

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

By Mark "MarkShot" Kratzer (written 03/31/00, Version 01.06 on 01/05/01)

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[SimHQ](#) is the official host of STK/EAW. The latest version may always be found at:
<http://www.simhq.com/>. (STK/EAW has been removed from the Combatsim site.)

You may email the author at: stkeaw@home.com.

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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 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.

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Salute!

Table of Contents

MarkShot's STK/EAW: Shoot to Kill / European Air War	1
Dedication.....	2
Purpose	2
History	2
Note	2
Introduction	7
General Applicability	7
Assumptions	7
EAW Basics for Online Play	7
Controls Needed.....	8
Calibration (sensitivity)	8
Essential Views to Use (programmed on your controls).....	9
Essential Functions to Use (programmed on your controls)	10
Spins	11
The Onset of Spins and Stalls	11
Avoiding Spins.....	12
Recovering from Spins	13
Turning Well.....	14
Nose-to-nose Guns	15
Gunnery (Taking the Shot)	15
Range	15
Profile	16
Shooting Views	16
Lead	16
Anticipate Motion	16
Short Bursts.....	17
Pull Lead	17
Use the Rudder.....	17
EAW Intermediate Skills for Online Play	17
Fights in Progress.....	17
Evaluating the Situation.....	17
Relative Energy State	18
Relative Angle State	18
Some Energy/Angle Observations	19
My Plan.....	20
Applying Energy State.....	20
You are Energy High and Angle Poor	20
You are Energy Low and Angle Poor	21
Opening a Fight.....	23
Coalitude Merge.....	23
Straight in with blazing guns	24
Seize angles advantage	24
A barrel roll.....	26

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

Nose under and shoot	27
Blow Through and Climb	28
You Start High	28
Straight Down Braked Descent	28
Boom and Zoom	30
You Start Low	31
Gain Altitude	31
Your Opponent Applies Straight Down Braked Descent	32
Your Opponent Applies Boom and Zoom with a Big Energy Advantage	32
Your Opponent Applies Boom and Zoom with a Small Energy Advantage	34
Miscellaneous Air Combat Maneuvering Topics	34
Managing Overshoots	34
Horizontal Scissors	35
Sustained Turn	35
Straight In and Diving Overshoots	36
Handling Extensions	36
Horizontal Extensions	36
Vertical Extensions	37
Some Moves to Watch For	37
Fake Spins	37
Hammerhead Reversals	37
Black Outs	37
Looping Fights	38
Burning Planes	38
Psychology Notes	38
Styles of Play	39
Angles and Spiraling Down	39
Energy and Stalls/Spins	39
Evasive Airshows	39
Conclusion	39
Special Topics	39
Topic: Domains (high/low fights) on 05/31/00	39
The Domain Concept	40
Visualization Exercise	40
The Setup	40
The Horizontal Plane	40
Seeing the Spaces as Domains	41
Some Basic Rules	41
For the low altitude player:	41
For the high altitude player:	41
The Essence of the High/Low Game	41
Topic: Engagement Psychology (suckering) on 05/31/00	42
Psychological Offense/Defense	42
Psychology of Manipulation	42
The Bait	43
The Trap	43

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

Some Examples.....	43
Pulling the Sucker Up.....	43
Pulling the Sucker Down.....	45
Topic: The Fallacy of the Evasive Style on 08/16/00.....	46
Introduction.....	46
Common Community Styles.....	46
The Evasive Style.....	47
Definition.....	47
The Evasive Style versus Normal Evasion.....	48
The Evasive Fight Pattern.....	48
Is the Evasive Style Being an Angle Fighter?.....	48
External Views.....	49
The Failings of the Evasive Style.....	49
Exposure.....	49
The Wrong Focus.....	50
Negative Closure Solution.....	51
Favoring Energy Dumping as the Answer to any Tangle.....	51
Arrival at Sea Level.....	52
The Community Evasive Style Phenomena.....	52
Closing Thoughts.....	53
Topic: The Basics of Energy Fighting on 08/29/00.....	53
Introduction.....	54
A Valuable Commodity.....	54
The Energy Fighter's Philosophy.....	54
How is Energy Lost?.....	55
Starting the Fight at a Lower Altitude.....	56
Usage of Flaps.....	56
Chopping the Throttle.....	58
Performing High-G Maneuvers.....	58
Diving down and not fighting in the vertical.....	59
How is Energy Managed?.....	59
Cashing in.....	61
A Practical Observation: Energy Fighting in Action.....	62
An Energy Fighting Illustration.....	62
Making the Best Merge.....	63
Conclusion.....	64
Topic: Mounting a High Altitude Attack on 08/30/00.....	64
Introduction.....	64
High Altitude Attacks.....	64
The Turning Circle Concept.....	64
What Low Altitude Defenders Do.....	66
The Settling Attack.....	66
The Attacker's Goals.....	68
Phases of the Attack.....	68
Phase I – Fake B&Z.....	69
Phase II – High yo-yo sucker plays and domain sucker plays.....	69

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

Phase III – Chewing up his turning circle.....	70
Common Mistakes by the Attacker.....	70
Some Variations.....	71
Attacker - Rapid Angles Conversion.....	71
Defender – Hug the Ocean.....	72
Conclusion.....	72
Topic: Why I Extend Away on Low Altitude Defense on 08/31/00.....	72
Topic: Winning the Slow and Low Turning Fight on 08/31/00.....	73
Topic: The Sinking Merge on 08/31/00.....	74
Topic: The Real-time Scoreboard for the E Fight on 01/05/01.....	75
Topic: Countering the Terminal Velocity Defense on 01/05/01.....	76
Topic: Solving the Rear-quarter Negative Closure Problem on 01/05/01.....	78
Topic: Stall Fighting on 01/06/01.....	80
Topic: The Emergence of the Twist Slash Turn Style on 01/06/01.....	82
Topic: An Impressive New High Altitude Attack Approach, Criss Cross Above on 01/06/01	83
Topic: Dealing with Evasive Spins from the Rear Quarter on 01/07/01.....	85
Topic: Making your opponent's Split-S dodge work for you on 01/07/01.....	86
Topic: Turns, Reversals, and Turning Forward Quarter Merges on 01/07/01.....	88
Topic: A Promising Merge Technique for Avoiding the Head On Shot on 01/07/01 89	
Topic: Lead Turns on The Merge on 01/07/01.....	90
Topic: An All Too Common Mistake – Merging When in an E Hole on 01/07/01.	90
Topic: Speed Matching High Altitude Attacks on 01/07/01.....	91
Topic: How to Become Deadly at EAW on 01/09/01.....	91
Topic: STK/EAW Source Material on 01/09/01.....	92
Topic: Why EAW Online Keeps Me Coming Back on 01/09/01.....	94
Topic: Answers to Some of Your Questions on 01/09/01.....	95
Post Script.....	96

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, 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.

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

- 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.

MarkShot's STK/EAW

Shoot to Kill / European Air War

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 queue 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 loose 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

MarkShot's STK/EAW

Shoot to Kill / European Air War

- 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.

MarkShot's STK/EAW

Shoot to Kill / European Air War

- 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.

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.

MarkShot's STK/EAW

Shoot to Kill / European Air War

- 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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Shoot to Kill / European Air War

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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Shoot to Kill / European Air War

- 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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Shoot to Kill / European Air War

- 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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Shoot to Kill / European Air War

- 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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Shoot to Kill / European Air War

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 ½ 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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Shoot to Kill / European Air War

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 ½ revolution or so, flip into padlock and watch him sail by. He will often be shooting.

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Shoot to Kill / European Air War

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

MarkShot's STK/EAW

Shoot to Kill / European Air War

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 mean 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 you 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.

- 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.

Special Topics

This portion of STK/EAW will be expanded with essay style contributions when the urge grabs me. Unfortunately, I do not have time to integrate these items back into the main body of work properly.

Topic: Domains (high/low fights) on 05/31/00

The majority of my EAW fights begin with one player having a great altitude advantage over the other. Often the player who attacks me from above wants to know what they are

doing wrong, or when they are being attacked from above, they want to know how to approach the situation.

What I would like to introduce in this section is a concept which I call "Domains". Before discussing domains, let us begin with the fact that you should understand two important prerequisite concepts.

- The value of energy in a dogfight and how to use it.
- Corner speed and its application in a dogfight.

The Domain Concept

To put it simply, a domain is someplace where you may exercise control/domination over your adversary.

Visualization Exercise

I will not be getting into maneuvering specifics in this section. Instead I would like to aid you, the reader, in visualizing a key concept that should assist you in generally appreciating what goes on in such high/low fights at the time they begin in earnest.

The Setup

As the low altitude plane, I often orient my Spit9 as follows.

- I put my opponent behind me.
- I pick an appropriate altitude based on what I want to do and the heat situation of my engine.
- I settle into a level or gradually climbing cruise around 190-220mph.

The Horizontal Plane

You will note that my aircraft is cruising along around corner speed. This means that I am optimally prepared to turn.

As my aircraft flies along, it defines a geometrical plane parallel to the ground. The airspace around my plane can be subdivided into two spaces, the Lower Space and the Upper Space. Let us look at my maneuverability in those two spaces. In the Upper

Space, I have little opportunity to maneuver. I am already at corner speed and any climbing maneuvers will put me below corner speed. Thus, reducing my turn rate and, in the extreme case, also reducing my roll rate. In the Lower Space, I can maneuver very well. I will start any descending maneuvers at corner speed. Any speed that would potentially be lost due to high wing loading (high G) is maintained due to the acceleration provided by gravity.

Seeing the Spaces as Domains

Now that we have established how the Upper and Lower Space differ in terms of my capabilities, we may also view the geometrically horizontal plane as defining two domains. The Upper Space is the domain of my opponent. In the Upper Space, I will be ill equipped to maneuver and quickly succumb to his energy advantage. The Lower Space is my domain. In the Lower Space, I will maneuver at my theoretical best and quickly gain an angles advantage on an attacker who enters that space with an energy advantage.

Some Basic Rules

This allows us to announce some fairly basic and obvious rules that many players often miss in these high/low fights.

For the low altitude player:

- Engage in your domain (Lower Space) when your opponent is willing to do so.
- Never engage (or enter) into your opponent's domain (Upper Space).

For the high altitude player:

- Engage in your domain (Upper Space) when your opponent is willing to do so.
- Never engage (or enter) into your opponent's domain (Lower Space).

The Essence of the High/Low Game

When you know what you are doing, the essence of the high/low game is to draw your opponent into your domain, and then capitalize on his mistake before he can rectify it.

Topic: Engagement Psychology (suckering) on 05/31/00

Unbeknownst to many EAW pilots, psychology can play a major part in achieving kills. There is more to victory (especially against lesser pilots), than just good flying techniques.

Psychological Offense/Defense

In the main body of STK/EAW, I briefly touched on some of the psychological aspects of a one-versus-one engagement. The perspective on psychology was that of establishing yourself as the better and/or more dangerous pilot. The idea was that once your opponent views you that way, then he is psychologically on the defensive. An opponent who feels defensive will often fly defensive. Needless to say, one cannot get kills by flying defensive.

Taking the psychological high ground was a matter of:

- Not spinning.
- Flying on the edge of the envelope.
- Taking passable snapshots on scissor crossings.
- Repeatedly dodging a boom and zoom attacker at just the right time.
- Avoiding nose to nose shots in favor of maneuvering for position.

Psychology of Manipulation

I would like to address in this topic a different aspect of psychology. It is the psychology of manipulation. I also tend to refer to it as suckering your opponent. Although not a flattering description, as you will see, it is really a matter of making your opponent behave foolishly.

I would estimate that anywhere from 50-70% of all my kills are the result of sucker plays. Also, the potential for sucker plays is usually fairly high when two players have yet to engage and there is a moderate disparity in energy states between them.

There are basically two tools you have at your disposal to execute the sucker play.

- The Bait
- The Trap

The Bait

You need something to entice your opponent. There is only one thing that you control which will get your opponent's attention and that is your destruction. In regards to bait, it is really more a matter of your potential destruction than your actual destruction. The important thing to realize is that the bait is your opponent's belief that your potential destruction is in hand. So, you are the bait.

The Trap

The trap is a matter of having your opponent willing to put himself in a situation where he either arrives at a critical angles or energy disadvantage. This creates the trap. Finally, through your skillful flying abilities and by applying the techniques which I have covered in the main body of STK/EAW, you close the trap to destroy your opponent.

Some Examples

EAW 1v1 engagements present countless opportunities to execute sucker plays. I will present two basic examples so you can see how this all comes together. Both of these examples were already covered in the main body of STK/EAW. In the main body of STK/EAW, we approached them from the perspective of the execution of the flight maneuvers. However, here we will be approaching them from the perspective of pilot versus pilot psychology.

Please note that there is some correlation between this topic and my previous discussion of domains.

Pulling the Sucker Up

Often you find yourself in an advantageous energy situation relative your opponent. Perhaps, you have 40-100 mph in terms of a normalized energy advantage. You can end up in this state in number of ways.

- The fight started with you at a higher altitude.
- Your opponent spun his plane.
- Your opponent performed a lot of flap down high G maneuvers and bled his energy away.

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- Your opponent spiraled down and throttle back intentionally to gain an angle advantage.

How you actually got into this situation is less relevant than what you are going to do with it. Given such a situation, I have taught that you will maneuver into the vertical in order to put yourself at corner speed while forcing your opponent to drop below corner speed. That is the technique, but what about the actual timing and manner by which you do this?

