PILOTS HANDBOOK

EVASIVE ACTION

DUEL FOR THE SKY

EVASIVE ACTION

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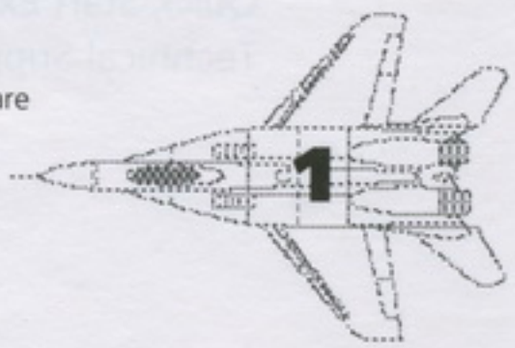


EVASIVE ACTION

CONTENTS

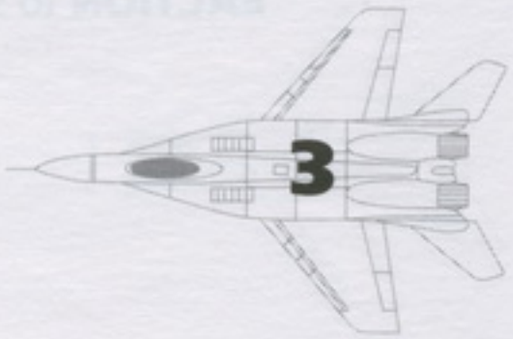
Introduction

Evasive Action - Duel for the Sky deals with the highly skilled and deadly art of aerial combat, affectionately known as *"Dogfighting"*. You are presented with the choice of four different aircraft-versus-aircraft scenarios encompassing four generations of fighters, from the early days of the Triplane through to spaceships of the 21st Century and beyond, where outer space is the venue for your do or die objective. Evasive Action represents the classic dogfight drama between two pilots in an exciting player-versus-player game.

The aim of the game is for you to enjoy all the elements of a great shoot-em-up, hence the program has been designed as a game rather than a flight simulation. With this in mind the need to remember 101 different keyboard controls normally associated with flight related software has been eliminated, so you can keep your eyes on the target and not on the key-board.

The next few pages have been designed to get you airborne quickly and easily and in the shortest possible space of time. Please take a few minutes to read them as they contain important information regarding the setup and use of Evasive Action.

We sincerely hope you enjoy playing Evasive Action for many months to come, and that you gain as much pleasure from playing the game as we had designing and programming it. Don't forget - "Watch your six".



HARDWARE REQUIREMENTS

Because Evasive Action has been designed to operate on most modern IBM PC and 100% Compatible machines a high specification machine is not required (although as with all software the performance will increase in line with machine capability). You will need a colour VGA or SVGA card and the game must be installed on your hard drive. Disk caching software (such as SMARTDRV™) is recommended as it will speed up disk access operations. Items such as joysticks, joystick splitters and modems are not essential but may enhance your game depending on the mode you wish to operate in. For last minute information on machine requirements, please take a look at the README file on disk 1:

Insert disk 1 into your floppy drive (**A:** or **B:**), and from the **A:>** or **B:>** prompt type **TYPE README.TXT -** the information will be displayed on screen. (For more information on viewing text files please refer to your operating system manuals).

INSTALLATION

It is strongly recommended that before installing this game you make backup copies of the disks and store the originals in a safe place. Please refer to your operating system manuals for instructions on how to make backup copies of diskettes.

Insert disk 1 into your floppy drive (**A:** or **B:**), and from the **A:>** or **B:>** prompt type **INSTALL** - the program will begin to install the software onto your Hard Drive. You will be prompted every few minutes to change the disks. When the installation is completed, you simply change to the newly created **EACTION** directory on your Hard Drive and type **EACTION** to start the game.

USING THE PROGRAM

The first time that you execute Evasive Action you will be prompted to set the parameters for the game by following a simple step by step procedure. The selection process uses a series of "Buttons" to enable you to make your choices; this procedure need only be done once. To make your selection you can do any one of the following :

- ➡ Repeatedly press the spacebar until the desired button is highlighted and press return.
- ➡ Use the mouse to point and click on the button you require.
- ➡ Press the highlighted letter of the corresponding button you require.

GAME SET-UP

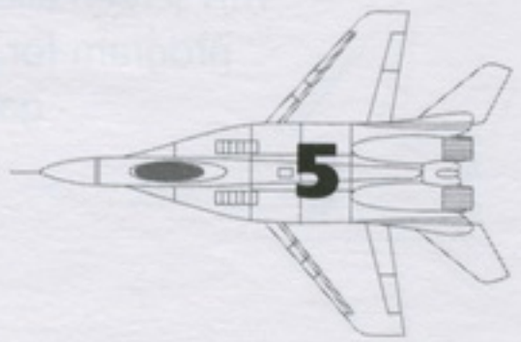
There are three modes of play available to you in Evasive Action:

1. **Single Player Mode**
2. **Two Player Split-Screen Mode**
3. **Two Player Datalink Mode**

For all modes of play see the Flight Control section for details on how to control your aircraft.

SINGLE PLAYER MODE

The single player mode is designed for combat against a computer controlled opponent.



TWO PLAYER SPLIT-SCREEN MODE

In most ways the Two Player Split-screen mode operates exactly like the one player mode. The main difference is that your opponent is human, therefore both players share a single screen. For keyboard control we have split the keyboard; the left-hand player uses the main portion of the keyboard while the second player uses the keys around the numeric keypad. Alternatively one or both players can use a joystick* - most important game functions can be accessed from the joystick alone, however the keyboard is used occasionally.

**For two player joystick control, you will either need a gamecard with two joystick ports or a suitable joystick splitter.*

DATALINK MODE

Datalink mode is for linking two remote computers together either by a direct serial link (Null Modem Cable) or via a Modem using a telephone line. If the two computers are linked at the time of starting the program, the software will automatically detect the cable link and give you the "Link" option in the game set-up screen; if you are using a modem you will see the "Modem" option button instead. The major advantage of Datalink play is that each player has a full-screen view of the action and can use their own computer to control their game.

HARDWARE SET-UP SCREEN

Evasive Action needs to know how you have your computer hardware set up. This screen allows you to configure the program for your particular computer; for instance you can tell the game which serial port you will use for linking to another computer. The screen will appear with a list of default

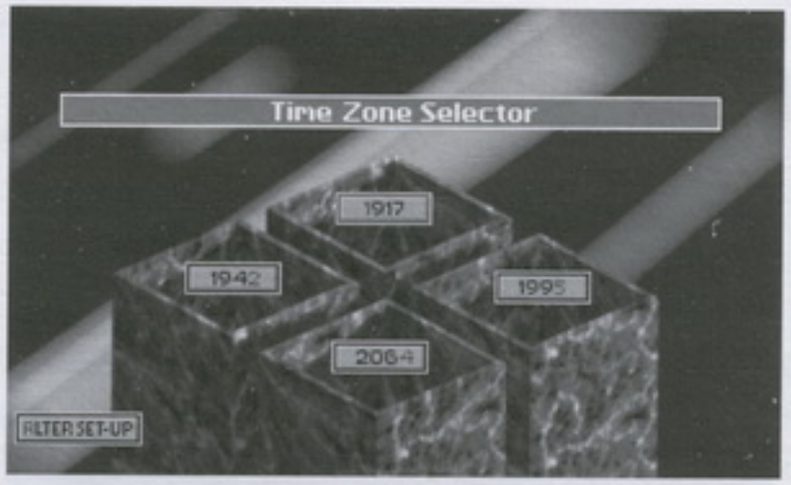
settings. Use the on-screen buttons to alter the settings to match your computer. If you make a mistake you can always come back to this screen to change things again.

- Main Player Yoke Device - The type of control you want to use to control the flight of the aircraft in the game.
- Second Player Yoke Device - If you plan to use the two player split-screen mode the second player will need a yoke of some kind too.
- Serial Port (for cable-link) - If you plan to link two computers together, use this option to select which serial port you will connect the cable to.
- Modem Port - Use this option to tell the game which COM port the modem is using.

When you are happy with the list of hardware options press the "ACCEPT" button to get back to the game. If you picked a joystick as a yoke you will be asked to go through a simple calibration procedure before moving on to the game.

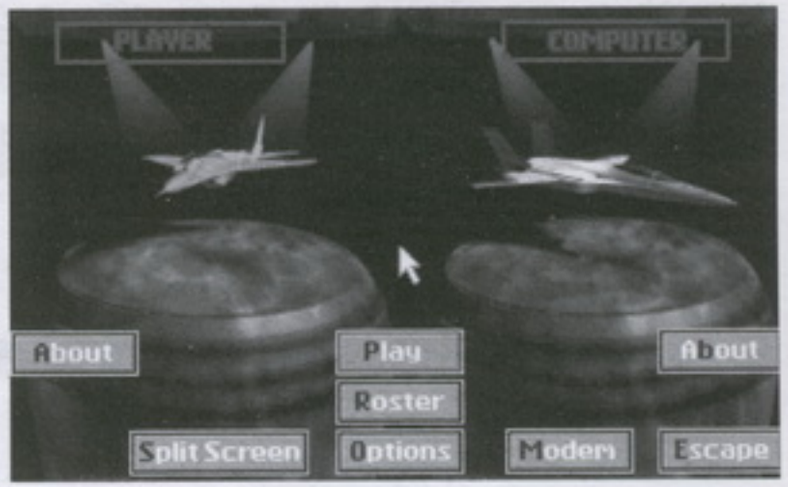
SCENARIO (TIME ZONE) SELECTOR

This screen enables you to choose the time zone that you wish to operate within, as well as set up the basic parameters of the game. You will notice that there are four different time zones to choose from: 1917, 1942, 1995 and 2064.



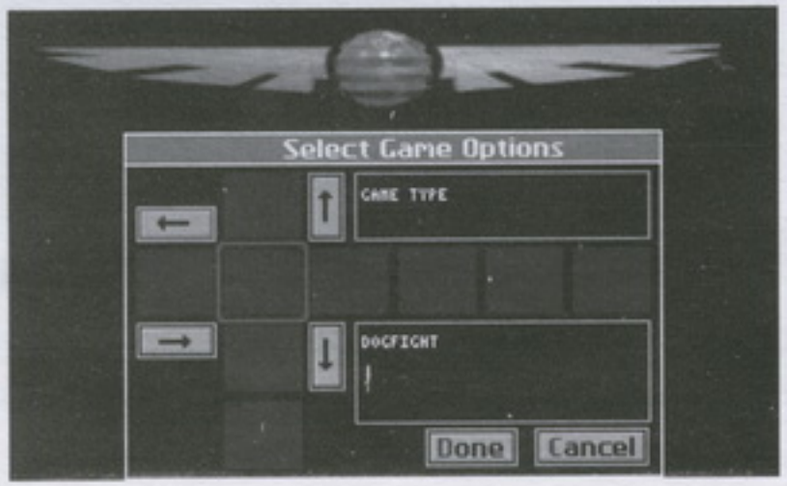
SUMMARY SCREEN

The summary screen is the second access panel of the game; you will see that there are 3D representations of the aircraft that are available in the particular Time Zone that you have chosen. From the summary screen you can select the following:



1. **Options**
2. **Roster**
3. **Single Player / Split-Screen Mode**
4. **Modem, Link and Unlink**
5. **Modem Screen**
6. **Play**

OPTIONS SCREEN



The options screen allows you to choose the game type of your choice. There are five main groups each with individual sub-settings:

- ➡ **GAME TYPE**
- ➡ **PLAYER AIRCRAFT**
- ➡ **OPPONENT AIRCRAFT**
- ➡ **COMPETITION STRUCTURE**
- ➡ **CHANGE AIRCRAFT CHARACTERISTICS**
- ➡ **OTHER OPTIONS**

Game Type:

There are three choices available here: Dogfight, Air Race and Attacker. In all of these game types there are common features including Friendly Bases, Hostile Bases, Stunts and Ground Targets. These features will work differently according to the game type chosen; you will be briefed prior to actually playing the game what the rules of engagement are. The following is a guideline of the varying parameters these objects employ according to the game type chosen:

Dogfight:

This game is a duel to the end with the option of utilising some of the features we have mentioned above; for example completing a stunt successfully will re-arm your aircraft, touching your undercarriage on a friendly base's runway will partially repair any damage to your aircraft, a complete touchdown will completely repair your plane. If you destroy any of the targets of opportunity you will be rewarded with bonus points.

Air Race:

Air Race is a real challenge of your flying capability as you will have to negotiate various stunts at speed. In this competition shooting your enemy will not kill him, it will only paralyse him momentarily, enabling you to catch up or overtake him. There are also various targets to destroy for bonuses.

Attacker:

Here we have the classic "Cat & Mouse" situation. One player is the aggressor for a period of time, his objective is to tag the other player by scoring a hit with a weapon. The roles are then reversed, with the aggressor becoming the defender and vice-versa. This is a great game with school playground type rules, you are "it" until you are either "tagged" with a weapon or the time runs out and you are forced to change roles.

Player Aircraft:

This allows you to choose which of the available aircraft you wish to fly. The choices will vary according to the time zone selected.

Opponent Aircraft:

Choose which aircraft your enemy will be flying. Once again the choice will vary according to the time zone selected.

Competition Structure:

Here you decide whether you want to have a Single Match, Best of 3 or Best of 5.

Change Aircraft Characteristics:

The aircraft in Evasive Action are modelled on their real life counterparts. You can, however, customise their performance within certain boundaries. For example, you can choose to make your aircraft faster but the manoeuvrability will suffer. Similarly, if you choose to be more manoeuvrable your speed will suffer. These options make for exciting combat between dissimilar aircraft.

Other Options:

This is where you decide how the game is won, for example either as a result of first blood or when the other pilot is killed.

