straight and level for more than a couple seconds. Those few seconds may be all an enemy pilot requires to saddle up to you and get in a burst of fire along your line of flight. Play the angles and alternate your speed to throw off his attempts to target your aircraft.

AIR COMBAT MANEUVERING

Modern air combat is a fast paced, violent, and confusing affair. A sky filled with dogfighting aircraft one minute can be vacant in the next. A player in the middle of a such a fight might think that an air battle goes on essentially without rhyme or reason. Nothing could be further from the truth. This section is designed to help the novice fighter pilot better understand what is going on around him because in *FLEET DEFENDER*, unlike other flight sims, there's a lot going on.

The art of Air Combat Maneuvering (ACM) is very much a technical skill. It is not unlike the thoughtful positioning of pieces on a Chess board. Brains beat brawn in ACM. Finesse and style are essential. The following section is a quick look at some fundamental rules of air combat maneuvering. It describes standard fighter tactics that all players can use to defeat the Soviet and Soviet-trained opponents you'll meet during the course of a normal campaign. It is offered as a brief overview and quick look into the world of modern air combat.

ENERGY MANAGEMENT

Energy Management is the art of balancing the four dynamic forces which act on all aircraft during flight; *Lift, Drag, Thrust, and Gravity (weight)*. When a pilot manages energy he is merely attending to that balance. Just as personnel managers like to get the most from their people, energy managers want to get the most from their available energy. They do this by manipulating the manner in which the principle forces of flight act upon their aircraft. Good pilots are by necessity, good managers.

The principle of energy management is being able to maximize the benefits derived from the *Big Four*. Used properly, the Big Four can give you distinct advantages in combat, ignoring them only leads to trouble. Not only do you need to remain aware of your own aircraft's energy status, it is always a good idea to pay attention to what the other guy is doing with his aircraft. If your opponent has run his aircraft out of energy, you need to be in a position to capitalize on his mistake.

Your Energy State

Simply put, your aircraft's energy state is the sum total of its *positional* plus its *kinetic* energy.

Positional energy can be defined as the weight of the aircraft multiplied by its current altitude. In a contest between two aircraft of equal weight and speed, the one flying at the greater altitude is said to have more positional energy. It is sometimes called *Potential* energy because it represents energy that is *potentially* available any time a pilot wishes to make use of it.

Altitude, in this respect, is a measure of the energy which an aircraft has on-call. The higher an aircraft travels the more potential energy it will have to call on in the future. Aircraft flying at lower altitudes have less positional energy because they cannot convert as much altitude into energy. To make up for this deficiency, an aircraft must increase its speed to replace Positional energy with *kinetic* energy.

Kinetic energy deals with the energy derived from speed (i.e. motion). An aircraft which is traveling at a high rate of speed has a wealth of energy. This energy can be spent performing maneuvers or used to gain altitude. The former option, performing maneuvers, bleeds off the energy by increasing the load factor of the aircraft, the latter method, gaining altitude, is a good way of trading kinetic energy for positional energy.

As you can see, a pilot who is caught flying both low and slow is a poor energy manager. If he should encounter trouble his only option is to open up the throttle. Gaining energy in this manner takes both time and fuel. The secret of good energy management is not to get caught in this predicament in the first place. Unless a pilot is escorting a group of slow-movers (like ASW helicopters), a F-14 should never fly at slow speeds down on the deck. (Of course, when you're trying to avoid radar detection, low and slow is your best bet. Just don't get caught flying low and slow when enemy aircraft are about).

The Bank

Energy to an aircraft is like having money in the bank. Although gliders are able to fly quite well without engines, no aircraft, not even a glider can fly without energy. When flying, energy is accumulated, saved up and then spent throughout the entire flight. This process is repeated over and over again until the aircraft lands. The secret of flight is knowing when to deposit and when to withdraw.

Flight makes constant demands on your aircraft's bank account. Energy is spent whenever you pull back on the stick, whether it be climbing for altitude or making a high G turn. Unlike the federal government, your aircraft will not let you continue spending once your bank account is gone; flight doesn't allow for deficit spending. A good pilot will try to minimize maneuvers which drain his bank account but there are times when this is impossible. Once your savings are used up, the aircraft will stop flying (stall). At this point, you will have to make a quick deposit of fresh energy or go down.

Creating new energy to maintain flight is known as *"going to the bank."* Usually, energy is created by simply pushing the throttles forward (adding power) or by trading in altitude. Either way, pilots usually try to minimize the number of trips to the bank they're forced to make.

One sure way to win a dogfight is to catch your opponent "going to the bank". Why? Because going to the bank is an indication that your opponent does not have the energy necessary to perform a desired action. In this condition, his ability to maneuver will be limited and his ability to climb will be nil. If you can prevent your opponent from renewing his energy, he's as good as gone, and you win the fight with style.

The Energy "Egg"

It used to be that the term *performance envelope* was a fairly esoteric concept. Today, it has become common practice to use the term to describe everything from automobiles to tennis shoes. Hardly anyone is left scratching their head when the phrase is used in day to day speech. When describing aircraft, the term performance envelope simply refers to a set of specific flight characteristics and parameters. How high can a particular aircraft fly, how far, how fast, and under what conditions?

One thing to remember when considering a particular aircraft's overall performance is that it varies widely according to the flying environment. Even though air is invisible *(at least it used to be before the industrial age)* it is thick stuff. While it appears that air is nothing more than empty space, an aircraft must wade through the atmosphere like a fish must swim through water. Air is not homogenous. It actually acts more like soup. Just as soup is thicker at the bottom of the bowl; so too, is air thicker the nearer it gets to the surface of the earth. For this reason, an aircraft's performance envelope takes on a peculiar egg shape. This is known as the *energy egg.*

In the horizontal plane, an aircraft will fly a perfect circle if it maintains a constant G force and speed. Think of the flight path as the waist of the energy egg. When the same aircraft tries to fly a perfect circle in the vertical plane, it is distorted by gravity into an egg shape. At the top of the egg, an aircraft will be nearing the end of its energy. It will be traveling slowly and have a very tight turn radius. Near the bottom of the egg, the aircraft will have picked up speed during its descent and have a much longer and flatter arc.

The shell of this egg is the area of maximum flight performance and fuel efficiency. Aircraft chasing around the outer edge of the egg are wasting energy by performing maneuvers which can be accomplished more efficiently at a lower power setting. Those aircraft flying without enough energy are said to be flying *"inside the egg."* Such aircraft will be unable to perform critical maneuvers when necessary.

"Corner" Velocity

There's a point in every fight where the adage "Speed is life" is counter-productive and can get you into trouble. Some pilots think that the faster they go, the better dogfighters they become. These guys try to buy their victories at the cost of some jet fuel. This brute strength approach to air combat misses the finer point to ACM. Pilots cannot shove the throttles all the way forward and expect to maneuver crisply. Speed is a fine thing to have when making slashing attacks, but when the enemy knows you're coming, it's also nice to be able to swing the nose of your aircraft around at a decent rate.

This balance of speed and maneuverability is known as an aircraft's *"corner velocity."* It is the speed at which an aircraft makes its quickest, tightest turns. A good energy manager will avoid the temptation to peg his throttle open. Instead of powering through a fight he will use the energy egg to give him a superior turning ability (rate of turn) and tight turning radius as well. A pilot that blows through a dogfight at 600 knots is just being a high speed cheerleader. He is flying way outside the energy egg and he'll be lucky if he gets close enough to wave as he goes by.

SITUATIONAL AWARENESS

Although the phrase situational awareness has only recently become fashionable, the concept of SA has been around since the birth of air combat. *Situational awareness is the ability of a pilot to mentally process the entirety of what is going on around him.* It means knowing where your wing-man is at all times and what he may be doing. It means keeping an eye on your "six" while going after the MiG in front of you.

One thing that separates veteran pilots from novices is SA. New pilots fall into the trap of focusing in on only their little part of a battle. For example, a novice pilot might bear in for an easy kill on one aircraft only to be taken out by another that he didn't see. Like a detective arriving at a crime scene, a pilot must be able to observe the whole setting while concentrating on just what is important to solving the case.

A pilot with a good situational awareness can mentally place himself in his wing-man's cockpit. A pilot with really good situational awareness will place himself in the enemy's cockpit as well. A significant part of SA is knowing what the other guy is getting ready to do. Two-seat aircraft, like the F-14, have the advantage of a second pair of eyes when it comes to SA. In return for the free ride, a RIO must be able to spot enemy aircraft that the pilot may have missed.

In *FLEET DEFENDER*, the best way to improve your situational awareness is by being familiar with enemy formations. Know what to look for so you can recognize it when you see it on radar. Practice, practice, practice! There is an entire training theater included in this simulation. It is here to help you. Use it.

The AWG-9 radar gives you a distinct range advantage over your opponents. *The Iranians used their F-14s as mini-AWACS early on in their war with Iraq.* Again, use this range advantage to determine what is going on around you. Don't become fixated on a single target.

The next best way to enhance your situational awareness is by simply looking out the window from time to time. (You know, just like they did in the old days.) *FLEET DEFENDER* gives you a number of different view perspectives. Use them all. Sometimes peering out the side of the cockpit can pay off in big dividends. You might just spot a bandit sneaking up on you that didn't show up on radar.

PURSUIT ANGLES

The ultimate objective in every air engagement is to reach a position of advantage from which you can shoot at the enemy without him shooting back. This usually means getting behind an enemy and pursuing him long enough to shoot your guns or launch a missile. Maintaining the proper pursuit angle while you close in for the kill is tricky business. Getting behind your enemy (i.e. getting in his "six") is only the beginning, now you have to stay there. At the same time, your opponent will be doing everything within his power to get away. His wild maneuvering and abrupt speed changes are designed to throw you.

Choose a pursuit angle that allows you to close on an enemy regardless of his maneuvers. Two things to consider when deciding on a pursuit option are the relative disparity of energy between the two aircraft and the engagement envelope of your air-to-air weapons.

Judging the target aircraft's energy level will be difficult when initially entering the engagement. Be careful. The worse thing you can do is jump into a fight with a high level of energy, assume a *lead pursuit*, and then proceed to overshoot the target.

Begin every pursuit involving closure in a *pure pursuit* profile. Keep your nose pointed directly at the target until you get a feel for the target's energy state. Once a stable closure rate has been established, you can increase the rate of closure by pulling into the target or fall back into a lag pursuit at your leisure. Remember, it's easier to loosen the screws than tighten so don't use up all your energy assuming a pursuit profile you can't maintain.

The weapons you carry also have a great deal to do with pursuit situations. For example, if you are out of AAMs and equipped only with guns, you must position your gunsight ahead of your target. This means that you will want to assume a *lead pursuit* profile. A pilot equipped with rear-aspect missiles only will generally prefer a *lag pursuit*. His object is to reach a position within the six o' clock arc of his target. This is the classic ACM "kill" position. *(Fortunately, you do not carry such limited weapons. Tail-chase heat-seekers are only found on older model fighters belonging to Third World nations.)*

Although a pilot can best bring his weapons within constraints from behind his opponent, all-aspect missiles give pilots greater latitude in determining pursuit options. Pure, even lag pursuits can be used effectively.

Lead Pursuit

A *Lead Pursuit* situation is one in which the pursuing aircraft keeps its nose pointed ahead of the target throughout the turn. Lead pursuits provide the pursuing pilot with the fastest means of affecting closure. This is a dangerous chase position because the pursuer is not always able to see his target. In tight turns, the line-of-sight (LOS) to the target will be blocked by the pursuer's own aircraft. If the pursuer is not careful, this could lead to the target being able to reverse on him.

In order for a pilot to maintain a *lead pursuit* situation he will have to continually increase his turn rate. At the same time, narrowing spatial distances (closure) will cause the pilot to fly an ever decreasing turn radius. Bear in mind that the G forces in this situation are greater on the pursuer than the pursued. As the two aircraft come together, the gap in G forces experienced by the pilots can be significant. There's no point in getting right up on the enemy if you're going to be asleep when you get there.

Pure Pursuit

A *Pure Pursuit* situation is one in which the pursuing aircraft keeps its nose pointed directly at the target throughout the turn. If you can keep aimed at the target as he turns you must be doing something right. You won't be able to affect a guns kill from a *Pure pursuit* but you will be able to boresight a missile.

These pursuit situations generally occur during transition periods between *Lead* and *Lag* pursuit profiles. A defender who sees an attacking aircraft in *Pure pursuit* will undoubtedly be spurred to begin out of plane maneuvers like climbing, diving, jinking, or making slicing turns.

Let him. All that maneuvering will begin to eat up his store of energy. Meanwhile, you can continue to close in. Your rate of closure won't be as fast as a Lead pursuit so use this extra time to position yourself well. Your RIO will appreciate the few additional moments to play with the radar.

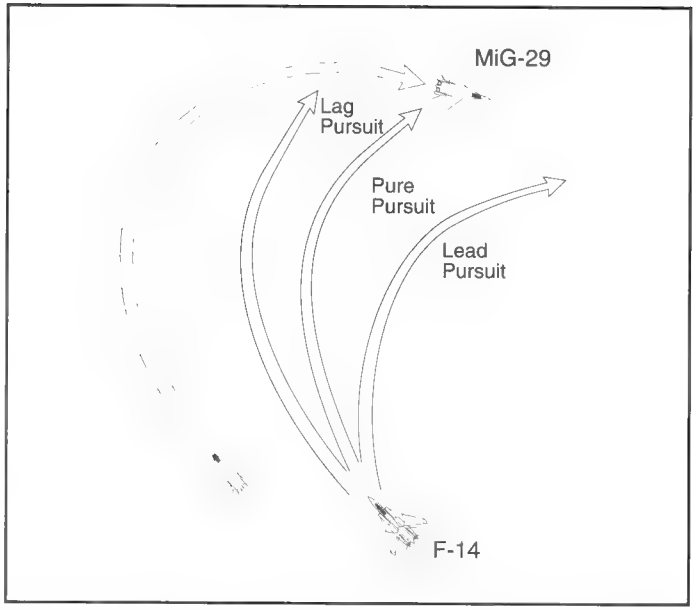


Figure 5-11: Lead, Pure, and Lag pursuit curves

Lag Pursuit

A *Lag Pursuit* situation is one in which the pursuing aircraft keeps its nose pointed behind the target throughout the turn. This type of pursuit is the easiest of the three for the pursuer. The chase aircraft can alter (and even stop) the rate of closure by making minor adjustments in nose-angle. It can be used to slide into a *Pure* or even *Lead pursuit* profile as the range decreases. This type of pursuit is also used to prevent a possible overshoot if the pursuing aircraft is traveling faster than its prey. Should the situation warrant it, the *Lag pursuit* also affords you the best chance to disengage from the fight.

BASIC FIGHTER MANEUVERS (BFM)

Although the F-14 was intended merely as a platform for launching missiles, its swept wing design gives it a dual mission capability. Not only does it launch missiles, but it is able to hold its own in a dogfight.

This section on Basic Fighter Maneuvers outlines some simple tricks to use against the enemy. You should also be on the look-out for when the enemy decides to use these tricks on you.

Break Turn

A Break turn is merely an abrupt change of direction made in response to an opponent's attack. It is usually made in the direction of the enemy aircraft to spoil his firing solution. If conducted properly, the Break turn forces the enemy to take a high "angle-off" gun shot. Even if your opponent is able to stay on your tail, his aiming perspective makes you a difficult target. This maneuver is also used to get inside the turning arc of approaching missiles.

A Break turn is made with wings inclined at 90 degrees. It is a high G maneuver which, if sustained, leads to a rapid loss of airspeed. This may cause your opponent to overshoot, so be prepared to take advantage of his mistake. In a sustained turn, your wings will sweep forward if too much energy bleeds off. Use this as an indication it's time to relax the stick.

If you are "bounced", Break turns give you time to recover from your initial surprise and start your own maneuvering. You cannot win air combat by remaining in a defensive posture. Use the Break turn to begin your offensive stradegy.

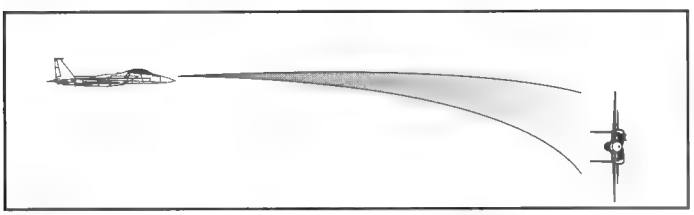


Figure 5-12: The Break or "Bat" turn. Turns like these expose the pilot to extreme G forces.

Early Turn

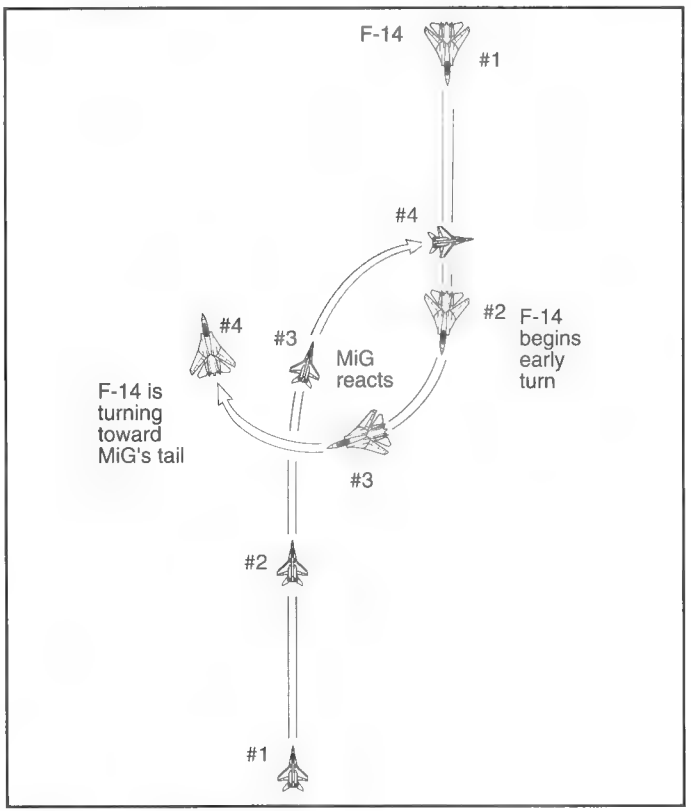


Figure 5-13: The Early (or Lead) turn. This is a tricky maneuver. It takes a delicate sense of timing to perform properly.

If the closure battle for position has resulted in a stalemate, your opponent may decide to barrel straight in to bring about an engagement. The early turn maneuver is used to counter this head to head confrontation. As shown in the diagram, it is a transitional maneuver used to get behind your opponent from a head-on aspect. The trick to performing the early turn is to anticipate your opponent's future position in relation to your own.

Inexperienced opponents usually fail to react to this maneuver in a timely fashion. They are soon caught in a turning battle they can't win. The Early (or Lead) Turn depicted above is actually the prelude to a "One Circle Fight." The winner of this battle will be the first pilot able to bring the nose of his aircraft to bear on the enemy.

Scissors

A Scissors maneuver is actually a series of turns and counter-turns in which the opposing aircraft are each attempting to get behind the other. This naturally causes both pilots to fly as slow as they dare in order to tighten their turns. Whichever pilot forces the other to take the lead in this type of battle comes out the winner. Speed brakes and flaps help to slow you down, but as your airspeed continues to drop the hard turning will eventually lead to a stall situation. Before that happens, disengage from the scissors and reposition yourself.

Disengaging from a scissors battle takes careful timing. Wait until you are pointing away from your opponent in an outward turn, roll inverted and dive away to increase the separation distance. Your opponent's airspeed will be low as well, giving you time to escape.

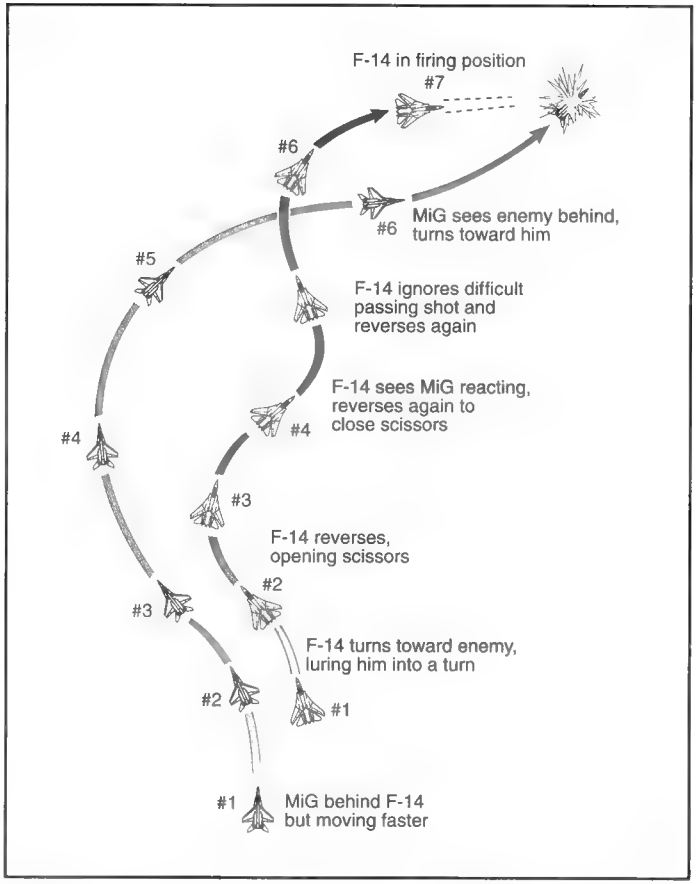


Figure 5-14: Despite its size, the F-14 has proven itself to be a master at the scissors fight.

Split-S

The Split-S is a reversal maneuver combining a half-roll and dive to increase speed. It is a quick way of changing your direction 180° and is usually begun from level flight or slight climb. To perform a Split-S, simply roll inverted. Once inverted, pull sharply back on the stick to enter a dive. This maneuver causes you to lose considerable altitude, so make sure you have at least 5,000 ft. to play with.

As you enter the dive, reduce your airspeed in order to keep from losing too much altitude. The nose down attitude will provide you with more than enough energy. Continue to pull back on the stick until you are once again level with the horizon then shove the throttles forward. You are now heading 180° from your original heading with a reservoir of stored energy.

After years of watching old war-movies depicting WW I air combat, most of us continue to think of the Split-S as a defensive maneuver. Actually, if you have an enemy fighter on your tail, going into a Split-S is tantamount to suicide. If the bandit happens to be low on energy and having trouble maintaining a pursuit, following you through a Split-S solves that problem.

Smart pilots recognize that a Split-S is really an offensive maneuver. It is used to transition into an attack profile, converting altitude into energy for a low slashing attack.

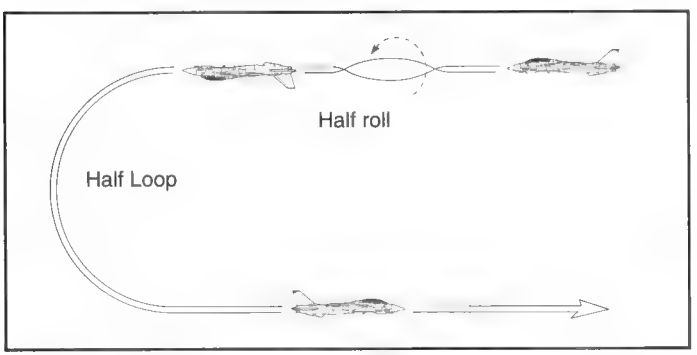


Figure 5-15: The Split S.

Immelmann Turn

The Immelmann turn is named after its inventor, Max Immelmann, a German World War I ace. It is the exact inverse of the Split-S. The Immelmann is a climbing half-loop used to get on the tail of an enemy coming head-on. Speed is the critical factor in performing an Immelmann turn. Check your air speed to insure that you have enough to perform this maneuver without stalling.

An Immelmann is best performed when begun from level flight or a slight nose-down attitude. Simply pull back on the stick, applying pressure until you reach the vertical plane. As your air speed continues to drop off, you must judge for yourself when to complete the pull-over. Once in level flight, a simple half-roll returns you to a normal flight profile heading in any direction you choose.

Like a Split-S, the Immelmann is also a conversion maneuver used to transition into an attack. Don't ever use an Immelmann to shake an opponent on your tail. In this instance, an Immelmann just gives your opponent an early Christmas gift. Even a Yak, not normally noted for its dogfighting prowess, can take advantage of a Tomcat dumb enough to pull an Immelmann in front of it.

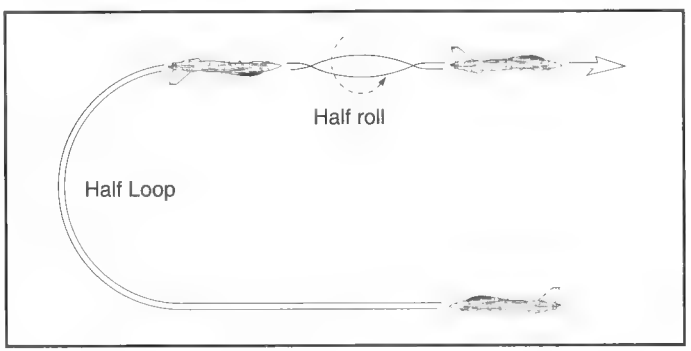


Figure 5-16: The Immelmann Turn.

Loop

By now, you undoubtedly will have noticed that a Loop is nothing more than combining a Split-S with an Immelmann, or vice versa. Either half of the maneuver can be performed first depending on the circumstances. Loops are performed to avoid an enemy in your six o' clock while trying to aim your guns at his tail at the same time.

If you are traveling fast and wish to slow down, pull into an Immelmann. Continue to apply constant back pressure while reducing your throttle. Once the nose comes over the top, your speed increases as you come down the back side of the Split-S. Add or subtract power as needed.

If you do not have enough energy to perform an Immelmann immediately start your Loop with a Split-S. Determine how much altitude you wish to lose and adjust your throttle accordingly. This provides you with additional energy for when you pull into your climb. Note that you end up flying inverted along your original heading.

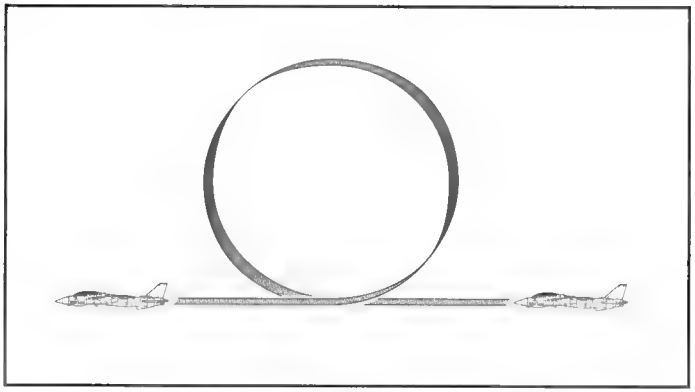


Figure 5-17: Although popular at air shows, the missile has rendered the Loop obsolete as a defensive maneuver.

ADVANCED FIGHTER TACTICS (AFT)

One Circle fights

A One Circle fight occurs when you and a single enemy aircraft meet head-on at the merge, pass each other, then break to the same direction. When this happens the dogfight becomes a series of nose-to-nose engagements resulting in ever shrinking concentric circles. Each of you will be attempting to convert this head-on aspect into a tail chase position of advantage. Energy management is critical in this type of fight because you're trading energy for nose angle with each subsequent pass. One Circle fights easily stagnate into a flat scissors reversals. Once there, the pilot able to make the sharpest, tightest turn will drop behind the other. Less maneuverable aircraft would do well to avoid this type of fight. One Circle fights are usually stationary. The merry-go-round effect locks the two aircraft in one piece of sky. This makes it easy for additional aircraft to find the dogfight.

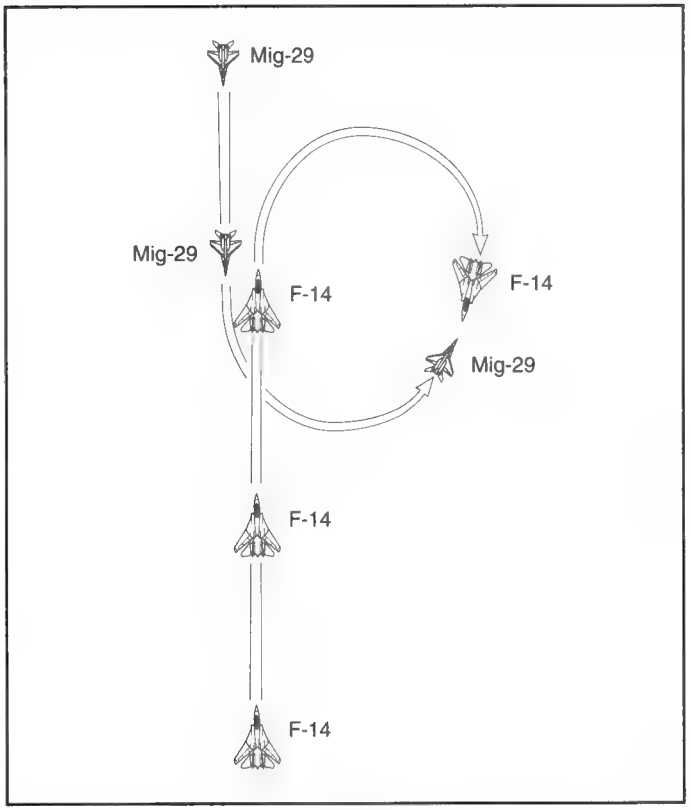


Figure 5-18: The object of a One Circle fight is to force the enemy to overshoot. It's a race to see who can be the first to go slowest.

Two Circle fights

The alternative to a One Circle fight is- you guessed it -*a Two Circle fight.* A Two circle fight occurs when you and a single enemy aircraft meet head-on at the merge, pass each other, then break in opposite directions. The paths your aircraft take resembles a figure eight *(or two adjacent circles)* when viewed from above. Again, the object of a Two Circle fight is to convert a head-on approach aspect into a tail chase situation. Initially, both you and your opponent go to your respective corners. At this point it is easy for one or both aircraft to disengage. Should you chose not to disengage, it becomes a matter of getting the nose of your aircraft around in time to point at the enemy first.

Speeds are generally kept higher than those in a One Circle fight because the physical area of a Two Circle fight is greater. Both you and your opponent are trying to speed around the circle and wind up in the other guy's "six." Aircraft equipped with all-aspect missiles will have an advantage. If you can get the nose of your aircraft around, you can shoot a missile from across the figure eight.

Two Circle fights are far more difficult to manage. Most of the time the aircraft involved will be pointed away from each other so get used to looking over your shoulder or keep the enemy in sight by using Padlock View [F8] Key.

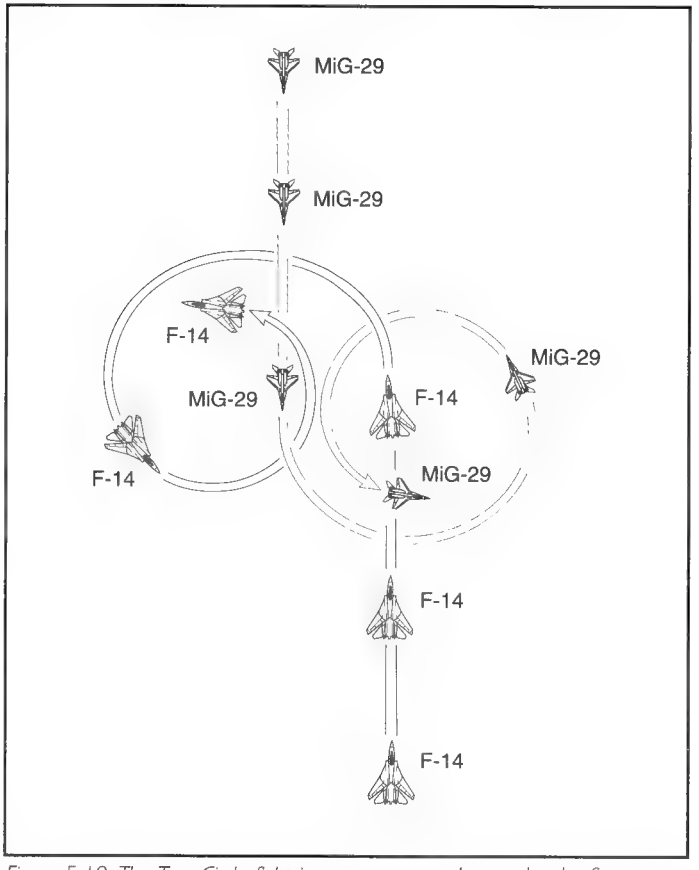
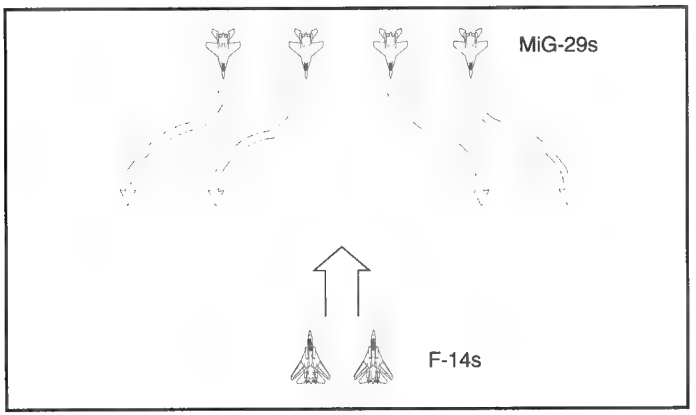


Figure 5-19: The Two Circle fight is a race to see who can be the first to turn and fire.