I will often turn flat and too fast with an opponent who I have an energy advantage on. I will do this for a turn or two. In some cases, my opponent may intentionally dump energy further so that he can improve his ability to turn inside me. The standard dogfighting reasons for me not to turn flat and fast significantly above corner speed are:

- I am turning with a much greater turn radius than what is possible for my plane.
- I may be experiencing some degree of black out which jeopardizes my situational awareness.

To some extent, I will permit my opponent to turn inside me and appear to be coming around fast on my tail provided that I am sure that I hold the energy advantage. What he sees is a rapidly improving angle situation which should be evolving into nice tracking rear quarter shot with minimal deflection. It is hard to imagine a more tempting situation. The trap has been baited. My opponent is now committed to the kill which he feels is due him. He is thinking what I want him to think.

Now, before I get myself killed, it is time to close the trap. Prior to my opponent gaining sufficient angles to pull lead and make a tracking shot, I initiate a tight climbing spiral. My opponent begins to loose angles rapidly as his speed drops off (well below corner). When I see my opponent's speed drop to 120mph or less, I should be at 180mph or so. At this point, I begin to level out and continue turning hard. Then, I quickly roll into him while dropping flaps. This rapidly puts me on his six with enough speed to put lead and get the kill.

In the best possible application of this technique, my opponent will be completely wallowing at below 100mph as I come around. I will simply need to complete my turn and put him out of his misery.

In less successful executions, I will be able to gain a position on my opponent's six, and then, I will have to push the fight through a number of turns to get the ultimate kill.

The important thing to realize is that my opponent was suckered up with psychology playing a key role in his demise.

Pulling the Sucker Down

The psychology of bait and trap can be applied equally well when you are the energy deficient player. I often apply it in those situations where I am under attack by a player who starts with significant altitude advantage.

Initially, my opponent will usually proceed through a number of high speed passes. I tend to place myself as such:

- I put my opponent behind me.
- I pick an appropriate altitude based on what I want to do and the heat situation of my engine.
- I settle into a level or gradually climbing cruise around 190-220mph.

I will initiate a dodge of my opponent before he gets inside my turning circle of about 3,000' or so. His initial attack runs will probably have him charging at me with as much as a 200mph energy advantage. Generally, in this case, he will try for a shot, zoom away, climb, and try it again. Under the circumstances, there is little more that I can do than getting out of the way. There is no real opportunity for me to successfully engage and I make no real attempt to do so. Mainly, I am just dodging and once again putting separation in excess of my turning circle between him and myself.

After a while, there will come a point where the attack run is taking place with my opponent holding a 60-100mph energy advantage. It is now time to bait the trap. Once again, I let my opponent fly up my six. At 3,500' - 4,500', I break back hard into him in a descending turn. My goal is to be in the following situation when the two planes pass:

- I am still turning, but we are pretty much passing with our noses oriented 180 degrees to one another. Generally, it is supposed to look to him like he is getting nose on first.
- I appear a few hundred feet below his nose. This makes the shot fairly difficult, since it is hard for him to push his nose down to shoot especially when going fast. Also, it encourages him to attempt to invert to take the shot, since this is the natural thing to do. However, this is something that he will not have sufficient time to accomplish.

Note that I have gotten him to begin inverting (rolling his wings), and this means he is going to be pulling down and entering my domain. Unfortunately for him, he is too fast to be doing this.

He will generally shoot as he goes by and then, make a diving turn by pulling back on the stick. He incorrectly assumes that it is a good time to initiate the turning engagement.

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As he passes above me, I will snap roll my plane in the other direction and break turn. He is currently in the process of making a large sweeping turn and possibly suffering from partial blackout. After a few seconds, I quickly snap roll and break turn in the opposite direction. My maneuver effectively looks like a level "S" inside his big "O". This will often put me somewhat behind him and above; and right on his six. From there, I can often press the angles advantage for a kill.

The important thing to realize is that my opponent was suckered down with psychology playing a key role in his demise.

Topic: *The Fallacy of the Evasive Style on 08/16/00*

Introduction

This special topic addition to STK/EAW is one of the more difficult sections to write and publish. The reason for this is that I expect it to be highly controversial. So, before I get too far into it. Let me say the following two things.

- I am not the best pilot out there, nor do I claim to be. However, I am confident that I have a lot of flight hours and that I am better than average.
- The thoughts which I put forth are my opinions on certain things. They could be wrong, but it is what I know and believe based on what I have seen. Feel free to disagree and ignore my recommendations.

This topic is about the failings of what I call the Evasive Style (of dogfighting). The reason why this topic will be controversial is that many decent to good players practice the Evasive Style and they are confident in its effectiveness. Energy Fighting which is a different style of fighting is covered in the next topic.

Common Community Styles

The Online EAW Community is group of players who regularly compete against one another. As a community, they tend to manifest certain forms of group behavior. In particular, various styles and moves tend to become popular and get assimilated by a large number of players in a short time frame. This is readily apparent if you play with a large number of players fairly regularly.

I made my entrance into the online arena in the early months of 2000. At that time, the Evasive Style was practiced by a minority of players. Perhaps 10-20% of those flying practiced this style. At the time, I assumed that this percentage could be explained by the normal variation in styles and experimentation.

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Now around the middle of 2000, the number of players employing this style are around 50-70% and the number is possibly still growing. It is my belief that this style has two essential flaws:

- It causes its practitioner to fly himself into a disadvantageous situation which is often the cause for his defeat.
- It emphasizes a psychology and the development of skills which put the player at a disadvantage against those who understand and practice Energy Fighting.

I will substantiate both of the above statements later on. The reader may well rebuke me with the fact that they are getting kills with it and getting killed by it. My response to this is that when two players apply the same technique, then, of course, the one who does it better will be the victor. However, that alone does not demonstrate that there is not a different technique which is itself more effective, such as Energy Fighting. Also, I would argue that the victor among two Evasive Style flyers is for the most part the more competent pilot and he could have out flown his adversary without having gone evasive.

The Evasive Style

Let me begin by characterizing the evasive style.

Definition

The Evasive Style is weighted heavily to putting an opponent on your near six o'clock (within 300' or closer). This is done with the intention of forcing an overshoot or reversal through radical low speed maneuvering. Typical maneuvers which are performed:

- Throttled back break turns
- Gear and flap dropping
- Barrel rolls
- Throttled back zoom climbs with apex gyrations
- Tail slides
- Negative G flying
- Descending vertical scissors with a chopped throttle

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- Real and faked spins
- Tight braked spiral down
- Moves/reversals in close proximity to the ground

One thing that most of these moves tend to have in common is flaps, throttling back, and possibly gear dropping. Much of what is done involves the dumping of energy and using the speed advantage of the player at the Evasive Fighter's six against him to force overshoots.

The Evasive Style versus Normal Evasion

The evasive style is somewhat different than just normal evasion. In normal evasion, the player who is doing the evading has flown his best fight, but has had his situation reduced to that of his opponent pulling closely onto his six o'clock. The fight is now in the end game for his trailing opponent and his gyrations are a last ditch attempt to delay the inevitable or perhaps achieve a reversal. In the Evasive Style, the player using it readily yields their six to an attacker in preparation to apply the various techniques mentioned above. The Evasive Style player will often forsake any energy advantage which he holds in order to achieve the setup by which he will apply these moves.

The Evasive Fight Pattern

Following the merge of a neutral fight, a fight with an Evasive Style opponent may take one of the following two forms:

- When two Evasive Style players meet, the fight often ends up a slow race to the ground between the two players rolling around each other with separations of a couple hundred feet from each other. Each player attempts to get slower than the other and maneuver more radically. This continues until right above the ground with the winner often being the last guy who could squeeze in a radical maneuver without crashing into the ground.
- When an Evasive Style player meets an Energy Fighter, the Energy Fighter rapidly gains the six o'clock position. From there, the fight pretty much proceeds as described above with the Evasive Style player trying hard to force an overshoot if the Energy Fighter is not careful.

Is the Evasive Style Being an Angle Fighter?

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There are those who will say that what I have described above is nothing more than the two well known schools of dogfighting which are Energy versus Angles. I would disagree. I believe that the doctrine of angles places greater emphasis on acquiring a positional advantage as opposed to an energy advantage in a dogfight. However, unlike the Evasive Style, the Angles Doctrine does not propose ever putting an adversary on your six o'clock. Further it should be noted, that most energy doctrine players transition to an angles doctrine in the final moments of the end game to score a kill. So, the Evasive Style is not simply the practice of Angles Fighting. Although the actual maneuvering may, in fact, bare quite a few similarities to it.

External Views

Lastly, I should note that many Evasive Style players will fly with external views as the use of such views have the greatest impact when two planes are in close proximity and maneuvering radically at low speeds. Although external views are commonly used, they are not a key aspect of the style. The key aspects are energy dumping, radical maneuvering at close range, and willingness to yield one's six o'clock to an attacker at close range. However, there is no doubt that effective application of external views can add considerably to the lethality of this style.

The Failings of the Evasive Style

The point of this special topic is a rant against the use of and continued spreading of the evasive style within the EAW community. The five key failings of this style are:

- Exposure to disadvantageous angle situations
- An incorrect focus of going on the defensive in fights as a means to victory
- Inadvertently solving the negative closure problem for a trailing attacker
- Favoring energy dumping as the answer to any tangle
- Arrival at sea level at an energy disadvantage

Exposure

Since the style focuses on often achieving an overshoot by an opponent at very close range, players tend to be willing to allow or put their opponent on their six o'clock. This may be pretty obvious point, but anytime you have someone on your six in guns range you are exposed. The Evasive Style aces will argue that their maneuvering up to the point of forcing an overshoot precludes their opponent from ever achieving a guns

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solution. This simply is not true if the trailer is good enough for the following three reasons:

- Part of good evasion involves flying in an unpredictable and difficult to follow fashion. Effectively, you put the trailing opponent into a reactive mode. He is always chasing after you; pointing his nose at where you have been. However, the reality is that seldom is anyone's flying totally random. As such, it does not take long for patterns to become obvious to the trailer such that he begins to anticipate what is next in the airshow sequence. At which point, the trailer needs only to fly his nose to where the evasive flyer is going to be and open fire when the evasive flyer has practically arrived.

The evasive flyer must continuously generate displacement as opposed to simply rolling his plane. By displacement we mean that he alters his flight vector. He cannot afford to remain on the same vector beyond three seconds or to have his next vector anticipated. This is extremely hard to do. If the trailer should only guess the next vector with random accuracy, then given a full load of ammo, the trailer has a half decent chance of connecting with a few shots from that position.

- At moderately close ranges (50'-150') and low speeds, the use of the rudder can have a tremendous compensating affect for achieving the deflection necessary for shots. By this I mean that the rudder can adjust the nose much more quickly, sharply, and accurately than the combination of ailerons and elevators alone. Of course, one has to be cautious not to spin by watching the amount of back pressure on the stick. The shots will often be snapshots (1 second opportunity) as opposed to tracking shots (3-6 second opportunities). However, defeating your opponent with five good shots is just as valid as one long tracking shot.
- There is always someone out there who maneuvers his plane as well as you or better. If you put such a person behind you, then the combat is over. Whereas, if you don't yield your six, then you still have a decent chance of victory.

So, my point is that any approach which advocates achieving victory by putting your opponent on your near six o'clock is substantially flawed.

The Wrong Focus

Since Evasive Style players generally believe that they can achieve kills with their opponent on their six o'clock, they tend to focus on the wrong skill development. They focus on improved airshows and radical maneuvering at close range rather than avoiding finding themselves in this situation in the first place.

When they meet even an average E fighter in a neutral fight, they are unable to stay on the offensive or maintain a neutral fight. By this I mean that the fight rapidly falls into a

situation where they find their opponent closing in on their six. In many cases, they may chose to readily give up their six and try for low turning angle moves.

If you accept that it is a bad idea to put an opponent behind you, then the focus of your skills development should be on how to avoid yielding your six to an opponent. This is as opposed to focusing on how to respond to an opponent who has gotten on your six.

Negative Closure Solution

Often one player, the trailer, will acquire the six of another player, the leader, with perhaps 2,000' of separation and negative closure of 10-40mph. This presents a problem for the trailer as he does not have a shot and is not getting closer to having one. Now, if the leader is an Energy Fighter, then the trailer has his work cut out for him. The leader will probably initiate a spiral up on the edge of the envelope. However, if the leader is an Evasive Style player, the leader will solve the trailer's problem for him. This usually happens in three ways:

- The leader will begin long range air show maneuvers. All maneuvering costs energy. When the leader losses his energy advantage, there will no longer be negative closure. The trailer gets positive closure, and thus has the opportunity to get in range and have sufficient energy to pull lead and take a shot.
- Most air show maneuvering create lateral displacement which tends to average to a vector which is more or less in the same direction. The trailer only has to ignore the lateral displacement and continue to fly roughly straight to capitalize on the leader's loss of forward speed due to lateral displacement (speed sideways).
- The leader will often consciously bring the trailer in closer so that he may practice his Evasive Style techniques. Bringing someone into close range with guns behind you is simply a poor proposition as we have seen already.

Favoring Energy Dumping as the Answer to any Tangle

When a fight takes place between an Energy Fighter and an Evasive Fighter, once the Energy Fighter has acquired the Evasive Fighter's six, he can often afford to also dump energy. In some cases, he may dump more energy than the Evasive Fighter. How can afford to do this?

- Often the Energy Fighter will dump energy in a tight downwards twisting fight by intentionally getting slower than the Evasive Fighter. The Energy Fighter can afford to do this, because he maintains his angle advantage; meaning he keeps his opponent in front of his nose and guns. Additionally, the Energy Fighter can afford to get slower if he remains above, since the additional altitude retained is

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probably still a sufficient energy advantage to generate a lead pursuit guns solution later on.