ROSTER SCREEN

When playing Evasive Action you might want to make a permanent record of your victories. The roster screen lets you do this as well as letting you pick your opponent. You are not forced to use the Roster, but you may find it adds to your enjoyment of the game. This screen acts like a filing cabinet and shows the list of stored players, each with his own file which holds a set of combat statistics. You can create new files

for yourself and your friends to permanently store your Evasive Action performance statistics; you can also delete them if they get too embarrassing! As well as holding the files of the players, the roster screen also shows the files of the opponent pilots; wickedly clever computer programs which actually fly the enemy aircraft in single player mode.
A unique feature of the game is its ability to create an opponent program based on the statistics stored in a human player file. This way you can practice against a friend who doesn't even know he is playing the game!

MODE SELECT

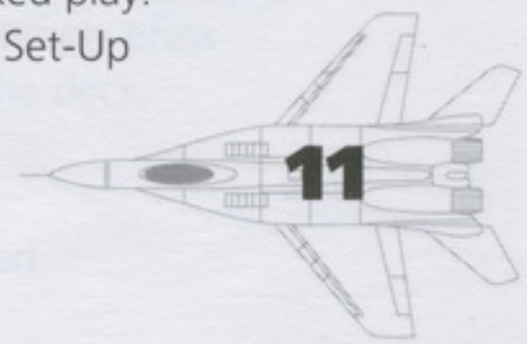
SINGLE PLAYER / SPLIT-SCREEN MODE

By selecting this button you can toggle between the Single Player and Split-Screen mode. You only need to select the Split-Screen mode if there are two players using the same computer.

DATALINK MODE

Modem Link Button

On the main summary screen is a button used for establishing linked play with another computer. If two properly configured machines, both running Evasive Action, are linked together by a null-modem serial cable the button appears marked with the work "LINK". If the link is not set up correctly or if the other computer is not running Evasive Action the button will read "MODEM". If you are using a cable, pressing "LINK" will take you into a version of the summary screen for linked play. If you are using a modem you need to go through the "MODEM" screen to get to linked play.
Remember that Evasive Action needs to be told which serial port is being used. Look at the Hardware Set-Up section earlier in this manual for details.



Linked Play

This section applies if you are playing with two computers linked either by a serial cable or a modem. The program should stay in linked mode until you decide to unlink; if there should be some problem with the hardware then the software will break the link automatically (this only happens after the program has repeatedly tried to re-establish contact and still fails). Some computers run faster than others; this is fine as Evasive Action is tolerant of linking computers together which are running at different rates. Every effort has been made to make linked play as seamless as possible and the time lag associated with many linked programs has been eliminated. Information exchanged between the two machines is checked for accuracy - should data be lost or altered by a noisy line you'll see a "bad-packet" on-screen message. This means the connection is having a few problems. If you see this message you might try ending the game and starting again.
N.B. You will also notice that the options screen and the roster screen operate in a slightly different way to take account of linked mode.

PLAY

This button needs no introduction as it speaks for itself - pressing it starts the game!

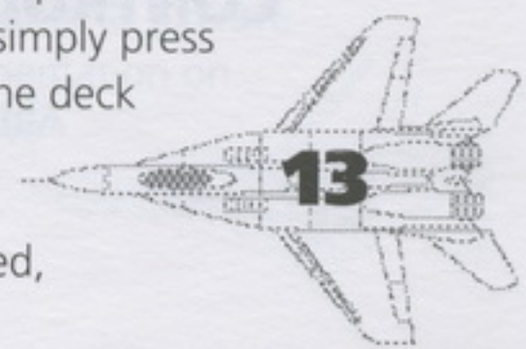
COMBAT SYSTEMS

During this section we will discuss five important features which form a vital part of the control of your aircraft and its on-board systems.

- **SYSTEM MONITOR**
- **LOCATOR SCREEN**
- **NARRATIVE SEQUENCES**
- **COCKPIT AND INSTRUMENTS**
- **"ACTION" KEY**
- **"SELECTOR" KEY**
- **EVASIVE ACTION GAMES**
- **USING WEAPONS**

SYSTEM MONITOR

This system enables you to have 2 key control of the game, as opposed to other flight related software where you would need to learn and remember dozens of keystroke sequences. In the cockpit of your aircraft on your right hand side is the System Monitor, this is where you will be able to view all the on-board systems available to you during your flight (the features that will be displayed will vary according to the aircraft type and the time zone being used). For the benefit of this explanation we will base the examples on the 1995 time zone. The system monitor is there to show the actions that are current, for example Launch, Raise Gear, Pickle Target, Missile, Cannon, Damage and Flare. These examples can be toggled by using the "SELECTOR" key, which we will explain later. To action any of the systems, you simply press the "ACTION" key which will also be explained later. For example in 1995 you begin the mission on the deck of an aircraft carrier and the system monitor will show the "Launch" action flashing on and off - pressing the "ACTION" key will launch your aircraft. Next you will see the "Raise Gear" action flashing on and off, once again press the "ACTION" key and the undercarriage of your aircraft will be raised, and so on.



LOCATOR SCREEN

The locator screen appears on the bottom left hand of your monitor when you are using the in-cockpit view. Its real purpose is to keep an eye on your opponent, although it serves one or two other purposes. Learning to make good use of the locator screen is of major tactical importance because it will help you to find and watch the enemy plane.
The locator has several modes. By default it shows a close-up view of the enemy plane. This is the most useful mode because you can see exactly what the other guy is doing. If you look closely at the locator screen you'll also see a 3D arrow. This arrow points in the direction to your opponent relative to your aircraft, for example if the arrow is pointing to the right then the enemy plane is to your right. The arrow moves as your aircraft turns. If the arrow is pointing backwards, out of the screen, then watch it - your opponent is behind you! If the arrow is pointing forwards into the screen that is where you want him - dead ahead.
If you have a slower computer or if you find it hard to see the arrow, press the V key. This toggles the arrow to fill the locator screen, however we lose the close-up view of the enemy. Each time the other aircraft does anything interesting, like firing off a missile for instance, the locator screen will cut to a close-up view showing you precisely what the other guy is doing. To improve game performance, in split-screen mode the locator screen remains in arrow-mode all the time. If you want to know what your opponent is doing you can always look at his half of the screen! In Datalink mode, either using a cable or a modem the locator screen operates as normal, letting you see your opponents actions instantly even if your opponent is hundreds of miles away.
The locator screen is such a useful feature for finding your enemy that its function has been extended to locate other game features. By pressing the TAB key the locator will help you find nearby targets, stunts and friendly bases.

CONTROLLING VIEWS

Although the locator screen goes some way to viewing potential enemies and targets, other perspectives on the game action are important. We have made a selection of game views available by using just

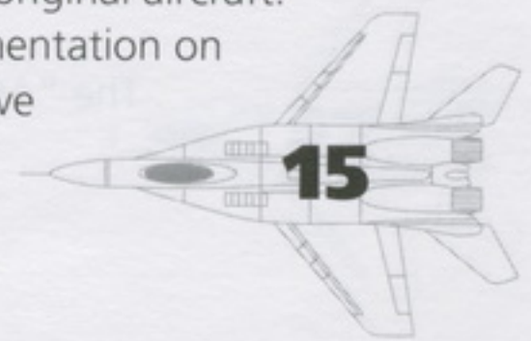
two buttons; F1 and F2. F1 puts you in the cockpit of your aircraft. This is the most useful view of all and is therefore the most accessible. Pressing the F2 key gives you a new view on the action. There are several views available including external views of your aircraft and even an in-cockpit perspective from your enemy's point-of view! Press F2 repeatedly until you get the desired view, and press F1 to return to your own cockpit.
When looking from the enemy's view, instead of locator and system displays you have a mini view from your aircraft (so that you don't fly into something) and a view of the enemy's yoke. This was included by the programmer to prove that the computer adversaries really are flying the planes. Once you have selected a view you can look around too, using the cursor arrow keys. For instance, when looking at an external view the cursor arrow keys move the viewpoint around the aircraft.

NARRATIVE SEQUENCES

In 3D games it is often very difficult to interpret what is actually happening. For instance, when the undercarriage is raised the only indication of the event is often a tiny on-screen indicator changing colour. When you are hit by either guns or missiles, the first the player knows about it is when he is hit! Evasive Action avoids this frustrating lack of clarity by employing narrative screens. When something important is taking place, the program will cut away from the user selected view to reveal an important event taking place - for example when you raise your undercarriage you will see the full screen view (Narrative) of your gear being raised and stowed.

COCKPIT AND INSTRUMENTS

When you enter the main game section of Evasive Action you will see authentic reproductions of the original aircraft. The cockpit layouts have been altered as little as possible to fit the computer screen and while instrumentation on the cockpits has been simplified, all vital instrumentation has been reproduced. In addition to the native instrumentation, all Evasive Action cockpits have an additional Locator Screen and a System Screen which are vital for playing the game.



1917 Scenario Instruments

The cockpits of the Sopwith Camel and the Fokker feature a compass, an altimeter and a speed indicator. Using the system screen it is also possible to call up an ammunition indicator and a damage display.
In reality World War 1 aircraft often had little or no instruments at all. They certainly did not have a damage display! We make no apology for adding these instruments. The computer game player has less feedback than his real-life pilot counterpart.

1942 Scenario Instruments

Both planes feature compass, altimeter speed indicators and a rate-of-climb. Some instruments have been enhanced with digital indicators to make them easier to read.

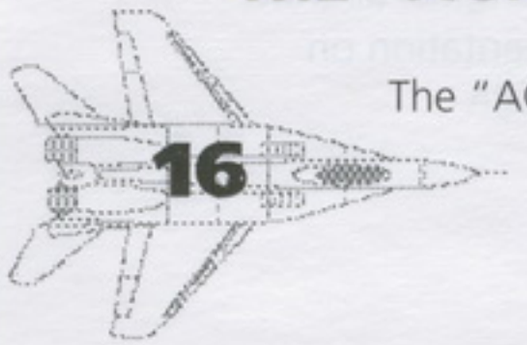
1995 Scenario Instruments

The main cockpit panel features a radar screen. Flying and combat information is shown via a head-up display. The radar screen uses colour-coded shapes to identify important ground features, and changes its detail level automatically.

2064 Scenario Instruments

The main cockpit area of both spacecraft prominently feature a scanner device which operates in a similar way to a radar, and the same colour conventions are used as in the 1995 Radar device. The entire transparent canopy of the spacecraft acts as one big head-up display, with three-dimensional images projected onto the canopy to assist targeting and navigation.

THE "ACTION" KEY



The "ACTION" key as we affectionately refer to it is simply the way in which you engage the systems available to you within the System Monitor. Depending on your choice of Yoke the "ACTION" key will either be a press of the fire button on your joystick or the Enter key on your keyboard (Yoke keys are defined in full on page 18).

THE "SELECTOR" KEY

The "Selector" key is the way you toggle through the systems available on your System Monitor. Once again this "Selector" key will differ according to the Yoke system employed.

FLIGHT CONTROL

Control of the aircraft in combat is designed to keep keyboard use to a minimum. Ideally players should be able to focus on the screen and keep their eyes on the target and their hands on the joystick (if fitted). However Evasive Action does support keyboard play only, even when there are two players sharing the same computer (Split-Screen Mode). In summary, most functions are available through the joystick, however some special controls require the player to use the keys.

To control the view from the aircraft, the locator screen and the throttle, direct use of the keyboard is required. These keys are defined in the table on the following page.

YOKE CONTROL KEYS

Function	Joystick 1 & 2	Main Keyboard	Keypad
"Action" Selected Menu Option	Fire Button 1	Enter	Keypad "0"
"Select" Next Menu Option	Fire Button 2	Space	Keypad "+"
Pitch Forward (Dive)	Stick Forward	@	Keypad 8
Pitch Back (Climb)	Stick Back	/	Keypad 2
Left Turn (Port)	Stick Left	Z	Keypad 4
Right Turn (Starboard)	Stick Right	X	Keypad 6

GAME CONTROL KEYS

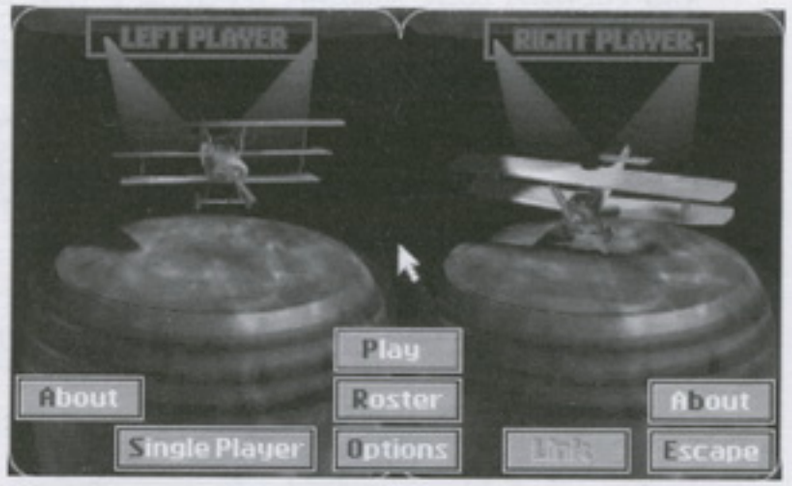
Function	Player 1 Joystick & Keyboard	Player 2 Joystick & Keyboard
Forward View	"F1" Function Key	Num Lock
Threat View	"F2" Function Key	Keypad "/"
Throttle Up	"+" Plus Key	Page Up
Throttle Down	"-" Minus Key	Page Down
Toggle Locator Subject	"TAB" Key	Keypad "*"
Close up view of Locator	"V" Key	Keypad "."

