



Ted Carlson/Fotodynamics

Black Knight™ User's Manual

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Chapter 1: Installation



1. INSTALLATION

The purpose of this chapter is to explain how to successfully install and run Black Knight. This manual assumes that you have a basic understanding of how to use the DOS command line syntax. If you are having trouble, please refer to your DOS manual.

1.1 REQUIREMENTS

In order for Black Knight to function properly, your computer must meet or exceed the following requirements:

- * PC-compatible 386/486/Pentium system
- * 8 MB of RAM
- * Hard Disk With 20 MB Free
- * VGA or Better
- * MS-DOS Version 5.0 or Higher

Optional and Recommended:

- * Joystick or ThrustMaster FCS/WCS/RCS
- * Sound Card and/or MIDI Device
- * Mouse
- * 486/DX-66 or Better

1.2 SOFTWARE INSTALLATION

- 1) Insert Black Knight CD into your CD-ROM drive.
- 2) If you're in Windows, exit completely by closing the Program Manager.
- 3) Change to the CD-ROM drive, by

typing: D:
3) Type: INSTALL

Black Knight Install program will display help screens to guide you through the installation process.

1.3 SOUND AND MUSIC DRIVER SETUP

Once Black Knight is installed, you must set up the sound and music drivers according to the hardware on your system. The SETUP program will run automatically after you have installed Black Knight and can be run at any other time by typing "SETUP" at the DOS command line from your Black Knight directory.

The SETUP program is divided into 3 parts. Part 1 is the Sound Driver Setup program which will allow you to select the appropriate driver for digital sound effects. Part 2 is the same as part 1 but is used for selecting an appropriate driver for music playback. Part 3 is the Delete Driver Utility which will allow you to save space on your hard disk, once the appropriate drivers have been selected.

If you can't find your particular device, then it is not supported and you should select the "No Sound Card" sound driver and/or the "No Music Card" music driver. It is possible that you can only have music but not digi-

tal sound effects and this depends on the type of sound device(s) you are using.

If you are experiencing problems with SETUP, please refer to the Appendix on Trouble-Shooting Questions & Answers.

1.4 STARTING BLACK KNIGHT

Once installed, Black Knight will start automatically. However, you can start Black Knight at any other time by changing to the directory containing Black Knight and typing, "BK" .

1.5 QUICK START

If you can't wait to get into the cockpit and shoot down a bandit, this may help.

1.5.1 CREATING A QUICK MISSION

When you have started Black Knight, there will be an introduction consisting of a title screen and opening animation. To break out of the cycle, press any key or mouse button and the MAIN MENU will be displayed. Next, select the "CREATE MISSION" item with the mouse or press the key. Once you have done this, the CREATE MISSION menu will appear and will present you with the options you wish to set for your mission.

For our purposes, we will create a simple mission, so select “ONE” bandit and give the tactical advantage to “FRIENDLY”. To do this, you can position the mouse over each one of these items and press a mouse button, or you can use the highlighted keys. When you are finished, select “OK”.

1.5.2 FLYING YOUR MISSION

As the mission starts, you will find yourself in the cockpit. If this is your first time flying, then Beginner Mode is active. Beginner Mode displays help at the top of the screen, and this will help you through your mission. There are several options for beginner help, including one line of text, a pop-up dialog box, or the voice of the “Flight Instructor.” Please refer to the chapter on Flight Controls for more information on Beginner Mode.

This quick start introduction is very basic and because Beginner Mode is active, the bandit will not make any offensive or defensive maneuvers. In order to fully understand your options in an engagement, you should study the chapter on Air Combat.

1.6 HOW TO FLY A MISSION

Most missions are strike missions, where there’s a specific ground target

to be attacked.

Get the plane airborne by: going to maximum power (**P** on the numeric keypad) and releasing the brake (**K**); when the aircraft is travelling above 160 knots (the number on the left number of the Heads Up Display (HUD)) pull back on the stick (or press **↓**); raise the landing gear (**G**), and the flaps (**F**) once you’re airborne; after you’ve passed 3000 ft (the number on the right of the HUD), reduce the engine power to 80% (**8**).

Follow the waypoint markers (the small ‘v’-shaped tick at the top of the HUD) by turning the aircraft towards it, so as to keep the mark in the center of the display. Pay attention to the waypoint description, as shown in the left Digital Display Indicator (DDI) screen. When it indicates a MISSION waypoint, that means that the waypoint marker is located directly over the mission target.

Use **→** to cycle the right DDI until it shows the word “TARGET” on the first line of information (usually says “NO TARGET”). Select an air-to-ground weapons system by pressing **I**. Now, with the waypoint marker centered in the HUD, select the target by pressing **←** until the right DDI says “MISSION TARGET”.

When the weapons system strobes blink green, you have a proper firing solution — press **space** to fire.

If the target is destroyed (it sometimes takes more than one hit to completely destroy a target), the waypoint display in the left DDI will be updated to the next flight path waypoint (“F. PATH”). These will lead you to your home base.

See the section on landing in the Training Missions Chapter for detailed information on landing procedures.

Chapter 2: Menus



Randy MacLean

2. MENUS

Black Knight contains a menuing system which organizes its features in an intuitive form. This chapter explains the menuing system.

Note: All keyboard command keys can be found on the Reference Guide pages. Throughout this manual only the key's functional name will be used.

2.1 NAVIGATING THE MENUS

You can navigate through Black Knight menuing system by selecting the menu items. This can be done with your mouse or your keyboard.

If you wish to use your mouse, you can select menu items by moving the mouse pointer over the menu item, and single-clicking on the item by pressing and releasing the left mouse button once.

Using your keyboard is just as simple. All of the menu items in Black Knight have a highlighted color associated with them. You can select the menu item by pressing the corresponding key of the highlighted letter. For example, in the MAIN MENU, the first item is "TRAINING MISSIONS" and the letter "T" is highlighted. You could select "TRAINING MISSIONS" by pressing

the highlighted key on your keyboard.

2.2 THE MAIN MENU

After the game introduction, the first menu to appear is the MAIN MENU. The Black Knight menu system is your gateway to the game. From here you can access the various missions, either training or combat. You can also access functions that give you complete control over many aspects of the game.

In addition to accessing other menus, you can review the credits or end the game by selecting "EXIT TO DOS".

2.3 THE TRAINING MISSIONS MENU

Selecting this will take you to the training menu listing. These specially devised missions are designed to make you familiar with various aspects of the game. There are eight training missions. They cover such things as take-offs, landings, and waypoints. They also offer individualized training in the use of all the primary weapons used in Black Knight. These include the AIM-7M "Sidewinder", AIM-9M "Sparrow", the M-61A1 Vulcan Cannon, the "Maverick", the MK-80 series of bombs, and rockets. Each mission is described in detail in the chapter on Training Missions.

2.4 THE COMBAT MISSIONS MENU

The Combat Missions menu lets you pick from a variety of combat missions. Each mission has a briefing line that tells you what your mission objectives are. Note that while you may pick a mission to take out an airfield, this does not mean that you will not encounter enemy aircraft as well. Each mission will have a primary objective. This is your "Mission Target." During the course of a mission, you can attack other enemy targets as well. Your first priority, however, is to take out the primary or mission target.

The COMBAT MISSIONS menu is similar in form and function to TRAINING MISSIONS, and navigating this menu is exactly the same. There are 50 unique combat missions.

2.5 CREATE MISSION

In Black Knight, you can set up your own combat scenario using the CREATE MISSION menu. You can set the time of day, sky and fog conditions, the number of friendlies and bandits, the tactical advantage, the altitude, and whether there are ground targets. Set each option to what you want, and select "OK" to begin the mission or "CANCEL" to return to the MAIN MENU.

NOTE: All SAM launchers are active and can shoot you down when you create a mission. Since you will start the mission at a random position of latitude and longitude, there's no telling whether you are in "SAM Country".

2.6 FREE FLIGHT

The FREE FLIGHT menu allows you to climb into your F/A-18 and take it for a "Sunday Drive" without worrying about any bandits, SAM launchers or waypoints. You can set the time of day, sky conditions and fog conditions and when you select "OK", your mission starts on the runway. In free flight, your F/A-18 is equipped with every major weapon type available. You could fly around and explore the scenery or you could practice using your A-G weapons. FREE FLIGHT is also an excellent place to practice landings, aerobatic maneuvers, and so on. The things you do in this mode do not count on the scoreboard.

2.6.1 TIME OF DAY

You may indicate the time of day selecting from these possible options. Noon, evening, dusk, midnight, dawn, and morning. This lets you fly a mission under the conditions you want.

2.6.2 SKY CONDITIONS

You may pick the sky conditions of either clear or overcast.

2.6.3 FOG CONDITIONS

You may choose whether or not there is fog. Your choices are light, heavy, or none.

2.6.4 TACTICAL ADVANTAGE

You also have the option of giving either yourself, or the enemy, a tactical advantage. This option may also be set to "None" so you start out equal.

2.6.5 NUMBER OF BANDITS

You may then choose the number of bandits you'll encounter.

2.6.6 GROUND TARGETS

This option lets you determine whether your mission contains ground targets or not.

2.6.7 ALTITUDE

Lastly, you can pick your starting altitude, ranging from 10,000 to 40,000 feet.

Tip: Use Free Flight to practice the maneuvers described in the chapter on Air Combat, like the Split-S, the Immelmann Turn, a Loop, and others.

Then, watch them on the Flight Recorder to see how you're doing.

2.7 FLIGHT RECORDER

While playing Black Knight, there will be times when you'll want to record the action. Perhaps when you're moving in and locked on to a ground target. Or when you've closed in on a bogie and are ready to finish him off with a "Sidewinder" missile. To capture all those momentous occasions, Black Knight comes with a Flight Recorder for you to use. The following section will describe how it works and the keystrokes used within the Flight Recorder.

2.7.1 USING THE FLIGHT RECORDER

With the Flight Recorder, you can view the action from any angle or from any point of view. Due to memory constraints, the Flight Recorder will record up to one minute of action at a time. It will not record beyond this limit. It is recording, however, all the time, keeping only that last minute of action.

With access from the Terminal Menu, you can record the current mission and save your recording. By default, the data is stored in a file named, PREVIOUS.REC. If you do not rename PREVIOUS.REC to something else, it

will be overwritten each time you access the Flight Recorder from the Terminal Menu.

If you wish to save a recording, use the "Save" button. Specify a file name like DOGFIGHT. The Flight Recorder will automatically put in the REC extension. You can have as many recordings as you like, dependent only on the disk space available. Always give each file a unique name and one that has meaning for you. Again, if you do not use the Save button and give the recording a file name other than PREVIOUS.REC it will be overwritten automatically the next time you record part of a mission.

To save more than 1 minute, you must stop the current mission, access the Terminal Menu, invoke the Flight Recorder, and save the REC file with a unique name. You could, for example, save a ground attack mission you are on. You could save the first recording as BOMB1.REC. Go back to the action and save the next recording as BOMB2.REC, and so on.

Later, you can use the "Load" button to load and replay your mission(s). While in Flight Recorder, a virtual mouse pointer is displayed and used if no mouse driver is currently loaded. Use your arrow keys to control the virtual mouse to move around the Flight

Recorder interface, to play, rewind, change the point of view, and so on.

2.7.2 FLIGHT RECORDER KEYS

Below is a listing of the individual buttons, and what they do.

The buttons on the Flight Recorder are much like the buttons on a standard VCR. You have Go To Beginning, Rewind, Play Backward, Back One Frame, Pause, Forward One Frame, Fast Forward, and Go To End. These buttons control the direction of play and help you to move back and forth in your recording. The next three buttons have an effect on the visual quality of your recording. The last three buttons to be shown have an effect on how you view your recordings and give you many ways to change perspective!

The selections Forward, Backward, Left, and Right are fairly self-explanatory.

In Fly-By you get the perspective of one who is watching the action fly by them. Truly an outside observer.

In the Circle viewpoint, you gain a totally different perspective. It's like the plane is in the center and everything else spins around it in a circle. You get to see the action from all directions. This can be rather interest-

ing because your perspective constantly changes.

In Target versus Plane viewpoint, you get the unique perspective from the object you are attacking. You can see what your plane looks like as it comes in on a bogey, for example.

In Plane versus Target perspective, you have the complete perspective from your point of view.

The next section deals with the use of custom viewpoints, which give you a wide range of options.

There are two custom views and each has benefits. From each you can constantly change your viewing angle by using the arrow keys provided. This view often lets you see things you might miss in other views. Let's look at both of the custom views.

2.7.2.1 CUSTOM 1

In this viewpoint it's as if a camera were attached to your F/A-18. Use the arrows to alter the perspective. The Custom 2 view gives you even more options.

2.7.2.2 CUSTOM 2

This viewpoint allows you to change more than just the angle of your view. It's a viewpoint in space. This makes it the most flexible of all the viewing

possibilities. You can change the angle and your view point. In addition, you can increase the movement size by a factor of 10 and zoom back and forth.

2.8 FLIGHT CONTROLS MENU

The Flight Controls menu lets you select how you will control your aircraft. Black Knight gives you a wide range of choices. It's also designed to be easy-to-use. It comes pre-programmed to be instantly compatible with some of the most popular flight control systems. Black Knight supports:

- ✓ Keyboard
- ✓ 2 Button Joystick
- ✓ 4 Button Joystick
- ✓ Control Yoke
- ✓ Joystick With Throttle
- ✓ Suncom F-15E Joystick
- ✓ ThrustMaster FCS
- ✓ ThrustMaster WCS
- ✓ Rudder Pedals

The preset defaults are described in the chapter on Flight Controls. This menu also gives you access to the Visual, Training, and Sound menus, which are also found in the TERMINAL MENU. These will be discussed later. The next section will describe the defaults for each of these control devices. All you have to do is select

the control device you have, and you're ready to play using the default assignments.

2.8.1 CALIBRATE JOYSTICK

This option pops up a quick series of menus that allow you to calibrate your joystick.

2.9 HIGH SCORES MENU

The High Scores menu takes you to the listing of the highest scores obtained in the game. Each pilot's score consists of four lines. These contain: your name (or "call sign"); the next unflown mission; the worst mission; the best mission; the total number of air and ground kills; and the total score for all missions. You can refly any mission, and if you achieve a higher score, it will replace your old score in the totals. The scoreboard also shows your Combat Effectiveness, a measure of your efficiency as a combat pilot.

Your score is determined by several factors. You are awarded points for achieving certain goals, and points are deducted for other items.

2.9.1 SCORING CRITERIA

CREDITS

mission target	500 points
enemy aircraft	300 points
bridge	200 points
other ground targets . .	100 points
manual landing	200 points

DEDUCTIONS

Eject	No mission score
Crash	No mission score
Abort Mission . . .	No mission score
Kill Wingman	-1000 points
Hit Wingman	-500 points

ORDINANCE USAGE DEDUCTIONS:

Gun (M-61)	Free
MK5/M151 rockets . . .	-10 points
MK-80 series bombs . .	-25 points
AIM-7M/AIM-9M	-50 points
AGM-88 HARM	-50 points
AGM-65F	-50 points

To get a higher score, you have to take out additional targets, and you must think more carefully about which weapons you use. If you use an AGM-65F, for example, to take out a truck, you would get 100 points for the truck and -50 for using the missile, leaving you with a net of 50 for the encounter! Better to use a rocket and net out to 90 points. Choose your weapons carefully. Here are a few other factors that have an effect on your score.

If a player selects UNLIMITED AMMO or INVINCIBILITY during a mission, they receive NO score for that mission.

Tip: It is best to set these parameters before you begin a mission using the Training Menu found under the Flight Controls or Terminal menus. Once set, leave them that way. Use the options you need to be successful and gain experience. Then, when you're ready, you can turn off something like UNLIMITED AMMO with confidence and get a higher score.

IMPORTANT NOTE: Black Knight does not operate in a “campaign mode” — for scoring purposes your player never dies. You can be killed in a crash, and then go right on flying other missions. Also, the missions can be flown in any order and you may go back and refly missions to improve your scores on those missions. When a mission has been reflown, the new score will be retained only if it's better than the previously recorded score. The total score is the total of the best scores on each of the missions flown.

2.10 CREDITS MENU

This menu simply shows you a screen giving credit to the many people who worked on Black Knights.

2.11 EXIT TO DOS

This menu option will immediately exit the program and return you to the DOS prompt.

2.12 TERMINAL MENU

From within any mission you may press the ESCAPE key to access the TERMINAL MENU. It provides access to several options that assist you in having control over the game.

