JET

OPERATING MANUAL

For AMIGA™ Computers

Jet

Operating Manual

For Amiga computers
Program Number AM-JT1

First Edition
First Printing

SubLOGIC Corporation
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482

SUBLOGIC MEDIA POLICY

SubLOGIC Corporation warrants all media for a period of three months from the date of purchase. We will replace any media that are out of warranty at a minimal charge.* SubLOGIC will extend this replacement service for a period of not less than ten years after purchase.

If you wish to return a defective disk, please return the media only. We have established an efficient and very fast repair/replacement system which promises long-run benefits to you. Returning manuals and/or packaging will complicate the system and will raise shipping costs.

While our turnaround time on defective media is very fast, a backup copy of this program disk is also available from SubLOGIC for $10.00 plus proof of purchase. Please specify your computer system (Amiga, Atari ST, etc.) when ordering a backup. If proof of purchase is not available, you may send your disk as proof. We will return the disk and a backup copy to you.

* Example: Replacement charge as of January 1, 1988 — $10.00 for a disk.

Table of Contents

Table of Contents

Introduction

Jet for the Amiga computers is the latest entry in SubLOGIC's line of aircraft simulations. This program is based on IBM Jet (released in 1985), but it owes much to Amiga Flight Simulator II and to Radar Raiders, a never-released product. Like IBM Jet, it is a simulation of both the F-16 Fighting Falcon and the F-18 Hornet jet fighters. These jets have tremendous power and agility and are easy to fly. Enemy targets include Soviet MiG-21 and MiG-23 jet fighters and Kynda-class missile cruisers. There are also numerous ground targets, some with the capability to return fire.

Free flight, dogfight, and target strike modes are available for both the F-16 (land-based) and F-18 (sea-based) jet fighters. The F-16 also supports a combined attack mode featuring both enemy MiGs and hostile ground targets. Like Amiga Flight Simulator II, this Jet program has a multiplayer option which allows you to fly with or dogfight against another player flying Jet on another computer. Amiga Jet is also scenery disk compatible.

In order to get you flying quickly, the first section of this manual visually presents the Jet's instruments, controls, and flying techniques. Skim the front section of the manual to familiarize yourself with Jet and to begin flying and dogfighting. Once you are comfortable with the program, you can read the more detailed sections of the manual.

Running Jet

Loading the Program

Amiga Jet can be loaded in any of the following ways:

Cold Boot:

Insert the Jet disk when your
Amiga computer asks for Workbench.

From Workbench:

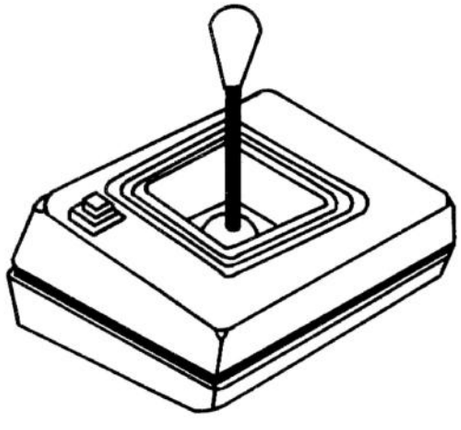
Insert the Jet disk in any drive.
Open disk.
Double click on the Jet icon.

From CLI:

Insert the Jet disk in any drive.
Make that drive the default drive.
Type "JET" and press [Return].

Optional:

Plug joystick into
game port 2.



Menu Selections

MENU

SELECT SCENARIO:

0 DEMONSTRATION

1 F16 DOGFIGHT

2 F16 TARGET STRIKE

3 F16 FREE FLIGHT

4 F16 COMBINED ATTACK

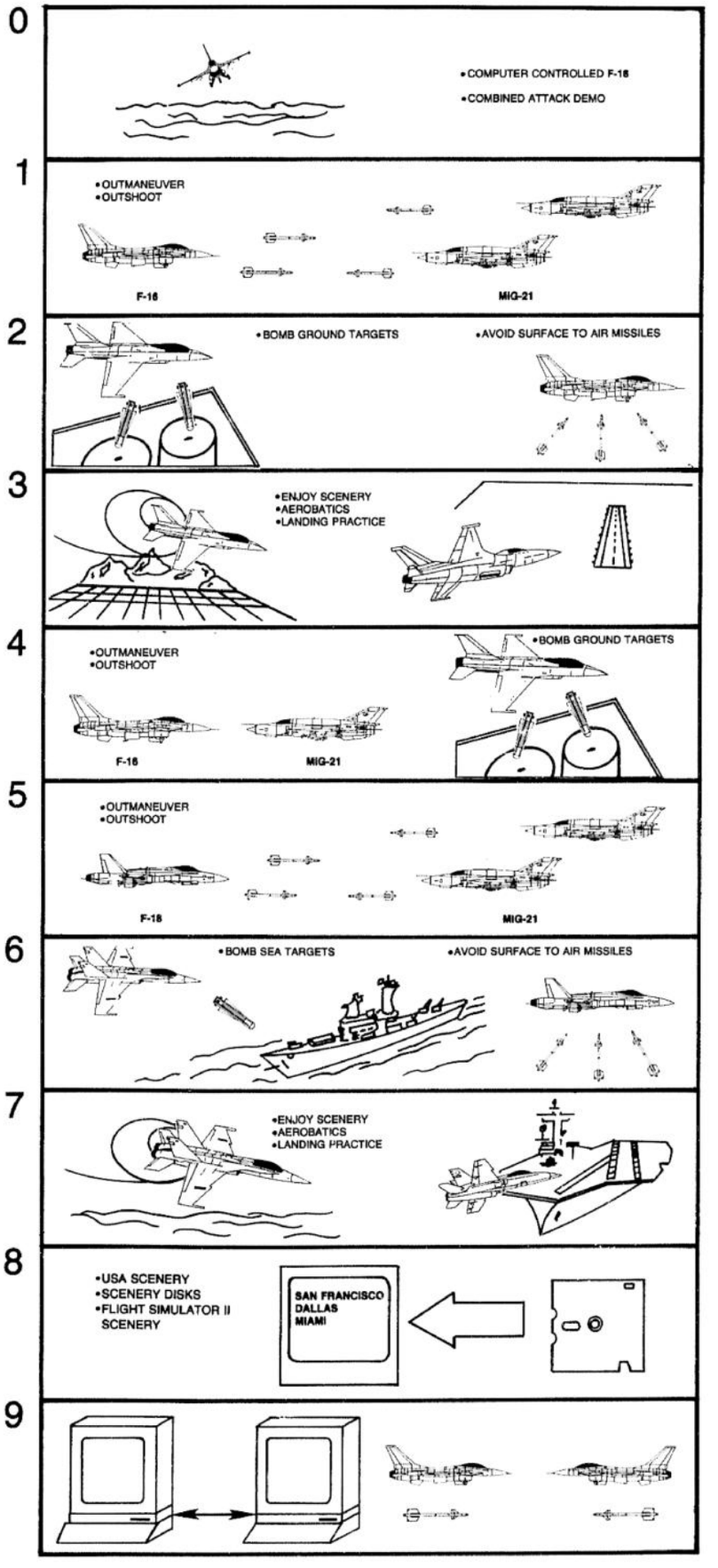
5 F18 DOGFIGHT

6 F18 TARGET STRIKE

7 F18 FREE FLIGHT

8 SCENERY DISK LOAD

9 MULTI-PLAYER DOGFIGHT



Menu Selections

MENU

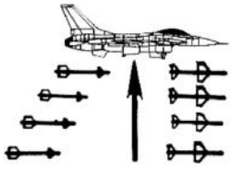
II **SELECT SKILL LEVEL (0-9):**

(0:PRACTICE,	**1:EASY,**	**9:DIFFICULT)**
· NOCRASH	· HARD TO CRASH	· EASY TO CRASH
· NO ENEMY FIRE	· WEAK ENEMIES	· STRONG ENEMIES
	· LITTLE ENEMY FIRE	· INTENSE ENEMY FIRE

