

## MarkShot's STK/EAW: Shoot to Kill / European Air War

By Mark "MarkShot" Kratzer (Version 01.02 on 04/06/00)

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## Dedication

This guide is dedicated to Kam Wun Leung, my wife. Many years ago she bought me a copy of Lucasfilm's Battle of Britain and a joystick/game card, and the rest is history. She is my inspiration in all things and my copilot for life.

## Purpose

The purpose of this guide is to introduce beginning players and veterans alike to what they need to know to effectively play Microprose's European Air War in one-versus-one engagements (full realism options) on Microsoft's [www.zone.com](http://www.zone.com) gaming site.

## History

For me, there have been three great periods of one-versus-one engagements with human players. They are:

- Falcon 3.0 (guns and missiles)
- Su-27 Flanker 1.0-1.5 (guns only)
- European Air War

The original STK (Shoot to Kill for Falcon 3) was born out of direct modem to modem engagements during the time period when I climbed to the top of Compuserve's Falcon 3 Ladder. It was 60+ page compilation of email guidance and tips.

In my Flanker days, I did a lot of instruction via text chat, but never endeavored to produce a compilation of what I learned.

Now flying EAW on the Zone, I find myself often tutoring in text chat after a number of kills. It is time for me to produce a new STK to share with other EAW enthusiasts.

## Note

I hope that recruit and ace alike will find this document useful.

[www.combatsim.com](http://www.combatsim.com) is the official host of STK/EAW. The latest version may always be found at: [http://www.combatsim.com/guides/stk\\_eaw/intro.htm](http://www.combatsim.com/guides/stk_eaw/intro.htm).

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Salute!

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## Introduction

In most flight simulations, the computer AI will quickly get boring for better players. The computer AI no matter how well programmed does not learn, adapt, and innovate. So, when it comes to finding the best competition, the logical place to look is for other human opponents. This guide is dedicated to one-versus-one engagements with full realism options in Microprose's European Air War.

## General Applicability

I generally prefer to fly Spitfires. However, most of the advice presented here lends itself to engagements in other planes. Speeds, distances, and altitudes may need to be adjusted accordingly if you are flying something other than a Spitfire.

I generally prefer to engage in one versus one fights. I find it to be more competitive as there are no other external factors. In furballs and team play, energy management and large scale situational awareness become much more significant issues. However, learning to excel in one-versus-one engagements is a necessary prerequisite for surviving in furballs and team play.

I usually prefer similar plane engagements. In fact when two aircraft are very dissimilar, engagements can often be quite dull, since one participant commits to BZ (boom and zoom) and the other commits to turning fights. Neither player will enter the element of the other and the fight drags out with little result. However, the advice presented here can be adapted to dissimilar engagements.

## Assumptions

This guide is not a tutorial on how to get started playing on the Zone or with EAW. It is assumed that:

- The player is familiar with the basic principles of flight and air combat. If you are not, then see [Fighter Combat: Tactics and Maneuvering](#) by Robert L. Shaw.
- The player is familiar with Microprose's European Air War game and is capable of reasonable skill in offline play.
- The player knows how to get to Microsoft's Zone Web site, [www.zone.com](http://www.zone.com), and get into a game.

## EAW Basics for Online Play

I discuss some of the most basic tools which you will need in order to play effectively.

## **Controls Needed**

A joystick is essential, you cannot hope to play competitively without it. Enough said.

Although I have a throttle, I think you could probably get by without it. I rarely throttle back. Thus, perhaps the control which is manipulated the least is the throttle. Of course, I still feel that it is better to have one than not.

I would also consider rudders to be an essential control. They have many uses. Here are three which immediately come to mind.

- Rapidly rolling the plane. I find that kicking same side rudder and stick achieve the quickest possible snap roll.
- Often to achieve the fine line up with the nose needed to make a shot, you can use the rudder to skid the nose into the proper alignment. This is in lieu of using the ailerons and rolling. Response seems to be quicker and at the same time control seems a little finer. This is assuming that the repositioning of your nose is not terribly substantial.
- Many times when your opponent is somewhat below and off to the side in the forward quarter, your plane obscures your view of him. Not knowing what your opponent is doing is very dangerous. Using the rudder, you often skid (twist) the plane so that you can get a view of your opponent.

## **Calibration (sensitivity)**

Properly calibrating your joystick in EAW is very important. Someone taught me early on that turning ability is very tied to a good calibration. To be more correct, I am really talking about setting a good sensitivity for your joystick. {I suspect that this might vary for different types of planes, but I have not delved into it that deeply. However, the other night I flew a P51D, and I did have the distinct impression that I was not getting enough Gs out of my P51D due to my joystick sensitivity setting for my usual Spitfire.}

In setting the sensitivity of your joystick, you are trying to achieve the optimal balance of control and response.

- If the sensitivity is too low, then you cannot pull max Gs in a turning fight, and you will be out turned by your opponent.
- If the sensitivity is too high, then you will find your aircraft difficult to control and easily spinning. Protracted turning fights that push your aircraft to the edge of the envelope will be difficult to manage.

If you have found the right balance, then your joystick should behave as follows when flying.

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- In most turning fights (150mph-230mph), the joystick will be moderately deflected (pulled back), 30-70%.
- If full deflection is pulled at best turning speeds (150mph-230mph), then your plane should quickly stall or spin.

### ***Essential Views to Use (programmed on your controls)***

What follows is the list of views which I make extensive use of in one-versus-one online combat.

I fly at 1024x768. So, I am generally in the **virtual cockpit** and most of that time is spent **padlocked** on my opponent.

In order to maintain situational awareness while padlocked, I use the **snap forward view**. I have this programmed to a press/release button on my Thrustmaster F22. This allows me to quickly glance forward. It is sort of analogous to glancing in a mirror while driving. This allows me to accomplish three things:

- I usually get an idea where my nose is relative to the horizon (pitch), and I can determine where my wings are relative to the horizon (roll). This is critical in managing energy, since you need to know your orientation in order to determine if your orientation can be supported by your current energy state, and also to prevent you from becoming too fast and going above corner speed.
- The snap forward view swivels your head in a panning fashion. Following the panning action, gives you an intuitive sense of where the bandit is relative to your plane; this is especially true when the bandit is in your rear quarter.
- The snap forward view allows you to competently execute maneuvers while twisting with your opponent. This includes maneuvers such as a Split-S at minimum altitude or a horizontal scissors right above the water. For a Split-S, you can quickly focus on making your wings level to make sure you pull up as opposed to auger. For a horizontal scissors, you can make sure that you achieve a perfect 180 degree roll of your wings.

Additionally, this view provides the X notation for the location of your opponent relative to your flight path. This is very useful for performing maneuvers that involve not being in exactly the same plane of motion. Some examples would be high and low yo-yos.

I also use the **snap backward** view to a much lesser degree. I generally only use the snap backward view in one particular case. This is when an opponent is B&Zing (boom and zooming) me from behind. I can watch my opponent approach and dodge out of his way at the appropriate moment. However, most of the time I prefer to put my opponent over one of my shoulders by performing a gentle turn in order to keep an eye on him.

