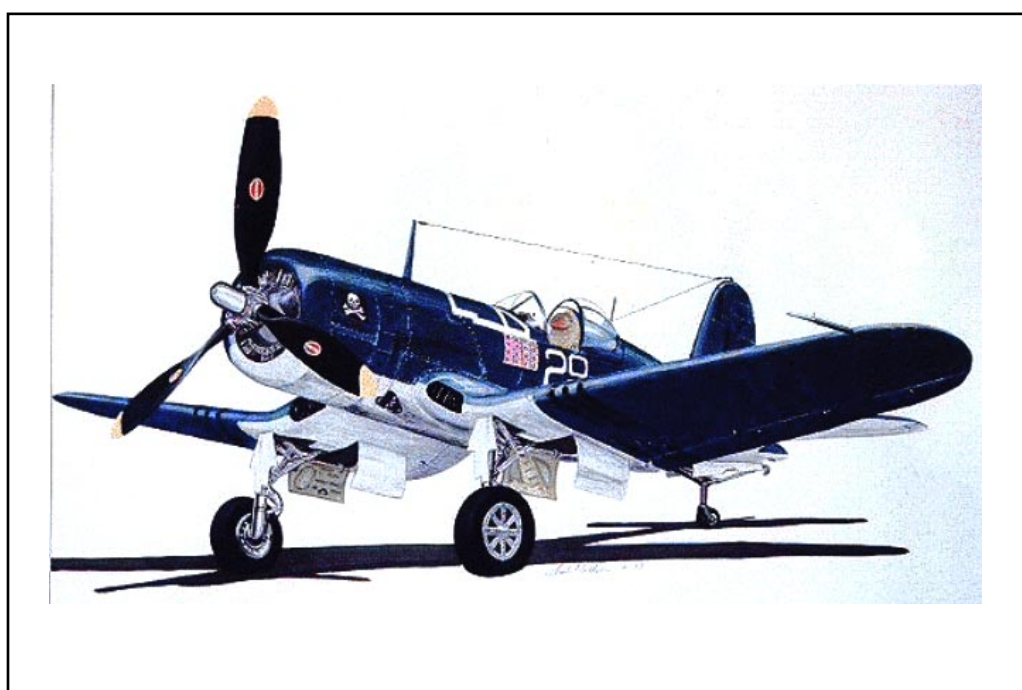


Air Warrior[®] for Windows[®]

Flight Instruction Manual



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FLIGHT INSTRUCTION

The following sections contain information beyond the administrative tasks and mechanics of playing *Air Warrior*. In the *Operations Manual*, you learned how to start and enter *Air Warrior*, how to move around in the environment, and became familiar with the many different command lines and command keys needed to "make things happen."

The *Flight Instruction Manual* is dedicated to providing you with the operational characteristics of the various aircraft and vehicles available to you, as well as the tactics and strategies necessary for success in *Air Warrior*. Tips and comments from active players are also included.



Virtually all players coming into the *Air Warrior* environment have had previous flight experience with limited, stand-alone flight simulator packages. Therefore, this manual does not cover basic theory of flight, or provide basic flight training. *Air Warrior* is an air combat simulation, and as such assumes you've done your basic training already. However, plenty of opportunity exists for you to practice and develop your skills off-line, using the Solo Flight feature.

This manual offers extensive information on such areas as aircraft power settings, energy dynamics, classic air combat maneuvers, gunnery, and strategic and tactical bombing. These topics will serve to give you basic instruction in the key areas of air combat.

For formal air combat instruction, the Air Warrior Training Academy offers a comprehensive seven-week online course, complete with a training manual and detailed maps. AWTa is sold as a flat rate package that includes all training materials and 21 hours of online time in the AWTa arena.

Cadets also receive free access to the AWTa software library where they can upload films of their exercises for critique by their instructors, or download training films and help files. Contact Kesmai by E-mail at XXXXXXXXXXXXXXXX for further information.



POWER AND FUEL CONSIDERATIONS

When flying the various high-performance aircraft in *Air Warrior*, you will need to make power adjustments for added boost, to conserve fuel, or to keep your maneuverability in high speed dives.

THROTTLE ADJUSTMENT

If you use the keyboard to control your throttle, pressing the lower case <c> raises your throttle by 7% and lower case <v> lowers it by 7%. The following throttle settings are recommended standards:

Maximum Cruise - 80% Throttle

This gives you the best compromise between speed and fuel consumption. Fuel consumption at 80% throttle is roughly half that of full throttle. However, you should not fly into combat at a cruise setting.

Military Power - Full Throttle

This is the maximum safe power setting except in high speed dives.

War Emergency Power (WEP)

This is maximum output, one setting above full throttle. When flying with WEP you are pushing the engine to its limits, and you can only do so for a few minutes. When you've flown on WEP for as long as your engine can tolerate it, the WEP light on your instrument panel will go out and WEP will no longer be available to you for the rest of the flight.

Air Warrior models aircraft "compressibility," meaning that your control surfaces will begin to lock up above a certain speed. Each plane's compressibility threshold is different, but a good general rule is to avoid WEP in high speed dives. It's best to think of WEP literally - power for an emergency. When you're diving you have gravity and the normal output of a high performance engine helping you along; you don't need WEP in that situation.

"High Blower Engages"

You will see this message when you climb above 19,000 feet in a Mustang, Corsair, or Hellcat. This means that the second stage of the supercharger has kicked in to compensate for the thinner air at high altitude. The blower gives a noticeable improvement in performance, though by no means comparable to, say, a jet's afterburner.

AIRCRAFT CONSIDERATIONS FOR WEP

Bf109F Franz

This fighter employs water injection for emergency power and can use WEP longer than aircraft that, in effect, redline their engines to gain an added boost.

Focke Wulf 190

The Focke Wulf has GM1 nitrous injection to boost high altitude performance, and you activate it when you hit the WEP key. If you employ WEP in the Focke Wulf at low or medium altitudes it will not provide the level of boost that WEP does on other fighters. You can use the Focke Wulf's WEP above 20,000 feet to increase climb performance, and above 25,000 feet to enhance overall engine performance.

CHOOSING YOUR FUEL LOAD

Air Warrior models both an airplane's fuel capacity and its actual fuel consumption based upon detailed test flight data. While actual World War II pilots did not instruct their crew chiefs to load less than a full tank of fuel, *Air Warrior* seldom forces you to employ an aircraft's full range or maximum flight duration. Thus, you can select whatever fuel load you think is suitable for your mission.

Fuel load is set in the Plane Setup Window of the Aircraft Selection Folder in the airfield Ready Room. The amount you enter is a percentage of a full tank. External tanks or drop tanks are not available in *Air Warrior*.

Each aircraft has a different sized internal fuel tank. The following are fighter fuel tank capacities in U.S. gallons:

P-51 Mustang	180
P-47 Thunderbolt	305
F6F-3 Hellcat	250
P-38 Lightning	410
F4U Corsair	178
Spitfire Mk IX	137
Focke Wulf 190	141
Messerschmitt Bf109F	106
Yakovlev 9	118
Ki-84 Frank	185
Mitsubishi A6M5 Zeke	155

From the above data it's clear that a fuel load percentage does not represent the same quantity of fuel on every airplane. 10% of a full tank would be nearly nine gallons on the Bf109F, but twice that amount on the Mustang. Each gallon of fuel adds six pounds of weight to the airplane. Thus, you should choose fuel load based upon an aircraft's fuel carrying capacity. You don't want to be hauling around a lot more fuel than you need, because the extra weight will reduce your fighter's performance.

FUEL CONSUMPTION

High performance aircraft engines modeled in *Air Warrior* consume an enormous amount of fuel at full throttle. In the actual war, fighter pilots flew at full throttle for brief periods of time, and in *Air Warrior* you too will have to practice fuel conservation on long missions, particularly during scenario play.

Most engines in *Air Warrior* consume between 200-250 gallons per hour at the war emergency power (WEP) power setting. That figure is cut in half, however,

when you reduce throttle to 80%. When you first start playing *Air Warrior*, it's a good idea to load 50% fuel and fly at full throttle until you gain a sense of when it's safe to ease off a bit.

In addition to throttling back, you can also cut fuel consumption by flying at very high altitudes, although this approach is not exactly suited to arena play.



AIR COMBAT MANEUVERS

Energy is the most important concept in Air Combat Maneuvers (ACM). It's best understood as a dynamic combination of airspeed and altitude. Airspeed is a measure of an aircraft's instantaneous ability to maneuver; altitude is a measure of an aircraft's potential ability to gain speed quickly by diving.

Together, they comprise a plane's energy state. Think of airspeed as cash in your pocket, and altitude as money in the bank. Climbing reduces your airspeed but increases your stored, potential speed; diving withdraws speed from your account to be spent maneuvering your airplane.

Higher [altitude] does not mean better e state, lower and faster can be a better position sometimes. Keep yer speed, gain e as your enemy slowly loses it, and then he'll be ripe for the up and wack lead turn, or he'll run away.

- Holmes

E-fighting is the art of maintaining your plane in a favorable energy state. "Favorable" is in the mind of the beholder. If you're in a FW it means enough E to extend past gun range for another pass. If you mean in a 38 it means maintain enough E to get over the top quickly, use flaps effectively and hit the "sweet spot" on the corner for a P-38. When I hang myself out to dry or spin I have made a mistake and don't have E anymore.

Don't confuse E fighting with speed or altitude. They are related but not the same thing. E relates to managing your options and position.

- DeadDuck

Equating BnZ with a "runaway" tactic assumes that the initial target of the attack is the only focus. When dealing with a broader front, and multiple incoming enema groups, BnZ allows one to engage more target groups than would otherwise be possible. What this requires is control - control over Greed. It is very tempting after a run where you see hits to go back and try to finish it off. But if you do - if you burn up the zoom and extension - you can't go after the next wave.

Remember - there's _always_ something stoopider up in the air you can go kill.

- DoK GoNzO

E fighting (to me anyway) can do anything because you are maintaining the correct amount of E for the _proper_ situation. That can range from anything to extending in a spit to taking a 51 and looping with a spit long enough to kill it. Know the enema's E, maintain yours.. and use whatever plane you have to its advantage.

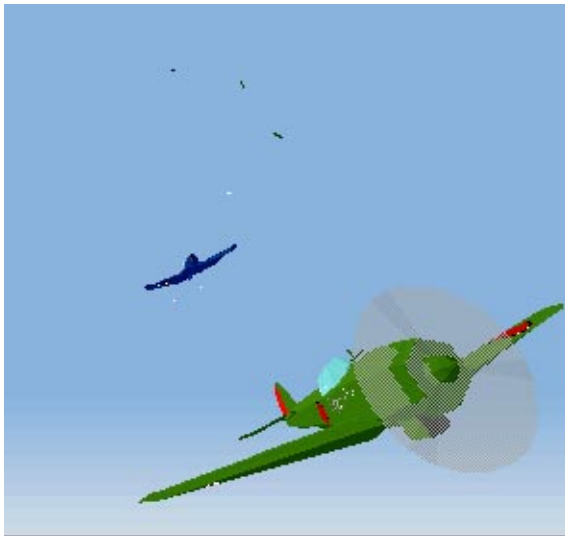
-HardRock

THE ENERGY MARKET OF AIR COMBAT

Maneuvering is the process of exchanging energy for position. Classic ACM are proven moves, perfected over decades, designed to gain you the most maneuverability for the least cost in energy.

Air combat is perhaps the only contest where it's both honorable and desirable to shoot someone in the back. This is the goal of ACM - to spend your energy to gain a tail shot. There are three good reasons for this:

1. The enemy's guns will not be pointing at you.
2. With tail shots you do not need to lead the target as much when shooting.
3. The tail offers the best position from which to adjust to a target's evasive moves.



CLASSIC AIR COMBAT MANEUVERS

Many air combat simulations cite classic air combat maneuvers (ACM) to create an atmosphere of realism. Knowing authentic ACM in *Air Warrior*, however, is not a quaint touch; rather, it is an essential skill you will need to become successful in the game.

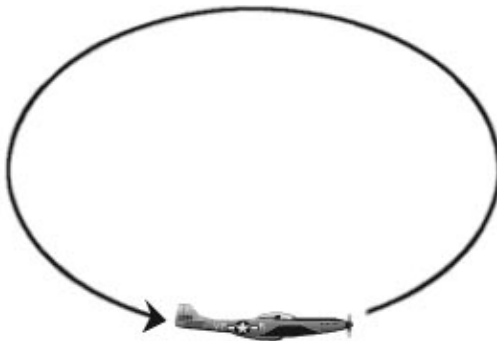
Simple Aileron Roll

Sideways movement of the stick causes your plane to roll. The aileron roll is a basic component of every air combat maneuver.



Loop

This is a full loop and is more an air show maneuver than an air combat maneuver. The loop is most effective against very slow targets, such as heavy bombers, or against fighters that are just taking off from an airfield.



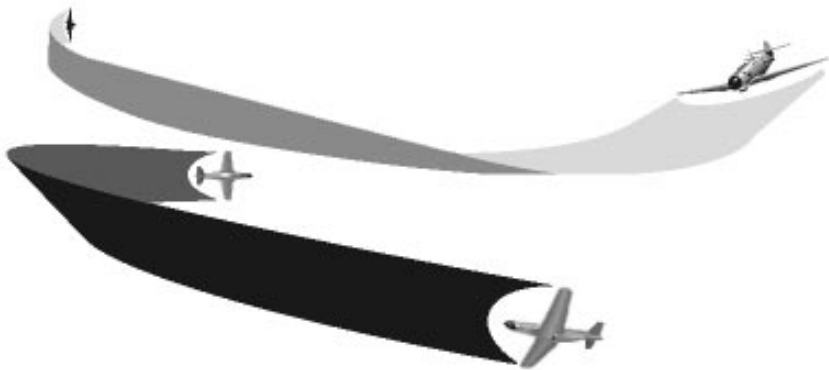
Break Turn

Frankly, any pilot whose first move is a flat turn should be as good as dead within 2 minutes.

- DoK GoNzO

The break turn is a hard, flat turn of last resort when you're under attack, and it depletes your energy rapidly. It's an aileron roll followed by sharp, backward pressure on the stick. The idea is to get out of the way of an attacker's bullets as quickly as possible. Usually pilots employ the break turn when caught by surprise, and it's a short-term solution at best.

In this illustration, defender B uses the break turn against attacker A. If you use this maneuver, make sure you turn INTO the attack, if possible. Breaking away from an attack presents your tail to the enemy.



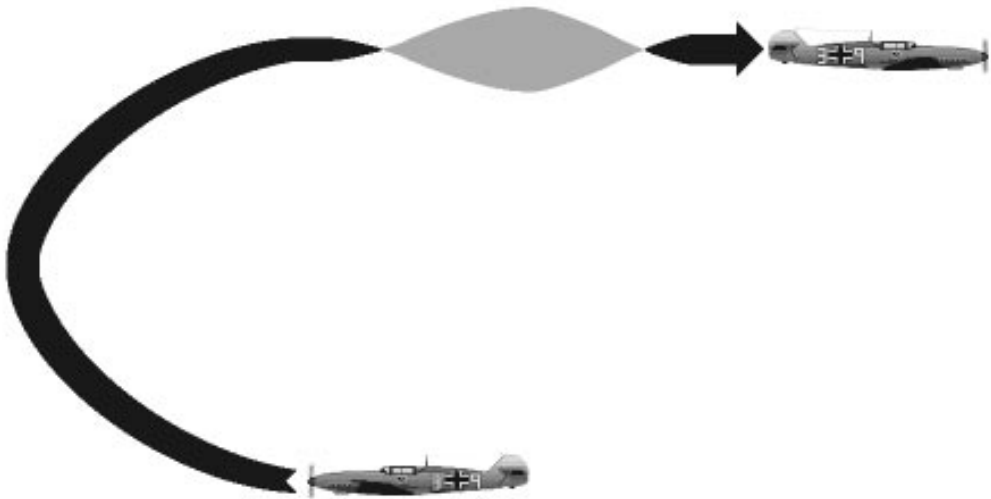
Immelmann Turn (Half Loop)

I've found it dangerous to begin a half-loop in the same direction as your entry. When I blow through a furball, and begin my zoom, I always do it with a slight turn. This loses you more energy than a pure half-loop, but saves you from being tracked easily as you egress.

- Vossman

An energy-efficient method of reversing your course, usually to set up a subsequent shot after making a high speed firing pass, is the Immelmann turn. This is a half loop — a vertical 180 degree turn — with an aileron roll at the top.

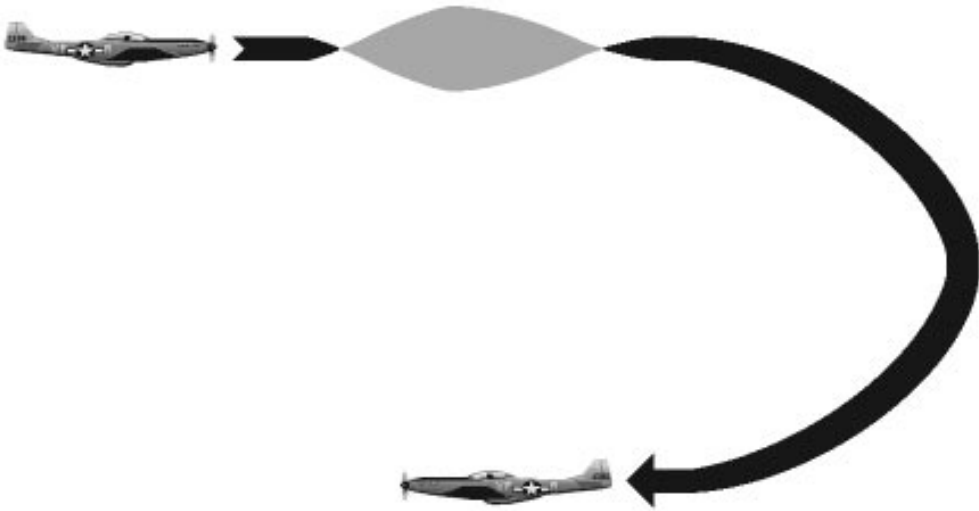
While it may preserve your energy, it can make your plane an easy target. Generally, you should avoid using this maneuver when enemies are within gun range.



Split - S

Called the Split Arse by the British, due to how the maneuver feels to the pilot, it is a half loop in reverse. You use it to attack a target below you and you need a fair amount of altitude to execute it. Roll the plane inverted, then pull back on the stick until level.

New players often dive right at lower targets head-on. Not only is this a bad angle from which to hit the target, it also affords the target an equal opportunity to hit you. With the split-s, you allow the bandit to pass below you and then you dive onto his tail. This requires timing, but it's an effective move.



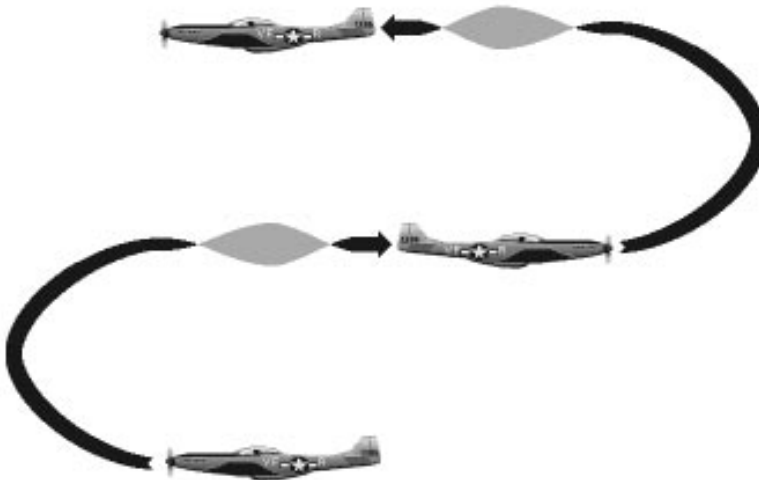
Vertical 8

One technique I like a lot is to get the enemy to follow me into vertical maneuvers when I have more speed than he does. This can be a bit tricky to judge and if you are incorrect, you get a tail full of lead. When it works, though, it is really fun. The enemy follows you up, probably firing the whole way when you are just out of gun range, then stalls out. When he does, you pull into a dive and hammer him as he is floundering at low speed.

- Brooke

The Vertical 8 is two half loops performed one right after the other. You can accomplish this only if your airspeed is very high. If a slower bandit tries to follow you, and he isn't watching his airspeed closely, he will stall below you, giving you an excellent opportunity to attack him.

Many players use this principle far more simply. They pull into a zoom climb after they've drawn the interest of a slower bandit. If the latter is not paying attention, he'll stall and become a helpless target. In *Air Warrior* this is called the rope-a-dope.



High Yo Yo

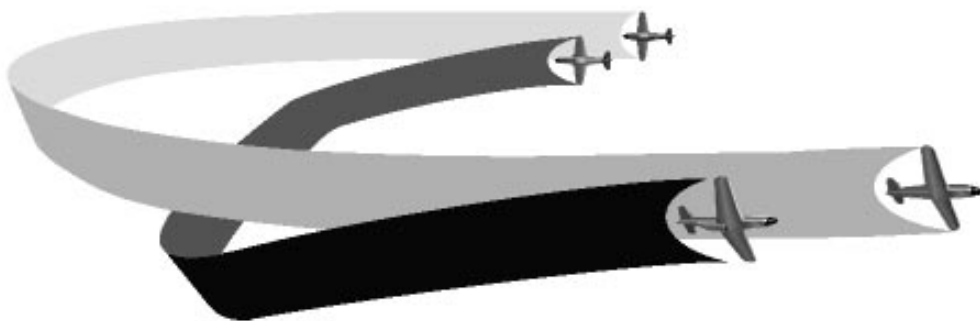
This is perhaps the most difficult maneuver for new players to understand and use. Attacker A makes a high speed pass on slower defender B who attempts to evade with a break turn. The attacker converts his speed into altitude by pulling his fighter into the vertical. While he does this he rolls his plane so that his cockpit points in the direction his quarry fled. By pulling back on the stick as he rolls, he steers his vertical momentum toward the attacker, allowing him to dive onto the defender's tail.



Low Yo Yo

Here, attacker A is moving slower than defender B. The attacker closes on his target by diving to convert altitude into airspeed to cut inside the defender's turn. This uses the same principle as the high yo yo, but in an opposite fashion.

With the high yo yo, the attacker converts speed to altitude in order to reduce his closure rate; in the low yo yo, the attacker converts altitude to speed to increase his rate of closure.



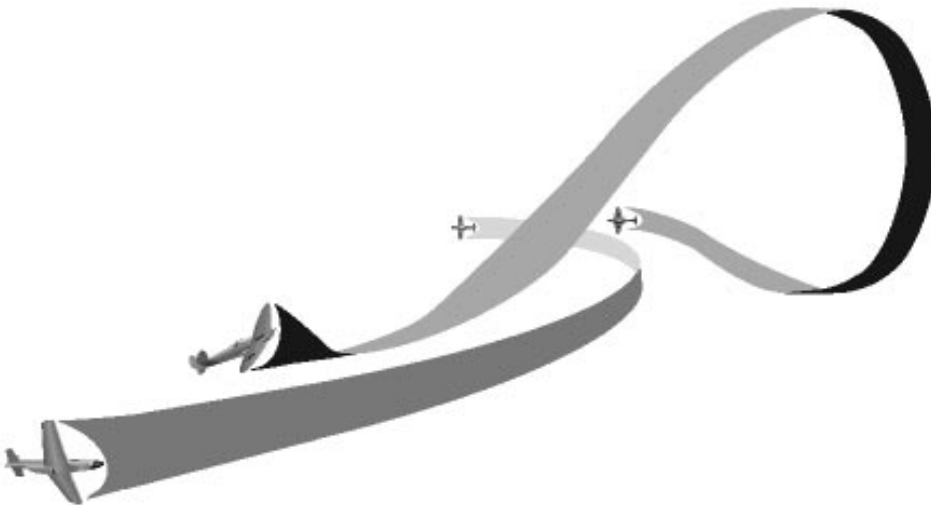
Barrel Roll

I know two definitions for barrel roll. One is an aerobatic maneuver where you pull the stick back and to the side. Viewed from behind, the plane travels in a circle (up and down) with the canopy toward the middle. Heading doesn't change. That's only occasionally useful in combat.

There's also a combat maneuver going by the name of barrel roll which is in the same family as lag rolls and high yo yos. Establish lead, pull up, float over the target, roll toward him, and pull down in behind him, rolling to lead him. You need speed for that.

- Warlock

Similar in principle to the High Yo-Yo, the barrel roll attack is a climbing turn designed to prevent overshoot, and reacquire an evading, lower energy target.



GUNNERY

DEFLECTION SHOOTING

Air Warrior employs time-of-flight gunnery. Once you pull the trigger, your bullets travel on the course you set for them, and if they collide with an aircraft along their flight path, you will get a hit. If you shoot right at a hard-turning target, chances are that your target will be somewhere else by the time your bullets arrive. Shooting where you think your target will be when your bullets get there is known as "pulling lead" (pronounced *lead*), or deflection gunnery; you adjust your tracer stream to your target's course and speed.



Pyro practices a bit of deflection shooting against an A-Land Corsair.

EFFECTS OF MANEUVERING

Personal log: I find that the better I shoot, the less I have to maneuver.

Gray Eagle

A fighter is a flying platform with fixed guns. Thus, it's a lot harder to concentrate your gunfire if the aircraft is performing hard maneuvers. You will see this reflected in your tracer stream which will appear to bend as you maneuver, making it much more difficult to hit your target.

LEAD COMPUTING SIGHT (LCS)

Also known as the pipper, this is a floating diamond that shows you where your bullets will go. You can enable it in the Controls dialog box in the Options menu. Many veteran *Air Warrior* players use tracers alone to judge the path of their bullets, but for a new player, the pipper can be an immense help in showing you the effects of maneuvering on the flight path of your bullets. Just by flying around for a few minutes off-line, watching the pipper as you maneuver, you can gain a sense of the effect G forces have on gunnery.

Using the bracket keys (<[> and <]>), you can change the pipper's range. The pipper gets smaller as you increase the range, reflecting the smaller area you have to hit as your distance to the target increases. Changing the pipper's range does not change the range or setting of your guns, however. In actual World War II era fighters, wing-mounted guns were set to concentrate or converge their fire at one point at a specific distance, typically 300 yards for the P-51 Mustang, for example.

BORESIGHT

This is a simple, fixed center point showing where your tracer stream will go if you are pulling no G's and performing no maneuvers. Many *Air Warrior* pilots use the boresight as a gross reference point, and employ the tracer stream for fine tuning.