Envelopment

An envelopment (also known as a *Pincer attack*) is normally used by a flight of enemy aircraft traveling in a Wall formation. It is actually the preferred method of attack because the aircraft will already be spread out in a linear fashion. The flight leader can immediately execute this attack without having to bother with pre-attack positioning. His aircraft will already be at their jump-off points.



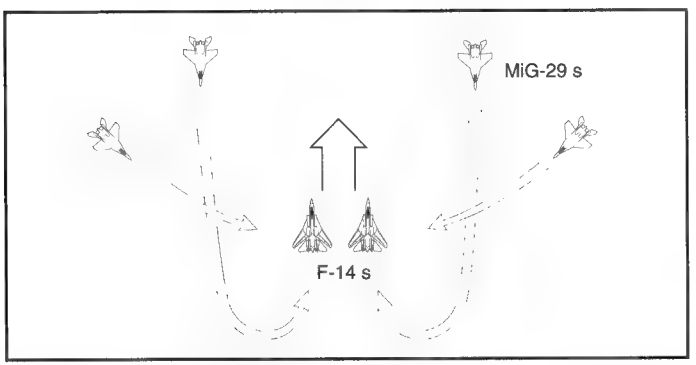


Figure 5-20A: Here a four-ship of enemy aircraft split into two pairs for the attack. No matter which way the target turns, at least one of the four attackers is guaranteed a position of advantage.

The envelopment attack only works when the enemy has the benefit of surprise. If they are able to approach undetected, they will break off into two pairs and attempt to overload a target by attacking from many directions at once. The inner aircraft of the formation will pass by then reverse on the target's "six". The outer aircraft first separate from the fight then reverse to engage the target from the flanks.

If, on the other hand, the four-ship is detected while still in its Wall formation, its first response will be defensive. As you can see by the following diagram, each aircraft separates into a different profile. Such a maneuver might well be termed a shot-gun approach.

The MiG positioned second from the right has just detected an enemy radar lock, it begins a post-hole spiral downward. The flight leader calls for a "break" which causes the other aircraft in the formation to separate. Some will go high, others will go low. The idea is to sucker an attacker into remaining fixated on the spiraling target he has locked. The target itself hopes to draw the attacker in while the other aircraft in the formation surround it.

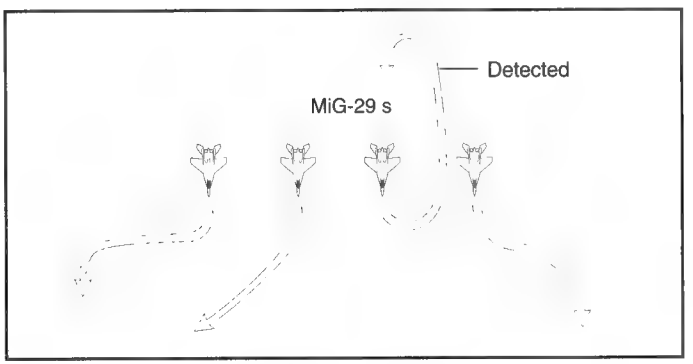
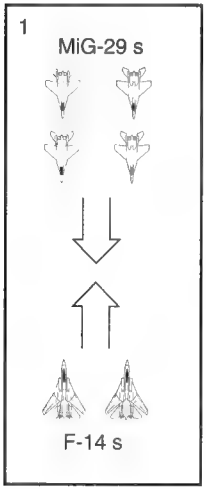
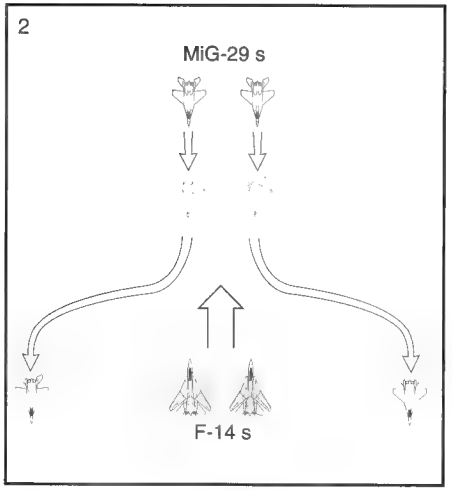


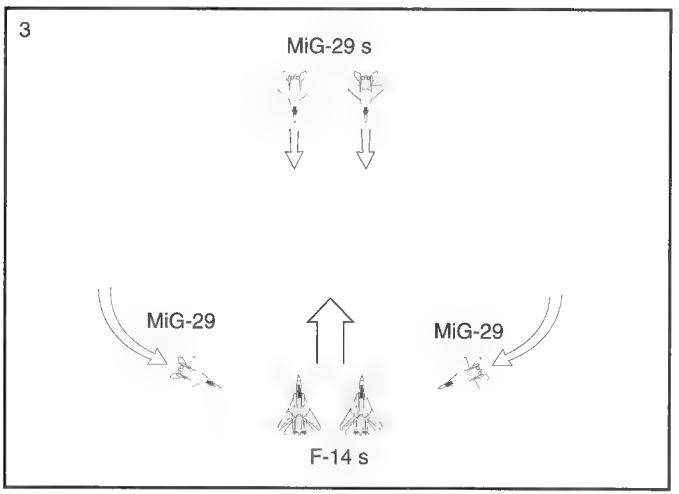
Figure 5-20B: The shot-gun approach sends each of the four aircraft off on its own. Communication will be the key to reuniting this force.

The Champagne





The Champagne is a tactical maneuver performed by an enemy four-ship in Box formation. As depicted in the series of diagrams, the Champagne is a double envelopment. The two trailing aircraft swing outward in an attempt to sandwich your two-ship. The leading aircraft maintain their heading but slow down to give you time to enter the trap. If viewed from above this maneuver takes on the appearance of a champagne glass, hence the name, Champagne.



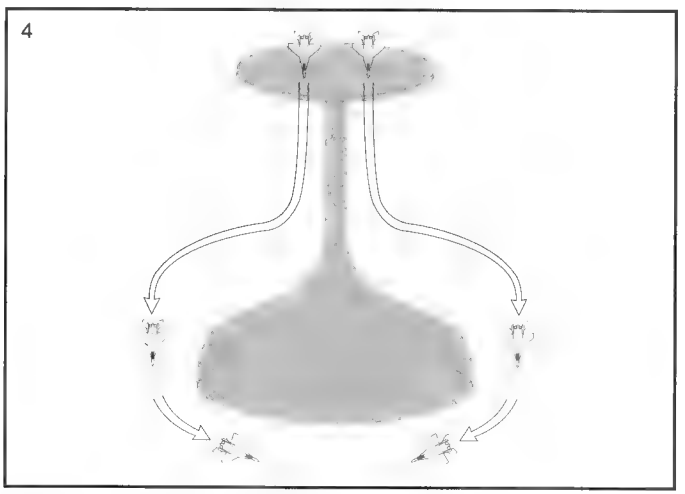


Figure 5-21: The Champagne features a two-pronged attack. One pair of enemy fighters continues down the middle while another two attempt to catch you in a pincers.

The Starburst

The Starburst is a tactical maneuver performed by an enemy four-ship in Ladder formation. As soon as one of the aircraft detects your radar attempting to "lock-on" it will begin a post-hole spiral downward. The other aircraft in the formation break in various directions as depicted in the diagram. They will attempt to sneak up on you while your attention is focused on the post-holer.

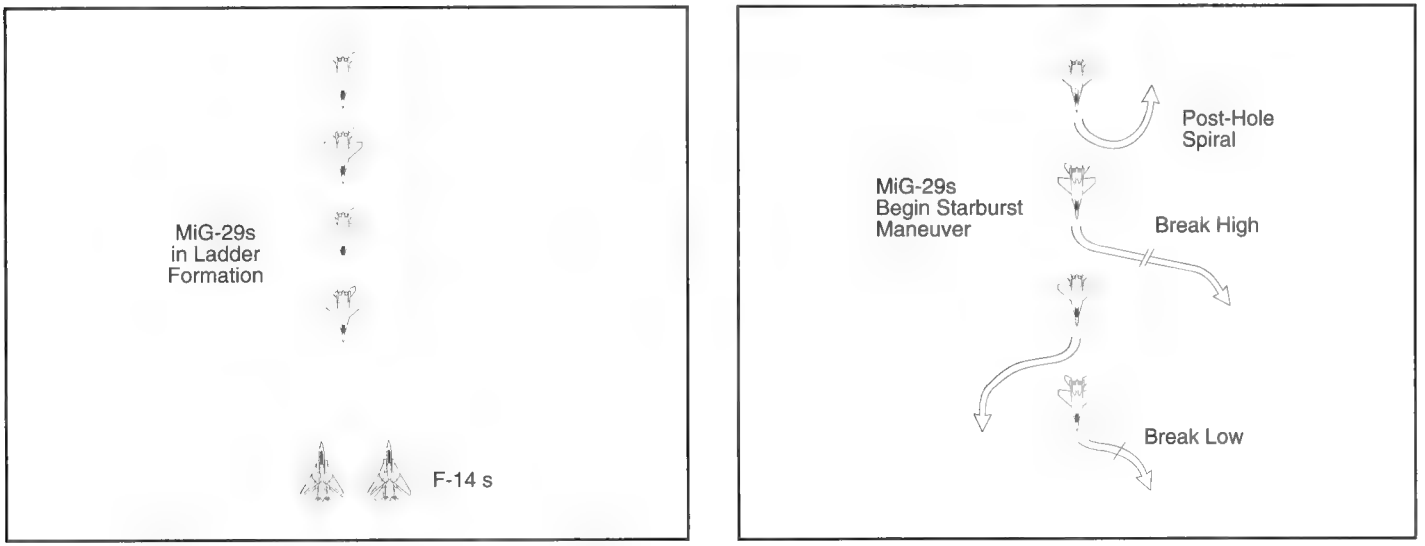


Figure 5-22: The Starburst is aptly named. Even on radar, it is a fascinating maneuver to watch unfold.

The Wheel Formation

The Wheel is a self-defense maneuver used by a formation when attacked by superior numbers of fighters. This maneuver, also known as a Lufberry, calls for the defending formation to begin flying in a tight circle. Pilots take up a nose-to-tail position with the aircraft in front so that each member of the formation has his "six" position covered by the pilot behind. This tactic was often used in WW II and Korea. These "guns-only" environments required that an attacker actually fall in line behind a member of the formation in order to attack. As soon as an attacker lined up to fire he also would be engaged from behind. The Wheel made it suicidal for an attacker to engage a member of the formation.

Now that most fighters are equipped with medium to long-range all-aspect AAMs the Wheel formation is far less effective. An attacker is not required to enter the formation in order to fire a missile. It can remain well clear of the circle and still attack.

Another drawback to the Wheel is that it roots the formation to one point in space and makes it easy to spot. Even so, the Wheel is still used by Third World nations because it gives the flight leader some measure of control over his aircraft.

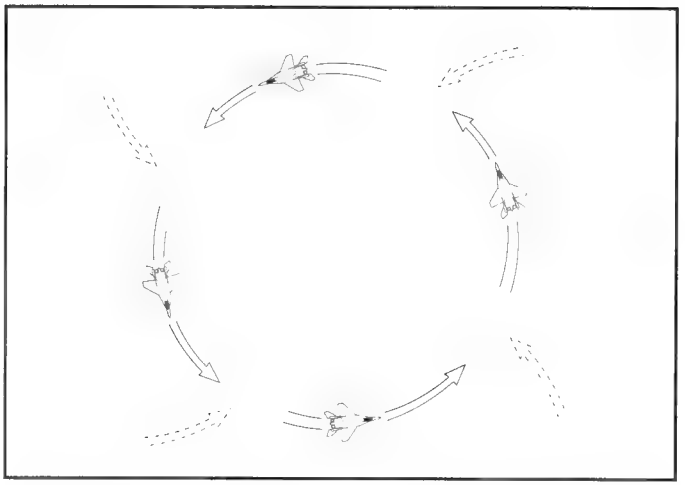


Figure 5-23: The Wheel is a classic defensive formation. Each pilot is responsible for protecting the aircraft in front of him. As you can see from the arrows, no aircraft can be attacked from outside the Wheel without exposing the attacker's "six".

CHAPTER SIX: THEATERS OF PLAY

NORTH CAPE THEATER

THEATER BACKGROUND

In the two great world wars of this century, the German army overran millions of square miles of European territory. Yet, in the end Germany found itself being gradually worn down and defeated by fresh men and material shipped across the Atlantic from the United States. Unable to prevent war supplies from reaching Europe by sea, Germany could merely watch as her enemies gathered strength. Control of the Atlantic allowed the nations allied against Germany to draw upon their colonial empires.

In both WW I and WW II, control of the Atlantic gave the United States time to build up its forces then conduct an invasion of Europe at a time and place of its choosing. During the 1980s, this strategy was continually drummed into Soviet naval officers. Their Northern and Baltic Sea fleets would be expected to sever the sea lanes connecting western Europe with the United States. It was no secret that NATO exercises periodically tested the ability to move troops and supplies from the U.S. to Europe in case of war.

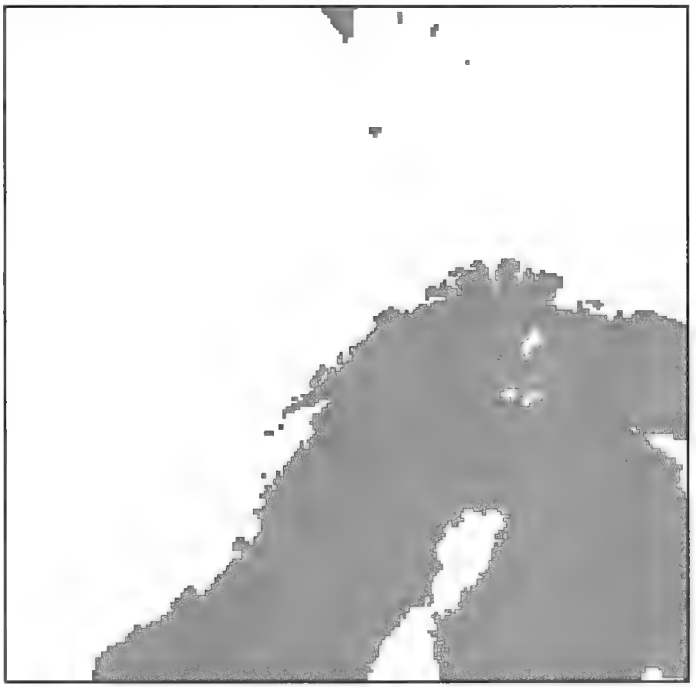
These maneuvers were known in military parlance as REFORGER (Return Forces to Germany) exercises. In case of a Soviet attack, REFORGER troops would move by air and then marry up with pre-positioned stocks of equipment. Preventing these forces from reaching western Europe would be the Red Air Force's worry.

Airlifts alone would be unable to move enough of the supplies needed to sustain combat operations, however. Heavy equipment, POL (petroleum, oil and lubricants) and the majority of combat vehicles would have to be moved by sea. This is where the Soviet navy was expected to step in. Preventing NATO convoys from ever reaching Europe was paramount. If the Red Banner Northern fleet could stop NATO from receiving sea-borne reinforcements, Soviet ground forces would sweep across Germany in weeks, perhaps days.

To this end, the Soviets starting holding exercises of their own. Large scale naval maneuvers showed that they were indeed capable of operating in the North Atlantic. It drove home the message that NATO's hold on the Atlantic was tenuous at best. The new Soviet Navy demonstrated just how easily it could disrupt the Atlantic. Tens of surface ships and submarines surged out from their home ports during these exercises. Lavish amounts of naval air support including everything from reconnaissance platforms to tactical coordinators and strike aircraft also took part.

Impressive as these exercises were to NATO officials, the key to their success lay in whether or not NATO's carrier battlegroups could be located and destroyed. NATO's ability to dominate the sky over the Atlantic would ultimately prevent the Soviets from conducting serious anti-shipping campaigns south of the GIUK (Greenland-Iceland-United Kingdom) gap. Even north of this line, an extended Soviet campaign in the face of NATO air power would prove very costly indeed. Eliminate the carriers, however, and the situation changes dramatically in favor of Moscow. Removing carrier-based air power from the region almost guarantees Soviet air supremacy.

Establishing air superiority would actually be just the first phase of a more grandiose plan. The next phase would have long-ranged Soviet bombers operating far out into the Atlantic. From their bases on the Kola peninsula these aircraft would pose a serious threat to NATO convoys. One way to further compound the danger to NATO would be to move the bases closer to the action. Unfortunately for the Soviet Union, the Kola peninsula is a long way from the Atlantic shipping routes. The only way to get bases closer to the action would be to use captured ports and airfields in Scandinavia, particularly Norway.



North Cape Theater Map

Situated on the left flank of the European theater of operations, Norway is somewhat isolated. Its proximity to the Soviet Union leaves it exposed and vulnerable to an overland attack. The Soviets could conceivably conquer Norway just as Germany did in 1940 if they coupled their land invasion with a strong air/sea campaign. Soviet bombers would then be in a position to challenge NATO convoys in the mid-Atlantic by staging sorties from captured Norwegian airbases.

The time is the mid-1980's and World War III has broken out. Political pressure on the top Soviet leadership has been mounting in recent months. The sluggish nature of the Soviet economy failed to live up to the rosy expectations of the latest Five-Year plan drawn up in Moscow. In the Ukraine, another poor harvest has added to the rising discontent. Feeling the heat, party bosses within the Kremlin have ordered the state security apparatus to go into operation but even this has failed to stem the increasing tide of open dissent

Only one thing has historically united the Soviet people and guaranteed their blind obedience- the threat of foreign invasion. The Soviet Central Committee has decided to stage a national crisis believing that the people will rally behind it. Accordingly, those in power have engineered the conflict and blamed the west for jeopardizing the security of Soviet citizens. The political in-fighting and diplomatic intrigue behind this conflict are beyond the scope of this simulation but suffice it to say that the purveyors of power in Moscow are willing to risk starting World War III in order to preserve their station in Soviet society.

Figure 6-1: MiG-29s "Fulcrums" heading toward Norway in a tight Cruise formation.

The three North Cape scenarios in depict a powerful Soviet campaign to capture Norwegian ports and airfields. The overall objective of the assault is to secure operating bases on NATO's weak northern flank. If all goes well, these bases will cut down on wasteful transit time and allow Soviet ships and aircraft to roam far out into the Atlantic. Eventually Norway may be used as a springboard for an all-out attack on Iceland. If this happens, western Europe might be cut off completely from the United States.

Your squadron is one of the two F-14 equipped squadrons assigned to the carrier in these scenarios. You are tasked with assisting friendly ground troops in Norway. The carrier group must still be defended at all times, however. Note that the three scenarios can be played separately or linked together into one gigantic campaign lasting for weeks.

NEUTRAL FORCES

The United States, United Kingdom, and Norway are the principle nations at war with the Soviet Union in this theater. Two additional Scandinavian countries, Finland and Sweden, are neutral to the conflict. Unfortunately, these nations may not preserve their neutrality for long.

Finland and Sweden will not enter the conflict as long as their territorial sovereignty is not compromised. However, because these nations lay between the major warring parties, numerous violations of their airspace are expected to occur. Accordingly, both nations have scrambled a limited number of interceptors to act as a deterrent to would-be intruders. As neutrals, these countries are obligated to intercept aircraft belonging to both NATO and the Soviet Union. Because neither country seeks a confrontation intruders will be escorted out of neutral airspace. Violators that refuse to comply with their escorts will be fired upon.

Finnish interceptors are usually Soviet export MiG-21s. Although the "Fishbed" is an older model aircraft, they carry relatively modern (AAMs) air-to-air missiles. Swedish interceptor squadrons are made up of SAAB Viggens as well as some exported Soviet aircraft. They are known to use Sparrows, Sidewinders, and Sky Flash AAMs.

Players that find themselves over neutral territory should immediately turn around. Avoid unpleasant confrontations by leaving the area- before an interception takes place. If intercepted, players should take no hostile action and follow the instructions of their escort. Do not fire on neutral aircraft! A player never receives points for shooting down neutral aircraft. Leave that to the Soviets.

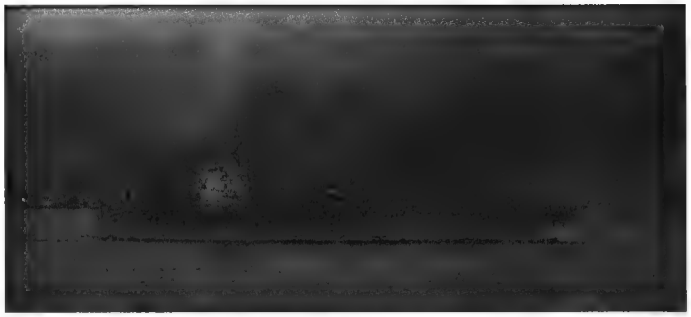


Figure 6-2: Pictured here, a U.S. carrier at anchor inside a Norwegian fjord in the days just prior to the Soviet attack.

CAMPAIGN SCENARIOS

Scenario #1 Fighting Withdrawal

Since early this morning, Soviet troops have been carrying out a massive air, sea and land assault on members of the NATO alliance. The Soviet Union was given no choice but to undertake this unilateral action in order to preempt an attack by NATO. *At least this was the story being told to the Soviet people.* No longer are the Soviet people to be held at bay by the evil forces of capitalism. The moral superiority of the "New Soviet Man" is about to be proven in combat.

The Iron Curtain has been peeled back at last, only to reveal a snarling monster. Tube after tube of Soviet artillery- pre-registered on their targets since 1945 -have begun belching forth a steady rain of steel. Every yard of the FEBA (Forward Edge of Battle) has been turned into a private Verdun. Behind this barrage of high explosive shells Soviet armor is advancing at great speed. All throughout Europe long lines of T-72s and APCs are racing over the border separating East and West Germany. Overhead, waves of Soviet fighters and bombers can be seen traveling west- their contrails plainly visible.

For the third time in this century, the Atlantic has become a battleground. As before, the stakes are mortal. The success or failure of the Soviet ground offensive depends on whether the lifeline between Europe and United States can be severed. If the U.S. can establish reliable sea routes for its reinforcements and supplies, the Soviet gamble will almost certainly fail. If, on the other hand, the Northern Red Banner Fleet can close down the shipping routes, England will be blockaded and Soviet land forces will sweep forward to the French border. Most importantly, the Communist Party leadership will remain intact. Basking in their military victory, the Soviet people can be persuaded to forget their empty bellies and barren store windows.

The Kremlin's plan for dealing with Norway is simple. Because of its proximity to the Kola peninsula (and Soviet bases located there), Norway is to be inundated by non-stop tactical airstrikes, followed by a division-sized airborne assault. All airfields in northern Norway are scheduled to be overrun by paratroopers within the first 36 to 48 hours of the operation. In addition, Spetznatz commando teams have been inserted by submarine at various critical points along the coast. Other submarines are to disrupt Norwegian naval activity by laying mines off its principal anchorages.

While Soviet paratroopers descend over northern Norway like snowflakes the airbases at Banak and Andoya are to be overrun by a combined assault of naval infantry and Special Forces units. These troops are to hold on to these key positions until reinforced by airborne troops belonging to the 76th Guards Airborne Division.

The main assault on the ground is to be carried out by a reinforced mechanized division pushing overland from Pechenga. Once the Norwegian border town of Kirkenes has fallen, the spearhead of the attack is to link up with various pockets. The road-bound assault column of T-72 tanks is to push forward relentlessly. Threats to the flanks of the column are to be ignored. Instead, groups of Mi-8 "Hip" helicopters will transport lightly equipped airmobile units to deal with critical areas as needed. Helicopters will provide much needed mobility that the tanks lack.

At sea, the Soviets intend to move a powerful surface action group (SAG) made up of ships of the Red Banner Northern Fleet down the coast of Norway in support of the ground operation. It is to assume a position off the coast and prevent reinforcements from reaching Norway by sea. Because Norway is geographically isolated from the rest of Europe, command of the surrounding seas is critical. NATO's carrier based air power must be eliminated early in the conflict before it has a chance to escape. This, in a nutshell, is the Soviet plan of operations in Norway.

A single U.S. aircraft carrier is currently conducting joint exercises with ships belonging to STANAVFORLANT (Standing Naval Forces Atlantic). If and when war breaks out, this carrier will be caught well forward of the GIUK SOSUS network. It will have to hurriedly retreat in the face of any determined Soviet onslaught. Warned that the current political situation has made a Soviet attack likely, NATO planners have decided against prematurely mobilizing their forces. Such an event could exacerbate the situation, so NATO ministers have been content to merely monitor Soviet preparations by satellite. Therefore the CNO (Chief of Naval Operations) has decided to allow the single U.S. carrier in Norwegian waters to remain where it is for the moment.

You are an F-14 pilot assigned to one of the two fighter squadrons onboard this carrier. As the scenario begins your battlegroup is tempting fate by steaming several hundred miles off the Norwegian coast. It is hard not to think of this tiny show of force as a sacrificial lamb. Twenty Tomcats are all that stand between your carrier and the full weight of a surprise Soviet attack. Regardless of how well you do personally, how many aircraft you shoot down or missions you complete, in order for you to win this campaign, the carrier must remain operational -signifying a successful escape. (Operational in this case is defined as being afloat and able to launch and recover aircraft.) Good luck!

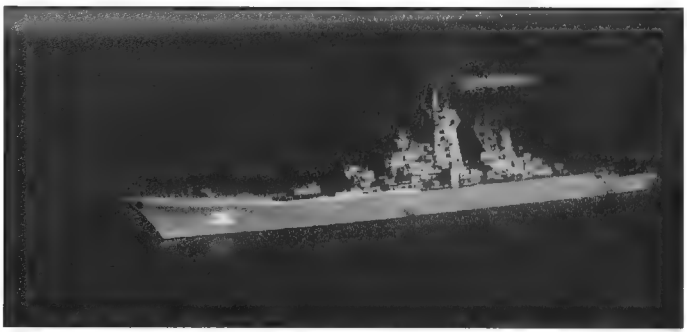


Figure 6-3: The Soviet BCGN Kirov pictured here with an escort at anchor just prior to the start of the operation.

Scenario #2 Return To Norway

The all-out Soviet assault on Norway outlined in Scenario #1 has been largely successful, although the majority of the country south of Orland remains in friendly hands. The small Norwegian navy, consisting mainly of frigates and coastal defense vessels, has been either sunk or forced to retreat along with the rest of NATO's forces. Vessels able to make the trip to ports in the UK have been saved. The rest of Norway's navy now lies at the bottom of various fjords.

A small portion of the Norwegian air force has also escaped to the United Kingdom. Norwegian airfields came under heavy attack from the outset. Banak and Bardufoss stood little chance once the Soviets knocked out the HAWK batteries surrounding them. Only the airfield at Andoya, separated from the mainland, was able to hold out for long. It, too, was eventually stormed, though a heavy toll of naval infantry was extracted.

Of the airfields in northern Norway only Bodo -located on a tiny peninsula, was able to remain operational for long. F-16s were able to fly from its cratered runway for several days into the war. Its garrison surrendered only after Soviet tanks pushed onto the high ground overlooking the airfield. While the Norwegians were being taken prisoner, a huge explosion rocked the peninsula. It seems that the Norwegians were able to detonate an underground cache of munitions pre-positioned beneath the airstrip itself. Tons of high explosives went up simultaneously completely chewing up a 120 ft. section of runway. Clearly, Bodo would be out of action for some time to come.

On the ground, Norwegian army units were involved in fierce fighting around population centers and key choke points along the roads leading south. The ferocity displayed by Norwegian troops during the heroic rear-guard action at Kirkenes surprised the Soviets and disrupted their timetable. Although the defenders at Kirkenes were overrun in the end, the Soviet drive never recovered the momentum it had lost. Even so, following the battle at Kirkenes all organized NATO resistance above battalion level ceased. NATO forces that remained in country fought a series of hit and run engagements trying to wear down the Soviet troops.

Logistics proved to be far more of an impediment to Soviet plans than any active resistance offered by NATO. In fact, there was nothing keeping Soviet troops from occupying the rest of Norway except the inability to supply their troops once the operation was concluded.

With NATO lines in central Europe falling back under severe pressure, very little can be spared to defend so-called "secondary fronts." Despite its importance, Norway has been placed in the category of a secondary front, a sideshow, if you will. The CNO in Washington disagrees strongly with this decision. He knows that in order to maintain his "bridge" of ships across the Atlantic NATO must not only hold its current position but retake the territory in Norway previously lost.

After the initial retreat, U.S. and NATO forces reorganized their strategic positions along the GIUK (Greenland-Iceland-United Kingdom) line. In general, the line held but a number of Soviet attack boats did manage to slip past and enter the Atlantic. On the ground, the Soviets were limited to occupying only the northernmost territory in Norway. This territory included some major airfields as far south as Bodo. The Soviet drive also overran Narvik -an important port and key to supplying any further drive south.

The Soviets must not be given time to consolidate their gains. The captured Norwegian facilities have sustained some battle damage, but will be operational again shortly. Those airfields that survived the initial strike have been overrun intact by Soviet airborne units. It has become apparent from satellite intelligence that these airfields are now going to be used to stage further raids on the UK and far out into the Atlantic.

NATO depends upon its Atlantic lifeline. Reinforcements from the US must travel the Atlantic either by sea or by air. If this "bridge" between Europe and North America is severed even for a short time, the West will lose the war in Europe. The U.S VII Corps in Bavaria is being pushed steadily back. There are just too few of the latest M-1 Abrams tanks to stop the flood of T-72s pouring through the Fulda Gap. As Soviet armor and mechanized divisions pour across the plains of northern Germany, the urgent need for reinforcements is painfully evident.

With Norwegian airfields firmly in Soviet hands, a knife is being held to the throat of NATO forces in Europe. NATO ports of disembarkation in southern France are now open to attack from long-range naval aircraft. If the Soviets are allowed to complete their preparations, it is anticipated that the bulk of Soviet naval aviation based on the Kola peninsula will be transferred to Norway. From these new staging areas, the distance to targets in the United Kingdom is literally quartered.

To preempt this eventuality a large force of U.S and Royal Marines is to conduct a surprise amphibious operation designed to retake Narvik. Once this is accomplished, the beachhead will be rapidly expanded to cut off Soviet forces farther south. A single carrier battlegroup is all that can be spared. This meager resource, one carrier with its air wing of 90 aircraft, has been tasked with providing air cover for the invasion.

Figure 6-4: A Newport Class LST off-loads vehicles in the harsh weather conditions near Narvik. Actually, the low clouds and snow fall prevented some Soviet airstrikes from targeting these ships.

In this scenario, you assume the role of an F-14 pilot in one of the two fighter squadrons onboard. Your carrier battlegroup is steaming just off the Norwegian coast so that it can provide the required close air support. Being this near to the coast, however, is like placing your head in the lion's mouth. Your ships are well within range of hundreds of Soviet fighters and bombers. Your squadron has a two-fold mission: protect the carrier group and assist friendly amphibious forces on the ground. If this operation succeeds it will be the first step in retaking all of Norway.