2.12.1 MISSILE VIEWS

If turned on, this option gives you a view that follows the missile to the target. You can watch the missile as it heads for and hits the objective. If your attention is needed in the cockpit, hit **[space]** to cut back to the cockpit. This will occur if there is some threat such as incoming enemy missiles, low altitude, and so on.

2.12.2 SAVE CURRENT RECORD BUFFER

This option lets you save the current contents of the Flight Recorder. A fast way to save the action during the heat of battle.

2.12.3 VIEW CURRENT RECORD BUFFER

This option lets you view the current contents of the Flight Recorder. You may want to use this before using the save option mentioned above.

2.13 VISUAL MENU

The VISUAL MENU appears in the Terminal Menu and in the Flight Controls menu. It can also be called up at any time by pressing **[ALT][V]**. It provides the following options that control visual effects.

2.13.1 DETAIL LEVEL

This is a speed optimization for slower computers. There are three levels: LOW, MED, and HIGH. On slow computers, you could select LOW to have the game run at a faster frame rate.

2.13.2 SIGHT RANGE

This is a speed optimization for slower computers. No objects or terrain farther than the specified distance are rendered, reducing the load on the PC and improving the performance of the game.

2.13.3 AIRCRAFT DETAIL

When selected, this applies gouraud shading to the rendering of aircraft, improving their realism. Leaving it off reduces the load on the CPU for better game performance.

2.13.4 GOURAUD SHADING

If this option is on, then gouraud shading will be applied to mountains and other scenery. Although gouraud

shading makes the graphics appear more realistic, the frame rate will slow down.

2.13.5 AVOID FLICKER

When this option is off, Black Knight will produce a faster frame rate. However, on most computer systems, you will have to turn this option on in order to avoid screen flicker.

2.14 THE TRAINING MENU

The TRAINING MENU also appears in the Flight Control and Terminal Menus. It can be brought up at any time by pressing [ALT][T]. It lets you determine the degree of difficulty of your missions. It has the following options.

2.14.1 BEGINNER MODE

If on, then Beginner Mode is active. Beginner Mode provides the following:

- 1) No Active SAM's
- 2) No Blackouts
- 3) Invincibility
- 4) Unlimited Ammo
- 5) Accurate Weapons And Counter-Measures
- 6) Enemy pilots have NO intelligence

Please note that manual targeting

with the targeting keys are disabled when flying a training mission in Beginner Mode.

2.14.2 NO BLACKOUTS

You will not blackout or red-out if this option in the TRAINING MENU is turned on. Turning your F/A-18 at a high positive G rate for a prolonged period of time causes the blood to run from your head which causes you to blackout. You red-out when negative Gs are pulled. Your G force is displayed on the HUD.

2.14.3 INVINCIBILITY

You are invincible if this option is set in the TRAINING MENU. When you are invincible, you can smash into the ground and sustain enemy fire.

2.14.4 UNLIMITED AMMO

When you turn this option on, you'll have unlimited ammunition for the missions. The initial load out will never deplete.

2.14.5 FLIGHT INSTRUCTOR

Activating this turns on the Black Knight "Flight Instructor", giving help in flying via onscreen messages and/or a voice coming through the intercom system of your F/A-18. You get the same sound advice, only you can listen to it rather than having it

displayed on your screen.

2.14.6 MESSAGE LINE

This will give you flight instruction through a one line display at the top of the screen.

2.14.7 DIALOG BOX

If you toggle this option you will see a dialog box, describing what you should do next. This is much more detailed than the regular Beginner mode.

2.14.8 VOICE VOLUME

This lets you adjust the volume of the Flight Instructor's voice. You may select from OFF through 100%.

2.15 THE SOUND MENU

The SOUND MENU gives you full control over all aspects of sound in the game. It can be found in the Terminal and Flight Control menus. You may also bring it up at any time by pressing [ALT][S]. Some options may not work depending on your sound card.

2.15.1 MUSIC VOLUME

This controls the volume of the music heard in the game.

2.15.2 EFFECTS VOLUME

The EFFECTS VOLUME control lets you determine how loud the sound effects in the game are.

2.15.3 ENGINE VOLUME

The ENGINE VOLUME allows you to toggle the engine sound either on or off. In this way, if you desire, you can have all other sounds except the engines.

2.15.4 VOICE VOLUME

This controls the volume of the voices heard throughout the game. Range is from OFF to 100%.

2.15.5 MOD MUSIC

One other feature of Black Knight allows you to play 4,6, or 8 channel Fasttracker or ProTracker music module files. Music module files have the extension of “.MOD”. Most major online services have a file area containing MOD files that you can download and play with Black Knight. To play a MOD, put the MOD file into the Black Knight directory and then select it from the Sound Menu with the Change Music option. If you don't hear anything after you select it, chances are that it is not in Fasttracker or ProTracker format, although it may also be that you have

insufficient memory on your computer.

You can convert your MOD file with Fasttracker. Fasttracker is available on most major online services as shareware.

One final note regarding MOD music is that it is digital and will play over your sound device driver, not your music device driver. MOD files are played at 11 kHz per channel.

2.15.6 3D

The 3D Sound system will reproduce the sound effects at their appropriate location in the 3D environment. If your device does not support stereo sound, such as the original SoundBlaster or SoundBlaster clones, than you will not be able to select this option.

2.15.7 REVERSE

REVERSE 3D is the same as 3D except the left and right channels are interchanged. If you see an explosion on the left side but it is heard on the right channel, then you should select the REVERSE 3D option.

2.15.8 CHANGE MUSIC

This option lets you change the music you listen to during the game. Black Knight comes with several MOD and

MIDI files for you to choose from. You may also use other MOD files that you may have.

2.16 AUTO LAND

During a mission you may select this option to have your aircraft automatically make a safe landing. Remember, that under the scoring system you would receive no points for the landing. On the other hand, if you're just starting out, you won't get killed trying to land either.

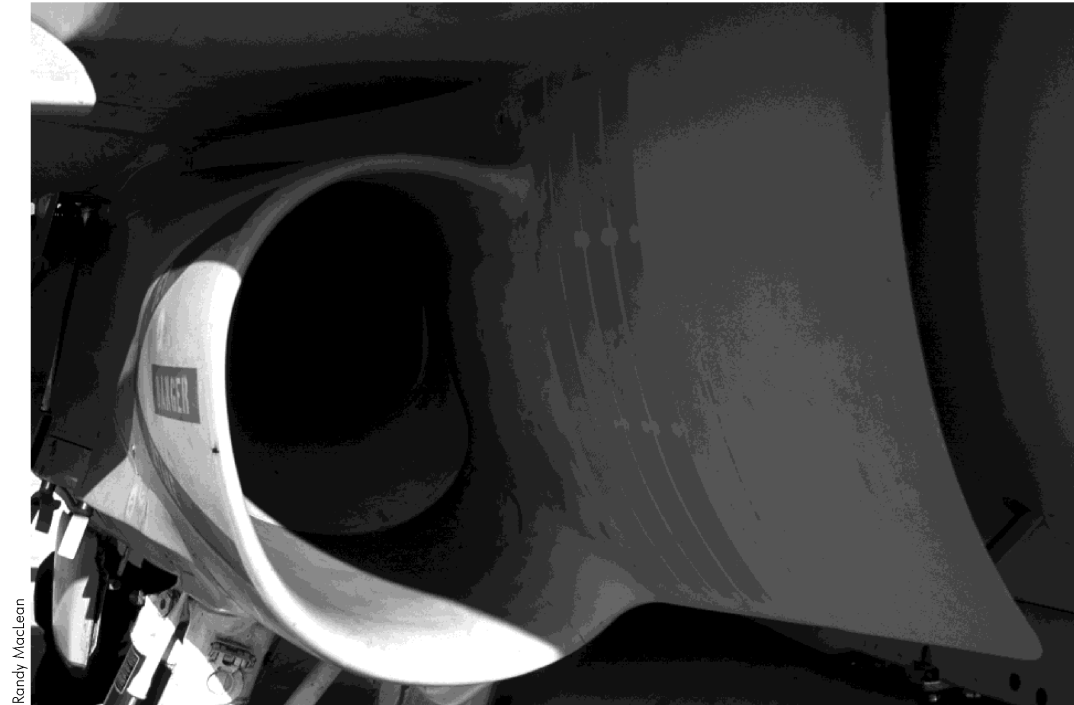
2.17 ABORT MISSION

Instantly aborts the current mission and returns you to the MAIN MENU. You receive no points for the portion of the mission flown.

2.18 BACK TO GAME

After doing something in the TERMINAL MENU, use this to return to your mission. While you are in the TERMINAL MENU nothing transpires, so you can resume right where you left off.

Chapter 3: Flight Controls



Randy MacLean

3. FLIGHT CONTROLS

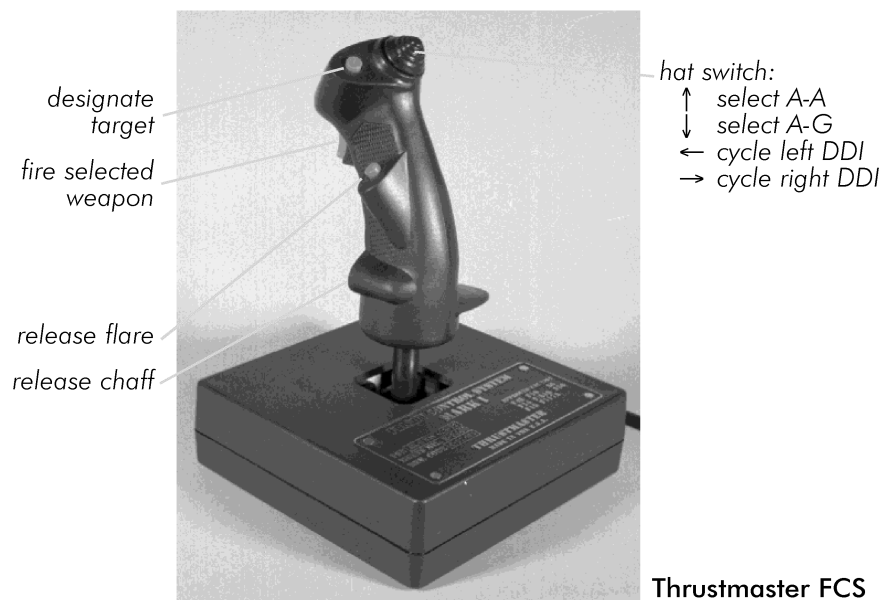
This chapter describes the various ways you can control the game and the various methods of flight control. This ranges from a full set of key-board commands, to default settings for some of the most popular flight control systems available. If you have one of the supported systems, all you have to do is check the appropriate radio button and your control system will be pre-configured for you. Each configuration will be described in detail.

3.1 KEYSTROKE GUIDE

Esc	Toggle TERMINAL MENU On/Off
F1	Forward View
F2	Rear View
F3	Left (Port) View
F4	Right (Starboard) View
F5	Fly By View
F6	Circle View
F7	Target to Plane
F8	Plane to Target
F9	Following View
F10	Leading View
F11	View Plane from Right
F12	View Plane From Left
Backspace	Toggle Cockpit Displays On/Off
~, [1-0]	Engines 0%-100%

[External Fuel Tank
*	Afterburners
/	ILS (Instrument Landing System)
<	Cycle Left DDI Screen
>	Cycle Right DDI Screen
[Cycle Air-To-Ground Weapons
]	Cycle Air-To-Air Weapons
J	Jettison All Armament And External Fuel
R	Select Radar Scanning Range
W	Override Mission Waypoint
F	Raise/Lower Flaps
G	Raise/Lower Landing Gear
K	Toggle Air-Brake or Wheel-Brake
P	Pause Game

T	Hold Key Down For 4X Time-Compression
=	Scroll Map Back To Center
Ctrl ↑	Scroll Map Up
Ctrl ↓	Scroll Map Down
Ctrl ←	Scroll Map Left
Ctrl →	Scroll Map Right
space	Shoot Current Weapon
Ins	Dispense Flare
Del	Dispense Chaff
Enter	Select Target Closest to Center Of HUD
;	Select Target to the Left
'	Select Target to the Right
Shift E	Eject
↑	Pitch Nose Down



Thrustmaster FCS

- Pitch Nose Up
- Roll Plane Left
- Roll Plane Right
- Yaw Plane Left
- Yaw Plane Right
- End Mission
- Toggle Visual Menu On/ Off
- Toggle Training Menu On/Off
- Toggle Sound Menu On/Off

3.2 FLIGHT CONTROL SYSTEMS

The flight control systems shown here are preprogrammed in Black Knight. All you have to do to activate one of these systems with the default settings is check the appropriate box in the FLIGHT CONTROLS menu. Be sure to calibrate your joystick as well for optimum performance.

3.2.1 THRUSTMASTER FLIGHT CONTROL SYSTEM (FCS)

The ThrustMaster Flight Control System, shown here, is programmed with the features we thought you'd use most. The diagram callouts indicate the default configuration.

3.2.2 THRUSTMASTER WEAPONS CONTROL SYSTEM (WCS)

The "Weapons Control System, shown here, works in conjunction with the ThrustMaster FCS. Because the layout of the WCS is rather complex, its configuration is described here.

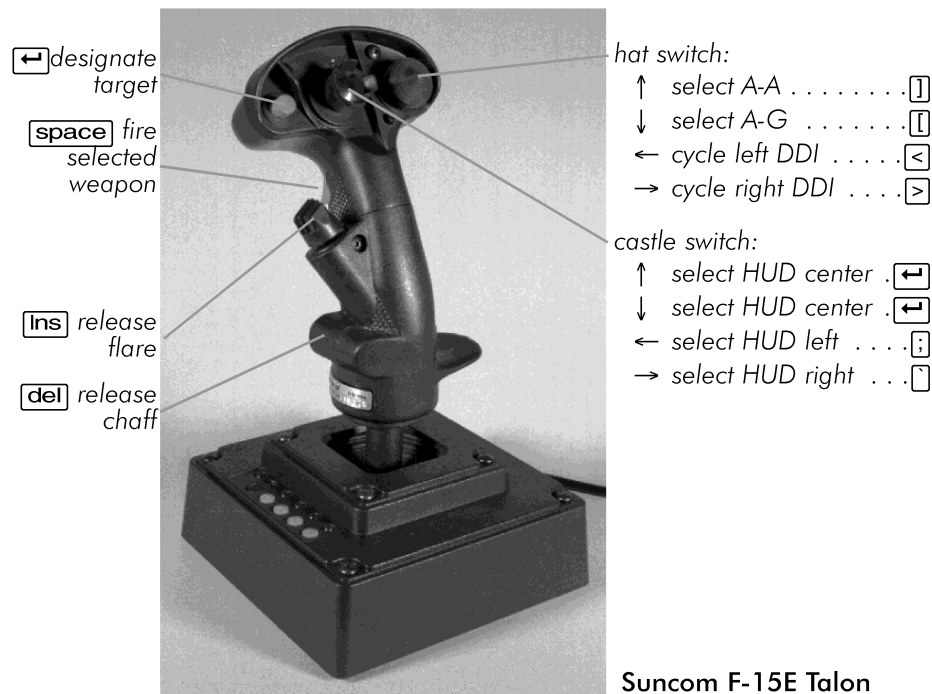
3.2.3 SUNCOM TALON F-15E

The Suncom F-15E Talon or Eagle model joysticks are exact replicas of the control sticks in the actual F/A-18s flown by the Black Knights. Standard configuration is much like the ThrustMaster FCS. The diagram callouts indicate the default settings.

Note: You must program your Suncom Talon to deliver the key-strokes indicated in the diagram. Information on programming your Suncom joystick can be found in the Suncom manual that accompanies it.

3.2.4 JOYSTICK WITH THROTTLE

Several popular joysticks come with a throttle control, the FlightMaster joy-



Suncom F-15E Talon

stick, for example. On such joysticks we've activated the throttle control on the joystick. If you have a similar joystick, just pick the "Joystick With Throttle" in the FLIGHT CONTROL menu.