EXIT KEYS

"ESC"	Abort Mission
"F10"	Function KeyFast exit to DOS

SCENARIOS

1917 Scenario - World War One
Sopwith Camel versus Fokker Dr.1 Triplane



The Camel was the first British type to carry twin Vickers guns; their breeches were enclosed in a hump which gave the Camel its name. In the hands of an experienced pilot the Camel could outmanoeuvre any contemporary airplane, with the possible exception of the Fokker Triplane. From July 1917, when it reached the Front, until Armistice, the Camel accounted for no less than 1,294 enemy machines. To the beginner the Camel too often displayed the unpleasant side of its character. Its amazing agility was partly due to the torque effect of its rotary engine, on right-hand turns the nose tended to drop; on left-hand turns to rise. A tight turn, uncorrected, was liable to finish in a fatal spin. The Clerget rotary would choke if the mixture were not weakened just after take-off; the machine would then stall and spin into the ground. The casualty rates among Camel pupils was very high.

The Fokker Triplane, designed as a response to the Sopwith Triplane, carried twin Spandau guns which could be fired independently or simultaneously, and were synchronised to fire through the airscrew. The Triplane had an excellent rate of climb and could match the Camel for manoeuvrability, merits which outweighed its lack of speed at combat height. The Dr.1 had a large rudder and no vertical stabiliser which enabled it to make tight turns without banking the wings. In late October 1917, however, Lieutenants Gontermann and Pastor were killed when their Dr.1s broke up in the air and the Triplane was withdrawn from operations. It was re-issued later with strengthened wings but the Triplane never fully recovered from this setback. These problems did mean, though, that the Fokker Dr.1 could not out-dive or out-run its opponent.

EVASIVE ACTION

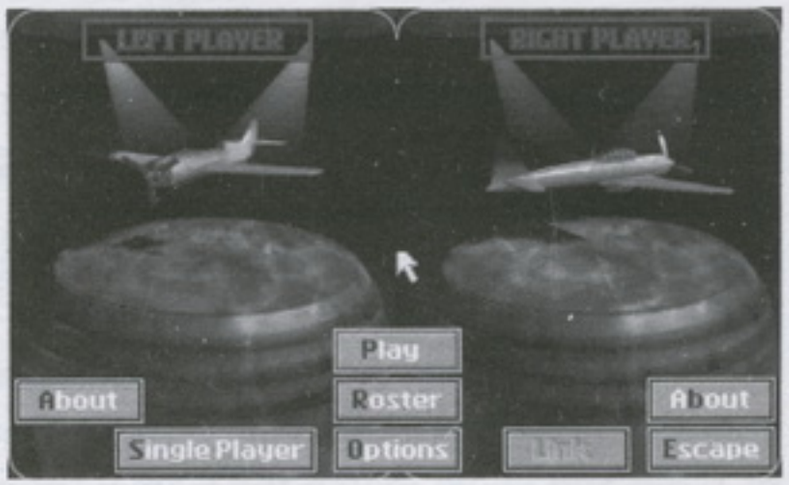
World War 1, more than any other conflict, relied on pilot skill and endeavour. Major James T. B. McCudden described his procedure:

"My system was always to attack the enemy at his disadvantage if possible, and if I were attacked at my disadvantage I usually broke off combat, for in my opinion the Germans in the air must be beaten at their own game, which is cunning. I think that the correct way to wage war is to down as many as possible of the enemy at the least risk, expense and casualties to one's own side."

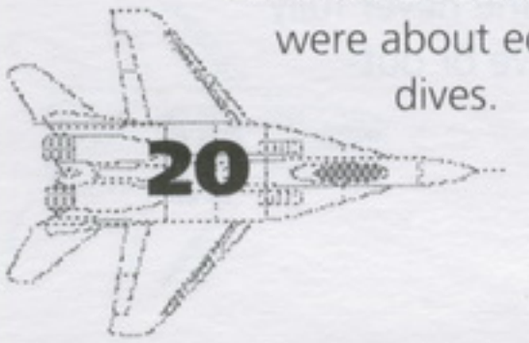
and Baron Manfred von Richthofen:

"Everything in the air that is beneath me, especially if it is a one seater...is lost, for it cannot shoot to the rear."

1942 Scenario - World War Two
Mitsubishi A6M2 Zero versus Grumman F6F-5 Hellcat



The Hellcat was much faster than the Zero at all altitudes. Up to around 10,000 the Hellcat was around 40mph faster than the Zero. From there on up to around 30,000 the Hellcat was faster than the Zero by as much as 66mph. Top speeds attained were 409 mph at 21,600 feet for the Hellcat and 335 mph at 18,000 for the Zero. In a climb the Zero climbed about 600ft/min better than the Hellcat up to 9,000. After that the advantage fell off gradually until the two aircraft were about equal at 14,000 feet. Above that figure the Hellcat had the advantage, varying from 500ft/min upwards at 22,000 feet to about 250ft/min better at 30,000ft. The best climbing speeds of the Hellcat and the Zero were found to be 152 and 123mph respectively. In an initial dive, the accelerations of the Zero and the Hellcat were about equal, after which the Hellcat was far superior. The Hellcat was slightly superior in zooms and after dives.



The Zero was greatly superior in a turn to the Hellcat, especially in slow speed turns at low and medium altitudes. Its advantage decreased to about parity at 30,000 feet. In a slow speed turn the Zero could gain one turn in three and one-half at 10,000 feet. The rate of roll of the Zero was about equal to the Hellcat under 235mph and inferior above that speed, due to the high control forces. The manoeuvrability of the Zero was remarkable at speeds below about 205mph, being far superior to that of the Hellcat. Its superiority, however, diminishes with increased speed, due to its high control forces and the Hellcat has the advantage at speeds above 235 mph. Pilot visibility was considered better in the Zero than the Hellcat in all respects the rear vision being good due to the bubble canopy and the complete absence of armour behind the pilot's head. There was no rear vision mirror installed in the Zero. The small gunsight did not interfere with forward vision.

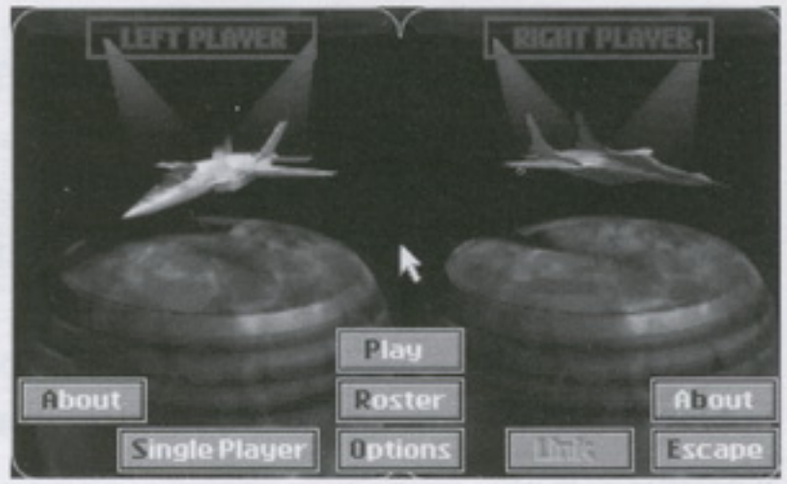
The facts show, therefore, that Hellcat pilots should NOT dog-fight with a Zero. Hellcats should not try to follow a loop or half-roll with a pull-through. Hellcat pilots should follow this dictum from Luftwaffe ace, Lt. Gen. Adolf Galland:

"The best approach to a battle...is surprise, make your attack and disappear and start a new attack. Don't get engaged and make it a dogfight."

When attacking with a Hellcat you should use your superior power and high speed performance you may have and attempt to use that altitude and speed to stage attacks on the Zero. However, once the Hellcat has committed itself to the attack it shouldn't hang around to admire the view! Get the hell out of there and grab that altitude again ready for the next attack. To evade a Zero on your tail, roll and dive away into a high speed turn. As the Zero pilot? The advice is simple, try to coax the Hellcat into a slow turn, get him down to your altitude and then out-manoeuvre him.

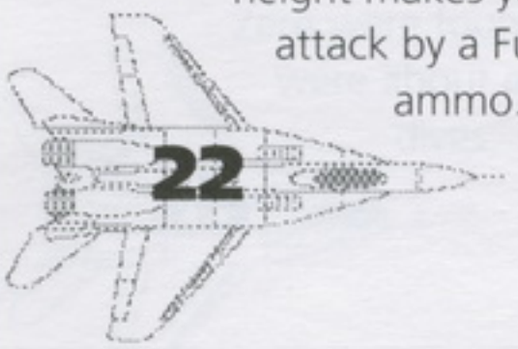
EVASIVE ACTION

1995 Scenario
F-18 Hornet versus MiG-29 Fulcrum



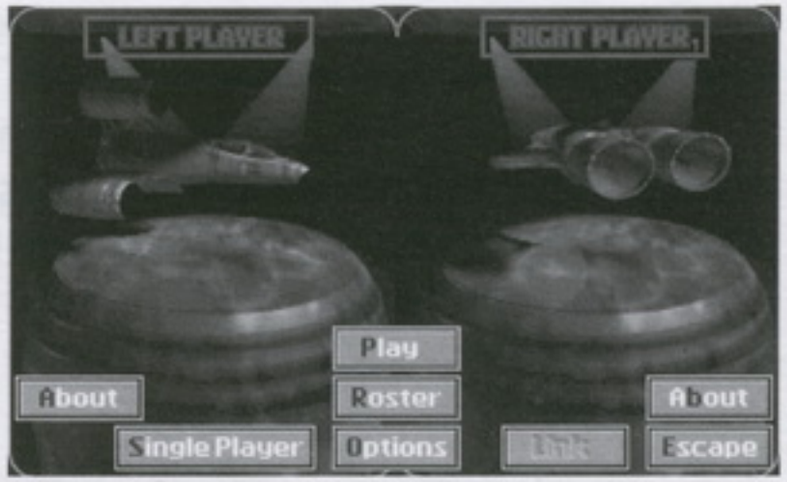
The MiG-29 Fulcrum is an intriguing aircraft as it has some unique abilities regarding its aerodynamic spectrum and the weapons it carries. For example, the Fulcrum is able to sustain a high angle of attack whilst in flight. Tests upon the aircraft show that angles up to 80 degrees are possible. This manoeuvre does allow the aircraft to quickly point at an opposing aircraft to attain a gun strafe, for example, before resuming its standard course. The most famous manoeuvre that the MiG-29 can offer is the 'Pugachev's Cobra' in which the nose is pulled back and up to such an extent that the aircraft's nose can even cross the perpendicular. The MiG's forward motion quickly comes to a halt, too. This manoeuvre, although not used in combat (no-one's heard of it, at any rate) might lead to an opponent over-shooting. The Fulcrum would then simply drop the nose back down and open up the throttle to prevent a stall. In fact, most other aircraft would struggle to maintain flight from this precarious position. The MiG-29 doesn't have too much of a problem, though. Regarding weapons, the MiG uses infra-red tracking to lock onto a target without using a radar. Hence the opponent has no warning that the MiG has achieved lock-on. The gun suffers from only carrying 150 rounds, however it is very accurate. Five rounds are fired in one burst.

The F-18's best chance of killing a Fulcrum at close quarters is a sneak attack from behind which gives either the F-18's guns a chance to smear the rear fuselage or missiles a chance to grip onto the hot engines. Traditionally, an attack from height was favoured. With missile attacks secrecy and stealth are more favoured and height advantage less so. Gaining height makes you more visible to the enemy's radar. A low and from behind attack is more preferable. A head-on attack by a Fulcrum is best met by an anti-radar missile. A gun hit in this posture is very unlikely, so save your ammo. Remember, too, that the Infra-red (IR) signature of the F-18's engines is like a beacon to the Fulcrum's heat-seeking missiles. The more throttle you apply, the better the IR target you become.



So, flying as the F-18, you must learn to make the most of the speed that is available. Thus, if speed is required then avoid high-g turns. Due to the lack of warning in Fulcrum IR attacks the greatest defence a F-18 has on these occasions is the Eyeball Mk.1. As IR missiles are short range the Fulcrum will attempt to sneak up behind you without you gaining a radar signature. Of course, once the IR attack is spotted you are able to hit the Electronic Counter-Measures button or drop flares. However, spotting the MiG is the first task.

2064 Scenario
Sonishi Laserman versus Aoun Leatherback



As both craft use atmosphere and outer space as their envelopes of flight there are different types of tactics that can and should be used by both types. For example, the Sonishi Laserman is rather more manoeuvrable in outer space where it can operate with freedom. Within an atmosphere, however, the manoeuvrability of the Laserman drops dramatically. In fact, the steering proves to be difficult and, thus, the Laserman fails to react quickly to the changing situation of a dogfight.

The Aoun Leatherback, on the other hand, has a different set of pros and cons. For example, the Leatherback has a greater degree of acceleration due to its twin Gravity Distortion Fusion Converters which produce a massive 158.8 tonnes of thrust compared to the Laserman's 72 tonnes of thrust. Hence the speed can be racked up very quickly. However, because the Leatherback has a mass of 55 tonnes it does tend to go ballistic during high speeds. The Laserman only has 31.2 tonnes of mass to control. Hence the Laserman is rather more manoeuvrable at low speeds than the Leatherback.

The Leatherback is best advised to adopt hit and run tactics striking the Laserman on the zoom. During atmospheric flight, the Aoun Leatherback displays very good manoeuvrability - similar, in

fact, to a dedicated atmosphere craft. It is in the interest of the Leatherback to coax or trap the Laserman into the atmosphere. Here, the Leatherback can utilise its greater degree of atmospheric manoeuvrability to down the Laserman. The Leatherback's high rotation rate during high speeds can be of use in gaining minor positional advantages for the guns during a strafing pass. This extra rotation speed is handy because the forward laser cannons have a smaller degree kill-zone (around 24 degrees), unlike the Laserman which auto-steers to the target in the forward hemisphere. The Leatherback should also avoid getting caught in tight corners. Entering into an attack should only be undertaken if the pilot knows what escape route he is going to follow at the other side.