- But the primary reason that the Energy Fighter can afford to do this is because if he should dump a little too much energy, the Evasive Fighter will often give back to him what he lost a little later in the fight.

Arrival at Sea Level

Ultimately the Energy Fighter pushed the Evasive Fighter down to sea level. This eliminates the potential for downward twisting and turning to cause overshoots. At this point, if the Energy Fighter has retained an energy advantage, he may capitalize on it.

The Community Evasive Style Phenomena

As stated in the beginning, there has been a growing trend by the EAW online community to adopt this form of dogfighting. Logic would seem to dictate that it must be an effective approach or it would not be possible for its application to expand. However, the point of this topic has been that it is an inferior approach relative to Energy Fighting. So, now I will address the reason for the expansion of this approach in the EAW online community. This is how I see it.

1. The community is continuously populated by new players.
2. Energy Fighting tends to be a subtle art which is not quickly grasped.
3. New players are mainly of the yank and pull variety. They go straight after the opponent as opposed to see the contest for the chess-like strategy game which it is. Thus, they often tend to maneuver at excessive speeds in order to achieve maximum performance for their plane. They have little awareness that they are building speed while dropping altitude and turning very poorly.
4. As such, new players are easy marks for tactics that involve rapid descent, energy dumping, twisting, and turning. They can very quickly be forced to overshoot and fall victim to rear quarter gun kills. New players can also be equally dispatched by Energy Fighting, but it tends not to generate the same sudden and glamorous kills. Energy Fighting tends to be a more cautious strategy which emphasizes risk avoidance before attempting violence. So, Evasive Fighters will find such techniques a very swift sword for dealing death to the unwary.
5. The victims in these situations tend to emulate the victors. This quickly generates a large strata of mid-level Evasive Flyers. They compete against each other by ever refining their airshow capabilities.

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6. The top evasive flyers win the majority of their fights. They are firmly entrenched in a mind set that makes it hard to see any other way. When they loose, they do not see the role energy management played in putting an opponent at their six. Instead they attribute the loss to not putting on a good enough airshow. They are unable to see that in Energy Fighting Doctrine a fight has already been resolved when one player has established a workable energy advantage over another and then converted it into an angles on that player's six. For the Energy Fighter, the rest is simply a matter of playing follow the leader and setting up for a number quick lethal bursts.

Closing Thoughts

I have addressed what I believe is going to be a controversial topic. Since you don't write a position paper contradicting the majority without generating an uproar. I have decided to write about such a topic for the following two reasons:

- STK/EAW is about getting kills. If we were interested in air shows, then we would be flying Flight Unlimited instead.
- I am hoping that I can reverse the growth of Evasive Fighting in the EAW online community. It pains me to see so many talented players losing fights which they might have had a chance to win if they had fought differently.

Take these lessons away from this topic. (Note, another topic covers Energy Fighting.)

- A player needs to stay on offense to win. Offense is not having another plane bearing down on your six from 500' away.
- Don't practice dealing with players who acquire your six at close range. You should simply be prepared to die in that case. Evasion should best be regarded as a last ditch effort. Practice keeping that from happening. Learn the art of Energy Fighting. Learn how to keep others out of your turning circle (addressed in a later topic).
- Learn how to achieve kills without exposure.
- Learn progressive strategies for achieving victory. Progressive strategies are not dependent on a single quick move that catches an opponent by surprise. Single quick moves may fail to catch a wary opponent, or the practitioner may fail to time or execute the move perfectly. Energy Fighting is a progressive strategy. Energy Fighters win a fight one turn at a time and slowly build an advantage.

Topic: *The Basics of Energy Fighting on 08/29/00*

Introduction

This topic deals with Energy Fighting. For those who are familiar with dogfighting concepts, this topic will not be breaking new ground. The original STK/EAW dealt with energy more in terms of how to use it and less in terms of how to get it and manage it. Here we will address these other matters.

Energy is very much the one of the core concepts of air combat. If one searches the Internet, one will find a number of excellent treatments on various Air Warrior, War Bird, and other game sites. I hope that my treatment of energy here will be more well tailored to the EAW dogfighter, and not simply a repetition of the lessons taught by others.

A Valuable Commodity

Everyone realizes that in a fight ammunition is a valuable commodity. You have to use it wisely as it is a finite resource which cannot be replenished while airborne. So, it is with energy. Mismanagement of energy will get you killed. See the original STK/EAW for discussion of what energy is, relative energy states, and how to analyze energy via the HUD.

Energy has a number of applications in a fight, but I will offer these two to illustrate how valuable it is.

- Suppose you and another plane are in a very tight close turning fight. You have both dropped well below corner speed (most degrees/second). You and your opponent are on opposite sides of a circle. Then, the plane with more energy will be closer to corner and able to turn better. Thus, this plane will be able to gain angles on the other as the two planes turn.
- Suppose you find an opponent at your six and within guns range, but you have a significant energy advantage. Then, you may defend yourself by heading into a climbing spiral as close to edge of the envelope as possible. This will allow you to place your plane out of reach of your opponent's guns. And if you are skilled enough, you might even turn this situation into a reversal.

The Energy Fighter's Philosophy

The Energy Fighter flies with a certainly philosophy which pervades everything he does.

- The Energy Fighter realizes that all things being equal, the plane with the energy advantage is assured a victory. Thus, when he has an energy advantage, he makes sure to maintain it and/or increase it. And when he is at an energy disadvantage,

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he does all that he can to try to force the convergence of energy states between himself and his opponent.

- The Energy Fighter is willing to forgo a quick victory achieved by either grabbing a rapid but risky angular advantage or through clever acrobatic flying. The Energy Fighter realizes that a kill gotten without exposing one's plane unnecessarily to risk after a number of turns is quite satisfactory.
- The Energy Fighter realizes that every action involves energy loss and perhaps gain. To win via energy fighting requires the cumulative management of energy through quite a number of different maneuvers. I like to say that that "Energy Fighters win the fight one turn at a time".
- The Energy Fighter looks to achieve a workable energy advantage. This means that the Energy Fighter will tend to avoid switching into Angles Fighting until he has achieved enough of an advantage that he may press in for the kill. There is no point in trying to cash in a small energy advantage that leaves you stuck in lag pursuit. At the time you cash in, you want your energy advantage to carry you to your opponent's six giving you a tracking, lead pulling gun shot.
- The Energy Fighter avoids dumping energy and rather looks to conserve it wherever possible.
- The Energy Fighter tends to maneuver in the vertical because he understands the concept of how such maneuvering can give good turn rates and energy conservation at the same time.
- The Energy Fighter will often dislodge himself and climb away from an opponent going down to retain his energy as opposed to trying to artificially slow himself down. The Energy Fighter knows that if he retains his energy advantage, then he should be able to reacquire his opponent's six.

How is Energy Lost?

So, how do players lose energy in a fight?

- Starting the fight at a lower altitude.
- Using flaps at the wrong time.
- Chopping the throttle.
- Performing high-G maneuvers.
- Diving down and not fighting in the vertical.

Starting the Fight at a Lower Altitude

Sometimes you are simply forced to start at a much lower altitude than your opponent. Of all the things listed here, this is the one which you may not be able to do much about. Of course, there are various steps you can take which will help in a general way.

- When you have an opponent's engine smoking at a reasonably high altitude (6,000' or better), then try to finish him off quickly. Thus, you should be able to match altitude with him by the time he respawns. (At the same time, he should be trying to drag you down to sea level in order to make you claim your kill.)
- Climb between victories while being conscious of your engine temperature.
- Generally move yourself away from the respawn area as you win each fight.
- Shoot for the tail instead of the engine. Tail kills are unquestionably fatal. (Personally, I just shoot, but I suppose there are some who are good enough to make the gunnery distinction.)
- If you have achieved significant engine damage of your opponent, then simply break off and climb. He will ultimately hit the ocean and respawn. This approach tends to be somewhat unsportsman like, I generally prefer to claim my kills by finishing what I started.
- Fly away from your respawned opponent and make him give up some of his altitude advantage to catch you.

Usage of Flaps

Flaps are a tremendous aid to turning. They do three things in that respect:

- They improve the turn rate.
- They reduce the turn radius.
- They stabilize the plane and push back the onset of stalls and spins.

However, there is one serious downside with flaps. By increasing lift, they also increase drag; and by increasing drag, they accelerate the loss of energy. So, it is very important to know when to use flaps and when not to. Here are some tips:

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- Be careful of deploying flaps against Energy Fighters. How do you know whether you are flying against an Energy Fighter or an Energy Dumper? Let's assume that both of you are more or less equal in energy at the given moment and in a wide circling fight (2,000'-3,500').
 - If you are flying against an Energy Fighter, he will appear to rise up in the turns and come around slowly at a low speed (150-200mph).
 - If you are flying against an energy ignorant player or an Energy Dumper, he will appear to sink rapidly in the turns. Energy Dumpers will often appear to wing over in the turns; there will be a slight apex, and then a twist (roll), and finally pull sharply downwards. At the same time, the relative separation between planes will rapidly be decreasing. Usually, the Energy Dumper is cutting throttle, using flaps, and applying heavy rudder into the turns.

An Energy Fighter will often try to force an early deployment of flaps by his opponent in order to grab a decisive energy advantage. Be cautious of getting caught.

- Avoid flaps in the early stages of a neutral fight right after the merge.
- Avoid flaps when speeds are still high (200mph or better). Drop flaps when the fight gets slow and tight.
- Avoid flaps when you don't feel that your opponent is rapidly out turning you and there is no immediate threat. Drop flaps when you are in jeopardy of losing position to your opponent in a major way and there are no other alternatives.
- Avoid flaps when there is still substantial separation between planes in a turning fight (3,000' or better). Drop flaps when the fight gets slow and close.
- Drop flaps when you are in a twisting arms length fight with an energy dumper on the way down and you need to take every possible step to maintain your position by staying somewhat above him and on his tail. The flaps will both add stability and have a braking affect to help prevent the overshoot which he is working on inducing.
- Avoid flaps when you are flying straight. They are doing nothing to help you, and they are impeding your ability to increase your energy state. So, whenever a turning fight straightens out, retract those flaps and regain some speed.
- Drop flaps if you are an Energy Fighter who has secured a significant energy advantage (50-100mph) and it is time to cash it in for angles and the kill.

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- Drop flaps if you are mounting a high altitude attack and you need to settle straight down on an opponent below you. (In this case, you will need to chop the throttle and drop gear too.)
- When dodging out of the way of a high speed attacker from above, avoid the use of flaps. The difference in relative speeds (and what this means in terms of turn rates/radius) and timing should be more than sufficient to spoil any shot potential by your opponent.
- Retract flaps when having completed $\frac{3}{4}$ of a loop at slow speeds. With little back pressure on the stick and flaps up, the nose of the plane should fall through rapidly towards the ground by itself. Then, reengage flaps upon the pull out.

You may ask how to apply the various flap settings? In practice, I tend to fly clean or using full flaps. Only rarely have I played with trying to fine tune a turn rate versus energy loss by applying partial flaps. Usually most of my energy tuning in a fight takes place by maneuvering in the vertical.

Chopping the Throttle

Well, this is pretty obvious. Your engine is the only way to increase your absolute energy state (increase speed or climb). Everything else covered here teaches you how to reduce your rate of energy loss and/or how you can get your opponent to increase his rate of energy loss such that you gain a relative advantage.

Performing High-G Maneuvers

High-G maneuvers accelerate energy loss. What are High-G maneuvers? (There are no G meters in EAW; Now, that would have been a very useful piece of HUD info to help people with their flying.) Whenever you are pulling back on the stick as hard as you can, then you are at high-G; especially when you do this at higher speeds (200mph and greater). Once again, note that the energy impact of such behavior is most pronounced when done at higher speeds.

High-G increases wing loading and angle of attack. Both of these increase drag. Increased drag means faster energy loss. Also, I have read elsewhere that rapidly yanking the stick to increase the angle of attack has a greater impact than slowly increasing the back pressure on the stick. I am not sure if this is modeled in EAW. However, I tend not to yank back on the stick as such behavior reduces one's ability to achieve fine control and increases the risk of spins and stalls.

What are some basic indications that you are performing high-G maneuvers?

- The wings of your plane rip off.

- You stall or spin you plane when at higher speeds.
- You black out.
- You pull back on the stick to turn hard when above 200mph.

Diving down and not fighting in the vertical

I have saved the best for last. Predominantly, players lose energy (except for instinctive Energy Dumpers) by going down when they should go up. Going down is almost always a mistake in terms of energy management. Why? Descent means that you gain the acceleration of gravity. With increased speed comes the following problems:

- High-G turns (extreme energy loss). Remember that high-G turns make your wings into two big air brakes!
- Risk of ripping off your wings (immediate death).
- Risk of black out (loss of situational awareness).
- Poor turning in terms of turn rate (degrees/second) and turn radius (loss of angles).

Once again diving down is generally a major mistake. Even if you avoid the problems of blackout, you are likely to lose both energy and angles simultaneously.

How is Energy Managed?

Energy is managed by avoiding many of the pitfalls mentioned above. Here we will focus on a key skill that most flyers need to learn and some specific situations and how to handle them properly.

The thing that most people need to learn is how to turn in the vertical.

The basic rule is that you should avoid turning when above corner speed. Why? Because your turn will be poor and you will lose energy at a faster rate.