3.2.5 4 BUTTON JOYSTICK

Four button joysticks, like the FlightMaster Pro, are configured as follows:

Trigger fire selected weapon
 Button 2 . . . designate HUD center
 Button 3 cycle Air-To-Air
 Button 4 cycle Air-To-Ground



Joystick with Throttle

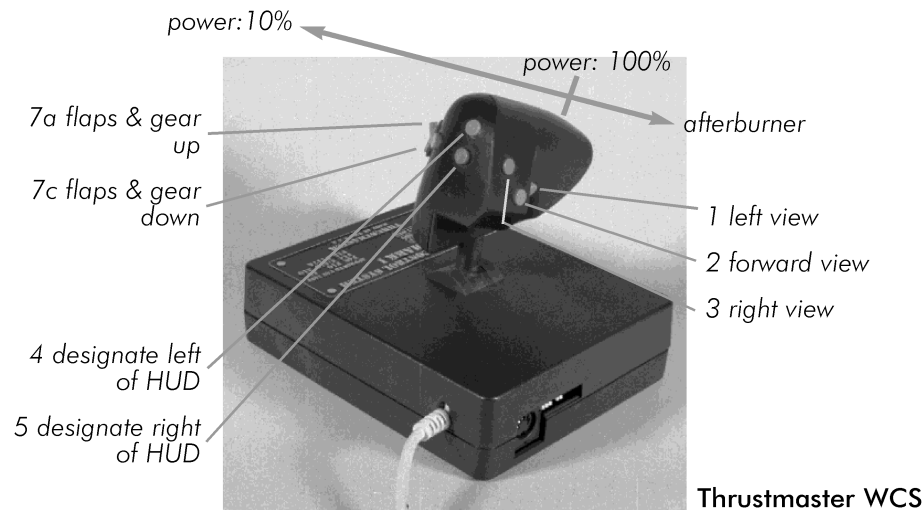
3.2.6 2 BUTTON JOYSTICKS

All two button joysticks are configured as follows:

Trigger Fire selected weapon
 Button 2 . . . designate HUD center

3.2.7 RUDDER PEDALS AND YOKE

For those who use rudder pedals and/or a yoke, you can select these options.



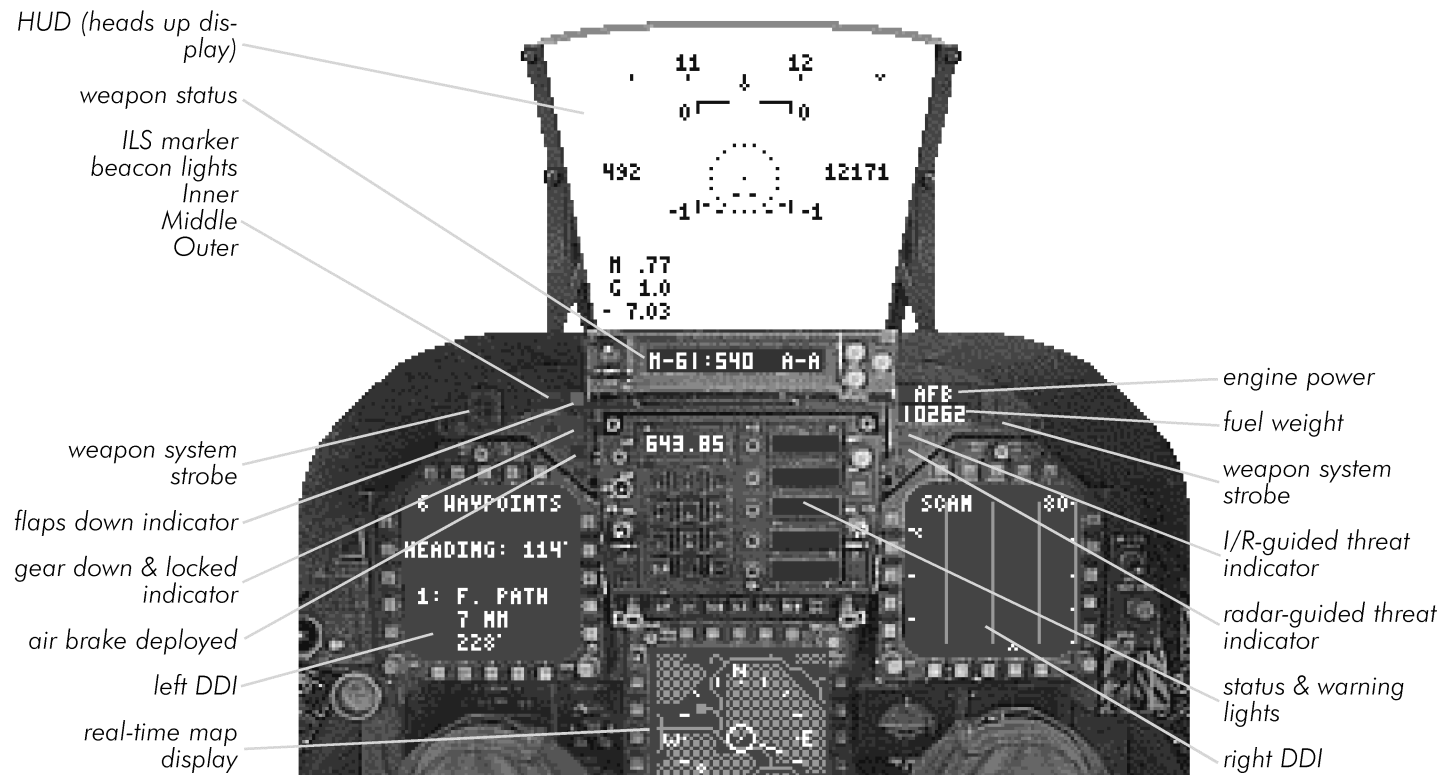
Thrustmaster WCS

Chapter 4: Cockpit



Randy MacLean

F/A-18 Cockpit



4. THE COCKPIT

The F/A-18 is best known for its virtually gauge-less cockpit. All of the information displayed in the cockpit will help you achieve your mission objectives. This chapter will explain all of the features that you can find in your F/A-18 cockpit.

4.1 HUD: HEADSUP-DISPLAY

Your Heads-Up-Display (HUD), is designed to do exactly what its title says - To keep your head up, so that you don't have to look down at the gauges in your cockpit. This is important in weapons delivery, air-combat and landing.

4.1.1 HEADING RULER

The Heading Ruler is like a ruler that slides across the top of the HUD. The numbers represent 10s of degrees, from 0 to 35, where 0 is north, 90 is east, 180 is south, and 270 is west.

4.1.2 CURRENT HEADING MARKER

The Current Heading Marker is a stationary point on the top of the HUD and is used in conjunction with the Heading Ruler. This point marks the spot on the Heading Ruler to indicate your heading as shown, the heading is 115, or southeast.

4.1.3 WAYPOINT MARKER

The Waypoint Marker is attached to the Heading Ruler and varies depending on the bearing angle to your current waypoint. (A discussion of waypoints can be found in the chapter on Training Missions). The waypoint marker appears as a small "V" on the HUD Display. When you are on route to a waypoint, you'll want to align the Waypoint Marker with the Current Heading Marker.

The Waypoint Marker never leaves the HUD. If it is to the extreme left or right of the Heading Ruler, it means that the waypoint bearing is beyond the current range of values as displayed by the Heading Ruler.

4.1.4 VELOCITY

This number indicates the airspeed of your F/A-18 expressed in knots.

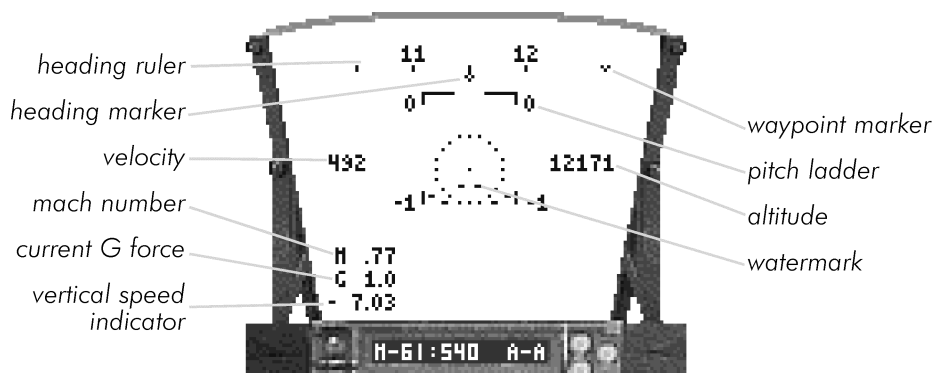
4.1.5 ALTITUDE

This number indicates the altitude of your F/A-18 expressed in feet.

NOTE: The altitude is displayed as true altitude. If you fly over some mountains, it will not tell you your altitude above the mountain.

4.1.6 PITCH LADDER

The Pitch Ladder is used to assess the pitch attitude of your aircraft. Each step on the ladder marks a 10 degree difference in pitch from the previous one. These steps run from negative 80 degrees (you're pointing nearly straight down) to positive 80 degrees (almost straight up), with the 0 line being on the horizon (level flight). The lines above the horizon line are solid, those below are broken.



4.1.7 MACH NUMBER

The term, “MACH” is often used in aerodynamics and is simply the unit of measurement of the speed of sound at a given altitude. In higher altitudes, the speed of sound is slower whereas in lower altitudes, sound travels faster. MACH 1 means that you are flying as fast as the speed of sound for a given altitude, and MACH 2 means that you would be flying twice as fast as the speed of sound. Your F/A-18 is capable of achieving MACH 1.8 at 36,000 ft.

4.1.8 CURRENT G

The Current G is the measurement of the G force that you are currently experiencing. 1G means that your body is experiencing a normal weight. Two Gs means that your body is experiencing twice its normal weight. In steady, level flight, you experience 1G,

but turning or even rolling your aircraft produces various G levels. Your F/A-18 is capable of nine Gs near sea level and when you are flying at approximately 550-600 knots.

Pulling excessive Gs for a prolonged period of time will cause the blood to run from your head. It is possible to blackout from your body’s inability to cope with excessive G forces. When negative G forces are experienced, the blood rushes in the opposite direction and goes to your head causing you to red-out.

You can prevent blackouts and red-outs by setting the “NO BLACK-OUTS” option from the TRAINING MENU.

4.1.9 VSI: VERTICAL SPEED INDICATOR

The VSI is a measurement of your F/A-18’s vertical speed and is

expressed in thousands of feet per minute. Your VSI comes in handy when you land your F/A-18.

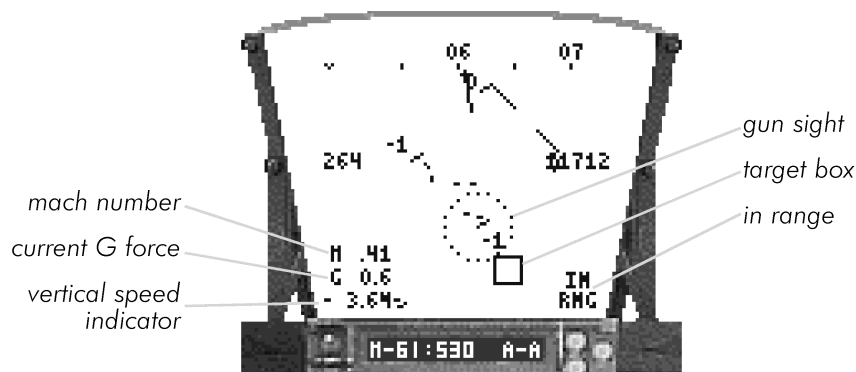
4.1.10 IN RANGE

If you have a target selected, and the target is within range of your current weapon’s capability, then you’ll see “IN RNG” displayed in the lower right hand corner of your HUD. With missiles, there is a minimum and maximum range. If you’re not within this range to your current target, then “IN RNG” is not displayed.

Note also, that when you see “IN RNG” displayed on your HUD, it does not necessarily mean that you are within proper firing parameters, such as having a lock on the target. Before you shoot, make sure that you are also within the proper firing parameters of the weapon. Please refer to the chapter on Training Missions for further information on weapons parameters.

4.1.11 GUN SIGHT

Your M-61A1 20mm Automatic Gun has a radar directed Gun Sight. The Gun Sight is only useful in air-combat when you have a target designated and tracked by your radar. When the Gun Sight is on top of the Target Designator Box, and “IN RNG” is



specified, you are within proper firing parameters for your M-61A1.

4.1.12 TARGET DIRECTION

When you have a target selected, its location is specified by the Target Direction.

4.1.13 TARGET DESIGNATOR BOX

When you have a target selected, and its projected location is within the HUD limits, you'll see the Target Designator Box on the HUD which specifies its location. When you have a lock on the target, a diamond will be superimposed over the Target Designator Box.

4.1.14 GP BOMB HUD DISPLAY

When you have selected an MK-80 Series General Purpose Bomb, your HUD will appear somewhat differently. These are not "smart bombs" like the AGM-65F and are simply free falling bombs. The differences in this HUD display are explained in the next few sections.

4.1.15 VELOCITY VECTOR

When you fly through the air, your direction of travel is usually not the same as the angle of your aircraft. For example, when an airplane lands, it is traveling downwards, but is pitched upwards. The Velocity Vector, graphi-

cally displays your direction of travel.

4.1.16 SIGHT LINE

The Sight Line is the vertical path that the bomb will travel before it impacts the ground. When you are bombing a bridge, for example, it's best to put that Sight Line directly in line with the length of the bridge.

4.1.17 IMPACT AREA

The Impact Area marks the approximate location on the earth where the bomb will hit. There is a considerable margin of error associated with the Impact Area, as other unknown forces, such as wind, will affect the true impact location of the bomb. However, the Impact Area is calculated by your on-board computer. When it is on top of a target, you should release your bombs. In general, you should release your bombs at a medi-

um altitude and shallow dive, or at a low altitude when flying level.

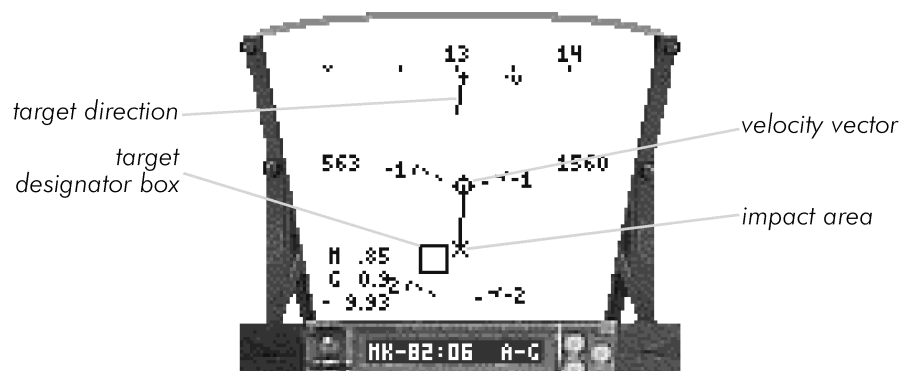
4.1.18 ILS DISPLAY

ILS stands for Instrument Landing System. The ILS provides you with important information about your landing approach. Vertical and horizontal deviation bars are displayed on the HUD as dotted lines. When they form a cross, you are perfectly in line with the runway.

Once you're in line with the runway and your deviation bars are in cross, you can maintain that appropriate glide path by pointing your nose directly towards the start of the runway.

4.1.19 HORIZONTAL DEVIATION BAR

When the Horizontal Deviation Bar is below the center, it means that you're



above the glide path and must reduce your altitude, for a successful landing. When it's above center, you're too low and must increase your altitude to intercept the appropriate glide path.

4.1.20 VERTICAL DEVIATION BAR

When the Vertical Deviation Bar is to the left of center, it means that you must fly somewhat to the left of the start of the runway because you are not in line with the glide path and the same can be said when the bar is to the right.

4.1.21 AOA BRACKET

The AOA (Angle Of Attack) Bracket should be used in conjunction with the Velocity Vector and is only useful in the very final stages of landing. When you are directly over the runway and your airspeed is approximately 165 knots, your AOA is higher and

your Velocity Vector should be near the center of the AOA Bracket and your nose should be pitched up to about 5 degrees.



4.1.22 VELOCITY VECTOR

When you fly through the air, your direction of travel is usually not the same as the angle of your aircraft. For example, when an airplane lands, it is traveling downwards, but is pitched upwards. The Velocity Vector, graphically displays your direction of travel. When landing, it should be used as described in the previous section.

Landing Tips: Once you learn to use the ILS you'll find landings much easier. The most common mistake is coming in too fast. Another common mistake is not beginning your approach soon enough. Don't wait until you're one mile out. Start your approach when you are several miles

from the runway. This will give you more time to lose altitude and reduce speed. It also gives you more time to make minor adjustments. Toggle the ILS, watch your speed, and practice! And don't forget to put the landing gear down.