GUN RANGE

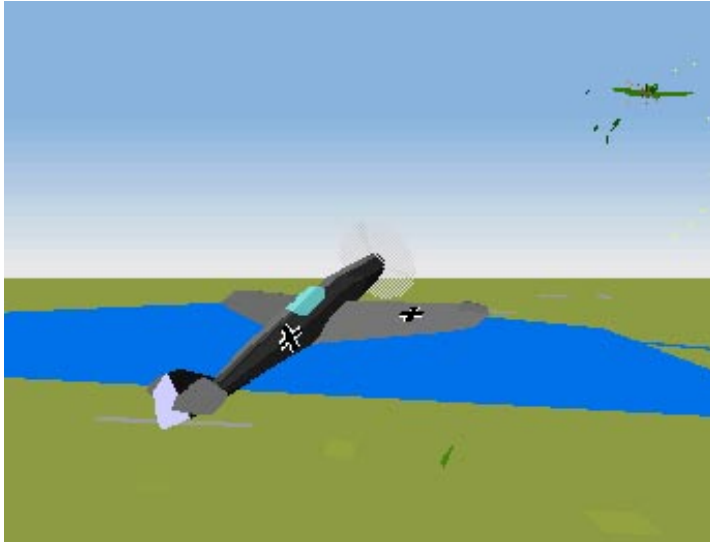
Operative gun range is between 650-800 yards, depending upon realism settings; but, as noted below under Lethality, long-range hits are not as effective as ones scored at shorter ranges. Maximum gun range is based on the speed of the bullets (2400 feet per second) and the duration of their effectiveness (two seconds).

When you add the speed of your aircraft to that of your bullets, your actual maximum gun range can be well over 1000 yards — particularly if your target is moving toward you at high speed — but the best way to become deadly in air combat is to learn to work for shots at closer ranges.

SEEING YOUR HITS

From a distance of 500 yards or less, you will see the hits you score register on your target. Flashes will appear on your victim, and parts of his plane will break off. If you hit his oil or fuel lines, smoke will billow from your target, and if you

land the decisive blow his plane will explode. Hits scored at distances greater than 500 yards also register but you will not see them. You will, however, see an aircraft explode due to long-range hits.

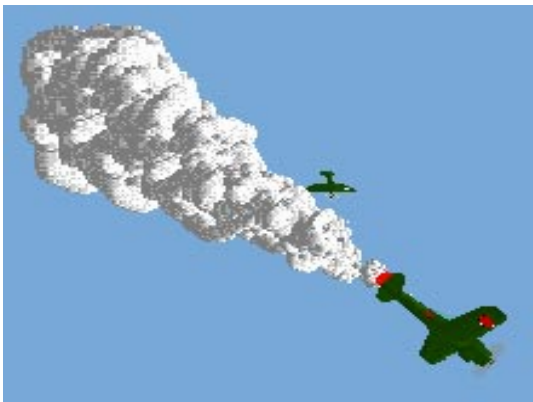


BATTLE DAMAGE

Taking hits from gunfire produces unpredictable results. Sometimes you can take several hits without damaging a vital system on your aircraft; at other times, one hit will destroy a critical system.

Smoke

When smoke starts to spew from your aircraft, it means that either your fuel or oil



lines have been damaged and are leaking. If it's an oil line hit, you will lose oil pressure. Eventually your engine will suffer oil starvation and seize up.

Fuel system damage means you are leaking gasoline and you'll soon be running on fumes. In either case, you should head for home as soon as you can.

Elevators

Sometimes gunfire hits will damage the control lines to your elevators or sever them entirely. When this happens, you lose some or all of your pitch control (forward/backward control on the stick). There is nothing you can do to compensate for complete loss of your elevators. The only option available is to bail out of your aircraft.

Ailerons

When your ailerons are damaged, your ability to roll the aircraft is diminished. As with elevators, you cannot compensate for the complete loss of ailerons.

Engine

If the engine is hit in a critical area, it will stall and you will not be able to restart it. Try to bring your plane in for a “deadstick” landing or bail out.

Flaps

Hits can sever your flaps controls. Your flaps will remain in the position they were in when you suffered the damage.

Landing Gear

Your landing gear may become stuck due to battle damage. This means you'll have to perform a wheels-up, belly landing.

LETHALITY

Lethality is not a word that tumbles off the tongue in normal conversation, but it's an essential concept in the *Air Warrior* game. To understand how it works, imagine shooting a 2 by 4 with a BB gun. While it might penetrate or at least dent the target, the mass of a BB and the velocity at which it travels out of the muzzle of a BB gun is not enough to cause any serious damage.

Now imagine shooting the 2 by 4 with a .45 caliber firearm. The mass of the bullet and the energy of the explosive charge that propels it could blow the 2 by 4 apart. This is much the way lethality is calculated in *Air Warrior*: it is the sheer force of the bullets and/or cannon shells fired from your aircraft.

WEAPONRY

Weaponry varies from fighter to fighter in *Air Warrior*. When you shoot, the program calculates the kinetic energy the armaments on your airplane produce, and applies that to whatever aircraft you hit. Each aircraft type, in turn, has its own capacity for punishment. Thus, how lethal you are, apart from your aim, is a matter of what you're shooting with and what you're shooting at. There are other considerations as well.

DISTANCE

As your bullets and/or cannon shells travel through the air, they lose kinetic energy, plus they tend to disperse. Your guns are twice as lethal at distances under 200 yards as they are at distances between 200 and 600 yards. Lethality is further reduced at distances between 600 yards and the maximum range of 800 yards.

AMMO LOAD

Most of the airplanes modeled in *Air Warrior* carried unequal amounts of ammunition for their guns. For example, the Focke Wulf 190 carried 950 rounds for its two machine guns, 500 cannon shells for two of its four 20 mm cannon, and 280 shells for the remaining two cannon. When you press the trigger on the Focke Wulf, all of its guns fire. Thus, as you go through your ammo load, some guns are going to run out of ammunition before others do, and your overall lethality will diminish in steps before you run out of ammo entirely.

In half-time play, *Air Warrior* gives you three times the documented ammunition for the plane you fly. In real-time play, however, you receive the actual ammo load the aircraft carried in combat.

To help you compare ammo load and lethality among the various *Air Warrior* fighters, appropriate bar charts are included in Appendix A of this manual.



CAPTURING AIRFIELDS

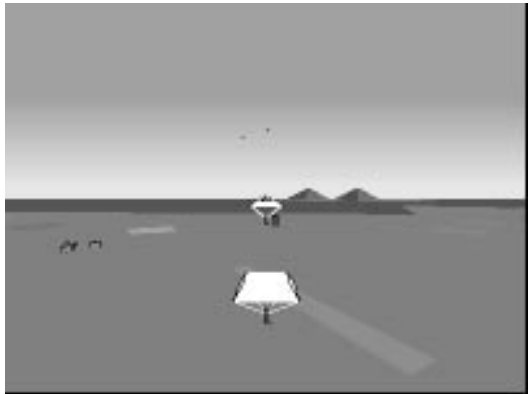
CAPTURABLE AIRFIELDS

Half-time:

Europe - fields 4,5,6,11; vehicle garages 7,8,9.

Real-time:

Europe - fields 86-88; vehicle garages 89-91



Virtual troopers hit the silk

Capturable airfields are often prized because they are the closest to the action.

CAPTURING FIELDS IN HALF-TIME ARENAS

To capture an airfield in a half-time arena, you have to destroy its control tower and land eight paratroops on it. Generally it's a good idea to destroy the field's ack (anti-aircraft installations) as well because it can shoot down your troop transport and/or kill your paratroops before they take the airfield.

CAPTURING FIELDS IN FULL REALISM ARENAS

As with most things in full realism, field capture requires a bit more effort and teamwork. In order to prepare a field for capture in Europe, you must destroy the aircraft hangar in addition to the tower. Taking out the ack is also a good idea though it's not required. Capture is then accomplished with the standard eight paratroopers. Then, to restore maintenance at the field, you must fly in another C-47, loaded with supplies.

CAPTURING VEHICLE GARAGES

By comparison, capturing a vehicle garage is far simpler. All you have to do is drop troops on it. There is no tower or ack to destroy, and the enemy seldom pays much attention to defending vehicle garages.

PREPPING A FIELD

Preparing, or “prepping” an airfield for capture requires bombs, though tanks have been known to provide this service. The towers at the 11 capturable fields in half-time Europe require only one bomb each to destroy them. All the others need 4 bombs each to kill them. This means that in order to prep the tougher fields in half-time Europe you will need at least a medium bomber, or three fighter bombers to have sufficient bombs to take out the tower and the ack. In the full realism arenas, you cannot prep fields on your own.

After an airfield has been prepped, troops have to arrive in a C-47 transport plane within 30 minutes. When you select the C-47, troops are automatically loaded aboard. Dropping troops requires at least 500 feet of altitude (they refuse to jump otherwise) and the command ordering them to jump is unique. Instead of an escape key sequence, you use the intercom key (the apostrophe) followed by an asterisk and the word GO. In effect, you are getting on the intercom to order your troops to hit the silk.

In-flight Command Line (troop transport only):

*go + ENTER	Causes one paratrooper to leave the plane (non-functional below 500 feet)
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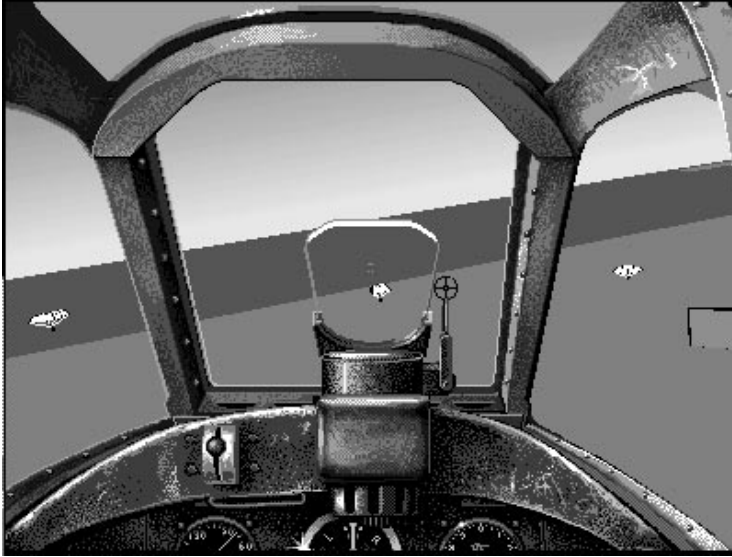
Repeat this command until all eight troops have jumped.

Where to drop the troops is a matter of judgment. Dropping right above the airstrip can be hazardous because defenders in Flakpanzers will have an easy time picking them off as they hang there in their parachutes. Similarly, dropping above the end of the runway affords enemy planes taking off from the embattled field a chance to shoot them. Usually the safest approach is to drop your troops 1000-1500 yards away and to one side of the airfield. They must be within approximately 1/2 mile of the airfield to seize it.

Capturing an airfield can be very difficult if the enemy is determined to hold onto it. When you destroy the field's ack, notice of its death is automatically broadcast on Channel 1, alerting the enemy to your intentions. Also, C-47s are easy to shoot down, and they have no guns to defend themselves from aerial attack.

Moreover, to block the capture, the enemy can shoot the paratroopers to prevent eight of them from reaching the field. Thus, airfield capture often requires good

teamwork among bombers, fighters, and transports. When you finally capture the field, however, and see the message to that effect broadcast by the host over the radio, it can be enormously satisfying to everyone on your side who took part.



Vossman bravely shoots a poor, defenseless paratrooper

*Suffice it to say that the C-47 paratrooper drop is a one of its kind command. You don't hit the escape key to trigger it ..NOOOOOOOOOOO! It's a hell of a lot more QUAINT than that! You're supposed to be commuuuunicating with those expectant virtual warriors sitting around the C-47's cargo hold. Just think of them back there, chewing gum and showing off pictures of their stateside honeys. Then, and only then, can you POSSIBLY IMAGINE that you have to hit the INTERCOM switch (') before the *Go to release them - TELL THEM - to jump.*

And if you get into all of that, be sure to ask, when you get back to base, how many of our boys made it. And while you're at it, you can go on a virtual drinking binge because of all the fresh-faced computer generated youth that perished in the prime of their pixilated little lives because you didn't check to see if the ack was down before you sent them. And next time you're sitting on the 6 of an enemy fighter, be sure you yell as you open fire, "This is for Joe!....This is for Shorty!...

-New User



BOMBING

Newcomers to *Air Warrior* will find both strategic and tactical bombing being employed on a regular basis. Strategic bombing is usually carried out by medium and heavy bombers, and is aimed at infrastructure and support facilities such as refineries and factories, with the strategy of reducing the enemy's ability to carry on the fight. Strategic bombing strikes are planned and coordinated to destroy multiple, related targets in a short period of time, for maximum effect on the enemy.

Tactical bombing is more immediate in scope, and is generally carried out by fighter bombers in support of an immediate mission. Tactical bombing missions are generally aimed at the suppression of enemy offense or defense capability, such as anti-aircraft installations, ground troops or airfield runways.

AIRFIELDS

In half-time arenas, you can knock a secondary airfield out of action for 30 minutes by dropping eight bombs on the runway. All eight must land within five minutes of each other. Thus if you miss and land fewer than eight, chances are you will fail to take out the field unless you are flying with other friendly bombers.

Main airfields in half-time are much harder targets, requiring at least 32 bombs to destroy. In real-time, destroying an airfield is done quite differently. Instead of bombing the runways, you must destroy the field's local facilities: its hangar, ammo dump, and all three fuel tanks. Successful destruction of an airfield forces the enemy to take off elsewhere. Sometimes, it can be more useful to impair an airfield's facilities rather than take out the field altogether.

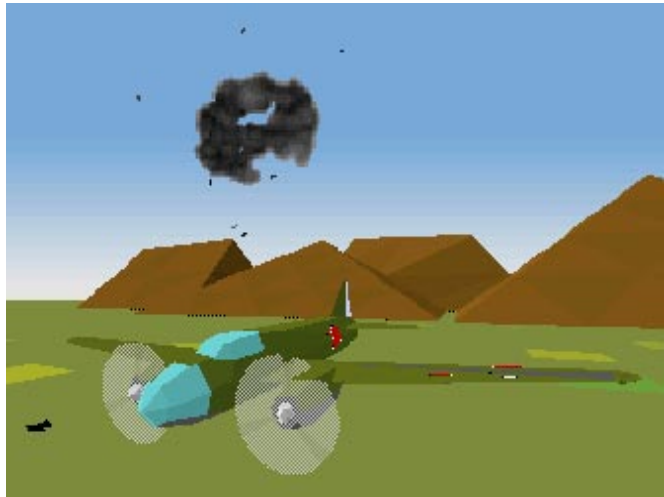


Approach view of a typical airfield

ANTI-AIRCRAFT (ACK)

Killing the ack at an airfield will leave planes taking off from the field far more vulnerable to attack. The ack is the smallest and hardest to hit of all bombing targets, but they take only one bomb, or a good strafing run, to kill.

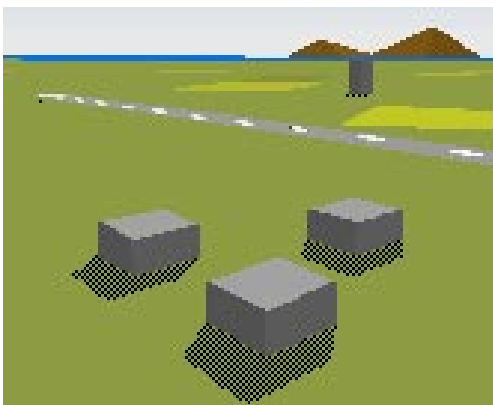
When you destroy an ack online, the host broadcasts a message that the ack has been shot down and a kill has been recorded. These look similar to the messages you see when a player has been shot down; the difference is that ack “player” numbers begin with the number 70.



Dodging ack

FUEL

Every airfield has a group of three gasoline storage tanks clustered together. Each tank takes two bombs to destroy, yet the explosion of one may take adjacent tanks with it. When an airfield’s fuel supply is damaged, the quality of the gas available at the field diminishes. The standard 100 octane fuel may become 85 or even 70 octane, affecting the performance of aircraft that subsequently take off there.



Fuel tanks

Damage to an airfield’s fuel usually results in host efforts to resupply it. A drone C-47 transport plane is dispatched from the affected country’s X:21 airfield bound for the injured field, as well as a convoy of drone supply trucks. When the C-47 arrives, the field’s fuel is restored to full potency for 15 minutes, after which the trucks should arrive to effect replenishment that will last until the fuel is bombed again.

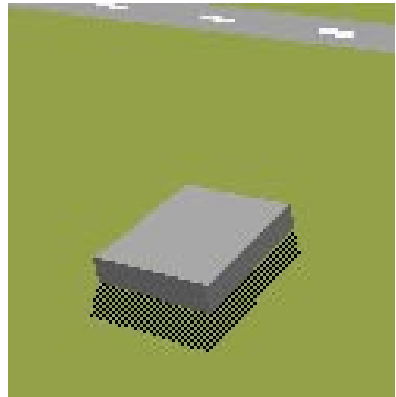
OIL REFINERIES

A country needs its oil refinery to replenish its stores of gasoline at airfield gas storage facilities that have been destroyed by bombing. If you destroy the enemy's "refer" you make fuel resupply impossible until the host can rebuild the refinery (about 30 minutes). However, if an airfield's fuel is damaged BEFORE the refinery is, then resupply planes and trucks will already be enroute to the damaged field.

Each country has one refinery and it's located near that country's X:1 airfield. A refinery consists of four buildings next to three cracking towers. The towers are the important structures here, and each one requires two bomb hits to destroy it.

AMMO DUMPS

These solitary structures contain ammunition for the airfield, and are tough targets. They are short buildings, sitting by themselves, one at each airfield. You need to hit one with four bombs to destroy it. Destruction of an ammo dump reduces the ammo load - usually cannon shells - of airplanes taking off from the affected field.



Ammo dump

AMMO FACTORIES

Each country has one of these located near its X:1 airfield. Destroying it takes four to six bombs. As is the case with a refinery, if a country's ammunition factory is gone, and one of its airfield's ammo dumps is destroyed shortly thereafter, resupply cannot begin for at least 30 minutes while the host rebuilds the factory.

RADAR

Nothing annoys the enemy quite the way losing his radar does. He can keep on fighting effectively — veteran pilots know how to operate very well indeed without radar — but with a distinct inconvenience.

Radar is located in the control tower at each country's main airfield in half-time (X:1 in Europe) and at each airfield's control tower in the real-time arena. It takes four bombs to kill a control tower, though there is a random element to all bomb damage. Once destroyed, a control tower stays out of action for 30 minutes.

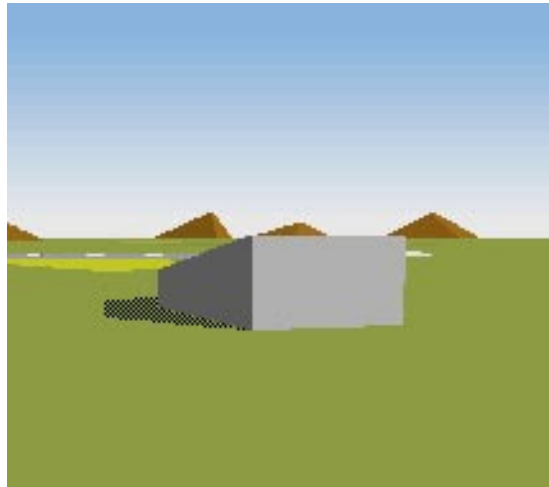
Radar can be a tough target to hit. The tower will call out to friendly aircraft, warning them of an enemy attack, as you approach. Further, main airfields are protected by three anti-aircraft batteries that can chew any attacking aircraft to pieces in a matter of moments.

You'll have to fly above 5,280 feet (1 mile) to avoid the "ack" in half-time, and far higher to avoid all acks in real-time (ack ranges in real-time can reach to 15,000 feet) but the higher you fly, the tougher it will be to drop your bombs accurately on a target as small as a control tower.

AIRCRAFT HANGARS

Aircraft hangars are the buildings with sloped roofs at airfields. It takes three bombs to destroy one, and its destruction reduces the ability of the airfield to maintain its planes properly. There is one airplane hangar at each airfield.

Once an aircraft hangar is gone, airplanes taking off from that field have poor maintenance, reduced durability, and may even be leaking gas or oil on takeoff.



Typical hangar building

SPARE PARTS FACTORIES

Yes, this works the same way the ammo factory or refinery does. When it's destroyed, resupply of airfields with bombed out hangars is retarded. And, like other factories, it takes four to six bomb hits to destroy and 30 minutes to rebuild.

AIRCRAFT FACTORIES

Each country has an aircraft factory producing one type of aircraft - either Spitfires or Focke Wulfs - and if it is blown up, then any airfields that lose their hangars while the aircraft factory is being rebuilt also lose their supply of the fighter the factory makes. There is a loophole to this rule however. If your country loses its Spitfire factory and you land your Spit at an airfield that's lost its hangar, you can rearm and refuel, and take off again in the same plane.

RUNWAYS

Rather than diminish the quality of an airfield, some people prefer the more direct approach of putting the airfield out of action entirely. You have to drop eight bombs directly on the runway to knock an airfield out of action, and no plane will be able to take off from the field for 30 minutes thereafter.

MAINTAINING DAMAGE TO ENEMY FACILITIES

Apart from subsequent bomber strikes to key manufacturing facilities before they can be rebuilt, there are other measures you can take to impair resupply and repair efforts.

You can shoot down resupply cargo planes and strafe resupply truck convoys. The hazard here is that you'll have to fly very low to get them, and this will leave you vulnerable to fighter attack.

PILOTING MEDIUM AND HEAVY BOMBERS

Flying a bomber is much like flying a fighter except that bombers are slower and less maneuverable. With medium and heavy bombers, bombs are loaded onto your plane automatically when you select it with the Aircraft Selection Folder at the airfield Ready Room.

There are two fundamental mistakes new pilots often make when they fly a bomber for the first time. First, you have to remember to turn on all of your engines; it's surprising how many people forget to do this at first, accustomed as they are to single-engine fighters.

Second, you should tune your radio. An apostrophe (') preceding a radio message in a bomber functions as an intercom; only people in your airplane will see it. If you want to talk to friendly aircraft over Channel 2, you have to tune your radio to 2 (<ESC + t2>, followed by <ENTER>) and use a slash (/) before your radio message. Double check your radio frequency, because occasionally a tune command is delayed or does not take effect at all. If your radio is set to Channel 1, then you could find yourself broadcasting information about your mission to all of your enemies.

The most important tool of a good bomber pilot is a comprehensive map. Maps can be downloaded from network software libraries, or you can order extensively detailed maps online from Kesmai.

The most important skill of a good bomber pilot is the ability to navigate to the target in a manner that provides a good approach for a bomb run. Approaching an east/west oriented rectangular target, such as a factory, from the north or south is not a winning strategy. Your bombs don't drop all at once; rather, they fall sequentially and land in a spread. Thus the approach is crucial.

You might want to fly to various targets off-line to get the hang of bombing and the use of your bombsight. As with any skill mastered in *Air Warrior*, proficiency comes with a lot of practice; and while off-line bombing practice may not be especially exciting, it is inexpensive.

BOMBER DEFENSE

"With fighters you are looking for a fight. With bombers you are looking to avoid fights because if you get in one you will probably die."

- Da Sloth

There are five basic methods of defending bombers in *Air Warrior*.

Stealth - Radar Evasion

They can't kill you if they don't see you. If you fly below 200 feet, you will not show up on radar. You will, however, show up as a tracking icon when you get within 5000 yards of an enemy plane. Thus, the stealth approach works best if you also pick a flight route that avoids enemy planes.

Fighter Escort

Fighter escort can be arranged from the very beginning of a mission, but usually it's organized on the fly. After you've taken off, get on Channel 2, tell your countrymen what you intend to do, and ask if anyone is available to escort you. Friendly fighters can also serve as escort without their even knowing it. If your side has achieved numerical superiority in a sector, you might want to capitalize on that and fly your bomber through while your fighters have the enemy tied up.

Gunners

Before you take off you can enlist players to fly as gunners on your bomber (see Section 9, Bomber Operations, in the *Operations Manual*). Bomber gunners receive a lethality bonus and can be effective against enemy fighters, just so long as there are not too many.

High Altitude Defense

Flying at 20,000 feet or more not only keeps you above most enemy fighters, it also gives you a method of escape by enabling you to dive and build up speed. There are two major drawbacks to high altitude bombing, however. First, bombers do not have outstanding rates of climb, and just getting to 20,000 feet is expensive. Second, as your altitude increases, so does the difficulty of hitting your target.

Low Altitude Defense

SEVERAL feet?? I get nosebleeds at several feet. I like to stay at about 5ft or so up. Of course, that's the altitude of my cockpit..... Not only do less experienced pilots go SMACK, but experienced ones do it every once in awhile. Going that low gives your gunner an even better chance to kill enemies (with an assist from a nearby planet ;) and gives the gunner a better chance to see somebody to shoot at in the first place.

- Da Sloth

This is largely a desperation tactic if your attempt at stealth by flying under radar fails. If you are at low altitude and are attacked by enemy fighters, drop your bomber down to extremely low altitude — 10 feet or less above the ground. Often, an enemy fighter will crash trying to kill you, though many *Air Warrior* pilots are wise to this tactic.

USING THE BOMBSIGHT - MEDIUM AND HEAVY BOMBERS

Air Warrior's level bombsight is patterned after the famous Norden Bombsight from World War II. It allows the bombardier to control the plane during a bomb run and it computes the likely place your bombs will land, given your altitude and velocity. You don't have to lead the target with this sight; just drop your bombs when the crosshairs are on it.

Moving from the pilot's cockpit to the bombardier's position (<ESC + z>, followed by <ENTER>) switches on the autopilot. You can switch it off if you choose, by hitting the <x> key, but generally you only want to make slight adjustments to your course when you're on a bomb run. If you've set yourself on a good bomb run angle before switching to the bombsight, you should only need to apply rudder controls to line up your target.

When bombing from medium to high altitudes, you will probably need to adjust magnification (<[> and <]> keys) to see your target and line it up. You also might

want to slow down to near stall speed when you drop on a target from high altitude and, thus, reduce bomb spread.

Be sure to open the bomb bay doors (using the command <ESC + a>, followed by <ENTER>) before attempting to drop your bombs, and remember to close them afterward; open bomb bay doors create considerable drag.