MENU

III **SELECT ARMAMENT**

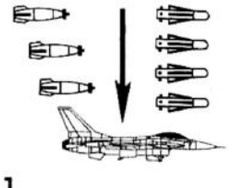
1 AIM-9 MISSILE
2 AIM-7 MISSILE



DOGFIGHT MISSILE LOAD UP

One to Six of Each Missile

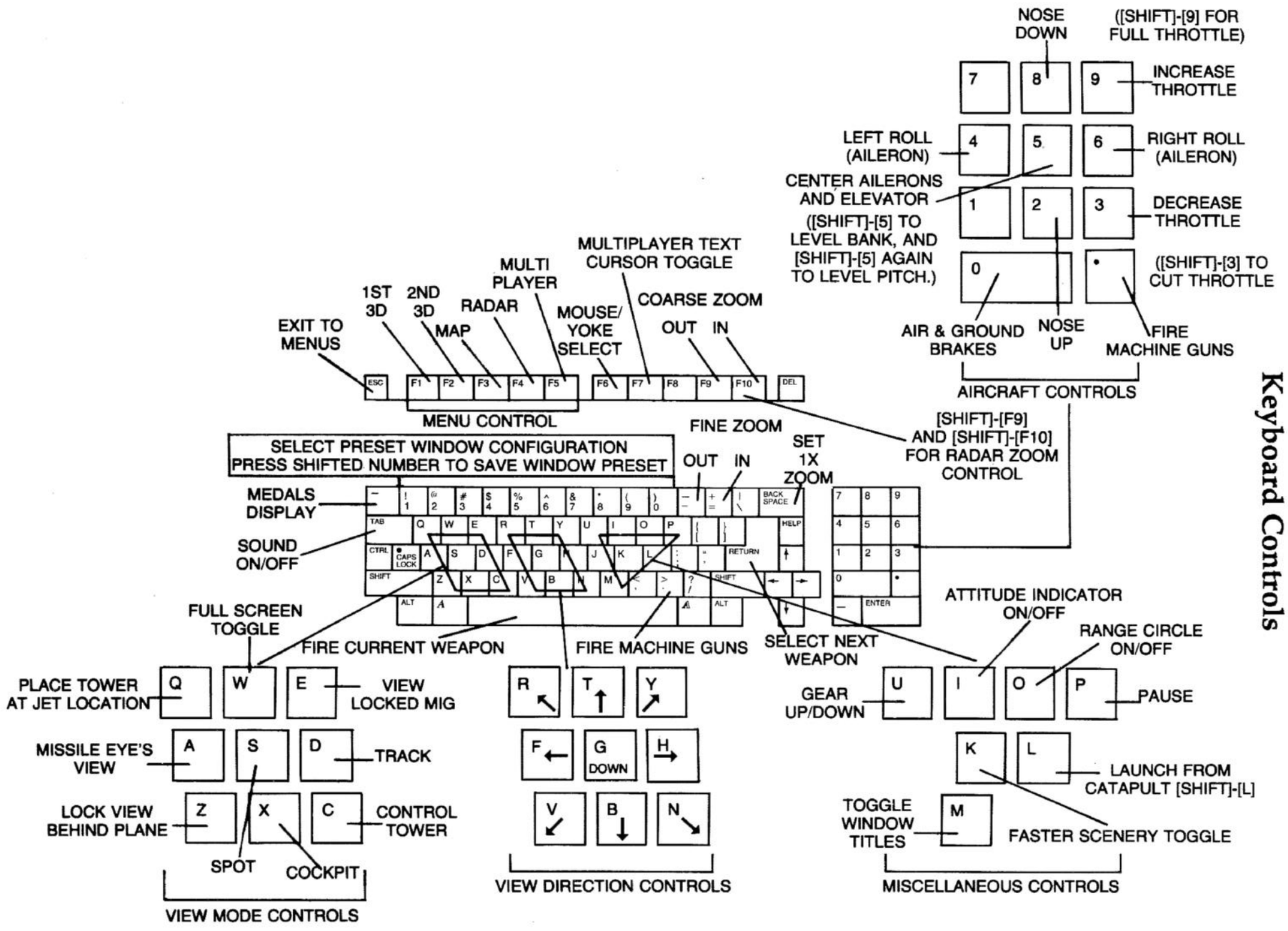
3 AGM-65 MISSILE
4 MK-82 BOMB



TARGET STRIKE BOMB LOADUP

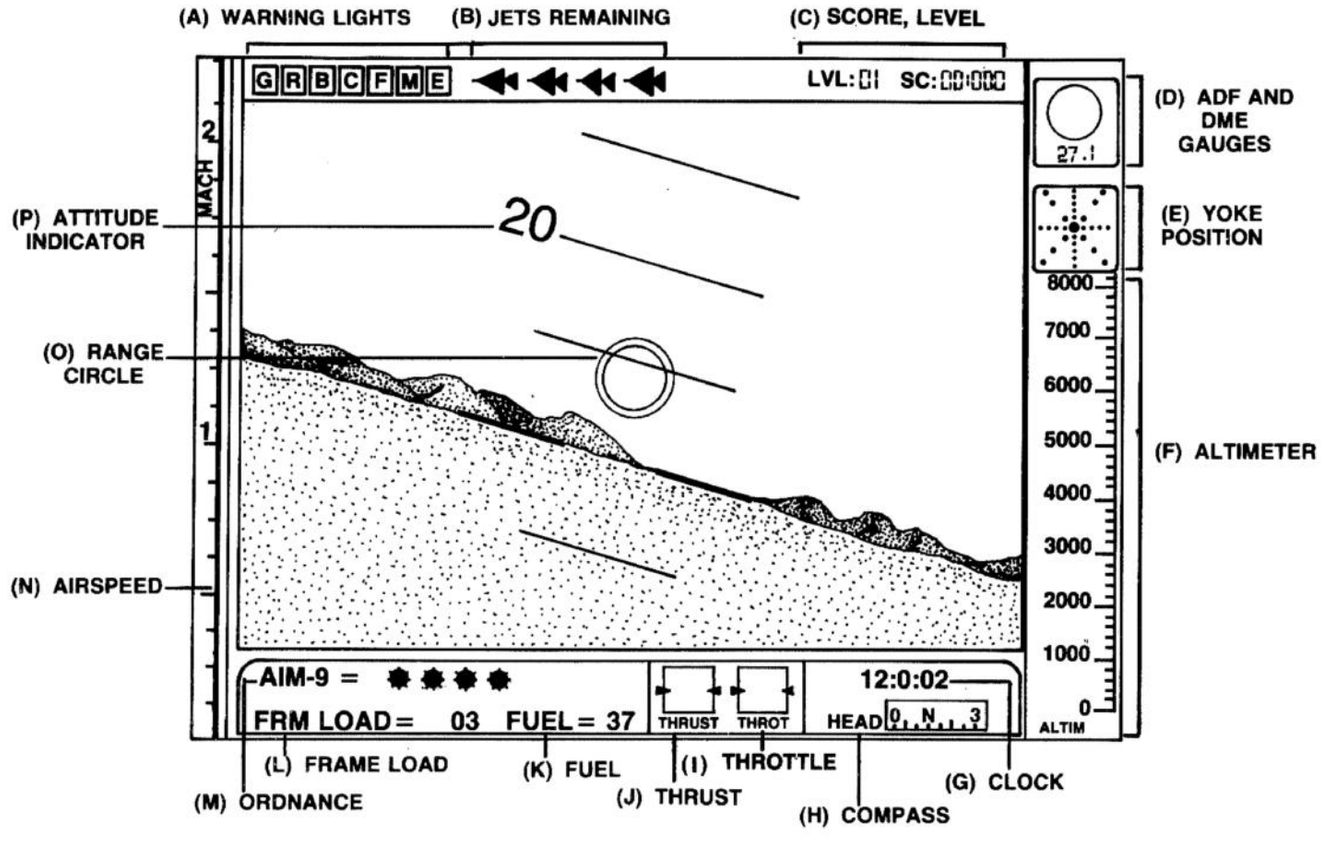
5 EXIT ARMING MENU

AFTER LOADUP PRESS THIS KEY



[SHIFT]-[R] TO REPAIR, REFUEL & REARM IF AT BASE
[SHIFT]-[E] TO EJECT
[SHIFT]-[N] TO ABORT EJECTION & FLY IMMEDIATELY

Display and Instruments



Heads-Up Display

A variety of instruments located around the sides of the screen allow for quick readings with minimum outside viewing interference. Please refer to the screen display illustration (opposite page) to determine instrument location.

A. Warning Lights

Warning indicator lights are used to alert the pilot to potentially dangerous conditions. A red or flashing warning light indicates possible trouble.

G Gear Down. This indicator is lit when your landing gear is down. Drag is greatly increased if the gear is down while flying. Remember to lower gear before landing.

R Red Out. If frame load drops below -3 Gs, you will 'red out' due to blood rushing to your head. You will be unable to control the jet until frame load decreases. This indicator begins to flash as you near red out.

B Blackout. If frame load exceeds 9 Gs, you will black out due to insufficient blood flow to your head. As in a red out, you will be unable to control the jet. This indicator will flash if you are nearing blackout.

C Crash Warning. If this indicator flashes as you come in for a landing, you will crash when you reach the ground. Pull up or level off your flight to touch down safely, and be sure that your gear is down.

F Fuel Low. This indicator flashes to alert you that you have less than 5% fuel left. Return to the nearest base to refuel.

M Missile Locked. This indicator flashes when an enemy missile is locked onto your jet. A missile warning beep also increases in frequency as an enemy missile approaches.

E Enemy Alert. This indicator flashes when an enemy MiG is detected within approximately 2-1/2 miles of your jet.

B. Jets Remaining

These icons indicate the number of jets you have remaining in combat scenarios. You earn another jet for every 10,000 points scored.

C. Score and Level

You earn points for destroying enemy targets in combat scenarios. Refer to the combat descriptions to determine the point values awarded.

Your current skill level is also shown here. Skill level is increased with each sortie completed.

D. ADF and DME Gauges

ADF stands for Automatic Direction Finder. Your home base is always equipped with an ADF broadcaster to which your ADF gauge is automatically tuned. When the needle is pointing straight up, you are flying directly toward the base.

DME stands for Distance Measuring Equipment. This gauge displays the distance to your base in tenths of a mile.

E. Yoke Position

A red cursor indicates the position of your control yoke relative to center. If it is above center, the jet is nosing up. When below center, the jet is nosing down. A cursor positioned to the left or right of center indicates that the jet is banking to the left or right respectively.

F. Altimeter

This scrolling gauge indicates your altitude in feet above ground level (AGL).

G. Clock

The clock shows time of day. To change hours, minutes, or seconds, position the mouse cursor over the appropriate digits and click the left mouse button to increment to the desired time. Jet operates in both day and night visual flight modes. Day lasts from 6:00 AM to 8:00 PM.

H. Compass

The compass displays the jet's magnetic heading (0..359), where 0 degrees indicates north, 90 degrees is east, 180 degrees is south, and 270 degrees is west.

I. Throttle

The throttle gauge shows the throttle setting as a percentage. This gauge turns red when afterburners are engaged.

J. Thrust

The thrust gauge shows the amount of thrust currently being generated as a percentage of maximum possible thrust (without afterburners). Maximum thrust is increased when afterburners are on.

K. Fuel

The fuel gauge shows the percentage of fuel remaining.

L. Frame Load

Frame Load measures the force exerted on the aircraft perpendicular to the wing surface. This force is measured in Gs, where one G equals the force of gravity. If frame load is a negative value, the force is applied upward with respect to the wing. This instrument is important because of the human body's limited tolerance to high acceleration. If frame load exceeds 9 Gs, you will blackout due to blood draining from your head. If frame load drops below -3 Gs, you will red out due to blood rushing to your head. Either condition causes you to temporarily lose control of the jet.

M. Ordnance

This shows the currently selected weapon and the remaining quantity of that weapon. A red icon indicates an available weapon. A white icon indicates the weapon has recently been fired.

N. Airspeed

The airspeed indicator displays airspeed in Mach number.

O. Range Circle

The range circle is an optional part of the Heads Up Display (HUD). It is toggled on and off by pressing the [O] key.

The range circle is used as an aid to determine distance to enemy targets. A white range circle indicates enemy targets are present but not nearby. An increasing percentage of the circle turns red as enemy targets come within range and approach your aircraft. The range circle is replaced by a black cross when no enemies are present.

P. Attitude Indicator

The attitude indicator is an optional part of the Heads Up Display (HUD). It is toggled on and off by pressing the [I] key.

The attitude indicator shows the orientation of your aircraft with respect to the ground. A scale of lines in 20 degree increments both above and below the horizon indicates the pitch of the aircraft. Blue lines are displayed above the horizon, red lines below. A split white line indicates the horizon line itself, while single points at the top and bottom of the scale indicate a 90-degree pitch attitude. The aircraft's bank angle is displayed by rotation of the pitch scale. The attitude indicator is very useful when the horizon is not visible outside the window.

3D Windows

The center screen area is usually occupied by the three-dimensional out-the-window display (see screen display illustration). This area is used for all 3D windows and the optional map display. Two 3D windows plus the map display may be located in this area.

A 3D window is selected or brought up by pressing a function key. Press [F1] to select the main 3D window, [F2] for the second 3D window, and [F3] for the map display. The currently selected 3D window is highlighted by a blue border. Unselected windows have white borders. Zoom and view controls apply to the selected window only. If you want to change zoom or view mode on another window, you must first select it by pressing the appropriate function key.

You can zoom in and out on any 3D window view. Select the window you'd like to adjust, and press either [+] or [F10] to zoom in, and [-] or [F9] to zoom out. The [+] and [-] keys adjust zoom in very fine increments, while the [F10] and [F9] keys adjust it very coarsely. Press the [Backspace] key to automatically reset the zoom factor to 1X.

All three-dimensional windows can be moved and sized with the mouse. To move a window, click and hold on the title bar area at the top of the window with the left mouse button and drag the window to the desired position. To change the size of a window, click and hold on the "invisible" size box at the lower right corner of the window and move the cursor to the desired position. To close a window, click on the "invisible" close box at the upper left corner of the window. You may also close a window by quickly pressing the corresponding function key twice.

You may go to a full screen three-dimensional display by pressing the [W] key. This removes all instrumentation and allows the whole screen to be used for 3D displays. Press [W] again to return to the standard display.

Map Display

Pressing the [F3] key turns on a map display of the area over which you are flying. This window can be sized or moved like the other 3D windows. Press [F3] twice sequentially (or click on the "invisible" close box) to turn off the map display.

You can zoom in and out in the map display to view either more detail or a greater area. Make sure that the map display is the selected 3D window (its border is blue), and press [F10] to zoom in and [F9] to zoom out. Use the [+] and [-] keys to adjust zoom in very fine increments. Press [Backspace] to reset the zoom factor to 1X.

Radar Display

Press the [F4] key to turn on the radar display. Its size is fixed, unlike the true 3D windows, but you can adjust the zoom factor by pressing [Shift][F9] to zoom out and [Shift][F10] to zoom in. The radius of the radar sweep is shown at the bottom of the radar display. Press [F4] twice or click on the "invisible" close box to turn off the radar display.

Colored dots have the following meanings on the radar display:

Color	Meaning
White	Enemy MiG
Green	Unlocked Enemy Missile
Red	Locked Enemy Missile
Blue	Friendly Missile

Preset Window Configurations

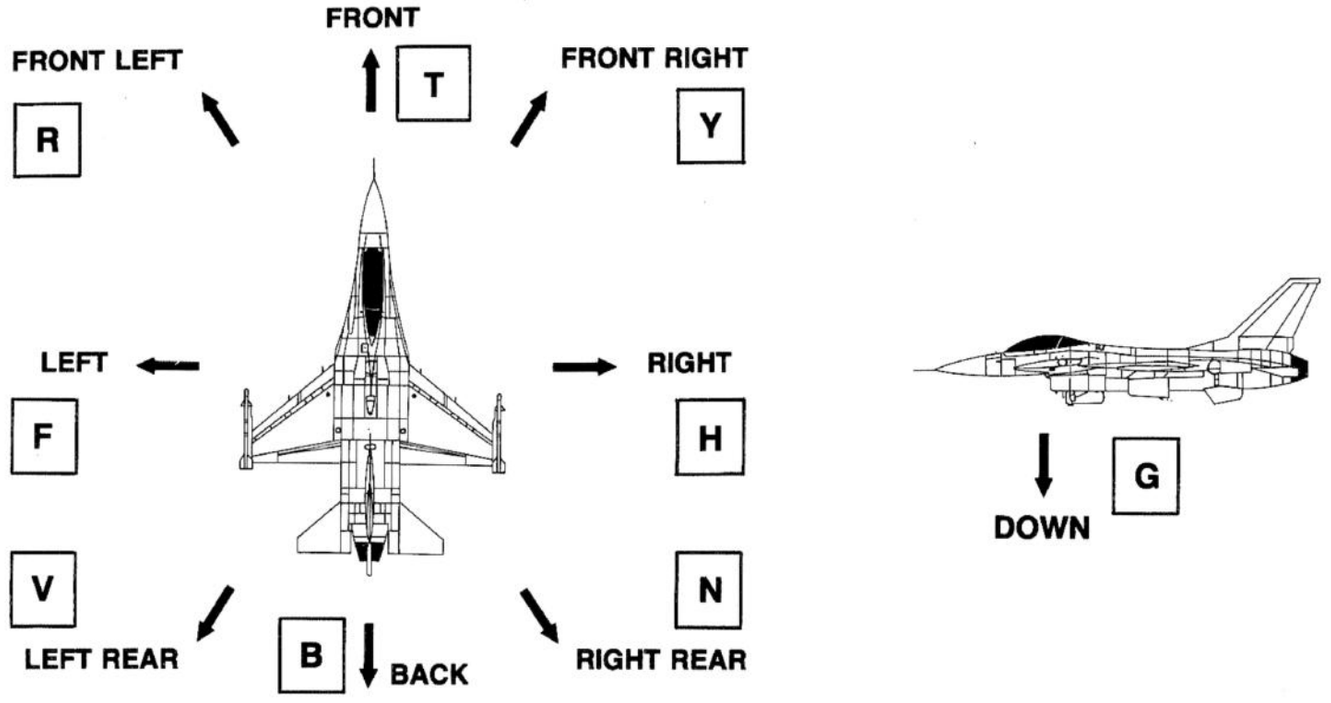
Because of the many view modes and windows available in Jet, you may want to frequently change window configurations. Ten default window configurations are available, all of which are user-definable. Press a number key between [0] and [9] (along the top of the keyboard, not on the keypad) to select from among the ten preset configurations. If you set up a different window configuration and would like to save it for further use, press [Shift] and a number key to save it. You may then recall it by pressing that unshifted number key.

All windows (3D, map, radar display) and their associated zoom factors, view directions, and view modes are saved as part of a window configuration.