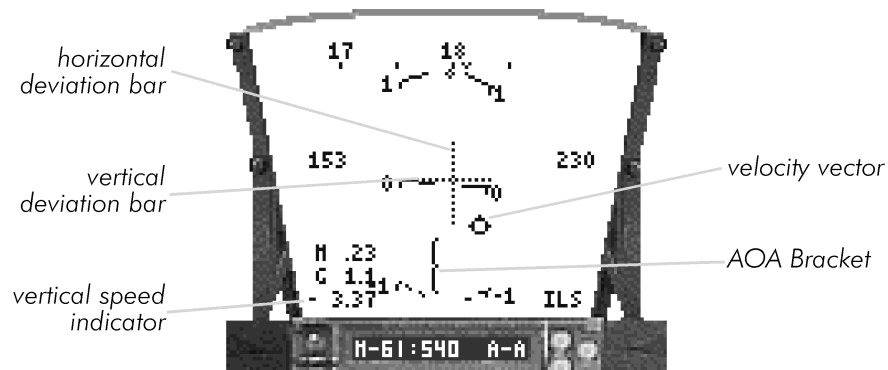
4.2 DDI: DIGITAL DISPLAY INDICATOR

Your Digital Display Indicator, or DDI, are the two multifunctional cockpit displays on the left and right sides of the cockpit. You can select the display for either the left or right DDI by pressing the  or  keys accordingly. The six different DDI displays are explained in the following sections.

4.3 RADAR DISPLAY

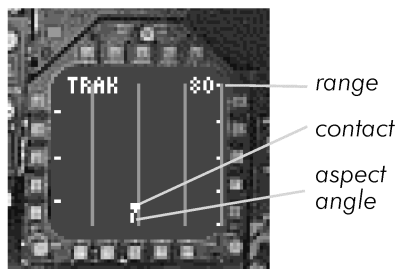
Your F/A-18 is equipped with a state-of-the-art Hughes APG-65 Pulse Doppler Radar system that is capable of tracking up to 10 targets simultaneously out to a range of 90 nautical miles.

The Radar Display shows you what your radar is actually "seeing" and will help you stay alive and quickly assess your tactical situation. When used in conjunction with your Target Display, you will have all the information you need to paint a mental picture of the bandit (enemy aircraft) and his intentions. This is what fighter pilots call



“situational awareness”.

When you see a Contact on your Radar Display, it means that there is a bogey (unknown aircraft) somewhere out in front of you. You can roughly determine its distance based on the vertical location of the Contact and the selected range of your radar. For example, if your range is set to 80 nautical miles and the Contact is in the center of the Radar Display, than the bogey is approximately 40 nautical miles in front of you. The higher up the Contact, the farther away the bogey and any bogeys out of range are not displayed.



The horizontal location of a Contact will help you understand the bearing angle to the bogey in relation to your current heading. In other words, if a Contact is directly on the left edge of the Radar Display, there is a bogey at 45 degrees to the left of your current heading.

4.3.1 RANGE

The Range number is the distance that the radar can see out in front of your aircraft and is expressed in nautical miles. This range is selectable between 10, 20, 40, 60, and 80 nautical miles by pressing the **[R]** key. If a target is beyond the Range, then it is not displayed.

4.3.2 ASPECT ANGLE

The Aspect Angle is a line, projected from the Contact, that represents the angular direction from the bandits aircraft to yours. When it points straight up, the target is moving directly away from you, regardless of where the contact is located.

4.3.3 CONTACT

A Contact is displayed as a small dot on your Radar Display and indicates that your radar has picked up an aircraft. If the Contact is on the left side of the Radar Display, it means that the target is to the left of your current heading.

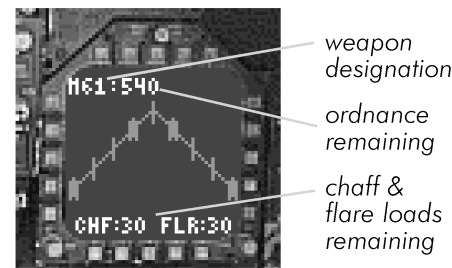
4.4 STORES DISPLAY

Your F/A-18 has nine external weapon stations and is capable of carrying a whopping 17,000 pounds. of ordnance! The Stores Display will tell you everything you need to know about

your armament on each station as well as information on your M-61A1 20mm Automatic Gun and countermeasures.

4.4.1 WEAPON DESIGNATION

The Weapon Designation is the name of the currently armed weapon.



4.4.2 ORDNANCE REMAINING

The number of rounds remaining for the currently selected weapon.

4.4.3 WEAPON TYPE

The Weapon Type will be either “A-A” for an air-to-air weapon or “A-G” for an air-to-ground weapon. If it is neither one of these, the Weapon Type will be blank.

4.4.4 STATION LOCATION

The nine stations are graphically displayed on the Stores Display. Any stations containing the currently armed weapon are highlighted. Since your

M-61A1 20mm Automatic Gun is internal, and not on any of the nine external stations, than no highlight appears.

4.4.5 NUMBER OF CHAFF

Chaff are counter-measures used to defend against hostile radar installations. Chaff can be useful against radar guided SAMs and radar guided A-A missiles. Your F/A-18 is equipped with 30 chaff loads when the mission starts.

4.4.6 NUMBER OF FLARES

Flares are counter-measures used to defend against infrared homing missiles. A flare can be useful against heat-seeking A-A missiles and SAMs. Your F/A-18 is also equipped with 30 flares when the mission starts.

4.5 WAYPOINT DISPLAY

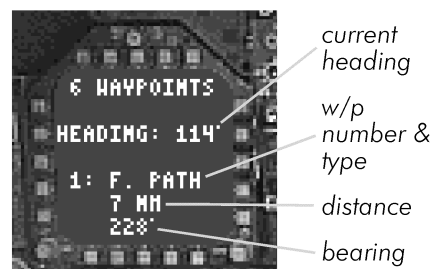
The Waypoint Display contains all the information you need for waypoint navigation.

4.5.1 NUMBER OF WAYPOINTS

Each mission will call for a unique flight plan. There can be any number of waypoints on a mission and the total number is specified in the Number of Waypoints.

4.5.2 CURRENT HEADING

Your Current Heading contains your aircraft's compass angle expressed in degrees. Zero degrees means that you are flying north, 90 degrees means east, 180 degrees mean south, and so on.



4.5.3 WAYPOINT NUMBER

The Waypoint Number tells you what the current waypoint number is. If this number is equal to the Number Of Waypoints, you should be heading for "HOMEBASE".

4.5.4 WAYPOINT TYPE

The Waypoint Type can be "F. PATH", "MISSION", or "HOMEBASE".

When the Waypoint Type says "F. PATH", than your next waypoint is a simple flight path waypoint. As you follow a flight path waypoint, you should try and maintain the target altitude. In Combat Missions, your target

altitude is at or above 22,000 feet to avoid small arms fire, AAA and most Surface-To-Air missiles.

When the Waypoint Type says "MISSION", than your next waypoint marks the general location of your mission target(s). There can be any number of mission targets.

When the Waypoint Type says "HOMEBASE", than your next waypoint marks the general location of the runway. You should be prepared to follow appropriate landing procedures.

4.5.5 WAYPOINT DISTANCE

The Waypoint Distance is the horizontal range, expressed in nautical miles, to your next waypoint. Horizontal range means that your altitude is not a factor in the Waypoint Distance.

4.5.6 WAYPOINT BEARING

The Waypoint Bearing is the compass angle that you should head towards in order to fly to your next waypoint.

4.6 THREAT DISPLAY

The Threat Display will show you all of the active ground-based radar installations that surround your aircraft as they're picked up by the external sensors on your F/A-18.

It can detect SAM radar sites and

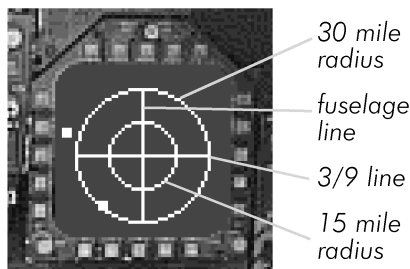
ground based radar installations and they are displayed as dots on the Threat Display.

4.6.1 FUSELAGE LINE

The Fuselage Line is used to help you determine where the active radar is located. If the Radar Source is to the right of this line, it is to the right of your aircraft.

4.6.2 3/9 LINE

The 3/9 LINE is also used to help you determine where the active radar is located. If the Radar Source is above this line, it is in front of you and you are flying towards the radar source.



4.6.3 30 MILE RADIUS

Any Radar Source within this circle is within 30 miles of your aircraft.

4.6.4 15 MILE RADIUS

Any Radar Source within this circle is within 15 miles of your aircraft. If you

notice a Radar Source inside of this circle, you should be on the alert for any SAM radar locks and be prepared to dispense some counter-measures if you notice a SAM launch.

4.6.5 RADAR LOCATION

The Radar Source is displayed as a dot on the Threat Display.

4.7 AGM-65F DISPLAY

The AGM-65F missile is equipped with an infrared imaging sensor in its nose. The benefit of infrared is the ability to see targets at night or in bad weather conditions. The missile uses the infrared image of the target for its guidance system.

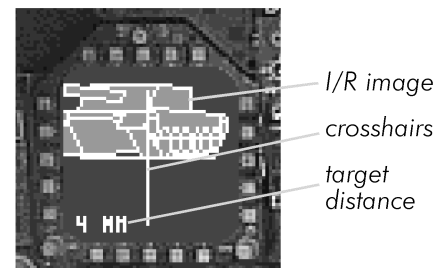
This image is also displayed on the AGM-65F Display but only when the missile is locked onto a target. In Black Knight, the target is zoomed-in at the appropriate viewing level automatically.

When an AGM-65F missile is locked onto a target and is in flight, the target's infrared image is displayed on the AGM-65F Display as viewed by the missile.

4.7.1 CROSS HAIRS

The center of the Cross Hairs marks the point where the missile will hit the

target. The missile also guides itself to this point after it's been fired.



4.7.2 TARGET DISTANCE

This is the distance that the missile is to the target and is expressed in nautical miles. Note that prior to firing your AGM-65F, this indicates the distance to the target from your plane.

4.8 TARGET DISPLAY

The Target Display is designed to assist you when you are engaging targets. There are three modes for this display which are automatically set depending on whether a target is selected or not and whether a target is an aerial or ground-based target.

When an aerial target is selected, this display will show you all the information about the aircraft you've targeted as sensed by your radar. When you've selected a ground target, it will display information about the ground target's distance and bearing.

4.8.1 GROUND TARGET MODE

Your APG-65 Pulse Doppler Radar is so advanced that it can also detect information about ground targets, not just aircraft.

This information is displayed in the Target Display. When you've selected a ground target, the Target Display will switch automatically to Ground Target Mode.

4.8.1.1 TARGET TYPE

In Ground Target Mode, there are two potential Target Types. It can either be "GRND TRGT:" or "MISSION TRGT:". When you're flying a ground strike mission, and you've selected the

appropriate target for that mission, it will say, "MISSION TRGT:", otherwise it will say, "GRND TRGT:".

4.8.1.2 DISTANCE

The distance to the ground target is displayed here and is expressed in nautical miles. This is always the distance from your aircraft to the target, unlike the AGM-65F Display.

4.8.1.3 BEARING ANGLE

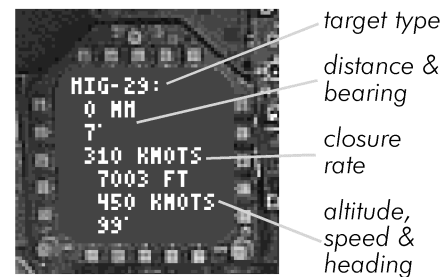
The Bearing Angle is the angle, expressed in degrees, that the selected ground target is in relation to your current heading. If the Bearing Angle is a negative number, it means that the target is to your left.

4.8.2 AERIAL TARGET MODE

Aerial Target Mode is set automatically when you've selected an aerial target.

4.8.2.1 TARGET TYPE

The Target Type tells you what type of



aircraft you've targeted. This piece of information comes from an Airborne Warning And Control System (AWACS). To make sure that you're not targeting a friendly, check out the Target Type before you decide to shoot this target.

4.8.2.2 DISTANCE

This is the distance to the target, from your aircraft, and is expressed in nautical miles.

4.8.2.3 BEARING

The Bearing is the compass heading, relative to yours, that you must fly to in order to be in line with the target. If it is a negative number, that means it is to the left of your current heading, and a positive reading means that the target is to the right.

4.8.2.4 CLOSURE RATE

The Closure Rate is the rate at which you are "closing-in" on the target. For example, if you are both heading directly towards each other and you are both flying at 200 knots, the Closure Rate is 400 knots.

4.8.2.5 ALTITUDE

This is the altitude of the target and is expressed in feet.

4.8.2.5 VELOCITY


This number indicates the airspeed of the target and is expressed in knots.

4.8.2.6 HEADING

This is the current heading of the target, expressed in angles, from 0 to 359. 0 means north, 90 means east, 180 means south, and 270 means west.

4.9 MAP DISPLAY

The Map Display is located low and center in your cockpit. It's a scrolling map that lets you see the surrounding terrain. To scroll the map, use the map scrolling keys.

To return the map to your current latitude and longitude, press the  key. Superimposed over the Map Display are some general navigational aids. These are explained in the next few sections.

4.9.1 COMPASS MARKINGS

The Compass Markings are simply stationary points designating the standard compass directions of travel: North, East, South, West, and so on.

4.9.2 CURRENT COMPASS HEADING

Your Current Compass Heading is a line projected from the center of the

compass, to the direction of your current heading.

4.9.3 WAYPOINT MARKER

The Waypoint Marker designates the compass heading that you should be heading towards in order to stay on course with your current waypoint.

4.9.4 CENTER CIRCLE

The Center Circle marks your latitude and longitude location on the map, but only if you have not scrolled the map. If you have scrolled the map, this will be an incorrect latitude and longitude location and you should press the (=) key to scroll the map back to your current location.

4.10 WARNING /WEAPON INDICATOR

4.10.1 WARNING

When your F/A-18 is in danger of falling apart, due to a structural limitation of the airframe, the Warning Indicator will turn on. There are a few reasons why this could happen - flying too fast, damage to the control surfaces, damage to the airframe, or when the airplane is spinning out of control pushing it to its structural limit.

4.11 STATUS INDICATORS

There are several Status Indicators

which relay some information about your aircraft. They are explained in the next few sections.

4.11.1 CURRENT WEAPON DISPLAY

The Current Weapon Display indicates the type of weapon that is currently armed, as well as the number remaining. When it says "A-A", it means that your currently armed weapon is for air-to-air deployment. When it says "A-G", it means that your currently armed weapon is for air-to-ground deployment.

4.11.2 ENGINE AND FUEL INDICATORS

The engine and fuel indicators are displayed as LED read-outs in the F/A-18 cockpit. They can be found on the right-hand side of the cockpit, above the right DDI. Engine power is shown as a percentage ranging from 0% to 100%. If you go to afterburners, the display says AFB.

4.11.3 FUEL

The FUEL read-out is directly beneath the engine percentage display. It displays the number of pounds of fuel remaining. Note that this read-out displays the amount of fuel remaining for your current fuel source. If you are currently using your external tank, it will display the pounds of fuel remaining for your external tank and disre-

gard measuring any fuel from your internal tank. The reverse is also true.

4.12 WARNING LIGHTS

There are several warning lights and indicators that relay important information about any potential radar locks, missile launches, and your F/A-18's status.

In the very center of the cockpit there is a series of five lights. Depending on your status they will display various things.

4.12.1 SAM

The SAM light will turn on when a SAM launcher has locked your F/A-18 on his radar.

4.12.2 A-A

The A-A light will turn on when an aircraft has locked your F/A-18 on his radar.

4.12.3 RAD

RAD is short for radar and when the RAD light is on, it means that there is a radar source, within 30 miles of your F/A-18, that is tracking your aircraft. It could be either a SAM launcher's radar, or a ground based radar. To find out where the radar source is being emitted from, use your Threat Display.

4.12.4 FAIL

When the FAIL light is on, it means that your F/A-18s structure is damaged severely.

4.12.5 ENG

When the ENG light is on, it will show either L for left or R for right engine. This generally means one of two things. The first is that one of your engines is damaged and can no longer produce thrust. The second is that it caught fire, but only if the fire light is on as well.