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I make extensive use of **fixed forward view with no cockpit**. I take most of my shots from this view. It gives you the maximum field of view and allows you to pull lead (point your nose ahead of the target) without losing site. I find it easier to aim, since there is less relative motion in this view than in padlock. I will generally switch to this view whenever my opponent is in my wind screen. I will either maneuver from this view or maybe get a shot. If my opponent is about to maneuver outside the field of view, then I switch back to padlock.

Lastly, I use **zoom in/out** from time to time. There are two particular instances where I find this useful.

- When you are in a turning fight at higher speeds with considerable separation, it is often hard to anticipate what your opponent intends, because you are too far away to follow the position of his nose and wings. Zooming in allows you to regain situational awareness.
- Sometimes your opponent is faster and running away from you in a straight and level horizontal extension. By zooming in with this view at 2000-3000 feet, it becomes possible to nick your opponent or come relatively close with a short burst or two. This often is not enough to decide the fight, but it is psychologically important to harass your opponent when you can. In many cases, your opponent will decide to reengage at his disadvantage out of fear of being shot in the back.

### ***Essential Functions to Use (programmed on your controls)***

**Flaps up/down** should be readily handy while you are flying. You often drop flaps in a turning fight when things get tight. You may also need to quickly retract them to avoid damaging them.

**Gear up/down** is also useful to have programmed. I may drop them when I am settling upon an opponent who is significantly below me as a fight begins. Effectively, I am using them as a form of air brakes. Don't ask me if this realistic; I don't know. But it works quite well in EAW. Some people drop gear in order to perform scissors or other maneuvers while trying to force an overshoot of their opponent. I generally prefer to avoid doing such things, because energy lost may be impossible to regain if your opponent knows what he is doing.

**Guns!** No further explanation is necessary.

**Gun Select** is useful when flying planes with a few cannon rounds and more numerous machine gun rounds. Generally, you want to fire your cannon rounds with a good chance of connecting. If you waste your ammo, you may not have it when you need it and/or you will not be able to score five consecutive kills or more without getting a new plane. Sometimes, I'll select just my machine guns in order to create harassing fire for my opponent. By this I mean that the potential for decent a shot is low, but you want to rattle



your opponent none the less. This tends to score psychological points even when actual damage is minimal.

**Lock/Unlock target** is pretty much self-explanatory.

## ***Spins***

Beyond the guns of their opponents, spins are probably the greatest single threat to the survival of new online players. In this section, I will cover:

- How to detect the onset of spins
- How to avoid spins
- How to recover from spins

## **The Onset of Spins and Stalls**

There are four things that are immediate indicators that a spin is imminent. If not quickly heeded, your situation in the fight will deteriorate very rapidly if your opponent has any skill at all.

- The HUD which shows your planes' information includes your airspeed. Normally, your airspeed is displayed in green. When you are in danger of a spin/stall, your airspeed will become yellow. This is the indication that you are now flying on the edge. Pushing it a little further will stall you or start you spinning.
- From your sound system, you will hear a shuddering sound. This is the audio cue which is analogous to your speed going yellow. The difference here is that this cue is generally indicative of a more severe situation.
- You should perceive a slight amount of shudder via the view system and/or a rapid slowing down of your relatively turn rate.
- You will lose padlock of the opponent who you are tracking. This means your plane is about to depart.

Ideally, when you get familiar with the planes in EAW, you should have a sense of four things and the tolerance of handling your plane can sustain without spinning.

- Altitude
- Speed

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- Side stick deflection
- Back stick deflection

Until that point, you can depend on the indicators identified above. When you have developed an intuitive sense and know how to recognize the indicators, then you will be ready to fly on the edge.

### **Avoiding Spins**

It is far better to avoid spins, then recover from them. Generally, when your plane spins the following things happen.

- You loose energy. I am not sure if this is a result of flight modeling or the fact that you will need to chop the throttle to recover.
- You loose position. It is likely that whatever your situation was with your opponent before the spin that after the spin your opponent will be maneuvering on your six or already there.
- You loose situational awareness. You are unable to focus upon your opponent and the time it takes to re-establish that focus may be more than you can afford when you come out of the spin.
- You suffer a blow to your ego, since you advertise to your opponent that you cannot fly your plane on the edge or that he has pushed you beyond your abilities.

Spins generally happen in the following combination of conditions.

- Your airspeed is between 100-200mph.
- You are turning hard (substantial back deflection of the stick).
- You are maintaining or gaining altitude; particularly when you are in an extreme nose up attitude.
- You are applying ailerons and/or rudder in conjunction with back pressure on the stick.

Here is what you can do to avoid spins.

- Get very gentle with back pressure on the stick when your airspeed is low (below 150mph). Use gentle and slight movements to increase the tightness of a turn watching for the onset of a spin. Don't simply yank the stick.
- When flying on the edge of a spin/stall, avoid applying aileron or rudder.

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- If you want to roll the plane (for example: your nose is above the horizon and you want to Split-S), you can apply full aileron and rudder no matter how slow you are as long as you do not pull back on the stick.
- If you cross over into a stall (shake and loose padlock), immediately center the stick. Such quick response should allow you to return to normal flight and you can carefully resume control input.
- Avoid heading into loops and other vertical maneuvers that you don't have the energy to support. For example, forget looping if you are beginning the loop at less than 200mph.
- Watch your opponent's energy state, do not get suckered into climbing and vertical maneuvers when your energy state is lower. Instead look to gain position through maneuvering or forcing an overshoot.
- When looping and doing Immelmans with low entry speeds (190-240mph), do not pull through the top (apply strong back pressure on the stick). Instead apply very slight back pressure with the stick. As your plane slows, its nose will fall through towards the horizon on its own. Generally, when this happens, you will actually get a good number of degrees/second without needing lift from the wings.
- If you must maneuver at very slow speeds, then drop your flaps. This will help improve the stability of your plane.

### Recovering from Spins

Once again, it is better to avoid spins than recover from them. Although I have seen some players who use spins as a defensive measure, I do not recommend it. I believe if you have such fine control of your aircraft, then it behooves you to maintain control and outmaneuver your opponent.

Here is what you need to do in order to recover from a spin.

1. Chop the throttle and center the stick.
2. Look at the horizon and note the direction which the nose is spinning in.
3. Apply full rudder against the direction of the spin and full aileron into the direction of the spin.
4. Wait until the rotation comes to halt and quickly center all controls. If you wait too long, then you will induce another spin.
5. Apply full throttle and keep the nose below the horizon momentarily.

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6. Gently begin to apply control inputs. If you are too sudden, then you will spin again.
7. Immediately begin some evasive maneuver (Split-S, or break turn, or horizontal scissors), since your opponent is most likely lining you up for a shot.
8. Regain padlock of your opponent and figure out what you should do next.

There are some players who after recovering will immediately fake a spin for two reasons.

- Buy time to determine what his proper strategy should be.
- Sometimes the non-spinning player who is making a guns run will be sloppy and sail straight by his target without breaking and climbing. The assumption by the non-spinning player is that he can safely overshoot, because the spinning player is out of control. Then, the spinning player performing the fake spin will quickly straighten out and shoot the overshooting non-spinning player in the back.

### ***Turning Well***

Beyond spins, the next most important skill which a new player can learn is how to achieve maximum turn performance. I will assume that the player is familiar with the concept of corner speed. If not, my own simple definition follows.