Scenario #3 Assault On The Kola Peninsula

Within days of war breaking out, northern Norway was decisively overrun by the Soviets in a multi-divisional assault. The stubborn defense of Kirkenes, however, delayed the early stages of the invasion. For many crucial hours, the heroic last stand around the Kirkenes roadblock gave the rest of NATO time to retreat in good order. Norwegian forces rallied quickly despite suffering a continuous pounding from the air. The front line eventually stabilized just south of Bodo. The Soviet drive had run out of steam. Southern Norway was safe for the moment.

The war in Norway now entered a new phase, as outlined in Scenario #2. It became obvious back at higher headquarters in Murmansk that Soviet troops, their ammunition and supplies exhausted, were occupying a dangerously exposed position. Fortunately, from their perspective NATO forces in Norway were in equally bad shape. Just the same, Soviet officers feared that the entire campaign might turn into a snowy guerrilla action. They desperately wanted to avoid this type of fighting, after all they had a previous bad experience with it during the Winter War of 1940. (The Red Army suffered grievious losses at the hands of Finnish ski troops.)

U.S. and Royal Marines in southern Norway called it "Injun fighting." All along the front, ski-patrols were inserted behind Soviet lines to wreak havoc. Anything smaller than a reinforced platoon was immediately ambushed by Marines as it tried to move. Nothing was safe. Truck convoys were shot up, communication lines destroyed and large numbers of prisoners were taken. Soviet morale plummeted. The troops sought out protective shelters then remained there. More and more, Soviet units became immobilized and isolated pockets of resistance in a sea of lightly equipped NATO forces.

The Soviets were not without successes of their own during this period. One notable victory came as a pair of Su-25 "Frogfoot" aircraft caught a company of Norwegian infantry out in the open. The company had just assembled for rations when the two fighters made a single pass overhead. In a matter of seconds, the Norwegian unit was reduced to a handful of screaming survivors. Hundreds lay dead and dying, their supply vehicles burning heaps of wreckage.

Figure 6-5: A friendly column of NATO anti-tank vehicles moves out over snow-covered roads. These hard-hitting but lightly equipped forces are headed for "Injun country" and another ambush behind Soviet lines.

The heaviest combat of the campaign took place not along the front, but near Narvik, some 100 miles behind the lines. After weeks of stagnant and stalemated fighting, Marines from the United States and U.K. came ashore in a bold amphibious operation. Immediately, the Soviets recognized the danger their troops were in as a result of this move. They threw everything they could at the beachhead in an attempt to keep the Marines pinned down. After suffering heinous casualties, greater than anything experienced in the Pacific during WW II, the Marines that landed outside Narvik finally took the town. *When this war is studied by future historians, favorable comparisons will be drawn between MacArthur's landing at Inchon and the Narvik operation. Both proved to be turning points.*

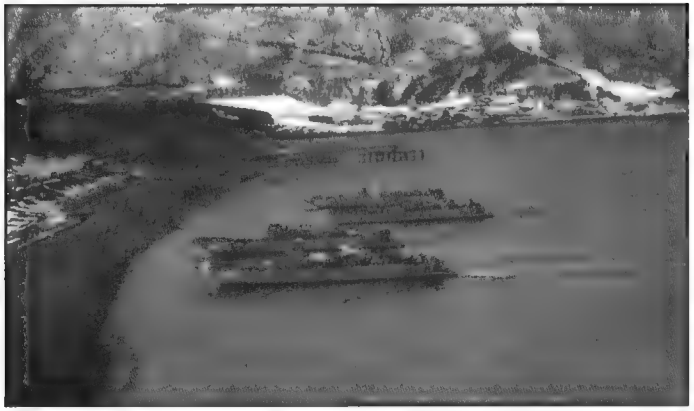


Figure 6-6: Amphibious assault craft come ashore near Narvik. These landing craft are getting ready to off-load supplies desperately needed in-land.

Soviet forces unlucky enough to be caught south of the city were instantly isolated by the operation. Cut off from their source of supplies, they yielded territory easily and surrendered. After days of intense combat Soviet resistance collapsed. NATO forces pushed northward to link up with the Marine beachhead. The counter-offensive paused briefly to take on additional supplies at Narvik. The attack quickly resumed, however, although by this time it was more of a foot race than an assault. Soviet troops reeled back toward Kirkenes with our forces in hot pursuit.

Assisted by carrier-based air power the Marines retook all but the northernmost sliver of the country. Bled white by their refusal to discard dubious and outdated tactics, the Marines managed to push the Soviets back as far as Kirkenes before grinding to a halt. The hard-fought campaign for Norway was over. The effectiveness of Soviet forces had been reduced in Norway by a general lack of supply. They had no choice but to give ground slowly. As the assault neared the Soviet border, however, resistance grew steadily and a deadlock ensued.

Figure 6-7: U.S. Marines in snow camouflage take cover in a frozen trench near Narvik as a plume of smoke rises from a near miss. Soviet airstrikes took a heavy toll of NATO forces in the beachhead.

This stalemate condition does not extend to the war at sea. A single U.S. carrier battlegroup has been moved to within striking distance of Soviet bases on the Kola peninsula. The war has now come full circle. For the first time NATO air power will be used to prosecute an extended campaign against the Soviet Union itself. The carrier will be taking the fight to the enemy, attacking the Soviets on their doorstep.

As an F-14 pilot you are assigned to one of two fighter squadrons onboard the carrier. You will be participating in a series of air strikes against a wide range of industrial and military targets. The objective of this air campaign is to destroy the war making potential of Soviet facilities in this region. Former Secretary of the Navy John Lehman once referred to the Kola peninsula as "the most valuable piece of real estate on earth."

Your job is to help turn this valuable piece of real estate into a low-rent zone. The F-14's role in this campaign will be to escort friendly aircraft on strike missions as well as establishing air superiority over this critical airspace. This high risk venture will expose the carrier group to enormous danger but if the mission is successful, Soviet forces in Norway will whither on the vine.

MEDITERRANEAN THEATER

THEATER BACKGROUND

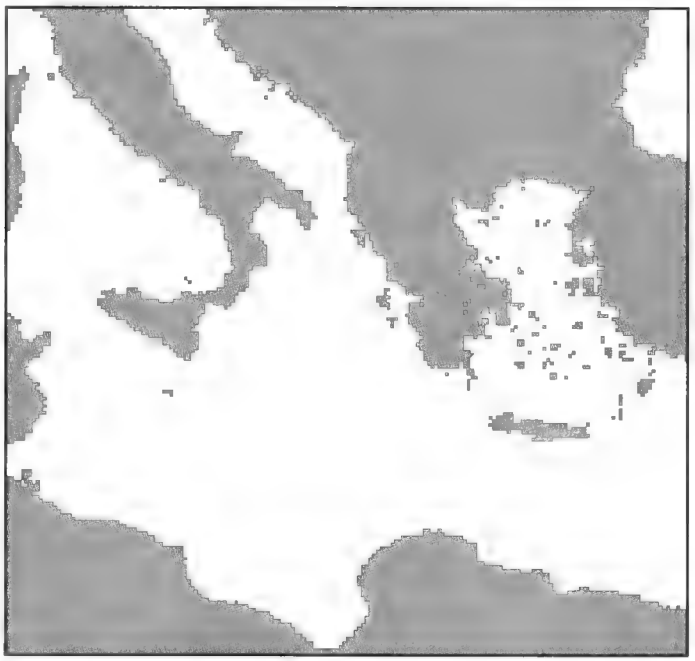
When people gather to debate modern air combat one analogy is made quite often. A close-quarters dogfight between supersonic fighters is referred to as a *knife fight in a phone booth.* Despite the fact that this well-worn cliché has become tiresome, it remains an accurate enough representation. Taking it one step farther, the military situation in the Mediterranean can be likened to a *knife fight in a phone booth inside a bathtub*. Naval officers transferring from the Pacific Seventh Fleet often find themselves suddenly suffering from claustrophobia when called upon to conduct tactical maneuvers in "the Med."

Supersonic aircraft can make a north-south trip across the Med in under an hour. Many single engine strike aircraft have the ability to cross the Med and return without refueling. This means that the air defense of naval surface groups must contend with the large numbers of less capable aircraft owned by the Third World nations in this region. A 360° air defense zone surrounding a battlegroup is mandatory because there's nowhere to retreat to that the enemy can't reach.

The short distances involved make attacks from any direction equally likely. The difficulties of maintaining an adequate air defense posture are further magnified by the preponderance of civilian aircraft in the region. Sorting all these radar returns must make life aboard an AWACS or AEW aircraft somewhat hectic. Presumably in time of war civilian flights would be canceled or at least re-routed out of the combat zone. However, one cannot always count on this. Mistakes do happen. One need only recall the tragic *Vincennes* incident in which a U.S. cruiser downed an Iranian Airbus over the Straits of Hormuz.

It is not unheard of for an attacking aircraft to mask its approach by using a marked civilian route. By masquerading as a civilian airliner following a scheduled flight plan an enemy aircraft could easily get close enough to a group of ships to launch a cruise missile. Smart pilots have also found ways to beat enemy radars by "piggy-backing" with large wide-body jets when necessary. F-14 pilots have to use extreme care when engaging BVR targets in the Med. The inability to positively identify targets at long ranges may hamper the use of the AIM-54 Phoenix in certain instances.

As you can see the Mediterranean Sea is very nearly a lake. Naval forces not indigenous to this region can only enter or exit at one of three points. Each of these entry/exit points also happens to be a natural choke point, a narrow sea-lane which can be easily be denied to a hostile fleet in time of war.



Mediterranean Theater Map

The most commonly used entry point for European based navies is the Strait of Gibraltar, located at the Mediterranean's far western end. The Bosphorus and Dardanelle narrows, known collectively as the *Turkish Straits*, is another common entrance to the Mediterranean. This body of water divides Turkey into two parts and connects the Black Sea with the Med. Soviet ships are effectively cut off from the Med unless Soviet ground forces are able to occupy the adjacent land mass. This has kept the Black Sea fleet bottled up and vexed Russian naval strategy for centuries.

The third and final entrance point is the Suez canal. This route into the Med is even more important to global trading partners than the Panama canal in the western hemisphere. It links the Mediterranean with the Red Sea and makes the long sea voyage around southern Africa unnecessary. The Suez canal facilitates the transfer of military forces between the Atlantic and Indian Oceans. The Persian Gulf War in 1991 dramatically proved the practicality of such transfers.

This region of the world is a powder keg ready to ignite at any moment. No less than 15 nations border on the Mediterranean Ocean. Such political congestion has caused this region to become a diplomatic morass. Most of the world's great religions have overlapping and competing interests here which keep this area in constant turmoil. It has been a battleground throughout human history and remains volatile today.

Fortunately for the United States and western Europe, the Soviet strategic position in this region has never been very good. Syria and Libya have proven to be the only two nations willing to allow the Soviets to regularly make use of their facilities. With Turkey controlling access through the Dardanelles, Soviet warships wishing to enter the Med must usually do so through the Strait of Gibraltar. Supplying these same ships would be impossible in time of war making free access to foreign ports crucial to Soviet planning.

The Soviet air force must contend with the same problems of access and resupply as the navy, albeit to a lesser degree. In time of war, Soviet aircraft will have to fight their way through hundreds of miles of hostile airspace just to reach the Med. Once again only Syria and Libya have proven to be steady allies. Even so the eastern Med is well within range of Soviet bombers based in the Crimea. These powerful aircraft could potentially block air/sea access to Israel in time of war.

Three Mediterranean campaign scenarios accurately portray a mix of strategic and tactical challenges. The first features U.S. carrier operations in the central Med. This set of missions assumes that Israel's 1982 invasion of Lebanon *(Operation Peace for Galilee)* has touched off a wider Syrian involvement. Having won the initial rounds, Israel is pushing slowly on two Arab capitals simultaneously, Beirut and Damascus. The Arab world has turned to the Soviet Union for help.

Embarrassed by the failure of their military equipment and pushed into a political corner, the Soviet Union has decided to intervene. As expected, this controversial move is vehemently opposed by both Israel and the United States. Both sides are hastily preparing for battle. Predictably, Libya has joined with the Soviets and Syria and hopes to embarrass the U.S. for the downing of its jets the previous year. With only one carrier battlegroup currently on hand the U.S. Sixth Fleet has been tasked with preventing Soviet forces from reaching Israel by sea.

The second campaign scenario is *Operation El Dorado Canyon* and contains historical missions actually flown during the 1986 airstrikes on Libya. These raids were meant to send a message to Libya's ruler, Col. Qaddifi, that the United States would respond aggressively to terrorism. You'll be participating in the joint USAF-Navy air operations calling upon carrier-based F-14s to protect F-111s flying in from their bases in the United Kingdom. Forced to fly a tortuous route around the Iberian peninsula, the tired "Aardvark" crews are depending upon your squadron for air cover. You'll have to escort them to their targets in Libya and then stand by to defend the carriers in case of retaliation.

The third and final Mediterranean campaign, Carrier Duel, is a futuristic scenario set early in the next century. This hypothetical conflict is intended to illustrate the tactics of modern carrier warfare from now until well into the next century. It is a "what-if" campaign that if fought in reality would represent the first true carrier vs. carrier battle since the Second World War. Although the equipment and weaponry have evolved dramatically, the tactics of air/sea combat have remained relatively unchanged (as you will soon discover).

Carrier Duel assumes that the 1989 break-up of the Soviet Union never occurred. The attempt to oust Gorbachev from power while he vacationed on the Black Sea was successful. Hard-line communists, along with their KGB mentors, return to power in Moscow and immediately begin a crack down on reform minded Yeltsin supporters. With Gorbachev in Lefortovo Prison and Yeltsin in hiding, opposition to the coup has been cowed into submission. Outside Russia, the various republics show no signs of declaring independence. In fact, there is some measure of support for a return to the Stalinist methods used to maintain law and order. At least in those days the country was strong and there was food to eat.

All this takes place with the military's blessing. As a reward, the military has been given a carte blanche to purchase whatever equipment they deem necessary to hold on to eastern Europe. Armed with an almost unlimited budget, the military has renewed its interest in acquiring big-ticket items. For the Soviet navy, this means completing the three aircraft carriers begun in the mid-1980s. In this scenario, you have a unique opportunity to meet these ships in battle.

NEUTRAL FORCES

Albania, Bulgaria, Romania, Yugoslavia

These nations are neutral parties to the Mediterranean conflicts described in the scenario briefs. In time of war, however, there is no doubt the Soviet Union would be able to exercise a great deal of political influence over them. Bulgaria and Romania, in particular, are vulnerable to a military response from the Soviet Union should their governments displease officials in Moscow. Because of the threat posed by Soviet troops these nations have granted Soviet aircraft free passage through their airspace. This right of passage has not been extended to U.S. or NATO aircraft.

Should your F-14 stray into their airspace expect to be treated as a hostile intruder. The Soviet MiG-21 "Fishbed" is the main interceptor flown by these nations. Their pilots are trained according to Soviet doctrine and will use standard Soviet tactics. Instead of MiGs, the Yugoslavian Federal Air Force (remember, these scenarios take place prior to the present day Bosnian crisis) has a number of J-22 Orao and Soko G-4 Galebs. These aircraft are probably not well maintained.

Greece, Italy, Turkey

Despite being members of NATO, Greece, Italy and Turkey have in the past refused to get involved in U.S. political entanglements. In the case of Greece and Turkey, they are much more likely to fight amongst themselves then assist the U.S. against a third party. Unless directly threatened these nations prefer to stay out of foreign affairs involving the use of military force. Fear of international terrorism is enough to keep the respective governments of these nations from joining in any retaliatory operation against Libya. Likewise, these nations will also stay out of any Middle Eastern crisis involving either Syria or Israel.

As far as these three are concerned neither country is worth confronting the Soviets. Because they are members of NATO, the U.S. has demanded that these nations offer at least a token resistance to any Soviet aircraft that stray into their airspace. Therefore, Soviet aircraft which overfly these nations will be met by F-4 and F-16 fighters. Authorization to fire must be given on a per case basis due to the sticky political situation.

Egypt

Egypt, while not a member of NATO, has cast its political future with the United States and western Europe since casting out its Soviet advisors in 1972. Despite Egypt's participation in the Yom Kippur War against Israel, relations have remained good. Egypt's help in *Operation Desert Shield/Storm* in 1990-91 was greatly appreciated by the U.S. and Multi-national forces. Egypt has been equipped with F-16 fighters but may have some Soviet equipment still lying around. Be sure to use your IFF when flying near Egypt. You may find yourself confronted by Egyptian pilots flying MiGs or Libyans flying French built Mirage F-1s! Air combat can get to be very confusing at times!

Tunisia

Like Egypt, Tunisia has the misfortune to be one of Libya's closest neighbors. It is also the home away from homeland for the PLO, so don't expect it to help the U.S. defend Israel. Tunisia is a neutral party in all the Med scenarios although it will intercept U.S. and allied aircraft. For political reasons, Tunisia chooses to pretend not to see Libyan or Soviet aircraft that *accidentally* venture into its airspace. Fortunately for the United States, F-5 "Tiger IIs" are the best fighter aircraft it can muster. Stay away from Tunisia and it'll remain a non-player.

CAMPAIGN SCENARIOS

Scenario #1 Powder-Keg

On June 6th, 1982, Israel sent a multi-divisional task force into southern Lebanon for the purpose of clearing out the PLO (Palestine Liberation Organization) sanctuaries located there. This move came in response to repeated cross-border provocation during the preceding months. Prior to the invasion, PLO guerrillas bombarded Israeli settlements in northern Galilee with rockets and heavy artillery on numerous occasions.

Israel's answer to these terrorist acts was characteristically quick in coming, but because there was no wish to provoke Syria it was limited to a few airstrikes only. The raids caused many civilian casualties and leveled a few villages, but did little to stop the shelling. Palestinian attacks actually intensified, emboldened by the lack of Israeli success in stopping them.

In desperation the Knesset (Israel's Cabinet) approved a plan drawn up by Israel's military leaders in which Israeli ground forces would enter southern Lebanon and drive the guerrillas out. Once this was accomplished a semi-permanent "security zone" would be established and policed by "Free Lebanese" troops under command of Major Sa'ad Haddad. Known as *Operation Peace for Galilee*, the Israeli plan called for a limited incursion only, no farther than 40 kilometers from the border. *As it turned out, Israeli troops would be required to go all the way to Beirut.*

The original plan envisioned a brief three-day engagement. Elements of seven Israeli divisions would charge across the Lebanese border in a massive frontal assault. As usual, the attack would be supported by lavish amounts of self-propelled artillery and backed up by total air superiority. An amphibious landing would be made halfway up the coast to Beirut just in case PLO guerrillas managed to escape the initial attack. At the end of the battle all of southern Lebanon up to the Awali river would be free of PLO guerrillas and safely under Israeli control.

In the meantime, Israeli communiqués would make it clear to the Syrians that this operation was intended only to eliminate the PLO infrastructure in southern Lebanon. Syria's position inside the country was not going to be jeopardized by Israel's invasion. But, Damascus was warned that if its forces moved to interfere they would be dealt with accordingly.

The plan looked promising on paper and in fact did clear the PLO from southern Lebanon. Military equipment was captured from the guerrillas but the cost soon soured the victory. If anything, the Israeli plan fell victim to its own success. Such overwhelming force was used that the PLO was discouraged from standing and fighting. Instead, with its leadership in flight northward, organized guerrilla resistance collapsed within the first 18 hours of the operation. Fearing encirclement, PLO fighters simply melted away in small groups or as individuals.

Many guerrillas fled north seeking safety in Beirut but most returned to the densely populated refugee camps dotting southern Lebanon. Once among the civilians they became difficult to dig out. The Israelis would have to choose between using firepower indiscriminately or sending in ground troops and risking protracted street-fights.

Although Syria received assurances from Israel (and U.S. envoy Philip Habib) that the Israelis had no desire to widen the war, on June 7th Syria moved to reinforce its troops in Lebanon. These reinforcements unfortunately included three additional SAM batteries which brought the total number of batteries to 19. To Israel, the establishment of such a strong air defense zone, parts of which actually extended into northern Israel was a virtual *causus belli.* Until now the two sides had only been involved in minor incidents, light skirmishes or desultory artillery exchanges. Now that the Syrians were moving fresh men and equipment (including the 3rd Armored Division) into the area all that was about to change.

On June 9th, Israeli aircraft and long-range artillery began a serious of airstrikes on the Syrian SAM installations which amaze and confound military analysts even today. Using mainly F-15C "Eagles", F-4E "Phantoms" and A-4 "Skyhawks", Israel destroyed 17 out of the 19 SAM sites in the Bekaa valley. An air battle involving hundreds of aircraft soon developed. Within hours, Israel had won an astonishingly one-sided victory, shooting down 30 Syrian MiGs. All Israeli aircraft returned safely.

Here the Powder-keg scenario departs from the actual events in 1982 and hypothesizes that the Israeli-Syrian confrontation in Lebanon escalates into a full scale war involving both the United States and Soviet Union. Events depicted in this scenario closely mirror the real-life situation in 1973 when late in the Yom Kippur War Israel pushed across the Suez canal opposite Cairo and was simultaneously advancing on Damascus.

Having won the initial exchanges, Israel is busily chasing the escaping PLO remnants northward into Beirut. Now that the Syrians have entered the conflict, large scale tank battles have broken out not only among the hills of southeastern Lebanon but along the Golan Heights "cease-fire line" as well. Well supported by the IAF (Israeli Air Force) now that the SAM network is destroyed, Israeli tanks have caught the Syrian 3rd Armored division strung out along the Beirut-Damascus highway. Hundreds of latest Soviet-supplied T-72s have been left burning.

Along the Golan, hunter-killer teams of Israeli attack helicopters have broken up columns of advancing armor. Stung by the magnitude of their losses, the Syrians are falling back followed closely by Israeli mechanized units. With Israeli forces pushing slowly on two Arab capitals simultaneously, the Arab world has appealed to the Soviet Union for help. Clearly embarrassed by the poor performance of their equipment the Soviet Union has been pushed into a political corner by its Arab allies and decided to intervene militarily.

Planeloads of men and equipment are off-loading at Syrian airbases around the clock. The bulk of the Soviet forces being sent to the Middle East must travel by sea, however. Accordingly, aircraft based in the Crimea and ships of the Soviet 5th Eskadra have been tasked to insure the safe passage of a huge amphibious task force. Over 35,000 Soviet naval infantrymen are boarding various transports along with all the supplies needed for an extended operation.

Figure 6-8: Men aboard the U.S.S Ticonderoga watch their Aegis radar screens for any new developments off the coast of Israel and Lebanon.

A strong Soviet SAG (surface action group) consisting of the Kiev-class carrier *Minsk*, the helicopter-cruiser *Moskva (Moscow)* and several guided-missile cruisers has just transited the Dardanelles and entered the Aegean Sea. Now clear of the straits, this group has been ordered to rendezvous with other Soviet surface ships now forming up south of Crete.

The few Soviet vessels remaining in Syrian ports have been directed to form their own action group southeast of Cyprus. In the Crimea, a large force of Soviet bombers and support aircraft is assembling at various strongly defended airfields. Backed by the additional Soviet aircraft in Syria, the amphibious force is well defended along its entire route.

Predictably, Libya has joined the Soviet-Syrian coalition and hopes to embarrass the U.S. for the downing of its two jets the previous year. It is situated squarely on the flank of our SLOC (Sea-Lane of Communication) leading through the Mediterranean. Its air and naval forces have been put on a high state of readiness. With all our attention focused on the Soviet threat, the Libyans hope to catch our ships by surprise.

Presently, the Sixth Fleet has only one carrier group in the Mediterranean. Due to the nature of this crisis, it has been decided to confront the Soviets with the forces on hand rather than await reinforcements.

Although, your carrier will be fighting outnumbered the CNO has calculated that the odds remain in our favor. The mission: prevent the Soviets from reaching Syria by sea. They are not to be allowed to land ground troops and equipment in either Syria or Israel. Failure to stop this move using conventional means will force the United States into a corner. It will have no recourse but to use nuclear weapons.

Scenario #2 Operation El Dorado Canyon

One of the United States' most steadfast and vociferous opponents in the Mediterranean is Libya's Colonel Muammar Qaddifi, head of that country's Jamahiriya (Greater State of the Masses) movement. Not only has Libya been hostile to the U.S., but Qaddifi has at one time or another threatened most of his Arab neighbors.

As a national leader Qaddifi has not always been the most stable of individuals. Known for wearing high-heeled shoes and lipstick to state functions, Qaddifi's erratic nature has both frightened and angered the West on many occasions. For example, in 1973 he personally ordered the captain of an Egyptian submarine to attack the luxury liner *Queen Elizabeth II* as it made for the Israeli port of Ashdod.

The submarine left Tripoli to intercept the *QE II* as it sailed eastward across the Mediterranean. Tragedy was narrowly averted at the last moment when the captain decided to radio home for confirmation. Egyptian officials immediately countermanded Qaddifi's orders and instructed the captain to return to Alexandria.

Since 1973, Qaddifi has insisted on claiming the entire Gulf of Sidra for Libya. The U.S. has challenged this contention on numerous occasions. This diplomatic struggle over the Gulf of Sidra has led to several shooting incidents between U.S. and Libyan aircraft. In 1980, an unarmed U.S. C-130 "Hercules" transport barely avoided being shot down by a pair of Libyan fighters over the Gulf. That same year another C-130 was surrounded by Libyan MiGs and had to be rescued by F-14s.

In August 1981, a carrier group consisting of the *U.S.S. Nimitz* and *U.S.S. Forrestal* challenged Qaddifi's contention that the Gulf of Sidra was Libyan territorial water. Over sixty Libyan aircraft were intercepted on the first day of the exercise. They were escorted away from U.S. ships by F-14s without a single shot being fired. The next day, however, two "Tomcats" from VF-41 "Black Aces" were attacked without warning by a pair of Su-22s. The lead "Fitter" fired an AA-2 Atoll which missed. Both "Fitters" were then immediately shot down after a brief BFM engagement. Almost overnight, bumper stickers sprang up proclaiming, "U.S. Navy: 2, Libya: 0".

Although Libya lost this round, it soon counter-attacked using terrorism as a weapon against the U.S. and western interests around the world. Libya's role as a sponsor of international terrorism in the 1980s was undeniable. The entire country was opened as a training ground for terrorist groups opposed to Israel and the West. Using profits from the sale of oil, Libya's erratic leader Muammar Qaddifi bank-rolled many extremist groups throughout the Middle-East.

In 1985, a TWA airliner was hijacked with 153 people on-board. The incident was resolved 17 days later but a young Navy diver was ruthlessly murdered and dumped on the tarmac in Beirut. The rest of the passengers were released unharmed. The terrorists escaped into Beirut.

The Italian cruise-ship *Achille Lauro*, was likewise hijacked several months later (Oct 1985). Again the matter was resolved but only after an elderly handicapped passenger was murdered. Taken from his wheelchair, he was shot twice then thrown overboard. One month later a Boeing 737 carrying the mastermind of this operation, Abu Abbas, and members of his group was intercepted by four F-14s belonging to VF-74 "Bedevilers" off the *U.S.S. Saratoga*. The airliner was then diverted to the military airfield at Sigonella, Italy. Unfortunately, the Italian government refused to extradite the terrorists to the U.S. and allowed them to go free.

Also in November 1985, another Boeing 737 belonging to EgyptAir was hijacked on a flight from Athens to Cairo. A gun battle erupted in mid-air between the hijackers, believed to be part of Abu Nidal's network of terrorists, and Egyptian security officers aboard the flight. At least one bullet penetrated the outer skin of the fuselage, forcing the airliner to make an emergency landing at Luqa airport on the island of Malta. Egyptian commandos later stormed the airliner but failed to surprise the hijackers. Almost sixty civilians died in a hail of bullets as the terrorists ran through the airplane's cabin throwing hand-grenades.

In December 1985, Abu Nidal's shadowy network struck two airports simultaneously, Rome and Vienna. Many civilians were killed and injured in the twin attacks. After being blamed for the attacks, Libya warned the U.S. that "suicide squads" were poised to take the war "into the streets of American cities."

By 1986, the United States was spoiling for a fight. Americans were frustrated over the government's seeming inability to protect its citizens from terrorism. The villains were hard to find and even when caught they always seemed to get away. Foreign governments were reluctant to cooperate with the U.S. for fear it would only make them a target for future terrorism.

In March, ships of the Navy's Sixth Fleet conducted a "freedom of navigation" exercise similar to the one in 1981. Code-named "Prairie Fire", it was intended to reestablish the right of maritime traffic to operate within the Gulf of Sidra. It is equally likely that the operation was designed to goad Qaddifi's air force into coming out to play. With three carriers in the area, *U.S.S. Coral Sea (CV-43), U.S.S. Kitty Hawk (CV-63)* and *U.S.S. America (CV-66)* there was more than enough air power on call.

On the morning of March 24th a three ship SAG consisting of the *U.S.S. Ticonderoga (CG-47), U.S.S. Scott (DDG-995)*, and *U.S.S. Caron (DD-970)* crossed the 32° 30' N latitude across the Gulf of Sidra, Libya's so-called "Line of Death." Overhead, F-14s from the carriers maintained a constant CAP. Libya's response was to fire SA-5 missiles at the F-14s and dispatch fast patrol boats to attack the U.S. SAG. Strike aircraft from the carriers attacked and destroyed the offending surface-to-air missile sites near Sirte. The patrol boats were also quickly sunk before becoming a threat to either the SAG or the carriers.

On March 24th, the Libyan Guided-missile patrol craft *(PTG) Waheed* was attacked and sunk by two A-6s belonging to VA-34 "Blue Blasters". The Waheed, a La Combattante-class patrol vessel, was struck by at least one Harpoon and several Rockeye munitions. The next day (March 25th), three additional patrol craft were attacked by VA-55 "Warhorses" and VA-85 "Black Falcons." After inflicting these losses, the U.S. called off the operation early. U.S. ships withdrew from the Gulf two days later, having made their point.

On April 2nd, a bomb exploded aboard a TWA flight en route from Rome to Athens. The bomb caused four passengers to be blown out of the aircraft. Autopsies performed on the bodies determined that three of the four survived the explosion only to fall to their deaths. The fourth was killed in the explosion. The incident was linked to Libyan supported terrorists.

Three days later another bomb exploded inside a crowded Berlin nightclub killing two American servicemen. The April 5th bombing of *La Belle* discotheque provoked a storm of outrage. Messages between Tripoli and its embassy were intercepted by U.S. intelligence assets. They confirmed who was behind the attack.

The attack on the TWA flight and the nightclub bombing in Berlin galvanized the Reagan administration into taking direct action against Libya. On the morning of April 14, 1986, the United States attacked a number of strategic targets inside Libya. The targets included command centers where Colonel Qaddifi was likely to be found. *Operation El Dorado Canyon* was an attempt, in President Reagan's words, "to make the world smaller for the terrorists."

The principal strike aircraft in this attack were twenty-four F-111s and five EF-111s. These aircraft took off from bases in northern England. They were supported by two aircraft carriers; the *U.S.S. Coral Sea* and *U.S.S. America* located in the Mediterranean at a patrol point known as Mad Dog Station. F/A-18s and A-6 aircraft from these carriers were ordered to attack various targets in eastern Libya while the F-111s struck Tripoli.

Covering the entire operation were F-14 "Tomcats." They were tasked with "delousing" the strike packages during their post-strike egress from Libya. The procedure was simple. Returning strike packages would pass through a cordon of F-14s charged with ensuring that no bandits were tailing them.

Because the F-111s were refused permission to overfly France, they were forced to take a circuitous route around the Iberian peninsula. This flight path added hours and many tedious mid-air refuelings to the mission. (Twenty-eight refueling tankers accompanied the F-111s.) By the time the F-111s reached their targets, they had already flown over 2,500 nautical miles.

Figure 6-9: An F-111 "Aardvark" on a low level pass drops high drag Mk. 82 "Airs" the old-fashioned way.

The fact that *El Dorado Canyon* was a joint Navy/Air Force operation put inter-service coordination at a premium. All were afraid that any deviation from the operation's split-second schedule could alert the Libyans prematurely. According to the plan, five military targets inside Libya were to be hit in an operation lasting less than twelve minutes. Sixty tons of bombs would be dropped before the Libyans knew what hit them.