4.12.6 HYD

HYD is short for hydraulic pressure. If your F/A-18 has been hit by a missile, it may have caused damage to the hydraulic system. This will cause the hydraulic system to lose pressure and eventually, this light may turn on to warn you. You may not be able to control certain aspects of your F/A-18 anymore.

4.12.7 FUEL

When you have run out of fuel, your fuel light will turn on. At this point, if you have an external fuel tank, you should use it. However, if you don't have any fuel left, you should jettison all of your weapons, and try to make a controlled crash landing on a level

area.

4.12.8 CTRL

CTRL stands for control surfaces. When this light is on, it means that either your aileron, elevator, or rudder is damaged.

4.12.9 FIRE

When you see this light, be careful. You're F/A-18 is on fire and it will probably spread and cause your fuel tank to blow up.

4.12.10 STALL LIGHT

When this light turns on, it means that your F/A-18 is flying too slowly in order for your wings to produce lift. Lift is the force that keeps you in the air and lift is generated by the airflow over the wings.

The status of the flaps, gear and brake will also show up on this five panel display. Note, however, that only one status light will display on the panel at any given time. For example, if you put your flaps down, the "FLAPS" light will come on. If you put your gear down, the "FLAPS" will be replaced by "GEAR." The same is true of the brake. In practice, it is better to depend on the status of the three small lights near the left DDI that will be described in section 4.14.1.

4.13 INDICATOR LIGHTS

There are several sets of indicator lights in your cockpit. These are used for determining proximity to your airfield, FOX1 and FOX2 status, status of flaps, gear, and brake, and target status.

4.13.1 FLAPS, GEAR, AND BRAKE

Just above the left DDI there are three square lights. From top to bottom, they indicate the status of the flaps, the landing gear, and the air brake.

When the FLAPS indicator light is on, it means that you have your flaps lowered. Your F/A-18 has a lower stall speed when your flaps are lowered and can fly slower. The flaps down light is yellow.

When the GEAR indicator light is on, your landing gear is down. The gear down light is green.

When your BRAKE indicator light is on, it means that either your wheel brake is engaged or air-brake is deployed. The brake on light is red.

Depend on these three lights to give you instant information about the flaps, gear, and brake.

4.13.2 LANDING MARKER LIGHTS

Three small rectangular lights are

located above the left DDI and to the left of the flaps, gear, and brake indicators. These are used when landing. The bottom one indicates when you have reached the outer marker of the landing zone by turning red. The center one indicates the mid marker and it turns yellow. Lastly, the top one indicates the inner marker and it turns green. Unless you are making your approach, all three will be off.

4.13.3 TARGETING INDICATORS

Above each DDI there is a window-shaped light. These are used in targeting the enemy. When no enemy has been targeted, they will be out. When you target an enemy, they will turn yellow. When an enemy is in range, they will turn green and begin to strobe. The purpose is to give you a noticeable visual indication of target status so you can pay attention to other things.

Chapter 5: Ground School



Ted Carlson/Fotodynamics

5. GROUND SCHOOL

5.1 OVERVIEW

You don't have to be an aeronautical engineer to understand the basics of why an airplane can fly. For most purposes, a pilot needs to have a general understanding of the four major forces acting on an aircraft in flight. These forces are lift, drag, thrust and weight.

5.2 LIFT AND WEIGHT

The only thing required to keep an aircraft in the air is a force that is equal and opposite to its weight. This force is called lift and is produced by the flow of air over the wings. This is why aircraft have to move forward in order to fly so that their wings can produce lift. A helicopter blade is similar to a wing and since its "wings" turn rapidly, the same lifting force is produced.

You can think of the lifting force as being perpendicular to the wings. In steady and level flight, it pulls the aircraft straight upwards while the weight pulls it downwards. However, when you bank your aircraft the lift is no longer straight upwards and not only do you lose altitude, but your heading begins to change.

5.3 THRUST AND DRAG

As already mentioned, lift is produced only when air flows over the wing. To make that air flow over the wing, the aircraft needs to travel at a sufficient speed. Its engines produce the force that propels it forward and this force is the thrust.

Drag is a force that slows an aircraft down and for our purposes, it is opposite to the thrust. Drag is the wind-resistance produced by the surfaces of the aircraft hitting the air. If the drag is greater than the thrust, in level flight, the airspeed will decrease and vice-versa.

5.4 ANGLE OF ATTACK

Angle of attack is the angle of the aircraft relative to the direction of travel. It's like holding your hand out of a car window - the more air that hits your hand, the more force there is that pushes it back, and the greater the angle of attack. The greater the angle of attack for a given altitude, the more drag an aircraft will experience. This is why turning an aircraft causes it to slow down due to the increase in angle of attack.

5.5 ALTITUDE CONSIDERATIONS

All of the forces, except weight, differ

depending on an aircraft's altitude because the atmospheric density and amount of oxygen decreases with altitude. At higher altitudes, your engines produce less thrust, your wings generate less lift, but your drag decreases. Because of this interesting relationship between the thrust and drag, each aircraft has a unique maximum speed. An F/A-18 can fly at MACH 1.8 at 36,000 ft.

5.6 G FORCE

A measurement often referred to by fighter pilots is G force. When you are standing on the ground, you are experiencing one G. On a roller coaster, your body might feel 3 times heavier than normal and this would be 3 Gs. When you turn your aircraft, this same type of measurement is used. Both your body, and the aircraft, experience the same G force.

5.7 CONTROL SURFACES

Maneuvering an aircraft involves nothing more than altering the forces that act on that aircraft. The forces are altered by manipulating the control surfaces on the wings and tail.

5.8 AILERON

The aileron controls the roll angle of an aircraft. The ailerons alter the lift

for each wing where the right wing produces an opposite lifting force from the right wing causing it to spin. The F/A-18 uses aileron-rudder interconnect to stabilize it during roll.

5.9 STABILATOR

The elevator controls the pitch of your aircraft. When pulling back on the stick, your stabilators are altered causing your aircraft to move upwards and pushing forward on the stick causes the nose of your aircraft to move downwards.

5.10 RUDDER

The rudder controls the two vertical tail surfaces of the F/A-18 causing it to side-slip or change your yaw angle. At high speeds, your rudder is slow, however the rudder is used primarily for A-G targeting and landing where slower speeds are required.

5.11 AIR-BRAKE

Your air-brake is located on the upper-rear surface of the engine housing. When you engage your air-brake, a flat surface is raised into the air to cause drag. The increased drag slows you down.

5.12 FLAPS

Flaps are surfaces on the wing that, when engaged, provide more lift. This is necessary to allow high-performance aircraft to fly at the relatively low speeds required at takeoff and landing. However, your flaps increase drag, preventing the aircraft from attaining higher speeds until they've been retracted..

5.13 STALL RECOVERY

When you are flying so slow that your wings can no longer produce enough lift to counter-act the weight, you begin to stall. If you are rapidly losing airspeed at a low altitude, the force of weight will pull your nose towards the ground and you'll start descending rapidly and probably crash before you have time to recover. Another danger is present when you stall during air-combat as you won't be able to maneuver your plane that well when stalling.

The best way to recover from a stall is to level your roll aspect, set full throttle, make sure that your air-brake is not engaged, and pull back on the stick till you are no longer in danger.

Chapter 6: Training Missions



Ted Carlson/Photodynamics

6. TRAINING MISSIONS

This chapter discusses all available Training Missions. It is recommended that you fly these missions in Beginner Mode and with the Flight Instructor turned on. These options are set in the TRAINING MENU, which is accessed from Flight Controls on the MAIN MENU. They will provide realtime help information and other important features for the beginner.

6.1 MISSION 1: TAKE-OFF / WAYPOINTS / LANDING

This section pertains to standard take-off and landing procedures as well as waypoint navigation with Training Mission 1.

6.1.1 TAKE-OFF

In this mission, you start on the runway. The control tower will alert you that you are cleared for take-off. Before you throttle up your engines, release the wheel-brake by pressing the **[K]** key. Once you've done this, you can increase your throttle for take-off. Press the **[*]** key and engage the afterburner. The AFB indicator will be displayed. When this occurs, you are at maximum throttle and should already be moving down the runway.

It is important to keep an eye on your airspeed located on the HUD. If you are traveling too fast on the ground, your tires will blow out, and you'll eventually crash.

When you are traveling at 180 knots, gently pull back on the stick. You want to reach a pitch angle of 5 degrees as indicated by the Pitch Ladder on the HUD. Once off the ground, raise your landing gear and flaps. You can do this by pressing the **[G]** and **[F]** keys accordingly.

When you reach 250 knots, you can begin your 25 degree climb by pulling back on the stick. For this mission, we'll climb to an altitude of 10,000 ft. When you've reached that altitude, you can level off. Once your airspeed is about 600 knots, decrease your throttle to about 60% engine RPM. If you find that you are flying excessively fast, you can activate the air-brake, but be sure to release it again when you reach 600 knots.

6.1.2 WAYPOINTS

Now you're ready to follow your waypoints. Waypoints are an essential part of navigation. Failure to follow your waypoints can be dangerous in a war zone because they are usually strategically planned to avoid radar detection from SAM launchers and ground

based radar stations. Your flight plan is loaded into your F/A-18's on-board computer before you take-off.

Waypoints are a series of imaginary points on the earth that you must fly to in order to follow a pre-determined flight plan. There can be any number of waypoints on a mission and the main goal is to maneuver your F/A-18 so that you are in line with the current waypoint. Once you have successfully reached a waypoint, your waypoint data is updated automatically by your on-board computer. Once updated, you'll know the new bearing angle (or compass heading) to your next waypoint. This information is displayed in three places:


- 1) As a marker near the edge of the map display.
- 2) As a marker near the top of the HUD display.
- 3) On one of your DDIs, if the Waypoint Display is selected.

Your DDIs Waypoint Display contains vital information regarding your waypoints. For a discussion of this display, please refer to chapter on the Cockpit.

6.1.3 LANDING

Whenever your DDIs Waypoint Display is a "HOMEBASE" waypoint, you know that it's time to come in for a

landing. The first thing you should do is maneuver your plane so that your heading is in line with the waypoint bearing angle as usual.

Once you are in line with the waypoint, you can use the ILS (Instrument Landing System) to help you line up with the runway. Press the  key to engage your ILS.

The ILS provides you with important information about your landing approach. Vertical and horizontal deviation bars are displayed on the HUD as dotted lines. When they form a cross, you are perfectly in line with the runway.

When the horizontal deviation bar is below the center, it means that you must pitch your nose down to intercept the appropriate glide path. When the horizontal deviation bar is above the center, it means that you must pitch your nose up to intercept the appropriate glide path.

When the vertical deviation bar is to the left of center, it means that you must fly somewhat to the left of the start of the runway because you are not in line with the glide path and the same can be said when the bar is to the right.

Once you're in line with the runway

and your deviation bars are in cross, you can maintain that appropriate glide path by pointing your nose directly towards the start of the runway.

Don't be too worried about getting those bars in a perfect cross. It is merely used to aid you in lining up as close as possible. For fine tuning your landing approach, you should only need to "pitch and rudder". Keep the nose up slightly and use the rudder controls.

Throughout the process of lining up with the runway, you should keep a close eye on your airspeed. When you are about 10 miles away, you should be traveling no faster than 400 knots. When you are directly over the start of the runway, you should be flying level with the runway at around 180 knots. The easiest way to do this is to set your throttle to 60% engine RPM and use your air-brake if you need to slow down. Don't forget to lower your landing gear and flaps when you are about 2 miles away. (You can look at your Waypoint Display on your DDI for determining your distance to the airstrip).

In the final stages of landing, when you are over the start of the runway, you need to be about 100 feet up, flying level, throttle at around 60%

engine RPM, and traveling at around 180 knots. If you are flying excessively fast, or are not lined up with the runway, you'll need to abort the landing and try again.


If all is well, you can enter your final stage of the landing procedure. The velocity vector and AOA bracket on your ILS HUD display will come in handy at this point. You should slow down to about 165 knots, pitch your plane up to about 5 degrees and place the velocity vector as close as possible to the center of the AOA bracket. Eventually your back wheels will touch down on the runway for a perfect landing. Try to stay above 160 knots or you may stall and crash. (Note: In Beginner Mode, you can smash into the ground and you won't crash.)

At touchdown, force your front wheel to the ground by pushing forward on the stick, engage your wheel brake, and cut your throttle. When you come to a complete stop, the mission will end automatically.

Although this mission may appear complicated at first, with a little practice, take-off, following your waypoints, and especially landing, will become easier.

6.1.4 EMERGENCY LANDING

There are times when you will need to make an emergency landing such as when you have run out of fuel, or have taken damage rendering the landing gear inoperable.

If you have run out of fuel, you may only need to switch fuel tanks and throttle back up to speed. To switch between internal and external fuel tanks, press the  key.

Otherwise, if you don't have any fuel left, or your landing gear is inoperable, you should jettison all of your weapons, and try to make a controlled crash landing on a level area. Failure to jettison your weapons could cause them to blow up on impact.

6.2 MISSION 2: AIR COMBAT / AIM-7M TRAINING

This section pertains to the usage of your AIM-7M Sparrow missile with Training Mission 2.

This mission starts in the air and you must know how to follow your waypoints, and land. Your automatic targeting system will designate the target for you.

The AIM-7M missile relies on your airplanes radar for its guidance system. In other words, your radar senses the

location of the bandit and relays that information to the missile as it flies. This means that you must be facing the target at all times before and after you fire the missile until the missile has either hit or missed the target.

The AIM-7M will only work at ranges between 1 and 30 miles. It's not very useful in a close range dogfight.

To select your AIM-7M missile, press the air-to-air selection key until the Current Weapon Display indicates AIM-7M. If you hear a low pitched tone, it means that your radar has picked up the target but you are not within the 1 to 30 mile range to the target. Before you fire your AIM-7M at the target, you must be sure you have a missile lock.

Just because you had a lock when you fired your missile, doesn't necessarily mean that your missile is guaranteed to hit its target. The closure rate of the missile to its target in conjunction with the dynamics of flight, make a 100% chance of hitting the target impossible. This is one of the reasons why your missiles are programmed to explode automatically when they pass the target because it will increase their chances of doing some damage. In any case, if you've missed the target, you will have to try again.

When the target is destroyed, you'll hear an explosion and all traces of its existence will cease. Your Target Display will say, "NO TARGET" and your Radar Display will show nothing. At this point, follow your waypoints and come in for a landing.

6.3 MISSION 3: AIR COMBAT / AIM-9M TRAINING

This section pertains to the usage of your AIM-9M A-A Sidewinder missile with Training Mission 3.

This mission starts in the air and you must know how to follow your waypoints, and land. Your automatic targeting system will designate the target for you.

The AIM-9M has an infrared imaging system in its nose. When a target is selected, it will lock onto the heat produced by the bandits engines. This means that it can only lock onto a target when it can detect the heat of the engine, so you must be behind the enemy, and not flying towards each other.

This may require some maneuvering.

The AIM-9M will only work at ranges between 1/4 and 10 miles. It's not very useful in a long range engagement.

To select your AIM-9M missile, press the air-to-air weapon selection key until your Current Weapon Display indicates AIM-9M. If you hear a low pitched tone, it means either that you are not within the 1/4 to 10 range, or that your missile can't see those heat producing engines. The Graphical Aspect Angle attached to the Contact on your Radar Display will come in handy for determining whether your missile can see those engines. The closer that the Graphical Aspect Angle is to pointing upwards, the better chance there is that your missile can obtain a lock. This may in fact require flying straight into the turning path of the bandit for a while. For instance, if the bandit aircraft was damaged and puffing smoke, you would try turning into the smoke. In other words, you need to fly into his turn circle and follow him through the turn. If your turn rate is faster, you're sure to get a lock eventually.

An advantage of the AIM-9M over the AIM-7M is that once you fire, you don't need to continue to point your radar at the enemy. The AIM-9M flies itself and is a fire-and-forget weapon. It is also somewhat more accurate.

Before you fire your AIM-9M at the target, you must be sure you have a missile lock.

Just because you had a lock when you fired your missile, doesn't necessarily mean that your missile is guaranteed to hit its target. The closure rate of the missile to its target, in conjunction with the dynamics of flight, makes a 100% chance of hitting the target impossible. This is one of the reasons why your missiles are programmed to explode automatically when they pass the target because it will increase their chances of doing some damage. In any case, if you've missed the target, you will have to try again.