So, how can you bring yourself to corner speed? Should you chop the throttle? Most emphatically, NO! The answer to this question is quite simple. Climb. You can climb and then turn or you can go into a climbing turn. Upon completing your turn, you may descend or simply remain at the higher altitude at a speed closer to corner.

You accomplish the following by climbing:

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- You bring your speed close to corner. This gives you best possible turn.
- You conserve energy as opposed to bleed it rapidly.

Here are some other points for managing energy in fights.

- You may also want to consider while making your turn in the vertical to not apply the maximum G which your plane is capable of without spinning. This is especially true if your opponent is not turning in the vertical with you. Granted you will suffer a short term loss of angles, but you will have gained a relative energy advantage. If you continue to use the vertical properly (meaning not bringing the fight down to your opponent and getting too fast), then you should be able to stay out of his gun sight. You are working on gaining a workable energy advantage over your opponent. Also, many players who don't really understand energy will tend to further exacerbate their loss as they become more and more desperate to get the angles for the shot.
- Another thing which you want to do is to avoid unnecessary maneuvers. All maneuvering costs energy. Sometimes, you are chasing someone who will dive, climb, roll, etc... If you will not lose your position, then don't bother matching his maneuvers. If he is rolling through a number of revolutions, remember that all you need to really match is his final vector.
- If you are faster than corner and trailing your opponent in a turn, then climb in the turn and take the high six position. You will be able to maintain your position with him and conserve energy at the same time.
- If your opponent is running away from you and you are both at high speeds (300mph or better) and then he pulls up hard into an Immelman to go nose to nose with you, what should you do? His plan is to gain nose on you first (since he has reduced his speed to be more maneuverable) and gun you down in the ensuing head on. There are two things which you should note here.
 - His plan requires you to be a willing participant. Meaning that you intend to go for the head to head shooting frenzy also.
 - From an Energy Fighting perspective, he has just done exactly what you want. He has dumped energy. You know that you can always take advantage of this later.

So, all you need to do is simply step out of his way and deny him the gun shot. After which, you break into a high climbing turn and come around. He can do two things at this point.

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- He can choose to turn with. In which case, you can translate your energy gain here into an improved turning rate over him.
- He can fly by and continue running away in the opposite direction. If you just grabbed the energy advantage, then you should be able to give pursuit and run him down.

Cashing in

The main focus of the fight for an Energy Fighter is to generate a sufficient disparity in relative energy states that he achieves a kill. Generally, a 50-100mph advantage is what is required here when the combatants are at relatively close range (500'-4000'). At some point, the Energy Fighter stops being the Energy Fighter and switches to being the Angles Fighter. This means that he cashes in (converts his energy advantage to an angular advantage) to get on his opponent's six and kills with a tracking gun shot. It is common that up to the point of cashing in, his opponent held the angles advantage at his six, but his opponent was much slower and could not pull lead for a shot.

Cashing in is a fairly simple process:

- Make sure that your opponent is slow (90-120mph) and that you have dragged him up to where you are at corner. If he is very slow, you may want to give him a few seconds and see if he spins.
- Make sure that you have achieved a fair amount of separation (500'-1500'). You will need this separation in order to have adequate turning room to acquire your opponent's six.
- Roll back into your opponent and pull back on the stick. This means that you reorient your lift vector to point towards your opponent. Typically, prior to this, you are probably in some form of climbing with your opponent has been falling behind and beneath you. You are now ready to reengage your opponent and gain angles rapidly.
- Drop your flaps. After getting through your roll, you generally want to drop your flaps in order to maximize your turn performance. It's now time to burn up the energy which you have been accumulating, and put it to good use.
- Implement a maximum performance turn. It is time to pull back on the stick and achieve the best turn possible.

Having cashed in, you should find yourself within 500' of your opponent's six with sufficient positive closure (20-40mph) to pull lead and take a tracking shot. Your opponent may dump energy at this point to escape. In which case, your best option is to

break into a high yo-yo and reposition on his six by using the separation he leaves by heading down to turn your plane.

A Practical Observation: Energy Fighting in Action

I often fly with people and they are unable to figure out how by 4-6th turn of a neutral fight, I managed to acquire their six. Basically what is happening is that I am apply Energy Fighting and with each turn gaining anywhere from 10-20mph on them. Remember Energy Fighters win the fight one turn at a time. By 4th or 6th turn, I have accumulated enough of an energy advantage to cash in.

When you think about it, it is pretty apparent that this is what underlies my gaining position. However, my opponents often think that somehow I know a magic secret that allows me to turn better than them. This is clearly not the case. How can you see that? Well, the fight often remains fairly neutral in the first turn or two. Why? Well, I have yet to acquire an energy advantage to work with. Thus, what is illustrated is that given a similar energy state their plane turns just as well as mine. I finally out turn them after a few more turns, because I have acquired an energy advantage which can be converted into a turning advantage.

An Energy Fighting Illustration

For those who still have some doubt as to how substantial Energy Fighting contributes to dogfighting victories, I propose the following exercise that you can do with a friend. Here is what you need to do:

- Go online and join a two player mayhem game.
- Take identical planes.
- Agree to fly straight into the merge full throttle; no maneuvering, no collisions, and no guns.
- When you hit the merge proceed into a climbing turn at a 45 degree pitch, and have your friend proceed into a diving turn at a 45 degree pitch. Both turns should be more or less the best turns which you can make. Coming out of your turns once again nose to nose.
- As the two planes merge again, observe the speed of both planes in the HUD.

You should notice that your speed should exceed that of your friend by 10-20mph. Now imagine that you do this through the next three merges. By the fourth passing, you should hold anywhere from 40-80mph energy advantage over your friend. Hopefully, once you have seen this, you will understand how critical energy management is. Failure

to manage energy well is like handing your opponent a 30% energy thrust boost. Why would anyone want to do that?

Making the Best Merge

The next question which people usually ask is “How can I make these good energy management turns in actual practice?”. Let's go back to the previous example. Once again we will apply the following simplifying assumptions: fly straight into the merge full throttle; no maneuvering, no collisions, and no guns. (The elimination of such assumptions would make things somewhat more complicated, but the underlying principles would still be the same.)

- Head into the merge with the forward no cockpit view. (This will vary if we drop our assumptions.) This allows you to keep an eye on your opponent and also keep track of your flight attitude quite well.
- At 500' separation go to padlock. This allows you to follow what your opponent's maneuver is going to be right after the merge.
- Upon passing, go to the snap forward view. This will allow you to be sure of your attitude (pitch and roll).
- Using the snap forward view, roll your plane in accordance with your current speed and corner speed. This sets up your turn in the vertical. Determine your roll (assuming a Spit9) based on the following recommendations. These are simply suggestions and they have not been tested to be empirically best. The point is that you will climb steeper in your turn the faster you are going; and the slower you are going the flatter (more level) your turn will be.
 - 150mph – roll 180 degrees (Split-S)
 - 200mph – roll 75 degrees
 - 230mph – roll 50 degrees
 - 260mph – roll 25 degrees
 - 300mph – roll 0 degrees (Immelman)
- Pull back on the stick. This executes your turn in the vertical.
- Release the snap forward view and return to padlock. This allows you to see what your opponent is doing and plan your next action.

This principle and technique of best the vertical maneuvers in a fight can be applied repeatedly many times during a fight.

Conclusion

Learning Energy Fighting is one of the core concepts necessary to being a successful dogfighter. Remember Energy Fighters win a fight one turn at a time.

Topic: *Mounting a High Altitude Attack on 08/30/00*

Introduction

In my flying experience, I get to see numerous high altitude attacks. This section addresses some of the principles that I have derived from my experience. I watch many people fail to get kills when they mount high altitude attacks. Theoretically, the player who is making the high altitude attack cannot lose. In this section, I hope to help you achieve success with your high altitude attacks.

High Altitude Attacks

For the most part, high altitude attacks are the result of the loser respawning in a new plane over the winner. Typically, the attacker may have anywhere from a 4,000 – 8,000' altitude advantage. From a relative energy perspective, the attacker often begins the encounter with an energy advantage well in excess of 200mph.

The Turning Circle Concept

Before I get into the main discussion, I would like to introduce a concept. I have been calling it "my turning circle". I do not know if there is a proper term for what I mean.

Imagine that I am flying along level in my Spit9 cruising at 200mph and somewhere out there and above me is someone in another Spit9 intent on killing me. Let's draw a sphere around my plane with a 3,000' radius. Now, let's only consider the rear hemisphere of the sphere. In fact, we can probably further narrow half sphere into something of a squat cone shape. Note, that I have presented this in 3D, but I often discuss it as if it were 2D (and perhaps it is a little easier to see like that).

This is the area which I refer to as my turning circle (Yes, I know; it's not really a circle and it's not really flat). One of the following is true of an attacker who is outside of my turning circle:

- He is too far away to pose any threat in terms of taking a shot or maneuvering with me.

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- If he is making a guns run at me, then I have sufficient room to reverse my flight path and meet him nose to nose. Meeting anyone nose to nose is a risking proposition at best. So, from the attacker's point of view, he has gained nothing from his starting altitude advantage. Also, if he is moving quite fast and above corner, then I may have the better shot, since I am likely to be more maneuverable than he is.

If on the other hand, if the attacker is inside my turning circle, then the attacker is a significant threat, even though he may still be too far away to have a gun shot. Why?

- I can no longer force a neutral nose to nose pass, since I have inadequate room to turn around.
- He has put himself in a position relative to my plane such that it is extremely difficult for me to dislodge him. Especially, if he has an energy advantage.
- If he has positive closure (which he should given that he started with a large energy advantage), then he is almost at the end game of being able to close and have a tracking shot.

So, the turning circle concept defines my area of vulnerability. You will observe that it is significantly more spacious than just the effective range of guns. The exact shape and size of the turning circle varies based on speeds, altitudes, planes, etc... However, the concept is valid regardless of the parameters. Now for a few related points about the turning circle:

- If I am the low altitude defender, then a plane which is outside of my turning circle or unable to maintain a position within my turning circle poses no real threat to me. This is why classic Boom and Zoom attacks can easily be dealt with one after another. In 1v1 fights, it should be almost impossible to achieve a B&Z kill against a defender who knows what he is doing. This is true, since the defender knows you are there and can easily dodge you.
- If you are the low altitude defender, then you must defend your turning circle. This is not a mistyping, I repeat: You must defend your turning circle. Merely, thinking that you want to stay out of guns range or spoil your opponent's tracking solution for gun shots is a mistake. If you can protect your turning circle, then tracking solutions are impossible and shots are impossible. Furthermore, if your turning circle is secure, then the attacker may hold a potential advantage, but he is unable to realize any actual advantage over you.

Although this more relates to Energy Fighting, I will mention this here. This is why energy management is so important. If you have equal or greater energy over your opponent, then defending your turning circle in a fight is fairly straight forward. There is no need for evasive airshows. If you are at an energy disadvantage, then you will need to very actively defend your turning circle. Poor

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energy management and failure to defend their turning circle is what leads many players into having to put on evasive airshows. If you know how to manage energy and defend your turning circle, then evasive airshows should be unnecessary.

Keep in mind, the loss of a fight begins not when your opponent is 500' from your six and getting ready to shoot. The loss of a fight begins when your opponent has acquired a position in your turning circle and can maintain that position.

- If you are the high altitude attacker, then one of your goals must be to encroach upon the defenders turning circle. As the attack progresses, you must progressively eat into his precious turning circle. When you have eaten enough of it, you will find a highly vulnerable target at its center.

What Low Altitude Defenders Do

There are generally two options available to the low altitude defender as he prepares to face your attacks.

- He may extend away and put you behind him.
- He may fly towards you and below you.

Most of this topic is focused on attacking the defender who extends away (the majority tend to do this). Flying towards and underneath an opponent is generally a mistake. It does tend to be done for a number of reasons:

- The defender is ignorant.
- The defender is an Evasive Style fighter (see STK/EAW topic) and thus readily willing to put an opponent in his turning circle.
- The defender is that much better than the attacker such that he is sneering at the attacker and wants to accelerate the pace of the game.

The Settling Attack

Having stated that flying towards an attacker is a mistake. Let's quickly investigate why and how to conduct the attack.

First, why is it a mistake for the defender?

- If the defender has a hot engine from the previous fight, there is little chance to cool it. This could be a definite problem if the attacker is an Energy Fighter.

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- The defender forfeits the chance to gain additional altitude which he might take advantage of in his defense. This is not to say that the defender can equalize energy states. He most likely cannot and should not bother trying. However, it is still much better to face an opponent who has a 300mph energy advantage at 6,000' than 2,000'.
- The attacker can approach the defender by practically coming straight down on him. This form of approach makes it almost impossible for the defender to force a nose to nose situation which would keep the attacker outside of his turning circle. This is because he would have to climb almost straight up to force a nose to nose situation, and he does not have the energy to do this.
- The attacker can very easily counter any turns which the defender makes with minimal maneuvering by simply rolling his wings. Remember that the defender is flying on the horizontal geometric plane and the attacker is flying on the vertical geometric plane. So, the attacker can simply roll his wings to adjust his nose for the target whose geometric plane is perpendicular to his flight vector.

The attacker should employ what I refer to as the settling attack method. It goes like this.