View Controls

Jet allows a wide range of viewing options. You can look from the cockpit in nine directions, or view the jet from a number of different external views. Enemy aircraft lock, full screen, and missile's eye views are also available. Title bars identifying each current window view can be toggled on and off by pressing the [M] key. Remember that view controls apply to the selected window only.

Cockpit View - [X]
In cockpit mode the display is from the viewpoint of the pilot. You can look in nine different directions by using the view direction control keys (see following diagram). To return to cockpit view from any other view, press the [X] key or a view direction key.



External and Miscellaneous Views

Spot Mode - [S]
In spot mode, your jet is viewed by a spot plane flying in formation off your right wing. This aircraft tracks you through all aerobatic maneuvers and keeps the view locked on your cockpit.

Control Tower Mode - [C]
In control tower mode, your jet is viewed from a control tower on the ground. The view remains locked on your cockpit.

Track Mode - [D]
Track mode is just like control tower mode except that the control tower follows you if you fly far away.

Place Tower at Jet - [Q]
Selecting this view option sets the control tower's location at the current jet position. This is useful if you want to view your jet from the control tower vantage point but are very high up or very far away. Press the [C] key to return the tower to its original position.

Lock View Behind Jet - [Z]
This is similar to spot mode, but the view is from a spot plane located directly behind your jet.

View Locked MiG - [E]
This mode locks your view onto an enemy MiG after you have successfully locked onto it (its tracking box appears black). Even if the lock is later broken, the view remains on the MiG.

Missile's Eye View - [A]
This mode shows the view from the vantage point of the most recently fired missile. If more than one active missile is in flight, you may press the [A] key to switch between active missile viewpoints.

Full Screen View - [W]
This eliminates all instruments, allowing the whole screen to be used for 3D views. This is particularly desirable when viewing scenery and performing aerobatics, but it can be dangerous to engage in a dogfight without the benefit of instruments. Press [W] again to return to the standard view.

Flying Jet

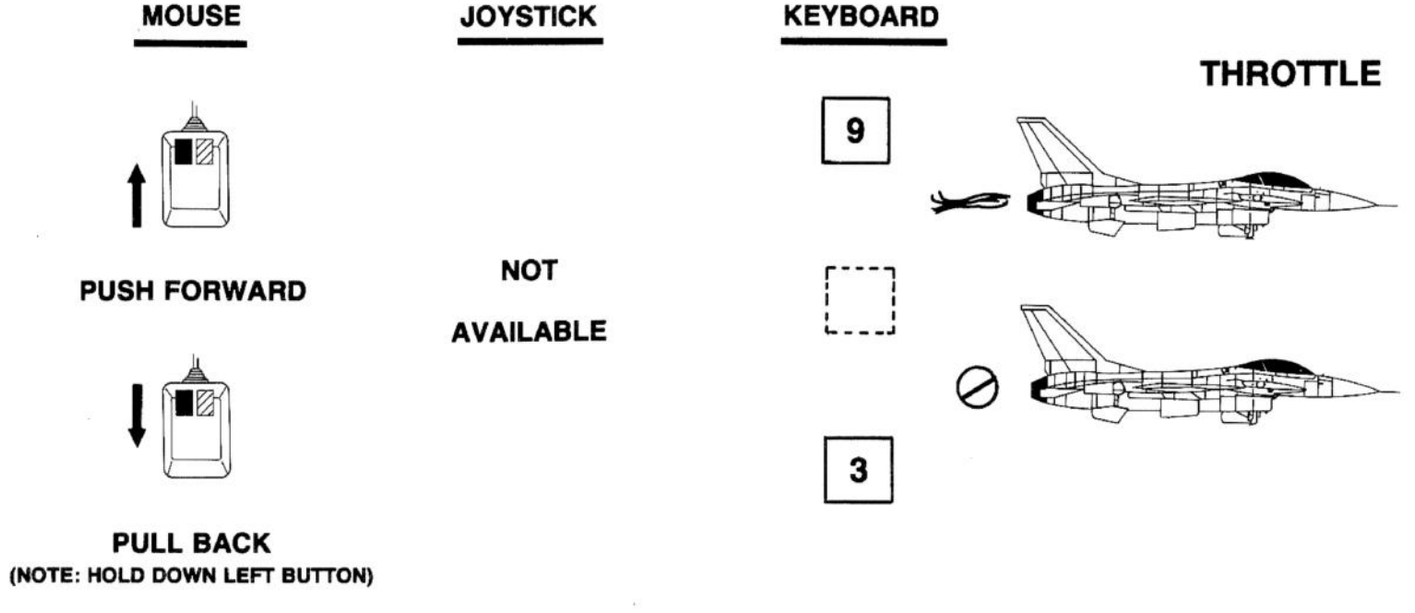
Flying by Wire

'Fly by wire' refers to a system of aircraft control in which the pilot sends steering commands to a computer which in turn generates actual elevator and aileron movement. All the pilot has to do is point the aircraft in the desired direction and the computer will keep it flying that way. Because the F-16 can generate more pounds of thrust than it weighs, it can accelerate vertically and is considered ballistic. This allows any angle of controlled flight.

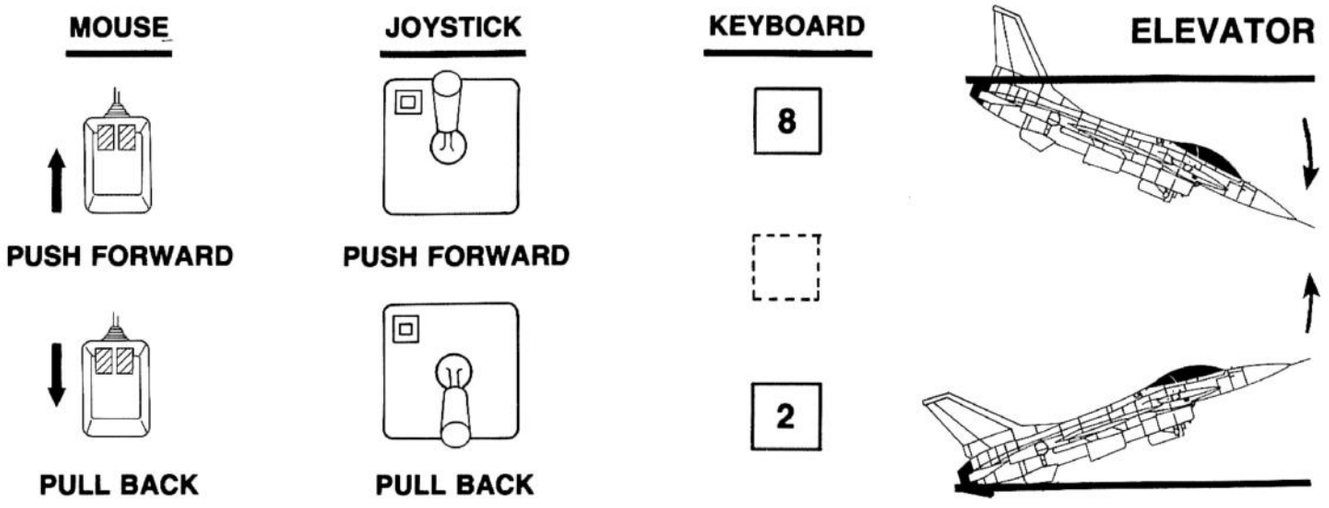
Controls

The Jet has five controls for flight operations. All of these are controllable from the keyboard. Some are controllable using the mouse or a joystick. Press the [F6] key to put the mouse into control yoke mode, and [F6] again to return to cursor mode. Plug a joystick into game port 2 to enable joystick control.

The THROTTLE controls engine thrust. Press the keypad [3] and [9] keys to decrease or increase thrust respectively. To cutoff thrust, hold down the [Shift] key and press the keypad [3] key. To go to full thrust, hold down the [Shift] key and press the keypad [9] key. To activate afterburners, press the keypad [9] key one more time when the throttle gauge reads 100%. Press the keypad [3] key once to deactivate afterburners.

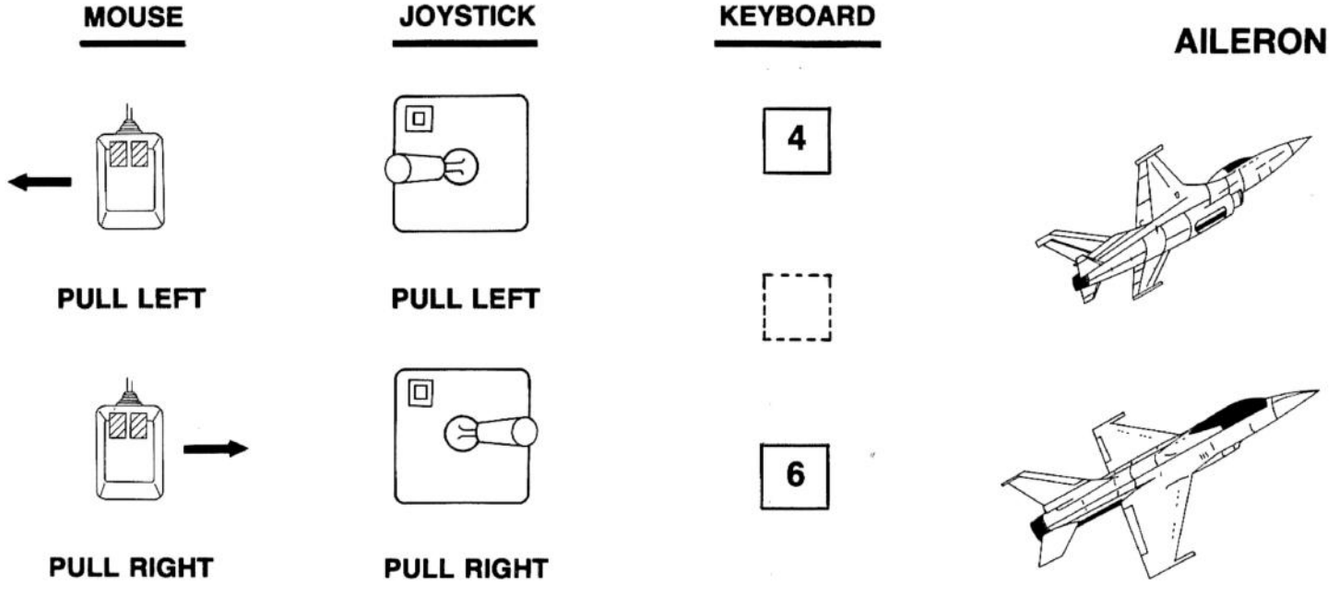


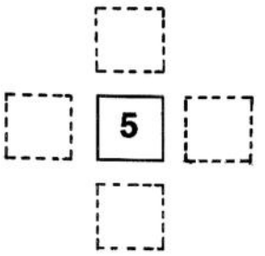
The ELEVATOR controls the aircraft's pitch attitude. Press the keypad [2] key to pitch the aircraft up, and the keypad [8] key to pitch down.



AILERONS control the jet's bank angle. Press the keypad [4] key to bank the aircraft left or turn counterclockwise. To bank right or turn clockwise, press the keypad [6] key.

When using the keyboard for elevator/aileron control, note that the more times you press a control key, the faster the aircraft rotates. Press the keypad [5] key to stop rotation about both axes. Hold down the [Shift] key and press the keypad [5] key to gradually decrease bank and level off the jet. Press [Shift] [5] again to gradually level off pitch as well. Pressing any other elevator or aileron control key halts this automatic return to straight and level flight.





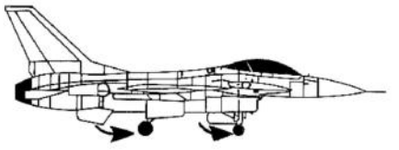
STOP PITCH AND BANK

[SHIFT] [5] TO ZERO BANK
[SHIFT] [5] AGAIN TO ZERO PITCH

LANDING GEAR must be down for all ground maneuvering. Press the [U] key to raise or lower the landing gear. When flying, the gear should be raised to reduce the drag on your aircraft and allow for greater airspeed. If you attempt to land with the gear up, you will crash.

LANDING GEAR

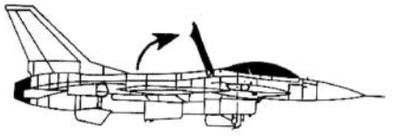
U



The AIRBRAKE is used for landings and for quick midair deceleration. Press the keypad [0] key to activate the airbrake. Hold it down to continue braking action. The airbrake will turn off automatically.

AIRBRAKES

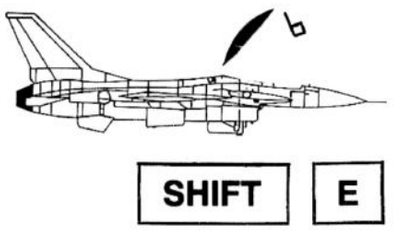
0



Ejection

In extreme emergencies (imminent crash or fatal missile hit) it may become necessary to bail out of the aircraft. Press [Shift] [E] to eject from the jet. If you are about to crash, you will be automatically ejected immediately upon impact.

* Use control tower view or spot mode to watch yourself drift to the ground.
* Press [Shift] [N] to end the ejection sequence and return to base immediately.



SHIFT E

Sample Flight

To begin a sample flight, load the Jet and make the following menu selections:

Select Scenario	-	[4] for F-16 Combined Attack
Skill Level	-	[0] for Practice Mode

Press [5] to exit the arming menu. You will now see the flight mode display, including the out-the-window view and HUD instruments. Note that you may press [P] at any time to pause the simulation during this sample flight, and press [P] again to resume.