Energy management is paramount is combat for both aircraft. If speed is lost do to excessive manoeuvring then it is most likely that you will decide to use the thrusters to increase your speed. This is fine if the need is great. However, beware that using the thrusters makes your craft highly visible to any opponent some distance away. Hence, nurture you energy and try not to betray your position.

AIRCRAFT TECHNICAL SPECIFICATIONS

Sopwith F1 Camel

Engine:	130hp Clergot 9B rotary
Max. Speed:	115 mph
Wing Span:	28 ft
Length:	18 ft 9 ins
Climb Rate:	16 min's to 15000 ft
Ceiling:	19,000 ft
Endurance:	21/2 hr's.
Armament:	Two synchronised propeller locked Vickers machine-guns.
Total Built:	5400
Introduced:	June 1917

Fokker Dr.1 Triplane

Engine:	110hp Oberursel rotary.
Max. Speed:	103 mph
Wing Span:	23 ft 7 ins
Length:	18 ft 11 ins
Climb Rate:	3 min's to 3280 ft
Ceiling:	20,000 ft
Endurance:	90 min.
Armament:	Twin 7.92mm synchronised Spandau machine-guns.
Total Built:	320
Introduced:	August 1917

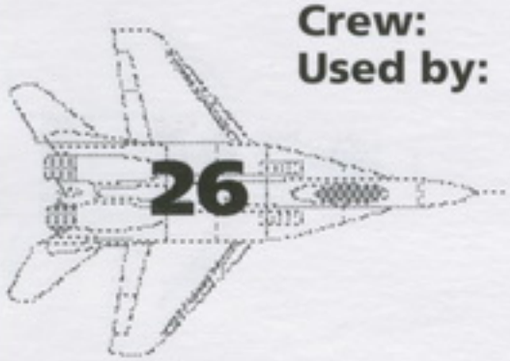
EVASIVE ACTION

Grumman Hellcat F6F-5

Engine:	2200hp Pratt & Whitney R-2800-10W Double Wasp 18 Cylinder 2 row water cooled radial.
Max. Speed:	376mph (605km/h) at 20,000 ft.
Wing Span:	42 ft 10 ins (13.05m)
Length:	33 ft 7 ins (10.2m)
Height:	13 ft 1 ins (3.99m)
Weight (Empty):	9042lbs (4,101kg)
Ceiling:	36,700 ft (11,185m)
Range:	1,090 miles (1,755km)
Armament:	2 x 20mm Cannons 400 rounds each (Wing-Mounted) 0.5 Under Wing attachments for six rockets Centre section pylons for 2,000lb. bombs.
Crew:	1
Used by:	United Kingdom (Royal Navy) United states of America (Navy & Marines).

Mitsubishi A6M5 Zero-Sen "Zeke"

Engine:	1130hp Nakajima NK1C Sakae 12, 14 cylinder 2 row air cooled radial, with individual exhaust stacks.
Max. Speed:	354 mph (570 km/h) at 20,000 ft.
Wing Span:	36 ft 1 ins (11.0m)
Length:	29 ft 9 ins (9.06m)
Height:	9 ft 8 ins (2.98m)
Weight (Empty):	3920lbs (1,778kg)
Ceiling:	37,500 ft (11,500m)
Range:	1,200 miles (1,920 km) with drop-tank
Armament:	2 x 20mm Type 99 Mk IV Cannons with belt fed 85 rounds per gun 2 x 7.7mm Cannon in fuselage. Plus 2 Wing-Racks for 132lb. (60kg) bombs.
Crew:	1
Used by:	Japan (Imperial Navy)



McDonnell-Douglas / Northrop F18 Hornet

Engine: 2 General Electric F404-GE-400 Augmented Turbo Fans, providing 32,000lbs of dry thrust.
Max. Speed: 1050kts (1.8 Mach).
Wing Span: 11.4296m (Wing Area 36.789 m2).
Length: 17.0703m.
Height: 4.6718m.
Weight (Empty): 12,700kg.
Ceiling: 49,999 ft (15,246m).
Range: 740 km.
Armament: 20mm Cannon 9 Weapon Pylons carrying various payloads including; AIM 9J Sidewinder rear aspect missile, Hughes AGM-65 Maverick Imaging Infra-Red (IIR) Guided Missile.
Radar Type: Medium range, High quality Doppler Radar.
Crew: 1
Used by: United States of America (Navy & Marines)

Mikoyan-Gurevich MiG-29 Fulcrum A

Engine: 2 Tumanskii R-33D Augmented Turbo Fans, providing 36,600lbs of dry thrust.
Max. Speed: 1260 Kt's (2.3 Mach).
Wing Span: 11.5m (Wing Area 36.789 m2).
Length: 17m.
Height: 4.5m.
Weight (Empty): 8,165kg.
Ceiling: 49,980 ft (15,240m).
Range: 650km.
Armament: 1 Multi-Barrel Cannon, 6 Weapon Pylons carrying various payloads including; AA-2 ATOLL rear aspect missile and AS-7 KERRY Radio Controlled Air to Surface Guided Missile.
Radar Type: Medium Range, Medium Quality Doppler Radar.
Crew: 1
Used by: The Commonwealth of Independent States (CIS), various Middle and Far Eastern Countries.

EVASIVE ACTION

Sonishi Laserman

Engine: Three 24.7 Tonne thrust swivel mounted Quadric Fusion Thrusters Single Gridspace steerage unit (Velocity Converter) Total effective thrust 72 Tonnes. 2.3 BGs max. acceleration.

Mass: 31.2 Tonnes (Fully Loaded)

Armament: 40 GJ Plasma Discharge Cannon (Rechargeable)
1.3 GW Steerable CO2 Laser with 65° Freedom (Rechargeable)
2/4 "Guppie" Cluster Missile Pod
2/4 Anti-Pursuit Mines

Endurance: 12.6 min's of sustained thrust.

Aoun Leatherback

Engine: Twin Gravity Distortion Fusion Converters motors giving a total of 158.8 Tonnes thrust.

Mass: 55 Tonnes (Fully Loaded)

Armament: 45 GJ Plasma Discharge Cannon (Rechargeable)
UVA Laser 24° Freedom (Rechargeable)
4 Ultra Smart "Teaser" Missile

Endurance: 10.3 min's of sustained thrust

USING WEAPONS

This section deals with the characteristics of the technical weaponry found on aircraft from 1995 to 2064, offering tips on use and tactics on avoidance.

F18 Hornet

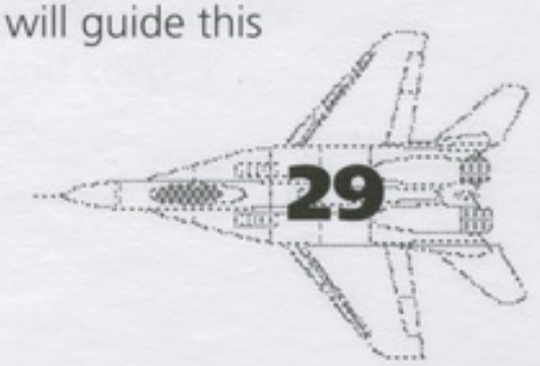
AIM 9J Sidewinder rear aspect missile: This weapon can only be used whilst you are behind the enemy, as it gains its signature from the heat of the enemy planes exhaust port. If you find yourself being chased by the AIM 9J use infra-red decoys in an attempt to fool the Sidewinder away from yourself, and keep the enemy in front of you.

Hughes AGM-65 Maverick IIR Guided Missile: Mavericks are simple to use Air-to-Ground, fire and forget missiles. All you need to do to use this weapon effectively is to get a target lock and fire, the missile itself will ensure that the target is hit.

MiG-29 Fulcrum

AA-2 ATOLL rear aspect missile: This weapon works on the same principal as the AIM 9J, it seeks from the rear.

AS-7 KERRY Radio controlled air to surface guided missile: This weapon needs to be constantly directed right up to the point of impact by means of keeping the target in your crosshairs. The Kerry is not as easy to use as the Maverick but it has a longer range. For the purpose of simplifying this weapons use the computer will guide this weapon home.



EVASIVE ACTION

Sonishi Laserman

1.3 GW Steerable CO2 Laser: This laser has a 65° forward kill zone, you only need to lock and fire and the laser will track the target within its zone.

Guppie Cluster Missile Pod: The Guppie is a fire and forget weapon that only requires you to nominate your target and press the fire button.

Anti Pursuit Mines: This weapon requires you to nominate your target and then fire, but the Anti Pursuit mine works in mysterious ways. It will be projected forward, then it will break to the rear of your ship, stop and arm itself. As it is a proximity mine, it will destroy anything - including your own ship - that gets too close.

Aoun Leatherback

UVA Laser: The UVA laser, although similar to the Sonishi's CO2 Laser, only has 24° kill zone.

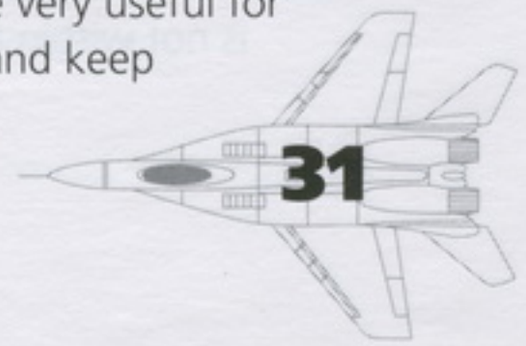
Teaser Missile: Unfortunately we are unable to give any details on this weapons characteristics as we have no intelligence on the Teaser at all.

DOGFIGHTING - THE ACE FACTOR

Evasive Action is a combat simulator that allows study of dissimilar aircraft over four time periods. By definition, dissimilar aircraft are those that differ by more than 10%. Differences occur in turn performance (how much G-force can an aircraft pull within a range of speeds to allow it to out-turn its opponent), speed, weight, pilot visibility, combat endurance (how long can that aircraft stay in the air), radar capability and so on.
Having a highly specified aircraft is all very well. However, the principle variable in determining just whose butt gets shot off is the pilot himself and his intimate knowledge of all aspects of relative performance and design, as well as familiarity with his weapons. Basically, if you know your own aircraft and your enemy's aircraft like the back of your hand then you have an enormous advantage over the enemy. Despite the popular misconception, air-to-air combat is a very `human' affair. Pilot's aren't kidding when they say that they strap on an aircraft. Never forget that technology is but a tool of the pilot.

Dissimilar combat is all about one pilot exploiting the opponent's most serious weaknesses while taking full advantage of his own fighter's greatest strengths. For example, what do you do if your aircraft is highly manoeuvrable (say, a Zero) but your opponent is more powerful and, hence, faster (say, a Hellcat)? You employ a system known, in some quarters, as Angles Tactics. The manoeuvrable aircraft (Zero) can get up close to the faster aircraft (Hellcat) by using Pure and Lead Pursuits (Figure 1). High and Low Yo-Yos (Figure 2) and Barrel-Roll attacks (Figure 3) also may be useful. On the other hand, if you are flying the faster, more powerful aircraft (Hellcat), your best option is to keep the fight to the horizontal plane. That is, keep the action hot whilst climbing and/or diving.

Nose-To-Nose Turns (Figure 4) make best use of turn radius potential and Lead Turns (Figure 5) can be very useful for immediate turn superiority. Hence, the faster, less manoeuvrable aircraft (Hellcat) will want to watch and keep clear of these manoeuvres. He'll also want to try to anticipate his opponent attempting to trap him into these manoeuvres. If this happens then it's time to break off and start again.



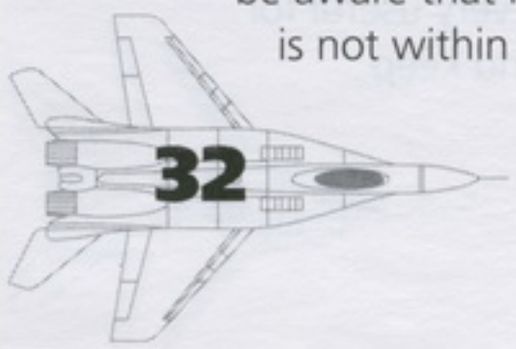
EVASIVE ACTION

The Hellcat would suffer by a Flat Scissors (Figure 6) since it suffers from both turn performance and minimum speed disadvantage. The Zero might also have some advantage in a Rolling Scissors (Figure 7) because of better slow-speed controllability - although not as great as the Flat Scissors. It is plain that the Hellcat should keep to what he knows best - high energy tactics - when engaging a highly manoeuvrable aircraft like a Zero.

A handy manoeuvre for the Hellcat who is on the defense is the Defensive Spiral (Figure 8). A Hellcat often can generate much greater drag than a Zero which can lead to a rapid vertical overshoot and a subsequent positional advantage for the Hellcat who can then blow the Zero out of the sky with its greater gun power. However, if this spiral cannot be initiated quickly then the Zero can use its superior low-speed turn performance to shallow out the spiral and regain the upper hand as the manoeuvre continues.

Throughout the fight, the pilot of the Zero can be somewhat less concerned with overshoots than he would be in the case of similar fighters, since the Hellcat's larger turn radius and higher speed make it more difficult for its pilot to gain advantage after an overshoot by the Zero. Gross vertical overshoots should still be avoided by the Zero, since they may allow the Hellcat a temporary advantage and, possibly, a snapshot after one of the Rolling Scissors. The Zero should resist climbing or diving when faced with a Hellcat to guard against zoom manoeuvres from the Hellcat. Greed is the Zero's greatest enemy. He should avoid trying to grab angles faster than the Zero's performance permits. Patience is the key. The Zero pilot must wait for the Hellcat to wear himself out, to dissipate the majority of his energy so that his flight becomes sluggish. Now, with the Zero's greater degree of manoeuvrability at low speeds, he can finish off the Hellcat at his leisure.