- Your opponent should be heading towards you at about 10,000' separation doing about 150-230mph and 6,000-10,000' below.
- Chop your throttle and climb if necessary to get your speed under 200mph.
- Drop flaps and gear.
- Point your nose down at your opponent and dive on him. If you find your speed getting too fast (greater than 230mph), then add a little spiral into your descent to avoid damaging your flaps and or gear.
- Make sure that your opponent either continues to fly towards you or begins to circle. Often he will begin to circle in an attempt to counter your attack and to maintain visibility of your plane. If he should switch into extending away, then break off your settling attack and switch plans.
- Generally, you should be able to get yourself fairly close to your opponent and to the outer edge of his turning circle fairly easily. Also, you should find your speed close to his while being about 2,000' above him.
- Retract your gear and go full throttle. Note that although you have dumped a lot of energy, you still initiate combat against your opponent with a 50-100mph energy advantage. You should already hold the angles advantage. If you had a 200mph energy advantage, then you would be too fast to effectively to push the attack forward.

- Apply energy fighting techniques to work you way deeper into your opponent's turning circle in order to take a tracking shot.

For the remainder of this topic, we will discuss defenders who are extending away and ignore any further discussion of settling attacks.

The Attacker's Goals

The high altitude attacker has three goals which he is trying to accomplish. Often they tend to happen together in an effectively prosecuted attack, but they can each be accomplished individually too.

- Knock the defender off balance and keep him off balance – What do we mean when we say off balance? It means that the defender is forced to be continuously turning or maneuvering. Flying straight and level has ceased to be a viable option. If the defender was simply to continue flying straight and level, you would crawl up his six and take a shot. Thus, to avoid that from happening he is now continuously maneuvering. He has been knocked off balance and if he makes a mistake or gets pushed too hard, he could well fall over. (Provide a decent tracking gun shot.)
- Acquire a position in the defender's turning circle and maintain it – We have already discussed the turning circle concept. If you can acquire a position in his turning circle, then you are now a real threat to him and you, yourself, are quite safe from his guns. At this point, applying standard Energy Fighting techniques should allow you to work your way in for the kill.
- Force the fight lower – If all you can do is force the fight lower, then it means that your opponent is most likely dumping energy to evade you. That can be a very effective defense. However, each dumping causes a further reduction of his absolute energy state (altitude). His options are getting fewer and fewer. When he reaches sea level, he will become quite vulnerable.

So, remember if you are not accomplishing any of the above, then you are doing little more than logging flight time. You have not at all aggravated the defender's predicament. The defender is probably cruising along admiring the scenery.

Phases of the Attack

I tend to think there are more less three distinct phases of the attack. These are:

- Phase I – Fake B&Z

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- Phase II – High yo-yo sucker plays and domain sucker plays
- Phase III – Chewing up his turning circle

We will explore each of these.

Phase I – Fake B&Z

Note that I am referring to Phase I as the “fake” B&Z. Why? Because it is almost impossible to blast someone on a high speed pass in a 1v1 fight. He knows you are there and it is just too easy for him to get out of the way. In perhaps four months, I have only had maybe two or three such shots. Of course, if you see a real opportunity for a shot, then go for it. The main point of this phase is to see if your opponent can be easily suckered.

So, you fly a classic B&Z profile. Get as close you can get without risking a nose to nose encounter, then zoom climb straight up. (This was covered in the original STK/EAW.) If your opponent is foolish, then he will follow you straight up. When his speed has dropped off significantly, then double back and kill him. You can do one or two of these Phase I attacks. I used to catch about 30% of those I played with doing stuff like this, but I think the skill level is getting better, since I would say its now down to 10-15%.

Phase II – High yo-yo sucker plays and domain sucker plays

At this point, you continue to charge your opponent looking for a quick passing shot. Either you get it or he rolls away from you with his superior turning ability (he is closer to corner). In most cases, you won't get it. And even if you do, only take the easy ones. Don't blow all your energy pulling hard for a poor shot opportunity.

As he rolls away from you, break into a climbing turn. (See the Energy Fighting topic.) You are looking to do one of three things.

- If your opponent turns after you, then you will level off into a flat turn when you are at corner speed. You will then be out turning him with an energy advantage. This would be a serious mistake by your opponent. See the topic about Domains.
- If your opponent heads off in the opposite direction, then you will perform a high yo-yo and immediately take another run at him.
- If you opponent attempts to maneuver below instead of turning his back and heading in the opposite direction, then you will level off into a flat turn when you are at corner speed. You will look to see if the turn(s) he is making and with the separation he is providing, if you have an opportunity to fall in behind him.

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Let's assume that your opponent knows better than to enter your domain. Your goal is to quickly perform another run on him while exercising reasonable energy management by using the vertical. You want to force him to quickly execute another maneuver to counter you. This process of causing him to continuously maneuver to counter you goes back to the goal of getting him off balance. At the same time, each subsequent run you make in Phase II, should put you closer to encroaching on his turning circle.

There are two common mistakes I see generally made in Phase II.

- Being overly concerned with loss of energy or rebuilding energy. In practice this means that each new run is reinitiated with excessive separation (beyond 4,000' - 5,000'). This does not further your goal of putting the defender off balance and picking up the pace. It is very hard to encroach on the turning circle of a good defender who is not off balance.
- Being totally unconcerned with loss of energy. In practice this means that after two or three runs the attacker is no longer the attacker. Effectively, you started with an advantage, but you now have a neutral fight.

If your opponent manages to hold you off for quite a while by losing altitude, this is fine. You will simply need to continue in Phase II until your opponent is at sea level.

Phase III – Chewing up his turning circle

If you have performed Phase II well, then your opponent is now continuously turning. You still hold a significant energy advantage (60-100mph). He is off balance and trying to address it with fast foot work. Each successive run has reduced separation between your planes at the start of the next run.

Your runs are now starting at separations of around 3,000'. You are on the edge of his turning circle. The next run or two will put you inside his turning circle. At this point, you have capitalized on your initial energy advantage. You simply need to continue applying Energy Fighting techniques and you will work your way closer to his six. This is the end game.

A common mistake at this point is to abandon vertical maneuvers and go for a quick angles grab. This usually results in a fair fight (neutral) or if your opponent is an Energy Fighter, then you may even end up on the defensive. Remember a fair fight is not your objective when you start with a major altitude advantage. You are after a one side victory and nothing less.

Common Mistakes by the Attacker

There are four common mistakes that I see from attackers when I am defending.

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- Lack of aggression – Such opponents know well enough to maintain an energy advantage. However, they do not realize that if they continuously provide me with 6,000-15,000' of separation after each run, that I could simply dodge them all day. They are presenting no threat to me and it takes only minimal skill to get out of the way of an attacker who is at least 100mph faster when you are at corner speed. Basically, lack of aggression although not endangering the attacker does little to endanger the defender either.
- Diving below – Such opponents dive below my altitude and make high speed and high-G turns below me. That plays right into the hand of the defender. Nothing converges energy states quicker than this type of attack technique. Often within 2-3 runs, the attacker has totally depleted his energy advantage.
- Speed matching – Such opponents try to slowly approach from the rear and above with minimal closure. Their goal is to slowly settle on your six with a 25-50mph energy advantage. Their goal is perfectly reasonable. However, their execution is poor. Their plan depends on making the single perfect move or turn to gain angles and have an energy advantage. If their opponent either effectively counters them or the attacker's timing is not perfect, then they will have blown it. If they blow it, then what they get is a neutral fight. The problem with Speed Matching is that it is not a progressive strategy. Progressive strategies tend to be much more effective than single maneuvers.
- Overheating the engine – If an attacker fails to manifest any aggression and continues with many attack runs, he could well overheat his engine. As the defender, I often cruise along throttled back keeping my engine cool until the wrestling match truly begins. Thus, many times I have been victorious due to an attacker's overheated engine even though I have been in the air much longer than him.

Some Variations

I would just like to throw in a couple of variations here which are fairly common.

Attacker - Rapid Angles Conversion

This approach proceeds with quite a few non-aggressive (lots of separation Phase II) runs. You are basically conditioning the defender to a certain rhythm. On one of those runs, in your climb away, you chop throttle and drop flaps and come around hard. Remember you still intend to hold an energy advantage.

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The idea is to catch the defender knapping in a patterned response. If you do this right, you can well go from non aggressive climbing/diving/climbing to being immediately in his turning circle.

Defender – Hug the Ocean

In this approach the defender cruises at 500' at corner speed. He puts the attacker behind him and does not attempt to gain any further altitude.

Against poor players, you can often get them to auger so close to the ocean in their passes.

Against better players, you know that sooner or later they will get themselves into your turning circle. However, if you are confident that you are able to fly better on the edge and maneuver at low speeds, then it is your goal to force the fight into a scissors. At which point, you plan to out scissor your opponent when he arrives into your turning circle. He will either spin, crash into the water, or loose his position. This strategy is fun to employ from time to time to simply do something different. Also, it forgoes the long time required to get a fight started when you extend away from the high altitude attacker with each new respawn.

Conclusion

The high altitude attacker needs to keep four things in mind while mounting his attack:

- The turning circle concept
- His goals
- The attack phases
- Not to yield his energy advantage, but also to capitalize on it

When the high altitude attack is performed properly by a good player its success rate should be very high. Hopefully, I have provided you some tools to work with here.

**Topic: Why I Extend Away on Low Altitude Defense on
08/31/00**

I often extend away from my opponents in between fights where I was the victor of the prior fight. I generally have two goals in 1v1 fights.

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- Win the immediate fight.
- Maximize the kills achieved with a single plane. (Personal record with one Spit9 is 13 kills; counting causing my opponent to crash too; however, more than half were with gun shots.)

By extending away from Ground Zero (the respawn area), I accomplish the following:

- Allow my engine to cool off from the previous fight.
- Gain sufficient altitude to give me options in the next fight.
- Prevent an opponent from performing the Settling Attack against me. As stated elsewhere this is very difficult to defend against.
- It generally puts my opponent approaching from my six.
 - This puts me in a good position to generate a rapidly and radically changing angles situation at the appropriate time when I cut back into him and at the same time to be heading exactly the opposite way in order to rapidly achieving separation again.
 - It psychologically puts my opponent at ease to the extent that he does not perceive me as being dangerous. However, if my opponent makes a wrong move, I can be very dangerous as I head back into him and immediately after it our passing.

Topic: *Winning the Slow and Low Turning Fight on 08/31/00*

Often I find myself in a low altitude (500' or so) slow (120-150mph) turning fight (one circle) where the two planes start fairly neutral. In many cases, I end up out turning my opponents and with them being unable to figure out how it happened. In reality, it is a very simple formula.

The opponents who get out turned generally attempt a number of low yo-yo maneuvers trying to improve their angles situation. This is a reasonable approach, and, in fact, would work if I simply turned flat (level). This would allow them to cut across the circle and use the acceleration of gravity to gain angles.

As you may have guessed, I am not simply turning flat. Instead I am slowly spiraling up on the edge of a spin/stall. This accomplishes two things:

- Although my opponent quickly grabs an angles advantage, he still needs to climb back up and even higher to use it in order to gain position in the turn. However, the reality is that what he gains going low in the yo-yo is always lost on the way

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back up. In fact, he tends to fall a little behind where he started. This happens because his additional maneuvering and higher speed turning costs more energy than if he had turned flat.

- I am slowly spiraling up. So, while he is going for angles, I am maintaining a decent turn rate and at the same time building up my energy state.

So, the turning fight is initially neutral. However, through about 6-10 turns I have managed to cause our relative energy states to diverge with myself getting the greater of the two. At which point when I have maybe a 30-45mph advantage with some vertical separation, I roll back into the fight and spiral down. This tends to gain me the angles to I need to get on my opponent's six.

Topic: *The Sinking Merge on 08/31/00*

Sinking merges have become a fairly popular style during the initial merge of a fight. Although it does seem that its popularity peaked in June of 2000; now, it appears to be falling off somewhat. Basically, your opponent is rapidly descending as they head towards you. Your opponent may either be fast and at full throttle or throttled back.

The main goal of this technique is to grab a quick angles advantage. This can happen in one of two ways:

- If you do not sink on the merge, then you set yourself up for a vertical lead turn. A lead turn is when your opponent uses the uncontested separation which you provide to obtain an angles advantage. In this case, the separation is in the vertical dimension.
- If you do sink on the merge, but are much faster than your opponent and try to engage in a tight turning fight, then he will turn inside you and get a shot at you.

I generally handle this merge by sinking along with my opponent while maintaining maximum throttle. This accomplishes two things:

- I deny him the opportunity for a vertical lead turn, since I do not permit any separation.
- If he is foolish enough to have reduced power, then I have him where I want him. I am going to turn in the vertical following the merge. If he reduced his throttle, then he is already at an energy disadvantage. Now, if he had dropped flaps too and turned hard, then I should acquire his six in the next 2-3 turns of the fight.

If he did not reduce power and turns in the vertical also, then the fight should be pretty much neutral for the next few turns.

Topic: *The Real-time Scoreboard for the E Fight on 01/05/01*

I occasionally fly with players who I am providing some assistance to. In many cases, they understand the importance of (E)nergy in dogfighting. However, they are unaware as to how they are doing in the E fight until it has progressed very far along, and the situation has become quite extreme.

It is important to realize that the HUD (for your plane and your opponent's) is an essential tool for E fighting in EAW. Few simulations have such an easy to use facility as EAW. You can get the same information in some jet simulations, but it generally requires having your opponent in the forward quarter and getting a radar or optical lock. In EAW, this information is always readily available to you at the bottom corners of the screen.

You should be watching the HUD continuously through out the fight. It will tell you who holds the E advantage and by how much. Looking at the HUD will tell you:

- My opponent is down by 70mph, if I perform a high climbing turn, then I can reverse the fight ...
- My opponent is up by 70mph, if I perform a quick break left then right, I could cause him to drift out in front ...
- My opponent is up by 40mph, if I Split-S and just clear the water, I could cause him to auger ...
- My opponent is up by 40mph, if I reverse my turn, then I should have nose on first ...
- My opponent is down by 40mph and has just reverse his turn, if I climb up, then I should be able stay out of his guns path and be able to lead turn him to gain some angles as he flies by ...