1. Press [I] to turn on the attitude indicator. This superimposes pitch markings over the out-the-window display.
2. Look around by pressing the view direction keys (keys [R], [F], [V], [B], [N], [H], [Y], and [T] to return to forward view).
3. View your plane from the control tower by pressing [C]. Press [F10] several times to zoom in, then [F9] to zoom back out. Press [Backspace] to return to 1X zoom factor.
4. Press [S] to view your plane from a spotter plane off your right wing. Press [X] to return to cockpit view.

5. Look at the various preset window configurations by pressing keys [2] through [0] along the top of the keyboard (not the keypad keys). Press [1] to return to the original window configuration.

6. Press [Shift] [9] (on the keypad) to give full throttle. Press [9] again to activate afterburners.

7. After about ten seconds, press the keypad [2] key several times to start pitching up. Press the keypad [5] key to stop pitching at about 10 degrees positive pitch.

8. Press [S] to go to spot mode, then press [U] to raise your gear. Note that the gear goes up and that you gain more airpseed. Press [I] to turn off the attitude indicator.

9. Press the keypad [4] key to begin a left bank. After one or two seconds press the keypad [5] key to stop increasing bank angle. Watch your jet turn and note the scenery in the background. Press [X] to return to cockpit view.

10. When the brown mountain range comes into view (heading about 40 degrees), press the [Shift] and keypad [5] keys to come out of your bank. Press [Shift] and keypad [5] again to level off pitch.

11. Bring the mouse cursor down to the green clock digits. Point and click on the "hours" digits with the left mouse button until they read "20" (8:00 PM). It is now night. Bank again and to view the moon, stars, and constellations.

12. Come out of your bank and head along the river through the mountains to the ocean. It may be helpful to zoom out once (press [F9]) for a wider field of view.

13. Press the [Spacebar] to fire your current weapon and [Return] to select the next one. Bombs drop quickly out of sight while missiles streak out to the horizon. If you see any enemy MiGs, you might want to fire several missiles at them.

14. As you near the mountains, you might try to fly between them. Don't worry about crashing. At skill level zero your plane won't suffer any damage.

15. Note the ADF and DME gauges at the top right of the screen. The DME digits display distance to your home base. The ADF needle points in the direction

of home base. Turn until the ADF needle is pointing straight up. This indicates that you are headed directly for home base. Try to fly back there.

16. Click on the "hours" digits again with the mouse until they read "06" (6:00 AM). It is now day.

17. Your home base should soon come into view. Try to align yourself with a runway and come in for a landing.

18. Press and hold on the keypad [3] key until the throttle decreases to about 30%. Press [U] to lower your gear. Use the keypad [4] and [6] keys to align with the runway, and the keypad [8] key to pitch down as you come in for a landing. If you need to lose speed rapidly, press the keypad [0] key to activate your airbrakes.

19. Once you have landed, press the [Shift] and keypad [3] keys to cut your throttle, then press and hold the keypad [0] key until you stop moving. This completes your sample flight.

Takeoff and Landing on the Carrier

When you select the F-18, you start out on the deck of a Nimitz-class aircraft carrier. Superimposed over a forward view of the launch catapult is the message:

Press SHIFT-L to launch from catapult

First increase throttle to full thrust with afterburners on. Then press [Shift] [L] to launch; the jet will be released and will accelerate rapidly down the deck. Pull back on the elevator as airspeed increases. When the F-18 clears the bow of the carrier the nose will come up and you will start gaining altitude.

In order to rearm or refuel the F-18 you must land back on the carrier. To do this you should try to position yourself about 3 miles west and slightly south of the carrier on a heading of 80 degrees. As you approach the carrier, the landing strip should be visible to the left of the superstructure, angled slightly north with respect to the ship's hull. Lower your landing gear and engage the airbrake to reduce airspeed. Keep the jet parallel to the landing strip by banking left or right, and aim your nose for the stern of the carrier by pitching up or down. Reduce throttle to about 20% to cut airspeed even more. Use your airbrakes (press

keypad [0]) if you need to decrease speed very raipdly. If you begin losing altitude too soon, increase the throttle. If your approach speed is too fast, decrease throttle. When the red and white dashed centerline of the landing strip becomes visible, aim for the gray tripwire to the left of the superstructure. As you pass over the stern of the ship, begin to flare by slowly raising the jet's nose, and try to touch down just short of the tripwire. If you catch the tripwire, the jet will stop abruptly and you will be returned to the launch catapult. In combat modes you may then press [Shift] [R] to return to the armament menu.

Weapon Systems

Ordnance

In either combat mode, once you've selected a skill level the arming menu then appears as:

Select Armament:

[1] Aim-9 Missile	4 x 160 lbs
[2] Aim-7 Missile	4 x 500 lbs
[3] AGM-65 Missile	4 x 460 lbs
[4] MK-82 Bomb	4 x 500 lbs
[5] Exit Arming Menu	

For the F-16 the following weight data appears below the menu:

F-16 Empty	:	14000 lbs
Internal Fuel	:	3700 lbs
Armament Weight	:	6480 lbs
Total Weight	:	24180 lbs

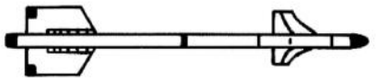
Corresponding figures are displayed for the F-18 when that jet is selected.

Choose your weapons by pressing the appropriate number key. Each time you make a selection, the number to the right of that weapon is incremented by one and your total weight is increased accordingly. If you select more than 5 of one weapon, that weapon's counter is reset to zero.

Press [5] to exit the arming menu once you've finished selecting your weapons. Note that the combined weight of the selected weapons affects the performance and flight characteristics of your jet. As you burn fuel and fire weapons, your weight decreases and the jet becomes more maneuverable. When flying the F-16 you can return to the arming menu at any time by landing at your home base and pressing [Shift][R]. If you are flying the F-18 you can rearm by catching the tripwire on the carrier deck's landing strip and pressing [Shift][R] to return to the armament menu. After rearming the F-18 you will be replaced on the launch catapult.

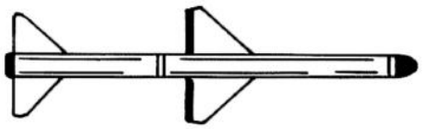
Dogfight Armament

AIM-9 SIDE WINDER



- Short range - 5 miles
- Heat seeking, light
- Accurate
- Good for close combat

AIM-7 SPARROW



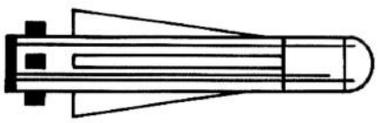
- Medium range - 25 miles
- Radar homing
- Disadvantage - high weight

M61 MACHINE GUN

- 500 rounds loaded when arming menu entered
- Can be used against **MiGs**
- 20mm cannon

Target Strike Armament

AGM-65 MAVERICK

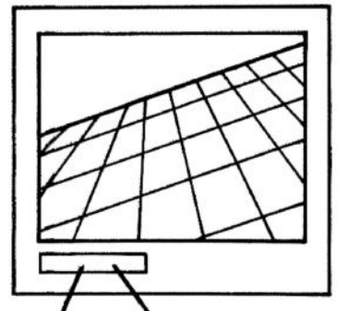


- Air-ground operation
- Medium range - 14 miles
- Optically guided
- Accurate
- Small warhead - small hit radius

MK-82 SMART BOMB

- Bomb. No propulsion
- Tracks a point on the ground
- Limited accuracy
- Large warhead - large hit radius

Weapons Indicator, Selector, and Fire Control



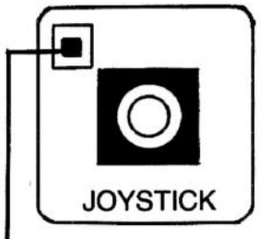
AIM-9: OOOOO

ACTIVE WEAPON — RED — WHITE

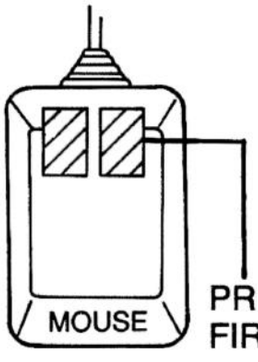
4 REMAINING
1 RECENTLY FIRED

SPACE BAR

PRESS TO FIRE AIM-9



PRESS TO FIRE AIM-9



PRESS TO FIRE AIM-9 (MUST BE IN YOKE MODE)

RETURN

PRESS TO SELECT NEW WEAPON

DOGFIGHT

- AIM-9
- AIM-7
- M61

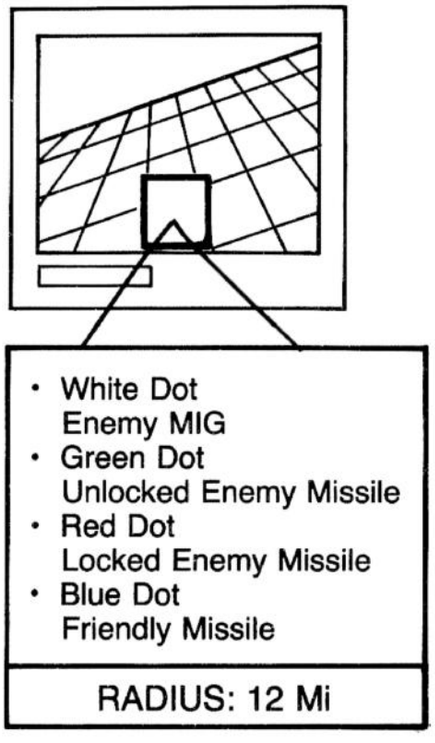
TARGET STRIKE

- AGM-65
- MK-82
- M61

COMBINED ATTACK

- AIM-9
- AIM-7
- AGM-65
- MK-82
- M61

Radar Screen



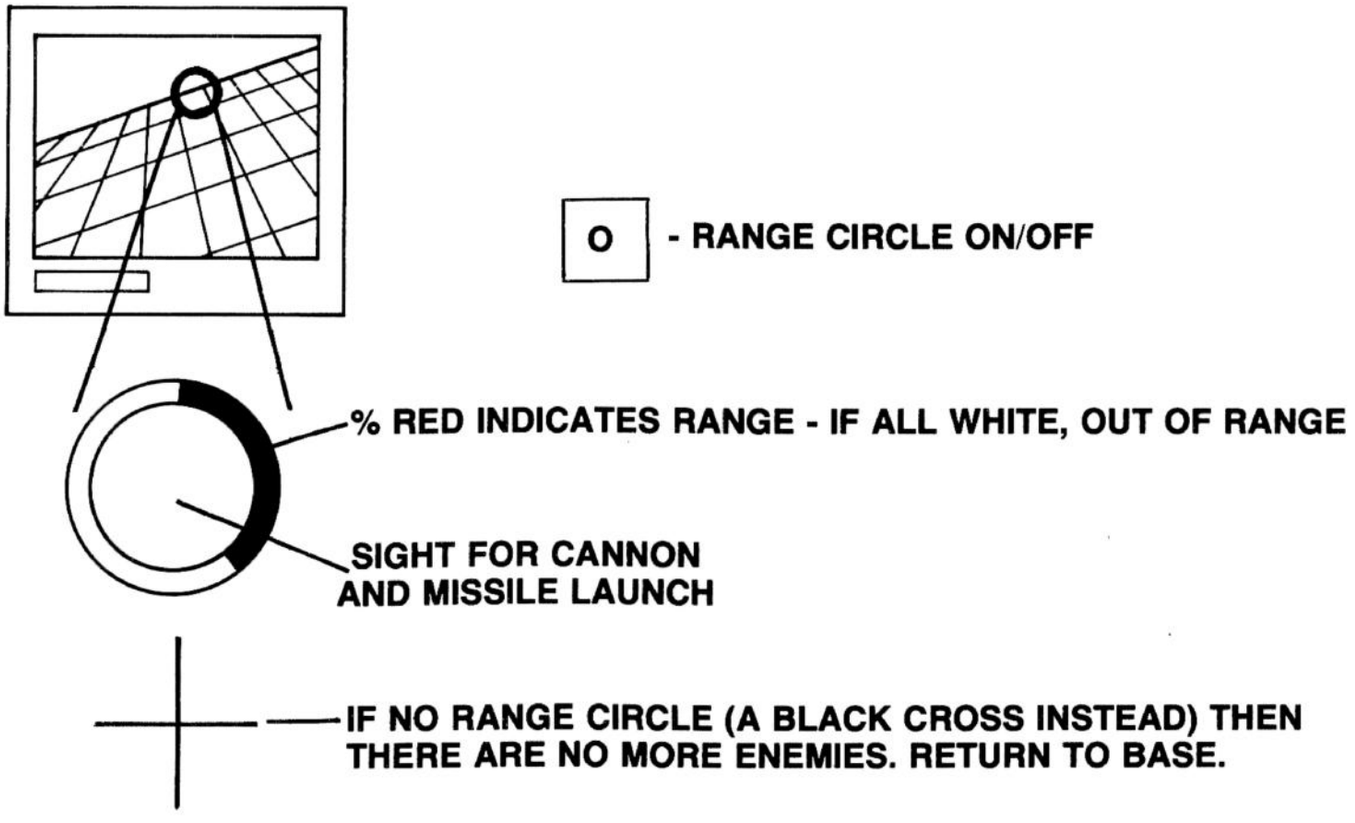
F4 - **RADAR DISPLAY ON**

F4 **F4** - **RADAR DISPLAY OFF**

SHIFT **F10** - **RADAR ZOOM IN**

SHIFT **F9** - **RADAR ZOOM OUT**

Range Circle



O - **RANGE CIRCLE ON/OFF**

Dogfight

Object and Rules

Dogfight is a three-dimensional combat scenario that pits you against Soviet MiG-21 and MiG-23 fighter aircraft. They are equipped with Atoll air-to-air missiles, while you can select from a variable arsenal of AIM-9 Sidewinder missiles and/or AIM-7 Sparrow missiles along with your 20mm Vulcan cannon. Your mission is to engage and shoot down all enemy aircraft at the skill level you've selected, then return to home base for refueling and rearming as required. If your mission has been a success, a new wave of enemy aircraft will then appear at the next higher level. As your skill level increases you will face more difficult enemy MiG's on each sortie.