Again, though, the Hellcat must be aware that this is just what the Zero is wishing and wanting. Hence, the Hellcat must be aware that he must maintain a relatively high speed. Even if the situation becomes to look favourable, if the Zero is not within the gun-sight then it is safer to get out of there, gain more speed and live to fight another day.



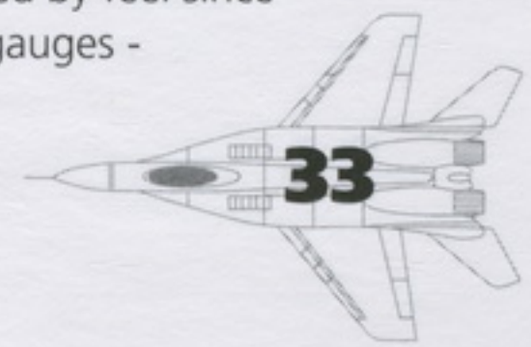
When two aircraft are more evenly matched then a pilot's cunning becomes more important and the dissimilar aspects of the aircraft's performance might be rather closer to the 10% figure.

Stepping back in time the two famous adversaries that epitomised dogfighting were the Sopwith Camel and the Fokker Triplane. As both aircraft are highly manoeuvrable pilots had to develop new tactics. For example, when flying at slow airspeeds the pilot may choose to push over the top of a vertical climb or to employ a `rudder reversal' at the peak of his zoom. Also called the `hammerhead turn', the latter manoeuvre cause the aircraft to rotate about its vertical axis, pivoting sideways from a nose-high to nose-low attitude. In most aircraft the rudder reversal is performed in an unloaded condition by applying full rudder in the direction the pilot wishes the nose to fall. If you ever get to an airshow, watch the aerobatic Pitts Specials or the Sukhois perform this manoeuvre. They tend to spill smoke whilst doing so to emphasis the action. The lazy tipping of the aircraft looks like the aircraft is balanced on its tail and is slowly tipping over to the side. This technique apparently was first used in combat by Max Immelmann, the famous World War 1 German flyer who was also one of the world's first fighter aces. One of Immelmann's favourite tactics was to make a high-speed diving attack on his victim, then pull up vertically, perform a rudder reversal and dive back down for another attack and so on, until the target was destroyed. This tactic so confounded the Allied opponents that they dubbed it the Immelmann Turn (Figure 9) and were convinced that it defied the laws of aerodynamics. Once it was figured out, the technique was widely copied by both sides. US ace, Air Vice Marshal, Jonnie Johnson explains, however, how when more powerful aircraft like the Camel came onto stream the manoeuvre could be a dangerous one if it wasn't timed properly:

> *"...for the lower pilot could climb after the Fokker and attack when it hung almost motionless in the vertical position, not under full control and presenting an easy shot."*

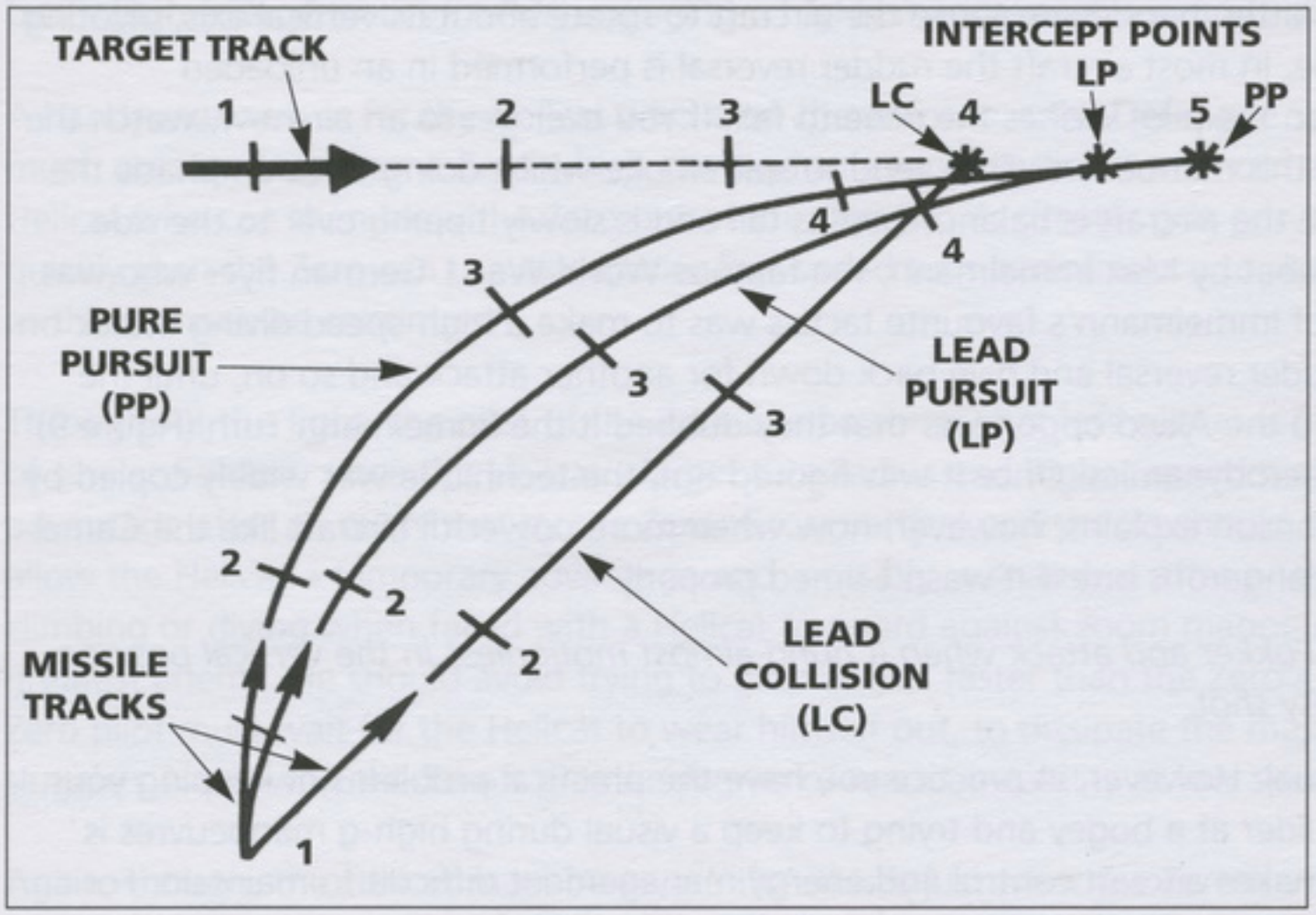
Of course, all of the above looks nice in a manual. However, in practice you have the practical problems of keeping your eye on your opponent. Looking over your shoulder at a bogey and trying to keep a visual during high-g manoeuvres is tough. Keeping visual under these conditions makes aircraft control and energy management difficult to maintain. For example, it's difficult to know whether your wings are level. Also, speed and altitude have to be judged by feel since the pilot may not be able to afford the luxury of actually taking his eyes off the bogey to look at the gauges - arduous and hazardous when you're fighting at low level.

Okay, Evasive Action is but a mere air combat simulation on a computer. However, I'll bet that you will experience that same combat pressure, especially when playing `human versus human'. Let's see how often you look at the gauges then!



DISSIMILAR COMBAT TACTICS

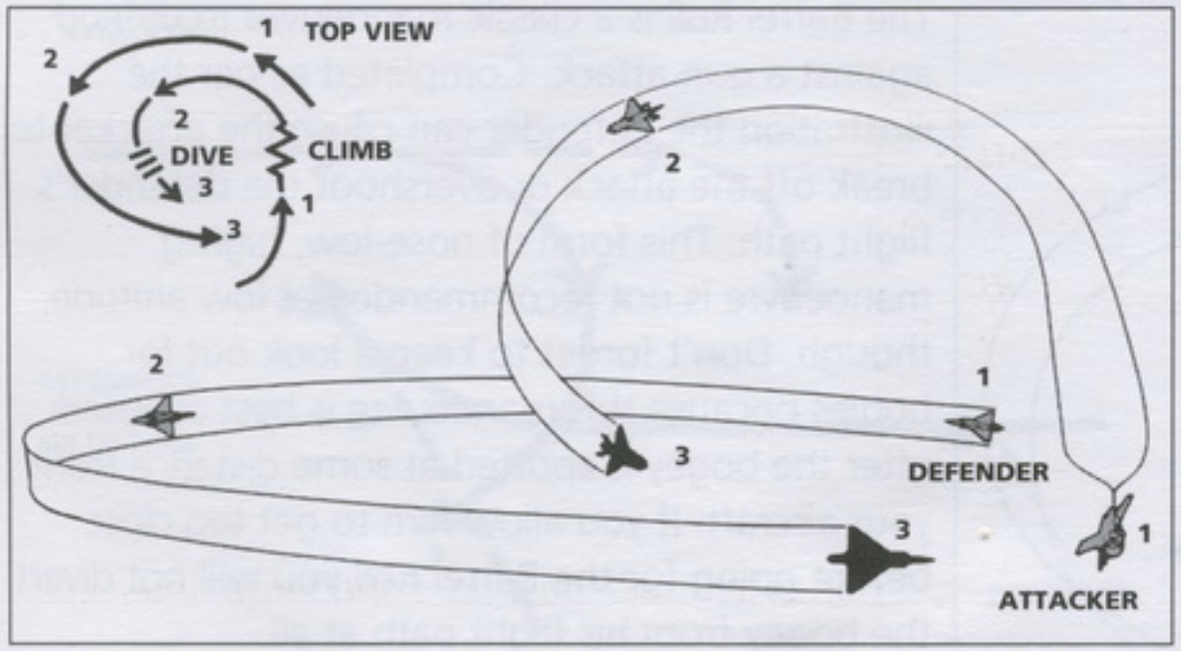
FIGURE 1: THE `LEAD' AND `PURE PURSUIT'



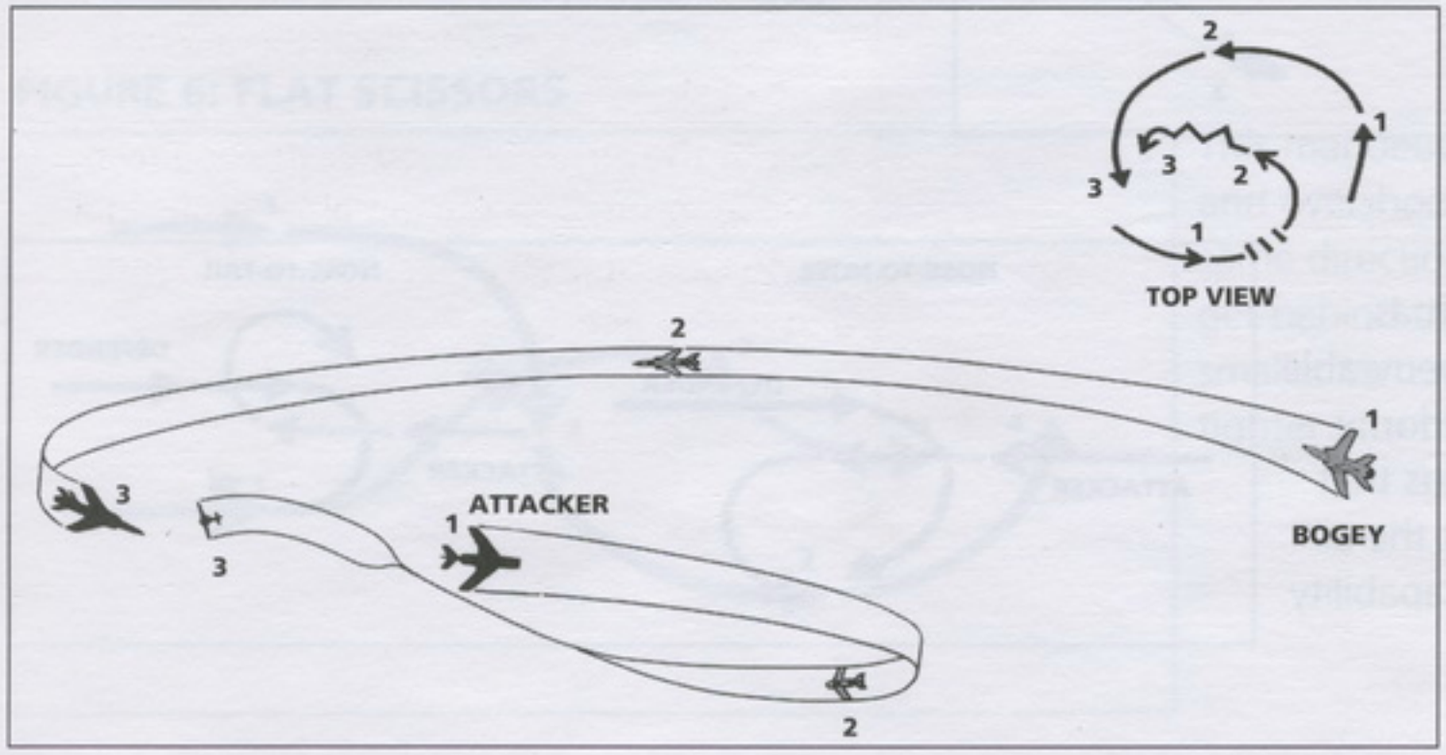
The Lead Pursuit is where the chasing aircraft keeps his nose firmly on the target aircraft at all times, generating a curved flight path that ends in a tail-chase with the target intercept at about point 5.