I have not described the above situations in a great deal of detail. They are not intended to be a presentation on appropriate tactics and counter-tactics. The intent is to illustrate how many decisions which you need to make are based directly on the relative E state. Comparing E is states is not just something you do when your opponent is 4,000' above and diving on you with 200mph of positive closure. Comparing E states is something that you must be doing all the time and perhaps is even more critical as you and your opponent begin to truly grapple with one another.

As I said in the very beginning of this guide, to compare E states one must consider both speed and altitude. However, there are certain moments in a fight where E state comparisons are important and fairly easy to make:

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- When two planes pass close to one another in the forward quarter (straight on merge or both planes are pulling hard into one another), one simply has to compare speeds to know who is ahead.
- When two planes are in co-altitude flat turns and circling, one simply has to compare speeds to know who is ahead.
- When two planes are in a looping style fight, one should compare speeds at the same phase of the maneuver that his opponent just went through. I often like to do my speed check at the bottom of the loop pull out or the over the top nose drop.
- When two planes are in flat turning fight both flying at the stall speed, one simply has to compare altitudes to know who is ahead.

Besides the fact that monitoring E states will help you to decide what strategy and maneuver to embark on, it will prove a great learning tool. In STK/EAW, I have tried to point out various E fighting mistakes as general rules. When you monitor E states when flying, if you see that at Time X, you and your opponent have equal E, but then, at Time X+30 seconds, your opponent has gained 20mph, then, clearly, you just made an E fighting mistake somewhere. You can use the HUD as a tool for catching these mistakes and correcting them in future fights. Remember no loss of E is insignificant, since each small loss of E will make a cumulative difference which will greatly benefit your opponent when he goes to cash it in.

Lesson: The HUD is the real-time score board for E fighting. Make use of it.

Topic: *Countering the Terminal Velocity Defense on 01/05/01*

I have discussed in STK/EAW how to defend one's self from a high altitude attacker who has respawned. My defensive style is based on staying close to corner speed, protecting your turning circle, and applying domains.

There are, of course, quite a few other styles. In general, most styles seek to cause you to do something foolish since you are too fast to turn well, and make you an easy target for a guns kill. Or alternatively, they tempt you to do something foolish to destroy your E advantage like entering into a looping fight.

Not falling prey to these styles is usually just a matter of keeping in mind not to enter your opponent's domain and to use the vertical to make your turns. This provides you with a good turn rate, separation to make the turn, a place to go where your opponent cannot point his guns, and energy conservation.

However, there is a defensive style which is somewhat different than noted above and is perhaps employed by 30% of the players out there. I refer to it as the Terminal Velocity

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Defense. Often you will respawn and hold a 200-500mph E advantage on your opponent. If you are a skilled player and your opponent is skilled, then he knows that he must converge energy states if he has any hope of engaging you in a fight.

Terminal Velocity was an idea introduced in high school physics. It is the maximum speed an object will fall at despite the acceleration of gravity due to air resistance. In a similar fashion, a plane has a maximum speed which it can fly in level flight. This is either due to air resistance it meets or the fact that beyond that speed the controls cease to function and the pilot cannot fly.

The Terminal Velocity defense is performed like this by the defender. During the time before your first attack run, the defender climbs and gains as much altitude as he can. As you close the distance to the defender he runs from you at well above corner speed. (assuming Spit9s) You might see the defender doing 300mph when you are 20,000' away. As you close with the defender, he continues to keep his nose down and accelerate. He will reach his Terminal Velocity or close to it. Perhaps, he will be doing 430mph when you are 7,000' away.

You still have the E advantage, but in order to gain a small closure rate of just 10mph, you will need to increase your dive in excess of his.

The end result of all this, is two planes barely maneuverable at 450mph and that E states have converged. Your 500mph advantage has been reduced to a 5mph advantage. This is a great accomplishment if your opponent can pull it off.

So, what should you do? First, you have to understand his game plan. You know what he is trying to do and that the physics of EAW prevent you from overtaking him. This defense can easily be countered by matching or near matching his speed, but staying above him by 4,000' or so. Don't bother trying to close the distance. A few things are possible here:

- He will grind his engine into the ground. You should have started with the cooler engine by respawning. All his climbing and full throttle diving should limit the amount of operational time at full throttle his engine has left. If the chase continues long enough, he will simply blow up.
- He will have to keep descending to maintain his speed. Sooner or later he will reach sea level. At which point, his speed will continue to fall off; yours too at the same rate, but you should still hold a 100-200mph advantage.
- He will realize that this approach is not working or he will receive a hot engine warning, he will back off the high speed run and switch to a maneuvering defense. You may now proceed to apply a traditional energy oriented approach of which he will have trouble defending, because he has precious little time left to run at full throttle.

Finally, I will say I do not advocate this defensive style. Why?

- As demonstrated, it can be easily countered.
- Such an approach grinds your engine into metal filings. I prefer to try to win a number of fights with one plane. To accomplish that, one must respect his engine.
- Also, it is better to idle along and have a cool engine so that when the time is right you can fight and win a protracted turning struggle. Full throttle when you are in a deep E hole and not in danger is simply poor engine management.
- I prefer to stay at corner speed. If my opponent closes fast, I can use his speed and lack of maneuverability to defend myself. (I am maximizing the difference between our E states to my advantage.) If he should close only slowly on me, then that is fine, since I am getting close to E parity and the time when I can make my stand and fight.

**Topic: Solving the Rear-quarter Negative Closure Problem
on 01/05/01**

This topic deals with how to solve the rear-quarter negative closure problem. What is it? This is when you find yourself behind someone by maybe a 1,000' and he is running away at maybe 10mph faster than you are pursuing. This often happens in a tight turning stall style fight with a lot of throttle chopping as two players race for the ocean and try to put moves on one another. This also happens in looping fights. Typically, your opponent realizes he is being out flown and that no radical move which he is making is going to give him with the upper hand. Since he realizes his change in strategy before you do, he will most likely go full throttle, flaps up as he is at maximum separation or angles from you with his nose heading down. By the time you realize it, he has gotten the jump on you and has a slight E advantage (5-15mph) which he is going to use to out run you. His plan is to get a enough separation to reenter the fight and hopefully find himself on better terms in this next attempt.

You have three goals in this situation in the following order:

- Stop his running away.
- Change your negative closure into positive closure.
- Make sure that the next phase of the fight has you at an energy advantage.

If he is within 1500' of you and running away straight, then I advise using the zoom view (one step up) and flying the nose straight. Pop a few quick shots at him. On a few occasions, I have gotten lucky and hit an engine. Of course, if that happens, the fight is

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over. However, it is quite possible to ping his plane. Often when you do this, he may simply turn back into the fight – negative closure problem solved. Otherwise, he may try to fly somewhat evasively. If he is not much faster than you that might be enough to reverse the closure problem.

Once he is out of range, don't bother wasting ammo. Start climbing. You may ask, "Won't this just further increase his rate of extension." The answer is yes. However, in almost all cases (this is a game of air combat), his intention is not to escape, but to reenter the fight. You would like to make sure that when he reenters the fight that you are holding the upper hand. Also, if you gain an E advantage now, then if he quickly reenters the fight and extends again, you could well have positive closure.

The only problem which you may have with climbing is that you will reach a point (I am in the forward no cockpit view) where you can no longer see him and what he is doing. This can be very dangerous if he reenters the fight and you do not see him coming back at you. You have two options to deal with that.

- You can keep him on the very bottom of your screen and just make sure that you stay above of him so that you hold the energy advantage.
- You can go to padlock view. In padlock, you should look for any rapid change in his rate of pulling away, change in altitude on the HUD, or change of heading on the HUD.

The extenders often tend to reenter the fight in two common ways.

- There are quite a few that will pull an Immelman and attempt to come back at you nose to nose guns. This is often the case if he has reached the conclusion that you are the better pilot and will out turn him. Then, he knows that nose to nose guns is the most even situation he can hope for. In some cases, he will drop flaps and chop the throttle so that his reversal is more abrupt. He hopes to catch you knapping and too fast to maneuver. But actually, this is an E gift for you, if you get it.

You should respond in the following fashion. First, if you have been climbing, this will force him to roll out of the top of his Immelman to take the shot. At this point, he should be relatively slow and have limited maneuverability. This should almost always be the case due to your climbing and the E he just burned in pulling a hard reversal. All you need to do is simply side step him by offsetting to one side and make a gentle (low G) climbing lead turn and reversal as he sails by below and off to the side.

- After his pass, he may initiate a turning fight and then you should find yourself in it with an E advantage (remember you were climbing building E while he ran away and ran back).

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Shoot to Kill / European Air War

- Otherwise, he may see that he doesn't have a shot, just extend off in the other direction in an attempt to do the same thing again. If you have done this maneuver right one or more times, then you should be able to achieve positive closure. At which point, these attempts at nose to nose shots by your opponent should come to an end and you can run him down and resume a turning fight.
- The extender may notice all the vertical separation which you are leaving and attempt to use it in order to convert to a position on your tail. He will often break into a hard descending turn and stay low as he passes you. After passing you, he will try to come up quickly from behind you on your six.

If you believe that you have built an energy advantage by climbing and by flying straight while he initiated a high speed and high-G turn back into you, then as he passes below you, you should head into a high climbing turn to match his turn as he comes up below you. At the top of your turn, you should be fairly slow (130mph) and turning very low G.

If you have done this right, then he should be blazing rounds away behind your tail from below as he hits 110mph. It does take a good sense of things to yield what looks like a shot to your opponent, but know that you are in a safe place. However, this whole maneuver is calculated to get him to commit himself to a course which will make him very vulnerable.

When he has taken his shot and seen his controls turn to mush with his nose pointed up, then:

- He may push it too hard and spin. If so, you should be all over him.
- You roll and nudge your nose back down and quickly swoop in on him before he regains maneuvering speed. Either you shoot him at this point or gain his six with enough of an E advantage to shoot him in the next 20 seconds.

Topic: Stall Fighting on 01/06/01

I would like to discuss a general topic. That is Stall Fighting. Stall Fighting tends to emphasize angle grabbing maneuvers at slow speeds with rapid loss of altitude. Stall Fighting pilots tend to win their engagements by relying on their superior control and maneuver capabilities over their opponent. Their opponent may often spin or simply be unable to keep up with their rapid and radical maneuvering.

It can be a very effective technique. In order for this technique to be employed, the fight must evolve to a certain degree of closeness (in terms of separation distances; 300'-1,000') and fairly slow (under 200mph). At which point, both pilots are in a tight

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embrace with the other. Neither can extricate himself without giving his opponent a very good shot at his six.

Under the conditions of a Stall Fight, the amount of energy advantage one player can grab over the other is fairly minimal. Perhaps, a player can grab a 10-15mph advantage, but to do so will mean a significant loss of angles. Remember that if a Stall Fighter gains your six, he will then go back to full throttle and thus you are unlikely to be able to do very much with your 15mph advantage.

So, how to deal with Stall Fighters? My initial recommendation would be to use E Fighting techniques to gain a positional advantage. Generally, this is not too hard to do, since Stall Fighters do not expect to win the fight in the early portion of the engagement when speeds are high and separation is significant. They plan to dazzle you with fast foot work up close. Thus, you should be able to grab an energy advantage and convert it to a positional advantage. It is at this point that your opponent will break into his Stall Fighting routine expecting to reverse the fight and use your energy advantage against you. As has been said, holding a minor E advantage and having someone acquire your six is a bad strategy. So, once you have acquired the positional advantage, you must match the fancy footwork of your opponent and maintain your position on your way down to the ocean.

You should keep in mind that these fights are often won (when neutral) by the player who manages to squeeze in the last radical move before the ocean negates further abrupt moves. Thus, you should be ready and prepared for the final move before the fight gets to 500'. If you still have a slight E advantage, you must be careful not to get pulled into the ocean. The best way to avoid this is to fly lag pursuit (loosely trail your opponent's flight path) during the climbing portion of whatever maneuver is coming. Thus, when you enter the descending phase you will have acquired extra room to pull out before the ocean. At the same time, you may have retained your small E advantage which can now be utilized as the fight flattens out.

The main difficulty in engaging Stall Fighters is not maintaining your position. If you are good with the controls, you should be able to do this. (If not, you must simply do more of it and learn.) The main difficulty is that such fights may often leave you down at the ocean in a flat turning fight flying lag pursuit, since you do not have enough E to get the tracking shot despite having a positional advantage. Such fights can become long protracted engagements of 5-15 on the edge of a stall turns. This can especially be a problem if you were not the player who respawned and you are in danger of cooking your engine. Needless to say, this is why extending away from the respawn area and defending your turning circle from attack at 40% throttle is essential. Failure to do so, will leave your engine too hot to fight a battle of 15 turns at 100% throttle.