When the target is destroyed, you'll hear an explosion and all traces of its existence will cease. Your Target Display will say, "NO TARGET" and your Radar Display will show nothing. At this point, follow your waypoints and come in for a landing.

6.4 MISSION 4: AIR COMBAT / M-61A1 TRAINING

This section pertains to the usage of your M-61A1 20mm Automatic Gun with Training Mission 4.

This mission starts in the air and you must know how to follow your waypoints, and land. Your automatic targeting system will designate the target for you.

Your M-61A1 20mm Automatic Gun, or cannon, is the hardest to master. There are 540 rounds at your disposal in the F/A-18. The effective range is 0 to 4,000 ft, but this range is sufficient for close range air-combat.

Obviously, there is no guidance system associated with bullets and shooting a bandit with one takes practice. However, your HUD displays a radar directed Gun Sight to help you aim at the bandit. It is radar directed, in that it uses the distance to the bandit, as calculated by your radar, to determine where the bullets will land.

In theory, when you place your Gun Sight directly on the bandit, any bullets fired will hit the bandit. However, there are many factors, especially in the dynamics of the flight involved in air-combat, that make this theory somewhat inaccurate. You don't want to wait until the Gun Sight is directly on the bandit before you shoot, but rather you want to begin shooting just BEFORE you think the Gun Sight is on top of the bandit and stop shooting when you know you won't hit the bandit. However, even if you hit the bandit, it may not do much damage - You may need to get a few good shots at 'em.

Using your M-61A1 20mm Automatic Gun is often necessary, as you may

not have any missiles left or you may be too close to the bandit to use your missiles.

When the target is destroyed, you'll hear an explosion and all traces of its existence will cease. Your Target Display will say, "NO TARGET" and your Radar Display will show nothing. At this point, follow your waypoints and come in for a landing.

6.5 MISSION 5: GROUND ATTACK / AGM-88A TRAINING

This section pertains to the usage of your AGM-88A A-G HARM missile with Training Mission 5.

This mission starts on the runway and you must know how to take-off, follow your waypoints, and land. You must also keep an eye on the Waypoint Type as indicated on your Waypoint DDI - If it says "MISSION", then it's time to complete your mission objective. Your automatic targeting system will designate the target for you.

The AGM-88A locks on to any target that emits radar energy. They are useful against radar guided SAM launchers (surface to air missiles), and ground based radar. Any target illuminated on your Threat DDI can be locked by an AGM-88A missile. It has a range of 1 to 30 miles.

To select your AGM-88A missile, press the air-to-ground weapon selection key until your Current Weapon Display indicates AGM-88A. If you hear a low pitched tone, it means that you are not in range to the target. Before you fire your AGM-88A at the target, you must be sure you have a missile lock.

Just because you had a lock when you fired your missile, doesn't necessarily mean that your missile is guaranteed to destroy its target. If the target is not destroyed, try taking another shot.

When the target is destroyed, you'll hear an explosion and see smoke and fire rise out of the ashes. At this point, follow your waypoints and come in for a landing.

6.6 MISSION 6: GROUND ATTACK / AGM-65F TRAINING

This section pertains to the usage of your AGM-65F A-G Maverick missile with Training Mission 6.

This mission starts on the runway and you must know how to take-off, follow your waypoints, and land. You must also keep an eye on the Waypoint Type as indicated on your Waypoint DDI - If it says "MISSION", then it's time to complete your mission objective. Your automatic targeting system

will designate the target for you.

The AGM-65F has an infrared imaging system in its nose. When a target is selected, it will lock onto the portion of the image that represents the target. This infrared image, much like a TV picture, can be displayed on the AGM-65F Display on a DDI in your cockpit. Since it is infrared, it also works at night and in fog. It has a range of 1 to 13 miles.

To select your AGM-65F missile, press the air-to-ground weapon selection key until your Current Weapon Display indicates AGM-65F. If you hear a low pitched tone, it means that you are not in range to the target. Before you fire your AGM-65F at the target, you must be sure you have a missile lock.

Just because you had a lock when you've fired your missile, doesn't necessarily mean that your missile is guaranteed to destroy its target. If the target is not destroyed, try taking another shot.

When the target is destroyed, you'll hear an explosion and see smoke and fire rise out of the ashes. At this point, follow your waypoints and come in for a landing.

NOTE: In a combat mission, there may be more than one target and if

this is the case, continue to destroy the targets until your waypoint data has been updated. If you run out of missiles and have not completely destroyed your mission objective, press the **[W]** key to override your “MISSION” waypoint.

6.7 MISSION 7: GROUND ATTACK / MK-80 TRAINING

This section pertains to the usage of your MK-80 Series General Purpose Bombs with Training Mission 7.

This mission starts on the runway and you must know how to take-off, follow your waypoints, and land. You must also keep an eye on the Waypoint Type as indicated on your Waypoint DDI - If it says “MISSION”, then it’s time to complete your mission objective. Your automatic targeting system will designate the target for you.

MK-80 Series Bombs are free falling bombs with no guidance system or boost phase. To deliver one of these, you must put the Impact Area designator, located on the HUD, right on top of the target. The best way to deliver these weapons is at a slow airspeed, at low altitude in a shallow dive. It will take some fancy maneuvering to get lined up with the target.

To select your bombs, press the air-

to-ground weapon selection key until your Current Weapon Display indicates MK-82, MK-83, or MK-84. When you think you’ve got the target in your sights, you can release your bombs.

There is a considerable margin of error associated with unguided bombs, such as wind and the turbulence of your aircraft at the point of release. If the target is not destroyed, try taking another shot.

When the target is destroyed, you’ll hear an explosion and see smoke and fire rise out of the ashes. At this point, follow your waypoints and come in for a landing.

NOTE: In a combat mission, there may be more than one target and if this is the case, continue to destroy the targets until your waypoint data has been updated.

6.8 MISSION 8: GROUND ATTACK / ROCKET TRAINING

This section pertains to the usage of your Rockets with Training Mission 8.

This mission starts on the runway and you must know how to take-off, follow your waypoints, and land. You must also keep an eye on the Waypoint Type as indicated on your Waypoint DDI - If it says “MISSION”, then it’s

time to complete your mission objective. Your automatic targeting system will designate the target for you.

Rockets are like unguided missiles in that they have a boost phase but no guidance system. They are useful against targets covering a large area. The best way to deliver these weapons is at a slow airspeed, at low altitude in a shallow dive. It will take some fancy maneuvering to get lined up with the target.

To select your rockets, press the **[I]** key until your Current Weapon Display indicates M151 or MK5. When you think you’ve got the target in your sights, you can shoot your rockets by pressing **[space]** or joystick trigger.

There is a considerable margin of error associated with rockets, such as wind and the turbulence of your aircraft at the point of firing. If the target is not destroyed, try taking another shot.

When the target is destroyed, you’ll hear an explosion and see smoke and fire rise out of the ashes. At this point, follow your waypoints and come in for a landing.

NOTE: In a combat mission, there may be more than one target and if this is the case, continue to destroy

the targets until your waypoint data
has been updated.

Chapter 7: Air Combat



Ted Carlson/Photodynamics

7. AIR-COMBAT

Air-combat is like 3D chess - Each move you make will have a direct impact on the final outcome. Besides winning an air-combat engagement, the main goal is to maneuver your aircraft into the proper parameters of your weapon so that you can shoot. In this chapter, we'll discuss some topics relating to air-combat.

7.1 STRATEGY

7.1.1 TURN RATE

The most important part of maneuvering your aircraft is how fast you can turn. If you can out-turn your opponent, you can get into weapons parameters and take the first shot. A faster turn rate can also save you when you need to get out of your opponents gun sight.

Your fastest turn rate, for a given altitude, is achievable when you pull the most Gs. At higher altitudes, you can't pull as many Gs as you can at lower altitudes.

So, how many Gs can you pull? It depends on your velocity. Although it varies slightly with altitude, in an F/A-18 you can pull the most Gs when you are traveling between 550 and 600 knots. Going any faster or slower

than this will mean that you won't be able to pull the maximum amount of Gs.

Tip: One thing to remember. If you have "Blackouts" turned on, pulling a high number of Gs will have an effect on you. One thing you can do is to pull the turn as hard as you can until the blackness starts to overtake you, and then ease off slightly. This will accomplish the major goal of making the turn, while not having you black out for an extended period of time.

7.1.2 MISSILE DEFENSE

When you see your FOX1 or FOX2 threat indicator lights go yellow, it means that enemy radar has locked onto you in preparation for a missile attack. When it begins to strobe red, it means the missile has been launched.

The first thing you should do is release your counter-measures and commence a hard turn to the left or right until your wings are perpendicular to the flight path of the missile. To put this another way, your 3/9 line is an imaginary line from wing tip to wing tip. When your 3/9 line is "pointing" towards the missile, you are flying perpendicular to the missile.

Flying perpendicular to the missile

gives you the greatest chance of not getting hit because it has the greatest angle-off, or heading, relative to your aircraft. This means that the missile has to make constant, abrupt changes in heading and it may in fact overshoot your aircraft.

If your FOX1 (lower) warning light comes on it means that there is a radar guided missile launched at your aircraft. Chaff is strips of foil that reflect the hostile radar energy and confuse it. Deploy your chaff counter-measures. Continue to deploy these counter-measures until your FOX1 stops flashing.

However, if your FOX2 (upper) warning light comes on it means that there is an infrared guided missile launched at your aircraft. Infrared guided missile home-in on the heat produced by your engines. Deploying flares may confuse the hostile missile. Deploy your flares and take some evasive action. Continue to deploy these counter-measures until your FOX2 light is not on.

Tip: In actual combat, pilots will often dispense a combination of chaff and flares, just to cover all possible contingencies. On the actual F/A-18, the pilot determines what they want to have released at given intervals when they respond to a missile threat. This

combination is then released automatically at the press of a button.

7.1.3 DEFENSIVE MANEUVERING

The best thing to do when there is a bandit on your six, is to point your “lift vector” towards the bandit and begin a hard defensive turn. What’s a “lift vector”? You can think of your lift vector as a line, that is permanently

attached to your aircraft, and points straight up from the wings.

When you are flying level, your lift vector is pointed towards the sky, and when you are flying upside-down, it would be pointing to the ground.

Pointing your lift vector towards the bandit and turning will pose the most problems for the bandit. Although this

means that you may pass directly in front of his direction of travel, and even his gun sight, it will only occur for a short period. Eventually, the bandit will have to do the most amount of maneuvering to put you back in his sights.

If you take some damage and you notice that you are spinning out of control or you see your fire and fuel lights light up, you should bail out. Press **[Shift][E]** to eject.

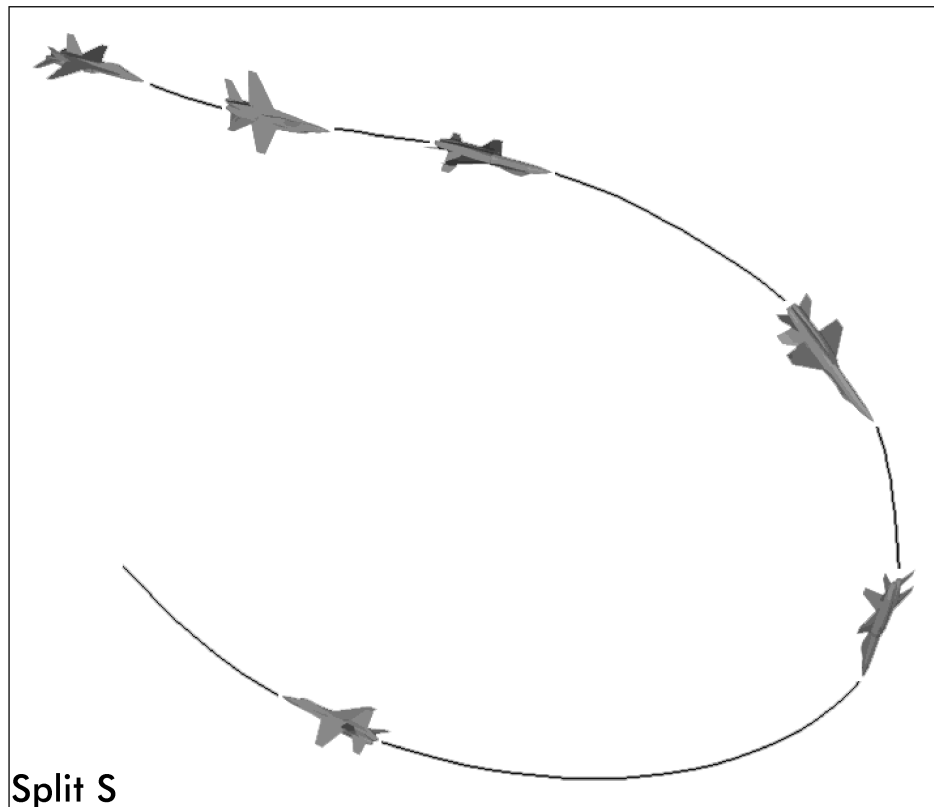
7.1.4 OFFENSIVE MANEUVERING

Your main goal in Offensive Maneuvering is to put your weapons into position to hit the bandit. Using your “Plane vs. Target” view **[F8]** will help you find the bandit if you become disoriented. Note that you must have a target selected in order for this view to work. In this view, when your plane is pointing away from you, you’re heading towards the bandit.

In a close range dogfight, the only valid weapons are your AIM-9M Sidewinder missile and your M-61A1 20mm Automatic Gun. At longer ranges, you might only be able to use your AIM-7M Sparrow missile.

7.2 COMBAT MANEUVERS

The maneuvers described in the



remainder of this chapter are basic maneuvers. In aerial combat, the use of these maneuvers may help you to elude an enemy and even turn the tables on them. A few of the maneuvers are slightly more complex and will take a bit more practice. You'll find that the practice will be well worth it when you encounter bandits during a mission. You'll note that some maneuvers are put together with others to form more complex maneuvers.

7.2.1 THE ROLL

The basic roll is very easy to do. Essentially, you are rotating the plane on its axis. In level flight, push the stick all the way to either the right or the left. You will roll around on the axis, going upside-down and then back to your normal flying position. For practice, keep the plane in level flight and just do a complete 360 degree roll. Once you feel confident, you can do a half-roll, rolling 180 degrees so you are upside-down, holding it for a moment and then rolling back to level flight.

7.2.2 THE SPLIT-S

Use: To shake an enemy, increase speed, and decrease altitude.

The "Split-S" is used to reverse your direction of flight, decrease altitude,

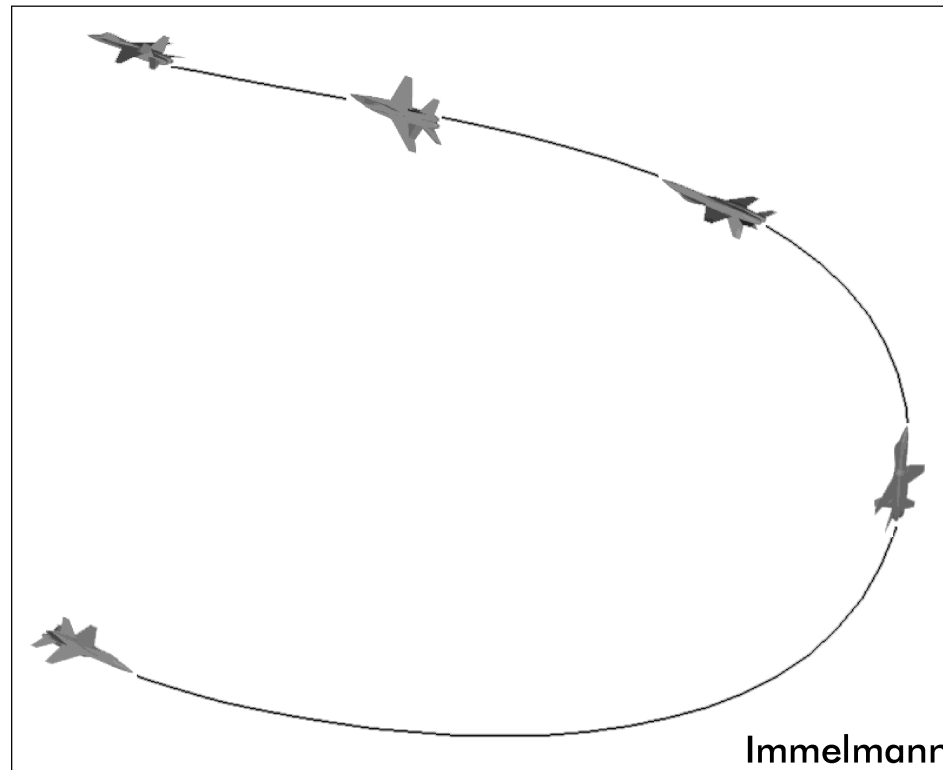
and increase air speed. It is accomplished by combining a "roll" with a "loop." While in level flight, do a half roll so you are inverted. Now, pull back on the stick. Because you are inverted, pulling back on the stick will throw you into a dive. This will increase your air speed and decrease your altitude. Do a half loop and pull out of the Split-S going in the opposite direction. This can be helpful for

evading or turning the tables on an enemy. Use your increased air speed and lower altitude to your advantage if you can.