The Pure Pursuit results from the aircraft leading the aircraft somewhat, keeping the nose of the aircraft ahead of the enemy by a small amount. This pursuit also results in a tail-chase but it takes less time to do it - between 4 and 5.

FIGURE 2: HIGH AND LOW YO-YOS



The High Yo-Yo is handy for preventing overshoots and reducing the angle-of-attack. Speeds of both aircraft should be about the same. One tip for the attacker is not to raise your nose too high as this can result in you losing speed/energy and the defender getting away from you.



The Low Yo-Yo should be used to get closer to the aircraft and improve your angle of attack - handy for less manoeuvrable aircraft who can not pull their nose around to get a shot in. This manoeuvre uses the greater power of the attacker with a little bit of help from gravity. Thus backing up your belief that God is on your side.

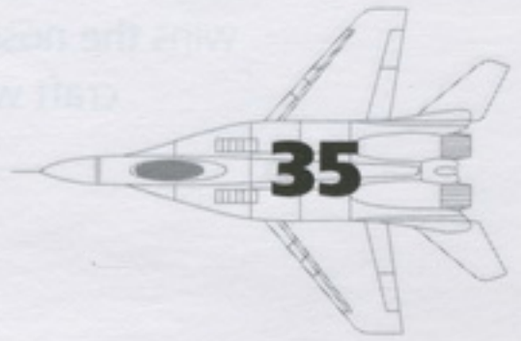
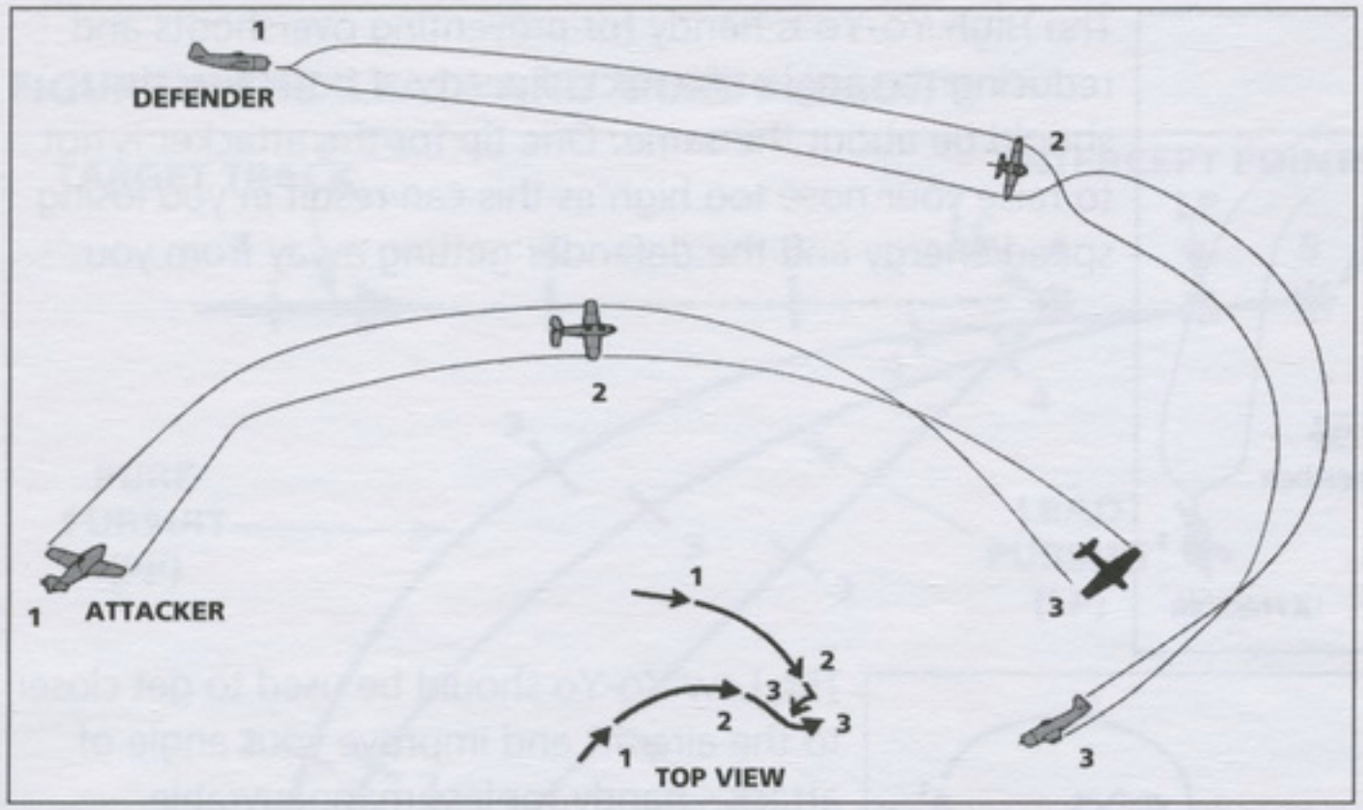
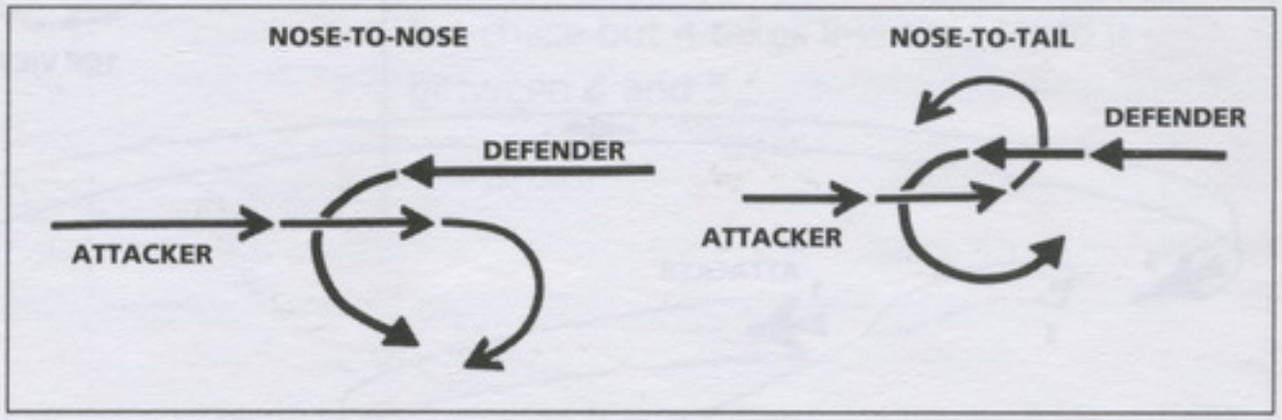


FIGURE 3: BARREL ROLL



The Barrel Roll is a classic manoeuvre to defend against a gun attack. Completed as per the illustration the defender can cause the attacker to break off the attack or overshoot the defender's flight path. This form of nose-low, high-g manoeuvre is not recommended at low altitude, though. Don't forget to keep a look out for bogies because this manoeuvre is best adopted after the bogey is spotted at some distance from your aircraft. If you allow him to get too close before going for the Barrel Roll you will not divert the bogey from his flight path at all.

FIGURE 4: NOSE-TO-NOSE TURN



A handy manoeuvre for manoeuvrable aircraft as, when the two aircraft have passed, the manoeuvrable aircraft is able to turn quickly to achieve superiority.

It's the aircraft with the tighter turn radius that wins the nose-to-nose turn battle, not the aircraft with the better turn-rate capability.

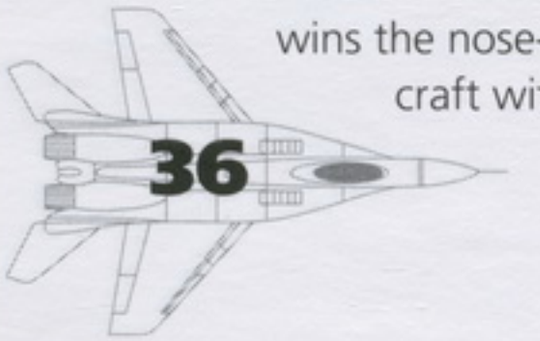
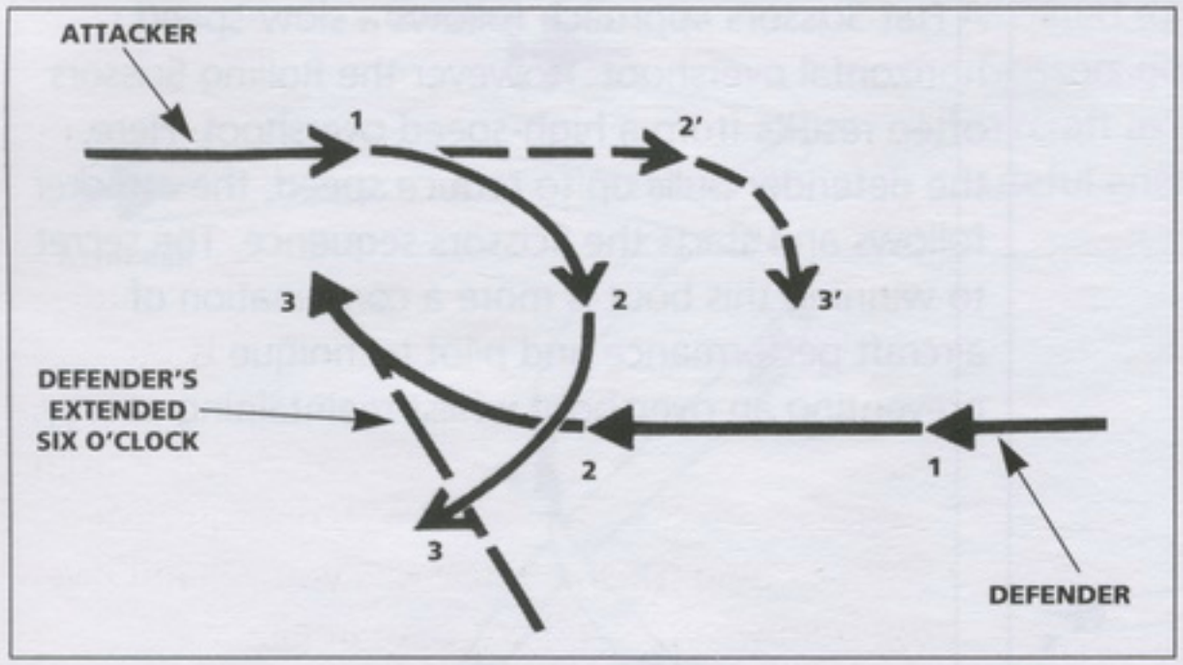
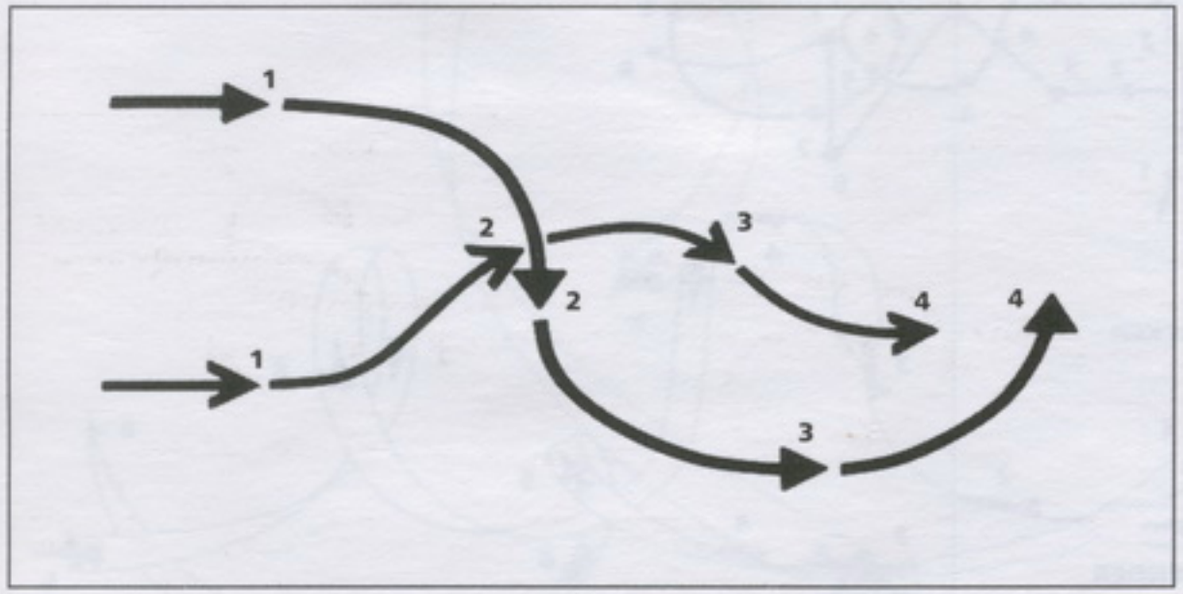