Lastly, I would like to add that I advocate E Fighting over Stall Fighting for the following reasons:

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- If you can gain an initial positional advantage via E Fighting, you can often maintain it for the rest of the fight. Thus, of two players who maneuver very well, the one who acquires the initial positional advantage will win most engagements. As previously discussed, when only one player E fights, he is almost guaranteed a chance at a positional advantage. He will cash in the E from above using the separation for turning room and the E advantage to out turn his opponent.
- Stall Fighters which are at a positional disadvantage tend to be vulnerable to snap shots (quick passing gun shots). This is primarily true, because often stall fighters tend to telegraph their move and flight path. Thus, if you are not totally out of E (have maneuvering speed) and you know where they are going before they go there, you can fly your nose to their future location and pop them with your guns. So, Stall Fighters are vulnerable to predictive flying/targeting techniques. In fact, it is not that hard to do, since the moves they make tend to be fairly obvious. E Fighting does not suffer from this problem. As is often the case when you E Fight, your opponent may well know exactly where you are going (I often enter into high climbing low G turns with them coming up from behind and below). However, since your opponent does not have the E to match your maneuver, his insight into what you are doing cannot be capitalized on.

**Topic: *The Emergence of the Twist Slash Turn Style on
01/06/01***

As I had discussed previously, the flying community tends to adopt various styles of combat as a group. One of the latest styles to emerge is what I call the Twist Slash Turn Style which I shall abbreviate as TST. TST is one instance of Stall Fighting.

This type of fight usually begins as a more or less neutral turning engagement. The turns may initially be fairly flat or there may be of a high yo-yo style. Initially, the turns manifest fairly decent energy conservation. Such initial turns, may last as long as four turns to as little as a single turn.

A rapid turning transition occurs by the Twist Slash Turn player. The player performs what looks to be a high yo-yo style turn, but at the apex of the turn, he performs a sharp twist (snap roll) and a quick pull downwards. Most often this is executed with the throttle chopped. (In fact, the whole descent down to the ocean may be more or less throttled back.) When one partakes in such a fight, it has a kind of a hybrid appearance. In one respect, it looks like a downward vertical scissors to a point. However, unlike a scissors which would just manifest criss-crossing, there is a circular component. In another respect, it looks like a tight spiral down unpowered fight. However, unlike a tight spiral down fight, motion is not truly circular and there tends to be intermittent forward quarter passes.

So, what is the objective of one who performs the TST (Twist Slash Turn) Style:

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- When performed well (especially when completely unpowered), it yields a fight of rapid and radical turns/cuts. For a player who is not very experienced, he can well be overwhelmed and lose situational awareness.
- If the non-TST player employs E fighting techniques, he will lose angles due initially to the twist and subsequently to the slash as the TST player passes close and turns sharply to acquire the E fighter's six.

How should one deal with the TST Style? There are a number of options:

- As with any style, one can engage in exactly the same thing and execute it better.
- One can apply less power than the TST player and perform a tight spiral down. Doing so tends to leave the TST player slashing downwards and passing beneath you. Although you are turning hard, you tend to drop less altitude. At some point during a slash as the pass beneath occurs, you can use the impending separation to lead turn and roll in behind the TST player. Often when you get a good position on his six (300'-600'), he will pursue another approach in a defensive fashion.
- You can maintain your current position with a slight E advantage, by flying lag pursuit towards the apex of the TST player's maneuver. Instead of roughly trying to match the TST player's snap roll and break downwards which more or less would force you into the type of overshoot situation which occurs with a scissors, you fly your plane towards a point above the apex of his snap roll and as it slows, you roll inverted and pull hard after him. This tends to maintain the current positional situation while allowing you to hold a slight E advantage. This slight advantage can often prove useful when the altitude has finally run out or he decides to skip a slash and attempt a loop. You just may have enough E to catch him with a shot at the top or bottom of the loop.
- You can forgo maintaining position for a turn or two and go for a shot. The TST player is going to rise up above your nose while drifting off to one side, then he is going to snap roll and come back down while continuing to drift off to the side. Instead of rising up with him, you simply turn flat (cutting throttle if you have to) to have your nose pointed at the place where he will come slashing through. As he comes slashing by, you open fire and then turn after him. You will lose angles by doing this, but you often can take out his engine which will pretty much end the fight. This approach is best employed at mid-level altitudes so that there is still time to address any angles lost on the way down.

Topic: An Impressive New High Altitude Attack Approach, Criss Cross Above on 01/06/01

Recently, I have seen a new high altitude attack approach which has impressed me greatly. It is a form of energy oriented attack, but somewhat different than what I

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personally employ. My personal style tends to make a series of runs on the defender. I turn in the vertical to maintain the E advantage, and I attempt to keep reducing separation with each subsequent run. Sooner or later, I have acquired a position in my opponent's turning circle or have push him down to the sea. In either case, I then apply standard energy tactics.

This new approach begins in a similar fashion to what I usually employ. However, instead of simply breaking into a high turn and then back down to begin the next run, this approach reverses its turn and passes over the opponent. The attacker continues to criss-cross back and forth around corner speed (200mph) about 2,000' above the defender.

The Criss Cross Above is rapidly becoming popular. I saw it start with one good flying buddy (although I do not know if he is the founder) and, at the time of writing, I would say that 15% of the community is employing it and its popularity is growing.

What I particularly like about it is the following.

In the attack I usually fly each run at my opponent can be divided into two phases from the perspective of the defender, the Safe Phase and the Dangerous Phase. In the Safe Phase, I am usually turning in the vertical and pulling off in preparation for my next run (note this does not mean that I am leaving 8,000' separation between us; separation is continuously decreasing). In the Dangerous Phase, I am rolling back in towards my opponent. If he fails to perform an extreme maneuver which takes advantage of his lower speed (closer to corner), I will most likely pop him with my guns and reposition above and even closer until I can finish him off.

In the Criss Cross Above Technique, there is no Safe Phase for the defender. The attacker remains continuously 2,000' away with an E advantage. Because he is above, the defender can do nothing about it. Climbing would put him in the attacker's domain and make him an easy kill. Straightening out will allow the attacker to immediately drop into his turning circle. Completing a full turn, will, also, allow the attacker to immediately drop into his turning circle. It is this continuous danger and maneuvering which is beautiful about it.

So, how to defend?

- I tend to avoid breaking back into my opponent when he makes his run until the last possible moment. Remember that to Criss Cross Above, he has to get you turning below. So, you can delay and frustrate him a bit by being careful of breaking back into him.
- When you break back into him observe whether he anticipates your turn and immediate climbs and turns himself. If so, his run is over, then straighten out and continue extending away. Remember that to Criss Cross Above, he has to get you turning below. So, you can delay and frustrate him a bit by being careful of breaking back into him.

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- These two items will only delay the onset of the Criss Cross Above, but not prevent it. Finally, your opponent will be Criss Crossing Above. Defending is a matter of matching his turns while staying below him. Thus, you should be able to look up along your wing and see him turning in the same direction above you. If he reverses his turn, then so do you. Remember to continue turning level. Do NOT climb towards him. If you fail to reverse your turn, he will use the expanding separation to drop in on your six. He is basically poised up there looking for an opening to drop in.

As some point, he will drop in on your. You must recognize when that happens. This is your final attempt to defend your turning circle. If you react prematurely or react too slowly, he will be on your six. If you time it right (break back into him and initiate a turning fight), you stand a good chance of getting a neutral fight. Getting a neutral fight when your opponent started with a big E advantage, is already a significant accomplishment!

I have yet to personally try this attack, my main problem with it is that it locks the attacker into the approach. I prefer to use my E advantage to grind my opponent down. The Criss Crossing Above can go on indefinitely if a good opportunity does not present itself. Also, I have noticed that the final attack usually takes the form of a sharp E dumping angles turn on to the opponent's six. If not well managed by the attacker, this could result in a neutral fight. I never want to offer a neutral fight when I start holding the advantage.

However, I do expect that this attack is quite effective against many average opponents. It would tend to push a players ability to maintain SA to its limits while keeping the plane maneuvering.

Topic: *Dealing with Evasive Spins from the Rear Quarter on 01/07/01*

From time to time, your opponent may realize that he is in serious trouble when you are 500'-1,000' from his tail and closing. As such, he may perform a real or fake spin. In either case, he is attempting to foil your shot, force and overshoot, and then recover to hopefully be on your six.

If this occurs in the horizontal, then I most often will take the shot I have and break into a climbing turn following the shot. This pretty much keeps you safe from him rapidly recovering. In most case, you can rapidly reacquire his six by reversing your turn and coming over the top and around.

At other times, he may initiate the spin when you are directly above him and you are both heading down. Prior to that he may be performing a tight corkscrew turn down. In any

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case, you have to make a decision early on: Will you maintain your energy advantage or will you stick to him like glue?

- If you decide to maintain your energy advantage, then you should probably avoid doing anything more to slow down. Take whatever shot you have, and break away, and climb, and come back around, and reacquire his six.
- If you decide to stick to him like glue, then you should be throttle chopped, flaps down, and gear dropped. Getting the gear down is essential to slowing your descent. You will have to be under 200mph to do this. Sometimes you will have to nose up a bit first while turning in order to get your speed down. You can also reduce closure by circling more in your descent (kind of a descending barrel roll).

Generally, this is my preferred approach. When done right, you will maintain your energy advantage, since you should be about the same speed, but still above your opponent. You no longer have rapid closure and your opponent will be quite slow. So, you will have a decent chance for a shot. Otherwise, as soon as his plane stops gyrating and hangs there coming out of the spin, you should have a shot and will be right on top of him again. Remember to retract your gear and go full throttle as soon as the spin is over. If he decides to dive and extend, you may want to retract your flaps too.

Topic: Making your opponent's Split-S dodge work for you on 01/07/01

Occasionally, you will have positive closure of 40-80mph coming up someone's tail. Knowing that you are faster, he may often choose to Split-S. He knows that if you roll and follow him, you will turn poorly being that much faster, put yourself below him, possibly black out, and burn (lose) energy at a faster rate than him.

Clearly, immediately following his move is a mistake. If on the other hand, you break into a high climbing turn, you will retain your energy advantage and potentially even add to it. However, you already had enough of an energy advantage. So, the net result will probably be lots of separation forming between your two planes, and the immediate moment of danger to your opponent will have passed. Often he will use the separation which he just acquired to make up the altitude which he just lost so that he can repeat the same maneuver again on your next run.

You, however, have another option. Instead of attempting to match his move, climb (pull up hard) above the point in space where he initiated his Split-S. When your airspeed is close to corner, perform your own Split-S. Here are a couple of advantages of doing this.

- The final separation created should be much less than simply going into a high climbing turn.

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- You should have retained the magnitude of your energy advantage.

Based on the above two points, if your opponent extends away, then the relative situation between you and him before his maneuver should be unchanged. However, the fight should have moved 500-1,500' closer to sea level. Forcing someone to sea level when you hold an energy advantage is always a good deal for you.

Another advantage is this.

- Your opponent often realizes that you chose to Split-S too. However given that you were in his rear quarter and obscured by his tail, he probably does not know exactly how you executed the maneuver. In most cases, he will assume that you just pulled hard after him.

This mistaken assumption is to your advantage. Note the following two points.

- You are not level with him or below, but generally above.
- You did not just blow a lot of energy or almost blacked out.

Based on his assumption, he may often come looping back at you. He does this because he believes he is going to out turn you in a looping fight, since you are too fast, and he knows that a few loops will pretty much converge E states and remove your advantage.

- When he loops back at you, he will have first miscalculated your altitude (normally, you would be lower based on what he believes). Thus, when he tries to meet you in a merge at the top of his Immelman, he is going to find himself extremely slow. It is at this point that you should be able to side step and lead turn him. This should allow you to very quickly come around on his six with energy to pull lead for a shot. If correctly executed, he will still be too slow to maneuver well enough to avoid your shot.
- Or you can mislead him to believe that you intend to engage in a looping fight. You do this by going down and passing underneath him. Then, pull up into a loop. He is going to pull down through the bottom of his loop and come up.

It is at the top of your loop that you do the unexpected. (You use your energy advantage instead of blow it like he expects.) Instead of coming back down, you roll out at the top and proceed into a low G flat turn. He has already committed himself to another loop and is coming up. If he simply loops, you should be able to drop in behind him. He may well see that threat and try to follow you at the top of his loop. However, he does not have the energy to do this. He will most likely spin or simply wallow at the top. In the meantime, you will come rapidly around to nail him. By the way, this is another case of

bait/trap which was presented earlier in STK/EAW. Such opportunities arise frequently in fights and one should attempt to exploit them in order to lead your opponent to the mistakes that will get him killed.

Topic: Turns, Reversals, and Turning Forward Quarter Merges on 01/07/01

Most players tend to realize when two planes are circling in the same direction that the faster plane (more energy) has the advantage. There are two cases we can look at.

- If both planes are below corner speed, then the faster plane is closer to corner speed and turning better.
- If both planes are above corner speed, then the faster plane can use the vertical to turn. By doing so, the faster plane gets a good turn rate, conserves E, and gets separation in which to get the nose around for a shot.

What most players have trouble seeing is when two planes are circling in the same direction and one reverses which one has the advantage. Typically, a reversal when the two planes are not too close and are opposite sides of a circle is going to yield a forward quarter pass and possibly a shot opportunity. Does the faster plane (more energy) still have the advantage in this situation?

The answer is “No” which surprises many players. Why is this? Well, this forward quarter pass is going to be a race for a nose on shot opportunity. The slower plane will most likely have an opportunity for a shot first and maybe the only shot. The slower plane is going to have a tighter turn radius. If you draw this out on a piece of paper, you should see that there should be a tangent (firing solution) from the slower plane's circle which transacts the faster plane's circle sooner.

There are quite a few important implications of the above statement.

- When you are in a flat turning fight and the other guy has the energy advantage (assuming that his range is roughly a turn radius), then reverse your turn and go for the shot.
- When you are in a flat turning fight and you have the energy advantage (assuming that the range is roughly in a turn radius) and your opponent reverses, then the hunter has just become the hunted. Avoid that merge!