You earn 1,000 points for each MiG-21 and 1,500 points for each MiG-23 you shoot down. These two different types of aircraft can be distinguished by shape and color. The MiG-23 is bulkier, with swept-back wings and a brown fuselage. The MiG-21 has a gray fuselage. If you shoot down all enemy aircraft before returning to base, you earn a 3,000 point bonus. You earn another jet to fly for every 10,000 points scored.

A warning beeper sounds and the missile warning indicator light flashes if an enemy missile comes within the danger threshold of your aircraft. If your jet is fatally damaged by an Atoll missile, the screen will flash red and orange and the aircraft will spin out of control. You have seconds to eject before your jet explodes and the game is over. If you eject in time, you will float safely back to earth, where you will be recovered and given a new jet to fly into combat. Note that an enemy missile hit is not necessarily fatal, particularly at lower skill levels. You may be able to sustain several hits before you have to eject. You will know that a hit is fatal when the screen flashes orange and red. Once all of your earned jets have been shot down, you are grounded and the game is over.

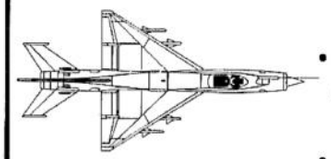
Enemy Aircraft

Enemy aircraft will come at you from the south at the start of each mission. You may encounter either MiG-21 or MiG-23 jets depending on skill level. The MiG-21 is less maneuverable than your F-16 or F-18 but can fly at about the same speed. The MiG-23 is faster than your jet and quite maneuverable. The skill level

you select determines the type and number of aircraft you must shoot down. The more advanced the skill level, the greater the number of enemy MiG-23s you will face.

During a dogfight the MiGs will track you and fire their Atoll air-to-air missiles. Missiles also track your jet, and will detonate their warheads if they come within the hit radius of your aircraft. MiGs will take evasive maneuvers if they detect that they have been locked onto by your weapon system.

MiG-21



- Appears GREY
- Encountered in low skill level games
- Atoll missile equipped

MiG-23

- Appears BROWN
- Encountered more frequently in high skill level games
- Fast
- Highly maneuverable
- Atoll missile equipped

You must select the appropriate weapon system (AIM-7 missile, AIM-9 missile, or M61 cannon) to target and shoot down an enemy aircraft. Press [Return] to select an appropriate weapon. A MiG will be highlighted by a white tracking box when it comes within range of your weapon system. You must position the range circle over the targeting box to lock onto the MiG. When your weapon system locks onto the MiG, the tracking box will turn black. Press the [Spacebar] to fire the selected weapon. The tracking box will turn red to indicate that the MiG is now being tracked by a missile. When your weapon system has locked onto a MiG, your missiles are able to track it and the probability of destroying it is greatly increased. If you fire a missile at an unlocked MiG, it is unlikely (but possible) that it will be destroyed.

After shooting down all opponents, or if you run out of weapons, you will have to return to home base. Any remaining MiGs will chase you until you enter the

safe zone surrounding your base. Once you have landed, press [Shift] [R] to refuel, repair and rearm your aircraft in order to resume combat.

Dogfight Strategies

The primary combat strategy of enemy MiG pilots is to get behind you. If you can anticipate the direction of their flight, you will be better able to lock onto and destroy them. It may be useful to zoom in to determine aircraft type when MiGs are far away, and to zoom out as far as possible to get a wider field of view when they are nearby. You can also use missile's eye view to gather information on approaching aircraft. As your missile approaches the target, you should be able to determine whether it is a MiG-21 or MiG-23. Remember that MiG-23 aircraft are faster and more maneuverable.

You may find it useful to preconfigure the display windows before going into battle. You can set up a front and back view to see as much area as possible, or perhaps a control tower view to get an overall picture of the battle.

You can turn off all non-essential scenery during combat to increase animation speeds and improve response to your control inputs. Press [K] to toggle non-essential scenery details off and on.

Although missiles are very effective for destroying MiGs at a distance, your gun is more effective in close combat. Since bullets cannot track a target, you will have to lead the target a bit. You can fire your gun at any time, regardless of which weapon is selected, by pressing the [.] key.

Always be prepared to evade an enemy missile. If you hear the missile warning beeper, bring up the radar display (press [F4]) to see how near it is. The best way to evade a missile is by changing direction, causing it to burn fuel, or by flying straight up if you have enough velocity. Be careful of missiles launched from a faraway MiG. You don't want to get destroyed before the battle has even begun!

If you suffer a fatal missile hit (flashing orange and red screen), eject immediately. Your jet has already been lost, and the game will be over if you don't eject in time.

Target Strike

Object and Rules

In the target strike game your mission is to seek and destroy all enemy ground targets. In F-16 flight mode, targets are randomly chosen from a set of fuel depots, factories, and missile silos. In F-18 mode, the targets are Kynda-class Soviet missile cruisers randomly placed in the water south of your carrier. Each target will be designated by a white tracking box. All targets are protected by Surface-to-Air Missile (SAM) launchers. Once a SAM site has been identified, it will be indicated on the HUD by angled brackets (<>). Your ordnance can include both AGM-65 air-to-ground missiles and MK-82 smart bombs. Press the [Return] key to cycle through your available weapons and select the one you'd like to use.

Turning on the range circle automatically activates the ground targeting computer. As you fly, the range circle indicates the distance from your jet to the point on the ground that intersects your current flight path. If this distance is greater than the range of your selected weapon, the range circle shows all white. When you come within range of a target (range circle turns partially red), you should maneuver your aircraft until the tracking box of the desired target is in the center of the range circle, and then press the [Spacebar] to release your weapon. The weapon will track that point to the ground. If the target is within the hit radius of the weapon, it will be destroyed.

You earn 1,000 points for each target you destroy. A bonus of 3,000 points is awarded if you destroy all enemy targets before returning to base, and another jet is awarded for every 10,000 points scored. Upon successfully completing a sortie, the skill level is automatically increased. Enemy SAM sites launch missiles more often as skill level increases.

Surface-to-Air Missiles

Enemy SAM launchers are only capable of detecting your presence within the conical airspace directly above them. If you pass within this airspace they will track your jet and launch their missiles. Because of this you should fly as low as possible when nearing your target. A warning beeper will sound if an enemy missile comes within the danger threshold of your aircraft. Your jet will sustain

damage if you are hit with a surface-to-air missile. The hit may or may not be fatal, depending on skill level. If it is a fatal hit, the screen will flash red and orange and the jet will spin out of control. You have seconds to eject before your aircraft explodes and the game is over. If you eject in time you will float safely back to earth, where you will be recovered and given a new jet to continue the mission. Once all your earned jets have been shot down, you are grounded and the game is over.

Target Strike Strategies

If you are having difficulty locating targets, zoom all the way out to get a wider field of view. Zoom in a bit to improve your firing accuracy as you approach the target. When firing air-to-ground weapons, it is important to remember that aiming errors are magnified at shallow pitch angles. Approaching the target from a steeper pitch angle will allow you to deviate slightly from the target and still impact the ground near it, but this will also place you in greater danger of being detected by the SAM launchers.

When you hear the missile warning beeper, a missile is probably very near to hitting you. You should turn sharply, or fly upward if you have a high enough velocity. If a missile hits you and the screen border flashes red and orange, eject immediately.

Combined Attack

Object and Rules

The combined attack game features both ground and airborne threats. (See Appendix B for a map of the battle area.) You begin at the base to the south. It is generally best to fly a counter-clockwise circle, and begin by flying toward the mountains to your northeast where an enemy base and numerous SAM sites are located. By the time you reach the base, you will probably encounter airborne resistance from MiGs flying in from other enemy airbases. Destroy these as necessary, but remember that more will follow. There are many targets along the sea and river, as well as enemy SAM sites. When all primary ground targets are destroyed, you will be notified so you can return to base for rearming and refueling. The skill level will then automatically increase, ground targets will be replaced, and you can fly the next round.

Combined Attack Strategies

Your objective is to destroy all primary ground targets. This allows you to advance to the next wave. Your jet cannot carry enough bombs to destroy all ground targets without rearming, but if you destroy all primary targets you will earn a sortie bonus. You may rearm and refuel at either your home base or the civilian airport to the north of the river. You will encounter fewer MiGs at lower skill levels; if you can eliminate all of them you will be able to destroy the ground targets without resistance (until more MiGs return). More powerful MiGs are encountered as skill level increases, so you will have to evade their fire in order to destroy the ground targets. It may also be necessary to destroy the enemy SAM sites in order to safely reach some of the targets. Remember that enemy SAM sites are indicated on the HUD by angled brackets (<>).

Multiplayer

The multiplayer option enables two players using separate machines to fly and dogfight together. Communication between machines is through the Amiga's serial port.

Connecting Two Machines Together

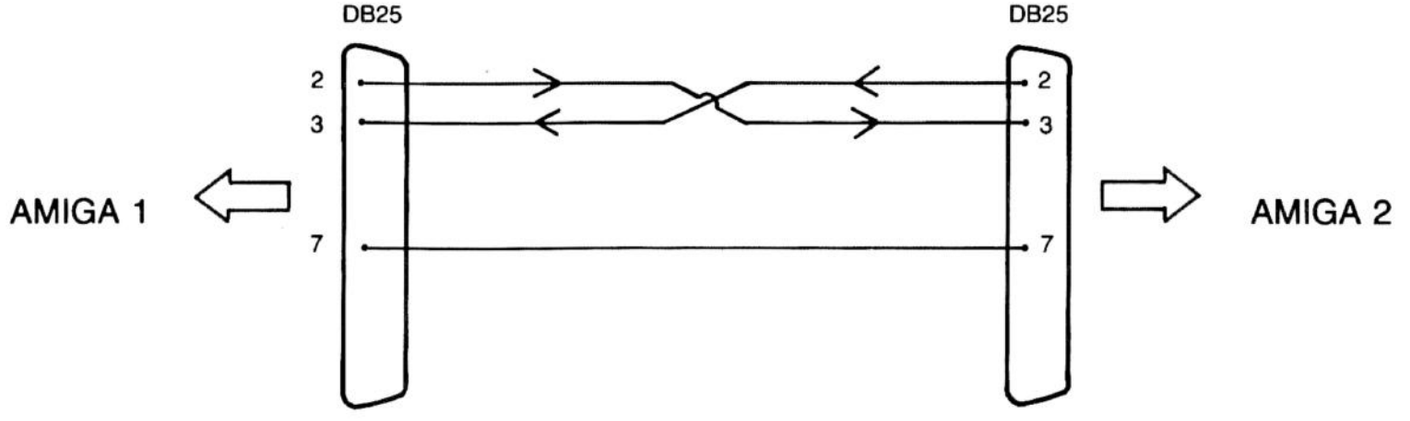
If you will be communicating between two nearby computers, you can connect them together using SubLOGIC serial cables. These cables may be ordered directly from SubLOGIC. (See the enclosed order card for more information.) Making the connection is simple. If the connection is between two Amiga computers, the cables will be identical. Plug the DB25 ends (rectangular ends) of the cables into the Amiga serial ports and then connect the RCA plugs together, inserting the male plug from one cable into the female plug on the other. Do the same for the other pair of plugs so that all four RCA plugs have been connected. This completes the connection. You are now ready to continue with multiplayer.

If you will be using two modems for communications, you can connect one modem directly to the modem port of each Amiga computer using a standard modem cable. You do not have to obtain a SubLOGIC serial cable to communicate via modem.