FIGURE 5: LEAD TURN



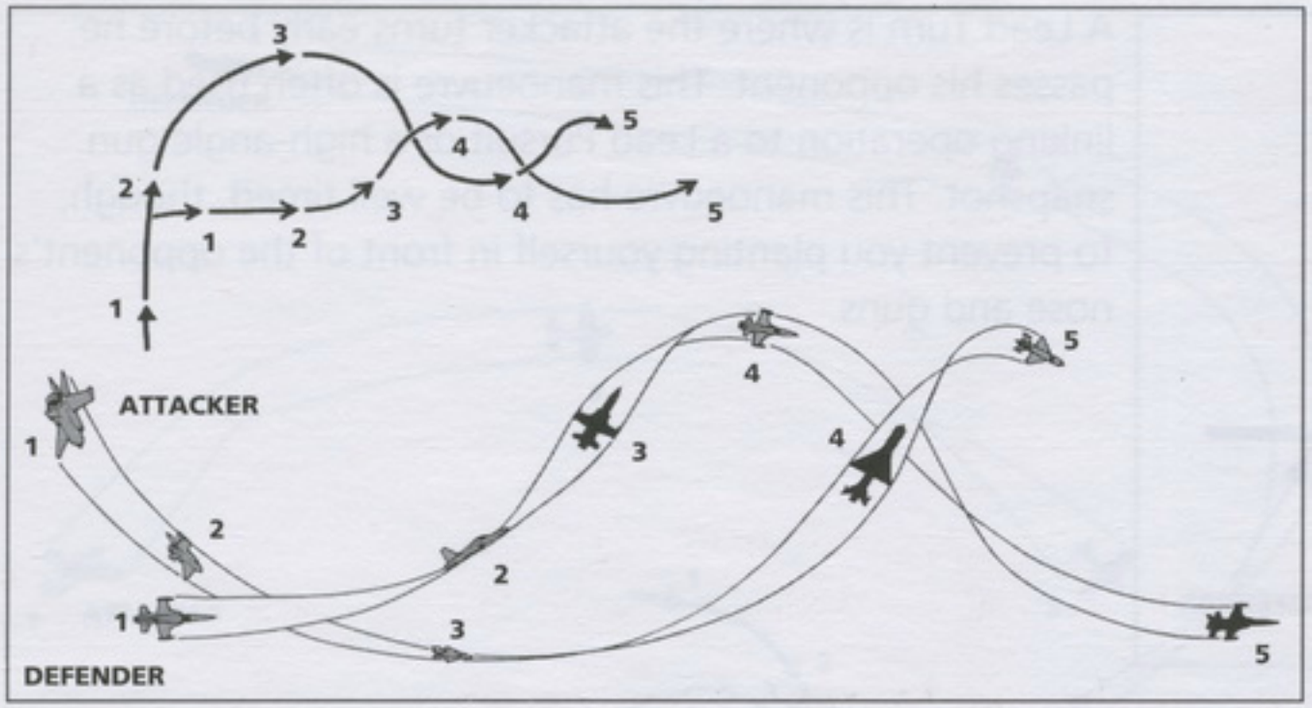
A Lead Turn is where the attacker turns early before he passes his opponent. This manoeuvre is often used as a linking operation to a Lead Pursuit or a high-angle gun snapshot. This manoeuvre has to be well timed, though, to prevent you planting yourself in front of the opponent's nose and guns.

FIGURE 6: FLAT SCISSORS



This manoeuvre is actually a series of nose-to-nose turns and overshoots performed by two aircraft flying in the same direction and at a similar altitude. Both are trying to get behind the other. However, the aircraft with the smaller turn radius will always win this tussle as it can turn tighter into the opponent's tail.

FIGURE 7: ROLLING SCISSORS



A Flat Scissors approach follows a slow-speed horizontal overshoot. However the Rolling Scissors often results from a high-speed overshoot. Here, the defender pulls up to reduce speed, the attacker follows and starts the Scissors sequence. The secret to winning this bout is more a combination of aircraft performance and pilot technique is preventing an overshoot whilst maintaining energy.

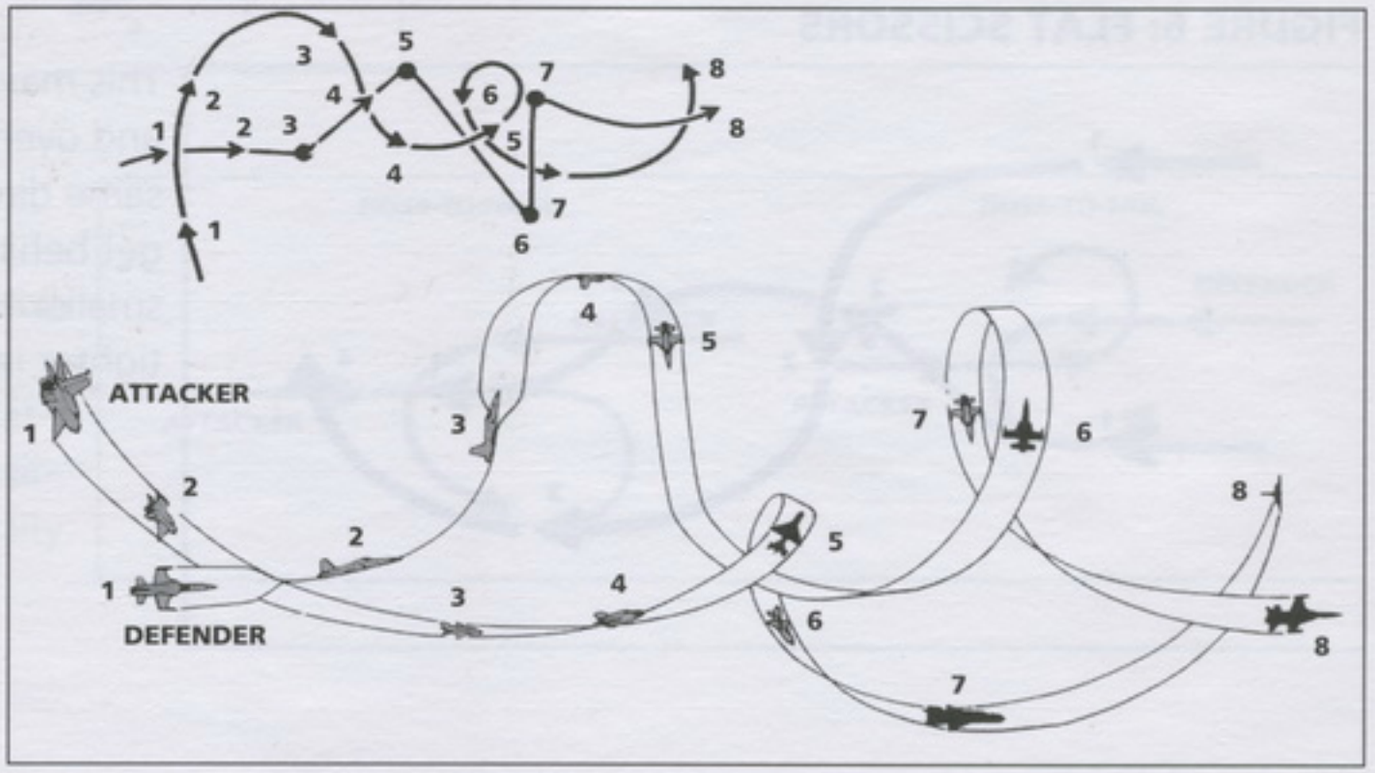
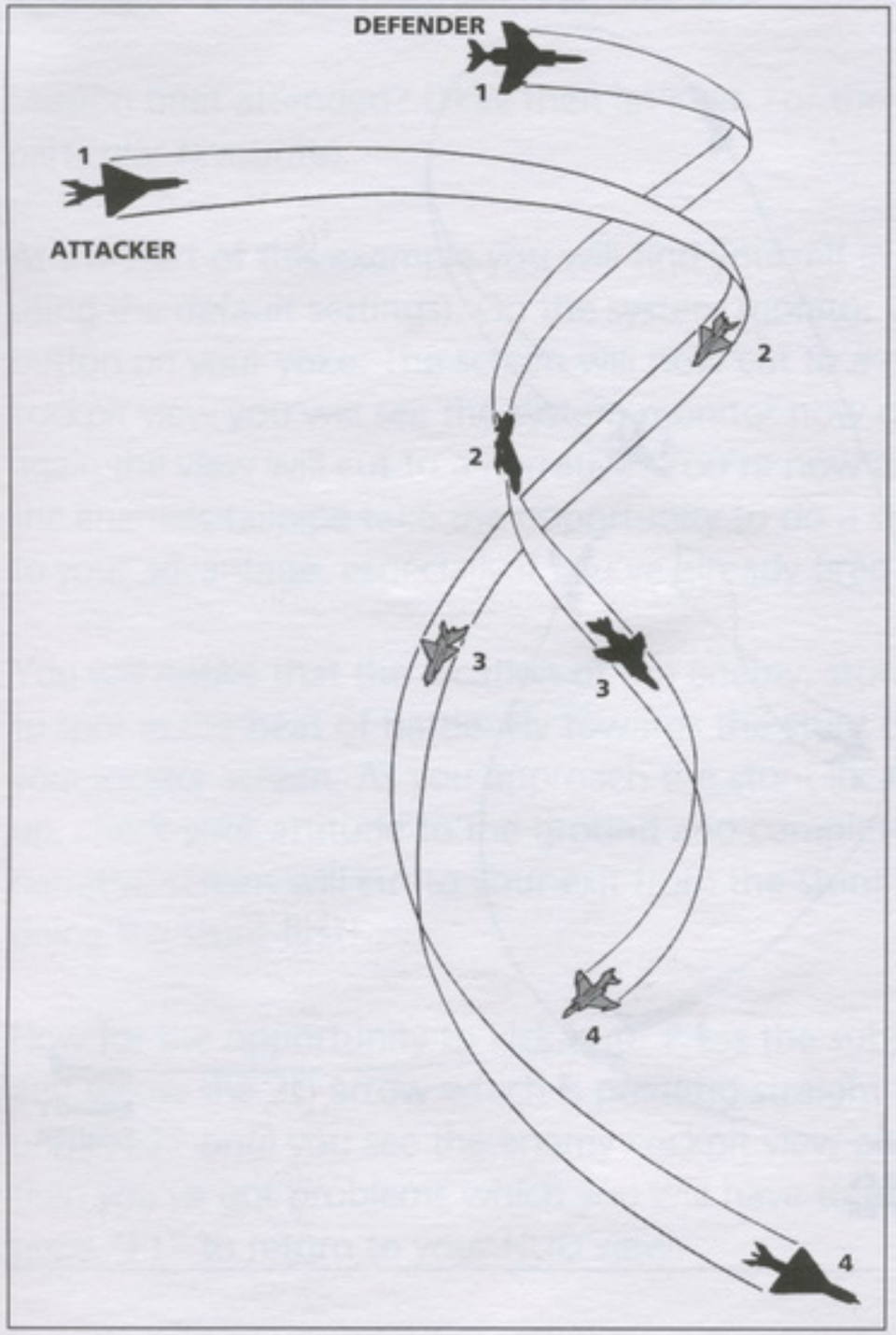


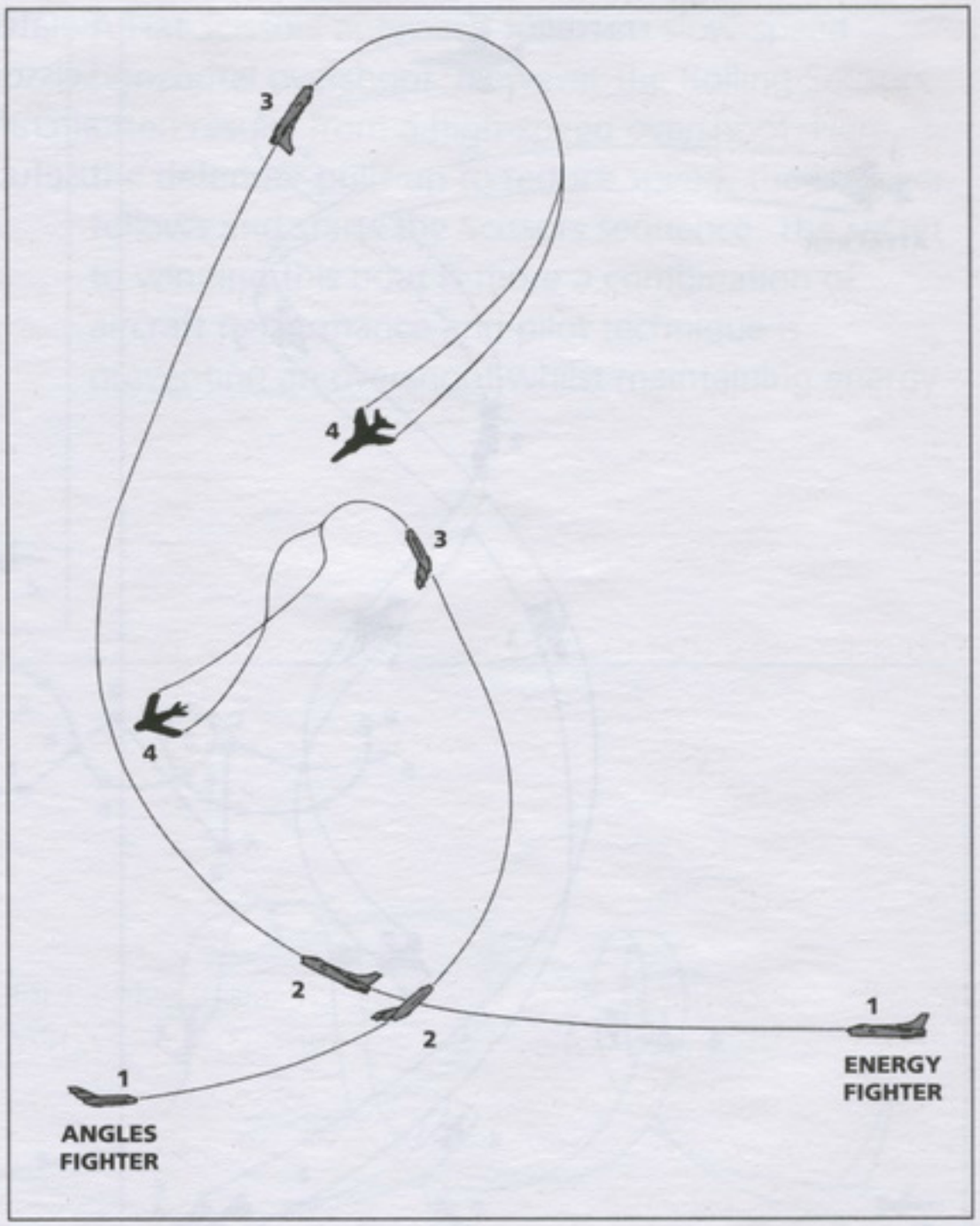
FIGURE 8: DEFENSIVE SPIRAL



Related to the Scissors, the Defensive Spiral is a form of tight Rolling Scissors going straight down. This manoeuvre benefits the faster aircraft as it results in a transferral of the faster aircraft's energy into useful energy.