DIVE BOMBING

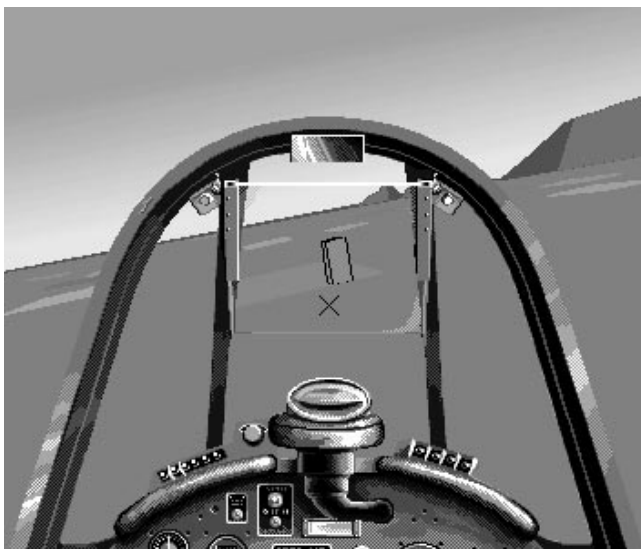
Choosing a Fighter Bomber

All fighters can carry at least one bomb; the Mustang, Lightning, Thunderbolt, Hellcat, and Corsair can carry two. No fighter carries bombs unless you load them before you head out on the runway. You can load bombs on your plane with the Plane Setup Window in the Aircraft Selection Folder in the Ready Room, or you can type /bomb at the airfield Ready Room before you take off. You cannot load bombs once you are in the airplane.

The plane you choose as a fighter bomber is generally a matter of experience and personal preference. Keep in mind that you'll probably be flying it as a fighter at some point in the mission and, even if you don't, dive bombing usually pushes an aircraft to its performance and maneuverability limits. Therefore you should probably avoid choosing a plane you've never flown before, simply because it carries two bombs. Also remember that bomb weight and drag will directly affect the performance of your aircraft.

Dive Bombsight

Air Warrior employs a bit of post World War II technology for dive bombing: the Continually Computing Impact Point (CCIP). This sight appears as an illusive X where your pilot's gunsight



CCIP Bombsight

would normally be, and it's the same color as the one you chose for your LCS gunsight. Like any bombsight, it shows you where your bombs would land if released. However, if you enable the CCIP you will rarely see the magic X. Why? Because in most flight situations if you drop a bomb, its impact point will be below you. Thus, to use the CCIP you have to be flying at an angle or at a speed that will place your bomb's impact point in front of you.

Arming bombs

In a dive bomber, you have to arm your bombs (<ESC + a>, followed by <ENTER>) before you can drop them.

High Angle Dive Bombing

If you dive at a steep angle the CCIP's X will appear. You want to maneuver your plane in order to put the X on your target and then hit the key to release a bomb. The hazard here is that you may not be able to pull your plane out of the dive before you too become an impact point on the ground. Start high angle dive bombing runs from at least 7,000 feet (10,000 feet in a real-time arena). Also, you can improve an airplane's handling in a dive if you reduce throttle, or lower flaps before you enter a steep dive. On the F4U Corsair, P-38 Lightning, F-86, or MiG-15 you can deploy dive brakes as well.

Low Angle Dive Bombing

I like a shallow, very fast delivery myself, approx. 350-375 ias. Level at 300-400 ft (the dive sight will just register). When the sight is where you want the bomb to hit, pickle it off and get outta Dodge.

Gray Eagle

This is often referred to as strafe bombing because you approach your target as if you were strafing it.

You begin a low angle dive bomb run from a greater distance away from your target than you would for a high angle strike. As you get close to the ground at high speed the CCIP will appear. Maneuver your plane until the X is on your target and release your bomb. The primary hazard with this approach is getting blown up by your own bomb. Make sure you're at least 300 feet above the explosion.

Important Note for All Forms of Dive Bombing: Remember that it takes a full second after you've hit the key for your bomb to actually release. Thus, if you immediately yank the stick after hitting the key, your bomb may be pulled off target.

"Bombing the ceiling is not allowed!"

This peculiarly phrased error message means that you have attempted to release a bomb under negative G's - a common occurrence if you push forward on the stick to make a last second flight adjustment just as you're dropping your bomb. You must release bombs under positive G's.

Weight and Drag from Bombs

Each bomb adds 550 pounds to your fighter. Not only will the added weight and drag reduce your aircraft's climb rate and speed, it will impair its maneuvering ability as well.

Dropping Bombs Over Friendly Territory

If you get jumped by enemy fighters and you want to ditch your bombs over friendly territory, do not fear; your bombs will do no damage to your own country's ground facilities or in-flight aircraft, though they will destroy friendly aircraft on the ground. Be careful that you don't destroy yourself by jettisoning your bombs while you're too close to the ground (usually less than 300 feet).

Dive Brakes

In *Air Warrior*, four fighters are equipped with dive brakes: F4U Corsair, P-38 Lightning, F-86, and MiG-15. On all, except the Corsair, you deploy them by pressing the <Spacebar> and holding it down. The dive brakes stay deployed until you release the <Spacebar>. The 38's dive brakes are actually a specialized flap designed to modify the airflow over the wings and restore pilot control at speeds above 375 knots.

Corsairs used their landing gear doors as dive brakes. Hitting the semicolon key (<;>) opens them and hitting it again retracts them.

COMBAT TACTICS

When you ask *Air Warriors* about fighter tactics, most of them will tell you to “Read Shaw.” They are referring to the book, Fighter Combat: Tactics and Maneuvering by Robert Shaw, published by the Naval Institute Press.



Bingo pummels another victim

A thorough discussion of fighter tactics is beyond the scope of this manual. Nonetheless, the following should provide a useful introduction to survival in arena *Air Warrior* play.

STYLES OF FIGHTING IN *AIR WARRIOR*

There are 2 main philosophies that are followed in Air Warrior. One is Turn fighting, the other is Energy fighting.

- Blackcat

In *Air Warrior*, you’ll often hear the term stallfighting. It refers to a style of fighting in which the pilot makes many high G maneuvers, eventually slowing to just above stall speed. This is also known as angles fighting.

The other predominant style is called energy fighting, meaning that the pilot prefers to make high speed attacks and employ low G maneuvers in order to preserve energy. Associated with this style is the "Boom and Zoom" (B&Z) attack where the attacker makes a high speed firing pass (Boom) and then extends away in a low G climb (Zoom).

Air Warriors differ over which style is best.

An energy fighter can attack a large number of enemies of equal skill and survive to fight again, while a stallfighter cannot. Thus, energy fighting can be performed by as little as one person successfully, while stallfighting requires a numerical advantage to be successful in the long run.

- Anvil

In Air Warrior, the important thing is that you derive the maximum entertainment for your dollar. Thus, if you find that going up, find the first enemy, and then getting into a stallfight with him (them) is your cup of tea, then by all means do it.

- Brooke



When it comes to stallfighting Spits in a P-38, few do it better than Dead Duck

SIZING UP THE FIGHT - SITUATIONAL AWARENESS

I look at three things: aircraft, energy, and numbers. If I have two of the three in my favor, I engage.

- Warlock

The most important skill of the fighter pilot is a keen sense of situational awareness (SA). This is the ability to rapidly assess your advantages and liabilities at all

times. It not only means knowing when to fight, but also when to avoid a fight or disengage when the fight is going against you.

Numbers

One of the biggest, if not the biggest, factor in combat is NUMBERS. Given equal planes, alt, and speed, the side with MORE planes has a built-in advantage. You can reduce or overcome these odds with coordination and tactics, but that requires SKILL. In a 3 on 2, I'd choose to be in the pair of aces against the trio of average pilots. In the 5 on 2, however, I'd choose to be in the average group. Things change with different alts and speeds, but Murphy always favors the simpler approach. In AW, that's embodied by numbers.

- Anvil

Obviously, if you enter a fight outnumbered, you begin at a disadvantage. Everyone knows this and most everyone can count, yet most new pilots fail to perceive what the numbers really are. New players are often astonished to discover that suddenly a gaggle of enemy fighters has appeared as if teleported to a fight that numerically was in the newbie's favor only minutes ago.

Part of this is due to conditioning by stand-alone air combat games that present the player with a series of balanced situations. Generally, however, the problem is simply lack of experience with the tools of the game.

I'm watching my radar most of the time when I'm on my way to a fight, and I'm checking it constantly during a fight - especially while extending after a firing pass.

- Vossman

Check the radar at least once every ten seconds.

- DoK GoNzO

Radar is the most important tool in assessing numbers. Even if you're out of radar range, or your radar has been knocked out, the radar screen continues to provide you with the numbers of enemy and friendly planes in your sector. Rest assured that if you enter a fight at an advantage, yet see many enemy plane counters in your sector, your apparently overmatched foe will be on the radio, urging his nearby comrades to join the fight. Paying attention to plane counters becomes even more important when you're fighting deep in enemy territory. Enemy planes have a lot less distance to cover to enter the fight than friendly planes.

Energy

Misjudge the enemy's energy state and it's Stiff City, campers.

- DoK GoNzO

The basic concept of energy is discussed in the ACM section, but it becomes much more complicated when you have to worry about more than your energy state relative to that of a single bandit.

A superior energy state can mitigate the advantage of number. Even outnumbered, a pilot with a substantial energy advantage can dictate the fight. Conversely, any number of low and slow fighters can do little to kill a higher and faster foe who doesn't wish to be shot at.

The thing to keep in mind when you have energy but not numbers is that you can attack only so long before your advantage disappears. Each firing pass you make reduces your total energy, while each passing minute allows enemy planes to improve their energy states. As with all facets of situational awareness, the trick is knowing when it's okay to attack and when it's time to leave.

Aircraft

Almost every fighter in *Air Warrior* has its own individual mixture of assets and liabilities. The Focke Wulf, for instance, cannot turn worth a damn, but it's fast and it has the most lethal armament in the game. A Spitfire is not as fast as a Focke Wulf and has a much lighter ammo load, but it can easily out-turn the FW. Thus, a fight between an equal number of Focke Wulfs and Spitfires at equivalent energy states is not an equal match. A successful *Air Warrior* pilot must learn the good and bad points of nearly every plane in the game, and how the various planes behave in combat.

One trick is understanding how planes move in a fight. You can get an idea about this by over-flying a battle. This will give you a ring-side seat and allow you to observe. Soon, you will notice that planes enter and leave the fight in some fairly predictable (i.e. targetable) ways. When you can recognize these patterns from afar, you are moving away from being the hunted and toward being the hunter. Even if you can't handle your plane very well yet, understanding the FLOW of battle can help you stay alive long enough to perfect your other skills.

- DoK GoNzO

SPINS AND STALLS

The nature of air combat in World War II was often dictated by the limitations of the aircraft. Flying under real-time conditions in *Air Warrior*, you encounter many of the foibles of piston engine fighters, and you have to take the same measures the original pilots did to recover when you push a plane beyond its limits (for a discussion of Realism/Difficulty elements, see Section 2 of the *Operations Manual*).

Yes real WWII pilots did try to avoid spins and stalls a lot more than we do in our sims. BUT they didn't avoid them _that_ much. There are plenty of accounts of people going vertical and watching the enemy spin - out below him....there are accounts of people trying to turn too tight and spinning.....believe me pilots did spin....but not just as much, because they were dealing with their real life.

- MadDuck

Recovering From a Spin

The problem here is that airflow over the wings and control surfaces is insufficient to support sustainable, controlled flight. Push the stick forward and try to work the plane into a dive to regain airspeed and airflow. At the same time, apply rudder in a direction opposite that of the spin. Also, it may be essential to cut throttle, because the engine's torque can drive the spin. When the plane stops spinning, center the rudder. As airflow over the wings returns, ease back on the stick and increase throttle.

Many pilots prefer to recover from spins using opposite aileron (rolling the plane in the direction opposite the spin) control alone.

Recovering From an Accelerated Stall

Again, you must restore lift-sustaining airflow over the wings in order to restore control over your aircraft. Try to pitch the nose forward in order to reduce the angle of attack of the wings. As your aircraft begins to recover, be extremely gentle in your stick movements until you've regained full control.

DEALING WITH RED-OUTS AND BLACKOUTS

Here too you lose control over your aircraft, but with red-outs and blackouts the pilot, not the plane, has been pushed beyond tolerance. You must wait until you regain consciousness before you can recover full stick and rudder control.

Many new players, especially those with experience in jet sims or actual jet aircraft, find the G limits in *Air Warrior* to be too low. Today's fighter pilot, employing the latest aircraft, G-suits, and G tolerance procedures can endure 9 G's or more for a substantial period of time. *Air Warrior*, however, relies on data from World War II, when cockpit seat positions were nearly erect, no meaningful G-suits were available, and G tolerance procedures had not yet been developed. Thus, in *Air Warrior*, you can withstand up to 9 G's for very brief periods of time, but you cannot sustain G levels above 6 G's.

WORKING WITH OTHER PILOTS - WINGMAN TACTICS

2 Versus 1

You've got two planes. You find some poor slob out on his own. Now, the objective is to maneuver so one of you forces the bogey to give the other of you a tail shot. There are only three useful situations. In order of preference they are:

- Drag

The bogey is on your wingie's tail. You get on the bogey's tail. Works best when you are in faster planes than the bogey. Advantages: bogies sometimes fixate so badly you can hammer on them 'til they die, and they never will break off. Disadvantages? Well, you wanna be the guy at the back...

- Assisted Waltz

Your wingie gets the bogey in a stalemated nose-to-tail turn. Meanwhile, you boom and zoom. You have at least a 50% chance of a tail shot on each pass. Advantage: obvious. Disadvantages: the wingie is in trouble if he loses the fight or another enemy stallfighter shows up. To be used only when the wingie has angles performance parity or advantage.

- Pincer

Your wingie attacks the bogey head on. Meanwhile, you slip in on the bogey's tail. The bogey is fixated on your wingie, so he won't see you. Advantage: you hit the bogey both ways. Disadvantages: timing is difficult, firing opportunity is short, and you may shoot your wingie in the face by accident (or worse, vice versa).

- Owl

2 Versus 2

Generally, if the two targets are dissimilar (i.e. a Spit and a Focke Wulf or a Mustang) you kill the plane with the best turn performance first. Say 2v2, all Spits, you go for the higher one first. If they are both at the same alt, and you have the E advantage, you both B&Z them. If they are co-E with you, it's jokers wild.

- Vossman

I try to ALWAYS kill the quickest turning plane first, because ALL fights eventually migrate down to a stallfight.

- Buckaroo

Take out the plane you can get the quickest.

- Warlock

The point is that one real good replacement for timing and communication is THINKING (... don't leave home without it).

If you're anticipating what the enema(s) are doing, why not also anticipate where your wingman (or -men) are doing to? F'rintance, you're both in Fw's and just did a head-on with 2 Spits. You both dove in to contact, but you had more alt on the in-run. This should tell you that you're wingman will probably extend further than you will (unless he's into sewericide). This opens options for a drag or an iso (if the Spits are greedy), or a box-in (if they're cagey).

Another neat thing about thinking like this is the kind of info you need to give each other on the radio is greatly reduced. About all the 4Q used to say on the 'comm was if they were going vertical, going flat, diving away, or coming back in. I was amazed as I toured other countries how much useless blabbering there was going on.

If both people (or all 4 people - whatever) are all THINKING, all you gotta do is keep each other informed of status and the collective intellect should take care of the rest. Now, this obviously will be a problem to the thinking-impaired - so be it.

Another aspect of this is playing a role within a section. If your wingman is obviously gonna get to a booger first, don't bother going down co-alt and trying to saddle up. If he's in trouble - OK. But otherwise you're just getting in the way. Make fast passes, and then get back to covering altitude. Repeat as needed. If your wingman knows he is clear to shoot, and you'll tell him of approaching boogers, then he can work. If you tell him you're gonna make a pass, he can time his move to when the booger breaks to avoid you.

Again - its thinking that will rule. Y'all can read all the fancy crap you want, but in the end this stuff breaks down real simple. Hell, I've read Shaw and all of it too.

The fact is that we don't have ideal comm' here. That's gonna get worse with real time because there's less time to type. With reduced visual range odds are you're gonna get jumped a lot more - so pre-planned moves will fall apart quicker than a Clinton cabinet appointment.

It's good to understand all the fundamentals, but you also have to apply it to the environment in which we play. The iso (isolation) is one of the niftiest gimmicks and yet very few people have caught on. Next time one of you yahoos goes chasing after a plane that for some reason is doing an extra long extend, and you're nattering away at it on ch.1, ask yourself what's happening to your wingman who took the OTHER guy you

just did a head-on with. If the guy on the extend knows his stuff, he can go vertical, reverse and come back to the ORIGINAL fight and help finish off your wingman while you're still sucking your thumb. And the only thing better than a 1-pass kill, is offing some dwark right in front of his wingman.

Oh - and don't forget that FEAR WORKS - if you're covering your wingman, just circling menacingly over his fight adds FEAR to the booger's craven little heart. He knows he can't run. He knows that he's an instant away from a Rheinmetal enema. He knows that even if he hits your wingman, he'll probably die anyway cuz you'll come down to help. And if you're at a decent altitude, friends of the corpse-to-be will likely be bluffed away.

- DoKiOr GoNzO



Holmes "offing some dwark right in front of his wingman"

Yeah, there's a certain melding that goes on when a coupla e-fighters are working well together. Never much said, just a feel for the drag and reverse. Spell, Hammer, and yo, when we were the Munda RNZAF Jugs worked the pendulum pretty good. Lately I've been flying e-pair with Shaky and it's starting to click tween us too. It's a keep the faith kinda thing. Never let yer mate get in over his head, and never let yourself get too slow to where he's gotta risk himself to save you.

- Holmes

THE VETERANS SPEAK

Most ride the edge constantly in furballs, or at least I do, using rudder, flaps and throttle to better their position. Blacking out is not advised however, because your turn rate actually decreases while you're blacked out due to controls locking, or at least mine has in all the films I've made.

So if you're say in spit vs spit, every accelerated stall or blackout you make gives up turn rate which gives up angle and gives your opponent more edge.

In this case he who can ride the edge better wins. Someone who's real good at it can outturn a guy even in an inferior turning plane. I use speed control to try and keep my speed at max turn speed and stay slow enough to be able to get max turn rate without blackout. An inexperienced Spit Jock will not notice that his spit simply doesn't burn E and slow down, and that the guy behind who is slowing down will thus outturn him until the spit does slow down. By that time he should be dead or you should be changing tactics.

I use an enemy's speed against him whenever I can, if he's faster I'll use his lack of turn rate, if he's slower, I'll get above him and use that too. Like a climbing spiral with me watching him out over the wing, not quite able to pull a shot on me, then the instant his nose drops or he can't maintain his climb and banks away etc. I'll drop a notch of flap and sorta barrel roll over on him and nail that 1 pass kill. <g>

The tactic I choose depends on the planes involved and the E difference between us.

- Killer

I'm a stall fighter and I'm forever riding in, on, under and over the blackouts:) One of the secrets is just knowing where you are when you go in.. and basically where you will be when you come out. I used to count seconds but now I just go by instinct. Spins are a pain as they come at the most critical times of a dogfight. On the other hand spins can be a fair escape mechanism..as long as you don't come out of it in front of your opponents guns. Sometimes that is balanced when you end up on his six tho:)

- HardRock

The first thing that hits Air Warrior pilots when they first fly in full realism is that their old styles usually don't serve them very well.

When I panic, I go into Default mode (flat turns.), run out of E, stall, spin, and crash. >:(I need a sign on the monitor that says, "Use the vertical Luke". Realtime does lend itself to better E Management.

- Bebop

One major thing I've noted, the old yank and bank definitely don't work here. You cannot hope to just follow your opponent around, hoping to cut inside his turns or loops. You have to think FAST in 3 dimensions, and maneuver to put yourself at a point in space that will allow you to get a shot at your opponent. This requires you to project where the opponent will be X moments in the future.

- Rapier

Flaps aren't what they used to be, but in the 38, 51, F4u and others a notch of flap works real well. That and a good chop on the throttle can yank you in behind a lot of stall fighters long enough for the kill.

- Killer

Once pilots learn how to use the vertical in realism, and how to avoid blacking out and departing, the next hurdle is breaking the deadlock of a looping fight — what some players call, “Loop Warrior.”

An alternative to looping is to extend out and come back for another pass... in a 1v1 head on, you might try a climbing turn... as the other guy loops over you, and starts back down, you can roll over and nail him... of course, if you miss, you end up following the guy around and around... The other thing I like to do is to provoke the enemy into a spin... Then shoot him as he recovers... it's doable... I need more practice myself to develop a sense of what I want to do... this stuff is certainly different from what I “grew up” on in 870.

- Cap'n Trips

I hit a notch coming over the top a lot, and also coming through the bottom along with a chop of throttle to maintain just enough speed to get over again and still maximize turn rate. It depends on speed and what I'm trying to accomplish anglewise. Also you can use a stall to drop your nose fast once you've passed vertical as well, but it takes practice.

I also use a notch in a 51/F4 when I chop throttle to yank in behind a F6F or 38 to get my turn rate inside theirs (if only temporarily) and get a good shot in, After which I immediately raise em, roll out and go nose/nose with my nose a bit down to get some sep and speed (if he isn't dead yet), and set up a scissors angle on him if he lets me.

You see you can hold a spit in your sights this way for a pretty good while in a 51 as he can't get his max turn rate until he slows down some, which the spit won't do unless he also chops throttle. In a nose down turn you can keep inside a spits turn pretty well if he doesn't control his speed, a very good pilot will, or he'll work vertical or a nose up turn, and you'll have to spot that and get out fast with nose down nose to nose turns until you get the speed and angle for disengaging.

This works to varying but less degrees with the Fw and 47 as well, better in the F4, and a spit pilot who uses speed control with good ACM maneuvers can be damn near unbeatable, at least 1-1 anyway.

You can practice all this on the offline drones pretty well, but they aren't nearly as smart or aggressive as online folx are.

This is all in realtime BTW, where throttle is as much or more important to turn rate than flaps, that stuff will get ya dead in 1/2 time muy pronto.

(why do I tell stuff like this to guys who will use it on me? death wish I guess) <g>

- Killer

TIPS FOR BEGINNERS FROM THE ACES

Those of you just starting in Air Warrior may at first be frustrated by a lack of success (meaning, you're getting killed a lot!) Take my word for it when I say that this was the case for 99% of the pilots in Air Warrior.

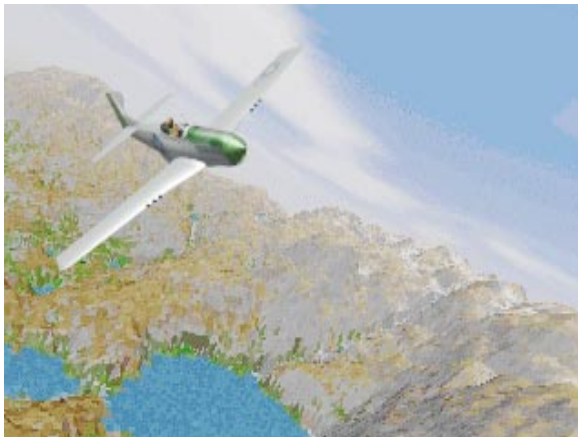
The major cause of this is a lack of understanding of exactly what it means to be in a "Multi-Player" environment. Most of us are used to arcade type electronic games, where the skill to be mastered is to point your gun at a target and hold the trigger until it dies, and where tactics mean discovering "tricks" which the computer controlled bad guys always fall for.



The deadly ace, Bessie, of the Wisconsin Air Force, courtesy of Bug

Neither of these arcade-game types of gameplay work in Air Warrior. That's because in Air Warrior you are pitting yourself against another live, breathing, PLOTTING human being, who has the same possibility of taking you out as you have against him. In addition, he may be working with other human wingmen to destroy you, and your only defense is to work with your wingmen more effectively. This is what Multiplayer games are all about, and you'll never be satisfied with a stupid computer controlled opponent again. Welcome!

- BlackCat



Frying Tiger's artist's conception of Air Warrior in the year 2000

Practice, practice, practice. YES! For newbies, pick ONE plane and learn it backwards and forwards. Get used to it at all altitudes and speeds. Practice low-level stuff a LOT - go under bridges and between buildings. Practice high-speed stuff a LOT - some planes which turn great slow can be out-turned at high speed. If you bounce from plane type to plane type it will take longer to get the basic skills needed to compete.

- DoK GoNzo

There are two things you need to do to be great at this game. The first is learn how to beat anyone 1:1 by forcing him to fight on your terms. The second is never get caught in a bad odds situation. Be aware of what's going on around you, and don't fly into multi-enemy groups alone. Ask questions. Fly with good players and try to beat them to the kill. Never give up. This game really isn't that hard but it SEEMS hard when you are new.

- Grog

- 1) Duel a friend and FILM it.*
- 2) Download films from the aces and watch their control movements, NOT the action. Also, go to the outside view; you learn a lot more from behind.*
- 3) Watch these films about 50 times 'til you can remember them by heart.*
- 4) Try to find out WHY you die.*
- 5) Befriend an ace. Laugh at his bad jokes, wink at him when at the bar, tell him repeatedly, "Awh shucks, you're the greatest Mr. AirWar Ace Sir..." Buy him drinks at the Cafe 'til he's so drunk he will tell you all the Secrets of the Universe (in AW). Then, leave him like the Femme Fatale would.*

- Buckaroo

Advice: Look more often. When in a dogfight, I would say I spend 90% of the fight watching him and only 10% looking out the front. It is VERY important to learn the view keys backwards and forwards.

- Ironman

In Air Warrior you get to benefit from your fatal mistakes. Real pilots, of course, took their newly-learned lessons with them to their graves.

- Anvil

Don't fly into the clouds; there aren't any.

- Volstag

PLATEAUS

What it comes down to is that at a certain point in Air Warrior life, every player hits the wall. "I keep getting killed even though I get kills now." "I auger too often." "I lose track of enemies." "My dive-bomb accuracy is too low." And so on. More often than not the problem is not skill-related. It's technique sometimes, but usually it's just a matter of retraining the thinking process.

- DoK GoNzO



Miss Invader, high over B-Land

When All Else Fails

You can work and work at this game, but your most memorable missions will involve the most important tool of the fighter pilot: incredible luck.

from the twilight zone - all true - consider if you will -

Man I had me one helluva Corsair ride last night. Check it out -

I ain't flown the F4 in real much, my technique is terrible. So here I am heading into A6 heavy, gonna keel something. Ratch had died there, Mav <i think> was returning from there, I dunno where the hell everyone else was. I'm hollerin, tryin to get 6 captured when there were no Az around and startin to get a lil pissed cuz I can't get no replies bout nobody's statuses.