The most important of the five targets was Qaddifi's command center within the Bab al Azziziyah army compound outside Tripoli. Nine F-111s attacked the site in three waves of three. Each wave was given its own code-name: "Remit", "Elton", and "Karma." *The only aircraft lost in this operation was an F-111 ("Karma-52").* Qaddifi was not home. He escaped the raid apparently no worse for wear.

Two other targets linked to terrorist activity were struck near Tripoli. U.S. intelligence had identified the Sidi Bilal naval base as being a training ground for terrorist commandos. Three F-111s (code-named "Jewel") struck the base causing slight damage. The final target near Tripoli was the International Airport. Six F-111s ("Puffy" and "Lujac") dropped the bombs which would be seen later on newscasts around the world. Twelve of their Mk. 82 bombs were filmed landing amongst five Soviet-built Il-76 "Candid" transports.

These three attacks took place in and around Tripoli in western Libya. In eastern Libya, aircraft from the U.S.S. Coral Sea and U.S.S. America attacked two military targets near the port of Benghazi. The first of these was the Jamahiriya army barracks. This compound, like Sidi Bilal, was being used to train terrorists. It was destroyed by twelve A-6 "Intruders". Four MiG-23s were also destroyed at nearby Benina airfield. Military planners believed these interceptors would be used to attack the strike packages.

El Dorado Canyon was over within the allotted twelve minutes. The actual damage caused by this attack was negligible; a few buildings were demolished, a few aircraft were destroyed. Like the "Doolittle raid" on Tokyo in 1942, the psychological impact of the raid was enormous, however. Americans believed they had finally struck a meaningful blow against state-sponsored terrorism. The raid received widespread approval back home.

Qaddifi managed to survive the attack. Only a fraction of the bombs meant for his command post were actually dropped. Visibly shaken, he appeared on Libyan television hours later to denounce the raid which allegedly killed one of his adopted daughters. Despite his threats and posturing, Qaddifi remained relatively quiet following the raid. The level of Libyan support for terrorism was dramatically curtailed.

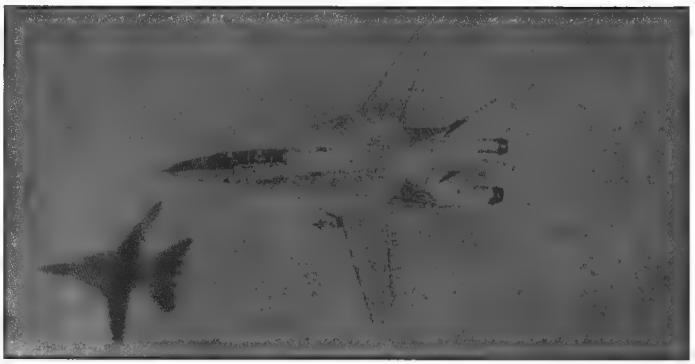


Figure 6-10: This F-14 spots its own shadow on the sand. Does this mean six more weeks of bombing?

The following order of battle lists the three aircraft carriers involved in "Prairie Fire." The *U.S.S. Saratoga*, listed here, left the Mediterranean on April 5th. It was present for "Prairie Fire" but could not be recalled in time for *Operation El Dorado Canyon.*

U.S.S. SARATOGA (CV-60)
Carrier Air Wing-17
F-14 Squadrons: VF-74 "Be-devilers", VF-103 "Sluggers"
A-7E Squadrons: VA-81 "Sunliners", VA-83 "Rampagers"
A-6E Squadron: VA-85 "Black Falcons"
E-2C AEW Squadron: VAW-125 "Tigertails"
EA-6B EW Squadron: VAQ-137 "Rooks"
S-3A ASW Squadron: VS-30 "Diamondcutters"
SH-3H ASW Squadron: HS-3 "Tridents"

U.S.S. CORAL SEA (CV-43)
Carrier Air Wing-13
2F/A-18 Squadrons: VFA-131 "Wildcats", VFA-132 "Privateers", VMFA-314 "Black Knights", VMFA-323 "Death Rattlers"
A-6E Squadron: VA-55 "Warhorses"
E-2C AEW Squadron: VAW-127 "Seabats"
EA-6 EW Squadron: VAQ-135 "Black Ravens"
SH-3H ASW Squadron: HS-17 "Neptune's Raiders"

U.S.S. AMERICA (CV-66)
Carrier Air Wing-1
F-14 Squadrons: VF-33 "Tarsiers" (Starfighters), VF-102 "Diamondbacks"
A-7E Squadrons: VA-46 "Clansmen", VA-72 "Bluehawks"
A-6E Squadron: VA-34 "Blue Blasters"
E-2C AEW Squadron: VAW-123 "Screwtops"
EA-6 EW Squadron: VMAQ-2 "Playboys"
S-3 ASW Squadron: VS-32 "Maulers"
SH-3H ASW Squadron: HS-11 "Dragon Slayers"

The *Operation El Dorado Canyon* scenario in assumes that Libya responds much more aggressively to the U.S. raid. With the *Saratoga* gone, only two F-14 squadrons (from the *America)* remain to protect the fleet. Will they be enough? Because the *Coral Sea* is unable to carry F-14s it has been removed from this scenario also. This leaves you with only one carrier to worry about.

Libya has a large airforce and many airbases protected by modern air-to-surface missiles. Although their pilot training is poor in comparison to ours, used properly, their air force can pose quite a danger. As a "Tomcat" pilot, your mission in this campaign is escort the various strike packages. Once they hit their targets, you are to defend your battlegroup from the expected Libyan counter-attack.

Scenario #3 Carrier Duel

Up until the mid-seventies Soviet naval doctrine dismissed our emphasis on naval aviation and the need to maintain expensive aircraft carriers. Aircraft carriers were overly vulnerable in time of war. Because U.S. carriers attract so much attention, their presence in a region is difficult to conceal.

So much of a carrier's air wing is devoted to self defense that little room is left over for staging offensive missions. If this is the case, Soviet naval observers argue, why invest so much when cheaper means exist to accomplish the same thing? Of course the Soviets have a point, but the question really must be answered in terms relative to each of the respective navies.

As a superpower with global responsibilities, the United States after WW II required a navy that would allow for unlimited force projection. This mission could only be fulfilled by possessing fast-moving aircraft carriers able to "go anywhere and do anything." Through its carrier battlegroups the United States could interject friendly air power into a region without regard for the availability of land-based facilities.

The Soviet Union, on the other hand, had an entirely different set of national objectives. Although the Soviets proclaimed themselves to be a superpower, in truth this status was merely contrived. Stalin's empire in 1945 was a regional powerhouse and nothing more. It dominated eastern Europe, but could do little if anything militarily in other parts of world. Its primary concern was holding on to the territory it gained in WW II.

The Soviet navy reflected this priority. Built for coastal defense Soviet surface ships could perform only local operations close to home *under cover of friendly land-based aircraft.*

Since 1945 it has become an accepted practice among career officers of the Soviet navy to disparage the military effectiveness of our carriers. Soviet officers must denigrate carrier-based aviation. Such thinking allows them to ignore the fact that their own naval forces could never perform missions such as those routinely performed by the U.S.N. Aircraft carriers have provided the U.S. with a sea-based striking power that the Soviets lack.

Rather than build aircraft carriers the Soviets took a different track. It has historically emphasized submarine warfare instead of naval aviation. Although the submarine is usually linked to Germany and its U-boat campaigns against England, it is important to remember that the Soviet navy actual possessed 3 times as many submarines as Germany in 1939. Today, this reliance on submarines is in keeping with the primary mission of the Soviet navy, *sea-denial and interdiction.*

While the United States developed carrier warfare after WW II, the Soviets cultivated the art of undersea warfare and cruise missile technology. Is there substance to past Soviet claims that our reliance on big, expensive aircraft carriers is a military liability? Or were our detractors merely jealous of the technological superiority needed to produce and maintain such vessels. Can our aircraft carriers be defended or are they just obvious and vulnerable targets?

It becomes hard to see the Soviet commentary as anything more than just sour-grapes. In the late 1960s the Soviet Union suddenly did an about-face on the need for naval aviation. Construction began on several new vessels able to carry and operate aircraft at sea. Did aircraft carriers all of a sudden become less vulnerable for some reason or was this change in Soviet thinking due to a change in mission?

The Cuban Missile Crisis proved to the Soviets that a strong independent navy was required if it was ever going to compete with the United States on a global scale. The ease at which the U.S. carrier-led naval forces cut them off from their Cuban ally in 1962 was embarrassing. It also showed how close the world could get to nuclear Armageddon if it tried.

With the U.S. deployment of a new generation of missile-carrying submarines the Soviet Union suddenly found itself vulnerable to a nuclear first strike. At the same time, without a means of deploying air power at sea the Soviets could not adequately defend their coast from the under water leg of the U.S. nuclear triad.

Figure 6-11: What's this, a near miss on one of our carriers? No -just a routine shock-test conducted by the Navy.

The Soviets began their commitment to naval aviation by producing "aircraft carrying ships" for the express purpose of conducting ASW (Anti-Submarine Warfare). Two tear-drop hulled vessels, the *Moskva* in 1967 and *Leningrad* in 1968 were constructed at the Nikolayev Ship Yard on the Black Sea. Armed as standard cruisers fore with a clear helicopter deck aft, these hybrid ships were labeled "anti-submarine cruisers." Although they could carry up to 18 helicopters these Moskva-class ships were unable to operate fixed-wing aircraft.

In 1970, construction began (also at Nikolayev) on a new class of vessel. The keel was laid for a second generation of ship devoted to naval aviation. Six years later, the first of four Kiev-class "aircraft carriers" *(Kiev, Minsk, Novorossiysk, and Baku)* was in service with the Soviet navy. With the deployment of the *Kiev*, the Soviet Union finally could boast of having a ship capable of operating fixed wing aircraft at sea. On closer inspection, however, the Kiev-class of ship is hardly the equal of what we, in the West, would consider a true aircraft carrier. It is only able to carry an air wing consisting of 20 helicopters and 15 VTOL (Vertical Take-off and Landing) aircraft.

The Kiev-class vessels like their predecessors, the Moskva-class helicopter-cruisers, are primary intended to conduct ASW operations. Yak-38 VTOL aircraft give the Kievs only a marginally better strike capability than that derived from the SSMs they carry on-board. As interceptors go, the contingent of "Forgers" is hardly imposing. Still, the Kiev-class vessels represent a first step for a nation who has made the move to sea-based air power late.

The Kiev class CVH vessels, are in keeping with the old saying that in order to run, one must first learn to walk. Operating these ships has given the Soviets much needed experience in deck handling and recovery operations. At the start of the 1980s, all that remained was for the Soviets to begin construction on a full-sized aircraft carrier.

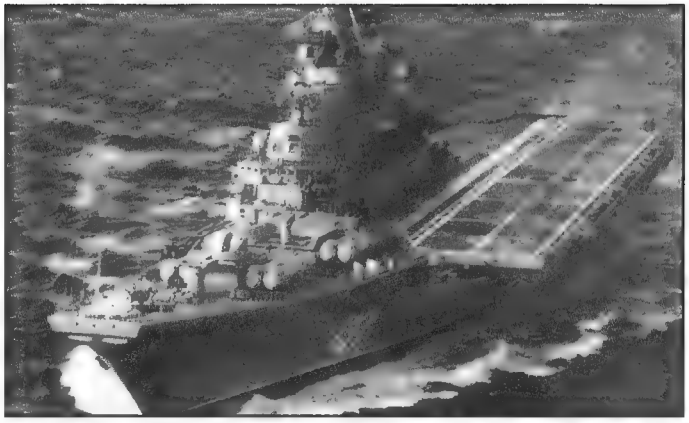


Figure 6-12: A Soviet Kiev-class CVG. This picture is actually the Novorossisk, sistership to the Kiev. Note the heavy anti-surface and ASW weaponry forward of the superstructure.

In 1983 the Soviets began building the first of three fleet carriers vaguely comparable in size if not striking power to our own. The 65,000 ton Admiral Kuznetsov was launched five years later and began sea trials in 1989. The Kuznetsov was not equipped with a catapult. Instead of power-assisted launches it utilizes a 12° ski-jump ramp to get its complement of nearly 60 fixed wing aircraft airborne. In addition to operating Yak VTOL aircraft as expected, naval versions of the MiG-29, Su-27, and Su-25 have been confirmed.

Following the launch of the Kuznetsov in 1985 her sistership, the Varyag, was laid down. After most of the hull structure was complete, work on this vessel was halted due to the break-up of the Soviet Union. Legal ownership of the Varyag has since been contested by Ukraine. It is likely that the ship will be offered for sale to foreign buyers or scrapped. (The Chinese have expressed an interest in purchasing the vessel intact.)

The largest of the three planned fleet carriers, the 76,000 ton *Ulyanovsk*, was never completed. Again, construction of this vessel was interrupted by the 1989 revolution. The hull was scrapped at Nikolayev shipyard after only 40% of the work was done. Had this carrier been launched it would have had a complement of approximately 75 fixed wing aircraft and been the closest thing to a U.S. style carrier yet produced by the Soviet Union.

By the year 2000, over fifty years will have elapsed since the last great carrier battles. Many within the naval community (in both nations) believe that the day of the aircraft carrier has passed. They point to the introduction of the long-range cruise missiles as proof of the carrier's vulnerability.

FLEET DEFENDER gives you the opportunity to discover for yourself whether or not the aircraft carrier remains a viable weapon into the next century. Carrier Duel assumes that the 1989 revolution in the Soviet Union never occurred and that the three fleet carriers entered service as scheduled. Having made these admittedly ahistorical concessions we can now proceed to set up the following imaginary carrier vs. carrier battle.

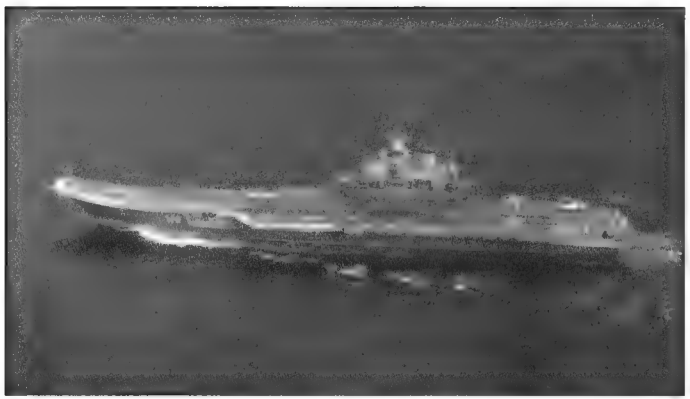


Figure 6-13: The Kuznetsov. The Soviet Union's only fleet carrier to conduct operational trials. Note the angled ski-jump flight deck. The Soviet designers were obviously influenced by the success of British carriers in the Falklands-Malvinas War.

Figure 6-14: Your wing-man flashes by as reports of hostile action begin to come in. It's time to see just how good Ivan really is!

You are assigned to an F-14 fighter squadron aboard a carrier that has been patrolling an area north of the Gulf of Sidra. You have been at sea for some weeks and everything has gone routinely well. The constant pattern of take-offs and landings has continued with mind-numbing regularity. Suddenly, reports of a clash with Soviets fighters are coming in. Soviet fighters ...this far out to sea? What's going on here?

Your carrier goes to Battle Stations just as a burst of ELF traffic is received on the bridge. The Soviet Union and the United States are apparently at war. The Soviet surface action group that passed through the Turkish Straits 18 hours ago has been spotted by satellite moving toward your carrier battlegroup at high speed. It is thought to contain at least two aircraft carriers plus numerous other ships. Soviet intentions are unclear at this point, but the CAP surrounding your carrier has been doubled just in case.

Despite being outnumbered 2-1 in aircraft carriers and at least 130-90 in aircraft, the men of your group are ready. If the Soviets are looking for a fight, they'll get it. Officers on the bridge are clearing for action because somewhere over the horizon a Soviet carrier force is fast approaching. In the next couple hours the sky will fill with aircraft and missiles. Once again, all eyes will be looking to the few available F-14s on-board to see them safely through the battle.

OCEANA TRAINING THEATER

Welcome to Oceana Naval Air Station, Virginia Beach, Va. Oceana is the training base for the Navy's east coast F-14 squadrons. In *FLEET DEFENDER*, Oceana is a training theater also. There are no campaigns to fight here. Instead, this theater gives you the opportunity to study various tactical problems and cultivate the flying/fighting skills you'll find necessary later on.

Select the Oceana training theater as you would either of the other two campaign theaters. You are then given the option to select the type of training that you believe you need most; Radar Training, Wing-man training, DACT, etc. There are eight training options for you to choose from.

Figure 6-15: An F-14A, landing gear extended, coming in for a landing. Carrier qualifications are the biggest part of a naval aviator's carrer in the Navy.

Oceana Training Theater map

FLEET READINESS TRAINING

After graduating from a basic flight school, prospective aviators are sent to Oceana for Fleet Readiness Training. In order to considered ready for sea duty aboard a carrier, they must demonstrate their proficiency by performing a number of successful carrier landings. To a naval aviator, being able to perform a carrier landing is a little like learning how to parallel park a car to you and me.

Fleet Readiness Training (FRT) allows you to practice your landing techniques to your heart's content in a simulated combat environment. There are no hostile forces to be encountered, only lots of friendly aircraft taking off or returning from missions. You can fly both day and night approaches in all types of weather conditions.

RADAR TRAINING

Target Identification

Being able to identify targets on radar is extremely important, after all, your F-14 is equipped with a powerful air-to-air missile able to hit a target at ranges exceeding 100 nm. It would be a shame to waste such a sophisticated system by waiting until you have a positive visual ID. That defeats the whole purpose of the AIM-54.

When your radar beam detects other objects in the sky, the return echo forms small rectangles on your radar screen. These images (or blips) are difficult to identify because one blip looks like every other, you could be looking at anything from a DC-10 to a cruise missile. As part of your overall radar training it is necessary for you to distinguish what you are seeing on your radar display.

One method of target identification is through a process of elimination. If a target is moving fast or flying high you can rule out helicopters with a fair degree of certainty. Another means of identifying targets is by size. Large targets are more easily spotted on radar and at greater ranges. For example, a four-engined bomber has a radar signature like a proverbial barn door. Your AWG-9 should have no trouble detecting these aircraft several hundred miles away. But your radar is hard pressed to detect a fighter-sized aircraft at the same range.

Fighter-sized objects will begin to show up on your radar display only as the range decreases. Cruise-missiles are even smaller still. From a head-on aspect, their tiny cross-section makes them almost undetectable except at very close range.

As part of your radar training, you are given a chance to practice identifying various objects on your radar. In each sequence a number of different objects have been placed directly in front of your F-14. The objects begin several hundred miles away but because the objects are headed at you, you have only a limited amount of time to distinguish between them.

The figures on the following table are modeled on a MiG-21 or comparable-sized target. Targets this size represent a radar cross section of approximately 5m^2 (54 ft^2). This table should be used as a guideline only. The actual range at which your radar can detect a particular target depends upon its size, altitude, and speed.

Radar Mode	Detection Range
Pulse Doppler Search (PDSRCH)	115 nm
Pulse Doppler Single Target Track (PDSTT)	95 nm
Range While Search (RWS)	90 nm
Track While Scan (TWS)	90 nm
Boresight/ Vertical Scan Lock-On (VSL)	5 nm

Formation Identification

The next step in your radar training is being able to identify enemy flight formations on radar. Because enemy aircraft perform ACM based in part upon their formation configuration, recognizing these various formations gives you distinct tactical advantages in combat.

In each sequence, an enemy formation has been placed directly in front of your F-14, just outside its maximum radar range. You are to identify the enemy formation then use that knowledge to your advantage in any subsequent combat. Since your F-14 is considerably outnumbered in these sequences, it has been made impervious to enemy missiles and gunfire for the purposes of this training.

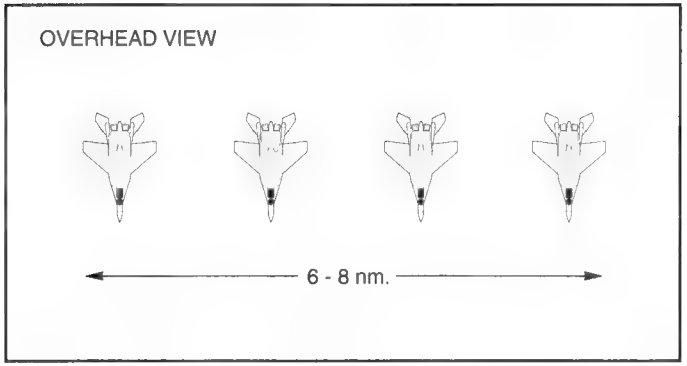
Enemy Formations

Here is a brief look at the four common enemy formations that are encountered in. They are the *Wall, Box, Ladder,* and *Cruise (Echelon)* formations.

WALL FORMATION

The Wall formation is a flight of aircraft brought on line. Seemingly unsophisticated, this formation requires good radar co-ordination and discipline to be effective. The Soviets often arrange flights of MiG-31s in Wall formations to take advantage of their powerful Foxhound radars. Third World air forces generally lack the level of training necessary to make the Wall formation work properly. Nevertheless, these nations use the Wall for command and control purposes.

A typical Wall formation may extend up to 8 nm horizontally and as much as 10,000 ft. vertically. It is easy to mistake a Wall formation on radar at ranges between 25-50 nm. Unless your radar is beaming at a very wide azimuth your radar may not detect aircraft on either end of the formation.



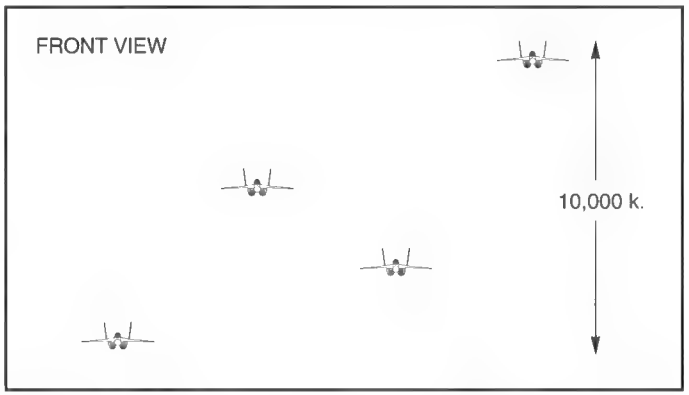


Figure 6-16: The Wall is one of the easiest formations for a flight leader to maintain. It is a line-abreast formation which staggers aircraft at various altitudes.

BOX FORMATION

The Box formation consists of four aircraft flying in a rectangular formation. The leading aircraft are positioned 8-10,000 ft higher than the two trailing aircraft so that the trailing aircraft can keep an eye on the leading pair's blind zones. Because of the difference in altitude, your radar may miss one or the other pair of aircraft. What seems to be only a single pair of bandits may surprise you and suddenly turn into a four-ship. *To keep this from happening, it is important to adjust your radar's bar setting in order to scan the entire formation.*

Aircraft flying in a Box formation use a tactic known as the Champagne. When a member of the formation detects an enemy aircraft or radar the formation splits up in an attempt to encircle the attacker. A detailed description of the Champagne maneuver is outlined in Chapter Five.

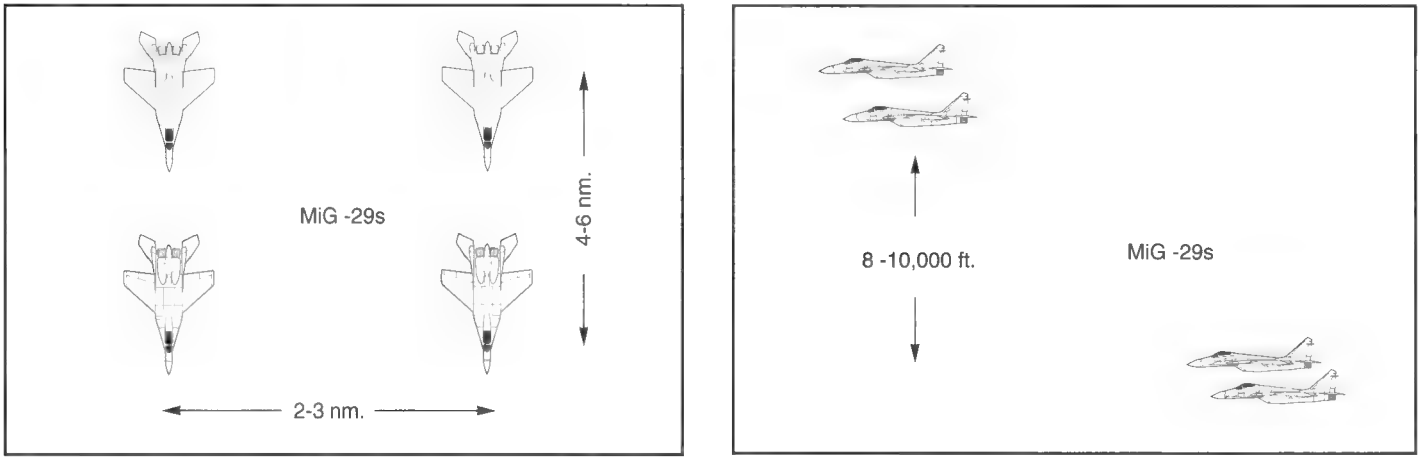


Figure 6-17: The Box Formation consists of four aircraft able to respond quickly to a variety of threats.

LADDER FORMATION

The Ladder formation is simply a vertical stack of aircraft. The Leading aircraft assumes the highest altitude. Each successive aircraft in the formation is positioned 1 nm behind and 3,000 ft beneath the one in front. The biggest danger in confronting a Ladder formation is not knowing how high or how low it extends. When attacking a Ladder it is always best to engage the upper half of the formation first.

Aircraft flying in a Ladder formation use a tactic known as the Starburst. When a member of the formation detects an enemy aircraft the formation breaks apart in order to overwhelm and confuse an attacker. A detailed description of the Starburst maneuver is outlined in Chapter Five.

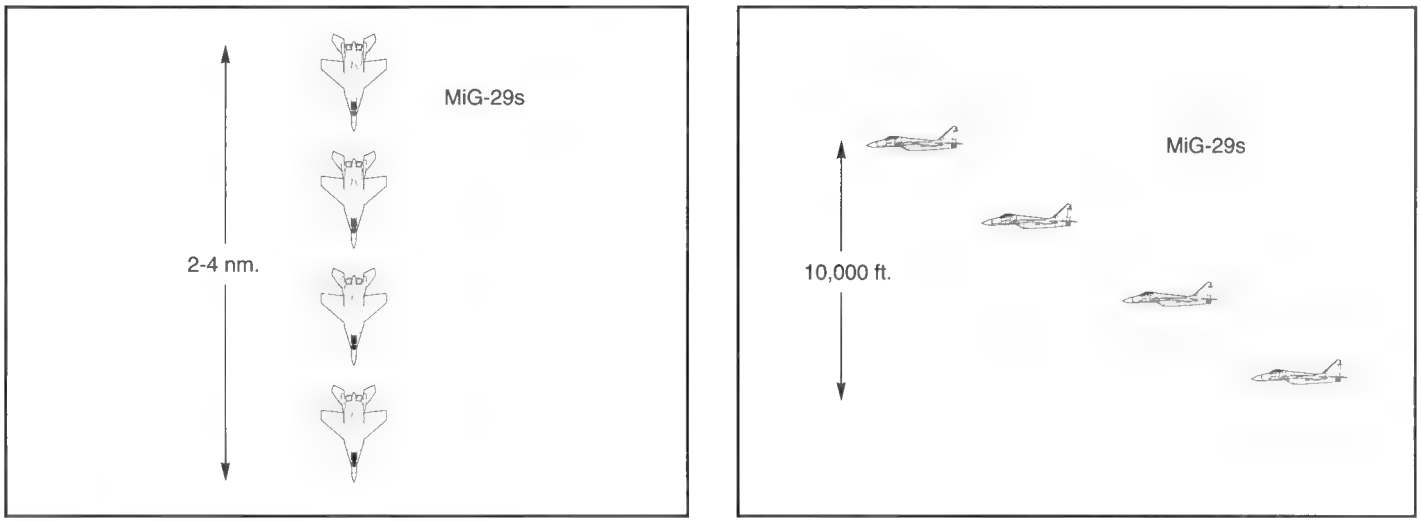
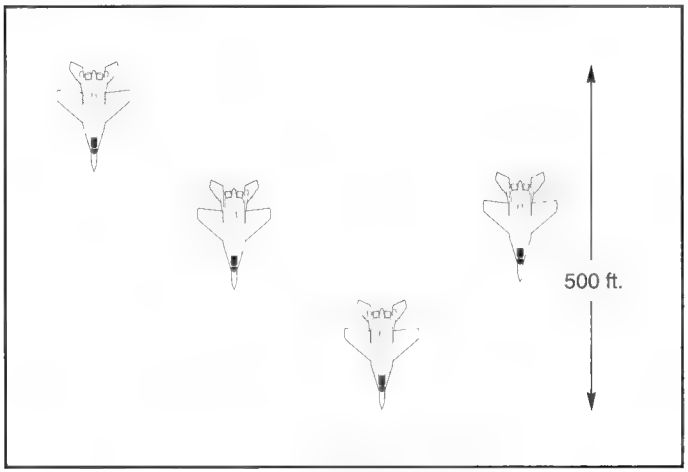


Figure 6-18: Because of the vertical separation between aircraft the Ladder formation is frequently mistaken for something else. It is hard to detect all the aircraft in a vertical stack with just one radar sweep.

THE CRUISE FORMATION

Cruise formation is used when the flight leader does not expect to encounter enemy aircraft. It is a tightly bunched formation which is difficult to spot on radar. Once detected, however, the close grouping of aircraft is unmistakable. This formation is often adopted by Third World air forces because it allows the flight leader to keep a close eye on his aircraft.

When aircraft in Cruise formation enter combat, they usually break into two pairs. Each pair will attempt to encircle an attacker by converging on him from opposite flanks. This pincer-like movement can be effective but it is an act of desperation. It is hard for a group of fighters to begin a combat sequence from Cruise formation.



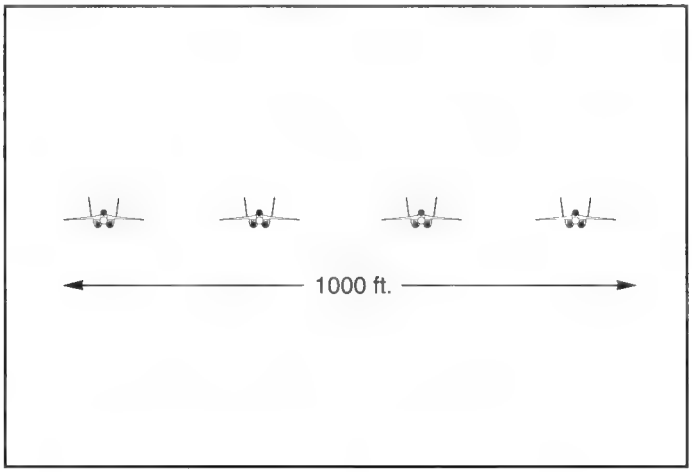


Figure 6-19: Cruise formation is a common traveling alignment used by aircraft when not in combat. It is designed for ease of command and control.

DISSIMILAR AIR COMBAT TRAINING (DACT) SORTIES

Dissimilar Air Combat Training (DACT) missions are designed to test your combat skills against a variety of different aircraft. (The F-14 has been included in these DACT missions just to see how well you'd do against another Tomcat.) You are given a chance to take on not only enemy aircraft, but some of our own models as well. Even though you can shoot at friendlies during these sorties, it's all right. No one gets hurt and no one will hold anything against you if you happen to down a few.

There are four categories of DACT sorties: Advantaged, Disadvantaged, Neutral and Miscellaneous. Each group refers to the initial starting position of your F-14 vis-a-vis your opponent(s). Within each category are two types of sorties: 1 v. 1 (one versus one) missions which test your skill versus a single opponent and 1 v. 2 (one versus two) missions. You may be faced with three or more in the case of miscellaneous sorties. All of these sorties are considered over once you have destroyed your opponents or have been shot down yourself. Simply exit the sortie to start the mission over or choose a new one.

Advantaged DACT Sorties

Advantaged DACT sorties begin with your F-14 holding some sort of tactical advantage over your opponent. In some cases you are given an altitude advantage while in others you are given an energy (or speed) advantage. A few of these sorties start out by placing your F-14 in the enemy aircraft's "six o'clock" firing arc.