Corner is the speed at which an aircraft can maintain its best turn. The best turn is the tightest turn (smallest radius) at the maximum degrees/second. This is important, since if you are turning at corner and your opponent is not, then you will be turning inside him. This will ultimately yield a rear quarter shot.

In order to turn well, you need to simply:

- Know what corner speed is for your aircraft and hold it if you can.
- Deploy your flaps.

The tricks you need to be aware of here are:

- You want to avoid reaching corner speed by chopping the throttle. Energy lost cannot be regained in the middle of a fight.
- The right way to get to corner speed is to turn into the vertical (climb) to slow your plane. This will also allow you to drop your flaps. This should be around 200mph or so.

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- If you are in a diving situation, you must retract your flaps beyond 250mph. Otherwise, they will become damaged.
- When you are in a turning fight and your opponent straightens out (without climbing) for any extended period of time, retract your flaps. Flaps act as a brake. By retracting them, you can regain some speed (building up your energy).

A final comment about flaps: Some people drop them to climb. I have not studied this situation, but I believe you lose more than you gain when you do this.

### ***Nose-to-nose Guns***

I generally prefer to avoid nose-to-nose guns situations. At best, you are simply rolling the dice to see who will survive. I prefer to take my shots from my opponent's rear quarter. At worst, your opponent is simply better at this than you. I will cover later how such situations can be avoided.

In any case, you definitely want to avoid nose-to-nose engagements with dissimilar planes when your opponent is flying a more heavily armored plane in terms of firepower and ability to sustain damage.

### ***Gunnery (Taking the Shot)***

In this section, I address a number of issues which relate to gunnery in EAW.

#### **Range**

The best range to take a shot is about 200-500'. Beyond 500', the chances of scoring hits diminish and the impact of small nose movements are magnified. There is nothing inherently wrong with shots from less than 200'. However I have the following problems with shooting from that close and closer.

- If you can be that close, then you should have already opened fire as you are already in the target's lethality envelope.
- To get that close, you may have too much closure on the target. This puts you in jeopardy of an overshoot or collision.
- At very close ranges, it is hard to maintain your position on your opponent. Remember that you may often be reacting to his abrupt movements. The distance compensates for your less than instantaneous response time.
- Lining up for the shot may require very substantial movements of your nose given the large angle involved due to the short range.

## Profile

I am not sure if the hit profile is modeled in EAW with regards to the cross section of the target exposed for the shot. I suspect that it is. In which case, I find that the best profile for shots is that of a hard turning target on which you are pulling lead. My reasons are as follows.

- There is a much larger profile than a simple rear quarter shot.
- It seems easier to maintain a steady guns platform in a turn than level flight. This may well be an artifact of joystick behavior than real world flight modeling.
- In a turn, it is easier to take advantage of tracers and let the target fly into the arc of fire by leading its flight path. Straight on rear quarter shots are either dead on or off; the target does not fly into the line of fire.

## Shooting Views

The forward view minus the cockpit is the best view to shoot from.

- You can lead the target without losing it under the nose of the plane.
- There is less relative motion than padlock view.

Padlock is best used for close range snapshots. These generally occur when two planes are in a scissors. Your opponent will pass in front of your nose for a brief instant; especially if you are winning the scissors. In this situation, you should attempt to line up the crossing and take a quick shot.

## Lead

Generally, you will need to lead the target based on how hard you are turning and the target's range. You should begin to get a feel for the amount of lead and be able to use the target's position relative to the reticule to fine tune your aiming.

## Anticipate Motion

When trying to line up a target, it's best to try to spend less time chasing the target and more time trying to anticipate where the target is going. This is particular true in high yo-yos and hammer head turns etc... Rather than chasing the target up his climbing arc and then back down, it would be better to get your nose pointed to where the target will need to be coming back down. You know this, because you can see that the target does not have sufficient energy to loop. By lining your nose up in the target's descent path, you stand a good chance of having a nice shot set up as your opponent flies by.

## Short Bursts

Take short bursts until you have the target lined and are getting hits. Then, let it rip and pound the target.

## Pull Lead

Generally, you will need to place your nose in front of where the target is going. Often you will let the target fly into your stream of fire. One thing which you want to avoid is pulling so much lead that you get the shot, but force yourself into a spin. Unless, you can win it with the shot, it is generally not worth it. This is particularly true in forward quarter passes. It would be better to continue jockeying for position and take a shot when there is no risk of a spin.

## Use the Rudder

The rudder can help your gunnery in two ways:

- You can use the rudder to quickly skid the nose and get the angle for a shot that you could not achieve by simply maneuvering the plane. This often occurs in tight spiral downs, close rear quarters when your opponent is rolling, and when you have gotten somewhat too close in trail.
- You can use the rudder to wiggle the nose and ensure that the target gets covered in the spray of bullets.

## EAW Intermediate Skills for Online Play

Now that you have mastered the basics of online play, I will move on to some intermediate topics.

### *Fights in Progress*

In this section, I discuss fights which are already in progress. Later on, I will discuss various ways to open a fight.

### **Evaluating the Situation**

The first thing which you will need to do is to be able to evaluate the situation between you and your opponent. I am addressing this as if it is a static process, but in reality this is a dynamic process which you must do continuously during a fight.

There are three things that you must address in your evaluation.

- Relative Energy State

- Angles Situation
- My Plan

## Relative Energy State

I start with energy states, since this, in my mind, is the most critical piece of information. It is the biggest factor in determining what your options are. Your energy state is based on two components: current speed and altitude. Thus, one could be high and slow and have a greater energy state than someone who is low and fast. Of course, if you are low and slow, then your energy state is scratching bottom.

The relative energy state is how your energy state compares to your opponent. I tend to see this as comparing two normalized quantities. Imagine, for a minute, that plane X is at X.SPEED and X.ALTITUDE and that plane Y is at Y.SPEED and Y.ALTITUDE. Then, define a new altitude (normalized) called N which is  $(X.ALTITUDE+Y.ALTITUDE)/2$ . Now, suppose X and Y either climb or dive to altitude N while maintaining full throttle. We have now eliminated altitude from our considerations and are left with just two speeds. The difference between X.SPEED and Y.SPEED define the relative energy state. The plane with the greater speed holds the energy advantage. This plane may hold a 10mph, 100mph, or 600mph advantage. Just to dispel any doubts that greater energy state corresponds to a clear advantage. The plane with the energy advantage in the fight always has the option to climb to a higher altitude and put itself beyond its opponents ability to point his guns at it. The reality of air combat is that a potential advantage alone does not convey victory. One still has to know what to do with it.

Arriving at the relative energy state in EAW is a simple process. It is done with the on screen HUD which on the left side displays your speed and altitude and on the right side displays your opponent's speed and altitude. Often in a tight turning fight, the two planes are roughly at the same altitude and one can just look at speeds. Otherwise, you must take altitude into consideration. After a while, you get an intuitive sense of how altitude figures into arriving at your evaluation. For the most part, you don't need to arrive at an exact number. You simply need to know who is holding the energy advantage and have a rough sense of the magnitude of that advantage.

## Relative Angle State

There are no all aspect, off bore, passive, air-to-air missiles in EAW. Thus, unless you cause your opponent to auger in (actually this happens fairly frequently), you can only resolve combat by pointing your guns at your opponent and taking him out. Assessing angles is basically a matter of determining how close each combatant is to getting his guns lined up on his opponent.