On the dive Mav tells me that ack is still up. That's all I needed to hear. Put the X on the spot, ack comes vis, release. No bombing the ceiling, fug. I was pullin a lil positive gs, still didn't work. Now I'm in ack range and I cannot for the life of me release the eggs. Ack starts popping me and an A P-51 comes in.

I loop over to try again to get my eggs to release. Figure I'm ded, least I can git the ack. Stall, spin, blackout, recover, and my FE is locked into the back/up view. I'm hitting every key trying to get the forward view to come back, no luck at all. Redout, blackout, boom, boom, I'm hearing all these explosions, my screen is blacked and I expect to be ded any second. Now I'm really pissed off, screw it, I hold down the trigger and start mashing the bomb release button.

Finally my eggs cut loose. Still blacked out I hear a few more explosions, expecting each one of em to be me blowin up. Then, silence. I release the stick and the blackout clears, I'm flying straight and easy, forward view showing finally.

I dunno what happened so, I hit the text back buffer. There it shows me with 2 Keels has been recorded!!! I look back and sure enough, there's a crater where the ack used to be! And the P-51 got hit during my spraying rage and crashed!

All this while either blacked out or looking thru the Back/Up view. The ack keel was amazing. I just flung them eggs off with no idea where they might end up. One of em happened to land exactly on the ack, dunno where the other one went.

Raced back to B2 where 3 az began to chase me. Suckered em all the way to B1 where they turned back cuz the ack.

The most incredible flight I've ever had.

- Holmes

ETHICS (SUCH AS THEY ARE) IN AIR WARRIOR

Folks new to Air Warrior often have a set of expectations regarding other players' behavior in the game that is better suited to tennis than it is to air combat.

Actually I prefer the no-chivalry attitude. It more closely reflects the air war in WW II. I for one have NEVER seen an enema aircraft pass up a vulch run on me when I have the bad taste to appear at a field with enema overhead, nor would I expect it. "Oh, there you are, please hurry and climb up here so that I have no advantage and we can have a fair fight to the death, old sport. Not to worry, if you run out of ammo, I'll wait while you replane." Please.

- Jedi

I don't care who you are, what you say, or where you are...if you get in front of my FW and I have ANY kind of advantage, I'm gonna come after you. This includes:

A. Taking off, landing, playing with yerself on the runway.

B. Ammoless, gasless, or clueless

C. Involved with another plane, or just really "good friends"

- Shaky Stick

You might come onto AW after a very bad day at work, or school and go shoot down some parachutes floating down from a bailing or just go after the smokers, sick and wounded trying to return to base. Hey thats better than kicking the cat down the stairs. Or ya might come online and brag about every kill on channel one, shoot smokers down and then an ally and finally there's still that cat ya haven't kicked yet.

So what, enjoy, what ever turns ya on, its a simulation and a game. If you decide to be an Air Warrior jerk then everyone will come hunting for you and you will learn to fly for your life, write a book about your experiences and then kick the cat.

- Scavenger

In a similar vein, newbees often expect friendly aircraft to come to their aid, even if the bad situation the newbie finds himself in would also turn into a bad situation for any prospective rescuer.

Lookit ... if you're gonna commit to a fight, it is not a fair assumption that everyone else on your team will come to your aid. Your squad maybe, but that's it. There is no logic to this. Why on EARTH would someone keep coming to your aid if most of the time they find themselves in a bad situation (low and slow and outnumbered) when they do?

If you get yourself in deep doodoo and odds are you're gonna die anyway, you OWE it to your side to not drag more people down with you. When I find myself in spots like that the MOST help I'll ask for is a few high speed runs to scare enemas into making a few turns so I can extend. Usually it's just: "don't bother, I'm dead anyway."

- DoKiOr GoNzO



FIGHTER REFERENCE

FIGHTERS OF LEGEND VERSUS THE FIGHTERS OF *Air Warrior*

The reason 'our' Jug stinks is that the real Jug would have stunk if it had had to perform in our arenas. The 'virtues' of some of our favorites disappear in the small world of AW.

- Eyeballs

Many new *Air Warrior* players are disappointed to discover that their favorite planes from history are not always the top performers in the *Air Warrior* simulation. For example, the P-51 Mustang is often depicted, quite rightly, as the fighter that won the air war in Europe. Yet, most new players find themselves hopelessly outclassed if they fly a Mustang in the *Air Warrior* arenas. One reason for this sort of discrepancy with the historical record is that in the actual war, with some extremely rare exceptions involving captured aircraft, Mustangs never fought Spitfires, Lightnings never fought Hellcats, Focke Wulfs never tangled with Me109's.



In arena play, *Air Warrior* fighters are not facing their historic adversaries. Second, and perhaps more importantly, *Air Warrior* fighters are not filling their historical roles in the arena. The Mustang made its mark as a high altitude escort fighter capable of flying to Berlin and back. In *Air Warrior* arena play, people are

paying for their time online. Thus they're not climbing very high, and they're looking to get to the fight fast. Performance alone does not make an aircraft valuable in war - its ability to serve a needed role well does. The vast majority of the time we only look to one role for fighters in *Air Warrior* — low altitude dogfighting.

Finally, in actual World War II air combat, the vast majority of kills were achieved against opponents who never saw what hit them. Few WWII aces got their kills by dogfighting. Rather, they were masters of seeing the enemy before they were seen, positioning themselves so that they were difficult to see (diving out of the sun, for example), or attacking enemy aircraft that were otherwise occupied, such as the Mustang's primary target — bomber interceptors.

If you get a bunch of 47s up above 30K and see some 109s diving on buffs at 25K and you get on their 6 before they see you and then the 109s try to dive away to safety, THEN you will see how wonderful the 47 was!

-Eyeballs



SPITFIRE MK IX



Every player has his or her own plane which they endorse but the Spitfire is the best all around fighter.

-Grog

The Spitfire MK IX has the best qualities in just about all the areas needed to win.

-Ghost Rider

If you fly the spit you are fly'n the badest ride in the game, and eventually you should be able to turn the tables in your favor. About the only thing the Fw has on the spit <performance wise> is its top speed and dive speed; other than that, the spit wins hands down in all other categories.

- Vortex

Aside from a light ammo load, the fundamental reason an *Air Warrior* pilot would hate the Spitfire is because it's too good an opponent. The Spit is fast, extremely maneuverable, and cannon equipped, making it the most popular plane in the European Theater.

History

Reginald Mitchell designed the Spitfire based upon his seaplane - the Supermarine S6 - that set speed records and won the Schneider Trophy in 1931. Unfortunately, he died in 1937 before his remarkable creation ever saw combat. Mitchell hated the name, Spitfire; he preferred "Shrew."

Though his fighter would have been just as deadly no matter what it was called, perhaps the Luftwaffe should be grateful that their pilots never had to report that they had been attacked by a flight of Shrews.

The Spitfire in *Air Warrior* - Half-Time Arena

The Spitfire dominates the European Theater of *Air Warrior*. Traditional weaknesses of the Spitfire, such as its limited range and narrow track landing gear, are not a factor in the game. One historic drawback of the plane is relevant; the Spit carries a light ammo load and loses more than 80% of its lethality once half its ammo is gone.

In every aspect of air combat the Spitfire excels. It has a high roll rate, excellent maneuverability, rapid climb rate, good speed, and guns second only to the Focke Wulf for sheer lethality. Although the Spit holds onto energy very well, most pilots use it for turn-and-burn dogfighting — what many *Air Warrior* players refer to as stallfighting.

The Spitfire Under Full Realism

Virtues

The Spitfire holds energy better than any fighter in *Air Warrior* — realism or no realism. It suffers less induced drag than any fighter in Europe, and can boom and zoom brilliantly, though, given its superb dogfighting abilities even under full realism, few pilots choose to do so. This is one sweet plane to fly. It handles extraordinarily well and can half-loop at speeds as low as 150 knots.

Unlike earlier marks of the Spitfire, the Spit IX has a decent sized fuel tank. It's also a good fighter at very high altitudes — better, in fact, than the Mustang.

Vices

Only one thing prevents the Spitfire from being the most popular full realism fighter in Europe: ammo load. It's not simply that the Spit has a short clip. Rather, it's the enormous plunge in lethality the Spit suffers after half of its ammo load — its cannon shells — is gone. This is why many pilots refer to the Spitfire as the one kill wonder.

Also, many pilots have trouble with blackouts in a Spitfire, owing to its ability to pull high G's at low speed. Finally, as its speed gets higher, its controls get stiffer until you lose virtually all control over the plane around 450 knots. This tendency toward control stiffness at high speed puts it at surprising disadvantage against its traditional opponent, the Focke Wulf 190.

Tips

Given the oft mentioned light ammo load, the Spit works best for pilots who are good shots. Although the Spit has a small supply of ammo, its guns are potent, rewarding the sniper rather than the sprayer.

Stay off of the flaps when flying a Spit, except to get over the top on low speed vertical maneuvers. The Spitfire has no maneuvering flap setting, and its flaps down position is intended to create increased drag for landing.

Armament: two .50 cal. machine guns; two 20 mm cannon. Ammo Load: 500 machine gun rounds; 240 cannon shells.

Payload: One 550 lb. bomb.

F6F-3 HELLCAT



Ya gotta love the F6... will feel nary a bit of trepidation when finding 38s, F4s, or Kis at co-alt & E.

- Kato

F6 has a decent ammo load and takes a decent amount of damage plus two eggs and handles real nice, one of the more forgiving planes to fly. Low speed turning, it's competitive with the Ki and 38, proolly fuel and ammo load and pilot skill would determine the outcome. It also handles well at higher speeds.

In other words, I LIKE it <G>

-Spellbound

History

Descended from the Wildcat, the Hellcat, like several other American designs, owed much of its success to its engine — the Pratt & Whitney R-2800 Double Wasp. In contemporary terms, the F6F is a Wildcat on steroids, with nearly twice the horsepower to go with its power plant's legendary durability.

Though many people consider the F4U Corsair the epitome of American WWII naval air power in the Pacific, the Hellcat was, far and away, the Navy's most successful fighter of the war, accounting for over 6000 air-to-air kills. It was this homely work horse that stole air superiority away from the sleeker, more nimble Japanese Zero.

The Hellcat in *Air Warrior*

The F6F is the best example of the phrase, "the whole is greater than the sum of its parts." The 'Cat is not fast; only the Zero is slower. Both the Ki-84 and the Zeke can out-turn it. The Corsair and the Lightning can out-climb it. Nonetheless, the Hellcat is a popular selection for fighting against these planes because of its combi-

nation of attributes — though great at nothing, it does everything well. It has a good climb rate, turns beautifully — particularly at high speeds — is very durable, and possesses, along with the Corsair, the largest ammo load of any fighter.

The F6F-3 Under Full Realism

One historical aspect of the Hellcat comes sharply into play under full realism — it is extremely forgiving. Unlike many fighters, you can really horse the 'Cat around. While it is capable of some rather determined spins, it will accept much mishandling before it enters one.

Virtues

Aside from its easygoing departure characteristics, the Hellcat dives well and has a remarkable ability to turn at high speeds. It can absorb a lot of punishment, and has a plentiful supply of ammunition.

Vices

Although many players stallfight in the 'Cat, it can be easily out-turned at low speed by Franks and Zekes. It also bleeds energy relative to the Corsair, Mustang, and Lightning. Finally, despite its reluctance to depart, the F6F can get into nasty spins if pushed beyond its generous limits.

The Hellcat Against Other Allied Planes

The 'Cat has two important strengths: range, and as already noted, ammo load. It lacks, however, good high altitude performance. The Corsair, Mustang, and Thunderbolt are all better performers above 35,000 feet.

Tips

If'n I'm in that Zeke, and some dweeb in a Cat tries to turn with me...that puppy is DEAD! DO NOT stalfite with ZEKES, the other pilot may NOT be a dweeb and let you go for the head-ons. If you don't get the head-ons, you're a toasted cat.

The cat does do nicely with most other stuff, tho...although the Ki seems to out turn it by a hair. Keep the speed up to 225 and you'll keel like crazy in it.

-Shaky Stick

Keep the 'Cat fast. It achieves its best turning performance at speeds between 225 and 250 knots. Even if it gets slow, however, it's not as helpless as a 'Stang, Jug, or Hog at low speed. You can devour those fighters in a stallfight, but be easy meat for a Zeke, or Ki.

Stay off the flaps. The Hellcat has two position flaps — full up or full down — and the down position is for increased drag for landing, not for maneuvering.

Armament: six .50 cal. machine guns. Ammo Load: 2350 rounds.

Payload: two 550 lb. bombs.

CHANCE-VOUGHT F4U-1 CORSAIR “HOG”



I love this plane because:

- A) It's blue*
- B) It's BIG*
- C) It's fast*
- D) It's ammo load is incredible*
- E) It's ammo is better than the Ki and P-38 after they lose cannon*
- F) It's blue*
- G) It can disengage pretty quickly because it's fast, big, and blue.*

-Buckaroo

Wow dept: I spent friday evening in a F4U, I had read somewhere the night before that, "If you like the FW, you will love the Hawg." I believe it was a quote from Killer. Anyway, I took the Hawg up around 10 times and had like 13 kills. This is by far my best F/K ratio night ever. The only plane that gave my F4 much of a problem was the KI, but I could normally B/Z them. Had to keep that speed up over 250 and didn't engage a KI unless I had alt.

The F4 is alot like the FW in terms of fire power and armor, but the F4 climbs and holds E better than the FW, I love the F4 now. I suppose this is nothing new to most of you kids, I just felt like sharing my new excitement. :)

-Gunner

History

The Corsair embodies the American approach to fighters in World War II: build an enormous aircraft and load it with an abundance of horsepower, armor and ammunition. Part of the Corsair's greatness is the result of a fortunate accident. The need to shorten its landing gear, due to the weight of the plane and its intended

role as a carrier-based fighter, was complicated by the enormous size of its propeller. The unconventional yet adopted solution was to bend the Corsair's wings into their now classic gull-wing shape. This also put the wing roots at exact right angles to the fuselage — a configuration later discovered to be ideal for reducing drag. The Corsair's sheer power was no accident. It's notoriously durable Pratt & Whitney Double Wasp radial engine produced over 2000 horsepower — one of the most potent aircraft power plants of the war.

The Corsair in *Air Warrior*

Though a few F4Us served in Europe, the Corsair is only available in *Air Warrior's* Pacific Theater. As in the actual war, the Hog in *Air Warrior* faces many aircraft that can easily out-turn it at slow speed, yet it's faster than its more nimble opponents, except perhaps the Ki 84. Thus, the Corsair must stay fast and avoid turning fights against all the Pacific fighters, save the Mustang. Only at high speeds does the Hog handle well. The F4U is an exceptional dive bomber and its advantages over the other two-bomb fighter bombers — the Mustang and the P-38 — are durability and ammo load. In fact, the Corsair is the most durable fighter in *Air Warrior* and possesses the most ammunition of any fighter in the game.

The Corsair Under Full Realism

In a full realism environment where planes cannot endlessly execute high G maneuvers, the Corsair is an even better fighter. Speed and durability, though important in any *Air Warrior* battle, become much more crucial when the going gets real. In fact, with the possible exception of the Me109, no fighter in *Air Warrior* benefits more from full realism than the Corsair. Many *Air Warrior* pilots believe that the F4U is clearly the finest full realism fighter in the game. Those who hold this belief, however, are among the most experienced of players. The Hog is only effective for pilots who know its secrets.

Virtues

Fast, and a good climber, the Corsair is also extremely durable; only the P-47 can take more punishment than the F4U. The Corsair dives better than the P-38, is faster than the Hellcat, and is more maneuverable in the vertical plane than the Mustang. Further, with its powerful engine and low drag gull wings, the Hog may be the best energy fighter of all. Also it has, along with the Hellcat, the most plentiful ammo load of any fighter in *Air Warrior*.

Vices

The Corsair's departure behavior is nothing short of horrendous; it takes both experience and skill to readily recover from spins in the F4U. The Hog turns poorly in low speed, flat turns, and is easy meat when it gets slow.

Tips

You can sharply improve the Hog's turning performance at low to medium speeds (160-200 knots) by employing one notch of flaps, though this will avail you little against Hellcats, Franks and Zekes. Use throttle adjustments in nose down turns to cut your turning radius, especially in a looping fight.

Against Zekes, employ the F4U's tremendous advantage in horsepower and climb rate to stay above your quarry. Against high Zekes, use the Hog's advantage in high speed maneuvering to make the Zeke bleed off its energy relative to you.

Against pursuing Franks at co-alt, you cannot outrun them, but you can climb out on them using a 3k/min climb rate and WEP if you begin this tactic from top level speed.

Armament: six .50 cal. machine guns. Ammo Load: 2350 rounds.

Payload: two 550 lb. bombs.

LOCKHEED P-38J LIGHTNING



In the Pacific, the P-38 makes the most sense because it has a lot more lethal ammunition than the Ki and, even though it has the roll rate of a 747, it's the most accomplished Zeke killer.

-Stiletto

The P-38 may be the best all-around airplane in *Air Warrior*, and it's a good choice for new players.

History

Referred to as the “Fork-tailed Devil” by the Luftwaffe, the P-38 was the only truly successful twin engine fighter of World War II. Relegated to primarily a ground attack role in Europe, the Lightning’s greatest success as a fighter came in the Pacific against lightly armed and armored Japanese fighters. Dick Bong, America’s most prolific ace, scored all of his 40 kills in a P-38.

The P-38 in *Air Warrior* - Half-Time Arena

Although not the best in any single aspect of performance, the Lightning provides perhaps the best combination of speed, climb rate, lethality, ammo load, pay load, maneuverability, and durability of any fighter in *Air Warrior*. Also, the 38 is the only American fighter equipped with a cannon, giving it a distinct, added punch.

The P-38 is the most maneuverable American plane in the game, but it's best used as an energy fighter. Be sure to watch your airspeed, however. Just like the actual aircraft it's modeled after, the Lightning suffers a loss of pilot control at speeds above 375 knots. Use your dive brake (<Spacebar>) to regain control or to improve the plane's handling in steep dives.

While the 38 has astonishing instantaneous turning ability, avoid prolonged turning fights against Spitfires and Zeros because both of these planes have far better sustained turning rates. Also, the 38 has the lowest roll rate of all the *Air Warrior* fighters. Get in the habit of using your rudder to help it out in a roll.

Its great range and ample ammo load can keep it effective over a long mission, plus it can completely dominate a Zeke or Ki in every department above 30k. Against German fighters it's a different story. While the 38 can outperform the Focke Wulf — particularly at high altitude — it will find itself overmatched in a high altitude dogfight with a Me109.

The Lightning Under Full Realism

Virtues

Even under full realism, the P-38 retains the best combination of firepower, ammo load, speed, climb rate, durability, and maneuverability of any fighter in Europe, and is a match for any fighter in the Pacific. It can maintain the vertical at astonishingly slow speeds as well, in part due to its flaps which, unlike most fighter flaps, add lift as well as drag.

Vices

Whereas the 38 is a great choice for new players in half-time, relaxed realism, it is strictly an expert's plane under realism. Its lateral maneuverability is diminished, its sluggish roll rate really needs strong rudder authority, and its departure behavior can be vicious if the pilot fails to take corrective action instantly. Further, the Lightning's legendary problems with compressibility in a dive become even more noticeable in real-time.

Two heavy engines out on the wings create severe problems for a P-38 entering an uncontrolled spin. In short order, an uncontrolled spin becomes an unrecoverable flat spin. You must take immediate corrective action because if you find yourself in a flat spin, the only choice you have left is bailing out of the aircraft.

Finally, the 38 suffers in the tough, high-lethality realism gunnery environment because it's such a large target.

Tips

Basically, two things help the 38 in a loop fight -

- * It has a really insane zoom ability (try a high-angle zoom from 300kts sometime)*
- * Flaps are really effective over the top and for the bottom half of loops The 38 can stallfight anything in the game using a nose-down profile for the fight and some flaps. It CANNOT repeat CANNOT fight a 109 in a nose-up turning situation. DO NOT COMMIT to a nose high turn. Rather loop over or under, try to rudder at the bottom/top of the loop and gain angles there.*

-Twist

Use the 38's maneuvering flap setting (one "notch" of flaps) at medium speed and its fabulous instantaneous turn performance to cut inside of your opponent. As noted above, the 38's flaps add lift as well as drag, so you will pay a price, but you can finish opponents faster in the realism arena.

Employing full flaps will give the Lightning a very low stall speed, which is very useful in getting over the top on a low speed half loop. While you can't flat turn very well at 150 knots, you can, however, go vertical. Be careful to keep your wings parallel to the horizon as you approach a stall or else the 38 will spin with determination.

Against co-alt Zeros, use the horsepower and climbing ability of the 38 to get above your opponent. A zoom climb, followed by a climbing spiral can be a very effective tactic here.

Don't be afraid to use the dive flaps (the <Spacebar> key) to keep your Lightning under control at very high speeds. Apply them for brief periods — only a second or two at a time — to maintain control at or above 375 knots. You can also use these specialized flaps as an effective dive brake for dive bombing, cutting your turn radius, or even as a method of slowing down in a hurry for a quick landing.

Finally, as mentioned earlier, make liberal use of the rudder to increase your roll rate. If you fly the 38 a lot, you'd probably appreciate a good set of rudder pedals.

Armament: Four .50 cal. machine guns; One 20 mm cannon. Ammo load: 1600 machine gun rounds; 150 cannon shells.

Payload: Two 550 lb. bombs.

P-47D THUNDERBOLT “JUG”



The only redeeming qualities of the P47 seems to have in AW are... 1. It IS tough, at least as durable as an F4, maybe even more so. 2. It accelerates very quickly in a dive. 3. Initial lethality from the 8 .50s seems good. 4. It carries two eggs. In every other category, it either stinks or is mediocre at best.

- Spellbound

The P-47 is a force to be fearful of while up high because of it's speed and firepower and the fact that nothing turns very well above 30ks. - Drum If you're gonna go hunt down a Jug, better get up _really_ high. Then when you think you're high enough, go climb another 10k. Then, if you didn't fly a Jug but thought a Pony would do the trick for you, think again. That jug is fast up there.

- Bingo

I have read a few books on how the pilots fell in love with the 47. Well, the fact is no matter what you flew, it's only natural to love it. You'd better, your life was in its' hands. There was always something about that type you could love. The 47 is fast at high altitude. It is heavily armored and it does have good hitting power right down to the last BB. But get it slow, or fly by yourself or try fighting in the weeds with it and your dead.

- JJ Flash

Like the Yak 9, the Thunderbolt is more an aircraft of historical significance than a viable choice in the arena. Also, like the Yak, its primary role is in history-based scenarios.

History

The P-47's nickname, the Jug, is actually short for Juggernaut, and not a commentary about its bloated, pug nosed appearance.

Although all fighters are designed with their power plants in mind, the Jug is a case of a fighter designed completely around an engine — the Pratt & Whitney Double Wasp R-2800, the most important American aircraft engine of the war.

Although its dimensions precluded sleek, low drag configurations for the aircraft that employed it, it overcame this deficiency with sheer muscle: 2300 horsepower on WEP in P-47D.

The Thunderbolt was the largest single engine fighter of World War II, and its appearance led many — particularly in the RAF — to dismiss the design as ungainly and ill-suited for a fighter role against nimble Luftwaffe aircraft, such as the Me109 and FW 190. What the Jug had, however, that the RAF fighters lacked at the time was range. It served as an able bomber escort until late '43 when the Merlin-powered Mustangs arrived.

Though the Jug had been displaced in its original role by the Mustang, it later surpassed its successor in the job the P-51 initially performed: ground attack. Whereas the Mustang's inline engine had made it vulnerable to ground fire, Jugs could absorb significantly more damage, and deliver a far more potent payload.

The Thunderbolt in *Air Warrior*

By the late 1944 era modeled in *Air Warrior*, the P-47 is obsolete as an air superiority fighter. As ground attack is limited in AW, the Jug has few uses in the arena beyond whimsy. It is supreme, however, in two aspects: it dives well, and can absorb the most punishment of any AW fighter. Also, it can carry two bombs, and its eight .50 caliber machine guns are potent, if you can bring them to bear.

The P-47 Under Full Realism

Unfortunately, the Thunderbolt benefits little from realism.

Virtues

Apart from its already-noted firepower, diving ability, and durability, the Jug is probably the most reluctant of *Air Warrior* fighters to enter a spin. It's an extremely stable aircraft. The P-47 is the fastest of all AW piston engine fighters above 30,000 feet, and it has the range for really long missions.

Vices

The P-47's stability comes at a price — this aircraft hates to maneuver. Turning ability is an oxymoron with the Thunderbolt, and half loops are an adventure, even if you begin the maneuver at 300 knots. Finally, despite its formidable guns, the Jug has a small ammo load for an American fighter. You'd get the same eight

machine guns, much more ammo, and better maneuverability flying an A26 bomber, not to mention six extra bombs.

The P-47 in Scenarios

If the Thunderbolt has a role in *Air Warrior*, it is in scenarios. Here, one of the Jug's noted attributes comes into play: high altitude performance. The P-47 is the fastest of all AW piston engine fighters above 30,000 feet. It also has the range to stay airborne over long, scenario missions.

Tips

With the Jug, you're going to compress in dives _right_ at 300 M.P.H. You need to be pulling two G's to avoid compressing over 300. Pulling two G's on and off's ok, but don't wait longer than the two seconds between pulls. If you're diving at more than 45° below 15ks in a compressed state, good bloody luck, and O yea; I'll tell your woman you said you loved her! <g> If you compress, throttling back is the only hope you have until your indicated speed reaches 300 again, or until your bird's angle of attack is above a 45° nose down setting. This is no joke, sorry, but I've tried all kinds of maneuvers in the Jug, and you're looking at compressing the bird at an even 300 for sure if the nose is pointing 45° down or more. (give or take a handful of these ^)

Try using one notch of flaps in your dives, you can stretch the Jug's unfriendly trait of compressing until 400 indicated speed, however from there it acts just like the 45° down, 300 compress bugger again. You'll need an indicated speed of 160 or less to deploy your flaps tho, so think ahead.