Regardless of what type of advantage you begin with, it is in your best interest to finish off your adversary quickly. If these sorties do nothing else they will demonstrate just how fast an advantage can be lost in ACM. Your adversary(ies) will be attempting to evade you from the very beginning of the fight. If they can successfully escape, the tables will suddenly be turned. You will be put on the defensive. Don't play around. Finish off your opponent(s) early.

In the 1 v. 2 sorties, the second adversary means double-trouble. You must decide for yourself how best to engage one enemy while keeping the other at bay. Don't become so focused on getting a kill, however, that you allow the other guy to get the upper hand.

Neutral DACT Sorties

Neutral sorties are once again designed to test your combat skills only this time you start from a neutral position (parity) with the enemy. Both you and your adversary(ies) start at exactly the same altitude, speed, and tactical placement.

You must start maneuvering for advantage from the very start of play. The enemy(ies) will be trying to do the same. The first pilot to get a drop on the enemy will usually win. Don't let these fights get away from you. It is very hard to recover once you are placed on the defensive.

Disadvantaged DACT Sorties

The most difficult situation you can face in air combat is to be put on the defensive by a competent enemy pilot. It is almost impossible to get away, and for this reason disadvantaged sorties have been included as part of your readiness training. Be forewarned, however, that these fights are not much fun. In most cases the enemy should win rather quickly. To have an even chance at winning you must evade the enemy immediately or spoil his opening attack at the very least.

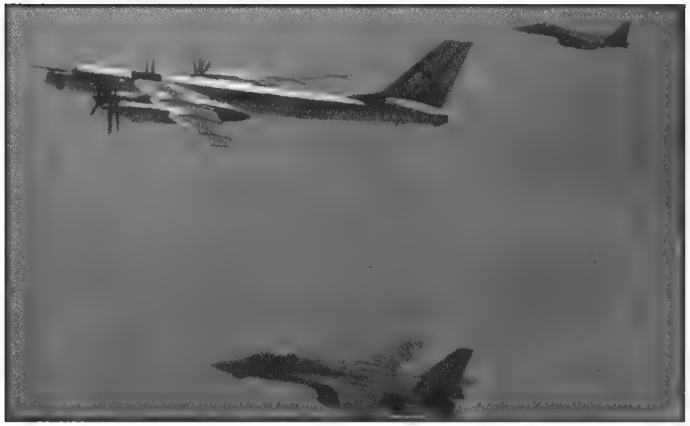


Figure 6-20: A Soviet Tu-95 "Bear" out to locate our carrier group and prove a point. This Bear came up short. Two F-14s are making sure this Bear finds its way back home.

As if being bounced by one enemy aircraft wasn't bad enough, how about two? Some of the sorties have both a flight leader and wing-man boring in on you for the kill. If you win one of these matches, you should count yourself very lucky indeed.

Miscellaneous DACT Sorties

These miscellaneous sorties test your reaction to a variety of combat situations not normally encountered by F-14 pilots. Each sortie requires that you to be on your guard at all times. Who knows what you may run into out there. Since the element of surprise is important to these missions you'll just have to fly 'em if you want to find out any more. They should prove very interesting- not just your run-of-the-mill interceptions.

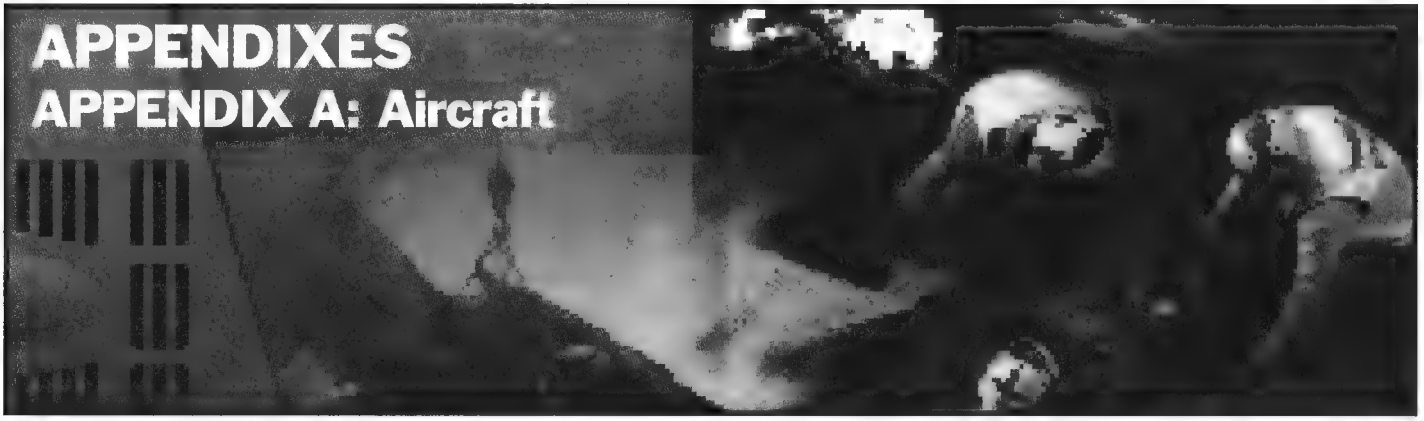
WING-MAN TRAINING

Your wing-man is an important contributor to the overall success of your mission but too often he is overlooked in the heat of battle. During campaigns your wing-man's skill level increases as does your own. Using up wing-men as bait or cannon fodder negates this important advantage.

The ten wing-man missions are designed to get you in the habit of using your wing-man to his full potential. Each mission presents you with a different tactical challenge requiring you to consider the deployment of your wing-man. You cannot win these missions per se. There are no winners or losers. The one thing you can do is evaluate your own performance and that of your wing-man.

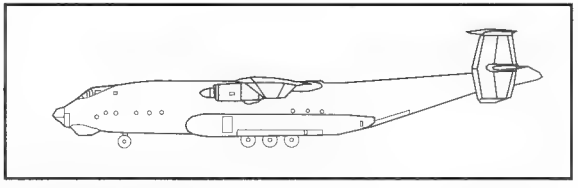
Before you tackle these missions, be sure to review the wing-man section of this manual. This section outlines the various commands you'll need to know in order to control your wing-man and complete these missions.

APPENDIXES
APPENDIX A: Aircraft



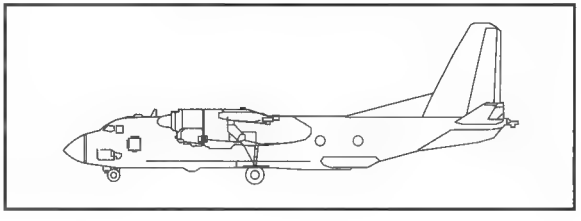
THREAT AIRCRAFT

An-22 "Cock"



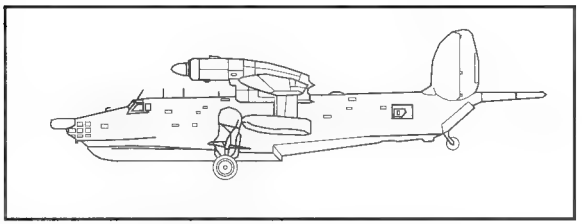
The Antinov 22 "Cock" was first displayed in public at the 1965 Paris air show. It is classified as a strategic heavy-lift transport and features a split tail design facilitating On/Off loading through the rear cargo doors. The An-22 has a crew of 5 and can carry up to 28 passengers plus cargo totaling a maximum of 175,000 lbs. Its rear doors can open in flight for large scale air drops if required. The An-22 is able to carry all Soviet MBTs plus some mobile SAM systems. Until the U.S. C-5 "Galaxy" entered service, the An-22 was the largest aircraft ever built. It has a cruising speed of 350 knots and a maximum range enabling it to reach any of the world's trouble spots unrefueled.

An-26 "Curl"



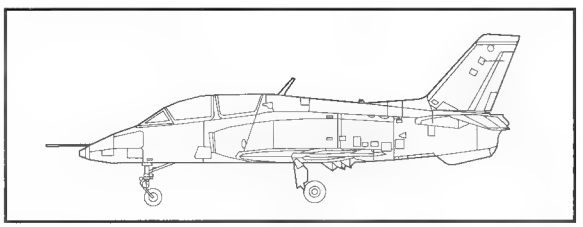
Like the An-22, the Soviet Union's Antonov-26 was first shown in public at the 1969 Paris air show. It is classified as a light tactical transport much like our C-130 "Hercules." It is the standard transport used by the Soviet Union and its allies for conducting airborne operations. This aircraft is able to transport up to 12,000 lbs. of palletized cargo or 40 passengers plus their gear. The An-26 is designed to operate from unpaved, rough strips common among Third World nations. It is equipped with an electric winch and conveyor system for rapid on/off loading. The An-26 has a crew of 5 and boasts a cruising speed of over 300 knots.

Be-12 "Mail"



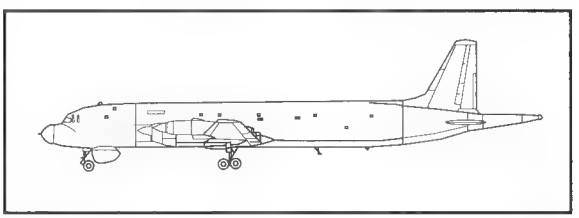
The Beriev-12 "Mail" is one of the world's few remaining military float-planes and is classified as a maritime patrol and ASW aircraft. To its Soviet crews, it is known as the *Tchaik.a* or seagull because of its gull-shaped wings. These wings give the Be-12 an impressive lift capacity which rivals that of the An-26. This aircraft normally carries ASW weaponry including bombs, torpedoes, and sonobuoys. In calm sea conditions, the Be-12 can conceivably land on the water's surface and search with its own sonar. Although the "Mail" is getting a little *long in the tooth* by contemporary standards, it will likely remain in service for some time as a SAR platform. It is currently used only by the Soviet Union Northern and Black Sea fleet. This flying boat has a cruising speed of 350 knots and a maximum range of 2,500 nm.

G-4 Super Galeb (Seagull)



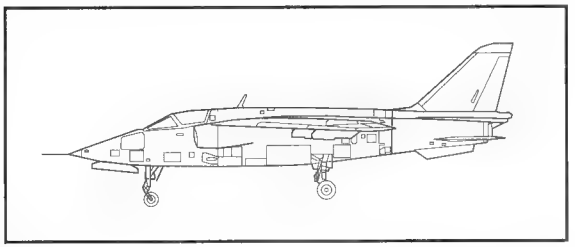
The G-4 Super Galeb is designed and constructed by the Yugoslavian firm SOKO. These two-seat light attack aircraft are left over from the Yugoslavian national air force. They are now being operated by Serbian pilots. The Super Galeb is very restricted in the amount of ordnance it is able to carry. It can carry a maximum bomb load of only 1,800 lbs. on each wing. In addition, the Super Galeb usually carries a centerline 23 mm GSh-23 gun pod. Although it is not billed as such, the Super Galeb is capable of counter-insurgency (COIN) operations. It is perfect for use against guerrilla or para-military forces deployed in mountainous terrain found throughout Yugoslavia. It is not, however, a good choice for precision bombing. The Super Galeb is a nimble aircraft but slow (500 knots). It does not have the ability to fight other aircraft nor the speed to run away.

Il-38 "May"



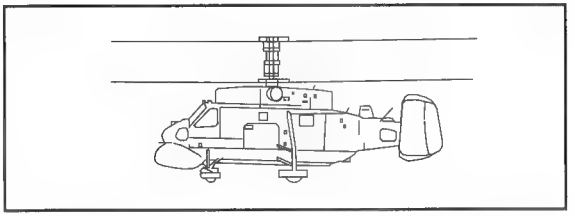
The Ilyushin-38 "May" is a maritime patrol and anti-submarine warfare (ASW) aircraft like the U.S. P-3 Orion. While it probably does not have all the sophisticated systems inherent in the Lockheed P-3, it does feature a magnetic anomaly detector (MAD) boom. This device can be seen protruding aft of the fuselage. Surface searches are conducted using the "Wet Eye" radar mounted in a radome under the nose. Development of the IL-38 took place in the mid-sixties and coincided with the deployment of increasingly capable U.S. submarines. This aircraft probably represents an intermediate step in the evolution of Soviet ASW aircraft. It certainly is an improvement over the Be-12 but is overshadowed by the Tu-142 "Bear F." The Il-38 has a crew of at least nine, included technicians. It has a modest cruising speed of 350 kts.

J-22 Orao (Eagle)



The J-22 Orao is a single seat ground support aircraft designed and built jointly by Yugoslavia and Romania (SOKO). While its main role is that of reconnaissance and light attack the J-22 Orao doubles as a low level interceptor. In *FLEET DEFENDER*, all of the J-22 Orao aircraft encountered are J-22D Orao 1 models. These aircraft are the Yugoslavian equivalent to Romania's IAR-93B. They feature two GSh-23L cannons each with 200 rds per gun. There are five external stations for mounting ordnance. The total weapons payload for this aircraft is less than 3,500 lbs. As an interceptor this aircraft is outmatched by most (if not all) fighter aircraft at medium altitudes. The J-22 can potentially beat a larger and more capable opponent down low, especially over mountainous terrain. Although the single seat versions are equipped with an afterburner, the maximum sustained speed this aircraft can manage (with ordnance) is roughly 500 knots.

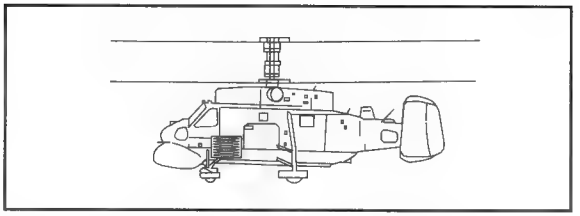
Ka-25 "Hormone"



The Kaminov-25 "Hormone" is a twin engine helicopter deployed on most Soviet naval vessels. Its principle role is that of aerial over-the-horizon (OTH) reconnaissance. In this role, the Ka-25 acts as a radar picket which can be offset from the mother-ship. There are two main variants of the "Hormone." The "Hormone-B" appeared first in 1961 and is a OTH targeting platform for missiles launched from other aircraft or surface vessels. The "Hormone-A" appeared afterward. This variant is an ASW platform which features a dunking sonar, MAD device, and one, possibly two, ASW torpedoes carried internally. The Ka-25 has two stacked co-axial rotors and two 900 shp engines. Despite its compact size the Ka-25 is underpowered and can only manage a cruising speed of 120 knots. These helicopters have a maximum range of less than 400 nm. If spotted at sea, you can count on a Soviet surface vessel being in the neighborhood.

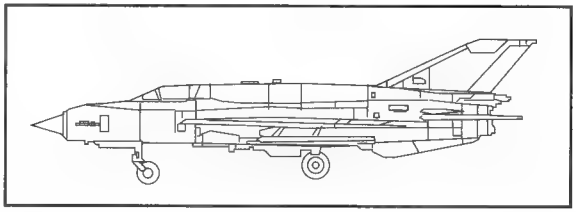
Figure A-1: The Kaminov-25 anti-submarine warfare helicopter. Note the chin-mounted radar radome and Yagi ESM antennae.

Ka-27 "Helix"



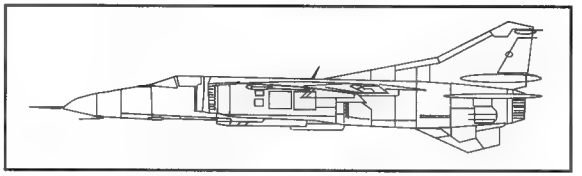
The Kaminov-27 "Helix" is designed as a replacement for the older Ka-25. The "Helix" has the same basic design as the Ka-25 but features an extended cabin and greater weapons outfit. Like the "Hormone" there are numerous "Helix" variants. The "Helix A" model is an ASW platform which carries a dunking sonar, MAD device, and search radar. These helicopters usually operate in pairs; one tracking the submarine, while the other deploys ordnance. The "Helix B" has been redesignated Ka-29. It is a heavily armored version of the Ka-27 used for seaborne transport of assault troops. The Ka-27 was exported to Yugoslavia during the 1980s and was redesignated Ka-28. It is believed these helicopters are the "Helix A" ASW variants. The Ka-27 features a crew of three and has a sustained cruising speed of approximately 120 knots.

MiG-21 "Fishbed"



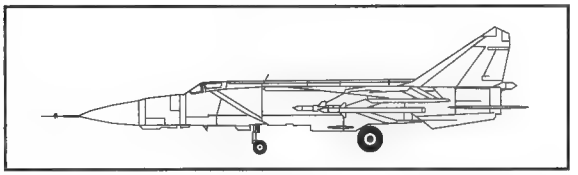
Known in Soviet circles as "Eagle", the MiG-21 is a testament to Soviet engineering. This ubiquitous delta-winged fighter aircraft is still in service after 25 years. In the 1960s, this aircraft was the Soviet Union's principle interceptor. It remains in service with many Third World nations today despite its limited avionics because of the ease at which it can be maintained. The delta wing gives the MiG-21 good low speed control but causes a rapid loss of energy due to the increased drag. All "Fishbeds" encountered in *FLEET DEFENDER* are assumed to be MiG-21bis-B ("Fishbed N"). The single-seat MiG-21bis features a GSh-23 23 mm cannon and up to four AAMs. Both radar-guided AA-2s and heat-seeking AA-2 or AA-8 missiles can be carried. The MiG-21bis mounts a "Jay Bird" search radar along the centerline. The single Tumansky turbo-jet engine gives the MiG-21 a maximum speed of 725 knots in a clean configuration.

MiG-23 "Flogger"



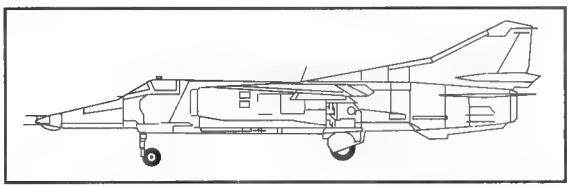
The MiG-23 "Flogger" is a single seat swept-wing fighter/bomber. It was first displayed at Domodedovo Airport near Moscow in 1967 and entered operational service with the Soviet airforce in 1973. It was the first Soviet fighter to demonstrate a "Look down-shoot down" capability. To a large extent, the MiG-23 has been replaced by MiG-29 and Su-27 fighter aircraft. Outside the Soviet Union, export versions of the MiG-23 still remain in service with several Third World air forces. In fact, the lion's share of Libyan air force is comprised of "Flogger E" and Flogger F" variants. Almost 100 MiG-23s are based throughout the country. The "Flogger E" is a single seat export version of the "Flogger B" with a "Jay Bird" radar adaptation. The "Flogger F" is a single attack fighter/bomber equipped with a laser rangefinder and AS-7 "Kerry" ASMs. The MiG-23 carries a GSh-23L 23mm gun in addition to four radar guided or heat-seeking AAMs. Its afterburning Tumansky turbojet gives this aircraft a maximum speed of almost 700 knots.

MiG-25 "Foxbat"



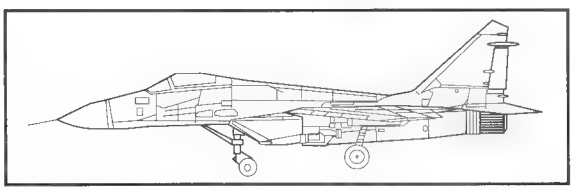
The MiG-25 "Foxbat" was the first Soviet aircraft to really scare Western military experts. It was produced to combat the intended deployment of a mach 3 high altitude bomber by the U.S. in the early 1960s. By 1964, the Soviets had produced a MiG-25 prototype capable of mach 3 even though the U.S. bomber program was long dead. By concentrating on altitude and speed, the Soviets had to sacrifice in other areas. As a result, the MiG-25 has impressive straight line performance but can't dogfight worth beans. Therefore, the "Foxbat" is classified as an interceptor rather than a true fighter. It seeks to avoid close combat and, like the F-14, relies on long range missiles to shoot down opponents. The MiG-25 is at its best only when flying within a narrow performance envelope (i.e. speeds above mach 2.5 and altitudes greater than 50,000 ft). Once the aircraft is forced to fly outside this envelope, it performs like a "truck." Because of this, the MiG-25 has been relegated to high altitude reconnaissance duty, and is rarely seen as a fighter.

MiG-27 "Flogger D"



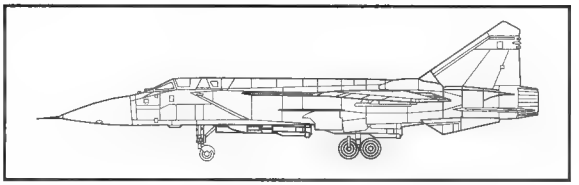
The MiG-27 "Flogger" is identical to the swept-wing MiG-23 except for a protruding nose window which houses an air-to-ground radar. This radar is used for precision targeting. There is also a covered radome which contains a laser sight for LGB delivery. Internally, the MiG-27 has been restructured to withstand higher buffeting at low levels. Its G tolerance is still limited to 8 Gs, however. The lack of an all-weather strike capability or air intercept radar limits the effectiveness of the MiG-27. It does carry a GSh-6-30 30 mm Gatling gun, however. While this gun is primarily used to strafe ground targets, it could easily be turned on an unsuspecting air target. The "Flogger D" also carries up to four heat-seeking missiles on external hard points for self-defense. The MiG-27's single afterburning turbofan gives it a maximum sustained speed approaching 700 knots.

MiG-29 "Fulcrum"



The MiG-29 "Fulcrum" is a single seat, all-weather fighter with a limited ground attack capability. Two versions of the MiG-29 are represented in *FLEET DEFENDER*. The first version is the land-based MiG-29 "Fulcrum A." The "Fulcrum A" is the standard production model which entered service in 1985. It features a GSh-30 30 mm gun in the right wingroot and can also carry up to six AAMs mounted on pylons, three per wing. The usual weapon configuration for this aircraft is four AA-10 "Alamo" and two AA-11 "Archer" missiles although it can also carry AA-9 "Amos" and AA-8 "Aphid" missiles as well. The other version of this aircraft is the naval variant "Fulcrum K." The "Fulcrum K" has been redesigned to allow it to operate off the Soviet Union's fleet carrier, *Admiral Kuznetsov*. Both versions have impressive performance records and a maneuverability which rivals the F-16 Falcon. The MiG-29's two afterburning Klimov turbofans give it a sustainable top end speed at sea level of 750 knots.

MiG-31 "Foxhound"



The MiG-31 "Foxhound" is a two-seat, all-weather, high-altitude strategic interceptor based on the earlier MiG-25 design. The "Foxhound" is said to have a "look down- shoot down" capability. Its "Flash Dance" radar is able to engage multiple targets simultaneously. The MiG-31 retains the MiG-25's basic outward appearance but has been significantly strengthened to enhance its performance at low altitudes. Despite the changes the MiG-31 retains some of the negative attributes of the MiG-25. Instead of carrying the AA-6 "Acrid", the MiG-31 carries the more capable long range AA-9 "Amos." With better missiles and a more powerful radar, the "Foxhound" can remain far away from a dogfight and still inflict casualties. MiG-31s are sometimes used as substitute AWACS aircraft. A number of "Foxhounds" get on line and use their "Flash Dance" radars to cover an enormous amount of airspace. These aircraft pack a single GSh-6-N23 23 mm gun with 260 rounds. If used correctly, these aircraft should never get close enough to enemy aircraft to use it.

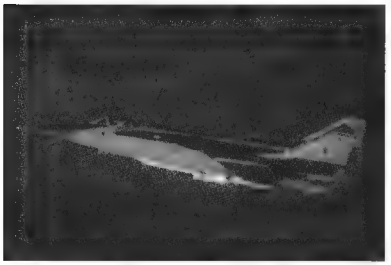
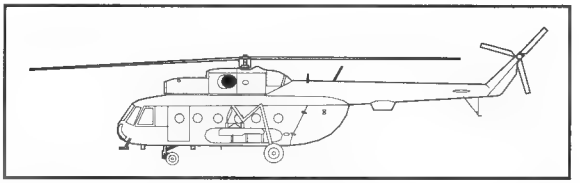


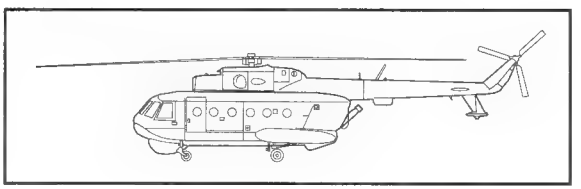
Figure A-2: The MiG-31, was the last front line, production fighter to be produced by the Soviet Union prior to the 1989 break-up.

Mi-8 "Hip"



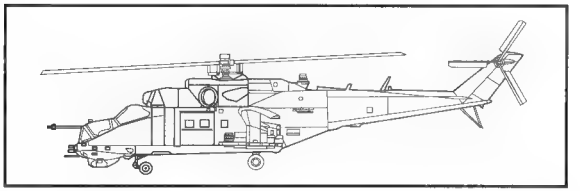
The Mil-8 "Hip" is a multi-purpose utility helicopter first flown by the Soviet Union in 1961. The standard production model features two 1,500 shp engines which drive a five-bladed single shaft rotor. The "Hip" has a maximum forward speed of 145 mph and an average cruising speed of 125 mph. The Mi-8 has a crew of three and can carry up to a platoon (32 men) of heavily armed troops or almost five tons of equipment. As an assault platform, the "Hip" carries twin racks for 57 mm rockets. It can lay down suppressive fire to keep a defending force pinned down as it lands its troops. The Mi-8 was widely used by Arab armies throughout their wars with Israeli. This helicopter was instrumental in the 1973 Egyptian crossing of the Suez canal. In *FLEET DEFENDER*, the "Hip" is used to transport Soviet assault troops and Spetznatz commandos behind our lines in Norway. In Libya, the Mi-8 is used to move men and equipment around the country. If you're lucky you may even catch Qaddifi on a sight seeing trip.

Mi-14 "Haze"



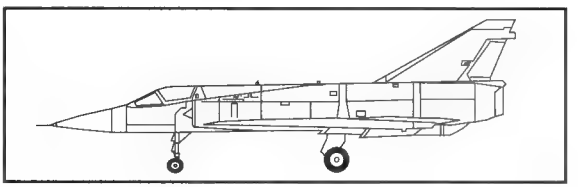
The Mil-14 "Haze" is nothing more than a float-equipped Mi-8 with a boat hull undercarriage. Its weight, appearance and performance are similar. Its role is that of dedicated ASW. The floats give the Mi-14 an amphibious capability that the Mi-8 lacks. It also features an ASW radome underneath its nose, dunking sonar and an magnetic anomaly detector (MAD) device. The "Haze" carries a crew of four plus a full array of sonobuoys, torpedoes, and depth charges. It has a cruising speed of 120 knots.

Mi-24 "Hind D"



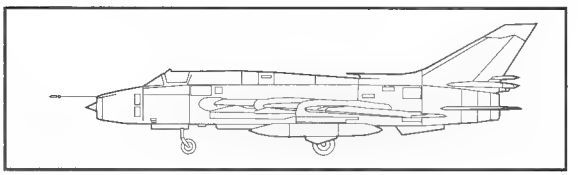
The Mil-24 "Hind D" is a heavily armored attack helicopter first deployed by the Soviet Union in 1975. It is intended as an anti-tank platform much like the AH-64 "Apache." However, unlike western attack helicopters, the Mi-24 is larger, heavier, and can also carry a squad of troops. All versions of the "Hind" have multi-barrel Gatling type guns mounted under the nose. The "Hind D" also carries four anti-tank missiles and up to four 57 mm rocket pods. The "Hind" has been nicknamed the "flying tank" because it is so heavily armored. There are even two tandem armored glass canopies for both pilot and co-pilot. All this armor drives the loaded weight of the helicopter over 22,000 lbs. In *FLEET DEFENDER*, the "Hind D" can be found escorting flights of Mi-8s or conducting raids on our armor concentrations. It has an average cruising speed of 140 knots but can manage a maximum speed of almost 180 knots.

Mirage F-1



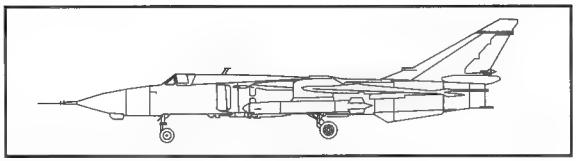
The Mirage F-1 is a single seat all-weather fighter/bomber. The French built Mirage F-1 is a new generation in Dassault aircraft design. It represents a departure from the familiar delta-wing configuration of the earlier Mirage aircraft. This return to a more traditional wing design has created a more stable platform. The aircraft has better short-field TOL characteristics as well as an improved dogfighting agility. Surprisingly, many Third World nations seem to prefer the delta winged Mirage III or Mirage 5 over this aircraft. Even so, over 500 Mirage F-1s were delivered to foreign buyers prior to 1974. Since that time sales of the F-1 have been eclipsed by the newer Mirage 2000 although the F-1 made something of a name for itself during the Iran-Iraq war. The F-1 became Iraq's principle air defense fighter and figured prominently as an attack platform during the "Tanker War" campaign. It was a Mirage F-1 which hit the *U.S.S Stark* in 1987 with an Exocet missile. The F-1's Atar 9k-50 turbojet gives it a maximum sustainable speed of 650 knots at low to medium altitudes.

Su-17 "Fitter"



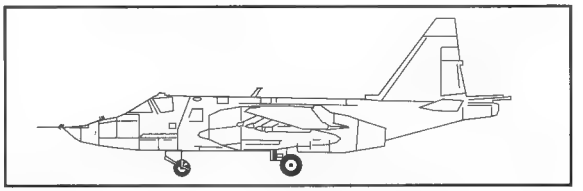
The Sukhoi-17 "Fitter" is a single seat fighter/bomber first displayed at Domodedovo airport near Moscow in 1967. The Su-17 differs little in external appearance from an earlier Sukhoi design, the Su-7. However, the Su-17 has a turning radius almost half that of the Su-7 plus better low speed handling and endurance. Its Lyulka AF-21F-3 afterburning turbojet engine gives the Su-17 a maximum speed of 700 knots at low altitudes. As an interceptor, the "Fitter" is somewhat outclassed by newer Soviet designs, especially the Su-27 "Flanker." Still, there is something to be said for quantity and there are hundreds of Su-17s assigned to Soviet Naval Aviation units. The Su-22 "Fitter D" is the designation given to the Su-17 when configured for export. The avionics in the export version are inferior to the standard Su-17 "Fitter C" used domestically. However, the Su-22 does seem to be relegated to an air-to-ground role. As a strike fighter in the hands of Third World nations, the Su-22 is probably limited to dropping free-fall bombs.

Su-24 "Fencer"



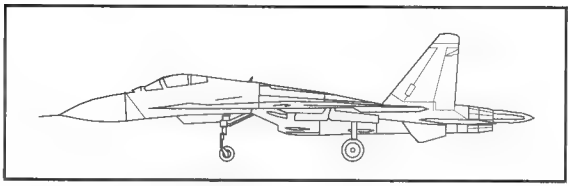
The Sukhoi-24 "Fencer" is a very capable two seat, all-weather ground attack aircraft. It was first displayed publicly in 1971. The Su-24 entered operational service in 1977 and represents the first Soviet aircraft since 1945 to be designed solely as a tactical strike aircraft. In time of war the "Fencer" is expected to strike NATO airfields in throughout western Europe. Using a Hi-Lo-Hi flight profile, this aircraft is quite capable of performing this mission from its bases inside the Soviet Union. Because of the "Fencer's" all-weather capability, it is likely to replace the MiG-27s remaining in Soviet inventory. This capable aircraft is almost certainly a copy of the F-111 design. It even duplicates the same tandem seating design error. It probably cannot perform the same type of low level penetrations expected of the F-111, however. The Su-24 packs a GSh-23 23 mm gun and a wide range of air-to-ground ordnance. It lacks an air-to-air capability and must rely on speed to escape would-be attackers. A maritime reconnaissance version exists known as the "Fencer E." Operational service began in 1985. It will eventually replace the Baltic Fleet's Tu-16s.