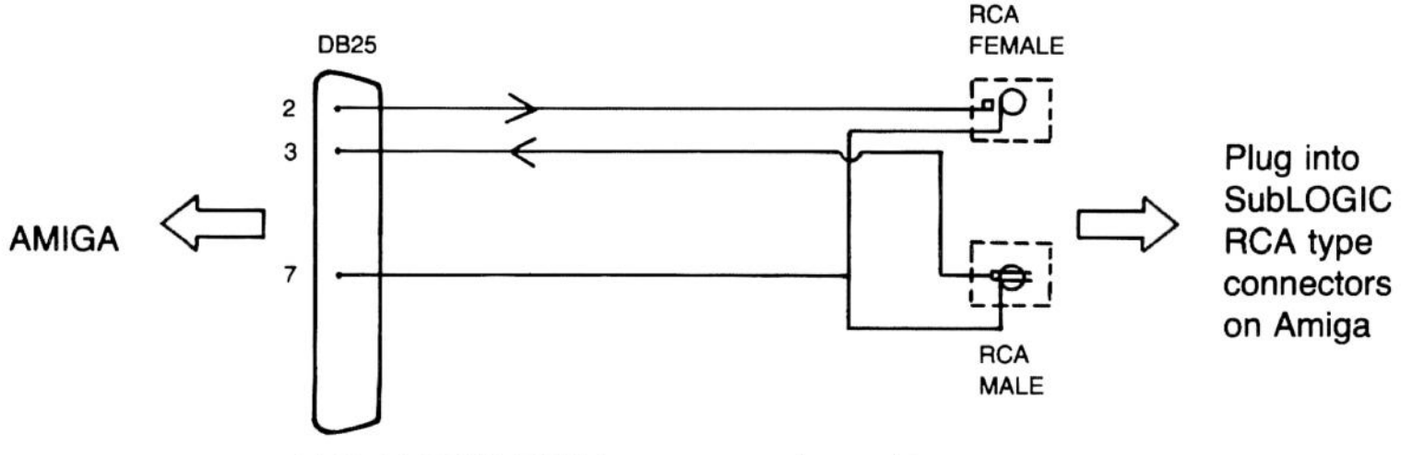
If you prefer, you can use your own cable connectors. For the Amiga or Atari ST, any null modem cable will work so long as you have the proper connectors on the ends. (See the following illustration.) For the Amiga 1000, the connector must be male; for the Amiga 500 and 2000, it must be female. A null modem cable is a cable in which lines 2 and 3 have been crossed, with all other lines passing straight through. For multiplayer communications it is only necessary that lines 2, 3, and 7 be connected.

Establishing Modem Communications

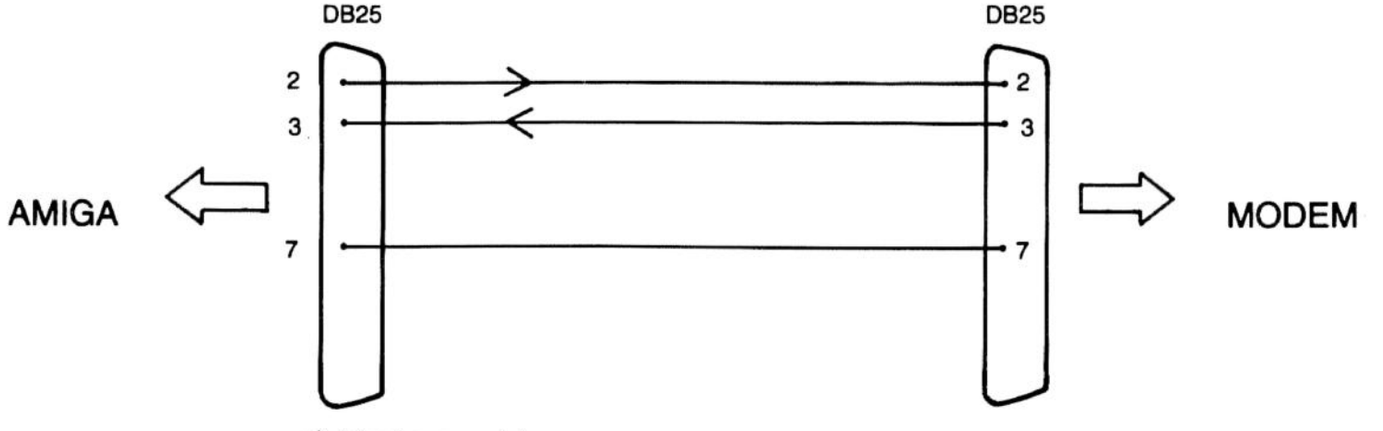
If you will be communicating through modems, you must first make a telephone connection. You can do this entirely within the Jet program. Select MULTIPLAYER DOGFIGHT from the main menu to go to the multiplayer menu. Select baud rate by clicking on the appropriate box on the right side of the



a) Null modem for connecting two Amiga computers.



b) SubLOGIC RCA type connecting cables



c) Modem cable

Note: Amiga 1000 owners: Use male DB25 plug
Amiga 500 and 2000 owners: Use female DB25 plug

menu. You will probably want to use a 300, 1200, or 2400 baud rate depending on what your modem can handle. Make sure the other player will be communicating at the same baud rate. Now, one of you must make the phone call and the other must answer it.

If you are both using Hayes-compatible modems, use the following procedure. The person answering need only click on the WAIT FOR RING box and wait for the phone call to come through. The person making the call may click on the DIAL box and then enter the phone number in the message box which will come up. (Note that there is a ">" symbol to the left of the message line. This signifies that characters will be sent to the modem, rather than to the other player. More on that later.) Press [Return] to make the phone call. If all goes well the number will be dialed and, when a connection has been established, the message "CONNECT" will be displayed on the bottom line of the message box. This indicates that the computers are ready to communicate. Appropriate information, such as coordinates, is now constantly being sent between machines.

If you are not using a Hayes-compatible modem, the DIAL and WAIT FOR RING options may not work for you. In place of these, click on the MESSAGES/ TALK TO MODEM box to talk to the modem. A message box will come up which will accept text to be sent either to the modem or the other player. In order to talk to the modem, enter ">" as the first character. Then, by pressing [Return], all characters entered on that line will be sent to the modem rather than to the other player. Incoming characters will be echoed to the bottom line of the message box, so you will know what your modem is saying. Consult your modem documentation to see how to establish a phone connection between machines.

You can send a command to the modem at any time by bringing up the message box and entering ">" as the first character. This instructs Jet to send the line to the modem rather than to the other player.

Direct Cable Communications

If your computers are connected by a direct cable (that is, without modems), use the following procedure to establish communications:

From the multiplayer menu, select your baud rate by clicking on the appropriate box on the right side of the menu. It is best to communicate at the highest baud

rate the machines will support so response will be quick. If both machines are Amigas, both players should select 57600 baud.

Dogfighting

Once you have established communications, you are ready to begin multiplayer dogfighting. Your jet will be fully armed with AIM-7 and AIM-9 missiles. Both your and your opponent's jets will be randomly placed within a fixed area in the multiplayer database.

There are a few functional differences in multiplayer dogfight mode. Your ADF gauge is automatically tuned to point at the other player's aircraft, and the DME digits display his distance. The View Locked MiG view mode will always track the other player's plane, even if it is not locked. The number of hits you can sustain is dependent upon your skill level. You may fly at a different skill level than your opponent if you like.

You may refuel, rearm, and repair at the airbase at any time by landing and pressing [Shift][R], but you will be particularly vulnerable to your opponent when coming in for a landing. Both jets are automatically refueled, rearmed, and repaired when one is shot down.

You receive 100 points each time you hit the other player, and 1,000 points for destroying his aircraft. The game ends when one player loses all his jets.

Sending and Receiving Messages

You may send messages to the other player by clicking on the MESSAGES/ TALK TO MODEM box on the multiplayer menu. (If the multiplayer menu is not active, press [F5] to bring it up.) A message box appears which will accept text to be sent to the other player. When you bring up the message box, all characters typed will be directed there, and will NOT have any effect on your flight (such as aircraft or view control). You can switch from entering message text to controlling your airplane by pressing the [F7] key. This causes all keys to have their normal effect. It also makes the message box cursor disappear to indicate that keys are functioning normally. Press the [F7] key again to return to message mode. The cursor will reappear, and keypresses will be directed to the message box.

Press [Return] to send your message. The message will be sent to the other player and the top line of the message box will be cleared. You may enter another message if you like, or you may close the box to exit message mode. If you are entering a very long message, it will be sent in pieces as you overrun the message box. The message box can accomodate 49 characters, so after you type your 50th character, the first 49 characters will be sent and your message line will be cleared so you can continue entering text.

Messages received from the other player will be displayed on the bottom line of the message box. If you receive a message from the other player while your message box is not active, it will be brought up automatically for you. If you want to respond to the message, you can do so in the normal way, or you can close the box after reading the message.

Medals

In all combat scenarios, you are awarded medals for specific achievements. You are awarded a Silver Star for each enemy MiG that you shoot down, and an Air Medal for each sortie you successfully complete. Each time your jet gets shot down but you manage to return to safety, you are awarded the Purple Heart for injuries suffered after ejecting into enemy territory. Other medals may be awarded for other achievements; you will learn about these as you earn them. Press the [~] key to see the medals display. Pressing any key exits the medals display.

No medals are awarded at skill level 0.

PURPLE HEART

SILVER STAR

AIR MEDAL

Loading Scenery Disks

SubLOGIC offers a set of Scenery Disks that allow you to fly over "real world" landscapes covering much of the United States and other areas of the world. To load a Scenery Disk into the Jet program, select game mode [8] from the startup menu. A display will prompt you to enter the starting north and east coordinates.

Insert the Scenery Disk into any drive. Then check that disk's maps and documentation to determine the coordinates of the airport you'd like to start from. Enter the north coordinate and press [Return], then enter the east coordinate and press [Return] again. The scenery disk will load into memory and you may continue with normal menu selections. Note that if you own a copy of Flight Simulator II, you may use it as a Scenery Disk by following the same procedure.

Credits

Program Design:
Chris Green, based upon IBM Jet by Charles Guy

Program Development:
Chris Green, Bruce Artwick, Matt Toschlog & Mike Kulas

Scenery Design:
Charles Guy, Matt Toschlog & Chris Green

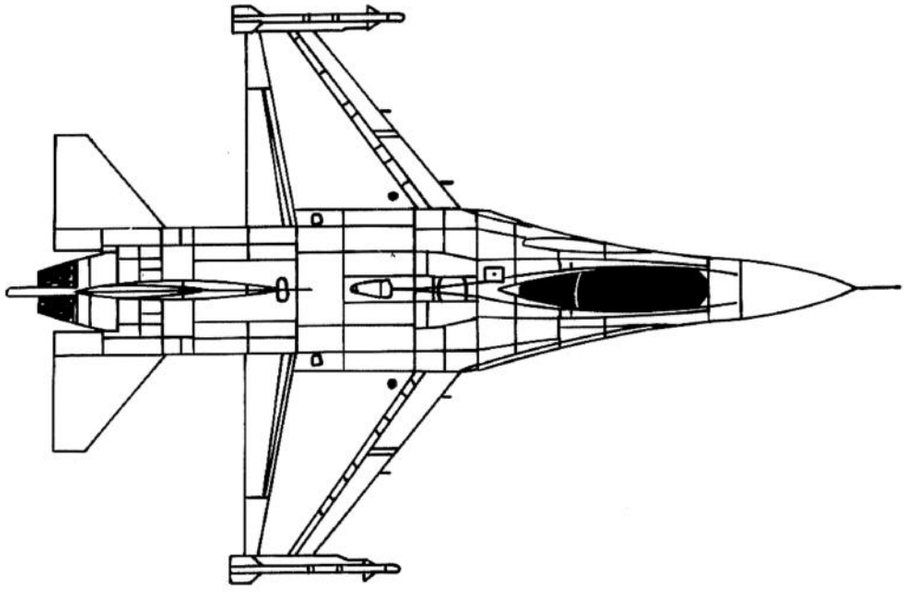
Graphic Design:
Katherine Voelz & Michelle Maase

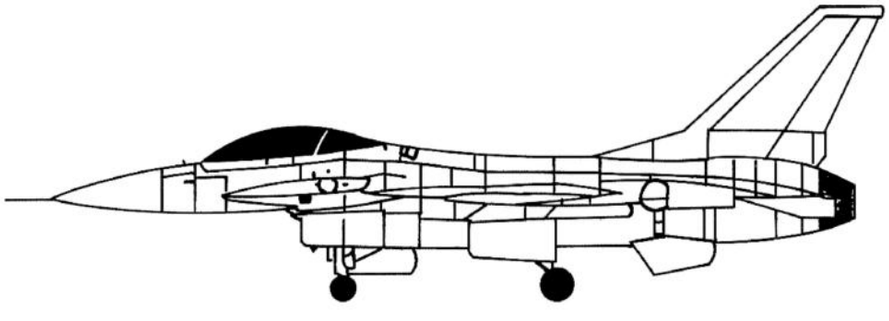
Documentation:
Mike Kulas, Matt Toschlog & Norm Olsen