If your target is directly behind you, then your angle situation is at 180 degrees (the worst, you are no where close to having a shot). If your target is directly in front of you,



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then your aspect angle is at 0 degrees (the best, you have a shot). Unlike relative energy states, angles is not necessarily a zero sum game. It is possible for both players to have a 0 degrees angles situation; when the two planes are heading straight towards each other. Generally speaking, the player with the lower number of degrees in regards to the angle situation is holding the advantage in terms of angles. I still regard relatively energy state to be more important, since an energy advantage can often be used to rectify an angles disadvantage.

{If anyone knows what the proper term for angle state <aspect angle?> is, then please email me. Thanks.}

When looking at angle state it is VERY important to observe the situation and how it is changing over time. If your opponent's angles state relative to you is decreasing while yours is increasing, then he is working into position for a shot. Often this can be in a turning fight that he is gradually winning and slowly closing in behind you. If you see such a situation developing, then you want to contemplate doing something before it becomes too extreme.

The evaluation of the angles state is generally a matter of using the view system. There are four components to consider.

- Position of your opponent relative to the virtual cockpit. Your opponent could be in your windscreen, off a wing, or over a shoulder.
- Position in the fixed view off of the reticule.
- Regular/zoom view and the direction of your opponent's nose.
- Snap forward view and how long it takes the panning system to flip back and forth.

### **Some Energy/Angle Observations**

I would like to take a minute to discuss the relative importance of energy state versus angle state. Relative energy state tends to take precedence over relative angle state when there is a significant difference in the relative energy state (100+ mph difference).

If you have a 100+ mph advantage with your opponent on your six, then you can probably save yourself by quickly going into a steep climbing spiral. Thus, relative energy state is more important. If you have 10 mph advantage with your opponent on your six, then you can only frustrate your opponent, but not escape. Thus, relative angle state is more important. Remember with a 10 mph energy advantage and an opponent on your six, you will need to maneuver radically (more radically than your opponent). It is quite likely that you burn up your pitiful energy advantage through high G maneuvers to escape.

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A player who is willing to dump energy (losing altitude while throttled back) can gain a momentary angles advantage or temporarily escape from an attacker. But the energy rich attacker, should be able to reposition and once again be in a better situation to push the attack. Of course, the target can once again dump energy to gain angles or escape. However, ultimately the fight will reach sea level. At which point, the attacker holds an energy advantage which can no longer be easily neutralized.

### **My Plan**

You should never simply be flying in a fight and reacting to what is going on. You should always have a plan. Your plan addresses what you are trying to accomplish: I am trying to take advantage of my opponent's energy advantage and sucker him into the water; I am trying to take advantage of my energy advantage and loop so that I can nail him wallowing at the top of his loop; I am trying to take advantage of my energy advantage by turning on the edge of a spin in order to force my opponent to spin; ...

Evaluating the relative energy and angle states will permit you to determine if your plan is prudent and if it is the best plan. If you need to change plans, then your options are going to be dictated by the relative energy and angle states.

### **Applying Energy State**

In this section, I look at how you can apply energy state when you have your opponent in your rear quarter. In other words, we are assuming that your relative angle state is poor.

### **You are Energy High and Angle Poor**

Assume that you are energy high by relatively 40-70mph.

You can see that your opponent is behind you and that he is in lag pursuit (cannot point his nose into your flight path for the shot). You know that he is in lag, because you have gone around a circle or two and are not dead yet.

You can do a number of things at this point.

- Spiraling down would certainly be the wrong thing. This will probably push you above corner speed while your opponent achieves corner speed and can pull lead.
- You could continue your level turn. This accomplishes little as it does not change the situation between you and your opponent.
- Then there is the right thing to do. You could turn and gradually climb. You continue to push up your altitude until you are riding the edge of a spin. At this point, one of two things could happen in regards to your opponent.

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- Your opponent pushes the pursuit by attempting to keep pace with you and goes into a spin. If this should happen, you should gently lower your nose to get a little speed and come around behind your opponent. You will either blast him and then break off and make another pass, or if he is coming out of the spin, then saddle up and shoot.
- Your opponent realizing what is going on may start backing off. This will both create horizontal and vertical separation between you and him. When there is adequate separation between you and your opponent, you should roll into him bringing your nose down and attempt to improve your angles situation. If you had enough of an initial energy advantage, then it may be possible to get a rear quarter position from this tactic.
- Another right thing to try if your opponent is not too deeply in your rear quarter is a high yo-yo. Basically, you will turn and climb, and then roll the nose back towards the ground, then turn and descend. If your opponent remained in a level turn, this can help you to cut across his turning circle.

### **You are Energy Low and Angle Poor**

Assume that you are energy low by relatively 40-70mph.

You can see that your opponent is in your rear quarter and that he is pulling lead pursuit (positioning for a shot). You know this from observing that the relative angle state has been changing rapidly in his favor.

You can do a number of things at this point. First, come wrong things to do.

- You could spiral up. You will quickly spin and become dead meat.
- You could remain level and turning. This should give you anywhere from 10-30 seconds of continued survival before you get hammered.

Now for some right things to do.

- The first thing which I would try is a horizontal scissors. This is basically a process of S-ing back and forth. At the point that your opponent has once again settled into a stable turn, you reverse and break the other way. This combines use of padlock to watch your opponent and his maneuver, and snap to forward view to execute perfect snap rolls and break turns. Ideally, since you are slower, your opponent is going to have trouble matching your turns and begin drifting out in front of your nose with each oscillation. There are a number of things which can happen at this point.

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- You may get a good snapshot from padlock on the crossing. Even if you do not, a little burst on the passing should help to increase your opponent's stress level. This could encourage him to disengage.
- Your opponent may fail to break off and you may be able to gain such an advantage in the scissors that you can pull onto his six.
- Your opponent might chop his throttle to rectify the worsening situation in the scissors. Assuming you manage to shake him or her, you have a very good chance of achieving a reversal.

A horizontal scissors is my preferred strategy because of the following reasons.

- Unlike other options, it does not require you to unnecessarily dump energy. You may need that energy in the future.
- It is a progressive strategy. What I mean is that it does not require you to beat your opponent through trickery (because maybe he won't fall for whatever) or by execution of one quick maneuver.
- It is an elegant approach that when you are doing it well clearly demonstrates maneuvering skill and discourages your opponent. You are quite likely to catch a poor to average opponent with this.
- If you are fairly low (1300-2300'), you could attempt a Split-S. Depending on how fast and how low you are, it might be advisable to chop the throttle too. You should have a general sense given the plane you are flying what is the minimum altitude at a given speed which you can perform a Split-S without crashing. A Split-S may accomplish one of three things.
  - Your opponent's excess energy may make it impossible for him to clear the ground. Thus, he augers. In my book, that is a kill and still quite satisfying.
  - Your opponent realizing that he cannot clear the ground may not try to follow. Thus, he disengages, and you can work on trying to establish yourself in a better position.
  - Your opponent realizing that he cannot clear the ground, chops the throttle and slows down to avert auguring. Although you have not shaken him, you have managed to degrade the size of his advantage in a measurable way. In fact, you should quickly check if you now have the energy advantage in case he misjudged how much to slow down.
- You can attempt a low yo-yo and cut across his turning circle. If this works, he will be inclined to descend somewhat in his turn. In which case, you should have gained back some angles in the process.