7.2.3 THE IMMELMANN TURN

Use: Getting on the tail of an enemy that had been coming towards you.

The "Immelmann" is the exact opposite of a Split-S. It is most often used to gain altitude and get on the tail of



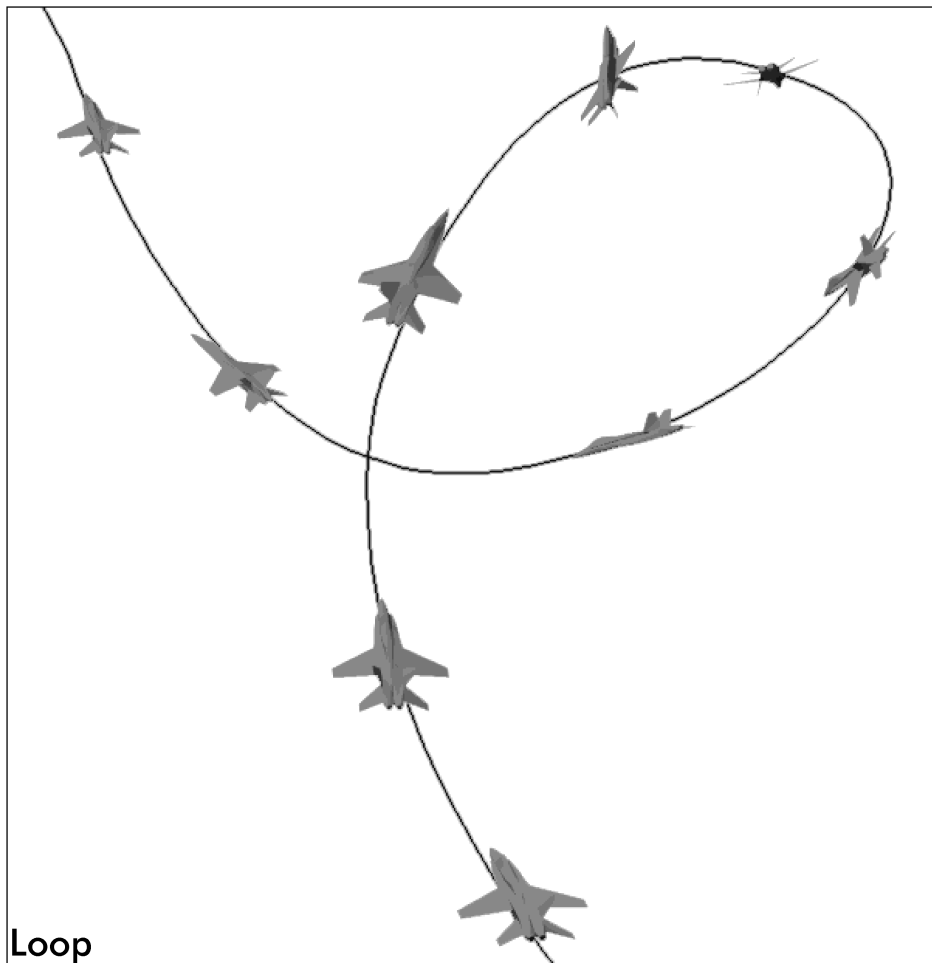
a bandit that was coming straight at you. This maneuver is named after its inventor, Max Immelmann. Immelmann was a World War I German flying ace. Starting from level

flight, make sure your air speed is adequate. Then pull back on the stick, going into a half loop. Your air speed will decrease. At the top of the loop you will be inverted and headed

in the opposite direction. To complete the Immelmann, just do a half roll so you are once again in level flight. Hopefully, you'll now be on the tail of a bandit that had been heading towards you before executing the Immelmann. Practice this and note that if your initial air speed is too low, you will stall before you can complete the maneuver. Practice makes perfect.

7.2.4 THE LOOP

While a simple maneuver, the “loop” is very useful if you have an enemy on your tail. To begin with, make sure you have adequate air speed, so you don't stall, and are in level flight. Then, pull back on the stick, lifting the nose of the plane. Keep pulling back. You'll note that your airspeed will decrease, but don't worry. As you come to the top of the loop you'll be upside-down. Continue pulling back as you go through the final part of the loop. Note that your airspeed will start to increase again. Pull out of the loop and resume level flight. Done correctly, a “loop” can help you to come out behind an enemy that was behind you before you performed the loop. At this point, you should note that if you do an Immelmann and a Split-S, you have a loop!



7.2.5 YO-YO MANEUVERS

Use: To quickly lose or gain speed, allowing you to position yourself for a higher kill probability.

Pilots refer to several different types of “yo-yo” maneuvers. One type is called a “pursuit” or “straight pursuit” yo-yo. It is also sometimes referred to as a low yo-yo. This maneuver is used when you are trying to catch an enemy that is ahead of and below you. The pursuit yo-yo begins by diving until you are at approximately the same altitude as the enemy. In order to catch him, the yo-yo sacrifices some of your altitude for increased speed. Put your plane into a shallow dive, thereby increasing your air speed. If you think you are within weapons range, bring the nose of your plane back up and take your best shot. If you are not within weapons range, bring the nose up, level off, and perform the yo-yo again. Perform this down-up maneuver several times, if necessary, until you are within weapons range. Remember, this maneuver sacrifices altitude for air-speed, while also increasing the Angle of Attack (AOA).

Another yo-yo style maneuver is called the high yo-yo. It does exactly the opposite of the pursuit yo-yo. This maneuver is generally used when you

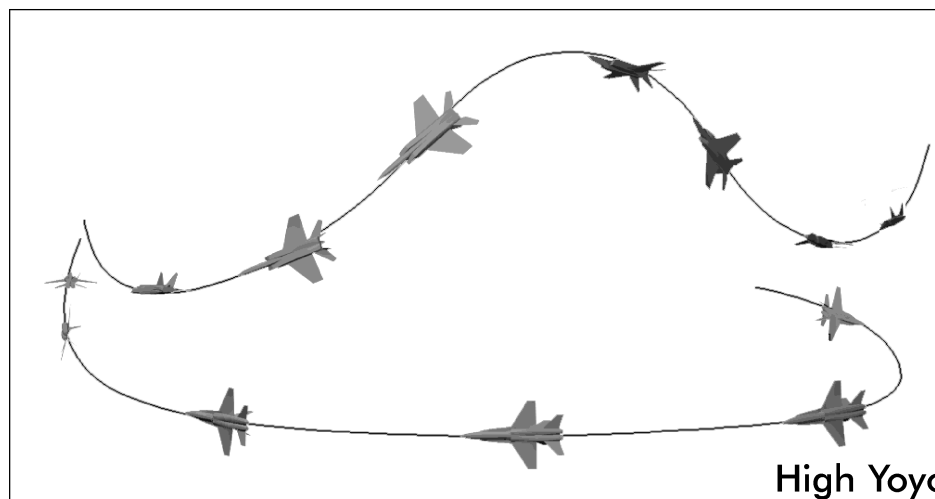
are in pursuit of an enemy and do not have sufficient Angle of Attack to make a good shot. To begin, roll out to one side slightly while pulling the nose up. This will decrease your air speed, but it will also improve your AOA. As with the pursuit yo-yo, you may have to do this several times before you achieve the desired effect. To summarize, the low or pursuit yo-yo decreases altitude while increasing speed and Angle of Attack. The high yo-yo increases the distance from the enemy, while improving the Angle of Attack.

7.2.6 THE BREAK TURN

Use: Quickly evading a closing enemy.

This is simple maneuver that may

save your life if an enemy is behind you and closing fast. It is designed to take you out of the path of enemy fire quickly, so you can move immediately into some other maneuver. In level flight push the stick to the left or right, until your wings are at about 90 degrees. (You may want to think of it as a quarter roll.) Essentially, you are turning back towards your attacker, who is behind you. Your air speed generally decreases rapidly. Also note that this maneuver produces high G forces. If you have “No Blackouts” turned off in the Training Menu, you will begin to blackout. Immediately go into another maneuver, such as a Split-S. This would increase your speed and decrease your altitude, thus increasing your distance from



the enemy. It is not recommended that you ever do a break turn without immediately following it with some other maneuver. To do so generally leaves you as a sitting duck.

7.2.7 BARREL ROLLS

Use: Both offensive and defensive.

It is not uncommon to see barrel rolls performed during an air show. The twisting path of the aircraft imitates the shape of a barrel. One might also describe the barrel roll as being like a “corkscrew.” The barrel roll can be used as either an offensive or a defensive maneuver.

Defensively, you can use a barrel roll to cause an enemy that is behind you to miss his shot. While in level flight, make an easy turn in one direction. At the same time, pull back on the stick and do a roll in the opposite direction of the turn. So, if you are turning to the left, roll to the right. Pulling back on the stick will raise the nose and reduce your speed. At the same time, the roll turns you away from the attacker. You are now inverted. Continue the roll so you head downward. Pull back slightly on the stick and continue the roll while you climb slightly again. Finish the barrel roll by completing the roll and resuming level flight.

Offensively, you can use a barrel roll to slow your plane down if you are closing too fast. Fighter pilots say that one of the worst things you can do is overshoot a bogey. This can quickly change who has the advantage. Rather than overshoot, you may want to try a barrel roll. The effect is that your air speed will decrease and you will be turning away from the enemy so you don't fly past him. The bogey will gain some distance on you, but at least you will still be in a good position to continue the pursuit.

7.2.8 THE SCISSORS

Pilots generally speak with disdain of a “scissors” maneuver. It is generally a situation a pilot tries to avoid. When a pilot finds himself in a scissors with an enemy, he knows they both have the same goal: to get the other aircraft out in front. What results is a series of turns, and counter-turns. The pilot who can make the tightest turn has the advantage. Unfortunately, the tightest turn is achieved at a slower speed. An example might be of help here. A bogey is approaching you from the rear and slightly to the left. His speed is greater than yours. You turn towards him, forcing him to turn outwards (left). Watch the bogey carefully while you turn outwards (right). The gap between you is now greater

and the bogey should turn towards you (right). You see his turn and turn back towards him (left). At this point, the bogeys path will cross yours. When it does, he will be on the opposite side of you. Here you would turn towards him (right). If you've turned tight enough and watched the bogey carefully, he should end up in your sights. One danger of the “scissors” is a stall. This often occurs because each pilot is reducing their speed in an attempt to make a tighter turn than their opponent. Another danger is losing and coming out ahead of the enemy. It's best to avoid a scissors all together. It was mentioned here because fighter pilots find it an interesting topic of discussion.

7.3 SOME FINAL WORDS

A good thing to get into the habit of doing, in air-combat, is to set one DDI to your Radar Display and the other to your Target Display. The Target Display will tell you a lot of important information about the target which is obtained through AWACS and your radar. A full explanation of the Target Display can be found in the chapter on the Cockpit.

When you are on route to a waypoint in a war zone and are not busy engaging any aerial targets, you want to

have the range set to its maximum of 80 nautical miles. This allows you to scan the largest area in the sky for potential bandits.

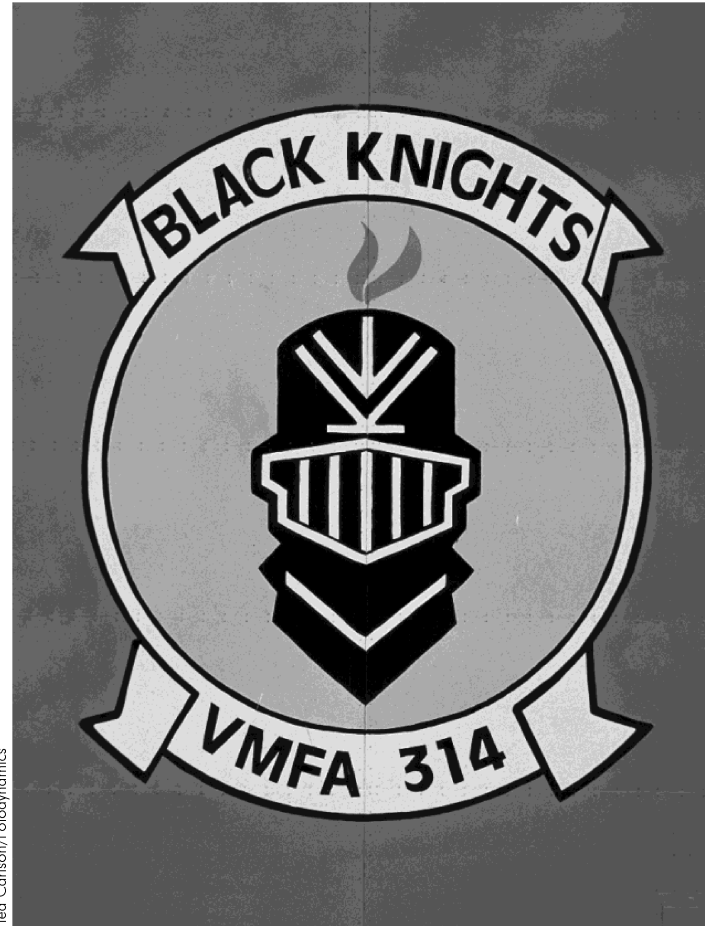
However, when you are in a close dogfight, you want the radar set to its smallest possible range. If the target you are tracking is within 10 nautical miles, set your radar to 10 nautical miles. This will allow you to have the best “view” of the target.

The aspect angle of a bandit is perhaps the single most important piece of information a fighter pilot could have. Your Radar Display shows this information as a line projecting from each Contact called the Aspect Angle. Instinct might tell you that this line is nothing more than the heading of the aircraft in relation to your heading. However, this is not the case. The aspect angle is nothing more than the angular direction from the bandits aircraft to yours. You can think of this as the angle that the bandit needs to turn his head, if he was in level flight, in order to see you. It has nothing to do with your aircraft’s heading.

To simplify this further, when the Aspect Angle is pointing straight up on your Radar Display, it means that your aircraft is positioned on his six o’clock position, the most advantageous position in air-combat. If the

Graphical Aspect Angle is projected down, you are on his 12 o’clock position and he is heading towards you.

Chapter 8: History



8. HISTORY OF THE BLACK KNIGHTS

This section gives a brief history of the Marine squadron known as the Black Knights. It contains information about the squadron from its creation to the present. We'd like to thank the Black Knights for their help in bringing you this information.

8.1 CREATION AND WORLD WAR II

Commissioned on 1 October 1943 at Cherry Point, North Carolina, VMF-314 was assigned the F-4U Corsair, and began training immediately for combat in the Pacific. Deploying to Midway Island in June, 1944, the squadron continued training until it moved to Ie Shima in May, 1945 to take part in the invasion of Okinawa. During the ensuing campaign, VMF-314 pilots were credited with 14 kills and the squadron was awarded the Presidential Unit Citation. At the conclusion of hostilities, VMF-314 moved to Kyushu, Japan, as part of the occupation force. In March, 1946, the squadron again returned to Cherry Point, North Carolina, and on 30 April 1947, was decommissioned.

8.2 THE KOREAN CONFLICT

VMF-314 was recommissioned in

1952 at Miami, Florida as part of the 3rd Marine Aircraft Wing. The next three years saw VMF-314 deployed twice; once to the Roosevelt Islands, Puerto Rico, and then to Atsugi, Japan for an eighteen month tour. In 1955, VMF-314 returned from Japan to the 3rd Marine Aircraft Wing, now stationed in El Toro, California.

8.3 IT BECOMES OFFICIAL

In 1957, the squadron received the new 4-4D Skyray, was redesignated VMF(AW)-314, and officially became the Black Knights.

VMFA-314 capped its significant achievements in 1957 by winning the Commandant's Efficiency Trophy.