Manual Illustrations:
Michelle Maase

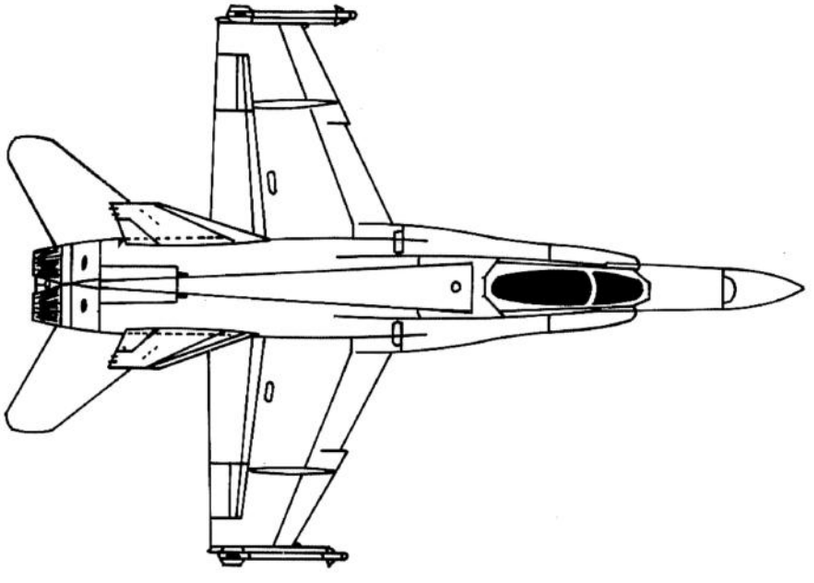
Playtesting:
Brad Ashmore

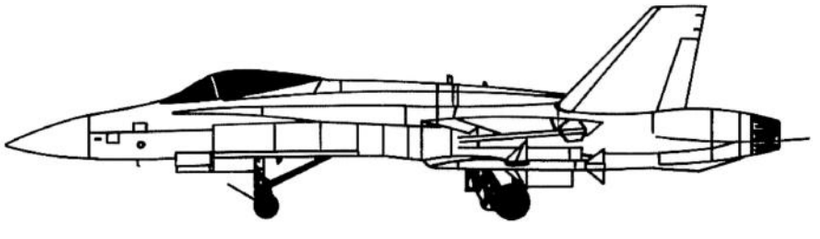
Appendix A - Aircraft Technical Data



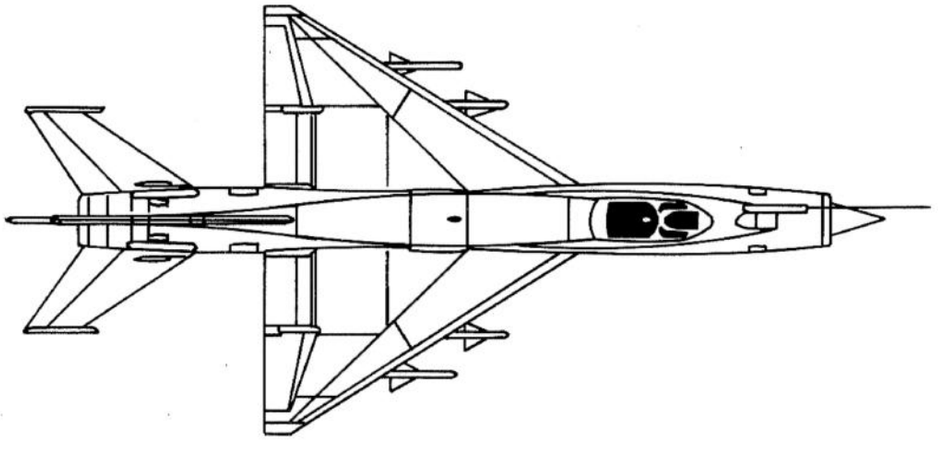


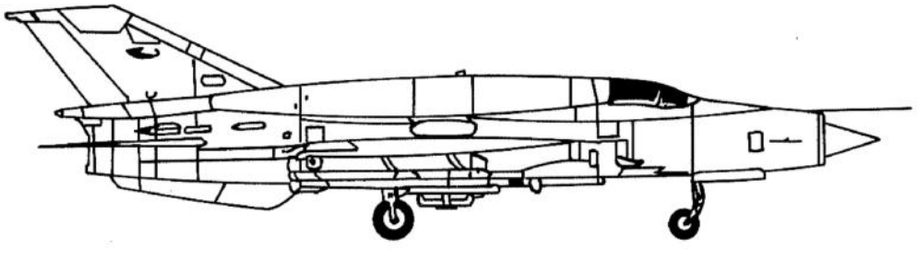
Aircraft:	F-16	**Empty weight**	14000 lbs
		Maximum weight	33000 lbs
Wing span	31 ft	**Maximum thrust**	23800 lbs
Length	47 ft	**Maximum speed**	1320 mph



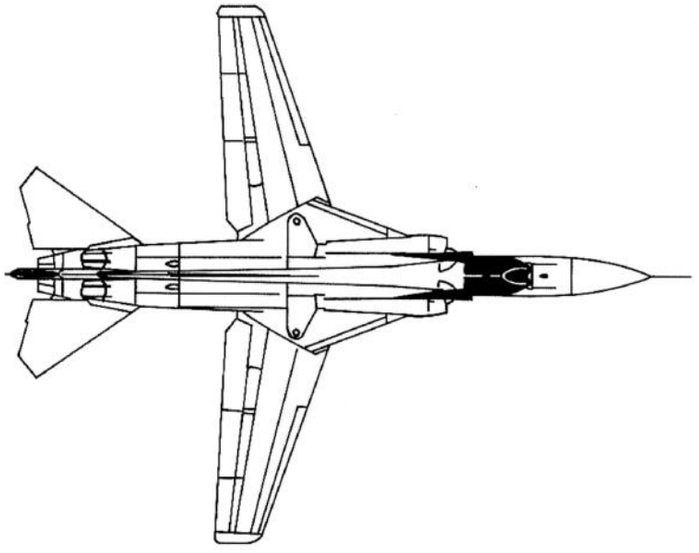


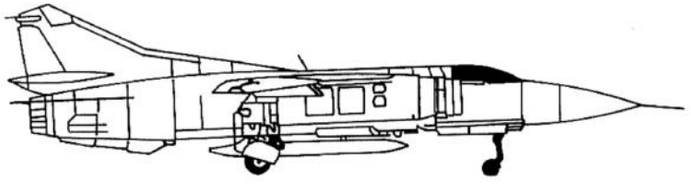
Aircraft:	F-18	**Empty weight**	20000 lbs
		Maximum weight	50000 lbs
Wing span	37 ft	**Maximum thrust**	16000 lbs X 2
Length	56 ft	**Maximum speed**	1190 mph





Aircraft:	MiG-21	**Empty weight**	12400 lbs
		Maximum weight	20725 lbs
Wing span	23 ft	**Maximum thrust**	14500 lbs
Length	51 ft	**Maximum speed**	1335 mph

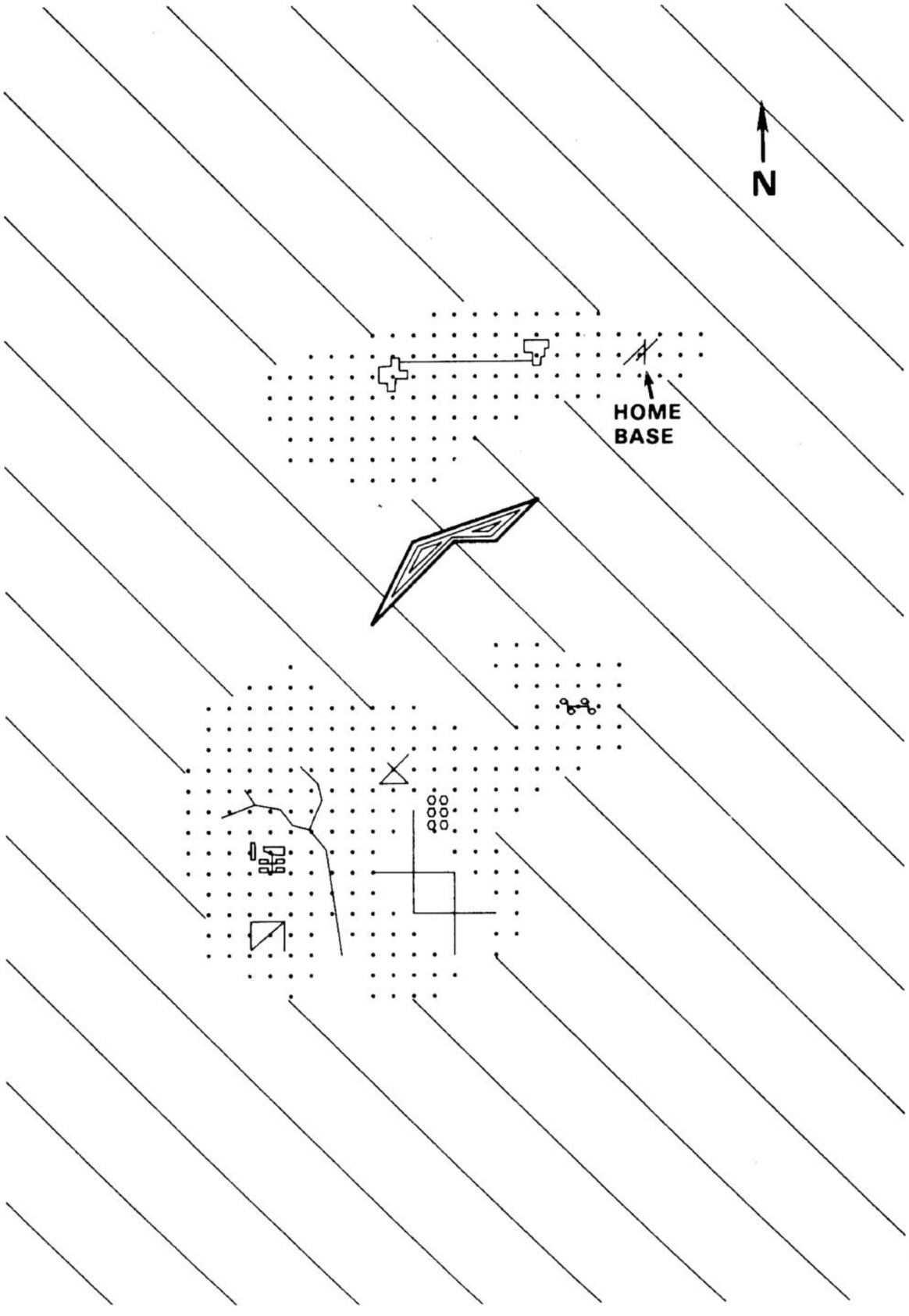




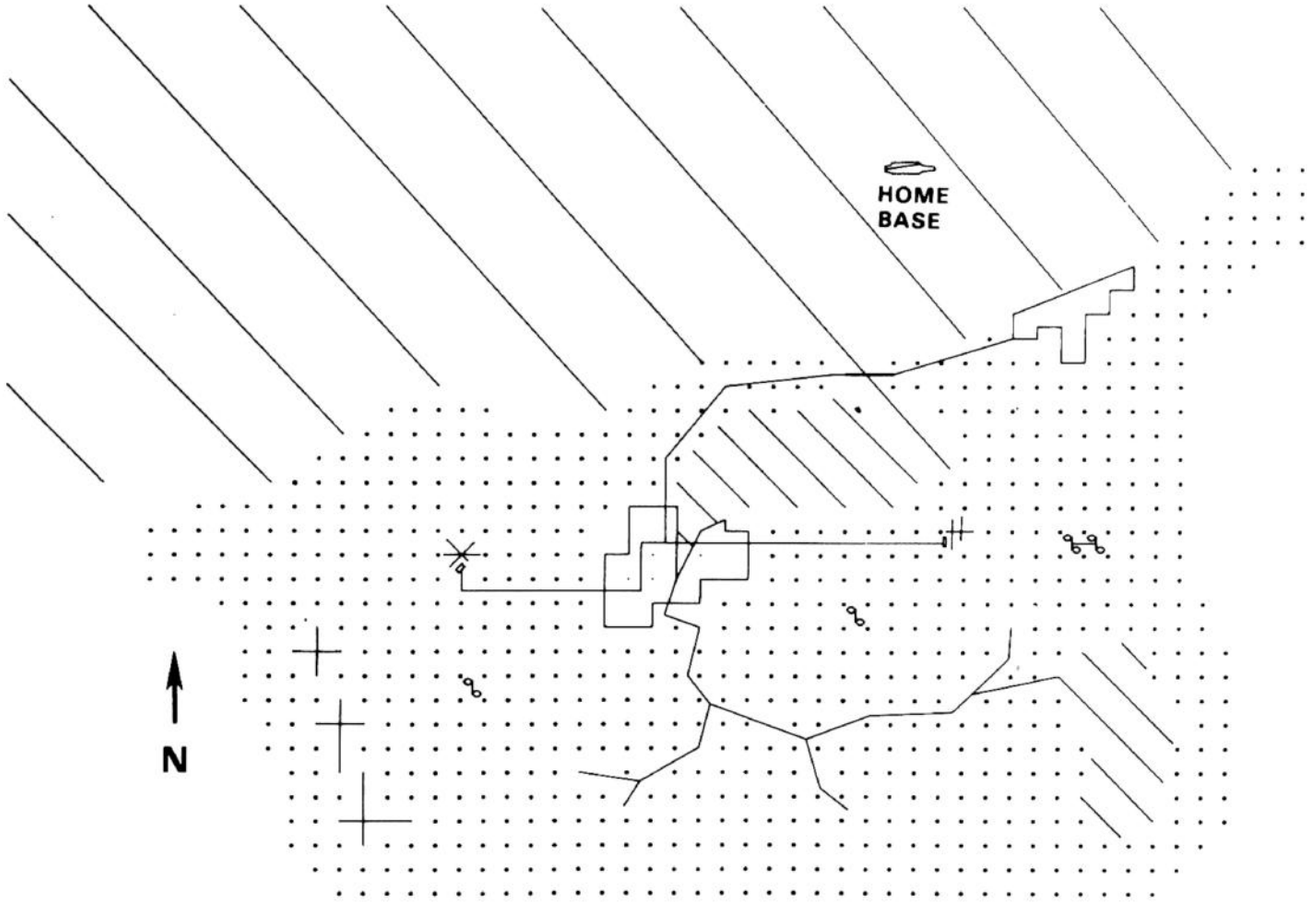
Aircraft:	MiG-23	**Empty weight**	18075 lbs
		Maximum weight	41670 lbs
Wing span	26-46 ft (variable)	**Maximum thrust**	27500 lbs
Length	59 ft	**Maximum speed**	1550 mph