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- If you have a significant amount of altitude (4000+'), you can initiate a tight spiral (cork screw) down. This is particularly effective if your opponent is close behind. This move works best if you chop the throttle. You should apply maximum rudder with near maximum back stick and aileron roll. Similar to a scissors, you should be rapidly switching between snap forward view and padlock view. A number of things can happen to your faster opponent if he tries to stay with you.
- Your opponent's excess speed could cause him to black out. This should allow you maneuver into a more equal turning situation with him (regain angles).
- Your lower speed will bring you closer to corner speed and your opponent will be further from it. Thus, you could turn inside him and position for a shot.
- Your opponent may overshoot you and fly by. All of a sudden, you are on his six and have a potential for a shot.

### ***Opening a Fight***

Up to this point, I have discussed fights that are already in progress. I have now come to the point in this article where I address initiating a fight. There are basically three ways a fight can begin in an EAW one-versus-one.

- Coaltitude Merge
- You start high
- You start low

### **Coaltitude Merge**

A coaltitude merge is generally a rare situation which occurs in one of a few ways.

- You leave the multi-player setup screen to fly.
- You collided with your opponent on the last fight.
- You both augered on the last fight.
- After winning the previous engagement, your plane was too heavily damaged to contemplate another fight in it. So, you bailed out.

There about five ways to open such a fight.

- Straight in with blazing guns
- Seize angles advantage
- Barrel roll
- Nose under and shoot
- Blow through and climb

### **Straight in with blazing guns**

This means to line your opponent up and begin firing at about 4,000' and continue until the planes have passed or someone is crippled. I never do this. First, it does not seem very exciting. Second, I have faith in my abilities to gain the upper hand. So, why should I flip a coin. Third, it goes against the grain to let anyone get a decent shot at my plane. As stated previously, I would only do this if I was flying an FW-190 versus a Spitfire or some other such situation.

### **Seize angles advantage**

This one accomplishes two high level objectives at once. First, you have reasonable chance of killing your opponent doing this. Second, within the first thirty seconds of the merge, you are going to have a very good sense of your opponent's skill level. Let me explain further how one goes about doing this.

1. Jump into the cockpit.
2. Determine if your opponent is going to be offset to the left or right of you. Let us assume to the right.
3. Immediately kick in full left rudder. This is to help you maintain sight of your opponent as you close. Also, you will need some right stick to counter the roll induced from the rudder.
4. Climb significantly while keeping the nose slightly rolled to the left. You want to be able to maintain site of your opponent and keep him off to one side.
5. Your ideal climb rate should put you at 130-150mph when the planes merge.
6. When your opponent is within 1,000'-1,500' release the rudder. Drop flaps. With right aileron and right rudder, begin a gentle roll towards your opponent. There are two possibilities here. If he does not attempt to line you up and shoot, then you have just created beautiful separation to do a vertical lead turn and roll in

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behind him. If he does attempt to line you up, then do not pull into him significantly until he has gone by. In most cases, his guns will be blazing and close, but he will not connect. After he passes, you then pull after him and should be on his six in 1 1/4 to 2 turns. Many times, you often force your opponent to spin via this approach.

The separation and lead turn approach is pretty clear and I do not need to say much about that. Except that as a general principal, whenever you allow separation either horizontal or vertical, you provide space for your opponent to turn into you. Most people understand this in the horizontal dimension, but many seem not to see how it applies to the vertical.

Assuming that your opponent is sharp enough to attempt to take a shot, here is what you are accomplishing via this opening move.

- You are conserving energy.
- You are climbing so that you can slow and drop flaps to improve your turning.
- Generally, you are denying your opponent a straight in guns shot.
- You are pushing the fight up to the edge of the envelope for the two fighters. If your opponent is not careful, he will spin. He often does, since many people are naturally inclined to follow the merge with an Immelman. On the whole, that is a good opening maneuver, but not when you are at 140mph. The right thing to do is to come back around by slicing downwards or rolling into a Split-S.
- You are grabbing a quick angles advantage. Usually, this will put you at a lower energy state than your opponent. However, most players get too frazzled seeing you already on their six to realize this. Thus, rather than going vertical to work the energy advantage, most will begin to spiral down with you. At this point, he tends to be too fast, and you are right at corner. Continue to work yourself in position for a shot is fairly easy.

As I said originally, this technique quickly tells you what your opponent is made of. Here are my ratings from best to worst.

1. He nails your engine on the merge. You are going to have some tough flying ahead for the rest of your flights. Do not make any more assumptions about what you can get away with.
2. He does not nail you on the merge, but he knows to hold onto the energy advantage and you are now in a circling fight with him somewhat higher. Only through good maneuvering are you going to take the advantage. You are going to have to fly consistently well against such a player to overcome him. He

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understands energy quite well and you have to be very careful about yielding any of it.

3. He begins turning with you and spiraling down. You begin to turn inside him. This player generally plays in a reactive mode. As long as you know where to take him, you should be able to manipulate him on each of the successive fights.
4. He goes vertical after passing and spins. This player does not have good control of his aircraft. Using the vertical, you should be able to nail him with spins almost as often as you shoot him.
5. He flies straight and allow you to roll in on his six. This player does not think in four dimensions (up/down, left/right, forward/backward, and velocity). It is likely that he barely understand ACM and the flight models. You will be flying circles around him for the rest of the fights.

This opening merge approach which I have just outlined here is not something which can work over and over again. Reasonable opponents will figure it out and adapt. However, you are often playing against unknown players and as I said co-altitude merges are not all that common. Mainly, I like it, since it seems to work well and gives away so much knowledge about who I am flying against very quickly. Lastly, on the surface to your opponent, you allowing separation seems like a naïve thing to do. Thus, when you get behind him and nail him quickly after that, it makes a suitable psychological impression.

### **A barrel roll**

This is a corkscrew motion with the flight path of your opponent representing the center of the screw. Here is how you do it.

1. Offset yourself to the left or right of your opponent using a little bit of rudder and aileron. Perhaps, you are 500' to the left or right. Otherwise, you head more or less straight for him and let him believe that it will be straight in with blazing guns.
2. At about 3,000' separation, roll your wings 45 degrees towards his flight path. I am usually flying in forward view.
3. Deflect the stick all the way back and to the side that he is on. Additionally, kick in full rudder into the side he is on.
4. Your plane is now doing a spiral motion around his flight path.
5. As you have completed  $\frac{1}{2}$  revolution or so, flip into padlock and watch him sail by. He will often be shooting.



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6. The merge will often take place around 1 revolution. At this point, watch what maneuver he is doing to come around, look at your own speed, and decide the best way to come around while conserving energy and maximizing turn performance.

Let us take a look at what this maneuver accomplishes.