Su-25 "Frogfoot"



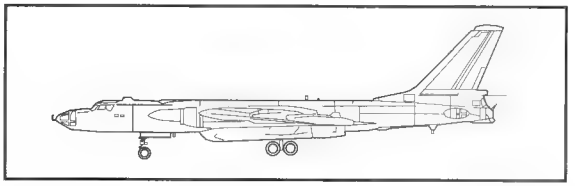
The Sukhoi-25 "Frogfoot" is the Soviet equivalent of the USAF's A-10 tank-killing "Thunderbolt II." As a ground attack aircraft the Su-25 is heavily armored and features a titanium "bath-tub" cockpit. Because this aircraft spends most of its time in close proximity to enemy ground fire, crew survivability is put at a premium. Like the "Warthog", the Su-25 is primarily used to attack enemy armor formations. It carries a panoply of munitions including AT missiles, rockets, and armor piercing cluster bombs. While it is feared by enemy ground troops the "Frogfoot" has little air-to-air capability. Lacking an air intercept radar, this aircraft is limited to heat-seeking self defense missiles (usually AA-8 "Aphids"). Though this aircraft is slow by fighter standards, it is very maneuverable even when loaded. The "Frogfoot" loves to fly at low altitudes and uses the terrain for cover very well. A naval version of the Su-25 is assigned to the Soviet carrier *Admiral Kuznetsov* . In *FLEET DEFENDER*, the naval version is used to provide air support to Soviet amphibious forces.

Su-27 "Flanker"



The Sukhoi-27 "Flanker" is a single seat all-weather interceptor which entered service in the mid-'80s after a difficult developmental period. It is perhaps the most capable air-to-air platform in Soviet inventory. Like the F-14, it is very large, over 50% larger than the MiG-29. It carries a track-while-scan Doppler "look-down- shoot down" radar of great power plus all the latest Soviet AAMs. The Su-27 has been deployed to the Kola peninsula in substantial numbers. Despite its size the "Flanker" remains an excellent dogfighter with demonstrated slow speed maneuverability. Its ability to tail slide at air shows has impressed audiences. The Su-27 carries a GSh-30 30 mm gun with 150 rds in the right wing root. It has a combination of pylons and hard points able to accommodate 10 AAMs. At least some of these missiles are slaved to a target designator in the pilot's helmet. A naval version of the Su-27 has been built for operations off the Soviet Union's fleet carrier, *Admiral Kuznetsov.*

Tu-16A/D/G/H/J/L "Badger"



The venerable Tupolev-16 "Badger" is an intermediate range bomber which has been converted to perform a number of specialized maritime tasks. It first flew in the early 1950s. Shortly afterward, the Tu-16 was declared obsolete with the introduction of the more capable Tu-22 and Tu-22M aircraft. Most were transferred to Soviet Naval Aviation during the 1960s. It became the Soviet Navy's first missile carrying aircraft in 1961. Since that time the Tu-16 has since been exported to many of the Soviet Union's client states. The "Badger A" is the standard production model strategic bomber. It is able to carry conventional or nuclear freefall bombs. The "Badger D" is a maritime reconnaissance platform notable for the three tandem radomes underneath the fuselage. The "Badger G" is a strike version similar to the "Badger A" yet able to carry two stand-off ASMs. The "Badger H" can usually be found accompanying a strike force. It is an ECM aircraft which carries up to 20,000 lbs. of chaff. The "Badger J" is an ECM active jammer which also accompanies a group of bombers. In *FLEET DEFENDER*, the "Badger" H and J models will be found in most large groups of Tu-16s. They will be using their specialized functions to protect these bomber groups. The "Badger L" is yet another electronic reconnaissance platform outfitted much like the Tu-95 "Bear D."

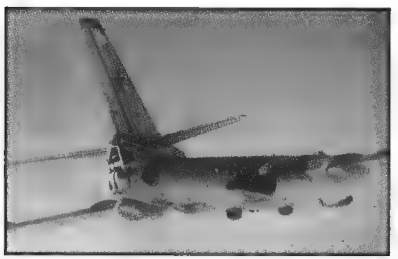
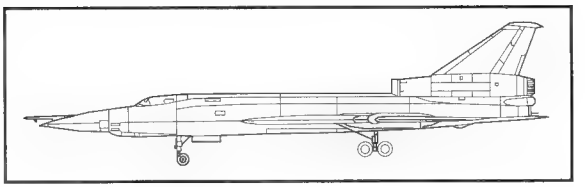


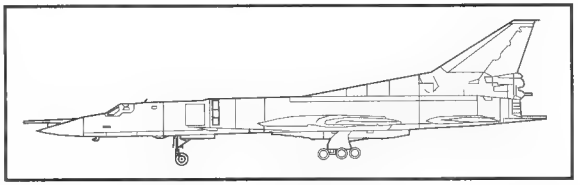
Figure A-3: The Tu-16 "Badger viewed from a tail-chase position. The twin 23 mm tail-mounted guns would make an interception from this aspect unhealthy.

Tu-22 "Blinder"



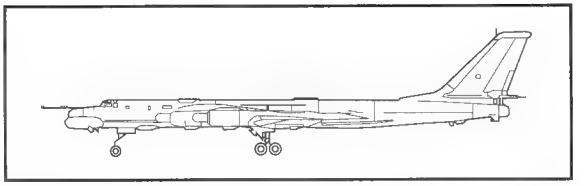
The Tupolev-22 "Blinder" is a twin engined supersonic strategic bomber with a crew of three. Development of this aircraft began in the late 1950s when it became apparent that the subsonic Tu-16 was nearing the end of its usefulness. In 1961, a Tu-22 was seen carrying a missile during a Moscow fly-by. Like its predecessor, the Tu-16, the "Blinder" has been overtaken by technological advances. Again the majority of Tu-22s were transferred to maritime duties or sold to the Third World. The "Blinder" is one of the few post 1950s bombers to actually participate in combat. Libyan "Blinder A" models have dropped bombs in both Tanzania and Chad. A second variant, the "Blinder B" is configured to carry a single ASM (usually an AS-4 "Kitchen.") The most common variant is the "Blinder C" used by Soviet Naval Aviation as a maritime reconnaissance platform. The Tu-22's normal cruising speed at mission altitude is approximately 400 knots. It features a tail mounted radar controlled NR-23 23 mm gun used for self defense.

Tu-22M "Backfire"



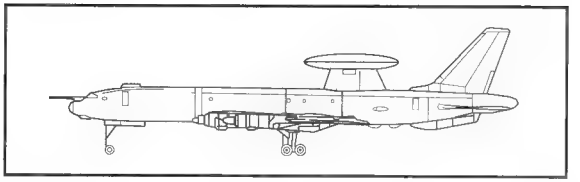
The Tupolev-22M "Backfire" is a twin engine swept-wing strategic bomber. Development of this aircraft began in the late 1960s but it wasn't until 1970 that prototypes began being spotted near Kazan. This aircraft has been the subject of much heated debate. U.S. officials consider the "Backfire" a nuclear-capable intercontinental strategic bomber able to reach targets throughout the United States with in-flight refueling. The Soviets, on the other hand, look upon the Tu-22M as an intermediate range strike platform. In 1980, the Department of Defense stated that the "Backfire" bomber was more of a threat to trans-Atlantic shipping than the Soviet submarine fleet. The Tu-22M normally carries one or two AS-4 or AS-6 anti-ship missiles. It has a crew of four and a comprehensive ECM suite. For self defense, there are a pair of tail-mounted radar controlled 23 mm guns. The "Backfire" is designed for low level penetration at supersonic speeds.

Tu-95D/G/F "Bear"



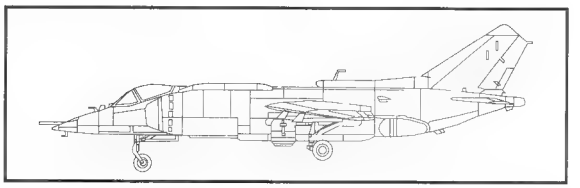
The Tupolev-95 "Bear" is a four engined turbo-prop strategic bomber and maritime reconnaissance aircraft. It has had the longest production run of any combat aircraft in history. The Tu-95 was declared operational as early as 1956. Since the time, the "Bear" has undergone several major modifications. The "Bear D" is an unarmed reconnaissance and OTH targeting variant. It can be recognized by the large ventral radome (Big Bulge) and smaller chin-mounted search radar. The "Bear G" is the missile carrying version of the same aircraft. It is configured to carry two AS-4 or AS-6 missiles. The Tu-142 "Bear F" is a dedicated ASW aircraft and has a second stores release point aft of the wings. The Tu-95 has a remarkable endurance and a combat radius of almost 4,500 nm. They are sent ahead of a main strike force to pinpoint targets and coordinate attacks. Their tell-tale "Big Bulge" radars are a dead give-away. Certain "Bear" aircraft are used as TACAMO platforms and trail numerous VLF antennas.

Tu-126 "Moss"



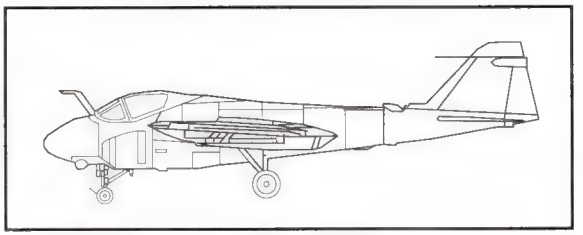
The Tu-126 "Moss" is a Soviet AWACs aircraft based on a Tu-114 fuselage. A rotating saucer above the fuselage houses a "Flat Jack" radar believed to have a maximum range of 250 nm. According to NATO sources this radar is ineffective over land and only slightly better over water. While this may or may not be true the Tu-126 is certainly less capable than our own AWACS aircraft. The "Moss" carries a crew of 12 including technicians. Its four turbo-prop engines give it a cruising speed of 350 knots. This aircraft is intended to work with a specific group of fighters. It is probably not able to bind a defense together like our E-2C "Hawkeye." Fewer than 10 of these aircraft remain in service today. Taking out one of these aircraft would be a major accomplishment for an F-14.

Yak-38 "Forger"



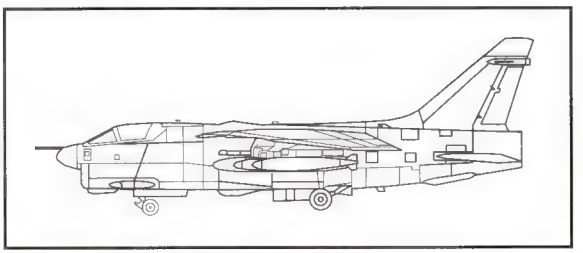
The Yakovlev-38 "Forger" is a single seat VTOL (vertical take-off and landing) fighter/bomber. The "Forger" was first deployed in 1976 when it was spotted on the deck of the Soviet CVH Kiev. This aircraft is designed for light attack, reconnaissance, and limited air-to-air operations. It is equipped with two pylons on each wing for mounting up to 8,000 lbs. of external ordnance. The "Forger" has no air intercept radar. For self defense, two AA-8 "Aphid" heat-seeking missiles are generally carried along with a GSh-23 23 mm gun. Although the "Forger" appears to mimic the British Harrier, the Yak-38 is far less capable. It will be hard pressed to hold its own against a true fighter aircraft. The "Forger" has a maximum speed at sea level of only 525 knots.

A-6E "Intruder"



The Grumman A-6E "Intruder" is a carrier-based, all-weather strike aircraft. The current production model is known as A-6E/TRAM (Target Recognition Attack Multi-sensor). The TRAM allows the bombardier/nav officer to acquire the target on radar then use the system's FLIR to visually identify it. Once identified, the TRAM can laser designate the target for precision bombing. The A-6E has 5 external hard points and can mount a variety of weapons including Harpoon missiles. These aircraft make up the heavy attack squadrons of a carrier's air wing. Three types of A-6 configurations are represented in *FLEET DEFENDER*. There is the standard attack A-6E, the EA-6B "Prowler" electronic jamming aircraft, and finally the KA-6D refueling tanker. The Prowler is unarmed except for HARM missiles currently fitted on some models. The KA-6D tanker carries no weapons. Instead the KA-6D carries up to 2,000 gallons of fuel which can be transfered in-flight. At the start of each campaign, there are ten (10) A-6Es, four (4) KA-6Ds and five (5) EA-6Bs on board your carrier.

A-7E "Corsair"



The Vought A-7E "Corsair" is a single-seat carrier-based, light attack aircraft. The "Corsair", based on the Navy's F-8 "Crusader", was produced to replace the Navy's aging A-4 Skyhawk in 1964. The first models were built to carry heavy payloads for very long distances. They had no all-weather capability. The E models have been upgraded with the addition of a FLIR. The A-7E mounts the same gun as the F-14 and can carry twice as much ammunition. There are three pylons on each wing plus a fuselage mount for a total of eight weapons stations. The maximum load for the aircraft including fuel is approximately 9,500 lbs. When fully loaded the aircraft is limited to 5 Gs or less. At sea level, the "Corsair" can manage a sustained level speed of almost 700 knots. Throughout the 1980s, the A-7 has been gradually replaced by the F/A-18 "Hornet." In *FLEET DEFENDER*, A-7Es will be present only in those campaigns taking place prior to 1985. Two squadrons (24 aircraft) are assigned to your carrier at the start of each pre-1985 campaign scenario.

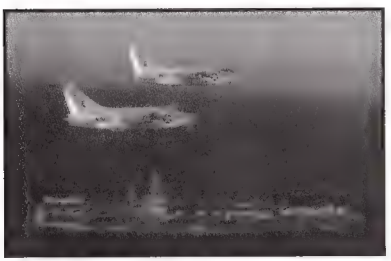
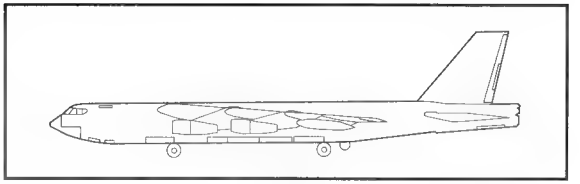


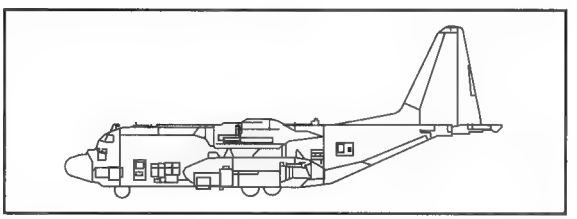
Figure A-4: Two A-7s overfly the U.S.S. Nimitz (CVN -68). This picture was taken in 1985, probably during one of its Mediterranean deployments.

B-52G "Stratofortress"



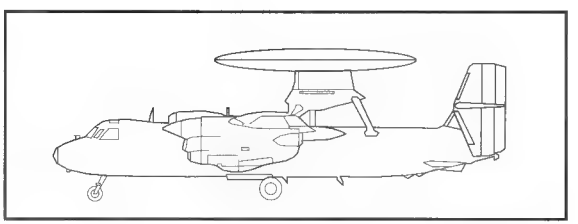
The Boeing B-52 "Stratofortress" is one of the oldest aircraft in the USAF inventory. Generally they are older than the men who fly them. The basic B-52 "Stratofortress" is a long range strategic bomber able to carry both conventional and nuclear payloads. These aircraft though aging, have kept pace with technological advances. Periodic modernization programs have upgraded their avionics as well as their ECM suite. They carry a crew of six; pilot, co-pilot, navigator, radar operator, ECM tech and dedicated gunner who operates a 20 mm Vulcan gun mounted on the tail. In *FLEET DEFENDER*, only the B-52G model is represented. The B-52G is used as a maritime reconnaissance and cruise missile launch platform. Besides ALCM (Air Launched Cruise Missiles) the B-52G also is equipped to fire Harpoon missiles at naval targets. In some scenarios, they will be equipped with conventional bombs. These aircraft have a service ceiling of 55,000 ft. and a maximum speed of 500 knots. Low level penetration runs can be made at 400 knots.

C-130 "Hercules"



The Lockheed C-130 "Hercules" is a tactical transport aircraft which has taken on numerous other roles over the years. Almost 2,000 of these aircraft have been produced. The C-130 is in service throughout the world. It is rugged, reliable, and inexpensive which are three things that make it attractive to the Third World. In *FLEET DEFENDER*, there are three different models of "Hercules" present. The most common version is the standard C-130H transport. This version is able to drop men and equipment with pinpoint accuracy. The second variant, an EC-130Q TACAMO (Take Charge And Move Out), is responsible for coordinating and orchestrating battlefield operations. The third variant found in *FLEET DEFENDER* is the EC-130H Compass Call. Compass Call is a jamming platform which is directed at disrupting enemy C³I. All three of these models are unarmed and travel very slowly. They are easy kills for enemy fighters unless given adequate fighter escort. The C-130's average cruising speed while transporting cargo is approximately 350 knots.

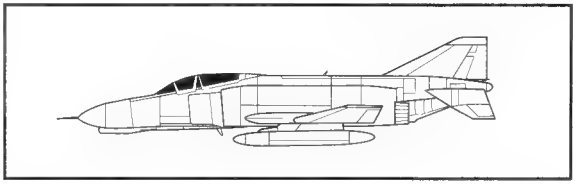
E-2C "Hawkeye"



The Grumman E-2C "Hawkeye" is a carrier-based Airborne Early Warning (AEW) aircraft. It entered service aboard the *U.S.S Saratoga* in 1974. This aircraft normally carries a crew of five. The heart of the E-2C is its AN/APS-145 radar which can cover up to 2,000 targets simultaneously out to a range of 250 nm. Both surface vessels and air targets (incl. cruise missiles) can be detected with up to forty contacts processed at one time. The E-2C can make passive detection of air targets out to almost 500 nm. Five (5) of these aircraft are normally carried aboard an aircraft carrier. One of these is aloft continuously. In *FLEET DEFENDER*,

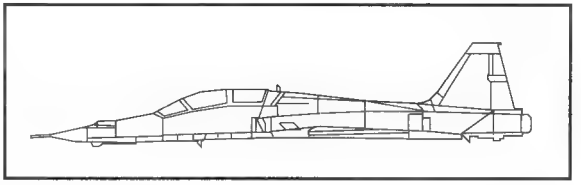
the "Hawkeye" is your best means of detecting incoming enemy aircraft. It acts as a pair of all-seeing eyes which bind the various CAP formations into a single cohesive defense unit. It will generally fly to a pre-determined point off-set from the carrier so that its radar emissions do not disclose the carrier's actual location. From there it can direct the "outer air battle" going on around the battlegroup. In this respect, the E-2C is the single most important aircraft onboard an aircraft carrier. It has an endurance time of up to 6 hours at a normal cruising speed of 300 knots.

F-4 "Phantom"



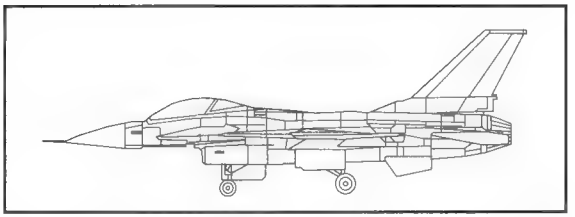
The McDonnell Douglas F-4 "Phantom II" is arguably the most recognizable fighter aircraft in the history of air combat. It is one of those classic aircraft that has managed to capture the imagination of air enthusiasts the world over. Like the confrontation between Spitfire and Me-109 during the Battle of Britain in 1940, the F-4 has come to symbolize the cold war air battles fought against Soviet MiGs. In the 1980s, the F-4 "Phantom" was surpassed as a front line fighter/interceptor but remains in service as a "Wild Weasel" SAM suppresser and jammer. Hundreds still remain on active duty as fighters with NATO and allied nations. In *FLEET DEFENDER*, the United Kingdom, Turkey and Greece all use the F-4 to supplement their force of F-16s. Their "Phantoms" are equipped with both AIM-7 Sparrows and AIM-9 Sidewinder missiles. All are equipped with a 20 mm Vulcan in the nose. The F-4's maximum air speed for high altitude interceptions is approximately 700 knots.

F-5E "Tiger II"



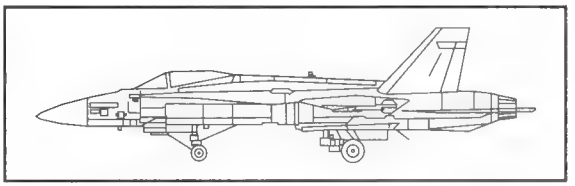
The Northrop F-5E "Tiger II", although built in the United States, was never adopted for service with the USAF except in specialized "Aggressor squadrons." It is characterized as being an economical light attack fighter with the emphasis on the word economical. The F-5 lacks the expensive avionics which would drive the cost up. For Third World nations, the F-5E represents an aerodynamically clean platform which can be expanded upon. They carry a 20 mm gun plus Sidewinder AAMs for self defense. While their main role is that of ground attack, F-5Es are flown as fighter/interceptors by some neutral nations. They are difficult to spot in combat because of their size. They are nimble and better than average dogfighters despite the lack of an air intercept radar. The United States uses these aircraft to simulate combat with Soviet MiGs. In *FLEET DEFENDER*, the F-5E will be encountered in the Mediterranean and Training theaters.

F-16 "Falcon"



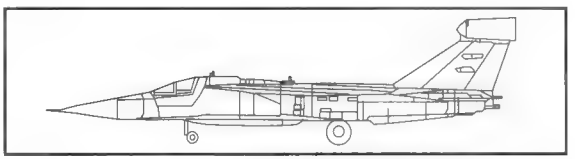
The General Dynamics F-16 "Falcon" is a single seat fighter considered by many to be the preeminent dogfighter in the world. Nicknamed the "electric jet" because of its fly-by-wire controls, the F-16 easily outperforms most fighter aircraft when it comes to ACM. The first prototypes were ordered in back in 1972. By 1975, four European nations (in addition to the USAF) had placed orders for the F-16. The first operational "Falcon" was delivered in 1979. The F-16 has many features which make it a pilot's dream machine, including a Head-up Display and HOTAS (Hands on Throttle and Stick) technology. It has a 360° degree bubble canopy which gives the pilot unlimited visibility. These aspects of aircraft design are crucial pilot aids yet often overlooked. The F-16 has a positive thrust-to-weight ratio which gives it a remarkable ability to make sustained climbs. It can turn on a dime and give you back change. The F-16 does have limitations, however. It is not a BVR (Beyond Visual Range) platform. It is good in close but lousy at long range combat. In *FLEET DEFENDER*, F-16s are an integral part of campaigns flown in both combat theaters.

F/A-18 "Hornet"



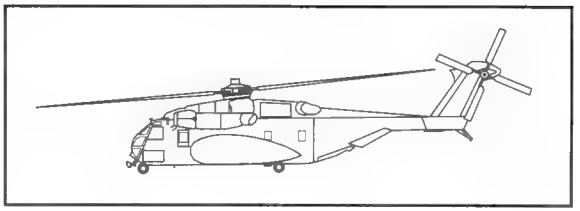
The McDonnell Douglas F/A-18 "Hornet" is a single seat (A model) multi-role aircraft which combines excellent fighter and strike characteristics. Although not as maneuverable as the F-16, the F/A-18 is capable of delivering a variety of air to ground ordnance. In the 1980s the Navy began replacing the A-7E aircraft with the F/A-18. The "Hornet" can carry a wide assortment of air-to-ground ordnance including Harpoons. In *FLEET DEFENDER*, twenty (20) F/A-18s are assigned to your carrier at the start of each post-1985 campaign. These dual role aircraft are invaluable. Not only can they perform strike missions but they can provide their own escort as well. The "Hornet" has nine external hard points for mounting ordnance. In addition to a M61A1 20 mm gun with 570 rds the "Hornet" also carries both Sparrow and Sidewinder missiles.

F-111 "One Eleven"



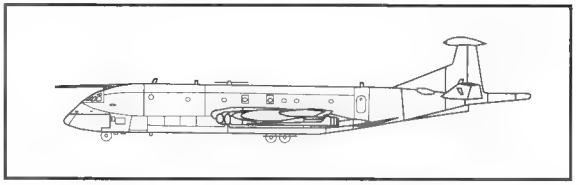
The General Dynamics F-111 "One Eleven" began its career back in the 1960s. It was billed as an aircraft that could do everything, fight like a fighter, bomb like a bomber and have the range of a heavy transport. In trying to be all these things the F-111 design got caught up in Congressional procurement squabbles. The on-again off-again nature of this aircraft's production didn't help, either. Defense Secretary McNamarra had tried to save money by having one aircraft perform many tasks but in the end he was accused of "buying the second best aircraft at the higher price." The F-111 became the first aircraft able to penetrate enemy airspace using terrain following radar (TFR). In this respect, the F-111 can be looked upon as the fore-runner to the B-1 bomber. In *FLEET DEFENDER*, F-111s are based in the United Kingdom. They will be conducting low level strikes on Soviet troop concentrations in Norway as well the historical 1986 Libyan strikes.

CH-53E "Super Stallion"



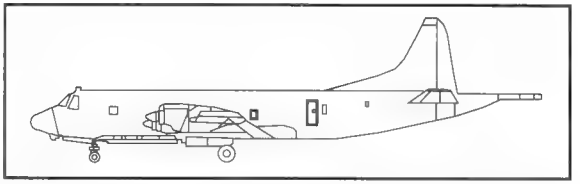
The Sikorsky CH-53E "Super Stallion" is a heavy-lift transport helicopter used by the Marine Corps for amphibious assault operations. It features a crew of three and can accommodate up to 55 passengers plus their equipment. A hydraulic ramp in the rear of the helicopter can be lowered for quick loading/unloading. In *FLEET DEFENDER*, these helicopters are used to move troops from ship to shore. They are also useful in removing damaged aircraft from the flight deck of your aircraft carrier. The CH-53 is unarmed and has a normal operating speed of 130 knots.

Nimrod



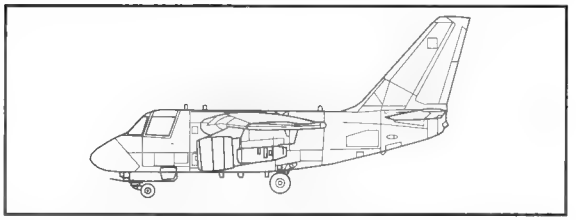
The British Aerospace (BA) Nimrod is a maritime reconnaissance platform similar to the U.S. P-3C "Orion." It is intended to remain in service with RAF Strike Command into the next century. The Nimrod has a crew of twelve including technicians. It carries the latest in ASW sensory equipment. With its MAD equipment the Nimrod can both detect and attack enemy submarines. Up to nine ASW torpedoes can be carried internally along with a number of active sonobuoys. The Nimrod combines medium altitude performance with outstanding low level handling characteristics. The Nimrod has four turbofan engines and can remain on patrol station for up to twelve (12) hours. It can carry Harpoon ASMs as well as heat-seeking AAMs for self defense.

P-3 "Orion"



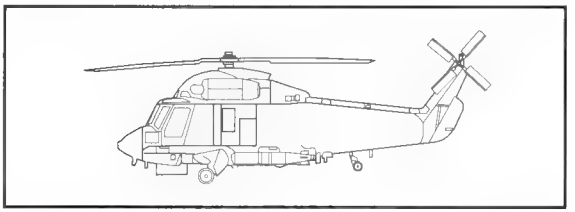
The Lockheed P-3 "Orion" is a land-based, long range maritime reconnaissance and ASW aircraft. It normally carries a crew of ten including technicians. The "Orion" carries a variety of ordnance; everything from Mk. 82 bombs, ASW torpedoes, to sonobuoys and nuclear depth charges. These aircraft have a mission radius of almost 1,500 miles and may stay on station for almost 3 hours. Normal patrol speed for these aircraft is 300 knots. The "Orion" has good medium altitude handling but it is particularly adept at low level operations. Two heat-seeking Sidewinder AAMs are usually mounted for self defense. There have been four major upgrades to the original P-3C since 1974. In *FLEET DEFENDER*, all P-3Cs meet Upgrade IV standards and feature the latest sonobuoy receivers, an IRDS (Infrared Detection System) for tracking targets, and Harpoon missiles.

S-3 "Viking"



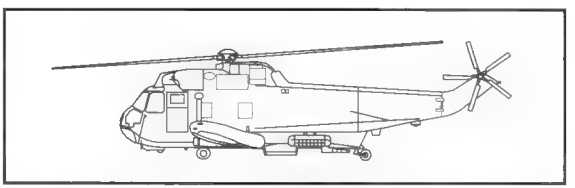
The Lockheed S-3 "Viking" is a carrier-based ASW aircraft. It replaced the Navy's S-2 "Tracker" in 1986. *FLEET DEFENDER* assumes that the S-3 has already replaced the S-2 in each scenario. Ten (10) of these aircraft serve aboard your aircraft carrier. The "Viking" carries a variety of anti-submarine ordnance including torpedoes, Mk. 82 500 lbs bombs, and depth charges. They can also carry a pair of Harpoon ASMs for light strikes. The "Viking" has no air-to-air capability. These aircraft will perform routine ASW duty throughout your campaign. If a submarine is spotted, additional S-3 aircraft or helicopters are automatically vectored to the area. These aircraft will need the protection afforded them by having F-14s around. At sea level, their maximum speed of 525 knots is not fast enough to evade enemy fighters.

SH-2F "Seasprite"



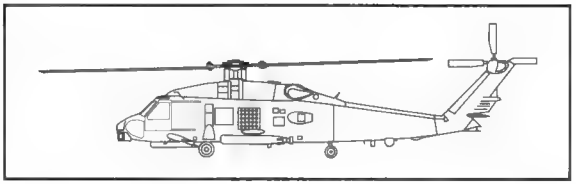
The Kaman SH-2F "Seasprite" is a ship based multi-purpose helicopter. Its principle duties include SAR (Search and Rescue), ASW, missile targeting and observation. The "Seasprite" was first deployed in 1971. Since that time the SH-2F has been brought up to Mk.1 LAMPS (Light Airborne Multi-Purpose System) standards. In this configuration the SH-2F can carry up to two ASW torpedoes, DIFAR and DICASS sonobuoys. The SH-2F has been upgraded and redesignated SH-2G. The SH-2G "Super Seasprite" has a better avionics fit than the F model. The G model includes a FLIR. This helicopter began service in 1987. In *FLEET DEFENDER*, the SH-2G appears in the later scenarios only. Both the F and G model Seasprite helicopters have a maximum operating speed of 130 knots.

SH-3A "Sea King"



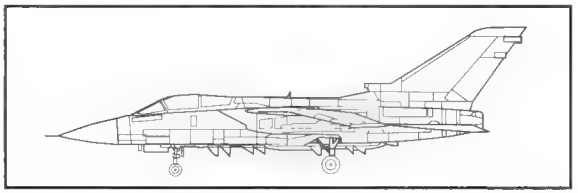
The Sikorsky SH-3A "Sea King" is based on an earlier Sikorsky design, the S-61, first flown in the 1950s. The S-61 was redesignated the SH-3 in 1962. The "Sea King" is both an ASW and SAR helicopter. It has a crew of four; pilot, co-pilot, and two sonar operators. It is equipped with a dipping sonar along with a number of active and passive sonobuoys. In addition, a MAD boom runs the length of the fuselage. A automatic hover system is used when conducting sonar operations. The "Sea King" is armed with two ASW torpedoes or depth charges. It has a maximum operating speed of 140 knots. The watertight boat-hull, retractable landing gear and flotation pontoons allow this helicopter to land on the surface of the water. In *FLEET DEFENDER*, these helicopters are used in ASW, SAR and transport operations.

SH-60B "Seahawk"



The Sikorsky SH-60B "Seahawk" began development in 1982 after winning a Navy competition to replace the LAMPS II. It is an ASW and anti-ship targeting helicopter able to operate in adverse weather conditions. The "Seahawk" is similar to the UH-60 "Blackhawk" used by the U.S. Army. It is able to undertake SAR operations and act as a communications picket and relay if necessary. The "Seahawk" can data-link its displays with those on-board the mother-ship. It is equipped with a MAD "bird" and armed with two ASW torpedoes. These helicopters are found on several classes of U.S. Frigates, Destroyers, and Cruisers. They can remain on station for more than an hour longer than the LAMPS I helicopters they are replacing.

Tornado GR.1, Mk.3



The Panavia Tornado GR.1 is a twin engined, all-weather strike fighter. It is designed for low level supersonic battlefield penetration. The Royal Air Force received its first Tornado GR.1 in 1982. It features a variable swept wing and a precision TFR (Terrain Following Radar). The Tornado GR.1 is a versatile platform allowing for a variety of mission configurations. Its maximum speed while mission loaded is just over 600 knots. The Tornado Mk.3 ADV (air defense variant) is equipped with the very capable pulse-Doppler Foxhunter radar. It carries up to four radar-guided Sky Flash missiles plus two heat-seeking Sidewinders. In *FLEET DEFENDER*, the GR.1 will be conducting low level strikes on military installations while the Mk.3 will be assigned to air defense duties.