*The higher you are, the worse this compress problem will be, but one good point to know is when you find yourself in a steep dive while locked into a compressing wing-shaker; you will be able to recover at lower alts where the air is thicker should you deem it unsafe for throttling back. Just hope to h*ll your not within gunnery range while locked into that compressed dive, or some German Luftwaffe bastage will be singing his song. HORRIDO! So throttle work (speed control) is to be considered more important than simply firewalling the throttle because of a "faster's better" type of thinking. If you use that mentality with the Jug you'll be over-shooting your targets and more than likely finding yourself diving out below the bandit many, many hundreds of feet too low.*

Not the spot for a Jug to be, you might live, but you're no longer a threat to the enemy fighter because it'll be days before you can regain any alt advantage on him. In short, if you get _one_ shot; don't bloody blow it by over diving the pig. (your choice as to who or what the so called _pig_ is to discibe;) Most success I've enjoyed with the Jug has come from diving in on the bandit and setting up a flat, (co-alt) or slightly below shot. This allows me to stabilize my speed and then zoom climb out just after the attack. If the bandit breaks; you've the speed to climb out of harms way. If the bandit loops; you can follow him up with a good tracking shot, plus continue your zoom straight up as the bandit frantically finishes his loop diving out.

Last point; you can't pull more than three G's while turning at high alt (20+ks) or you'll notice the Jug will freeze! The elevator's will acted like airbrakes, and you'll slow into stall speed faster than you can say; this Jug's sucks! You must fully center the stick then gently pull into the three G's again, no more tho. When looking for a target, pick one off your wingman's six first, for there will be many to choose from should he screw up.

- Drum

Don't fly this plane in the arena unless you have a sense of humor.

If you do, work with a wingman and employ the Jug as a vulture magnet. Enemy pilots flock to P-47s and you and your wingie can be effective with a goodly amount of separation, and good communication. The 47's speed, diving ability, and durability make it perhaps the perfect choice for bait-and-drag tactics — the art of getting enemy planes fixated on one target while setting up a wingman for a shot.

On boom and zoom attacks, it's best to use the Split-S to reverse on subsequent passes, rather than tempt fate by trying to half loop this winged leviathan. If you get into trouble, point that ample nose down; the Jug dives like a wrecking ball, takes more damage than a T-34 tank, and you can often get away from even determined foes.

Armament: eight .50 cal. machine guns. Ammo Load: 1600 rounds.

Payload: two 550 lb. bombs.

NORTH AMERICAN P-51D MUSTANG



The P51D cannot out turn a Spit MkIX. The P51D doesn't have the cannon of a FW190A8. The P51D doesn't have the durability of a P47D. The P51D doesn't have the twin engines of the P38L. Lastly the P51D is neither big or blue. The P-51D Mustang is simply the best all around fighter plane in Air Warrior. Granted it is not for everyone. It does require skill and thinking to be flown well and survive. Remember though that as long as you fly it within its envelope, high speed passes and turning to kill, the plane is very deadly.

*Be watching your six for Mustangs.
Because nothing else can catch you.*

- Fencer

When I fly a P51 its usually because I feel the need for speed. That one quality the P51 excels at, if used properly, leaves you with complete control of your situation in almost any hostile environment."

-Killer

Probably the best known World War II fighter in the United States, the Mustang's name comes up all over the world when experts discuss which propeller-driven fighter was the best of the war. The aircraft's most remarkable attributes, however, do not always come into play in the *Air Warrior* game.

History

Though developed in 1940, the P-51 did not come into its own until late 1942 when the British, for whom the plane was originally built, decided to replace its standard Allison engine with the more powerful Merlin engine. Still, it would take American military leaders nearly a year more before they understood the virtues and importance of the Mustang as the long-range strike and escort fighter that would eventually change the course of the air war in Europe.

The Mustang in *Air Warrior*

Very often new players, familiar with the Mustang of legend, are dismayed when they fly the plane in *Air Warrior*.

Many of the Mustang's fundamental qualities, such as its splendid high altitude performance and enormous range, do not come into play in the main *Air Warrior* arena. Fights above 20,000 feet, where the 'Stang is at its best, are rare and players fly, at most, tens of miles to get to a fight, not hundreds. Further the game's lethality model favors cannon-equipped planes; the P-51 has machine guns only.

Nonetheless, the Mustang's assets can be employed effectively by pilots who know how to put them to use. It's the fastest prop fighter in the game at most altitudes, one of the most durable, and while its guns are not especially lethal, the 51 carries a lot of ammunition and holds onto its maximum lethality through 70% of its ammo load. Its speed also makes the 'Stang an unstoppable dive bomber.

Fly the Mustang with patience and use it strictly as a boom and zoom energy fighter. It was in this sort of fighting the Mustang earned the legendary reputation it so thoroughly deserves.

Flying the Mustang Under Full Realism

Perhaps more than any aircraft modeled in *Air Warrior*, the Mustang represents the difference between an essential fighter in war, and a useful aircraft in a simulation. The P-51's best attributes are seldom brought into play in *Air Warrior*, even under full realism.

Virtues

The Mustang possesses a superb combination of speed, acceleration, and smooth high speed handling, plus it holds onto energy extremely well. Unlike other fighters that suffer progressive control stiffness at high speeds, the Mustang's roll rate actually improves with speed. It is also a durable fighter with decent guns and a good ammo supply.

Vices

This is an aircraft that must stay fast to be effective. The 51 has vicious departure behavior, difficult spin recovery, and a terrible low speed turn rate. The Stang also resists half loops at speeds below 225 knots. Mustangs have a nasty tendency to

enter accelerated stalls and uncontrolled spins with little warning. In addition to the standard stick forward/opposite rudder technique to recover from an uncontrolled spin, you'll also have to reduce throttle sharply.

The P-51 has long legs, handles well at high altitude, and has enough ammo to get the job done. Against Japanese fighters, the 51 can eat them alive above 30k. Against German fighters, it's vulnerable to Me109s at high altitude, but it can handle Focke Wulfs with ease at almost any height.

Tips

The P-51 is the premier B&Z plane, but with speed comes blackouts. So here is an exercise that you will learn to avoid blackouts during a high G turn.

Climb above 10,000 feet, then start a nose low bank turn. You will want to keep your airspeed around 180. At this speed, try to pull as many g's as possible (should be around 4 g's sustained). Now, put your flaps down 1 position, and see how many G's you can sustain - should be around 6. Now hold that turn close as you can to 6 g's, all the way to the ground.

Keep practicing this until you can do it without blacking out. You should also try to change directions of your turn, and keeping G's high during the directional change.

Once you train your eye's to watch the G-meter, staying awake will be much easier. :)

-Rash

The 51 performs best above 155ias. Keep your eyes peeled for when the speedometer pegs out below that magical 155 number. As you start dropping to 155-150ias in a combat situation (and you should only if you're turning or looping) you should either be thinking "time to nose down a bit to build my IAS" or "time to deploy 1/4 flaps to keep me from stalling". Now, either of these situations are not good in combat. It means you're starting to blow it. But we'll talk more about fighting your Pony later. When you do get slow in the 51 it is extremely important to lay off the rudder. The 51 spins fairly easily at low speeds (below 155ias). When you are approaching stall you must be very careful with your control movements. Dump 1/4 flaps to help you turn around 150ias then start a low nose slice (low yoyo). Retract your flaps as you go low to build your air speed up quicker.

As you accelerate think about your energy state and expenditure of it. As in the previous example, potential energy is always better to have than kinetic. The more you nose down the more you spend. You could be doing something better like climbing and storing extra energy. So, as you regain better control of the 51 think about starting to go into the vertical again. Generally, in the 51 hard turns are a no no.

Turns in the horizontal are extremely wasteful of energy and given the fact that 95% of the planes in Air Warrior turn better at low speeds than the 51 this is a grave error to be making. You must constantly be thinking energy management in the 51. The 51

performs atrociously at best with anything more than 1/4 flaps. It doesn't possess the ability to flip over gracefully at low speeds with full flaps as the F4U does at the top of a loop.

If you ever find that you're deploying more than 1/4 flaps you may need to rethink your tactics. Spinning the 51 can be a trying experience at best. I've had times where I'm on the edge at 15k and just barely spin. I planted myself 30 seconds later in the dirt. I corrected one spin just to whack myself into a reverse direction spin over and over. Remember, lay off the rudder at low speeds.

- Bingo

Armament: Six .50 cal machine guns. Ammo load: 1880 rounds.

Payload: two 550 lb. bombs

MITSUBISHI A6M5 ZERO “ZEKE”



This sucker turns on a dime and, in the hands of a master, is a very awesome plane. Ghost Rider I have a LOT of fun with the Zeke. Trick is NEVER go to full flaps. You WILL outturn all others (except another Zeke) without full flaps. I LOVE outturning a 38 with one click of flaps, and moving at 120mph.

- Buckaroo

The Zeke is *Air Warrior's* pure dogfighter. Nothing turns as well and at such low speeds as the Zero, but nothing blows up as quickly if you make a mistake.

History

Although the Zero had been used by the Japanese for 18 months prior to Pearl Harbor, it came as a total surprise to the U.S. air forces. American fighters, such as the P-40 Warhawk and P-39 Airacobra, were ponderous, under-powered, outdated machines compared to the astonishingly maneuverable Zeke. American pilots did find an answer to the Zeke's dominance, but not through flying a more nimble airplane. Instead, they flew faster, more durable, and heavier armed fighters, and avoided turning with the Zeke altogether.

The Zeke in *Air Warrior*

The Zeke's deficiencies are many. It has the least durable piston engine in *Air Warrior*, the smallest ammo load, and is clearly the slowest of the fighters. It climbs poorly, bleeds energy quickly, and has sharply limited turning ability at high speeds.

Nonetheless the Zero is one of the most popular planes in the Pacific due to its phenomenal turning ability at low speeds. The Zeke is perfect for the sort of fighting most common in the Pacific: low speed dogfighting in tightly clustered, multiplane engagements - the so-called furball. It can do an Immelmann turn at under 120 knots and an alert Zeke pilot can get out of the way of most Boom & Zoom (B&Z) high speed attacks even if his airspeed is very low.

The Zeke is fun to fly, but if your idea of fun is surviving and landing your missions, then you'd best choose another fighter.

The Zeke Under Full Realism

Virtues

Even under full realism, the Zero is the sweetest handling plane in the game. You can still make those dramatic “bat turns” even at low speed. Its departure characteristics are docile as well.

Vices

As with the actual Zero, the *Air Warrior* Zeke is so slow, it seems like it's flying in half-time, particularly when it's facing American fighters. It's also, as noted, the most fragile prop fighter, and its positively anemic ammo load seems all the more paltry in realism. Further, the Zeke hates speed; its controls nearly seize up at speeds over 300 knots, and its wings rip off at very high speed. The Zeke also has distinct structural limitations that severely limit the number of G's you can pull at high speeds. In short, if you pull more than 7 G's at speeds above 250 knots, your flight will end abruptly.

A lack of horsepower really handicaps the Zero, especially at high altitudes. The Zeke's maneuvering advantage vanishes entirely above 25,000 feet. Its strong suit is range.

Tips

Deflection or long range shots are a complete waste of time in a Zero. For this fighter to be effective, it must use its maneuvering advantage to acquire short range, “in the saddle” shots. You can compensate to some extent for the Zeke's slow speed by employing bold lead turns, but if you get too bold you will present your opponent with a shot and, as noted, Zekes do not take damage well.

Armament: two 7.7 mm machine guns; two 20 mm cannon. Ammo Load: 250 machine gun rounds; 250 cannon shells.

Payload: none.

NAKAJIMA KI-84 HAYATE “FRANK”



This is my personal favorite. I LOVE this plane! Packs a good punch and has good maneuverability too!

- Ghost Rider

The Ki-84 is a fighter with few flaws; it's fast, maneuverable, and lethal.

History

Late in the war, after taking a pounding at the hands of powerful, heavily armed, and durable American aircraft, the Japanese Army wanted a fighter that could compete with heavy U.S. airborne iron on its own terms. In design at least, they certainly succeeded with the Ki-84. Japan's badly decimated aircraft industry, however, was not up to the task of producing the plane. Had the Frank not suffered from appalling manufacturing deficiencies, it certainly would have been one of the greatest prop fighters of the Second World War.

The Ki-84 in *Air Warrior*

Fortunately for *Air Warrior* Frank pilots, the game does not model the failures of material and workmanship the actual Ki suffered. The Frank has a 1900 horsepower Homare engine in an airframe more than one ton lighter than the Corsair. This gives the Frank excellent speed — faster than even the Mustang at low altitudes — along with an excellent climb rate. The Frank can out-turn every plane in the Pacific except the Zero, at low speeds, and the P-38 at high speeds.

The Ki is lethal, sporting two 20 mm cannon in addition to two machine guns, but its lethality drops sharply after 35% of its ammunition is gone. Nonetheless, the total ammo load on a Frank is substantial.

Most planes in *Air Warrior* come with distinct assets and limitations that dictate the way you should fight when flying them. The Ki, however, is so versatile that it appeals to energy fighters and turn-and-burn dogfighters alike. It's main deficiency against American planes is durability, but that is perhaps its only drawback.

The Frank Under Full Realism

Opinions vary widely over the values and vices of the Frank in full realism. Some call it, "the Focke Wulf of the Pacific," due to its mixture of great guns and speed, combined with its nasty departure characteristics.

The Ki's fundamental structural limitations, compared to American fighters, become more of an issue in full realism. Whereas an American fighter can pull as many as 8 or 9 G's briefly at high speed, a similar stress to the Frank's airframe would rip its wings off.

Virtues

The Ki-84 is extremely fast — the fastest fighter in the Pacific at the low to medium altitudes where most battles take place in the online, network arena.

In addition, the Frank is extremely maneuverable, particularly at speeds between 150-250 knots. At these speeds, only a Zeke can outturn it. Lastly, the Ki has good guns, an ample ammo load, and excellent range.

Vices

The Frank is not a sturdy aircraft. At high speeds you constantly run the risk of ripping its wings off in maneuvers, and its controls turn to mush above 350 knots.

Also, the Ki will depart into violent spins if pushed beyond its low speed limits. Stalling this airplane when its wings are not parallel to the horizon is almost certain to induce a nasty spin.

Finally, with its radial engine and high parasitic drag, the Ki accelerates poorly, and bleeds energy badly — especially in straight boom and zoom maneuvers.

Initially, most pilots would regard the Frank as an ideal fighter due to its range, guns, ammo load, speed, and maneuverability. While it indeed possesses these attributes, the Ki is absolutely terrible at the extreme altitudes typical in scenario play. It can barely maintain level flight at 35,000 feet - a common height for combat air patrols in the better high altitude fighters.

Tips

Throttle back in nose-down turns, especially if you're entering the turn at high speed. Many novice Ki pilots tend to enter compressibility, over-control the plane to compensate, and then rip the wings off when they regain control of the aircraft.

Watch your airspeed in high speed tail chases, especially against American fighters. Again, compressibility is the enemy here; you will lose control over your plane before the pilot in the American fighter will. If you throttle back, or make constant, though slight, flight adjustments as you reach speeds of 375 knots and above, you can often stave off or delay the onset of compressibility.

Armament: two 20 mm cannon; two 12.7 mm machine guns. Ammo load: 700 machine gun rounds; 240 cannon shells.

Payload: one 550 lb. bomb.

FOCKE WULF 190A-8



I like the Focke Wulf for its sheer lethality, it can kill any plane with one good firing pass. The FW can do some very good high speed maneuvering, but it cannot maintain maneuvering speed very long and takes a complete mastery of ACM skills and intimate knowledge of the aircraft to compete in a close in knife fight. All others would do better using it in the Boom and Zoom role. In short, the FW is the most lethal plane in the skies. In the hands of a master, its a killing machine. For the less experienced, a coffin on wings.

- Killer

The Focke Wulf can pull away from the Spit in just about every instance, unless the FW pilot is compromised by other planes/bad SA/etc. I don't know how many times I've tugged some dweeb in a Spit along in either a FW, P51, or P47. You'd think they'd get a clue when we are in level flight and the range starts growing, but no, they usually hang back there until they are solidly planted somewhere, at which point I have radio'd their position to everyone under the sun, including alt, speed, and probably fuel they have. Duh.

- Twist

History

British Spitfire Mk V pilots were holding their own against the Luftwaffe's front line fighter, the Bf109, in the late spring of 1941. Then the sudden appearance of the Focke Wulf 190 nearly threw the RAF into panic. Faster, more maneuverable, and possessing the most devastating armament yet seen in a fighter, the Focke Wulf was to become Germany's most impressive mass-produced prop fighter of World War II.

Its emergence resulted in the rapid development of the Spitfire Mk IX. Until then, the RAF attempted to console its anxious pilots by telling them that the Spitfire could outturn the Focke Wulf. One RAF pilot is reported to have stood up during such a briefing and shouted, "But turning does not win dogfights!"

The Focke Wulf 190A-8 in the Half-Time Arena

Turning ability does dictate the winner of many dogfights in the *Air Warrior* half-time arena, but the turn fight is not the Focke Wulf's forte. Although it has the highest roll rate of any plane in the game, the 190 has a poor sustained turn performance, particularly when it's slow. The plane also lacks the sort of war emergency power other fighters enjoy. Its GM1 nitrous injection is strictly to enhance the Focke Wulf's high altitude performance, and it is not as effective at low altitude as WEP is on other fighters.

The Focke Wulf's assets are strictly speed and firepower; of the European theater prop fighters, only the Mustang is faster, and the 190's guns are the most lethal in *Air Warrior*. Despite this, the Focke Wulf pilot must choose his engagements wisely and avoid Spitfires at equal and higher altitude.

In short, the 190 is not a good choice for the new player. Focke Wulf fliers must be very savvy in their engagements, and that requires a goodly amount of *Air Warrior* experience.

The Focke Wulf Under Full Realism

Virtues

All of the Focke Wulf's previously noted qualities — speed, firepower, durability, and ammo load — also work to its advantage in full realism. Its high speed handling is particularly handy in real-time as well. When presented with its historical role — that of a bomber interceptor — the Focke Wulf is a terrifying beast. It can blow through close escort and deliver kills so quickly that often the first hint the enemy has of its presence is the destruction of one of its bombers. Also, the 190 has enormous range, and can stay airborne throughout the longest missions.

Vices

Relative to the Me109, Spitfire, Mustang, and P-38, the Focke Wulf bleeds energy terribly. Its radial engine configuration presents much parasitic drag.

Not only does the Focke Wulf turn poorly, and struggle in the vertical, it also has mean-spirited departure behavior. It will produce vicious spins if pushed beyond its tender flight envelope. As a dogfighter, particularly at high altitudes, the Focke Wulf is completely out of its element.

Tips

As with most pure energy fighters, the Focke Wulf is most effective as a member of a team, or as an opportunist. Whereas the 109 or Spitfire must saddle up on the tail of an opponent to achieve multiple kill missions, a 190 driver has the guns and the ammunition to kill several planes without extensive maneuvering; the target need only pass through the gunsight for a short period.

Where the Focke Wulf truly excels is as a member of a mixed pair — flying with an angles fighter such as a Spit or 109. The more agile plane usually draws the most attention, thereby setting up the 190 for shots. If the 190 is attacked, the angles fighter can defend it. Although not well suited to dogfighting, the Focke Wulf can stay defensive for a long period of time by employing its superior roll rate, thereby giving a wingman ample time to dispatch threatening aircraft.

However, if you are like most *Air Warriors*, and want to furball without regard to coordinating with a wingie, this calls for a change in strategy. If you boom and zoom the furball at ludicrous speed, chances are you won't find much to shoot at. Rather, enter the scrum at maximum level speed, pass on through, and measure your extension based on how much attention you've attracted. When your tail is clear, zoom but don't come over the top — you don't want to risk triggering the FW's nastier traits. Instead, roll inverted and Split-S back toward the furball. You can maintain this see-saw for a prolonged period of time, while maintaining enough energy to extend completely away from the battle if need be.

Armament: two 13 mm machine guns; four, 20 mm cannon. Ammo load: 950 machine gun rounds; 780 cannon shells.

Payload: one 550 lb. bomb.

MESSERSCHMITT BF109F-4 “FRANZ”



Fill'er up with regular, shove the throttle to the wall, and climb like a scalded monkey. I like the Willy cuz it has the power to perch. The speed and climb rate are top notch, allowing you to quickly grab, and hold, a position of advantage. It gets me where I want to be while I still want to be there. Looks cool too and it's the closest I'll ever get to having a real Mercedes.

- Holmes

Previously modeled in *Air Warrior* as the 109G-6 “Gustav,” this legendary German fighter was no match for other available fighters, except perhaps for the Russian Yak-9. Recently, however, the Gustav has been replaced in the game by the earlier F-4 “Franz” variant that many Luftwaffe pilots praised as the finest 109 of all.

History

Late in 1940, based upon lessons learned in the Battle of Britain, Willy Messerschmitt's Augsburg design team reworked their notorious Bf109¹. Previously, it had been the finest fighter in the world, but its supremacy was seriously challenged by the British Spitfire. The result was the F series: aerodynamically streamlined, making it faster, and far more maneuverable than the previous E, or “Emil” series. The Franz variant was short lived, however, as the need for more heavily armed bomber interceptors grew.

¹ Though most people, including the pilots who flew her, referred to this plane as the ME109, latter day purists often insist on calling it the Bf 109. Bf stands for the company that originally manufactured the aircraft - the Bayerische Flugzeugwerke (Bavarian Flying Works).

The Bf109 in *Air Warrior* - Half-Time Arena

Like all German aircraft, the 109 is only available in Europe. When the Franz version was introduced to *Air Warrior*, its role changed from a sentimental or even comic plane choice, to one of the game's outstanding fighter aircraft.

The Franz remains lightly armed with a limited supply of ammunition, although its lethality holds up over most of its ammo load. It's not a particularly durable plane, and you will have to take a larger percentage of a full fuel load in the 109 due to its small gas tank.

Still, the Franz has the highest climb rate of any prop fighter in *Air Warrior* and it's faster than either the Focke Wulf or the Spitfire at medium altitudes. Its water-injected War Emergency Power boost lasts 20 minutes compared to the 10 minutes of WEP most fighters possess. Also, the Franz is capable of full performance on reduced octane fuel; you don't have to check the gas quality at an airfield when you fly the 109.

The Me109F-4 Under Full Realism

No aircraft in *Air Warrior* has benefited from full realism more than the Me109.

Virtues

The 109 has exceptionally manageable departure characteristics. It is reluctant to spin, it recovers easily, and it can turn well at low speeds. Its ammunition, while not in large supply, holds its full lethality over nearly its entire load. This plane climbs like a rocket, particularly on WEP. Also, its low thrust-to-weight ratio gives it the best level acceleration of any AW piston engine fighter.

Vices

The Franz's ease in spin recovery diminishes sharply with a full fuel tank, which you often need, given the 109's reduced fuel capacity - the smallest of all the AW aircraft (see page 2.3 in this manual). Also, the 109 lacks the sheer speed of a Focke Wulf or Mustang and, like the Spitfire, it suffers progressive control stiffness above 300 knots. Its short range, limited ammo load, and control problems in a dive - especially from very high altitudes - require a lot more from the pilot than most of the *Air Warrior* fighters.

Tips

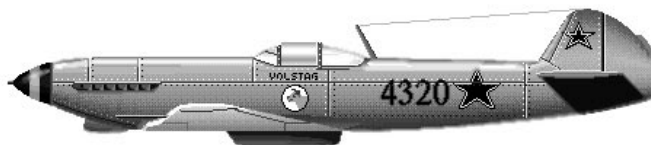
As noted earlier, you have to be more tender with the 109 when she has a full fuel tank. In arena play, don't be afraid to climb out on WEP; you've got double the WEP of other European fighters, and you can use it to gain altitude fast.

Only use the 109's maneuvering flap setting to help you get over the top of a low speed half-loop. Far from being helpful in flat turns, it actually performs more like an air brake.

Armament: two 13 mm machine guns; one, 20 mm cannon. Ammo Load: 600 machine gun rounds; 200 cannon shells.

Payload: one 550 lb. bomb.

YAKOVLEV YAK-9D



In the end the Yak is a real challenge to fly effectively, & that's why I find it so appealing. Kills don't come as often in it, but when you get one you know you've earned it.

- Vortex

I am the Yakman, and you all know it!

- Volstag

“Yakmen” in *Air Warrior* generally choose to fly the Yak as a joke. The Yak-9 is the weakest fighter in the game: slow, sluggish, weakly armed, and fragile.

History

The Yak-9 embodied the Soviet approach to fighter design in the Second World War. Innovation and elegance were discarded entirely in favor of dependability and ease of production, as Russia was forced into compensating through sheer numbers what she lacked in first-rate materials and experienced pilots. Nonetheless, the Yak-9 was a formidable fighter, and gave its chief Luftwaffe opponent — the Messerschmitt Bf109 — a good deal of trouble, especially at low altitudes.

The Yak-9 in *Air Warrior* - Half-Time Arena

Yak attacks are rare in *Air Warrior* and seldom conducted with the level of seriousness typical of most missions. The best reason to fly the Yak is for an odd sort of fun; if you kill an opponent with your Yak, you have embarrassed him, but if he kills you he has not accomplished anything to boast about. If you're new to *Air Warrior*, avoid this plane entirely.

If you fly the Yak and have any aspiration to survive the experience, choose opponents at far lower altitudes than yourself. The Yak will turn capably for short periods of time, but it bleeds energy quickly. Thus, even against a lower or slower foe, if you make a mistake you will likely die.

The Yak-9 Under Full Realism

Use standard stall and spin recovery procedures when flying in a real arena in a Yak. Data on the Yak's distinctive low and high speed qualities are scarce, and the plane's behavior is less individualized than it is for many of the other *Air Warrior* fighters. The Yak has short legs, is terrible above 25,000 feet, and has an unspectacular ammo load.

Tips

Overall, there isn't a plane in the game that has as much going against it as the Yak. It's painfully slow, has an extremely light ammo load that carries a lethality rating falling somewhere between a spitball and a spud gun. It bleeds E at an amazing rate, refuses to maneuver in a high speed dive, barely carries enough fuel to make it to the end of the runway, and blows up if you look at it the wrong way. If all that wasn't enough, it has some very nasty spin characteristics...do not force this plane around or it will get most upset with you. If you like a challenge, this is the plane you want to fly.

Things aren't all bad with the Yak though. At least initially, it has a very tight turn radius and does handle quite well at slow speeds. As well, one of the things I find quite intriguing about the plane is that its most glaring weakness (its dramatic E-bleed), if exploited properly, can be its most formidable weapon. The plane is like a big air brake, and a Spit, 38, or 109 will have to really work the throttle/brakes/flaps to keep from overshooting you in a stallfight. A timely Low Yo Yo or chopping of the throttle will often place you right on the badguys 6 as he's fighting to slow down and maintain position on you...now's the time to open up with the spud guns.