- As usual, it conserves energy. There is no throttling back or flaps.
- The two planes are closing around 400-600mph. The window of being in optimal guns range is very small and the optimal line up window is much smaller. You become an extremely difficult target to hit. You are maneuvering in two dimensions.
- Depending on your opponent's skill level this maneuver can be disorienting and leave him very confused as to what you are up to.
- Usually, your opponent's best chance for a shot will tend to be as you complete one revolution and are below him. If he tries for it, then it will lead him to invert. If he follows the shot with a split-S, he will probably be moving too fast for a good turn. Thus, you should be able to establish an angles advantage by turn flat or by slicing somewhat upward.
- It says to your opponent that "I am quite confident that once this fight gets going I will shoot him up without having to expose my plane to damage". That is confidence.

Another nice thing about the barrel roll is that it can be done through numerous merges. There is little that can be done to counter a well executed barrel roll.

### **Nose under and shoot**

This approach is very similar to straight in with guns blazing. The idea is that you set yourself up with your flight path maybe 500' or more below your opponent. If your opponent allows this to happen, then 1000' before the merge you point your nose into his flight path and let loose with your guns.

For your opponent, responding to this approach is somewhat difficult. It is harder to push the nose down to take a shot. Rolling and inverting is very time consuming and it is hard to achieve a good line up at such high closure.

I generally do not attempt this opening move. If find it too simplistic; it is pretty clear what you are up to. If someone tries this against my seize the angles advantage opening move, then I am in lead turning heaven and will be on his six almost immediately. Also, a barrel roll effectively neutralizes this technique.

## **Blow Through and Climb**

I have seen this move done by one or two others. Although, I have not attempted this myself. Mainly because it does not seem very aggressive. However, in that regard, it is a very insidious strategy.

Basically, as soon as you go through the merge you initiate a moderate climb which gradually begins to decrease your speed. In the meantime, your opponent is likely to do some form of hard reversal (either an Immelman or flat turn). The theory is that your opponent who makes the much more radical maneuver will force himself to lose some energy. This is even more true if your opponent dropped flaps.

Your opponent is now in trail, but outside of guns range. You are gradually climbing, and perhaps gradually turning too. Given that you now have a slight to moderate energy advantage you force your opponent into a stall/spin situation.

## **You Start High**

Getting to start the fight with a significant altitude advantage is usually the result of one of two possibilities.

- You just lost a low level fight (200' - 4,000') and are reborn around (8'000' - 9'000').
- You won a high level fight (6,000' - 10,000') and have taken advantage of the time it takes for your opponent to get reborn in order for you to climb.

There are two main techniques I employ in this situation.

- Straight Down Braked Descent
- Boom and Zoom

## **Straight Down Braked Descent**

I use this when my opponent is pretty much directly below me by 4,000' - 8'000' and is not running away horizontally. Often when your opponent is directly below, he will tend to circle while flying level or climbing. Occasionally, he may dive to build speed so that he can loop up to engage when you dive down. This approach cannot be used if he is distant or extending away. Here is what you do.

1. Chop the throttle.
2. Slow down to about 200mph or less.

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3. Drop flaps.
4. Drop gear.
5. Note that the combination of throttle/flaps/gear will allow you to come almost straight down without accelerating much past 230mph. Thus, it is almost like riding the plane down with a speed brake. You can come down very steep like this.
6. Keep your eye on your opponent using the zoom view. You want to verify that he is circling and be careful if he intends to point his nose at you. You also need to watch his speed. You generally will be spiraling a bit on descent while watching him carefully.

Now, there are a number of possibilities.

- If he is very fast (250mph or better), you maneuver to get positioned on his tail making sure that you will have a normalized energy advantage of 50-100mph. The timing of when to retract gear/flaps and go to full throttle is very critical. If you do this too late, you will have position without an energy advantage, and then, the tables could be turned on you.
- If he is at a good turning speed 200 mph, then work your way behind him. At about 2000'-3000' separation, 200mph, and with 1,000' altitude advantage, pull up the gear and kick in full throttle. This should give you the energy advantage you will need to either maintain position and shoot if your opponent goes up or to reposition by turning at altitude if your opponent goes down. If the fight goes down, then remember not to damage your flaps and do not get suckered moving too fast. Remember, you have the energy advantage, go up and use it.
- Your opponent may have committed himself to taking a shot at you. You will know this by two things. First, you can see him in padlock and zoom with his nose coming around and up at you. Second, you can watch his speed rapidly dropping off on the HUD. Although it may look like you are the target, in reality, you have set him up very nicely.

Quickly retract your gear and go to full throttle. Initiate a flat (level) hard turn or hard turn with a little climb. This will be enough to deny him the shot and further force him to commit to maneuvering in a futile attempt. At this point, his speed should be bleeding off rapidly. He can be anywhere from 80-130mph and nose high. If he spins, then carefully circle around behind him and blast him or saddle up if he is coming out of the spin. If he is simply wallowing nose high, you should be able to turn rapidly around and line him up with a really good shot as he hangs suspended in front of you.

## Boom and Zoom

I refer to what I describe here as Boom and Zoom, but it is and it is not. It is in the sense that you dive and charge at your opponent. It is not in the sense that you are neither expecting or really trying to take any form of shot.

I use this approach when my opponent is not directly below me and is heading away from me attempting to gain altitude.

The execution is fairly simple. Find your opponent and while at full throttle point your nose at him. You will rapidly accelerate to the 400mph+ range. Be careful, not to damage your plane or go out of control.

Your opponent may respond to this technique in one of two ways as you get into range (within 7,000' or less).

- Your opponent may wait for the last second and break turn or Split-S to avoid being a target. This presents no threat to you and he is going defensive.
- Your opponent may turn back into you and attempt to go nose-to-nose guns. This can potentially be dangerous. Nose-to-nose guns is always dangerous. In this case, he is probably in much better position to go nose-to-nose guns than you are, because he is at a much more maneuverable speed for his plane.

In either case, your intention is to respond in the same manner. You remember that you are not really looking for a shot. Your goal is to zoom climb straight up. If your opponent dodges you, then you will initiate this a few seconds after his break move. If your opponent is going nose-to-nose guns, then you better have your nose pointed straight up before he gets into guns range.

The execution of the zoom climb is fairly simple.

1. Level your wings with the horizon. You should be at 400mph-500mph.
2. Pull straight back on the stick.
3. Use the panning view to look over your wing and verify that you are pointed straight up. Your airspeed should be dropping rapidly while your altitude is increasing rapidly.
4. Use your stick to push forward or backwards to maintain your nose straight up.
5. Go back to padlock and the HUD and see what your opponent is up to.

With a significant energy advantage, you should be safe from being shot while doing this. A purely vertical tail chase shot is hard and it is even harder with lots of separation as

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your opponent's plane rapidly slows down and loses its maneuverability. Your opponent may do one of three things here.

- Your opponent does not attempt to engage and extends away. This means that he is not going to be easily suckered, but it was worth the try. At this point, you probably want to make a couple of more passes without extreme zooms and go into high vertical turns. Sooner or later, your diminished range to your opponent will force him to start turning as opposed to simply extending. At this point, you apply energy techniques which we already discussed. Basically, you will look to turn flat at altitude and roll in. Otherwise, you can initiate a looping fight while making sure that the tops of the loops are kept high to capitalize on your energy advantage.
- Your opponent does not attempt to engage, but does not extend away. You can gently come over the top and initiate the straight down braked descent technique which was just discussed.
- Your opponent takes the bait and goes for a shot. He does this, because it looks like you are going to yield a lot of separation to him to turn into. This is in fact true. However, gravity is going to turn this opportunity into a trap. You watch your opponent's speed in the HUD. Do not worry about not being able to see him in padlock. It is very important that you continue to remain completely vertical. When you see his speed falling through 150mph, pop your flaps and begin, as quickly as possible, to turn back into him. If your opponent has continued to climb, he is going to spin or be a sitting duck for a shot. If your opponent is pulling down to get his nose below the horizon and regain maneuvering speed, you have an excellent opportunity to settle on his six.