APPENDIX B: Naval Vessels

MAJOR THREAT VESSELS

Kuznetsov class (Aircraft carrier)

The *Admiral Kuznetsov* represents the former Soviet Union's first attempt at deploying a true fixed-wing aircraft carrier. The ship's keel was laid down in 1983 at the Crimean shipyard of Nikolayev. Thereafter, construction was watched closely by interested observers in the West. With the addition of this vessel the Soviet Navy was making a transition from coastal defense force to one capable of sustained global operations. The *Adm. Kuznetsov,* (and her sister ship *Varyag)* compare poorly to aircraft carriers belonging to western navies. The Soviets have yet to gain practical experience operating their carriers under wartime conditions. This ship has had few sea trials since joining the Northern Fleet in 1991. Its four steam-driven turbines give it a maximum speed of 32 knots.

Kuznetsov class carriers have a 1000 ft. flight deck which ends at the bow in a 12° "ski jump" ramp. A below deck hangar is able to store up to 60 aircraft. Normally these ships can operate 24 naval versions of the Su-27 Flanker or MiG-29 Fulcrum. This mix of fixed-wing aircraft seems more suited for interception rather than strike missions. If a heavy strike wing is needed Yak-38 Forger and Su-25 Frogfoot aircraft can be substituted. The real offensive potential of these ships lies in their SS-N-19 "Shipwreck" missiles. For ASW and targeting purposes up to 18 Ka- 25/27 helicopters are also carried. Air defense is provided by multiple batteries of SA-N-9 and SA-N-11 missiles.

Complement: est. 2200

Kiev class (V/STOL Aircraft carrier)

Kiev class V/STOL carriers are not be considered true aircraft carriers by Western standards. The four ships of this class *(Kiev, Minsk, Novorossiysk,* and *Baku)* are more correctly designated as anti-submarine carriers and are equipped with numerous ASW weapons (including torpedoes!) These ships normally carry 15 V/STOL Yak-38 aircraft plus another 15-17 helicopters. All aircraft can be stowed in a large below deck hangar. The Kiev class features an angled deck with the island located to the right of the flight line. The deck is level and is usually marked with landing spaces for seven helicopters. Kiev class carriers also carry SS-N-12 Sandbox missiles, a twin SUW-N-1 ASW launcher and two RBU-6000 ASW mortars. These carriers also carry a formidable array of SAM launchers (including SA-N-3, SA-N-4, and vertical launching SA-N-9s). Each ship is steam-driven by four turbine engines which can generate a maximum speed of 32 knots.

The *Kiev,* flagship of this class, was first seen on her maiden voyage in 1976. Deployed to the Mediterranean in July of that year the ship was subsequently moved to the Murmansk area. Since the break-up of the Soviet Union, two ships of this class *(Minsk* and *Novorossiysk)* are being broken up and sold for scrap.

Complement: 1,600

Moscow class (Cruiser-helicopter carrier)

The Moscow class helicopter carrier was originally designed as a counter to the U.S. Navy's submarine program. Alarmed by the advances made in submarine-launched strategic missile technology the Soviet Union built two ships of this class *(Moscow* and *Leningrad)* before abandoning the effort. Moscow class helicopter carriers should rightly be classified as hybrid ASW cruisers. Forward of the superstructure they are configured as cruisers. The aft section consists of an open flight deck to designed to accommodate helicopters. They feature a poorly designed hull which causes the ship to ride down in the bow. The elongated tear-drop shape hull reaches its widest point aft of amidships.

The aircraft component of these ships consists of 12-15 helicopters, usually Ka-25 Hormones. The elevators cannot accommodate larger aircraft. Mi-14 Haze have been spotted aboard these ships but must be serviced on the flight deck. The normal mission for the helicopters aboard the *Moscow* is ASW although SSM targeting missions are possible. In addition the ship is also equipped with a twin SUW-N-1 ASW missile launcher and a pair of RBU-6000 ASW mortars.

Following the break-up of the Soviet Union only the Moscow remains in service. With the development of the Kiev class carriers, the Moscow class helicopter carrier has been rendered obsolete and will likely be scrapped in the mid-1990s. The Moscow first put to sea in 1967 and by today's standards this ship would be a liability to its battlegroup. Its air defense is limited to two twin SA-N-3 batteries. Even when operating at peak performance (unlikely) its two steam-turbines only give it a top speed of 30 knots. This means other ships in the battlegroup will have to slow down to remain with it.

Complement: 850

Kirov class (Battlecruiser)

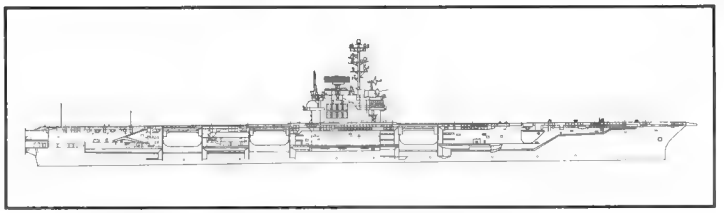
Except for aircraft carriers, Kirov class battlecruisers are the largest surface warship built since World War II. Two of these battlecruisers *(Kirov* and *Frunze)* entered service during the mid-1980s. These ships represent the best of Soviet naval engineering and design. Two pressurized water nuclear reactors combine with conventional oil-fired boilers to produce a maximum speed of 32 knots. These ships have an almost unlimited cruising range but resupplying the ship with normal supplies and ammunition will hamper extended operations.

The deck of the *Kirov* class battlecruiser is literally jammed with weapon systems of all types. It carries two 100 mm guns (130 mm in the *Frunze)* for shore bombardment or surface engagements. The main striking weapon is the SS-N-19 missile. These ships are outfitted with twenty launchers and have the distinction of carrying the largest number of anti-ship missiles carried by any warship afloat. SS-N-14s, torpedoes, and RBU mortars are carried to conduct anti-submarine warfare. Three Ka-25/29 helicopters are kept aboard for ASW and targeting purposes. The anti-aircraft defenses of these ships are impressive. The *Kirov* has both SA-N-4 and vertically launched SA-N-6 missiles. The *Frunze* is equipped as the *Kirov* except that the SS-N-14s have been removed to make room for SA-N-9 launchers.

Complement: 800

U.S. AIRCRAFT CARRIERS

Forrestal class (Aircraft Carrier)



The Forrestal was the first class of aircraft carrier to be constructed after the demise of the Navy's plans for a flush-deck "super-carrier." Congressional budget constraints caused the Forrestal class to be dramatically scaled back from the original 100,000 ton design that the Navy had originally hoped for. The Forrestal class of ships really owe their existence to the fall-out from the "admiral's revolt" in 1949. They are the first post WW II carriers to be built from the keel up and are named after James V. Forrestal, former Secretary of the Navy. Four Forrestal class aircraft carriers are currently in service with the USN. Three of the four are present in *FLEET DEFENDER*, the *U.S.S Forrestal* (CV 59), *U.S.S Saratoga* (CV 60), and *U.S.S Independence* (CV 62). The fourth ship *U.S.S Ranger* (CV 61) is currently on duty with the Seventh Fleet in the Pacific and home ported in Yokosuka, Japan.

Figure A-5: Shown here, the U.S.S. America at anchor.

Forrestal class carriers have a overall length of 1,039 feet and a beam width of 130 feet. They have a draught of 37 feet and displace 79,000 tons when fully loaded. The ships are powered by four Westinghouse steam turbines which generate over 260,000 shp. Steam for the turbines is created by eight conventional (non-nuclear) Babcock & Wilcox boilers. This propulsion system gives these carriers a maximum speed of 33 knots and a sustained cruising speed of 20 knots. To put things in perspective, the rudder alone weighs almost as much as an M-1 tank (45 tons).

The greatest change to accompany the Forrestal carriers was a move to an angled flight deck. Most of the problems associated with operating high speed jet aircraft were immediately solved by this new flight deck configuration. Now if an aircraft overshot the runway it would not endanger the rest of the ship, it would simply go around. The angled portion of the flight deck is 250 feet long on the *Forrestal*, 270 feet long of the other three ships of this class.

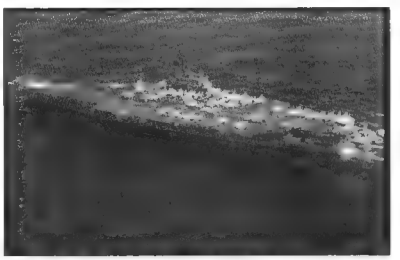
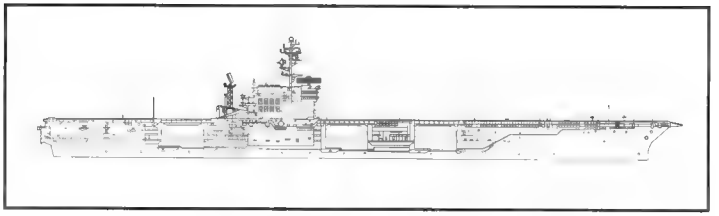


Figure A-6: The stately U.S.S. Independence (CV 62) with most of her aircraft on deck, pictured here in 1982.

The air wing aboard these carriers is comprised of over 85 aircraft. Four elevators move these aircraft between the flight deck and below deck hangar area. The port side elevator is positioned poorly so that it blocks the two port side catapults when in use. These design flaw has been corrected on Kitty Hawk class carriers. There are a total of four catapults on the flight deck which are capable of launching four aircraft per minute.

Each ship in this class has gun and missile systems for use in destroying incoming missiles. Originally they were equipped with eight 5-inch DP Mk. 42 guns. These were subsequently removed and replaced by three Mk.29 Sea Sparrow launchers and three Mk.15 20 mm CIWS guns.

Kitty Hawk class (Aircraft carrier)



The Kitty Hawk is the second major class of aircraft carrier to be designed following WW II. The design concept, though similar to the Forrestal class, shows some major revisions. For example, the flight deck is somewhat larger, allowing for more aircraft to remain top-side. The port elevator, which had interfered with catapult operations on the Forrestal carriers, was placed aft of the catapults. These ships were originally designated as Aircraft Carrier-Attack (CVA). They were subsequently redesignated as multi-mission carriers (CV) in 1974-75 following modifications which allow them to conduct anti-submarine warfare.

Following the Korean War, aircraft carriers had to be designed to accommodate jet aircraft. Kitty Hawk class carriers have a total length of 1,045 feet and draw 37 feet of water. Fully loaded these carriers displace almost 81,000 tons, a significant increase over the Forrestals. This increase represents the ability of Kitty Hawk carriers to store more aviation fuels and munitions. There are four Kitty Hawk carriers currently in service. Three of these carriers are represented in *FLEET DEFENDER*; the *U.S.S Kitty Hawk* (CV 63), *U.S.S. America* (CV 66), and the *U.S.S. John F. Kennedy "Big John"* (CV 67). The fourth carrier U.S.S. Constellation is currently stationed in the Pacific.

Figure A-7: Namesake of the Kitty Hawk class, the U.S.S. Kitty Hawk pictured here in 1992. Note the two parked F-14s on Ready Five.

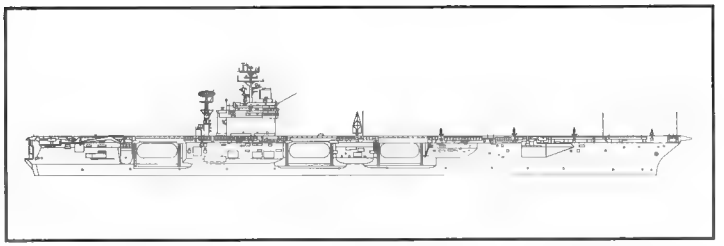
Like the Forrestals, Kitty Hawk carriers have four catapults and four elevators. As previously stated, they have been arranged differently on the flight deck. The superstructure has been moved aft so that only one elevator is forward of the island. The ships are powered by eight 1,200 psi Foster Wheeler boilers connected to four steam turbines. These turbines produce 280,000 shp giving these ships a maximum speed of 33 knots.

The air wing of Kitty Hawk carriers is roughly the same as that of the Forrestals. There are over 25 pumping stations on the flight deck and inside the hangar so that aircraft can be rapidly refueled. The angled portion of the flight deck is 251 feet long (266 feet on the *Kennedy*). The hangar area is considerably larger (740 ft.) than that of the Forrestals. Each ship in this class is equipped with three Mk.29 Sea Sparrow launchers and three Mk. 15 20 mm CIWS guns.

Figure A-8: The U.S.S. John F. Kennedy pictured here at anchor in 1991.

The *Kennedy* has been officially designated as a separate one ship class though it is usually lumped in with the Kitty Hawk carriers. "Big John" is longer than the other three but more narrow in the beam. The hangar deck is much smaller, only 688 ft long and 25 ft high. One notable external difference is the smokestack canted to starboard to keep smoke from interfering with flight operations.

Nimitz class (Aircraft Carrier)



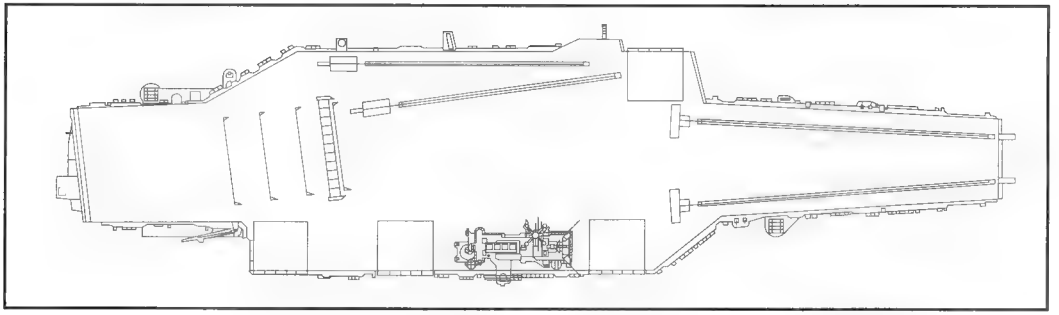
There are two Nimitz class aircraft carriers represented in *FLEET DEFENDER*; the *U.S.S Dwight D. Eisenhower "Ike"* (CVN 69) and the *U.S.S Theodore Roosevelt "Big Stick"* (CVN 71). This class of carrier was ordered as a replacement for the Navy's aging Midway class carriers in the mid-1960s. The first Nimitz class carrier, *U.S.S Nimitz* (CVN 68) took seven years to complete. It finally entered service in 1975 after much Congressional wrangling.

There are a total of six Nimitz carriers currently in service. These vessels are the largest warships ever built, with a length of almost 1,100 feet and a beam width of 135 feet. When fully loaded these ships have a draught of almost 38 ft. and a displacement of 94,000 tons. Nimitz class carriers are powered by two Westinghouse A4W pressurized water nuclear reactors. Connected to these reactors are four steam turbines producing the equivalent of 280,000 shp. Despite their immense size, Nimitz class carriers are able to sustain 32 knots.

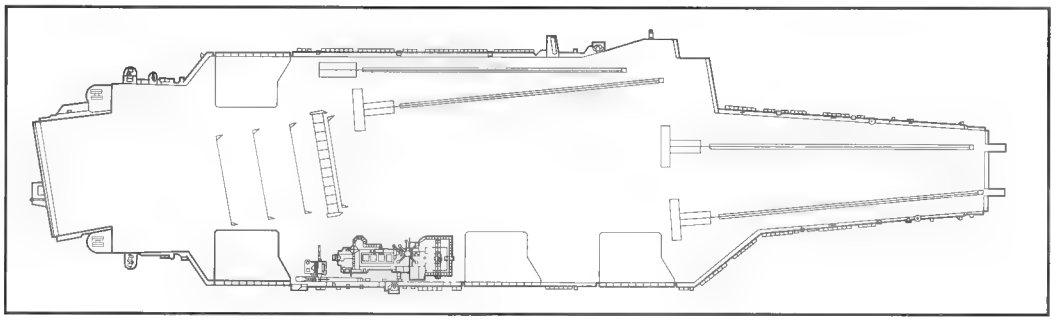
Figure A-9: Stern view of the "Big Stick." An F-14 is about to be cat shot off the deck of the U.S.S. Theodore Roosevelt (CVN 71). Note the blast deflector being raised.

Calling these ships floating cities is no small exaggeration. There are over 6,200 people on-board at any one time. This requires the ship's mess to cook almost 19,000 meals and produce 400,000 gallons of distilled water every day. To make sure everyone stays in touch there are over 2,500 telephones spread throughout the ship. The angled flight deck on the *Eisenhower* is 253 feet long (258 feet on the *Roosevelt).* The total length of the flight deck is 1,092 feet. Underneath the flight deck is a large hangar/ maintenance area over 680 feet long. Between the flight deck and the hangar, over 85 aircraft are parked, serviced, and stored. Four elevators are used to move aircraft from the hangar deck to the flight deck and vice versa. Three of the elevators are located along the starboard side, one on the port side. The four steam catapults are capable of launching one aircraft every twenty seconds.

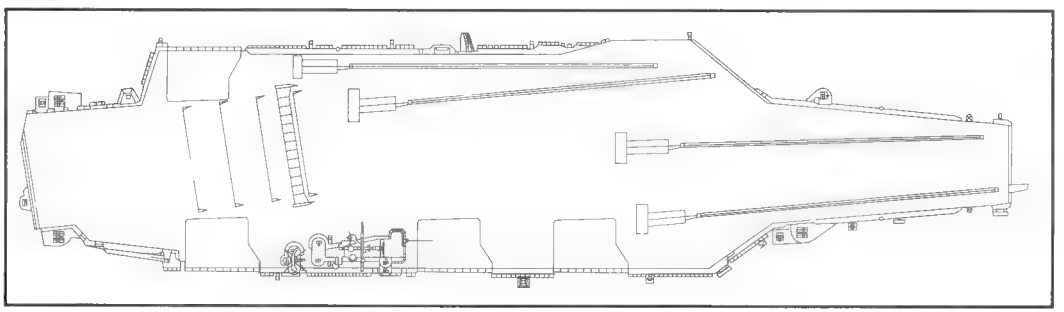
The carrier relies primarily on its component aircraft for self defense. Even so it is equipped with gun and missiles systems for knocking down the incoming missiles that manage to get through. Each Nimitz carrier has three Mk. 29 Sea Sparrow SAM launchers as well as three Mk. 15 20 mm Phalanx CIWS (Close-In Weapon System).



Forrestal class deck plan



Kitty Hawk class deck plan



Nimitz class deck plan

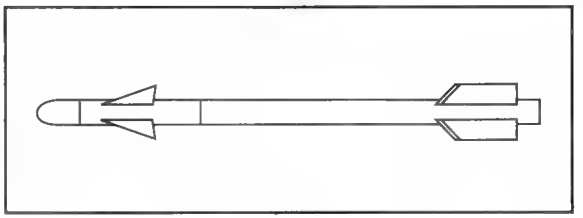
Figure A-10: Displayed here are the three classes of United States aircraft carriers which normally carry F-14 squadrons for self-defense.

APPENDIX C: Air-to-Air Missiles

THREAT AIR-TO-AIR MISSILES (AAMS)

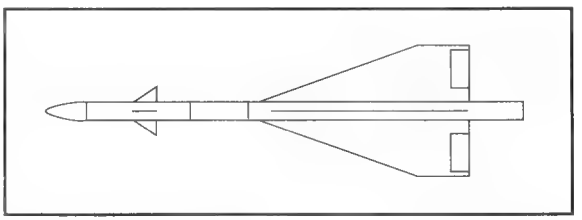
AA-2 Atoll

The AA-2 Atoll was originally designed and produced during the 1960s. It was a reproduction of the early AIM-9B Sidewinder heat-seeking missile. Since the missile has been periodically upgraded. There are now two versions of this missile; the improved heat-seeking AA-2D and radar-guided AA-2C. Despite the improvements, the AA-2D may only track targets from a tail-chase aspect only. The AA-2D uses a solid propellant and has a maximum range of 2 nm. The AA-2C incorporates a semi-active radar homer and has a maximum range of 4 nm.

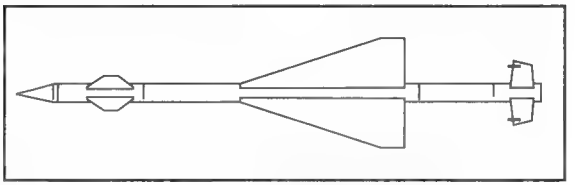


AA-6 Acrid

The AA-6 Acrid is a Soviet-made missile which entered service in the early 1970s. It is one of the largest air-to-air missiles in the world. There are two versions of the AA-6; the radar-guided A model with a range of 22 nm and the heat-seeking B model which has a range of 14 nm. Both models use a solid propellant. The Acrid-A uses a semi-active radar guidance although improved models may contain an active radar seeker. Production of these missiles stopped in 1982. The AA-6 was specifically designed for use aboard the MiG-25 Foxbat but many have been exported to Iraq, Libya, and Syria. In foreign countries the AA-6 is carried by Su-22 Fitters.

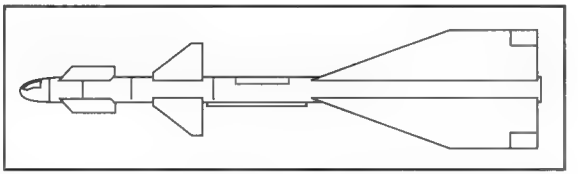


AA-7 Apex



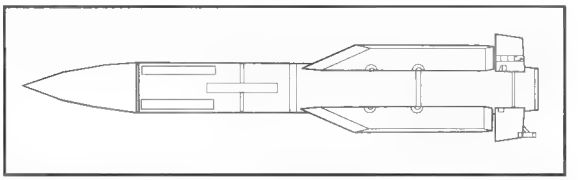
The AA-7 Apex was first detected by Western sources in the mid-1970s. It is a third generation Soviet medium range missile. There are two versions of this missile; the AA-7A radar-guided version and the heat-seeking B model. Both have a maximum range of 10 nm. The radar-guided Apex is superior in performance to the U.S. AIM-7 Sparrow and boasts a "look-down-shoot down" capability. The missile is equipped with a semi-active J-band radar seeker which is very effective against low flying targets. The warhead represents approximately 15% of the missile's overall weight and is fitted with an active radar fuze. The heat-seeking version is an all-aspect missile with improved ability to ignore counter-measures. Like other advanced AAMs the Apex has been exported to most client states of the former Soviet Union.

AA-8 Aphid



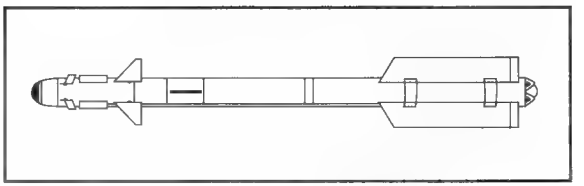
The AA-8 Aphid was designed as a replacement for the aging Soviet inventory of Atoll missiles. Carried in pairs by most Soviet fighters, the Aphid is a heat-seeking missile with a maximum range of 4 nm. Although radar-guided versions of this missile have been reported, to date only the IR model has been seen on Soviet fighters. Early Aphid models had only a tail-chase engagement aspect but later reproductions have been fitted with an electro-optical fuze. This addition gives the missile a much broader tracking envelope. Aphid missiles are found in the inventory of many Third World states. The former federal air force of Yugoslavia is known to have purchased a number of these missiles.

AA-9 Amos



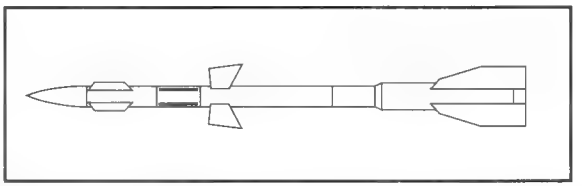
The AA-9 Amos is a fourth generation Soviet AAM intended to perform a mission similar to that of the AIM-54 Phoenix. An obvious design influence is also noticeable in the physical appearance of the Amos. Development of this missile began in the mid-1970s when the need to counter U.S. carrier-based AEW aircraft became apparent. Like the Phoenix, these missiles are able to engage targets at extremely long ranges. The Amos has a range of 55 nm making it the second longest ranged missile in the game (next to the Phoenix). Four AA-9s are carried by the MiG-31. The Foxhound's powerful I-band radar provides mid-course corrections to the missile during its flight. Unlike the Phoenix, it is not a "fire and forget" missile.

AA-10 Alamo



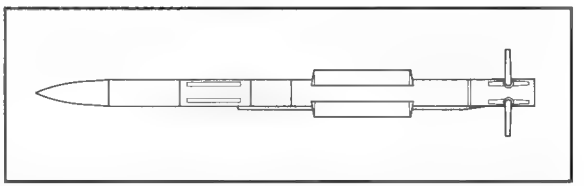
The AA-10 Alamo is a fourth generation Soviet AAM. There are actually six different Alamo missiles although only the three major versions are represented in *FLEET DEFENDER*. The three AA-10s in the game are the semi-active radar-guided AA-10A, the heat-seeking AA-10B, and a longer range radar-guided version known as the AA-10 Alamo C. The A and C models have ranges of 26 nm and 45 nm respectively. Both have semi-active J-band monopulse radars. An active seeker for this missile is currently under development and can be expected to enter service shortly. The heat-seeking Alamo B version has a range of 21 nm. This is extremely long for an Infrared tracking missile. It features an improved IR head which is less susceptible to counter-measures.

AA-11 Archer



The AA-11 Archer is also a fourth generation missile. The Archer is an Infrared (heat-seeking) missile which entered service with the Soviet Air Force in the late 1980s. The Archer is carried by only the most advanced Soviet fighters. It has been selectively exported to only a small number of client states since the 1989 break-up. In the MiG-29, the missiles are slaved to the pilot's helmet-mounted designator. This allows the pilot to engage targets at a high off-angle. The Archer has a short range, all-aspect engagement envelope and is able to track fast-moving, highly-maneuverable targets. It carries a large warhead equipped with an active radar fuze. The maximum range for this missile is believed to be around 12 nm.

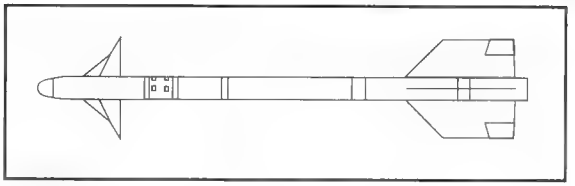
AA-X-12



The AA-X-12 is the CIS's (former Soviet Union) latest AAM. This missile has not as yet entered service. It is so new that details on its performance are hard to obtain. It has been included in *FLEET DEFENDER* so that players can get an opportunity to look at the next generation of AAM technology. You will actually be the first in the west to go up against this missile. The AA-X-12 is believed to be powered by a two stage solid propellant engine. Its maximum range is estimated to be 40 nm. The missile is guided by a mid-course inertial system which switches to an active radar seeker for terminal flight guidance. It this respect it is much like the AIM-54 Phoenix. Delivery date for this missile is believed to be 1994.

FRIENDLY AIR-TO-AIR MISSILES (AAMS)

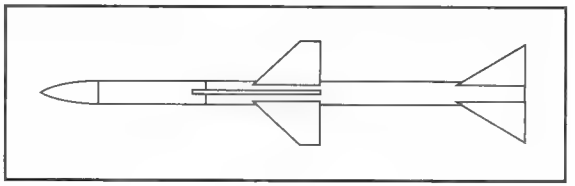
AIM-9 Sidewinder



The AIM-9 Sidewinder heat seeking AAM is the most widely used AAM in the western world. Over 110,000 of these missiles have been produced and are currently in use by 28 different nations. In fact, the Soviet Atoll is believed to have been designed using the AIM-9 as a model. The missile was named Sidewinder because of the snake-like side-to-side motion it makes while tracking a target. Early Sidewinders were given the name "Groundwinder" because of their inability to track targets near the ground.

Some estimates have placed the Sidewinder's hit probability as low as 40%. Subsequent modifications have eliminated many of the problems which plagued this series. The AIM-7 has even acquired an all-aspect sensitivity. The current AIM-9M production model features an improved resistance to electronic counter-measures and an ability to track targets against a hot back-drop. Since the Vietnam War Sidewinder missiles have used a reduced smoke propellant making aerial detection more difficult. The maximum engagement range for this missile is 4.5 nm.

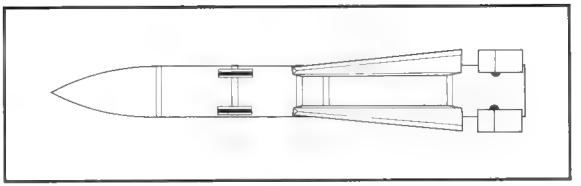
AIM-7 Sparrow



The AIM-7 Sparrow is a medium range, radar-guided missile. The origin of the Sparrow family of missiles dates back to the late 1950s. The first Sparrow used by the U.S. Navy was the AIM-7C. Since the '50s numerous improvements have been made to the Sparrow. Each successive change has been given its own letter designation. The AIM-7P model depicted in some scenarios features a mono-pulse, semi-active seeker head which allows it to operate in a heavy ECM environment. It has a 39 kg. warhead and a range of 24 nm.

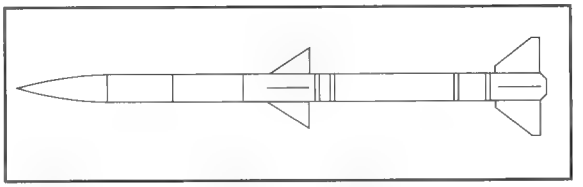
These missiles are designed to intercept low flying aircraft against a backdrop of ground clutter. In particular, the AIM-7P model is able to track sea-skimming anti-ship missiles. To fire the missile the launching aircraft must first obtain a radar "lock." Once the target is "locked" the missile is fired. The launching aircraft must continuously illuminate (or "paint") the target with its radar. If the target is able to maneuver out of the launching aircraft's radar envelope the missile will miss. A surface-launched variant, known as Sea Sparrow, is currently in service with the U.S. Navy.

AIM-54 Phoenix



The AIM-54 Phoenix is a long-range air-to-air missile developed in the late 1960s for the U.S. Navy. The AIM-54A entered front line service in 1974. It has a CW semi-active radar homer and an active homer used during the missile's terminal flight phase. If the missile encounters ECM jamming it is designed to home-in on the source of the jamming. The AWG-9 radar carried by the F-14 allows up to six of these missiles to track independent targets simultaneously. Although the F-14 can physically carry six AIM-54s, it rarely does. At $1 million each, the Phoenix is an expensive missile. It is normally employed against non-maneuvering targets such as high altitude bombers or reconnaissance craft. The AIM-54C features an active radar fuze, solid-state components, and improved ECCM. It uses inertial guidance during its flight to back-up the semi-active homer. Both the "A" and "C" models have a maximum range in excess of 80 nm. The Phoenix is a "fire and forget" missile and does not require the aircraft's radar to "paint" the target after launch.

AIM-120A AMRAAM

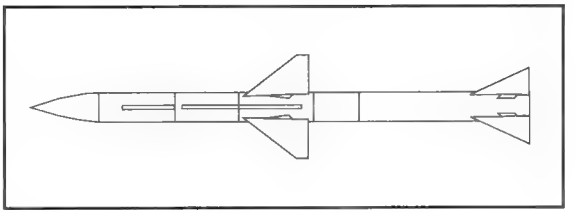


The AIM-120A Advanced Medium Range Air-to-Air Missile (AMRAAM) began development in 1975. Production began in the late 1980s at around 180 missiles per year. It entered service with the U.S. Air Force in 1991 followed by the Navy in 1993. The AMRAAM represents a generational improvement over the AIM-7 Sparrow it was designed to replace. Unlike the Sparrow, the AMRAAM does not require post-launch guidance from the launching aircraft. It is a "fire and forget" missile which relies on inertial guidance. When a target is within range (26 nm) the missile goes into terminal mode and switches on its own I-band active radar. The AMRAAM is faster than the Sparrow and more resistant to ECM. The missile also features a low smoke propellant which allows it to go unnoticed in combat. The AMRAAM warhead weighs approximately 22 kg. and contains an active radar proximity fuze. When the fuze detects a target within a pre-set distance the warhead detonates.