Now, let us talk a little about how to avoid forward quarter turning merge situations. These tend to be quite different than the straight in merges that open the initial fight in EAW.

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If you are not going to beat the other guy to the shot, because you have the energy advantage, then do the following.

- Stop pulling hard into the other guy. You will lose angles by doing this, but at that instant you are simply helping him to line up the shot on you.
- Straighten out and start climbing.
- After the planes pass, turn in the vertical and come around. Begin to employ your energy advantage again.

If you follow this recommendation, your opponent should have trouble making up the extra angles and lifting his nose. He will not get the shot. If he is slow enough and fixated on the getting it, then he may even spin himself trying to yank the nose. (It is almost always a mistake to spin going for a shot.)

Are there cases when you happen to be the slower player, but are in jeopardy of being shot in the forward quarter? Yes, there are. These often happen when the other player has used vertical separation and a superior turn rate to come around and you are somewhat below corner speed.

In most cases, your opponent will be level with you or somewhat higher. You need to break hard downwards and across beneath his nose. This presents the hardest possible shot.

- If he does not invert, he will have a hard time pushing his nose down.
- If he inverts, he risks making a big E mistake on the passing by heading down and fast. Even if he inverts, the roll and the pull will take time such that he will not be able to line up the shot.

Usually, after he passes I will reverse my turn and check to see if he dived below blowing all his energy. In which case, I will stay above and climb some getting ready to go on the offensive.

As a final note, reversal of turns can quickly lead to scissoring fights.

Topic: A Promising Merge Technique for Avoiding the Head On Shot on 01/07/01

In the past, I have offered the barrel roll as a technique which you can use on the straight on merge to avoid a head on shot. Such situations are dangerous, since despite whatever skill you possess, you could well get killed by a lesser skilled and luckier player.

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I have tried this technique a few times with great success. You offset to one side as in the barrel roll. At about 6,000' separation, you begin to cross to the other side, and if the merge has yet to happen, you repeat this. The important thing is to keep your opponent out of phase with your cuts back and forth. Thus, there is little opportunity to line up a shot on what should be a merge with 500mph closure. (Please, note the next topic in regards to this technique.)

Topic: *Lead Turns on The Merge on 01/07/01*

Quite a few beginning players allow themselves to be lead turned on the merge. A lead turn is when two planes approach and they are not on a collision course. Thus, there is either horizontal or vertical separation in their flight paths.

In which case, if one plane initiates a turn towards the other prior to the merge and the other flies straight, then the turning plane:

- May have enough room to turn that he can shoot the straight flying plane as he flies by.
- Will gain angles upon the straight flying plane. I often say that such angles come "for free". Normally, if one wants to acquire some angles, one has to be willing to trade some energy to do it; in order, to get a superior turn rate. But in this case, only one plane is turning. So, there is no energy cost at all.

How does one avoid being lead turned on the merge? It's very simple. The basic rule of merges is:

- Pass as close to the other plane as possible.
- Do not collide.
- Do not get shot.

If you keep that in mind, you will not be lead turned. Remember a lead turn can happen in any dimension.

Topic: *An All Too Common Mistake – Merging When in an E Hole on 01/07/01*

All too often, I see players fly into a merge with me when they have a 50-150mph E deficit. I generally use the analogy of: "Why would a guy with a knife charge a guy with a lance?".

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When you are in an E hole (major E deficit), the first thing you should do is put your opponent behind you, adopt your defensive stance, protect your turning circle, and try to get him to blow his E advantage. You do not attack from a position of weakness.

This applies to the following situations among others.

- When you have respawned and your opponent is minimally 3,000' away and above you.
- When you have recovered from a spin and your opponent is minimally 3,000' away.
- When you are chasing an opponent, but your engine is much hotter and you have an overheat warning.

Topic: *Speed Matching High Altitude Attacks on 01/07/01*

A number of players when attacking after a respawn attempt to slowly settle on you and speed match you as they get closer while maintaining a slight closure rate.

I generally advise against this form of attack. It is based on a single attack run and having perfect timing against a defender who is composed, flying straight and level, and waiting for the critical moment. It too easy to mess this up and end up with a neutral fight.

An energy oriented attack is a superior approach. It provides numerous opportunities to probe the defender for weakness and to capitalize on a mistake. If things do not look good, you can always pull off into the vertical re-evaluate. Also, when you finally make your move in for the kill, the defender should be off balance and ill prepared to deal with you. This often does not happen when you speed match.

Topic: *How to Become Deadly at EAW on 01/09/01*

The following is excerpted from an email which I wrote to someone summarizing my general recommendations on how one gets good at this.

Try to fly with others on the Zone.

1v1 with similar planes is a good way to compare skills. Most of what I teach will work with any of the EAW planes; not just the Spit9.

Try to apply E fighting techniques against all opponents. There are other ways to get kills, but I think E fighting is the superior basis on which to build. When

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fighting angle/stall fighters; use E fighting to first get position, then switch to angle/stall fighting when you have it.

Avoid engaging with an opponent if you do not have E parity.

Avoid being suckered up (too slow); avoid being suckered down (too fast).

If you can win, try to maximize the number of kills you can get per plane. Be stingy with your shots. Keep a distance from the respawn area. Don't drive your engine too hard until you have E parity or an advantage.

Try to categorize other player's flying styles. Also, try to categorize strategies (a series of maneuvers with a purpose) and individual maneuvers. There is more or less a finite set. Know what your opponent hopes to gain and know what your counter is.

The above is true for yourself. Don't simply react. Have a plan and attempt to execute it. Be prepared to change your plan if the situation changes or if your plan is not working.

There is a fair amount of psychology in this game. True domination is the result of getting others to do what you want them to do. For the 0-70% players, you can most often lead them towards the mistakes which will kill them.

Teach others what they did wrong and what you did. (The new players understand very little and think it is all magic. It's really a game of chess.) When you do this, you cannot simply fall back on the same move all the time, you must grow. At the same time, if you can teach it, then you understand it well enough to tune it and optimize it.

Well, there you have it.

Go forth and kill! :)

Topic: STK/EAW Source Material on 01/09/01

STK/EAW primarily derives its material from instructional chats I do after flying with people. Many people ask me if I will fly with them and use Roger/Wilco to give them realtime instruction. I usually decline to do this for the following reasons.

- I find chatting while flying distracting. I get very focused when flying.
- I save the post-flight chat buffers which have good material for review so that I can find material to add to STK/EAW.

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- Air combat is like a chess game. If you were told by your opponent what he intends with every move, he would be hard pressed to checkmate you.

I provide a sample chat below for those who have never flown with me. The name of the actual student involved has been changed and grammar/spelling has not been corrected.

```
MarkShot> you there?
Student> yes
Student> gg mark wow was pretty intese for me hehe
MarkShot> So, did you get to see what scissors are?
Student> yes and I lost
MarkShot> Ah - but you looked like you were getting the hang of
it.
MarkShot> Also, what do you think happened on the last three
fights?
Student> I got trapped
MarkShot> Good that you realize that - how?
Student> I didnt have enough speed to follow you up
MarkShot> Yeh, but my question is - what did I do to get you
thinking you should engage me?
MarkShot> Of course, I know what I did. :)
Student> u flew right in front of me
MarkShot> I think it was more than that - I looked like I was
going to play of loop de loop with you right?
Student> yes
MarkShot> Well, my loop and your loops were fundamentally
different - how do you think?
Student> I think they were because I never had as much E as you
to loop with
MarkShot> aside: psychology plays a big part in combat
MarkShot> Nah - if I did what you thought I would do - you would
have been fine ...
MarkShot> You expected tight hard turn loops with me trying to
turn my speed into a more aggressive loop ...
MarkShot> Instead I flew a very lazy loop with a lot of altitude
gain ...
MarkShot> That moved the focal point of our fight higher ... that
already gave you some trouble ...
MarkShot> Now what is the next thing I did which generally
finished you?
Student> shoot me
Student> :)
MarkShot> Nah ...
Student> got the angle
MarkShot> At the top (mine) - when you were on your last gasp of
E coming up to meet me ...
MarkShot> If I had come back down at you - you had a chance ...
MarkShot> I would roll out of the loop at the top and pull you up
even higher ...
MarkShot> Do you recall?
Student> yes
Student> u made it so i didnt have a shot
MarkShot> Then, I would go into a hard flat turn and get a
reversal on you - wham!
Student> interesting
```

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MarkShot> So, there was some illusion, some bait, and a trap when you were hanging on by a thin thread :)

MarkShot> How could you have lived?

Student> alt-b

MarkShot> Nah ...

Student> tried to keep up with u

MarkShot> On the start of my loop, realizing what I was up to and let my just climb away - I was not danger to you ...

MarkShot> Or when you realized that you were dropping speed rapidly - getting your nose down and get back to 170-200mph ...

MarkShot> Yes, I might have come around on you, but then you scissor ...

MarkShot> Remember what I said last night about pushing a bad position into a crisis?

Student> yes

Student> im a glutton for mistakes

MarkShot> When you were taking runs at me while I was at 500' ...

MarkShot> You saw that as soon and you started to climb away ... I just let you go ...

MarkShot> I just settled back into my defensive posture.

Student> right

MarkShot> If you cannot kill me ...

MarkShot> Because either you don't have the E and I won't turn down and back into you to fight or

MarkShot> (cannot remember the other)

MarkShot> Break off while you still get me heading away from you.

MarkShot> Why is that the ideal time to break off?

Student> makes me burn E to get fly back to you

MarkShot> three reasons:

MarkShot> (1) Maximum separation (we are going in different directions) prepares you to defend - clears your turning circle

MarkShot> (2) I ain't really looking at you - that makes me much less dangerous

MarkShot> (3) If I am flying towards, any break of will give me a huge angles advantage (like your six)

MarkShot> Got it?

Student> got it

MarkShot> Well - I got to get to sleep - nice flying with you.

Student> ok thanks mark

Student> good night

MarkShot> You flew well - Salute!

Student> S!

Topic: *Why EAW Online Keeps Me Coming Back on 01/09/01*

Okay, this has nothing to do with air combat techniques ...

I had EAW, since the game was released. I flew it offline from time to time. I did a little bit of online play in 1999 via a 56K modem, but not much.

In the end of 1999, I got cable modem service. So, around the start of 2000, I decided to see how gaming was with a high bandwidth connection. Among the games I tried was

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Shoot to Kill / European Air War

EAW on the Zone. I got hooked and dropped everything else. I pretty much flew exclusively online for a year.

Recently, I have found myself looking for something else to do: fly another game online, play campaign or strategy games offline, play EAW sweeps online, ... However, I keep finding myself coming back to the Zone for more 1v1 in EAW. Why? If you love the struggle for the kill, you cannot find a more challenging environment in which to test your skills. Certainly, no game offline can give you that. Or if you love to be at a deep disadvantage and fight your way back and win, you will find that online each time after your opponent's respawn. Whether you win or lose, you will see more variation in flying techniques in one evening than playing four flight simulations offline in one night. It is simply the place to be.

Topic: *Answers to Some of Your Questions on 01/09/01*

Another off topic, topic. I have decided to answer some of the questions I commonly get asked.

- I am not a pilot and the only heavy vehicles which I have controlled are motorcycles and cars. I have worked in computer systems development for 18 years and am currently self-employed.
- I consider WWII the golden age of dogfighting. WWI planes were themselves the greatest threat to their pilots. Modern jet dogfights should not really take place, because of air to air missiles. (Of course, you can have a lot of fun going "guns only" in these games.)
- I am 42 years old. As a kid, I was fascinated by things that fly. I did build/fly model planes as a kid. However, with the coming of PCs, the ability to actually be at the controls first person is a dream come true.
- I do not join clubs, squads, ladders, tournaments, or wars. In 1994, I played on a the F3 Ladder on Compuserve, there were some great times, but there was also quite a bit of pettiness. I do this for fun and lack of commitments means no problems with aggravation. Also, since I teach everyone who asks, most squads/clubs would feel that I was being disloyal if I were to be a member.
- I am not the best EAW player. However, I am better than average. When it comes to teaching and helping others, I think I have a talent for it. As previously noted, this can help one to improve ones own skills too. It certainly has helped me.
- I have never received any money for STK/F3 (the original for Falcon 3; available upon request) or STK/EAW (this guide). I wrote both of these documents to

MarkShot's STK/EAW

Shoot to Kill / European Air War

share my love of the game with others, and to assist in growing the community of players.

- I am always happy to hear from those who read this guide. The two things I usually want to know is: Did it help you? If so, what was most useful to you?
- If contacted and time can be found, I will attempt to fly with someone who wants help and debrief them in text chat afterwards. (See sample chat included.)
- I prefer not to fly dissimilar. Such fights when fought by two competent players can become 30 minute stand offs. I rarely fly team sweeps.
- I have KALI and have flown there once or twice, but the Zone seems more convenient to me.
- The controls I use are Thrustmaster F22, TQS, and RCS. (no force feedback)
- I only use in internal views.
- I do fly other planes besides, my favorite, the Spit9.
- I have tried ECAO v1.4. But the standard EAW v1.2 works fine for me. The material presented in STK/EAW works equally well for ECAO v1.4. The flight models are, of course, different, but the EAW physics model (universe) is the same.

I think that covers most of what I commonly get asked.

Good hunting!

Post Script

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

[SimHQ](http://www.simhq.com/) is the official host of STK/EAW. The latest version may always be found at: <http://www.simhq.com/>. (STK/EAW has been removed from the Combatsim site.)

You may email the author at: stkeaw@home.com.