Remember when you have your nose pointed straight up, it is important to come gently over the top in order not to spin. If you are sufficiently slow, then let the nose fall through the horizon by itself.

### **You Start Low**

You usually start the fight low when you have just won a fight at a lower altitude and your opponent is reborn above you. This is the most difficult way to begin a fight. Theoretically, against an equal or better opponent it should be virtually impossible to win such a fight. Of course, if you are reading STK/EAW and mastering the lessons here, then you probably have a 50-90% chance of winning such fights.

### **Gain Altitude**

The first thing you should do immediately at the point your opponent is killed or surrenders in his current plane is climb. Begin a steady climb at 180-220mph while flying straight. You are increasing your energy state and you can only do this before the next fight begins. Even if when the fight begins, you are still at a major energy

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disadvantage, every foot gained now gives you options to minimally hold off your opponent or out maneuver your opponent. In the case where you are only holding your opponent off, every second you live increases his chance of making a mistake. Remember when you are at 50' and 200mph, there is little you can do to defeat a decent player with an energy advantage who is in your rear quarter. So, climb now!

Remember to fly straight. You are trying to put as much distance as possible between where you are and where your opponent is to be reborn. The idea is that by running away and climbing, you are going to make him trade some of his energy advantage in order to close the distance with you. When the fight finally starts, you will have degraded his advantage somewhat.

When he is reborn, then you should keep him over one shoulder while climbing so that you can keep track of his range. You can use the snap backward view if his approach is very shallow to watch him.

Your opponent is likely to do one of two things which I just described previously.

### **Your Opponent Applies Straight Down Braked Descent**

I would continue my climb and flying straight until he is down to 5,000' in range. He is going to be settling almost straight down on you and moving slowly. It is very hard to prevent him from saddling you up when he makes this kind of approach. The best you can do is not make it so easy. There are two things you can do.

- You can turn flat while maintaining 200mph or so.
- You can zig zag back and forth while maintaining 200mph or so.

Either way he will be falling in on your six with a likely 50-70mph energy advantage. Once he has settled in behind you, it is time to switch tactics to a horizontal scissors or spiral down. You are basically in a fight which we have described earlier.

### **Your Opponent Applies Boom and Zoom with a Big Energy Advantage**

This is the most common form of attack which you are going to see. It is also quite easy to defend against. Your opponent is going to be very fast (300-500mph) and unable to maneuver. You will be at optimum maneuvering speed (180-220mph). Basically, you are going to dodge out his way when the range gets down to 3,000'. Do not dodge too soon or you will give him a chance to line you up again and settle in on your six.

The dodge which I recommend is a Split-S. Here are my reasons.

- It is the best maneuver for maintaining your optimum turning speed.

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- Your opponent could try to depress his nose to shoot which is virtually impossible when trying to line you up in a Split-S.
- Otherwise, your opponent needs to invert and pull after you while he is still accelerating. There is no way that he will be able to stay with you.
- If your opponent does attempt to follow you, he may well black out and auger in.
- If your opponent does attempt to follow you without auguring in, you may see an opportunity to get on his six.

Here are ways that your opponent can respond to your Split-S and, in turn, your counter response.

- If your opponent remains level and extends up and away, then you roll out of the bottom of your Split-S heading in the other direction and climb so that you regain altitude and bring your speed back to 200mph. Pretty much, you have just re-established the situation before his diving run at you began. Of course, it seems like nothing has been accomplished, but you have to remember that with such an advantage, your opponent is going to dictate ultimately when the dogfighting begins. One thing that you may accomplish by repeatedly executing this move is slowly wearing down his energy advantage until it is safe to engage in a turning fight.
- Your opponent may invert and pull towards you to follow. If he does not attempt to decelerate, then roll into another Split-S at the bottom of your current one. Somewhere in this second Split-S, you will find him below you and see that you are inside his turning circle. You now have a very good chance to saddle him up. He may be blacking out and you should have built up a decent amount of speed. If he does not quickly recover situational awareness, then you may have just put yourself in a rear quarter position which you can maintain.
- Your opponent may invert and pull towards you to follow. He may also cut the throttle. You will know this by watching his speed in the HUD or being unable to see him in padlock, since he is directly behind you. This is the most dangerous situation. He still probably holds an energy advantage at this point. You have two options. If you are high enough, then you should chop your throttle and begin a defensive spiral down. Otherwise, it is time to engage in a horizontal scissors. Whatever you do, do not let yourself be suckered into a looping fight.

You should also keep your eye out for the opponent who misjudges how much energy to dump and effectively leaves you holding the energy advantage. It happens more than you would think while executing radical descending maneuvers.

## **Your Opponent Applies Boom and Zoom with a Small Energy Advantage**

Your opponent is going to be going moderately fast (250-300mph). This is either because you are running away and climbing has drained him of his energy advantage or he is trying to close slowly and avoid an overshoot. You will be at optimum maneuvering speed (180-220mph).

In this situation, you cannot dodge. He does not have enough speed for you to use it against him. Instead wait until he is about 3,000'-4000' behind you. Then, do the following.

- Turn hard and level back into him.
- As he enters your forward quarter, begin to drop your nose and slice downwards at about 20-30 degrees. Do not break into a Split-S, as this will put your opponent on your six. Do not stay level, as he will probably have a shot at you. Cutting somewhat below him will present a pretty difficult shot.
- Your opponent most likely will continue tracking you. Thus, he becomes committed to a turn. As soon as the two of you pass, roll 180 degrees and turn hard in the opposite direction. Given that he will probably be in excess of corner and heading downwards and that you will be close to corner, you should be able to cut inside your opponent's turning circle. This will allow you to establish a rear quarter position. Attempt to hold and improve that position unless he goes up to shake you off.

Further variations of such fights have been addressed in an earlier section of this guide.

## ***Miscellaneous Air Combat Maneuvering Topics***

There are a number of unrelated topics that I feel are worth covering to fill out a pilots repertoire of training.

### **Managing Overshoots**

Having more energy than your opponent often puts you at risk of overshooting in him. An overshoot is when you fly past your opponent putting him behind you and effectively becoming a target for his guns. The appropriate techniques for handling an overshoot almost always involve going vertical and conserving energy. Rarely do you want to simply chop throttle and decelerate. Remember having an energy advantage can always be capitalized on. If you chop the throttle, you risk yielding your energy advantage and leaving yourself on your opponent's six stuck in lag pursuit.



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There are cases when you are well planted on his six and might consider decelerating somewhat. These are cases where you will get a long tracking shot as opposed to a quick snapshot. You should be careful to decelerate while still maintaining a 20-60mph energy advantage. This will give you the ability to pull lead pursuit and aim your guns.

Now, I will analyze a few different types of overshoot situations.