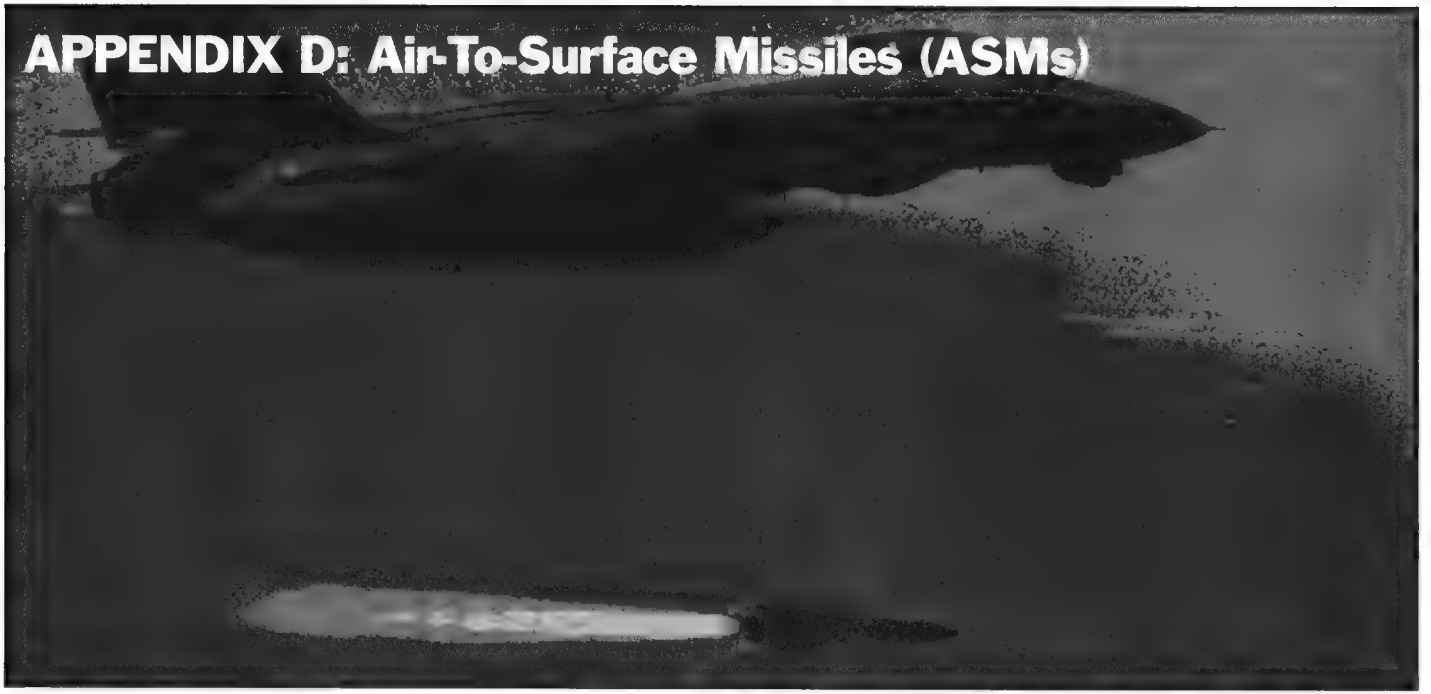
In *FLEET DEFENDER*, your F-14 is not equipped to carry the AMRAAM. Other friendly aircraft, like the F/A-18 and Norway's F-16s do carry this missile. In fact, Norway is experimenting with a land based version of the AMRAAM to replace its existing HAWK batteries. It is the most modern AAM deployed by the U.S. Air Force and was designed to replace the AIM-7 Sparrow. No doubt the Gulf War in 1991 speeded the development process somewhat. This missile has figured prominently in the air battles that have been taken place over Iraq. Three of these missiles have been fired in combat, two have hit their intended targets. U.S. F-16C fighters downed a MiG-23 on 17 Jan 93 and a MiG-25 on 18 Jan 93.

Sky Flash

Development of the Sky Flash AAM began in 1973. This missile is essentially a retooled AIM-7E although numerous modifications and improvements have been made outside the U.S. The Sky Flash entered service with the U.K's Royal Air Force in 1978 and with the Swedish Royal Air Force in 1981. The Sky Flash missile is J-band, semi-active radar-guided missile designed specifically for use against fast, low flying aircraft. It has a maximum range of 27 nm and a minimum range of 2 nm. It is faster than the U.S. Sparrow and less susceptible to enemy counter-measures. In *FLEET DEFENDER*, the Sky Flash is used by Sweden's Viggen aircraft as well as the U.K.'s Mk. 3 Tornado fighter.



APPENDIX D: Air-To-Surface Missiles (ASMs)



THREAT AIR-TO-SURFACE MISSILES (ASMS)

AM-39 Exocet

From time to time a piece of military hardware gains a notoriety which extends into the civilian world. The Exocet ASM is one such weapon. It became the United Kingdom's great boogey-man during the Falklands-Malvinas War in 1982 even though Argentina possessed only five of these missiles. Outside the military community the Exocet became something of a wonder weapon, something that the manufacturer, France's Aerospatiale, did little to discourage. In reality, the air launched Exocet is an early generation ASM which entered service back in 1979. France exported these missiles widely during the 1980s especially to countries in the Middle East. A pair of Exocet missiles (accidentally) struck the U.S.S. Stark in 1987. *Note that while the ship was heavily damaged it did not sink.* These missiles are sea-skimmers with a maximum range of 38 nm. They hug the surface of the water and only "lock-on" to their target in the last (terminal) phase of flight.

AS-4 "Kitchen"

The AS-4 "Kitchen" is an air-to-surface missile originally designed in the 1960s to carry nuclear warheads. In the 1970s a newer version of this missile appeared which was believed to carry a large conventional 1000 kg. HE warhead. The AS-4 is released from the parent aircraft at a very high altitude. The missile stays at this altitude so that it consumes less fuel. Once it reaches the vicinity of the target the missile tips over into a steep dive. It then plunges into the target from a near vertical angle. The anti-ship version of this missile relies on inertial mid-course guidance followed by a passive radar-homing seeker. It has a maximum range of 220 nm. These missiles have been spotted on Tu-95 "Bear G" and Tu-22 "Backfire" bombers belonging to Soviet Naval Aviation.

AS-5 "Kelt"

The AS-5 "Kelt" is an anti-ship missile which was developed in the 1960s as a successor to the AS-2 "Kipper." The Kelt is capable of delivering both nuclear and conventional payloads out to a maximum range of 180 nm. Normally carried by Tu-16 "Badger" strike aircraft, the AS-5 uses a temperamental liquid fuel propellant rather than the more stable solid propellant used in later models. The Soviets have been gradually phasing this missile out of service over the last two decades. It has been exported to Soviet allies in the Middle East and was used by Egypt to attack Israel in 1973. The Kelt can operate in a sea-skimming mode like the AM-39 Exocet or use a high altitude flight profile like the AS-4.

AS-6 "Kingfish"

The AS-6 "Kingfish" is an anti-ship missile similar to the AS-4 in appearance and mission performance. Like the Kitchen, the AS-6 has both nuclear and conventional configurations. In its conventional form the Kingfish carries a 1000 kg HE warhead. The missile is released from the launching aircraft at a very high altitude. It remains at this altitude until reaching the target whereupon it enters a terminal dive. The AS-6 uses solid fuel as propellant and has a range of approximately 180 nm. The conventional anti-ship version of this missile has an active radar homer but receives inertial guidance for its mid-course corrections. It is carried by Badger and Backfire bombers belonging to Soviet Naval Aviation.

AS-7 "Kerry"

The AS-7 "Kerry" is a short-range missile able to be carried by a number of single engine fighter aircraft. It is command-guided using a radio data link and flown by means of a joystick. The pilot must keep the missile (and target) in sight until impact. This means that the aircraft is committed and cannot evade once the missile is launched. A flare on the missile itself aids the pilot in tracking it. The range of this missile is only 2.5 nm. In practical terms, using this missile is tantamount to suicide. Any aircraft forced to close to within this missile's effective range will likely be destroyed by the target's CIWS guns. No longer used by Soviet aircraft, the AS-7 is still operational in some Third World air forces, like Libya and Syria.

AS-9 "Kyle"

The AS-9 "Kyle" is a medium range anti-radar missile. It is designed to home-in on shipboard radar systems, especially those radars associated with fire control. Tactically, these missiles would be launched just ahead of the main strike to "take away the eyes" of the fleet at the critical moment when an attack is in progress. The Kyle resembles the AS-4 in outward appearance. It uses a liquid fuel to give it a range of almost 50 nm and carries a conventional 2000 lb. warhead. On radar, it mimics the flight profile of other ASMs. It has been exported to both Iraq and Libya in large numbers and can be easily adapted to fit a variety of strike aircraft.

AS-10 "Karen"

The AS-10 "Karen" is merely an improved version of the AS-7 "Kerry." Like the "Kerry" it is short-ranged (5.5 nm) and may be carried by single engined fighter aircraft. The warhead of this missile is small by comparison, weighing in at only 250 lb. of high explosive. However, it may be guided to the target by laser if designated by the firing aircraft. This is a distinct benefit over the "Kerry" when used in a high ECM environment. Unfortunately, the launching aircraft must still close to within dangerous proximity to its target. An attacker would be better off using LGBs and delivering them from a higher altitude. These missiles are currently in service with a number of Third World air forces.

AS-12 "Kegler"

The AS-12 "Kegler" is a anti-radar air-to-surface missile designed to be launched from a low level flight profile. It is likely that the AS-12 is viewed as an eventual replacement for the AS-9. The "Kegler" entered service in the late 1970s. It has been mounted on fighter aircraft such as the MiG-27 and Su-17. The AS-12 is also carried by larger bomber aircraft such as the Tu-16 "Badger" and Tu-22 "Backfire." These missiles are guided by the target's own radar emissions. If the target shuts down its radar the missile can continue to guide itself by homing in on the target's last known location. The "Kegler" can carry a 250 lb. fragmentation warhead out to a maximum range of 25 nm.

AS-15 "Kent"

The AS-15 "Kent" is an intermediate range nuclear cruise missile similar in mission performance to the U.S. Tomahawk. Although not much is known about this missile it is believed to carry a 200 kiloton nuclear warhead. The "Kent" can be carried by a variety of multi-engined bombers as well as the "Bear" family of reconnaissance aircraft. It is propelled by a single turbo-fan engine and has an estimated range in excess of 1600 nm. The "Kent" uses inertial guidance with periodic updates provided by a TERCOM terrain-matching radar system. It is a sea-skimmer, meaning that it hugs the surface of the water (or land) during its flight. Immediately after launch the missile drops to around 300 ft. AGL and stays there until it reaches its target.

Kh-31P

The Kh-31P is a medium range, anti-radar missile designed to perform a mission similar to the AS-9. It has only recently entered service after being publicly displayed in 1991. It has an uncharacteristic appearance for a Soviet designed missile which suggests that the Soviets may have been aided by espionage. The missile is estimated to have a 500 lb. HE warhead and a range exceeding 80 nm. The guidance system, therefore, probably has an inertial back-up in case the target stops emitting radiation. Normally, the missile guides itself by means of a passive homer which detects operational radars. These missiles will likely be launched just prior to the main attack forcing the target to shut off its radars to preserve them.

AS-16 "Kickback"

The AS-16 "Kickback" is a long-range, radar-guided missile carried by the "Backfire" bomber (and perhaps the "Bear H"). The Backfire stores these missiles on a special rotary launcher mounted internally. The missile itself entered service with Soviet naval aviation in the late 1980s. The "Kickback" is fueled by solid propellant giving it a range of over 100 nm. It can carry either a conventional 650 lb. HE warhead or a 350 kiloton nuclear warhead. The missile uses inertial guidance while in flight. It is unclear whether these missiles possess a terminal guidance feature. An anti-radar version may exist.

FRIENDLY AIR-TO-SURFACE MISSILES (ASMS)

AGM-62 "Walleye II"

The AGM-62 is actually an unpowered glide bomb, not a missile. It is nicknamed the "Walleye" because of the large TV camera lens in its nose gives it a fish-like appearance. The "Walleye" is linked to the launching aircraft by a data link pod. The operator locks-on to the target visually then releases the ordnance. The bomb steers itself as it glides toward the target image. The range of this weapon depends, of course, upon the distance it is able to glide. Since this bomb is unpowered the glide distance is a function of altitude. The "Walleye II" has a 1 ton (2,000 lbs.) high explosive warhead. In *FLEET DEFENDER*, the "Walleye II" is carried by A-6E and A-7E strike aircraft.

AGM-84 Harpoon

The AGM-84A Harpoon is an air launched, medium range, anti-ship missile with a maximum range approaching 60 nm. It is designed as a sea-skimmer, flying very low over the surface of the water using inertial guidance. Once in terminal mode, the missile activates a phased-array J-band radar seeker in order to acquire its target. The missile is usually fired after the range and bearing of a target is known. However, the Harpoon may be launched using a technique known as Bearing Only Launch (BOL). In this case the missile is simply launched along a particular bearing with its radar seeker looking for any target within a 45 degree search arc. Its 220 kg. warhead is more than enough to cripple or sink a medium sized warship with a single hit.

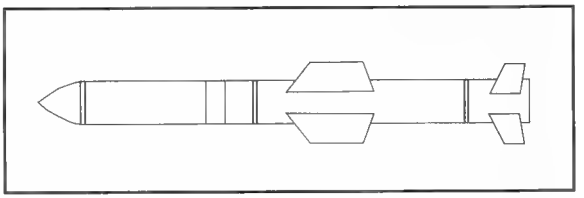


Figure A-11: Next to the Exocet, the Harpoon is one of the more famous anti-ship missiles to enter service during the 1980s.

AGM-86C ALCM

The AGM-86C ALCM (Air Launched Cruise Missile) is an intermediate range cruise missile. The C model ALCM is a conventionally armed adaptation of the nuclear tipped AGM-86B. In *FLEET DEFENDER*, the ALCM is carried by B-52G bombers and used to conduct strategic airstrikes on both air and sea targets. The missile has a maximum range exceeding 1000 nm. It uses a turbofan engine and follows a low level flight profile. Once launched the ALCM is inertial guided with periodic updates from its GPS (Global Positioning System). Six of these missiles can be carried by a single B-52G.

AGM-88 HARM

The AGM-88 HARM (High-speed Anti-Radiation Missile) is currently replacing both the Shrike and Standard ARMs. It entered service in 1983 and was first used in combat during the 1986 strike on Libya. HARMS are used exclusively to suppress or destroy enemy radar installations. The AGM-88A can be programmed to attack pre-selected targets or launched on a set bearing to engage targets of opportunity. Used extensively during the Gulf war, over 1,000 were fired mainly by F-4G Wild Weasels. The HARM causes hostile radars to cease emitting radiation or risk a direct hit. They carry a 66 kg. fragmentation warhead and has a range of 15 nm. In *FLEET DEFENDER*, some aircraft out of each strike package may release HARMs to knock out enemy radars ahead of the main strike.

Sea Eagle

The Sea Eagle is a long range, sea-skimming air-to-surface missile developed by the United Kingdom. This missile entered service with the RAF in 1985 and is normally carried by Tornado GR.1 strike aircraft. The Sea Eagle uses inertial mid-course guidance then switches to a J-band active radar during its terminal phase of flight. The missile is a sea-skimmer which means that it hugs the surface of the water after launch making detection difficult. It can carry a conventional 230 kg. armor-piercing high explosive warhead out to an impressive maximum range of 60 nm. In *FLEET DEFENDER*, Tornado GR.1s in the North Cape scenarios carry the Sea Eagle.

APPENDIX E: Enemy Surface-To-Air Missiles (SAMS)

LAND BASED SURFACE-TO-AIR MISSILES (SAMS)

Crotale Self-Propelled SAM

The French-made Crotale is a mobile surface-to-air missile system designed for all-weather operations against low flying aircraft. A typical Crotale battery consists of a single radar acquisition unit and three missile launchers. The acquisition radar is an E-band pulse-Doppler system with a maximum detection range of 20 nm. Up to twelve targets can be tracked at one time. The missile launchers are equipped with J-band monopulse tracking radars and four missiles in the ready-to-launch position. The Crotale missile has a maximum range of 5 nm. It is highly maneuverable and can withstand a load factor exceeding 25 Gs. In *FLEET DEFENDER*, Libya is equipped with a number of Crotale batteries stationed near its military installations.

SA-2 Modified "Guideline" Fixed-Site SAM

The SA-2 "Guideline" is one of the oldest SAM systems still in service. It was a "Guideline" which shot down Gary Power's U-2 spy plane in 1960. During the Vietnam war, the SA-2 was nicknamed the "flying telephone pole" by U.S. flight crews. The missile is a beam-rider and may be command guided by an E-band *Fan Song* radar. The SA-2 has a slant range of 25 nm and can engage targets up to 18,000 feet. Accuracy has always been this missile's greatest problem. Therefore, these missiles are generally fired in salvoes forcing the target aircraft to at least react to each launch. The Guideline has terrible acquisition problems at low altitudes and lacks the ability to make drastic course corrections. The warhead is command detonated once the missile comes within proximity of its target. The first U.S. aircraft lost during the Persian Gulf war was an F/A-18 downed by an SA-2 over western Iraq. In *FLEET DEFENDER*, the SA-2 is deployed in belts of SAMs stretching across likely avenues of approach.

SA-3 "Goa" Fixed-Site SAM

The SA-3 "Goa" is a two-stage SAM designed as a point defense system for use against low flying aircraft. The SA-3 uses an I/J band radar for fire control and a C-band acquisition radar known by the NATO code name *Flat Face*. It has a range of 10 nm and an operational ceiling of 13,000 feet. Targeting data is provided by a *Low Blow* radar system able to guide two missiles simultaneously. The *Low Blow* radar has been retrofitted with a back-up TV camera for command guidance when jammed. U.S. intelligence analysts got a first hand look at the SA-3 when a number of Egyptian batteries were captured intact in 1973 by the Israeli army. The SA-3 carries a 60 kg. high explosive fragmentation warhead which can be detonated when the reaches proximity to the target. The lethal blast radius is less than 50 feet.

SA-5 "Gammon" Fixed-Site SAM

The SA-5 "Gammon" is a medium to high altitude surface-to-air missile system. It was designed as a long range area defense system to combat the latest generation of U.S. strategic bombers in the late 1960s. The number of missile sites inside the Soviet Union grew to a peak of 130 sites in 1985-1986. An SA-5 battalion is comprised of an E-band *Barlock* radar search and acquisition radar backed up by a H-band *Square Pair* fire control radar. The "Gammon" has a maximum range of 125 nm and a minimum range of 20 nm. Mid-course corrections are provided by the *Square Pair* radar. Terminal guidance provided by an active radar homing seeker. Syria received four battalions of SA-5 missiles in 1982 following the disastrous confrontation with Israel in the Bekaa Valley.

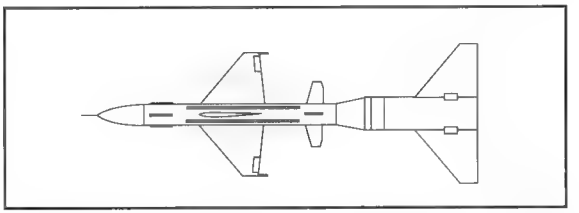


Figure A-12: In 1985, Libya received three full brigades of SA-5s just in time to launch a few at U.S. aircraft during El Dorado Canyon.

SA-6 "Gainful" Self-propelled SAM

The SA-6 "Gainful" is a self-propelled surface-to-air missile system designed to engage targets at low to medium altitude. Each launch vehicle carries three missiles mounted on an ASU-85 chassis data linked to a *Straight Flush* radar. A SA-6 regiment consists of a single *Thin Skin* radar, two *Long Track* radars and five SA-6 batteries. Each battery consists of a *Straight Flush* radar and four launch vehicles. The *Straight Flush* radar is equipped with a back-up optical TV camera with a range of 16 nm in case of jamming. Initial target acquisition is made at long range by *Long Track* E- band surveillance radar. Targeting information is then developed by the *Straight Flush* radar assisted by height information provided by the *Thin Skin* radar. The missile has a maximum range of 12 nm. Final guidance to target is provided by a semi-active homing seeker in the nose of the missile. Like the SA-5, the Gainful was also used in 1982 by Syria and again in 1986 by Libya.

SHIP BASED SURFACE-TO-AIR MISSILES (NSAMS)

CADS-N-1 "Close Air Defense System- Naval"

The CADS-N-1 is the latest in naval based air defense. It features a missile and gun combination like that of the land-based 2S6 mobile SAM. The gun portion of this weapon is a new multi-barrel 30mm "Gatling" type CIWS. Straddling the gun are two (possibly four) missiles which have been designated as SA-N-11s. Not much is known about this system beyond that which can be determined from aerial surveillance (TARPS missions). The CADS-N-1 system has been installed on the aircraft carrier *Kuznetsov* and certain Kirov class battlecruisers. There are eight CADS mountings on the *Kuznetsov* and six on the Kirovs. The SA-N-11 missiles have a maximum range of 5 nm.

SA-N-3 "Goblet"

The SA-N-3 "Goblet" is the first Soviet SAM designed purely to fulfill a naval air defense role. It is an radar-guided area defense missile which was first deployed in the early 1960s. The "Goblet" remains in service on Kiev and Moscow class helicopter carriers. Various guided-missile cruisers are also equipped with this SAM. There are two versions of this missile, the SA-N-3A and SA-N-3B. The 3A model is found on most ships and has a range of 16 nm. The 3B model, installed on Kiev class vessels, has a range of 30 nm. The "Goblet" has a speed approaching mach 2.5 and an altitude envelope which reaches as high as 70,000 feet. The target is first acquired by a D-band *Top Sail* radar. The missile is then guided to the target by a F/H band *Head Light* fire control radar.

SA-N-4 "Gecko"

The SA-N-4 "Gecko" is a point defense SAM system found on most Soviet warships. After entering service in 1970, the missile was widely exported to Third World client states. The missile was designed to engage fast moving aircraft at extremely low altitudes. It has a slant range of 8 nm and travels at a speed of mach 2.5 nm. A *Pop Group* fire control radar acquires the target then guides the missile to the target. The "Gecko" is used on a number of Soviet vessels including the Fleet Replenishment ship *Berezina*. It is currently in service on Libyan Koni class frigates and Nanuchka corvettes as well as Split class frigates owned by the former Yugoslavian navy.

SA-N-6 "Grumble"

The SA-N-6 "Grumble" is an area defense SAM system. It is a naval version of the SA-10 "Grumble." The missile is expected to perform the same tactical mission as the SA-N-3 "Goblet," long range coverage of a multi-ship task group. It has a slant range out to 50 nm if used against targets at high altitudes. Against sea-skimming targets, 100 meters AGL or less, it has a range of only 15 nm. On the *Kirov*, 96 SA-N-6 missiles are slaved to a *Top Steer* fire control radar. The missile itself has a solid fuel propellant and a 90 kg. HE warhead. Once the missile nears the target a semi-active radar seeker acquires the target and guides the missile during its terminal phase.

SA-N-7 "Gadfly"

The SA-N-7 "Gadfly" is a point defense SAM system patterned after its successful land-based cousin, the SA-11. The missile is fueled by a solid propellant and can reach speeds in excess of mach 3. The "Gadfly" has a 70 kg. HE warhead and a maximum range of 10 nm. As you can see this weapon is designed for point blank local defense. After the target is detected by search radar it is then passed to a *Front Dome* fire control radar. The *Front Dome* tracks the target while the missile is in flight. The missile then switches on its semi-active seeker during its terminal phase.

SA-N-9 TOR-M/ Klinok

Like the "Gadfly," the SA-N-9 is a point defense SAM system. It is designed for local air defense of individual ships or small surface groups. Once a target is detected it is passed on to a pair of *Cross Sword* fire control radars. The missiles are first ejected vertically from sealed containers then the missile's solid propellant ignites once it is clear of the ship. The SA-N-9 is then command guided to the target. Electro-optical devices are available if the missile is fired in a heavy ECM environment. These missiles have a maximum range of 6 nm. They have small high explosive warheads, only 15 kg. However, this is more than enough to deflect or destroy in-coming missiles.

APPENDIX F: Glossary

A

AAA: Anti-Aircraft Artillery or Triple-A
ACLS: (Automatic Carrier Landing System)
ACM: Air Combat Maneuvering (dogfighting)
ADA: Air Defense Artillery
AEW: Airborne Early Warning
AGL: Above Ground Level (referring to altitude)
AIM: Air Intercept Missile (i.e. AIM-120A, AIM-54)
Air Boss: officer responsible for all flight deck and hangar operations
ASL: Above Sea level (referring to altitude)
Angle of attack: the angular difference between the aircraft's mean chord line and the relative wind
ARM: Anti-radiation missile
ASM: Air-to-Surface missile
Aspect angle: angle between defender's flight path and attacker's flight path (measured from defender's six o'clock) usage: AIM-9L is an all-aspect missile.
ASW: Anti-Submarine Warfare
AWACS: Airborne Warning and Control System
AWG: Airborne Weapons Group

B

Bandit: an enemy (hostile) aircraft
BDA: Bomb damage assessment (or alternatively Battle Damage Assessment)
BFM: Basic Fighter Maneuvers
"Bingo": radio call that aircraft only has enough fuel remaining to return to base
"Blow Thru": high speed closure with enemy formation indicating no intention of turning to engage
Blue Water Ops: carrier operations taking place out of range of alternate recovery sites on land
"Bogey": a radar/ visual contact of unknown identity
"Bolter": an aircraft which fails to hook the arresting cable on landing
"Break": radio call indicating an immediate high G turn, an evasive maneuver
"Buster" term used for Full Military Power, means to hurry up or expedite
BVR: Beyond Visual Range

C

C3I: Command, Control, Communications and Intelligence (read as Cee Three Eye)
CAG: Commander Air Group
CAP: Combat Air Patrol
CAS: Close Air Support
Cat shot: catapult assisted take-off from a carrier deck
"Catching a three wire": a perfect carrier landing
CBU: Cluster Bomb Unit
Cell: Two or more tankers/bombers flying in formation
Chaff: passive form of electronic countermeasure, usually carried in a pod or dispenser aboard an aircraft and released to disrupt radar tracking and/or acquisition
CIC: Combat Information Center
CIWS (pronounced See-Wiz): Close-In Weapon System "Phalanx" multi-barreled 20 mm chain gun with a extremely high cyclic rate of fire
Closure: relative rate at which approaching aircraft draw near to you
"Cold Nose": term meaning your radar is turned off, KA-6 Tanker crews get upset if you refuel with the radar on.

D

DASH: flight profile maximizing speed, usually a very high altitude straight line flight
"Double-Nuts": aircraft number 100 or 00, usually belonging to the CAG
"Double-Ugly": less than flattering nickname for the less than beautiful F-4 Phantom II, a.k.a "Rhino", "Smokin' Thunderhog"
Down: a broken or usable part

E

ECM: Electronic Counter-Measures
"Electric Jet": nickname for the F-16 because of its Fly-By-Wire flight controls
Elevator: portion of flight deck which transports aircraft between decks
EW: Electronic Warfare

F

"Flying Telephone Poles": SA-2 surface-to-air Missiles
FM: F***ing Magic, a difficult concept that is hard to understand, naval equivalent of the Air Force term "cosmic"
FOD: Foreign Object Damage- a loose object which is sucked into an engine causing damage
F-Pole: distance from launching aircraft to the target at the time its missile impacts
Fouled Deck: any situation in which the flight deck is unready to land aircraft
Fox I/II: launch of radar guided missile/ infrared missile
"Furball": multiple aircraft engagement (a dogfight)

G

G force: measurement of gravity force; two Gs would be twice normal gravity
GIUK: Greenland-Iceland-United Kingdom
Glidepath: the descent path of an aircraft while landing
"Gomer": an enemy pilot
Green Shirt: flight deck crew-member responsible for readying aircraft for take-off

H

Hard Deck: an imaginary altitude restriction used for safety reasons during training exercises

"Hawk": staying above an engagement

HAWK: (Homing All the Way Killer) a US made surface-to-air missile

Helo: Navy term for helicopter

Hook: arresting hook which is deployed from the aircraft on landing

Hot Pump: refueling an aircraft while the engines are running

I

IR: Infra-Red

J

JBD: Jet Blast Deflector

Jinking: erratic defensive maneuver designed make a firing solution difficult, looks to an observer that the aircraft is "fishtailing"

K

Ka: Kaminov, former Soviet design bureau

KIAS: Knots indicated air speed

"Knock It Off": terminate fighting maneuvers immediately, usually used only in training

L

LAMPS: Light Airborne Multi-Purpose System (helicopter)

Lawn Dart: refers to the F-16 because of the high accident rate during development

"Long lines-Little hooks": the proper method of dogfighting

LSO: Landing Signals Officer

Lufberry: a circular track flown by opponents who cannot close with one another to achieve a firing solution

M

Marking: leaving contrails or otherwise making aerial detection easy for opposing aircraft; (F-4 Phantom was a famous case, nicknamed the Smokin' Thunderhog)

"MeatBall": carrier landing aid set to produce a 30 glideslope

MiG: Mikoyan-Gurevich, former Soviet design bureau

Mi: Mil, former Soviet helicopter design bureau

MSA: Minimum Safe Altitude

MSL: Mean Sea Level

Mule: small tow vehicle used to move aircraft around the hangar and flight decks

N

NFWS: Navy Fighter Weapons School (the Navy's TOP GUN course)

nm: nautical mile

No Joy: opposite of Tally, no visual contact with opposing aircrew

"Nugget": freshman aviator on his first tour

O

Oh-dark-thirty: very early in the morning
OTH: Over-The-Horizon (targeting)
overshoot: potentially dangerous position of being forced out in front of an opposing aircraft

P

Package: group of aircraft combined to perform a single mission
"Padlocked": crew cannot take eyes off of target without losing it
Pickle: releasing ordnance
Picket: a ship positioned on the outer edge of a task force designed to provide early radar information
Pipper: small dot in the center of the target reticle, represents the line of sight
"Pit": the back-seat of the F-14
Pk: probability of kill
Pucker/Factor: method of rating particularly hazardous missions or activities
Purple Shirt: flight deck crew-member responsible for fueling aircraft

R

Ready (or Alert) Five: manned aircraft in alert status which are able to be airborne within 5 minutes
Red Shirt: flight deck crew member responsible for arming aircraft
RIO: Radar Intercept Officer- the F-14's back seater
ROE: Rules of Engagement
RWR: Radar Warning Receiver

S

SAR: Search and Rescue
SAM: Surface to Air missile
SARH (semi-active radar-homing) radar guidance provided to a weapon by illuminating the target with radar
Scramble: quick take-off
Shooter: designated aircraft that will release ordnance
Slick: the aircraft is flying with no external equipment to create drag
"Smash": power, juice, energy
Snap Shot: high-angle gun shot
Sortie: one flight mission by one aircraft
SOSUS: Sound Surveillance System
"Speed Jeans": nickname for a pilot's G-suit
"Speed o' heat": flying with the afterburner lit
Splash: air to air kill or weapons impact on ground target
SSM: Surface-to-Surface Missile
Su: Sukhoi, former Soviet design bureau

T

Tally-Ho: sighting of a confirmed target, opposite of No Joy
Target Rich Environment: area of operations has many eligible targets
TARPS: Tactical Aerial Reconnaissance Pod System
TLAR: method of bombing, shooting, or landing; acronym meaning *(That Looks About Right)*
Top Off: fill tanks with fuel
Trailer: last aircraft in a formation
Trap: successful carrier landing
Tumbleweed: a request for information, no Tally, no contact
Tu: Tupolev, former Soviet design bureau
Two-ship: standard flight of two aircraft, lead and wingman

V

V/STOL: Vertical/ Short Take-off and Landing
Vmax: maximum possible speed for that altitude
Vulture's Row: observation deck on the island

W

Wave-off: an order from the LSO telling pilot to not to land
White Shirt: flight deck crew-member responsible for inspecting aircraft prior to a cat launch
Winchester: no ordnance remaining, essentially unarmed
WOW switch: *weight on wheels* switch which disables various systems while the aircraft is on the ground

Y

Yak: former Soviet design bureau Yakolev
Yellow Shirt: director responsible for aircraft movement on the flight deck

Z

Zulu time (i.e. 0455 hrs Zulu): Greenwich mean time

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