8.4 THE VIETNAM YEARS

Equipped with the F-4B, VMFA-314 embarked on a series of firsts in both Marine and Naval Aviation. Between 1961 and late 1964, VMFA-314 set an F-4B record of 1,314 flight hours in a 30 day period. They also took part in 11 research, development, and evaluation projects, setting new standards in air-to-air weaponry.

In 1965, VMFA-314 returned to the Far East. In the four years of its combat operations in the Republic of Vietnam, VMFA-314 proved itself to be

the foremost Marine squadron. The Black Knights flew more than 25,000 combat hours, and F-4B record. They also dropped more than 100 million pounds of ordinance in support of allied ground units. The Black Knights took part in operations in North and South Vietnam, Laos, and the Tonkin Gulf.

In 1968, the Black Knights received the Chief of Naval Operations Aviation Safety Award. In 1969, VMFA-314 was proud to claim the Hanson Trophy from the American Fighter Pilots Association for selection as the best Marine Corps Fighter Attack Squadron. The Commandant's Efficiency Trophy was awarded to the Black Knights in 1970. In September of that year, VMFA-314 ended forty-nine months of combat deployment and received the Meritorious Unit Citation for its outstanding performance.

8.5 BREAKING NEW GROUND

The Black Knights continued to provide the best training for its fighter aircrew and ground personnel in all missions required of the F4 Phantom until 24 May 1982. At that time, the squadron's last F4 was transferred in preparation for transition to the new F/A-18 Hornet.

On 15 December 1982, VMFA-314 received its first two F/A-18s, becoming the first tactical squadron in the Navy/Marine Corps inventory to employ the Hornet. Tasked with spearheading the transition to a new generation of Strike Fighter, the Black Knights were the first to undergo a MCCRES evaluation, scoring 98, flying 351.7 hours. Later that year, VMFA-314 completed carrier qualifications aboard the USS Carl Vinson and the USS Constellation.

8.6 MIDDLE EAST OPERATIONS

In 1985, VMFA-314 was transferred to Carrier Air Wing 13, and spent much of their time preparing for an upcoming cruise. In October, ten F/A-18s embarked aboard the USS Coral Sea for duty with the Sixth Fleet in the Mediterranean Sea. With tensions high in the Middle East, the Black Knights participated in Freedom of Navigation operations in the vicinity of Libya. On 15 April 1986, VMFA-314 took part in Operation El Dorado Canyon, Gulf of Sidra and executed a combat strike on Libya. At the conclusion of this seven month cruise the Black Knights returned to El Toro, California and MAG (Marine Air Group) -11.

8.7 ANOTHER FIRST

With operations established ashore, the Black Knights concentrated on increasing their readiness in close air support, low level tactics, and air combat maneuvering. On 1 July 1986, a Black Knight pilot successfully dropped a Walleye in the R-2507 range north of El Centro, California. This was the first time a T.V. guided weapon had been deployed from a VFMA-314 aircraft.

8.8 OTHER OPERATIONS

In 1987, VMFA-314 deployed to Egypt as part of Operation Bright Star 87. There, six aircraft, nine pilots, and a ground support team conducted dissimilar air combat training with the Egyptian Air Force.

In 1988, VMFA-314 flew ten F/A-18s from MCAS El Toro to Balikesir, Turkey as part of MAG-50 for Display Determination-88, a joint NATO exercise.

In early 1989, VMFA-314 returned to WESTPAC, as part of the Unit Deployment Program for the first time since their return from the Republic of Vietnam in 1970.

The Black Knights participated in two consecutive Cope Thunder exercises

in the Republic of the Philippines. They also had several deployments throughout the Far East, one of which was Kunsan AB, Republic of South Korea. Another from Kadena AB, Okinawa was in support of the Marine Corps frontline mission. The squadron returned to El Toro in October.

8.9 DESERT STORM

In the summer of 1990, preparing to return to WESTPAC, the Black Knights were rapidly deployed to the Persian Gulf. They were the first Marine F/A-18 squadron to arrive in Bahrain for Operation Desert Shield as part of Marine Air Group 70. For nearly six months the Black Knights maintained a 24 hour a day Combat Air Patrol over the Arabian Gulf

On 16 January 1991, Operation Desert Shield became Desert Storm. The Black Knights flew over 1,500 hours and flew 814 combat sorties; more sorties than any other Navy or Marine Corps Squadron.

The Black Knights' missions included Escort, HARM, Air-To-Air Fighter Sweep, and Strike. The Black Knights were also the only Marine squadron to utilize the Walleye II smart bomb during Desert Storm. The Black Knights returned from the Gulf at the end of hostilities in March 1991, without the

loss of any squadron members or aircraft.

8.10 TO THE PRESENT

In August 1992, VMFA-314 transferred to Carrier Airwing Eleven. On 15 June 1993 the Black Knights were deployed to the Indian Ocean and Persian Gulf aboard the aircraft carrier USS Abraham Lincoln. During the deployment the squadron participated in Operation Southern Watch, enforcing the UN “no-fly-zone” in southern Iraq. They also participated in Operation Continue Hope, providing close air support to the 13th and 22nd MEU off the coast of Somalia. The squadron returned from the cruise on 15 December 1993 and was reassigned to MAG-11. Since their return, the squadron has continued to train while upgrading their jets with new 92A software.

The Black Knights participated in “Scorpion-Wind” in Yuma with all marines in December of 1994. In April, 1995 they also took part in joint service exercise “Green Flag”, an air-to-air and air-to-ground operation.

The Black Knights moved to Miramar, California from El Toro, California, on July 12, 1995.

They are currently flying F/A-18A

Lot9s and will be getting F/A-18C Lot 18s near the end of 1995. The Lot 18s have more powerful engines and advances in many other systems as well. It is expected that the Black Knights will deploy on the USS Nimitz at the end of 1995.

8.11 PROUD OF THEIR NAME: PART OF THE TRADITION

Since almost the beginning of man's great adventure into flying, pilots have loved naming their craft. The Wright brothers had the Kitty Hawk and Charles Lindbergh had the Spirit of St. Louis. In World War I, the pilots of fighters, bombers, and other aircraft started naming their planes and often accompanied the name with a picture. Many may recall the movie “Memphis Belle”, the true story of a World War II bomber and the crew that flew it. The famous planes and pilots of history tend to stay fresh in our minds, while other details may not, through their names or their insignia. Few of us haven't heard of the exploits of the Red Baron, or seen the televised missions of the Black Sheep squadron, headed by Pappy Boyington. While many of us may not remember many other details about the events that led to the end of World War II, almost everyone remembers the name, Enola Gay, the name of the

plane that dropped the atomic bomb. And so it is that the nickname of a pilot, or the insignia painted on the fuselage of a plane, may often be one of the few things that is remembered. The proud and innovative Marine pilots of the Black Knights, have maintained this tradition of distinguishing their aircraft from all others. Each of the F/A-18 aircraft flown by the Black Knights, is marked with the distinctive insignia of a black lance and the helmet from a suit of armor. The squadron designation, VMFA-314, is incorporated into the lance and helmet. Ancient tools carried into battle by the Knights of the Middle Ages. This insignia says to all who see it, “We are the Black Knights, and we have something to be proud of!”

Appendices



Ted Carlson/Fotodynamics

APPENDIX

A.1 ORDNANCE

This section deals with the weaponry that is used on your F/A 18. If you understand the weaponry more fully, you'll stand a better chance of accomplishing your missions. You'll be able to select the correct weapon for each objective. This section is broken down into "Air-To-Air" and "Air-To-Ground" divisions.

A.1.1 AIR-TO-AIR WEAPONS

A.1.1.1 AIM-9M SIDEWINDER

The AIM-9M Sidewinder is a medium-range, heat seeking missile with a maximum range of approximately 11 nautical miles (nm). The Sidewinder has a maximum "hit" probability of about 85% and is moderately lethal.

A.1.1.2 "AIM-7M "SPARROW"

The AIM-7M "Sparrow" is a radar guided missile. The pilot must obtain a positive "lock" on the enemy aircraft before firing the Sparrow. In addition, once the missile is fired, the pilot must keep the target within Range or the missile will become erratic.

Among pilots this is referred to as the missile "going ballistic." The AIM-7M Sparrow has an approximate range of 26 nautical miles. The AIM-7M

Sparrow also has an on-board, programmable processor.

A.1.1.3 THE M61A1 20 MM

The M61-A1 cannon is an effective weapon, but it must be used in very close quarters. Its range is only about 4,000 feet. It can fire approximately 6,000 rounds per minute. In battle, this weapon should only be used when you have no other options. Based on its range, you have to be almost on top of your target in order to get a "kill."

A.1.2 AIR-TO-GROUND WEAPONS

A.1.2.1 AGM-65F "MAVERICK"

The AGM-65F "Maverick" is an extremely accurate air-to-ground missile that can do a great deal of damage. It also has the benefit of being able to use several different means for guidance. These are often referred to as "smart bombs" because they are so accurate. Once the missile is locked on its target, the pilot can forget about it and concentrate on the next target. Its range is about 8.5 nautical miles.

A.1.2.2 AGM-88A HARM

The AGM-88M HARM (High-speed Anti-Radiation Missile) is used for a specific purpose. They are extremely

effective at taking out enemy radar installations. The HARM missiles lock in on the radar pulses. The AGM-88M HARM has a range of approximately 26 nautical miles.

A.1.2.3 MK-80 SERIES GP BOMBS

These "iron bombs" have no guidance and no propulsion. They have to be dropped directly on the target. While more difficult to deliver, they are also much less expensive than weapons like the AGM-65F.

A.1.2.4 ROCKETS

Rockets are basically unguided missiles. They are good for taking out targets that cover a large area. Like the iron bombs, it takes some skill to deliver them to the target.

A.2 FRAME RATE OPTIMIZATION

There are many factors that affect the "frame rate" of Black Knight. The most obvious factor is your computer hardware. SE Software recommends a 486/DX running at 66 MHz or better for average realism.

Although Black Knight can work on computers with or without a math coprocessor, there will be an increase in the frame rate when a coprocessor is present. Computers equipped with 486/DX and Pentium processors have

math coprocessors built into the chip, however, 386/SX, 386/DX and 486/SX processors do not, as the coprocessor must be purchased separately.

Black Knight allows you to adjust the frame rate in other ways, but a trade-off exists between frame rate and realism. You have complete control over this trade-off. For instance, if more realistic graphics are displayed, a slower frame rate will occur.

You can adjust the frame rate during a mission by adjusting values contained in the VISUAL MENU. (Explained in the chapter on Menus.)

The following options from this menu affect the frame rate:

A.2.1 DETAIL LEVEL

LOW: Low graphical detail, fastest frame rate

MED: Medium graphical detail, average frame rate

HIGH: Highest graphical detail, slowest frame rate

A.2.2 SIGHT RANGE

The more miles that you can see, the more graphics that are displayed and the slower the frame rate. 10 miles is average.

A.2.3 AIRCRAFT DETAIL

You can trade aircraft rendering detail for frame rate by lowering the level of detail. For older systems, setting the detail level to low or medium will improve the frame rate of the game when aircraft are being seen on the screen.

A.2.4 GOURAUD SHADING

Although gouraud shading makes the graphics appear more realistic, the frame rate will slow down.

A.2.5 NO BLACKOUTS

When you blackout, the frame rate slows down. When this option is on, you won't black out and the frame rate won't decrease.

A.2.6 SOUND

When 3D or REVERSE 3D is enabled, both the left and right channels must be calculated separately and so the frame rate will slow down.

A.2.7 MUSIC

When the 3D option is off, the load on the system is reduced allowing a higher frame rate.

A.2.8 AVOID FLICKER

When this option is off, Black Knight will produce a faster frame rate.

However, on some computer systems, you may have to turn this option on in order to avoid screen flicker. This also has minimal effect on frame rate.

One last option at your disposal that you can use to increase the frame rate is to bypass the installation of any memory managers such as QEMM and EMM386 by using a blank floppy boot disk. Black Knight, and many other software applications, must pass through these memory managers, if they are installed.

If they are not loaded, then there won't be any extra time needed to pass through the memory manager and the result is a faster frame rate.

A.3 CREATING A BOOT DISK

To create a boot disk, you need to use a blank formatted disk. If the disk you want to use is not formatted, then you must format it. Once formatted, you must transfer the system files to this disk to make it bootable. Please refer to your DOS manual for specific instructions on creating a boot disk.

Once you have successfully created your boot disk, change to your Black Knight directory, put the boot disk in the drive, and run the boot disk utility. The command line syntax for the BOOTDISK utility is "BOOTDISK A:"

or “BOOTDISK B:” depending on which floppy drive is bootable. Usually, it is the “A:” drive. The boot disk utility will place a simple CONFIG.SYS file on the boot disk.

When using the boot disk, you will NOT have mouse support. If you wish to have mouse support, you must create an AUTOEXEC.BAT file on the boot disk to have it load the mouse driver. Keep in mind that you will not be able to load the mouse driver into high memory, but rather you must load it into low memory. Please refer to your mouse software documentation for further information on loading your particular mouse driver in an AUTOEXEC.BAT file.

Note also that if you have a Gravis UltraSound, you need to load the ULTRAMID driver in the AUTOEXEC.BAT file on the boot disk. If you have a ProAudio Spectrum, you must put the MVSOUND.SYS command in the CONFIG.SYS file on the boot disk. If you don't do these things, you may not hear any music. You should refer to your sound card documentation for instructions.

A.4 TROUBLE-SHOOTING QUESTIONS AND ANSWERS

Question:

Why does the SETUP program lock-up my computer after I select “Test Driver”?

Question:

Why do I get a “Failed to Initialize Driver” error message in SETUP?

Question:

Why don't I hear sound playing when informed that the sound is playing in SETUP?

Answer:

You must be certain that the driver you selected is correct and also that the parameters associated with that driver are correct. Note that the default values may be incorrect. For instance, the newer SoundBlaster cards have a factory default IRQ setting of 5 instead of 7. However, if you have a SoundBlaster, SETUP will auto-detect for the BLASTER environment variable, which should contain correct values.

Question:

How do I know what the values are that correspond to my sound device when prompted for these values in SETUP?

Answer:

SETUP will provide the most common default values. If you have a SoundBlaster, SETUP will auto-detect for the BLASTER environment variable and use this information for its default values. You can try out the default values to see if they work. Note that most of the sound devices supported by Black Knight come with their own software which can automatically detect these settings and relay that information to you. In this case, consult your sound card software documentation for this information.

Question:

I can't get SETUP to work with my sound device. What should I do?

Answer:

If all else fails, select the ‘No Sound Card’ sound driver and the ‘No Music Card’ music driver. Then run Black Knight.

Question:

How come I can't run SETUP?

Answer:

SETUP is automatically executed when you install Black Knight. If you opted to delete the drivers when you

installed Black Knight, than SETUP does not exist and you must re-install Black Knight.

Question:

Why does my F/A-18 seem to turn by itself?

Question:

Why does my F/A-18 seem to turn too slowly when using the joystick?

Answer:

You should calibrate your joystick. This can be done using the CALIBRATE JOYSTICK option from the FLIGHT CONTROLS MENU. Please refer to the chapter on Flight Controls for information about the OPTIONS MENU.

Question:

Why doesn't my joystick work with Black Knight?

Answer:

There could 3 reasons:

- 1) Your joystick is not hooked up to joystick port number 1 on your computer.
- 2) You failed to calibrate the joystick. The joystick can be enabled by selecting the CALIBRATE JOYSTICK option from

the FLIGHT CONTROLS MENU. Please refer to the chapter on Flight Controls for information about the FLIGHT CONTROLS MENU.

- 3) You hooked up your joystick while the game was running. In order for the joystick to work, you must make sure that it is hooked up prior to starting Black Knight.

Question:

I'm using the keyboard to maneuver my F/A-18 but some keys don't respond when I hold down more than one key. What should I do?

Answer:

The best thing to do is to use the arrow keys located on the numeric key-pad as this may solve the problem. However, you should try to avoid pressing more than two keys at any one time. This is due to computer keyboard hardware and is not the result of an error in Black Knight. Using a joystick not only solves this problem but allows for much easier game play.

Question:

Sometimes running Black Knight freezes up my computer. What should I do?

Question:

When I start Black Knight, I get a message telling me that there is not enough memory. What should I do?

Answer:

The best thing to do is to run Black Knight after you have booted your computer with a DOS boot disk. Please refer to the APPENDIX: CREATING A BLANK FLOPPY BOOT DISK for further information.

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