### **Horizontal Scissors**

If you are faster, then you cannot win a horizontal scissors against a good opponent. Do not even bother to try. Instead you also scissor with him while climbing above him. This will accomplish three things.

- You will conserve energy.
- You will slow down so that you can match his turns.
- You will be safe from his guns, since he will not have the energy to lift his nose.

After 20-40 seconds of this, there are three things which can happen.

- He may begin to straighten out having partially shook you. You can then simply roll in on his six for a shot.
- He may continue scissoring and attempt to lift his nose for a shot at you. This could put him into a spin.
- He may continue scissoring below you. At some point, a well timed barrel roll should allow you to reduce your immediate forward velocity and settle in behind him with an energy advantage to pull lead and take a shot.

### **Sustained Turn**

Overshoots in sustained turns which are generally level are fairly easy to address. You face two big risks here.

- Your opponent could turn inside you and get on your six for the shot.
- You could black out and lose situational awareness.

The proper way to address this situation is to convert your level turn into a high yo-yo. So, you make your flat turn into a climbing turn. The steepness will be determined by just how much you are above corner speed. When your speed bleeds off and you are turning well, it is time to roll your nose downward and back towards your opponent. By doing this you should have maintained your position.

Another option which you can pursue is that when you reach the altitude that puts you at corner speed is to proceed to turn level. Your opponent will be inclined to try to turn into you and up, this will put him at a maneuverability disadvantage.

In the case where your opponent is spiraling sharply down, a high yo-yo will not be sufficient. On the other hand, it is very important to realize that in order for your opponent to effectively put you at an angles disadvantage in a spiral down, he has probably chopped the throttle. This means that he has greatly sacrificed energy. You should go steeply vertical and evaluate the situation. If your opponent comes back at you, then you should be able to maneuver for a shot having retained your energy. If your opponent stays low, you should be able to use the separation to maneuver onto his rear quarter.

### **Straight In and Diving Overshoots**

In both cases, the first thing to do is not simply fly along straight and expose yourself to a shot. Begin to break left or right. The second thing to do is to begin to climb as quickly as possible while continuing to turn.

### **Handling Extensions**

There are two forms of extensions: horizontal and vertical extensions.

#### **Horizontal Extensions**

Horizontal extensions basically amount to an opponent getting enough separation that he can turn back in towards you and go nose-to-nose. There are primarily two situations that occur.

- He may reverse at considerable distance (4,000' - 8000') and come back at you. This can generally be treated as a co-altitude merge which has been covered already.
- He may reverse at a close distance (3'000' - 6,000') and come back at you usually by coming over the top of an Immelman. Generally, those who do this tend to chop the throttle as soon as the pull up. Your opponents goal is to turn more tightly (being more maneuverable) and blast you upon his return or turn inside you in one or two subsequent turns. You can see this coming by watching his speed in the loop from your HUD. It will fall off at a much greater rate than it normally would. So, you have him dumping energy and going for angles. Your strategy is to simply avoid the forward quarter shot, go up, and play an energy fight.

## **Vertical Extensions**

During a vertical extension, you either have the energy to follow your opponent or you do not. If you do not, then you want to make sure that you do not end up with your nose above the horizon and too slow to maneuver (less than 200mph). It is better to let your opponent get away from you than make yourself an easy target. You become an easy target when you do not have enough speed to maneuver; and especially when your nose is pointed up, since it takes time and bleeds further airspeed to get it pointed down.

## ***Some Moves to Watch For***

Here are some moves you should watch for.

### **Fake Spins**

Some players will initiate real spins, recover, but appear to still be spinning so that you are encourage to take a shot and fly by, or simply fly carelessly close to him. You should always treat shooting spinning opponents as overshoot situations. So, shoot, break off, turn, and climb.

### **Hammerhead Reversals**

Some players will climb up sharply at very low speeds with you closely following on their six. He will stall first and execute a hammerhead turn so that his nose reverses and he has a forward quarter gun shot at you on his way back down. Unfortunately, I do not have much experience with this maneuver. So, I cannot explain exactly how it is done or how to defend against it. Although I can say that it is quite rare.

### **Black Outs**

Beware of being forced into black out situations and loosing situational awareness. If you do, then you may crash or not know if your opponent is positioning behind you.

To address blackouts do the following:

- Pull gently and gradually on the stick so that you can maintain site. Better to maintain site and go into lag, then loose situational awareness.
- Know your altitude and how your plane is oriented towards the ground. If you are looping or diving, then be extra careful.
- Watch your altitude and speed, if you are getting too fast, climb. Avoid throttling back unless you can do that and still hold an energy advantage on your opponent.

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- If you blackout, then center your controls. Then, immediately regain padlock of your opponent.

## **Looping Fights**

In a looping fight, you may have the energy advantage or you may not.

If you have the energy advantage, but your opponent is dominating you from an angle perspective, then you can often address this by not pulling over the top with so much vigor. Instead let your plane come over the top in a lazy fashion, this will have the affect of dragging (displacing) the fight upwards. At some point, it will put you in a superior maneuverability situation.

If you do not have the energy advantage and your are not maneuvering well due to diminished airspeed, then you will need to begin flatten out the fight and initiate a strategy of emphasizing your maneuverability to capitalize on the fact that your opponent will probably end up being too fast.

## **Burning Planes**

Your opponent usually gets eliminated in four manners.

- You damage or destroy his engine.
- You shoot off his tail.
- You shoot off his wing.
- You force him to crash.

It is important to remember that an opponent with a damaged engine can still fight at a diminished capacity. He may be lacking engine power to build airspeed, but he can trade altitude in order to gain airspeed. Once he has airspeed, he can once again begin to maneuver. When your opponent can maneuver, then you are potentially a target.

So, if your opponent's engine is damaged, then be careful of flying straight and level. If you are not planning to immediately finish your opponent off (maybe you want to retain the energy which you already have for the next fight), then it is best to climb and circle until you are beyond guns range.

## ***Psychology Notes***

Often getting a rear quarter position on an opponent even when you he holds the energy advantage is very unsettling to him. He will often go completely defensive without realizing that the situation is not that desperate. Of course, once he goes completely defensive, the situation will usually become truly desperate for him.

If you happen to find your opponent in your rear quarter, quickly analyze the situation. If it turns out that you are holding the energy advantage, then realize that you have a very good chance of shaking him and/or reversing the situation. Then, fly smartly.

## ***Styles of Play***

This section to developed in a later release.

## **Angles and Spiraling Down**

## **Energy and Stalls/Spins**

## **Evasive Airshows**

## **Conclusion**

Hopefully, the reader has drawn a number of key insights from reading this document.

- Air combat is a thinking game with engagement principles, tactics, strategy, and psychology.
- There is no single killer move or technique. Victory is the culmination of doing many things very well in a highly dynamic environment.
- You should fly in a proactive fashion and control the fight as opposed to flying in a reactive fashion.
- Management of energy is the central discipline which you must practice in each second of every engagement if you hope to truly dominate the field of your fellow flyers.

## **Post Script**

To the extent possible, I will attempt to enhance and release new versions of this guide.

[www.combatsim.com](http://www.combatsim.com) is the official host of STK/EAW. The latest version may always be found at: [http://www.combatsim.com/guides/stk\\_eaw/intro.htm](http://www.combatsim.com/guides/stk_eaw/intro.htm).

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