Bottom line, you will be forced to learn good E-management in a Yak. More so than any plane its crucial to your survival. If at all possible allow yourself some alt to work with, 5-10k is usually plenty. Low Yo Yo's, Split S's, and nose low turns can keep you in the fight for a long time. And definitely do not get in the habit of spraying your ammo all over creation or taking long range shots. You don't have enough bullets and the ones you do have don't hit that hard. Hold your fire until your nice and close with a good tail or deflection shot. And by all means, if there's badguys about keep maneuvering. You can't afford to take many hits, so stay active and make yourself as difficult a target as possible.

- Vortex

Armament: two 13 mm machine guns; one 20 mm cannon. Ammo Load: 600 machine gun rounds; 400 cannon shells.

Payload: one 550 lb. bomb.

MESSERSCHMITT ME 262A STURMVOGEL (STORMBIRD)



The ME 262 is not normally available in the main *Air Warrior* arena except on occasional jet nights and in certain historical scenarios.

History

Without question, the ME 262 was the most formidable fighter aircraft of World War II, largely because it possessed technology a generation ahead of propeller driven airplanes. What's surprising is that Willy Messerschmitt began development of this jet fighter before the Second World War began.

Fortunately for the Allies, technical delays in the development of the Jumbo jet engine, along with inexplicable misjudgments on the part of German leadership, kept the 262 out of action until the war was all but lost for Germany.

The ME262 in *Air Warrior* - Half-Time Arena

The Sturmvogel is seldom made available in *Air Warrior*, because it tends to disrupt the normal balance of the game.

Nonetheless, when the ME262 is available, players are often surprised that they do so poorly while flying it. The 262 is an unstoppable fighter just so long as you don't try to dogfight in it. Not only does it lack the low speed maneuverability of a propeller-driven fighter, it also can't withstand the amount of combat damage the prop planes can. Jet aircraft consume far more fuel than piston engine planes, and the Sturmvogel is a flying gas can. It blows up with the least amount of damage of any fighter in *Air Warrior*.

Flown properly, nothing can boom and zoom like the ME262. It's 50 knots faster than any other plane in the game, and it's capable of 15,000 foot zoom climbs that leave pursuing piston engine fighters hanging on their props. More than any other *Air Warrior* aircraft, the 262 requires patience.

The Sturmvogel Under Full Realism

Virtues

In half-time, it was readily possible to lead turn a 262 in a prop fighter; in real time, such maneuvers are nearly impossible. As with the actual Me262, this is practically an unstoppable plane in the hands of someone who knows what he's doing, owing to its sheer speed and near flawless high speed handling. In addition, the 262's already withering armaments become all the more devastating with realistic lethality.

It can also cover ground in a hurry, avoid advance escort completely, and deliver a lethal punch before gunners and close escort can react. The 262 can be most effective as an escort killer, particularly when escorts sharply outnumber interceptors. In these situations, escorts tend to not check their tail as frequently as they should, because their mindset is as hunters, not prey.

Vices

The 262 is more vulnerable than a Gooney Bird when it's slow. It accelerates poorly and takes a long time to build up its energy state. It's also as fragile as a Zeke when it comes to taking hits — a distinct problem with high lethality. You have to exercise extreme care when maneuvering the ME262 at high speeds because it will pull an enormous number of G's with just a little bit of stick deflection.

Aside from blacking out, you can easily rip the wings off the aircraft if you pull back abruptly on the stick. Landings are difficult, too, because it's hard to slow the 262 down; it doesn't have a propeller to create extra drag at low throttle.

You would think the 262 would be even more frightening than the Focke Wulf as a bomber interceptor, and it is dangerous in this role. It lacks the ammo load of the 190; however, its high closure rate against buffs makes gunnery difficult, and it will blow up if it takes a couple of hits from bomber gunners. It also lacks range, and it can't mix it up in a dogfight.

Tips

Stay fast, avoid head-on shots, and nothing can touch you. You will have a tough time killing agile fighters who know enough to get out of your way, but you will find your self boresighting many victims before they know you are there. Be extremely careful in nose down turns because the turning radius and speed of the 262 tends to fool pilots with little experience in the plane. This is a polite way of saying that folks tend to auger a lot when they first try the 262.

The range of the 262 can be extended significantly by reducing throttle. At full throttle, the 262 only has 35 minutes of fuel; yet it can stay airborne for upwards of 80 minutes at 50% throttle at high altitude, while maintaining sufficient speed to run away from any piston engine fighter.

The 262 has no remarkable spin characteristics. If you go into an uncontrolled spin, normal recovery procedures will be effective.

Armament: four 30 mm cannon. Ammo Load: 720 cannon shells.

Payload: one 550 lb. bomb.

WAR EMERGENCY POWER (WEP) INFORMATION

Spitfire Mk IX E

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	293	293	137	157	4516	0:00	41.2	211	27.5	143
1000	296	291	137	156	4503	0:13	40.6	214	26.9	144
2000	298	290	139	155	4483	0:26	40.0	217	26.3	144
3000	300	288	140	154	4459	0:40	39.5	220	25.7	146
4000	303	285	141	153	4437	0:53	38.9	223	25.1	147
5000	307	285	143	152	4501	1:06	38.4	226	24.9	151
6000	311	284	143	151	4557	1:20	37.8	229	24.3	151
7000	316	284	144	150	4603	1:33	37.1	232	23.7	152
8000	319	283	146	149	4635	1:46	36.5	238	23.5	156
9000	322	282	147	148	4621	1:59	36.0	241	23.0	157
10000	325	279	149	147	4600	2:12	35.5	244	22.4	158
11000	328	277	150	146	4575	2:25	34.9	247	21.9	160
12000	330	275	151	145	4518	2:38	34.3	252	21.4	161
13000	330	270	153	144	4346	2:52	33.9	256	20.6	161
14000	330	266	152	141	4179	3:06	33.3	259	19.8	160
15000	329	262	154	141	4014	3:20	32.8	264	19.3	162
16000	330	258	156	140	3922	3:35	32.2	268	18.5	161
17000	337	259	157	139	4028	3:51	31.7	274	18.4	164
18000	343	259	158	138	4118	4:05	31.2	278	18.2	169
19000	348	259	160	137	4199	4:20	30.7	283	17.7	170
20000	352	257	162	136	4189	4:34	30.1	286	17.5	174
21000	351	253	163	135	4012	4:49	29.7	292	16.8	173
22000	351	248	165	135	3838	5:04	29.1	298	16.2	173
23000	350	243	165	132	3666	5:20	28.6	302	15.5	173
24000	350	239	167	131	3500	5:37	28.2	307	14.9	173
25000	350	235	167	129	3335	5:54	27.7	313	14.3	173
26000	349	230	170	128	3174	6:13	27.2	319	13.7	173
27000	348	225	171	128	3016	6:32	26.7	325	13.1	173
28000	347	221	171	125	2859	6:52	26.2	331	12.6	173
29000	346	217	173	125	2707	7:14	25.7	337	12.0	173
30000	345	212	176	124	2557	7:37	25.3	343	11.5	174
31000	344	208	176	122	2409	8:01	24.5	344	10.8	172
32000	343	203	178	121	2265	8:27	23.5	342	10.3	172
33000	343	199	181	121	2122	8:54	22.6	342	9.8	173
34000	341	194	183	120	1982	9:23	21.6	341	9.3	173
35000	340	190	183	118	1844	9:55	20.7	339	8.7	172
36000	338	185	186	117	1707	10:28	19.8	338	8.2	172

A = True Top Airspeed
 B = Indicated Top Airspeed
 C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

F6F-3

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	272	272	134	154	3141	0:00	41.7	208	21.3	114
1000	275	271	135	153	3157	0:18	41.2	211	20.9	116
2000	278	270	136	152	3167	0:37	40.6	214	20.4	117
3000	281	269	137	151	3171	0:56	39.9	217	20.0	117
4000	283	267	138	150	3165	1:15	39.3	220	19.5	119
5000	284	263	139	149	3077	1:34	38.7	224	19.1	120
6000	284	261	141	148	2990	1:54	38.1	226	18.2	119
7000	285	257	142	147	2902	2:15	37.5	231	17.8	121
8000	286	254	143	146	2831	2:36	37.0	235	17.4	122
9000	290	254	144	145	2874	2:57	36.5	238	17.0	123
10000	295	253	146	144	2908	3:17	35.9	241	16.6	124
11000	298	253	149	145	2936	3:38	35.2	244	16.2	126
12000	303	252	150	144	2962	3:58	34.7	250	16.2	129
13000	306	251	152	143	2998	4:18	34.2	253	15.9	131
14000	310	250	153	142	3027	4:38	33.6	257	15.5	132
15000	315	250	157	143	3047	4:58	33.1	262	15.1	133
16000	318	249	158	142	3048	5:18	32.6	265	14.8	135
17000	320	246	160	141	3003	5:38	32.0	271	14.4	137
18000	323	244	162	140	2954	5:58	31.5	274	14.1	138
19000	324	242	163	139	2904	6:18	31.0	280	13.7	140
20000	326	239	164	139	2839	6:39	30.5	284	13.1	139
21000	328	236	166	138	2753	7:00	30.0	289	12.7	141
22000	329	232	168	137	2666	7:23	29.4	295	12.1	141
23000	330	229	170	136	2576	7:46	29.0	298	11.8	143
24000	329	225	172	135	2457	8:09	28.5	305	11.2	143
25000	327	219	174	134	2292	8:35	28.0	310	10.7	143
26000	325	214	176	133	2130	9:02	27.5	316	10.1	143
27000	323	209	177	132	1973	9:31	27.0	322	9.2	141
28000	320	203	180	131	1824	10:03	26.0	320	8.7	141
29000	318	199	182	131	1686	10:37	24.9	318	8.2	141
30000	316	194	183	130	1551	11:14	23.7	314	7.6	141
31000	313	189	186	129	1418	11:54	22.7	312	7.1	142
32000	310	183	189	128	1292	12:39	21.6	309	6.2	140
33000	308	179	190	127	1170	13:27	20.7	308	5.7	140
34000	305	174	193	127	1051	14:21	19.7	305	5.2	141
35000	302	169	196	126	934	15:22	18.7	301	4.6	141
36000	297	163	198	125	817	16:30	17.6	296	3.6	140

A = True Top Airspeed
 B = Indicated Top Airspeed
 C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

F4U-1D

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	300	300	143	165	3863	0:00	35.2	246	20.5	150
1000	303	299	144	164	3885	0:15	34.7	250	20.1	151
2000	307	297	146	163	3898	0:30	34.3	253	19.6	152
3000	310	297	147	162	3906	0:46	33.7	257	19.2	153
4000	313	295	149	161	3908	1:01	33.2	262	18.8	155
5000	316	293	150	160	3892	1:16	32.7	265	18.6	157
6000	318	291	151	159	3875	1:32	32.3	268	18.2	159
7000	321	290	153	158	3850	1:47	31.7	274	17.8	161
8000	323	287	155	158	3824	2:03	31.3	277	17.4	163
9000	326	285	156	157	3811	2:19	30.8	280	17.0	164
10000	330	283	157	156	3792	2:35	30.3	286	16.6	165
11000	332	282	159	155	3769	2:50	29.8	290	16.2	167
12000	336	279	161	154	3753	3:06	29.4	295	15.8	169
13000	340	278	163	153	3779	3:22	28.9	298	15.5	171
14000	343	277	164	152	3799	3:38	28.5	305	15.1	172
15000	348	277	168	153	3809	3:54	28.0	310	14.7	174
16000	351	275	170	152	3813	4:10	27.5	314	14.4	176
17000	356	273	171	152	3810	4:25	27.1	319	14.2	179
18000	359	271	173	151	3799	4:41	26.7	325	13.9	181
19000	363	270	176	150	3783	4:57	26.2	331	13.5	183
20000	365	267	177	149	3732	5:13	25.8	337	13.0	184
21000	366	263	177	147	3623	5:29	25.3	341	12.7	185
22000	368	260	179	146	3513	5:46	24.9	347	12.2	185
23000	369	257	182	145	3399	6:03	24.5	353	11.9	187
24000	369	252	183	144	3267	6:21	24.0	359	11.4	188
25000	368	247	184	142	3101	6:40	23.6	367	10.9	188
26000	367	242	186	141	2938	7:00	22.8	365	10.3	186
27000	366	237	189	141	2778	7:21	22.0	366	9.8	187
28000	364	232	191	140	2619	7:43	21.1	365	9.4	187
29000	363	227	191	138	2466	8:07	20.3	363	9.0	188
30000	362	222	194	137	2313	8:32	19.5	362	8.4	186
31000	360	217	197	136	2163	8:59	18.7	360	8.0	187
32000	358	212	199	136	2016	9:28	17.8	358	7.6	188
33000	357	207	203	135	1869	9:58	17.1	356	7.1	187
34000	355	202	203	133	1727	10:32	16.3	353	6.7	188
35000	352	197	206	133	1586	11:08	15.6	352	6.2	187
36000	350	191	210	132	1446	11:48	14.9	350	5.8	188

A = True Top Airspeed
 B = Indicated Top Airspeed
 C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

P-38J

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	300	300	146	168	3922	0:00	35.8	242	21.1	144
1000	303	299	150	170	3927	0:15	35.2	245	20.6	146
2000	307	297	151	169	3926	0:30	34.7	248	20.2	147
3000	310	297	152	168	3920	0:45	34.2	253	19.7	149
4000	313	295	154	166	3909	1:01	33.8	257	19.3	150
5000	316	293	155	165	3872	1:16	33.2	260	18.9	151
6000	318	291	157	164	3834	1:32	32.7	265	18.4	152
7000	321	289	157	164	3792	1:47	32.3	269	17.8	152
8000	323	287	159	163	3749	2:03	31.7	272	17.3	153
9000	326	285	161	162	3722	2:19	31.2	278	17.0	155
10000	330	283	163	161	3690	2:35	30.8	281	16.6	157
11000	332	282	163	160	3657	2:52	30.3	286	16.2	158
12000	335	279	168	161	3615	3:08	29.8	290	15.8	160
13000	337	277	169	160	3555	3:25	29.3	296	15.2	159
14000	340	274	170	159	3496	3:42	28.8	299	14.8	161
15000	342	271	172	158	3432	3:59	28.4	305	14.5	163
16000	344	269	174	157	3373	4:17	27.9	311	13.9	163
17000	347	267	177	156	3322	4:35	27.4	314	13.6	164
18000	350	264	178	155	3268	4:53	27.0	320	13.2	166
19000	352	263	180	154	3214	5:12	26.6	326	12.7	166
20000	355	260	182	153	3156	5:30	26.1	331	12.4	168
21000	357	257	183	152	3096	5:50	25.7	338	12.1	171
22000	360	255	186	151	3034	6:09	25.2	344	11.6	171
23000	363	252	188	150	2969	6:29	24.8	350	11.3	172
24000	364	250	192	151	2888	6:50	24.4	356	10.8	173
25000	365	245	195	150	2782	7:11	24.0	362	10.3	173
26000	366	242	195	148	2677	7:33	23.5	366	9.9	173
27000	367	238	197	147	2573	7:56	22.7	366	9.4	174
28000	366	233	199	146	2438	8:20	21.7	365	9.0	174
29000	363	227	202	145	2268	8:45	20.9	364	8.5	175
30000	361	221	203	143	2103	9:13	19.9	360	7.9	173
31000	357	216	205	142	1941	9:42	19.0	357	7.3	172
32000	355	210	208	141	1798	10:14	18.1	354	6.9	173
33000	352	204	210	141	1668	10:49	17.3	351	6.3	171
34000	350	199	213	140	1542	11:26	16.6	350	5.9	172
35000	347	194	217	139	1419	12:07	15.8	347	5.3	171
36000	344	189	219	138	1296	12:51	15.0	344	4.7	171

A = True Top Airspeed

B = Indicated Top Airspeed

C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed

E = Best Rate of Climb

F = Time to Altitude

G = Maximum Instantaneous Turn Rate

H = Corner Velocity

I = Maximum Sustained Turn Rate

J = Maximum Airspeed in a Flat Turn

P-47D

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	292	292	149	171	2749	0:00	28.8	265	15.6	155
1000	297	292	150	170	2775	0:21	28.4	271	15.3	156
2000	300	291	151	169	2795	0:42	28.1	274	15.2	159
3000	303	290	153	169	2809	1:04	27.6	278	14.9	161
4000	308	290	155	168	2820	1:25	27.2	284	14.6	163
5000	311	289	157	167	2824	1:46	26.8	287	14.2	164
6000	315	288	160	168	2825	2:08	26.4	291	13.9	166
7000	318	287	162	167	2821	2:29	26.0	296	13.6	167
8000	322	285	163	167	2814	2:50	25.6	299	13.3	169
9000	325	284	165	166	2810	3:12	25.2	305	13.0	171
10000	329	283	167	165	2800	3:33	24.8	309	12.7	173
11000	332	282	169	164	2788	3:54	24.5	315	12.4	175
12000	337	280	170	163	2780	4:16	24.0	318	12.1	177
13000	341	280	175	165	2805	4:38	23.7	325	12.0	180
14000	346	280	177	164	2826	4:59	23.3	331	11.8	183
15000	351	279	178	163	2840	5:20	22.9	336	11.5	184
16000	356	278	183	164	2843	5:41	22.5	340	11.2	186
17000	360	277	184	163	2827	6:02	22.2	346	10.9	189
18000	364	276	187	162	2806	6:24	21.8	352	10.7	191
19000	368	274	189	162	2781	6:45	21.5	358	10.4	193
20000	371	271	193	162	2735	7:07	21.1	365	10.2	195
21000	373	268	196	162	2653	7:29	20.8	371	9.7	196
22000	374	264	197	161	2570	7:52	20.2	373	9.3	196
23000	376	261	200	160	2484	8:16	19.7	376	9.1	198
24000	377	257	203	159	2385	8:40	19.0	376	8.7	199
25000	377	252	203	157	2260	9:06	18.3	375	8.2	197
26000	376	248	206	156	2137	9:34	17.7	376	7.8	198
27000	375	243	209	156	2016	10:02	17.0	374	7.5	199
28000	374	238	211	155	1891	10:33	16.3	373	7.1	200
29000	372	233	215	154	1764	11:06	15.7	372	6.7	199
30000	370	228	217	153	1638	11:41	15.0	369	6.3	200
31000	369	222	220	153	1514	12:19	14.4	368	5.9	199
32000	366	217	222	151	1393	13:01	13.7	365	5.5	200
33000	364	211	225	150	1272	13:46	13.1	363	5.1	199
34000	361	206	228	149	1153	14:35	12.5	360	4.6	199
35000	358	200	231	149	1036	15:30	11.9	358	4.3	200
36000	355	194	235	148	923	16:31	11.2	354	3.8	200

A = True Top Airspeed
 B = Indicated Top Airspeed
 C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

P-51D

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	320	320	157	180	3453	0:00	34.8	221	20.3	135
1000	323	319	157	179	3466	0:17	34.4	224	19.9	137
2000	328	318	161	180	3472	0:34	33.9	227	19.5	137
3000	331	317	163	178	3474	0:51	33.4	231	19.0	139
4000	335	316	163	177	3474	1:09	32.9	234	18.6	140
5000	339	315	165	176	3486	1:26	32.5	237	18.5	144
6000	343	314	168	177	3495	1:43	31.9	240	18.1	144
7000	347	313	170	176	3497	2:00	31.4	244	17.7	146
8000	351	311	171	174	3488	2:17	30.9	249	17.3	148
9000	353	309	174	175	3436	2:35	30.5	252	16.9	149
10000	356	306	176	174	3381	2:52	30.1	256	16.2	149
11000	358	303	177	173	3325	3:10	29.5	259	15.8	151
12000	360	300	179	171	3245	3:28	29.1	264	15.5	151
13000	358	294	178	168	3071	3:47	28.7	268	14.8	151
14000	357	288	180	167	2904	4:07	28.1	271	14.2	151
15000	354	282	182	166	2739	4:29	27.8	278	13.3	149
16000	354	277	182	163	2620	4:51	27.3	281	13.0	151
17000	358	276	185	164	2613	5:14	26.9	286	12.7	152
18000	363	274	187	163	2602	5:37	26.4	291	12.4	154
19000	367	273	190	163	2587	6:00	26.0	296	11.8	154
20000	370	271	193	162	2562	6:24	25.5	302	11.5	156
21000	374	269	195	161	2520	6:47	25.1	305	11.3	157
22000	377	266	198	161	2475	7:11	24.7	311	11.0	160
23000	380	264	201	160	2426	7:36	24.2	318	10.5	160
24000	381	261	203	159	2343	8:01	23.8	321	10.2	162
25000	380	255	204	158	2205	8:27	23.4	327	9.5	160
26000	378	250	207	157	2071	8:55	23.0	333	9.0	160
27000	377	244	210	156	1939	9:25	22.6	339	8.5	161
28000	375	238	211	155	1800	9:57	22.2	346	8.1	161
29000	371	232	212	152	1654	10:32	21.8	352	7.4	159
30000	368	226	214	151	1511	11:10	21.4	358	7.0	160
31000	364	219	217	150	1371	11:52	20.9	363	6.3	158
32000	361	213	219	149	1245	12:37	19.9	359	5.6	157
33000	357	208	222	148	1129	13:28	19.0	357	5.1	158
34000	354	202	224	147	1015	14:24	18.1	353	4.7	158
35000	350	196	228	146	904	15:26	17.3	351	3.9	157
36000	346	190	232	147	792	16:37	16.3	345	3.1	157

A = True Top Airspeed
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 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

A6M5a

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	254	254	123	142	2836	0:00	78.0	251	27.8	97
1000	257	253	124	141	2845	0:20	77.1	255	27.2	97
2000	260	252	127	142	2849	0:42	75.7	258	26.6	98
3000	263	251	128	141	2850	1:03	74.9	262	26.0	99
4000	265	250	129	140	2846	1:24	73.5	265	25.4	100
5000	267	248	130	139	2815	1:45	71.6	266	24.9	101
6000	269	246	130	138	2782	2:06	70.2	269	24.3	102
7000	271	244	132	137	2747	2:28	68.3	270	23.7	103
8000	273	242	135	137	2701	2:50	66.5	271	23.2	104
9000	273	238	134	134	2605	3:13	64.7	272	22.1	103
10000	273	235	135	133	2508	3:36	62.5	271	21.6	104
11000	273	231	136	132	2414	4:01	60.9	272	20.5	103
12000	273	227	137	131	2322	4:26	58.8	271	20.0	104
13000	273	223	138	130	2236	4:52	57.2	272	18.9	104
14000	273	220	139	129	2152	5:20	55.2	271	18.5	104
15000	273	217	141	128	2068	5:48	53.7	273	17.5	104
16000	274	214	142	127	2005	6:17	51.8	272	17.1	105
17000	277	213	143	126	1998	6:47	50.7	276	16.7	106
18000	280	212	146	127	1985	7:17	49.6	278	16.3	107
19000	283	210	148	126	1972	7:48	48.6	282	15.9	109
20000	284	209	149	125	1926	8:19	47.2	284	15.5	110
21000	283	204	150	124	1819	8:51	45.5	283	14.6	110
22000	283	200	151	123	1714	9:25	43.9	282	13.7	109
23000	282	196	153	122	1610	10:01	42.0	280	12.9	109
24000	280	191	155	121	1514	10:39	40.5	279	12.1	108
25000	279	188	157	121	1424	11:20	39.0	279	11.8	110
26000	278	183	157	120	1335	12:03	37.6	278	10.9	109
27000	277	180	159	119	1249	12:50	36.0	276	10.1	109
28000	277	176	161	118	1162	13:40	34.7	276	9.3	109
29000	275	172	163	117	1078	14:33	33.2	274	8.5	108
30000	273	168	164	116	995	15:31	31.7	271	7.7	108
31000	271	163	166	115	912	16:34	30.5	271	6.9	108
32000	270	159	168	114	832	17:43	29.1	270	6.0	108
33000	267	155	172	115	750	18:59	27.8	267	5.1	108
34000	264	150	174	114	671	20:23	26.4	264	4.0	108
35000	262	146	176	113	594	21:58	25.2	262	2.8	108
36000	258	142	178	112	516	23:46	23.8	258	0.0	108

A = True Top Airspeed
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D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

Ki-84

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	316	316	152	175	3790	0:00	42.6	178	25.4	111
1000	322	317	156	176	3877	0:15	41.9	179	24.8	113
2000	327	317	158	177	3954	0:30	41.3	182	24.8	116
3000	332	318	159	175	4024	0:45	40.8	184	24.3	117
4000	337	318	163	176	4073	1:00	40.2	188	23.7	117
5000	337	313	163	175	3930	1:15	39.7	191	23.2	119
6000	337	309	163	171	3793	1:31	39.1	194	22.2	118
7000	337	304	163	170	3656	1:47	38.4	197	21.7	119
8000	337	299	165	168	3523	2:04	37.9	200	20.7	118
9000	337	295	166	167	3402	2:21	37.3	204	19.8	117
10000	337	290	167	166	3281	2:39	36.7	206	19.3	118
11000	337	286	169	164	3164	2:58	36.1	210	18.4	118
12000	338	283	170	163	3075	3:17	35.6	212	18.0	119
13000	344	283	171	161	3106	3:36	35.0	216	17.6	121
14000	350	282	174	162	3130	3:55	34.5	219	17.2	122
15000	354	282	177	162	3148	4:15	33.9	223	16.7	124
16000	359	281	179	161	3149	4:34	33.3	226	16.7	126
17000	362	278	180	160	3109	4:53	32.8	231	15.9	126
18000	365	277	183	160	3065	5:12	32.3	235	15.6	128
19000	369	274	185	159	3021	5:32	31.7	238	15.2	129
20000	370	270	187	157	2941	5:52	31.1	241	14.4	129
21000	370	266	189	156	2795	6:13	30.7	247	14.1	131
22000	369	261	190	155	2652	6:35	30.2	251	13.4	130
23000	367	256	191	153	2511	6:58	29.6	256	12.7	130
24000	364	249	193	152	2339	7:23	29.2	259	12.0	130
25000	359	241	193	149	2116	7:50	28.6	264	11.0	127
26000	353	233	195	148	1900	8:20	28.2	269	9.9	125
27000	346	224	195	145	1695	8:53	27.6	272	9.3	124
28000	341	217	197	144	1524	9:30	27.2	278	8.2	123
29000	338	211	198	143	1395	10:12	26.6	284	7.6	123
30000	335	205	201	142	1270	10:57	26.2	288	6.9	123
31000	331	200	203	140	1147	11:46	25.7	294	5.7	121
32000	326	193	204	139	1016	12:42	25.2	300	5.0	121
33000	320	186	205	137	876	13:45	24.7	306	3.5	119
34000	313	178	207	136	741	14:59	24.3	311	2.4	119
35000	304	170	210	135	609	16:28	22.9	305	0.0	120
36000	294	161	211	133	469	18:20	21.2	293	0.0	122