FIGURE 9: IMMELMANN TURN

If performed correctly the defender is in a heap of trouble as he might try a high-g turn to gain a sight for his guns. However, this will result in dramatically slowing his aircraft and, thus, endangering it. If he decides to run for it the defender will be diving away to gain speed and distance. Breaking away from a possible attack from the attacking aircraft is guesswork at best and will either end up as a lucky shot by the defender onto the over-shooting attacker or the defender breaking off from the combat entirely. Again, defending this manoeuvre is best done before the manoeuvre is accomplished in the first place. If recognised early enough the defender can break off and gain height to maintain energy.



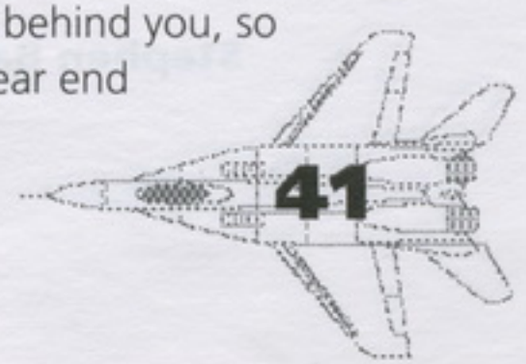
QUICK START EXAMPLE

Mission brief attended? Okay then let's go. For the benefit of this example we will choose the 1995 scenario (my particular favourite).

At the start of this example you will find yourself in the cockpit of the F-18 onboard an aircraft carrier (assuming you are using the default settings). On the system monitor you will see the word "Carrier Launch" is flashing; press the "ACTION" button on your yoke. The screen will now cut to a narrative showing the launch of your aircraft; when you return to cockpit view you will see the system monitor now displays "Raise Gear". Press the "ACTION" button to raise your gear, again the view will cut to a narrative. You're now airborne and ready for action, however before you go and slam one up the enemies tailpipe take the opportunity to do a stunt. I realise you would rather go for the enemies throat but it will be to your advantage, especially if you've already fired off a few loose rounds (accidentally of course!).

You will notice that the location of the enemy, stunts, and other targets of opportunity are labelled, making them easier to spot in the heat of battle. Fly towards the stunt by keeping its location in your HUD or by following the 3D arrow on your locator screen. As you approach the stunt location the area that you must fly through is highlighted, so line yourself up, check your attitude to the ground and complete the stunt without hitting the structure. If you're successful the narrative screen will cut to your exit from the stunt and the word "Rearmed" will appear. I said there was an advantage to doing the stunt first!

Now for the opportunity to kick butt. Press the subject locator (TAB key) until the enemy plane is on your locator screen and follow the 3D arrow which is pointing straight to him. You should "check your six" as he may be behind you, so press "F2" until you see the enemy cockpit view and look at his view on things. If you see your own rear end then you've got problems which you will have to resolve on the double, however if you are safe then press "F1" to return to your HUD view.



EVASIVE ACTION

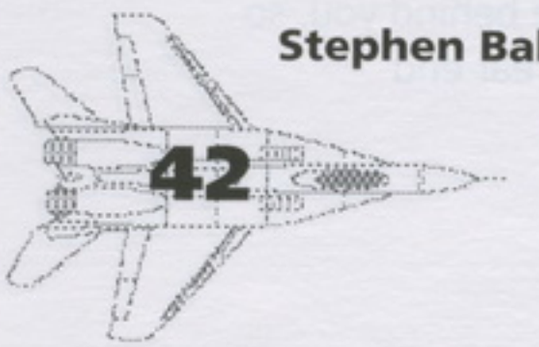
Check to see that you have "Pickle Target" flashing on your system monitor if you want to use missiles. "Pickle Target" doesn't imply that you are going to preserve your enemy in Brine as a keepsake, its aim is to help you totally disintegrate him. To achieve this you must get behind him, as you are carrying AIM 9J Rear Aspect Missiles which get their signature from the heat emitting from his exhaust port. Once you are behind the enemy and in range press the "ACTION" button on your yoke, a square box will appear on your HUD along with a diamond. You must follow until the diamond and the square combine indicating "Missile Lock" - now squeeze one off by pressing your "ACTION" button.

You may have to do this a couple of times to actually get a "kill" as the enemy will use his decoys and flares to confuse your missiles and avoid being hit, but he may not be successful. You can follow the action as the locator screen will give the missiles view of your enemy. If you see the missile disappear up his tailpipe then "Bingo, Ginger's bought it - scratch one MiG" - you have successfully completed your mission, the game will end and you'll be sitting proudly on the podium as the winner.

If on the other hand you find yourself in the situation where he's behind you "letting a few off", then press your "Selector" button to bring up "Flares" on the system monitor, press the "ACTION" button to release them and take Evasive Action. There is no point in pleading on the radio for a wingman to clear your tail, as in Evasive Action you are on your own. If you get hit or run out of any weapons try bugging out and head for a stunt, as successful completion of another stunt will do any necessary repairs or rearm your aircraft enabling you to re-engage the target.

As one of the authors of this manual, I have spent many weeks playing this game and I thoroughly enjoyed myself - as I am sure you will too. Good Luck!

Stephen Baker.



TECHNICAL SUPPORT

Should you experience any technical problems with this game, such as it failing to operate, please contact our Technical Services Department.

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Maltings Park
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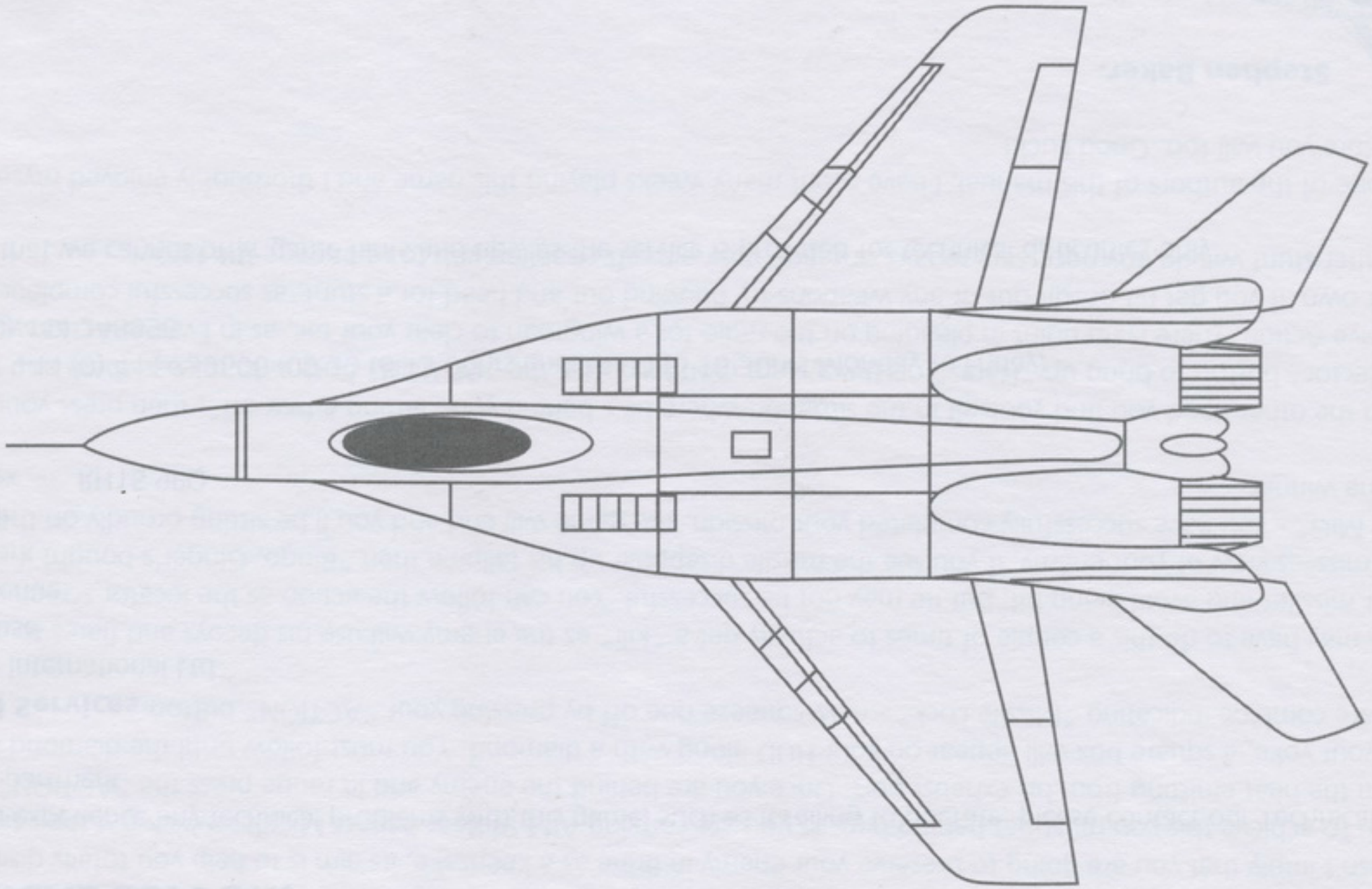
Telephone: +44 (0) 444 239600 (09:30 to 13.00hrs and 14.00 to 16:30hrs Monday to Friday)
Fax: +44 (0) 444 248996

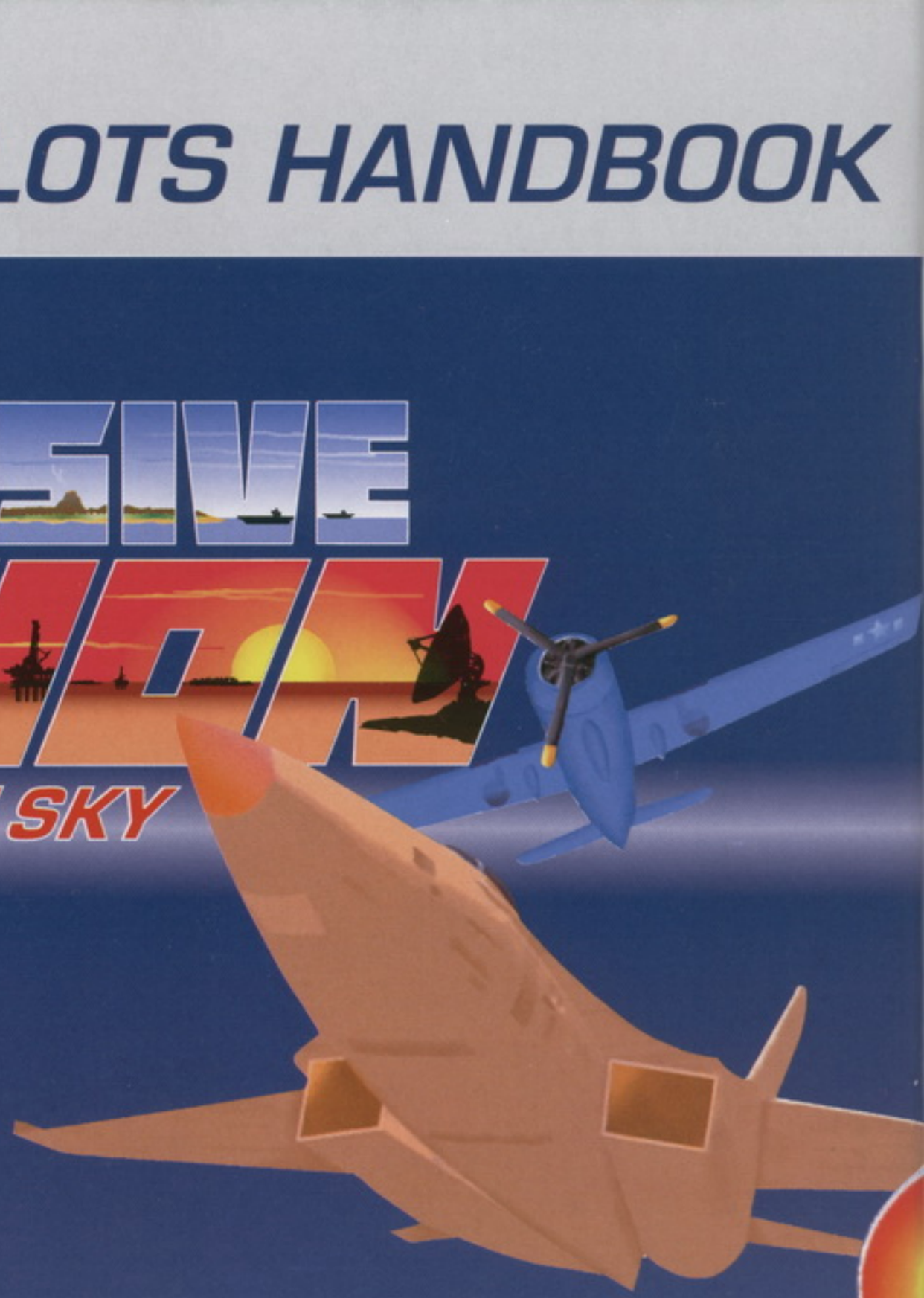
We regret that we cannot offer game hints and tips, as the service is provided for technical difficulties only.



PILOTS HANDBOOK

EVASIVE ACTION

DUEL FOR THE SKY



Designed and written by Glyn Williams.

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