A = True Top Airspeed
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D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

FW 190 A-8

Using WEP

	A	B	C	D	E	F	G	H	I	J
O	309	309	155	178	3400	0:00	37.0	234	19.3	131
1000	310	305	156	177	3321	0:17	36.5	238	18.5	131
2000	310	302	157	175	3241	0:35	36.0	241	18.1	131
3000	312	298	158	174	3160	0:54	35.5	244	17.7	133
4000	313	295	160	173	3079	1:13	34.9	247	16.9	132
5000	314	291	161	172	2987	1:33	34.4	252	16.6	134
6000	314	288	163	171	2897	1:54	33.9	256	15.8	133
7000	315	283	162	168	2807	2:15	33.4	259	15.5	135
8000	316	280	163	166	2725	2:36	32.8	264	14.8	134
9000	318	278	166	167	2698	2:59	32.4	268	14.4	136
10000	322	277	168	166	2668	3:21	31.9	271	14.1	137
11000	324	275	170	165	2636	3:44	31.4	277	13.8	138
12000	327	273	171	164	2613	4:06	30.9	280	13.5	140
13000	332	273	175	165	2639	4:29	30.4	285	13.2	142
14000	337	272	178	165	2659	4:52	29.9	289	12.8	144
15000	343	272	180	164	2673	5:14	29.4	295	12.5	145
16000	346	270	182	163	2664	5:37	28.9	298	12.2	146
17000	348	268	185	164	2594	6:00	28.5	304	11.9	149
18000	350	264	187	163	2522	6:23	28.0	310	11.4	148
19000	352	262	189	162	2450	6:47	27.5	313	11.1	150
20000	351	257	190	160	2337	7:12	27.1	319	10.6	150
21000	348	250	193	159	2139	7:39	26.7	325	9.8	148
22000	343	243	193	157	1949	8:09	26.2	331	9.3	148
23000	338	236	195	156	1763	8:41	25.8	337	8.5	146
24000	336	229	197	155	1627	9:16	24.8	335	8.0	146
25000	337	223	199	154	1561	9:54	24.1	338	7.5	146
26000	338	218	201	153	1494	10:33	23.3	338	7.0	147
27000	339	213	203	152	1427	11:14	22.5	338	6.8	149
28000	339	208	208	152	1337	11:58	21.7	338	6.3	150
29000	337	203	210	151	1228	12:44	20.8	337	5.9	150
30000	335	197	212	150	1119	13:36	19.8	333	5.1	148
31000	332	190	215	149	1010	14:32	19.0	331	4.6	149
32000	329	185	217	148	905	15:35	18.1	329	4.1	150
33000	325	179	220	147	799	16:45	17.2	325	3.1	148
34000	321	172	224	147	694	18:05	16.3	320	2.5	149
35000	316	164	228	146	592	19:39	15.4	315	1.7	150
36000	310	157	230	145	489	21:30	14.4	308	0.0	151

A = True Top Airspeed
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 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

Bf 109-F4

Using WEP

	A	B	C	D	E	F	G	H	I	J
O	287	287	137	157	4402	0:00	38.7	195	25.5	132
1000	291	287	139	158	4474	0:13	38.2	197	25.4	136
2000	296	287	140	157	4535	0:26	37.6	201	24.8	137
3000	300	287	142	156	4588	0:39	37.1	204	24.3	137
4000	304	287	144	157	4632	0:52	36.6	207	24.1	141
5000	308	286	146	156	4656	1:05	36.0	210	23.6	142
6000	312	285	147	155	4675	1:18	35.5	213	23.1	143
7000	316	284	148	154	4685	1:31	34.9	217	22.5	144
8000	319	283	151	154	4691	1:44	34.4	219	22.4	148
9000	323	283	153	153	4712	1:57	33.8	223	21.8	149
10000	327	282	154	152	4723	2:09	33.3	226	21.3	151
11000	331	281	156	151	4730	2:22	32.7	231	20.8	151
12000	335	279	158	152	4716	2:35	32.3	235	20.3	153
13000	337	277	160	151	4648	2:48	31.8	238	19.8	154
14000	340	274	162	150	4578	3:01	31.3	242	19.4	156
15000	342	272	163	149	4505	3:14	30.7	244	18.9	157
16000	343	269	164	148	4404	3:27	30.3	251	18.2	157
17000	343	264	164	145	4230	3:41	29.8	254	17.7	158
18000	343	260	166	144	4058	3:56	29.2	258	17.0	158
19000	343	256	168	143	3890	4:11	28.8	263	16.3	157
20000	343	250	167	141	3725	4:26	28.3	266	15.6	157
21000	343	246	169	140	3564	4:43	27.8	272	15.0	157
22000	343	242	170	139	3405	5:00	27.4	276	14.3	157
23000	342	237	172	138	3247	5:18	26.9	282	13.7	157
24000	342	233	172	135	3095	5:37	26.4	285	13.1	157
25000	341	229	174	135	2944	5:57	26.0	291	12.5	157
26000	340	224	177	134	2796	6:18	25.5	297	12.0	157
27000	340	220	178	133	2651	6:40	25.1	301	11.4	157
28000	339	216	180	132	2507	7:03	24.7	307	10.9	157
29000	338	211	181	130	2368	7:28	24.2	313	10.3	157
30000	337	207	183	129	2230	7:54	23.7	319	9.8	157
31000	337	203	185	128	2094	8:22	23.3	325	9.3	157
32000	335	198	187	127	1961	8:51	22.9	331	8.8	158
33000	334	194	190	127	1828	9:23	22.3	334	8.4	158
34000	332	190	192	126	1699	9:57	21.3	332	7.6	157
35000	330	185	195	125	1571	10:34	20.4	331	7.2	157
36000	329	180	197	124	1444	11:13	19.4	328	6.7	158

A = True Top Airspeed
 B = Indicated Top Airspeed
 C = Best Climb, True Airspeed

D = Best Climb, Indicated Airspeed
 E = Best Rate of Climb
 F = Time to Altitude
 G = Maximum Instantaneous Turn Rate

H = Corner Velocity
 I = Maximum Sustained Turn Rate
 J = Maximum Airspeed in a Flat Turn

Yak 9D

Using WEP

	A	B	C	D	E	F	G	H	I	J
0	270	270	132	152	3651	0:00	38.5	197	22.8	123
1000	273	269	133	151	3675	0:19	38.0	197	22.3	124
2000	277	268	137	152	3690	0:38	37.4	201	22.3	127
3000	279	267	137	151	3701	0:58	36.9	204	21.8	128
4000	283	266	138	150	3706	1:17	36.4	207	21.3	129
5000	285	265	140	149	3694	1:36	35.8	210	20.8	131
6000	288	263	141	148	3680	1:56	35.3	213	20.4	131
7000	290	262	143	147	3660	2:15	34.7	217	19.9	132
8000	294	261	145	149	3645	2:35	34.2	219	19.4	134
9000	298	261	147	148	3704	2:55	33.7	224	19.0	135
10000	303	261	148	147	3752	3:14	33.2	228	18.9	138
11000	308	261	151	148	3793	3:33	32.7	231	18.5	140
12000	311	260	153	147	3794	3:52	32.3	235	18.0	141
13000	311	256	154	146	3655	4:11	31.7	238	17.6	143
14000	312	252	156	145	3521	4:31	31.1	242	16.9	142
15000	312	248	156	142	3387	4:52	30.7	247	16.1	142
16000	312	243	157	141	3252	5:14	30.3	251	15.7	144
17000	311	239	158	140	3106	5:37	29.7	254	15.1	143
18000	311	236	160	139	2962	6:01	29.2	259	14.4	143
19000	310	231	162	138	2822	6:27	28.8	263	13.7	142
20000	310	227	162	136	2685	6:54	28.2	266	13.1	142
21000	310	223	163	135	2549	7:22	27.8	272	12.5	142
22000	309	218	165	134	2415	7:52	27.3	276	11.9	142
23000	308	214	167	133	2282	8:24	26.9	282	11.6	144
24000	307	210	169	132	2153	8:58	26.4	287	11.0	144
25000	306	205	170	132	2026	9:34	26.0	291	10.4	144
26000	305	201	172	131	1900	10:14	25.5	297	9.8	144
27000	303	197	175	130	1777	10:56	25.0	303	9.3	144
28000	303	192	177	129	1654	11:41	24.1	301	8.8	144
29000	301	188	178	128	1534	12:31	23.1	299	7.9	142
30000	299	183	181	128	1416	13:26	22.1	298	7.4	142
31000	297	179	183	127	1299	14:26	21.2	296	6.9	142
32000	296	175	185	126	1184	15:34	20.2	294	6.4	143
33000	293	170	188	125	1070	16:50	19.4	293	5.9	143
34000	290	165	190	125	958	18:18	18.4	290	5.3	144
35000	287	160	192	124	847	20:01	17.4	286	4.4	142
36000	283	155	195	123	737	22:05	16.5	283	3.8	143

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H = Corner Velocity
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Me262

	A	B	C	D	E	F	G	H	I	J
0	411	411	245	245	3723	0:00	27.1	319	16.8	206
1000	411	405	245	241	3606	0:23	26.7	324	16.3	206
2000	411	399	247	240	3489	0:45	26.3	328	15.7	206
3000	412	393	246	235	3375	1:07	25.9	333	15.2	206
4000	412	388	248	234	3269	1:30	25.5	340	14.7	205
5000	416	386	250	232	3234	1:53	25.1	343	14.3	207
6000	419	384	254	232	3200	2:17	24.8	349	14.0	209
7000	424	381	255	230	3164	2:41	24.4	354	13.7	211
8000	427	380	257	228	3126	3:06	24.0	360	13.2	211
9000	432	377	261	228	3088	3:31	23.6	366	12.9	213
10000	435	374	263	227	3048	3:56	23.3	372	12.6	215
11000	439	373	267	227	3007	4:21	22.9	376	12.3	217
12000	444	370	269	225	2966	4:47	22.6	382	11.9	217
13000	447	367	272	223	2922	5:14	22.2	390	11.6	219
14000	452	365	276	222	2879	5:40	21.9	396	11.2	220
15000	456	362	278	221	2834	6:08	21.5	402	10.9	221
16000	459	359	281	219	2772	6:36	21.2	409	10.5	222
17000	459	353	283	217	2664	7:05	20.8	415	10.1	222
18000	460	348	283	215	2556	7:35	20.5	421	9.8	223
19000	460	342	284	211	2452	8:07	20.2	430	9.4	224
20000	460	337	287	209	2349	8:40	19.8	436	8.9	222
21000	460	332	287	207	2248	9:15	19.5	445	8.6	223
22000	461	326	290	205	2148	9:52	19.2	451	8.2	224
23000	461	320	291	202	2049	10:31	18.8	459	7.8	222
24000	461	315	292	199	1953	11:12	18.2	460	7.5	223
25000	461	309	294	198	1858	11:55	17.6	459	7.2	225
26000	461	304	295	195	1764	12:42	17.0	460	6.7	223
27000	461	299	297	192	1672	13:31	16.4	459	6.5	225
28000	460	293	300	191	1580	14:24	15.7	459	6.0	224
29000	460	287	301	188	1491	15:20	15.1	459	5.7	223
30000	459	282	304	187	1403	16:21	14.6	458	5.4	225
31000	459	277	306	184	1315	17:27	14.0	458	5.0	224
32000	459	271	307	182	1229	18:39	13.5	457	4.6	224
33000	458	266	311	181	1143	19:58	13.0	457	4.4	226
34000	457	260	313	178	1059	21:26	12.4	454	4.0	226
35000	455	254	317	177	976	23:05	11.9	454	3.6	225
36000	453	248	319	175	893	24:57	11.4	452	3.2	225

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BOMBER AND VEHICLE REFERENCE

BOEING B-17 FLYING FORTRESS

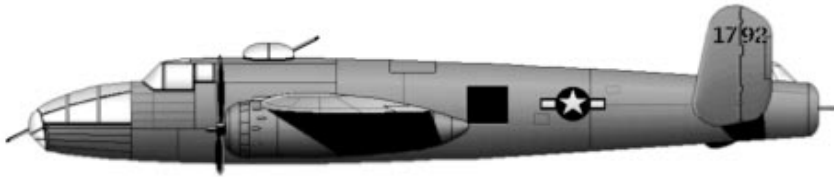


This is the airplane that comes most readily to mind when people think of the heavy bombers of World War II. It is the most durable aircraft in *Air Warrior*, carries the biggest payload (12 bombs), and has six gunner positions. If you want to crew up a bomber and strike more than one target, this is the aircraft to choose. The Fort's chief performance asset is its speed at high altitudes; its chief drawback is a nasty tendency to rip wings above 300 knots. Under no G loading, the 17 can achieve 320 knots in a dive, though you'd best not try to ride this edge, particularly with a crew aboard. In the realism arena the B-17 makes for the ultimate DeathStar when it's heavily crewed by good gunners.

Payload: 12 bombs

Armament: one .50 cal. machine gun (mg) in left waist position; one .50 cal. mg in right waist; two .50 cal. mg in upper turret; two .50 cal. mg in tail; two .50 cal. mg in ball turret; two .50 cal. mg in chin position

NORTH AMERICAN B-25J MITCHELL



Although the most significant American medium bomber of the Second World War, the B-25 in *Air Warrior* is seldom used except for nostalgic reasons. What it comes down to, in game play, is that whatever the B-25 can do, the A26 can do better. The Mitchell carries six bombs, eight .50 caliber guns in the nose, and five gunner positions. What speed the Mitchell has diminishes sharply above 20,000 feet, and it tends to rip wings in violent maneuvers, or at speeds above 275 knots.

Payload: six bombs

Armament: eight .50 cal. machine guns (mg) operated by the pilot; two .50 cal. mg in tail; two .50 cal. mg in upper turret; one .50 cal. mg in left waist position; one .50 cal. mg in right waist; two .50 cal. mg in nose gunner position

DE HAVILLAND MOSQUITO MK XVI



The sole defense of the “Mossie” is speed. It has no guns or gunner positions, yet only a well flown Mustang can catch it once it’s achieved a head of steam. As the Mosquito can only carry four bombs, it’s a special purpose bomber in *Air Warrior*. Many players use it on missions against enemy radar. Unlike American buffs, which are like flying tanks, the Mosquito is constructed of plywood, thus it will take little damage. It’s not as vulnerable to speed as American buffs, however; a Mossie can travel at up to 450 knots without ripping its wings.

Payload: four bombs

Armament: none

JUNKERS JU88A4

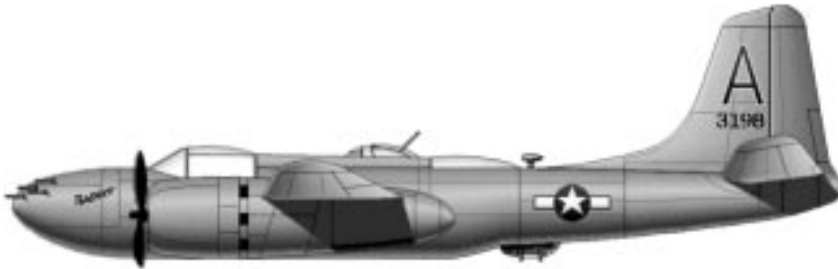


The Junkers 88 was perhaps the most versatile of all Luftwaffe aircraft. At various times in the Second World War, the JU88 served as a level bomber, dive bomber, ground attack aircraft, and radar equipped night fighter. In *Air Warrior*, however, this bomber is little used except for nostalgia or novelty. It carries four bombs, has one pilot-operated machine gun, and three gunner positions. The 88 is to bombers what the Yak is to fighters in *Air Warrior*. Although it can be quite maneuverable once its bombs have been dropped, it has the lightest caliber guns of any aircraft in the game, save the Mossie's total absence of firepower.

Payload: four bombs.

Armament: one 7.9 mm machine gun (mg) operated by the pilot; one 7.9 mm mg in the nose; one 13 mm mg in the upper gunner position; one 7.9 mm mg in lower tunnel position

DOUGLAS A26B INVADER

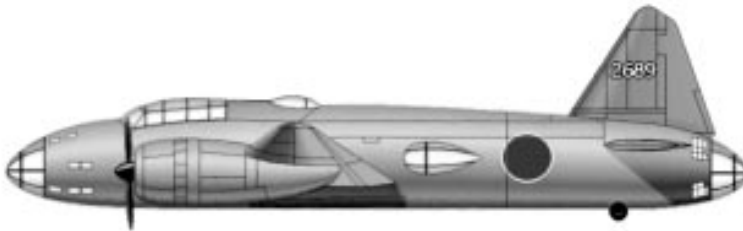


The Invader in *Air Warrior* is the fastest medium bomber, with the exception of the Mosquito. Unlike the Mosquito, the A26 has formidable armament: eight, .50 caliber machine guns in the nose, plus two gunner positions. The A26 also can carry eight bombs, making it ideal for striking at enemy airfields. Without question, the A26 is the most versatile aircraft in *Air Warrior*. As the actual Invader pilots noted during WWII, this plane very nearly has the capability of a fighter once its bomb load has been dispensed. It also has an immense supply of forward firing ammo. Stick in a gunner or two, and you have a quite lethal aircraft.

Payload: eight bombs

Armament: eight .50 cal. machine guns (mg) operated by the pilot; two .50 cal. mg in upper turret; two .50 cal. mg in lower gunner position

MITSUBISHI G4M2 “BETTY”



The Betty's strength and weakness arise from its role as an extreme long-range bomber. Of light construction, and capable of carrying up to 1100 gallons of fuel, the G4M had a range of 2300 miles, but it lit up like flash paper when hit by even light enemy gunfire. It's entire wing was a massive, unprotected gas tank and the Betty became a death trap of rare proportions. What's worse, it's lightly armed, save for the one 20 mm cannon allotted to the tail gunner. As you might expect, the Betty is rarely flown in *Air Warrior*.

Payload: six bombs

Armament: one 7.7 mm machine gun (mg) in the upper gunner position; one 7.7 mm mg in the chin; one 7.7 mm mg in the left waist; one 7.7 mm mg in the right waist; one 20 mm cannon in the tail gunner position

DOUGLAS C-47 SKYTRAIN “GOONEY BIRD”

Developed from the DC-3 passenger plane, the rugged, dependable C-47 made a crucial contribution to the Allied war effort during World War II, serving as a transport for troops, supplies, and wounded soldiers. While not an exciting plane to fly in *Air Warrior*, the C-47 serves a unique role: it provides the only means available to carry paratroopers for airfield capture. You can also employ the Gooney Bird as a cargo transport to resupply damaged airfields.

SOVIET T-34 TANK



History

A total surprise to the German invaders in the summer of 1941, the T-34 completely outclassed contemporary German armor. The T-34 was fast, dependable, extremely rugged, and its 76 mm main gun packed enormous firepower. Subsequent, and now famous, German tanks, such as the Panther and Tiger, were developed specifically to improve upon the T-34.

The T-34 in *Air Warrior* - Half-Time Arena

Few people employ the tank in *Air Warrior* but for those with the patience and skill necessary to master its 76 mm cannon, it can be a devastating weapon. Its big gun has a range of 9000 yards and it carries 55 shells, each with a third the power of the standard 550 lb. bomb issued to airplanes in the game.

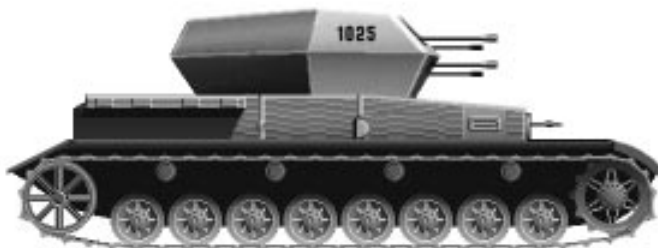
This means that it can do more damage than most bombers, although its speed, glacial in comparison to airplanes, limits its usefulness. You can use a tank to destroy most targets that are vulnerable to bombs: anti-aircraft batteries (acks), towers, hangars, fuel storage tanks, ammo dumps, even planes on a runway. You cannot destroy or close an airfield with a tank, however. The T-34 can take on a crew of three, in addition to the driver: a main gunner, a hull machine gunner, and an external machine gunner on top of the turret.

Crewed tank missions can be a great deal of fun, particularly for new players, because it's very difficult to kill a tank before it inflicts damage to the enemy. If you have the time and patience, driving a tank to an enemy airfield and wreaking havoc can be most rewarding.

A moving tank is difficult to destroy, and even a stationary tank can absorb a lot of punishment before it dies. An enemy tank's appearance at an airfield most always draws a lot of attention. Often the flustered enemy will mount an extensive effort, occupying several pilots, to rid itself of the tank.

Thus, tanking can be a useful strategy if your country is significantly outnumbered. Pitched tank battles are rare in *Air Warrior*. The game is, after all, about air combat, not armored warfare. Still, the T-34 tank provides a powerful and entertaining alternative to battle in the virtual skies.

FLAKPANZER IV WHIRLWIND



The Flakpanzer is an armored anti-aircraft vehicle available at all airfields and vehicle garages in Europe.

History

Consisting of a turret battery of four 20 mm anti-aircraft guns, mounted on obsolete German tank chassis that had been returned from the front for overhaul, the Flakpanzer was truly a makeshift armored vehicle. It was only produced for a few months in the latter half of 1944, and was replaced with a model that employed larger, more effective guns.

The Flakpanzer in *Air Warrior* - Half-Time Arena

The Flakpanzer provides the only player controlled anti-aircraft weapon in the game, and it can be thoroughly lethal in the right hands. Its four 20 mm cannon deliver a punch comparable to the Focke Wulf and it has over four times the Focke Wulf's supply of cannon ammunition.

In addition to airfield defense against enemy planes, the Flak is an effective weapon against paratroops during airfield capture attempts. It is also an effective anti-tank weapon at short range, but its guns will not damage structural facilities such as aircraft hangers, and fuel tanks. Mostly, the Flak is useful for immediate airfield defense when you can't take off safely from an embattled field, and there

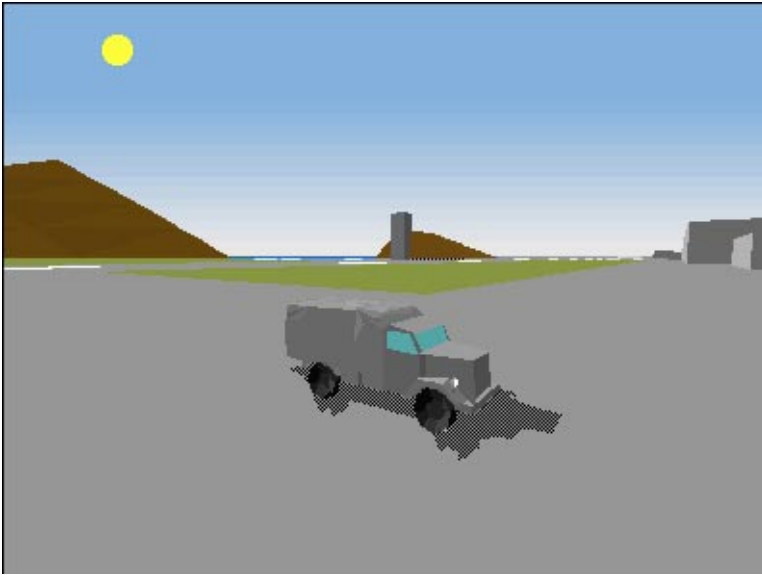
isn't time to take a fighter from another airfield to help out. In those situations there is no reason to drive the Flakpanzer. Just jump to the gunner position and start shooting at the nearest enemy plane.

Although your effective range is only 600 yards, you can begin firing when incoming targets reach 700 or 800 yards away. There is little need to practice ammo conservation in a Flakpanzer.

Armament: four 20 mm cannon; one 7.92 mm machine gun.

Ammo load: 3200 cannon shells; 1600 machine gun rounds

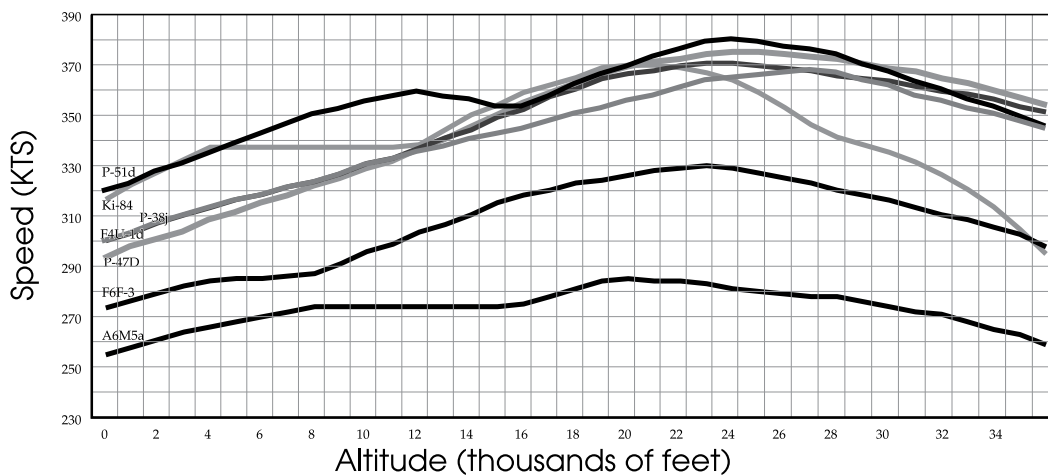
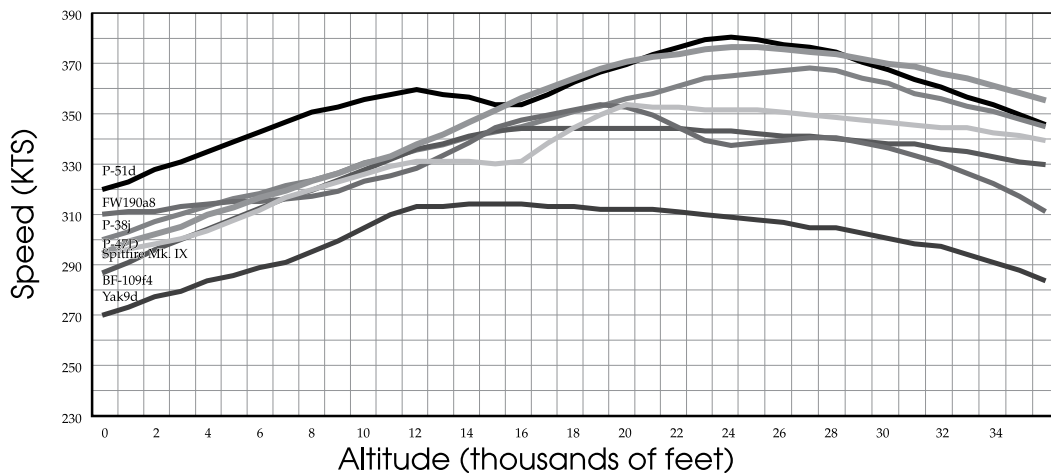
OTHER VEHICLES



Air Warrior also has the Willys Jeep and a cargo transport truck. The jeep has a single .50 caliber machine gun; the truck has no armaments whatsoever. Neither is used by *Air Warrior* players very often, although some pilots use jeeps to pop out onto airfields to check for nearby bandits; then, if they find an enemy strafing or bombing the field, it won't go against them in the scores as will a death in a fighter.

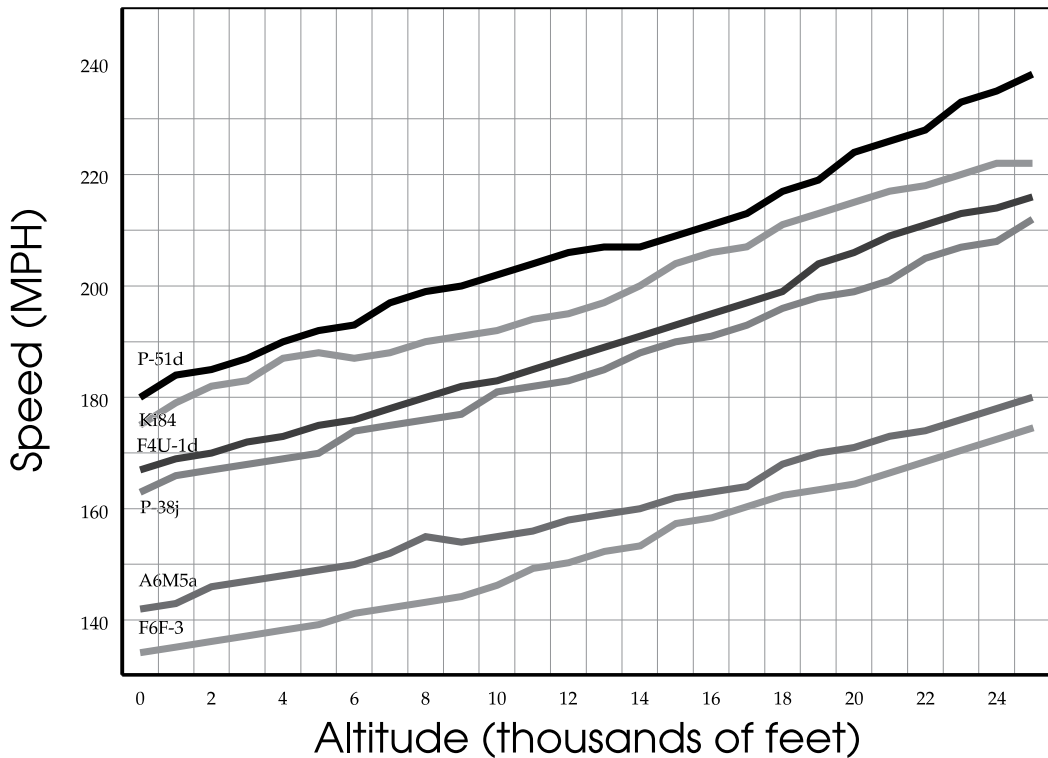
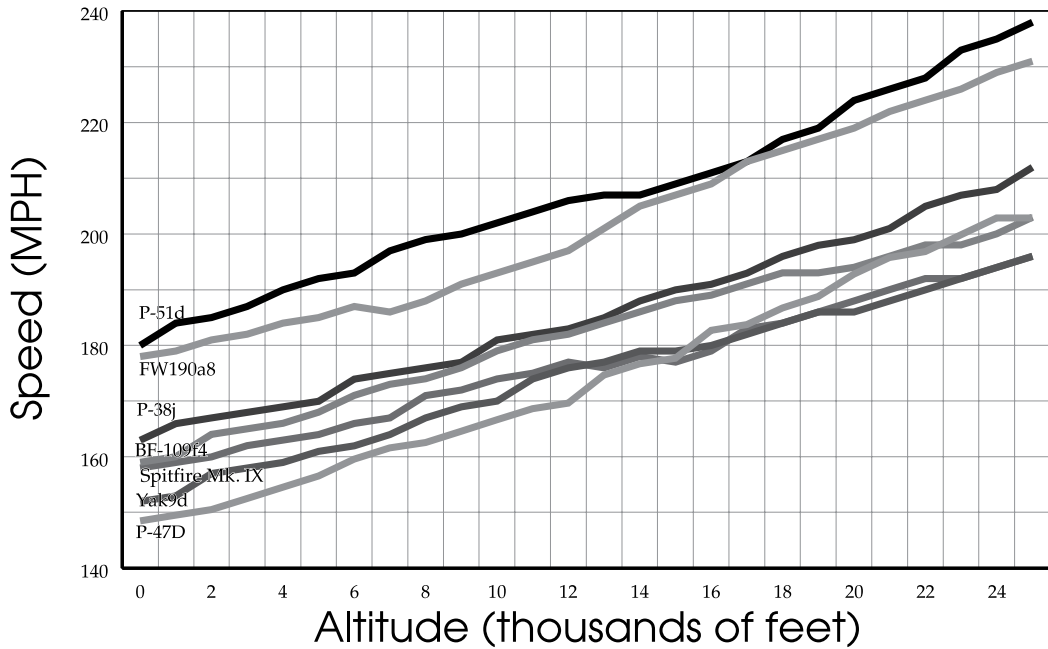
APPENDIX A - PLANE COMPARISONS

True Top Airspeed *All Fighters Using WEP*



page 2

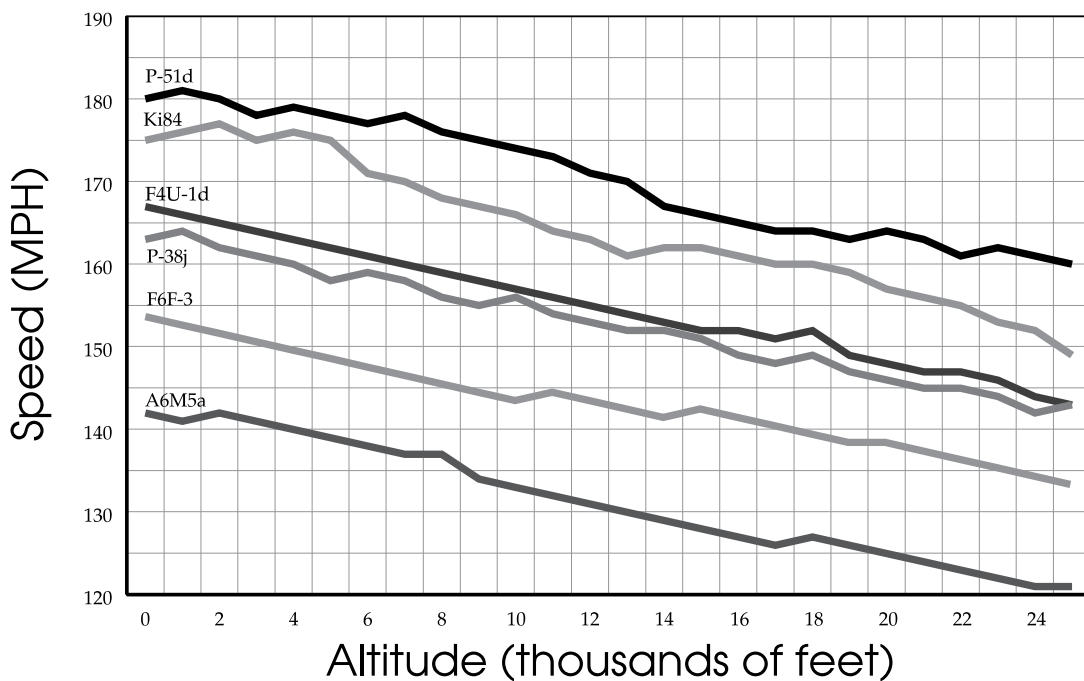
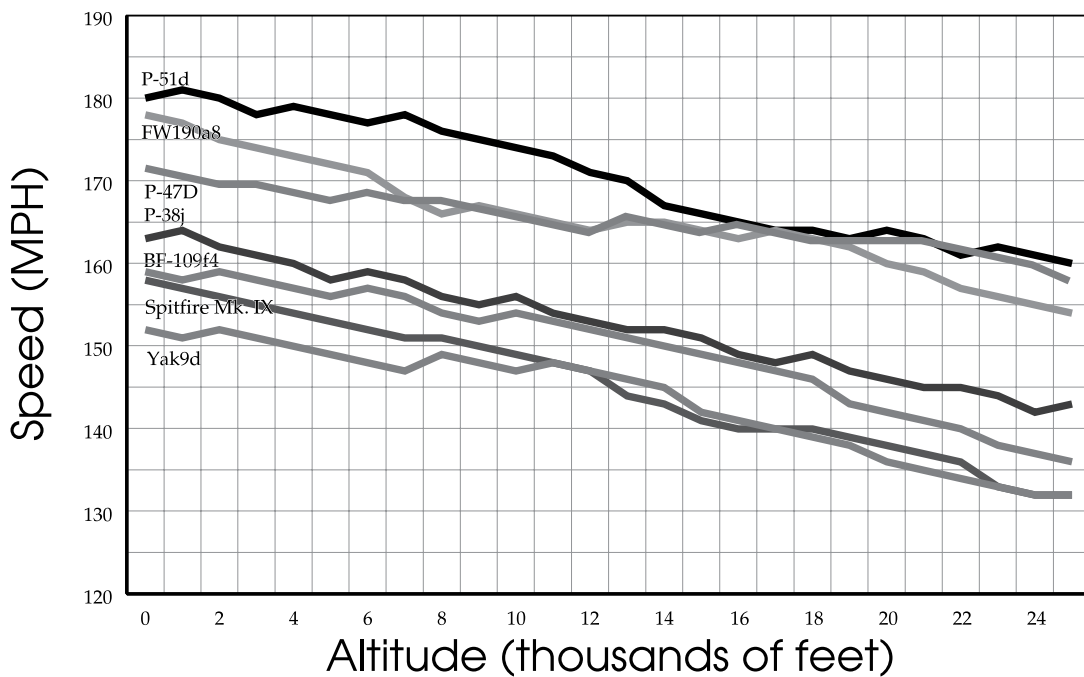
Best Climb-True Airspeed

All Fighters Using WEP

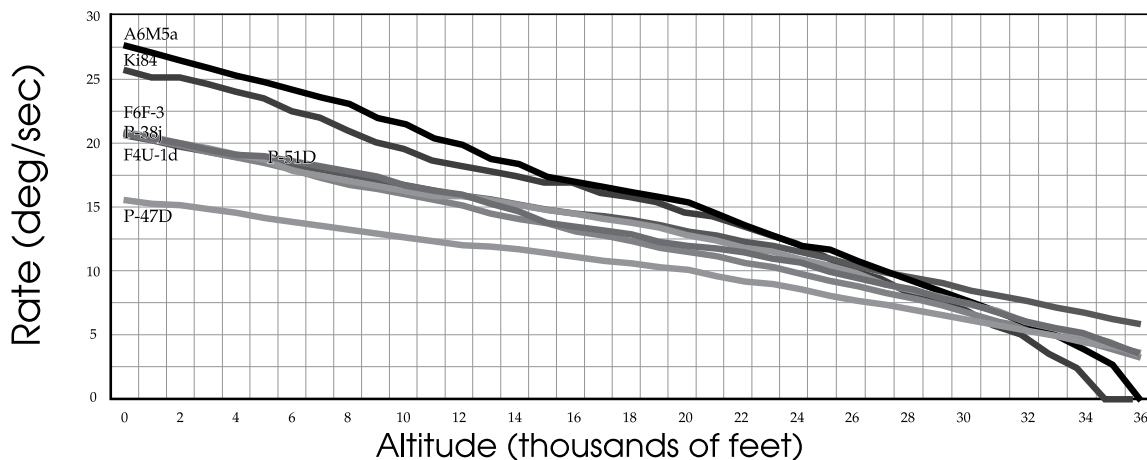
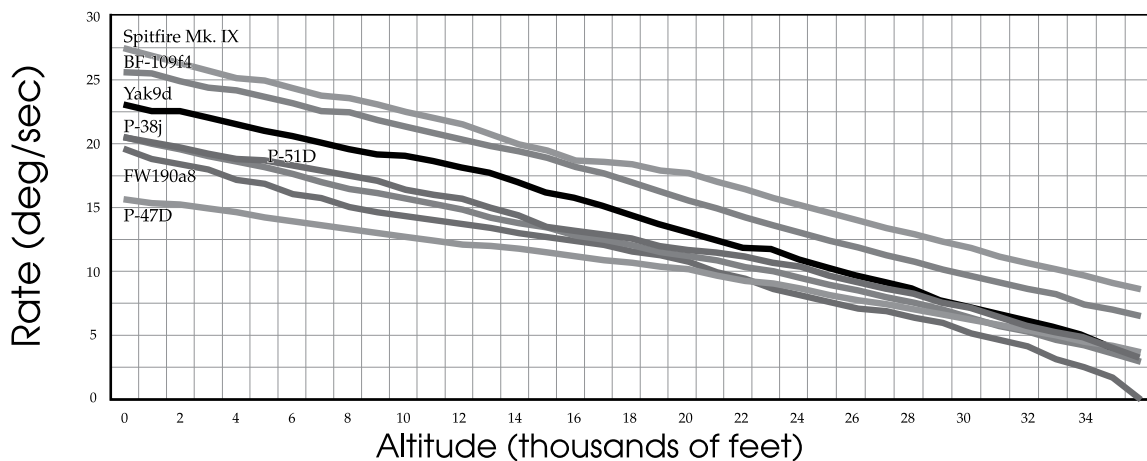
Best Climb-Indicated Airspeed

page 3

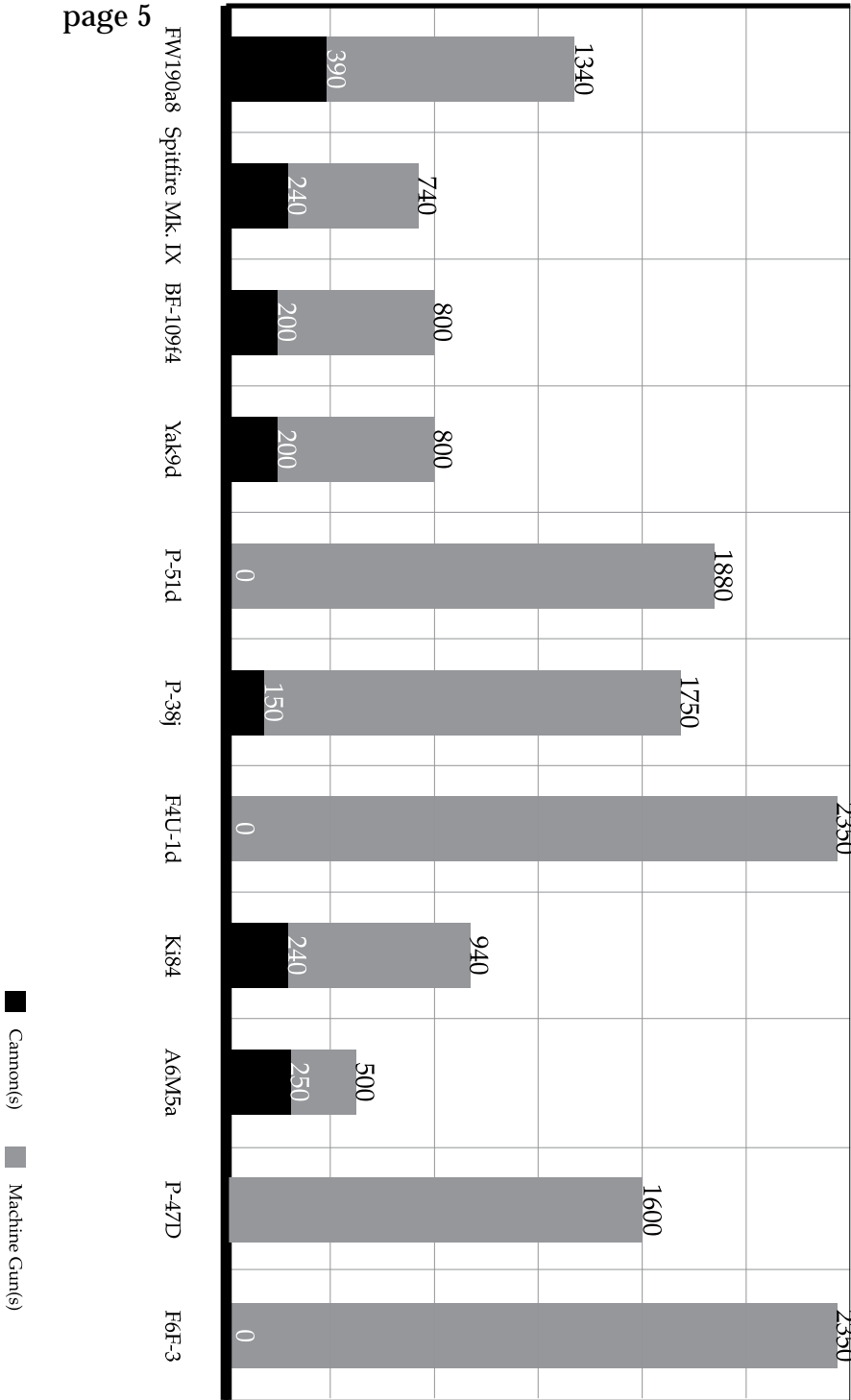
All Fighters Using WEP



page 4 **Maximum Sustained Turn Rate** *All Fighters Using WEP*

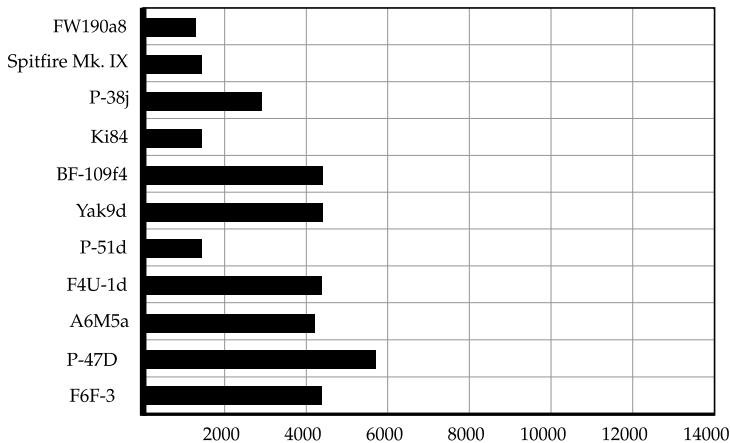
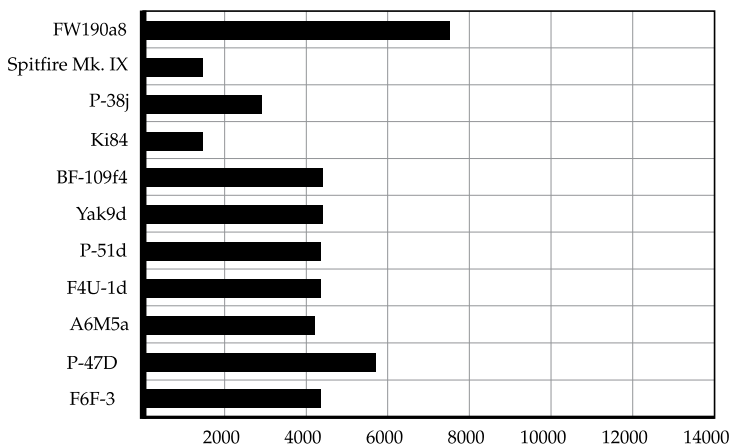
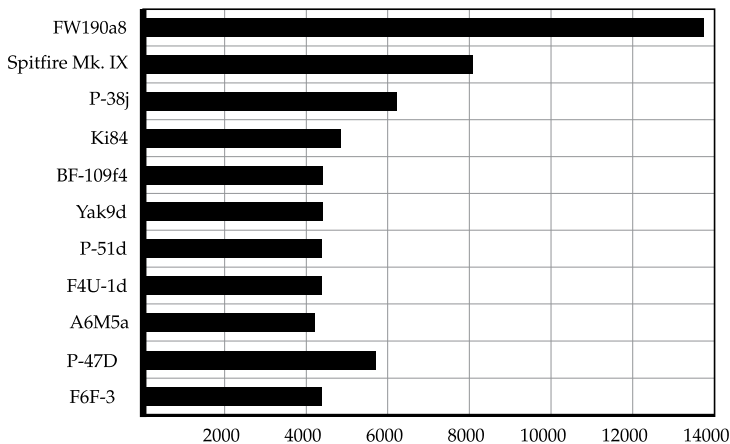


Ammo Load



page 6

Lethality Rating

100%, 45%, and 20% of Ammo Load

APPENDIX B - GLOSSARY

AIR WARRIOR JARGON

There is a language to air combat. Given that people using the radio in *Air Warrior* are typing and flying at the same time, most terms are abbreviated or become acronyms, and some are creations of the game entirely.

- AAA..... Anti-aircraft artillery.
- Ack..... same as AAA.
- AFK away from the keyboard.
- Alt Altitude.
- Angels Another term for altitude, in thousands of feet (i.e.: “Angels 10” means 10,000 feet).
- Auger Crash landing.
- B4..... Before.
- BRB Be right back. This means you’ll be away from your computer for a moment. It’s followed by “back” when you return.
- Bandit..... Enemy plane.
- Bingo Used if you’re out of or short on something, followed by the item you lack (e.g., “Bingo ammo”)
- Bogey Unidentified aircraft.
- Buff Bomber.
- Bug..... To run away.
- B&Z Boom and zoom; a style of fighter attack.
- Cat jumped on my keyboard
..... No abbreviation or acronym for this common excuse has yet been devised.
- CC I understand.
- Con..... Short for icon, meaning you are close enough to pick up a local tracking icon (e.g., “Con C Spit!”).

- CR Climb Rate. When flying formation it's useful to let people know what your climb rate is or to conform to theirs (e.g., "CR=4" means your climb rate is 4,000 feet per minute).
- Deadstick Flying without the aid of engine power.
- DeathStar Heavily gunned bomber on the full realism page.
- Deck This can mean either the topside of a ship, such as a CV deck or, more commonly, it means close to the earth, as in "flying on the deck."
- Dien Dying.
- Ditch To land safely somewhere other than a runway.
- Drone A computer controlled aircraft/player.
- Dump You were disconnected from *Air Warrior* host computer against your will.
- Dweeb An unskilled player.
- E Energy.
- Efighter A type of fighter aircraft suited to high speed attack, but not dogfighting (e.g., "Grab an efighter"), or a pilot who practices boom and zoom energy tactics (e.g., "He's a pure efighter")
- Egg Bomb. Sometimes this is used as a verb meaning to bomb (e.g., "I egged him on the runway").
- Fiter Fighter.
- Frog Auger When you crash, sometimes it takes the host a few moments to process your virtual demise. From your cockpit it appears, for a second or two, that you've hopped off the ground, hence the term.
- Furball A thickly populated dogfight.
- <g,d,r> Grinning, ducking, and running (entered in message text as shown - <> symbols are not related to keyboard command keys).
- Glider Same as deadstick.
- hehe Laughter.

Hdg	Heading, usually followed by what heading it is (e.g., “Hdg 090”).
Icon	Same as Con above.
IMHO	In my humble opinion, yet rarely is there much humility involved with this acronym’s use.
In	Means you are engaging the enemy. This is often said with a bit more enthusiasm, such as “In In In!”
Jabo	German term for fighter bomber (Jagdbomber). Although it is seldom used in the game, the manual author likes the sound of it when used as a verb (e.g., “I jaboed the sucker!”).
K	One thousand (e.g., “Bogey at 5k”)
Kts	Airspeed in knots.
L8r	Later, meaning see you later.
No Joy	You don’t see the plane that someone has pointed out to you.
Off	You are disengaging.
OiNk	I remembered this time, DoK ;)
One hit [system]	
.....	Means that a single hit from gunfire has taken out a critical system (e.g., “One hit engine!”)
OTW	On the way.
Out	Same as “Off” except sometimes “Out” is followed by your exit heading (e.g., “Out 245”). Out can also refer to how far away you are from something you’re trying to reach (e.g., “Hang on! 5k out”)
OTOH	On the other hand.
Ping	Feedback, on your end, of a hit you’ve suffered. For example, a “ping-less death” means that you’ve been shot down without hearing bullets hit your plane.
Poof	Tells people that you are logging off immediately; a last good-bye before exiting the game.
Prep	To prepare an airfield for capture.

- Refer Refinery.
- Rgr Roger, same as CC.
- ROFL Rolling on floor laughing. It means you think something is very funny. This has many variations, from LOL (laughing out loud) to ROFLASTC (Rolling on floor laughing and scaring the cat).
- RTB Return to base. Sometimes this is followed by the number of the field where you plan to land (e.g., “Rtb 19”).
- Smoke Generally used as a verb in *Air Warrior*, it means to leak oil or fuel due to hits from gunfire or to cause the same to happen to someone else (e.g., “I smoked him!”).
- Stallfight A dogfight occurring near stall speed.
- Vis I see (e.g., “Vis C Stang”). This is similar to “Con” except it includes more distant planes that you may have identified with your radar. Generally, “Vis” is less urgent than “Con.”
- Vulch From the noun, vulture, in *Air Warrior* it becomes a verb, meaning to prey upon a nearly or completely defenseless victim. “Nice vulch!” it is not entirely a compliment.
- Warp Network delays causing planes to appear as if they’re jumping around, rather than flying around.
- :) A sideways happy face.
- You will see many, many variations on this. Here are a few:
- :-) this one has a nose.
- 8-) this one is wearing glasses.
- ;-) this one is winking.
- :^) tongue in cheek.
- :(..... A sideways, unhappy face. Usually, with this one, you are spared the variations.

There are communications customs that don’t contain words. Many pilots count out their kills over the radio. Some pilots, when they urgently need assistance, will issue three blank radio messages to signify a distress call.

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