Appendix B - Scenario Area Maps

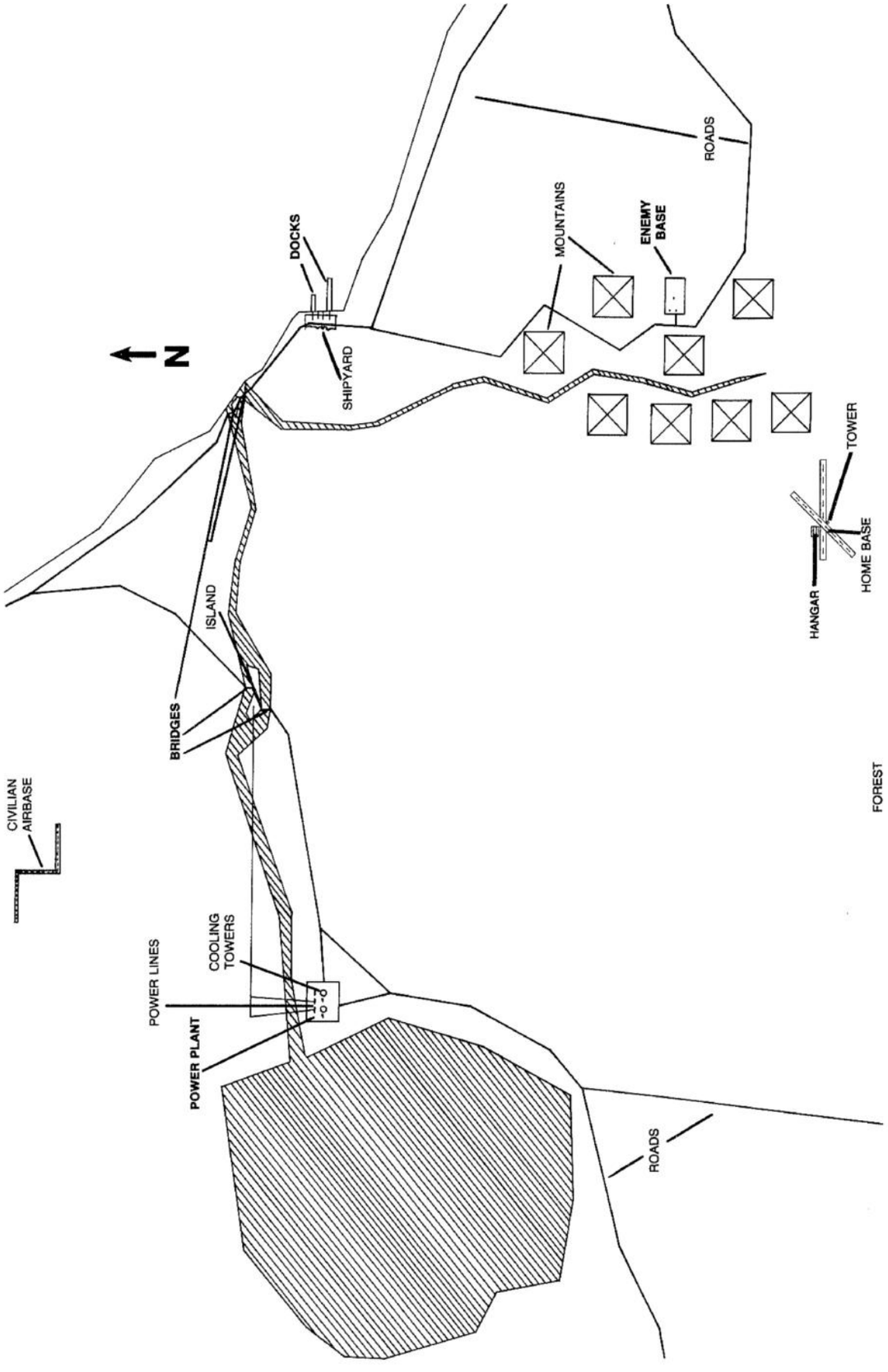
F-16 Free Flight Area



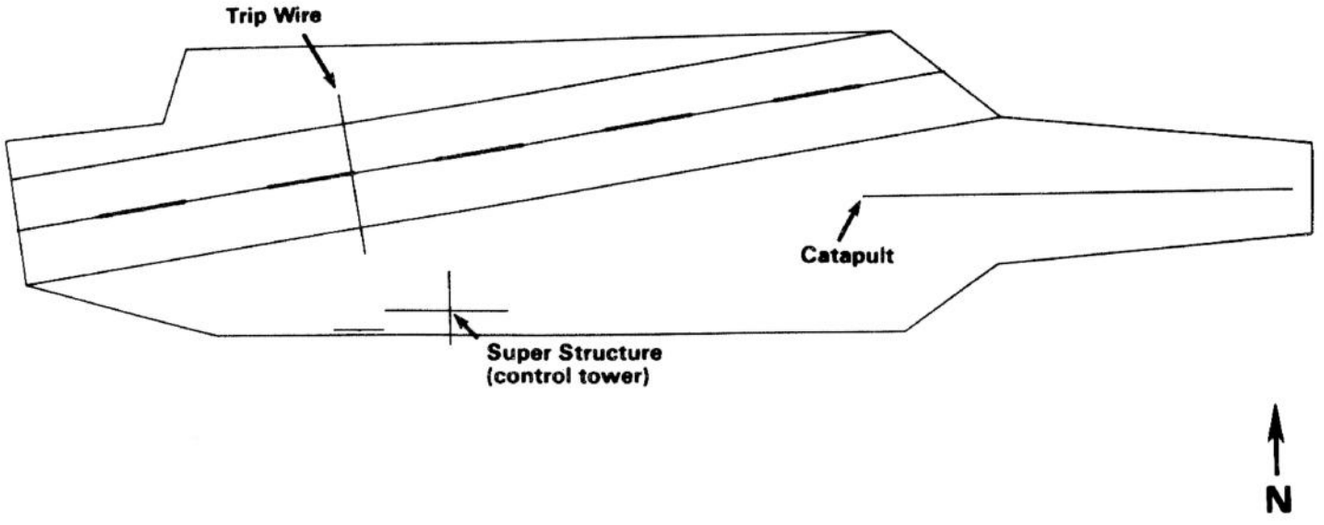
F-18 Free Flight Area



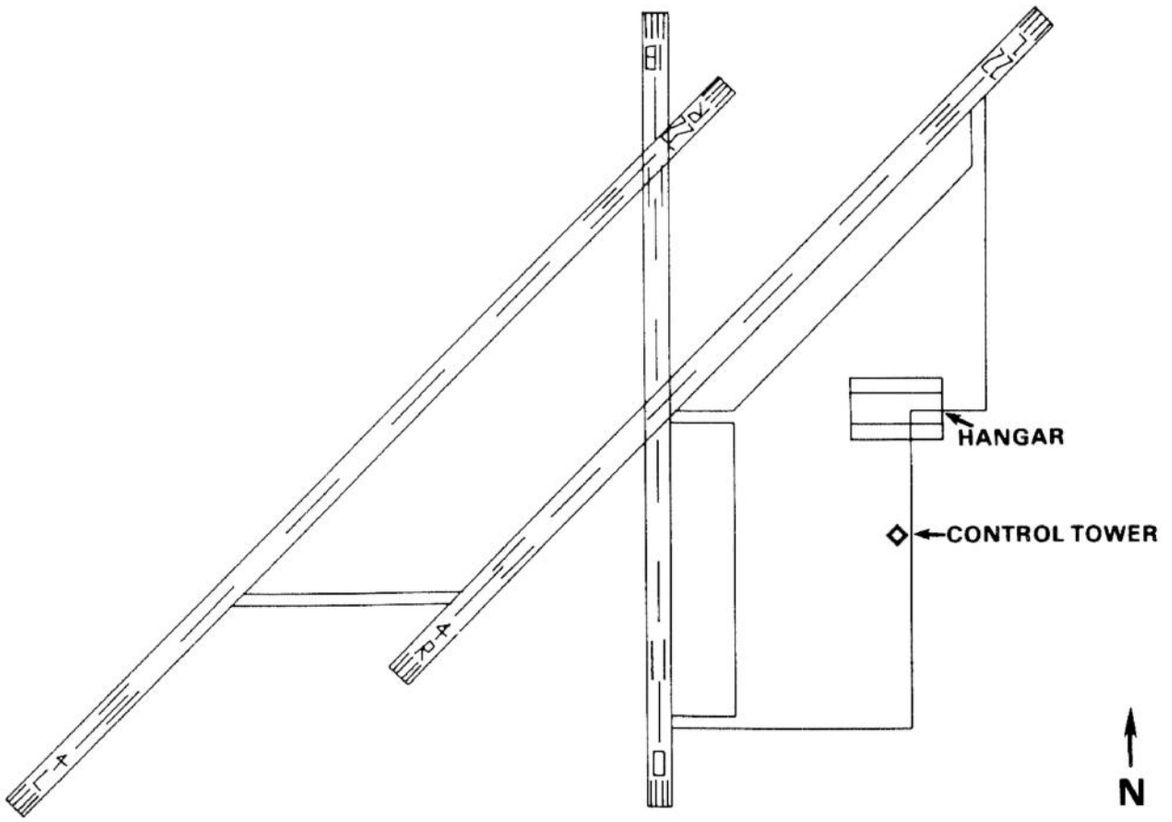
Combined Attack Battle Area



Nimitz-Class Aircraft Carrier



F-16 Home Base



Appendix C - A History of Fighter Jets

The beginnings of jet development occurred in the early 1930s, when it was first suggested that a stream of hot exhaust could power an airplane. Two early pioneers were Frank Whittle of England and Hans von Ohain of Germany, each of whom began work on a turbojet engine during the 30s.

The first jet-powered aircraft flew on August 27, 1939, just days before the start of World War II. This German plane, the He 178, was built by Ernst Heinkel and powered by an engine built by Ohain.

The advent of World War II hastened development of the jet as a fighter plane. The Me 262, built by Willy Messerschmitt and powered by a Junker Jumo 004 engine, first took off on July 18, 1942. Within two years, the Germans were flying the Me 262 on sorties against Allied bombers. The Me 262 could fly at 540 miles per hour, more than 70 mph faster than the fastest Allied fighter. The Me 262 proved very effective, but it came too late in the war to save the Germans.

In England, Frank Whittle's work had proceeded too slowly and development of a turbojet was handed over to Rolls-Royce. The first British jet did not take to the air until 1941, two years after Heinkel's aircraft. The first British fighter was the Gloster Meteor, only a handful of which were produced during the war.

The American jet program lagged behind the German and English efforts. The first American jet, Bell Aircraft's XP-59, did not fly until September 1942. The XP-59 was not very successful, however, with a top speed of only 413 mph, slower than the Air Force's fastest prop planes. In January 1944 Lockheed Corporation unveiled the F-80 Shooting Star, the first American jet fighter. The F-80 could fly at 560 mph and proved to be extremely versatile. The following year, Republic Aviation Company unveiled the F-84 Thunderjet. The F-84 was designed as a fighter-bomber and had a range of nearly 2,000 miles. Two years later the Grumman Aircraft Engineering Corporation announced the carrier-based F9F Panther.

At the end of World War II, the Americans and Soviets captured much of the German technology. The most significant innovation borrowed from the Germans was the swept wings of the Me 262. The Soviet MiG-15, using a copy of a Rolls-Royce turbojet and the swept-wing design of the Me 262, was first displayed in 1948. The first American jet to use the swept-wing design was the F-86 Sabre, with a top speed of 675 miles per hour.

The first jet-versus-jet combat occurred in the Korean war of 1950-1953. At the beginning of the war the United Nations forces used the F-80 Shooting Star, the P-51 Mustang, and the Navy Panther. Their main adversary was the prop-driven Soviet Yak-9. However, when China entered the war and began using MiG-15s, it became necessary to use the American F-86 Sabres, a more even match to the MiG-15. The Sabres proved to be very successful in Korea, due mostly to the superior skill of the American pilots. In the last months of the war, the Sabre scored a kill ratio of over 17 to 1 against the MiG-15.

The first supersonic jet was the American F-100D Super Sabre. Deployed in 1954, the F-100 had a top speed of 910 mph and was also the first jet to use heat-resistant titanium alloys. In 1958, the F-105 Thunderchief became operational. The Thunderchief was the best fighter-bomber in the Air Force arsenal during the 1960s.

The F-100 and F-105, along with the Navy's F-4 Phantom and A-4 Skyhawk, were the most-used fighters in the Viet Nam war. Their primary adversaries were Soviet; the MiG-17 (an updated version of the MiG-15), the MiG-19 (the first supersonic Soviet jet), and the MiG-21. The MiG-21 had been developed after the Korean war as a supersonic day interceptor. It was capable of speeds as high as Mach 2, and was more maneuverable than the F-105 or F-4.

Jet fighters were now equipped with more than just machine guns. American jets were fitted with heat-seeking Sidewinder and radar-guided Sparrow missiles. Soviet jets had mostly heat-seeking Atoll missiles, a less-effective copy of the American Sidewinder. The Sidewinder and Atoll missiles would home in on the exhaust from the back of an enemy jet. The Sparrow used a radar signal for guidance and had a longer range than the Sidewinder.

For bombing runs, US jets were fitted with the 250-pound radio-guided Bullpup. This used radio signals from the attack plane to guide it to its target. To disable enemy defenses, US planes carried Shrike missiles which homed in on the radar signals used by the enemy to track US planes. Many planes by this time carried "black boxes" as standard equipment, used to confuse enemy radar. Another tactic was to disperse chaff, small strips of aluminum foil also used to confuse enemy radar.

By the end of the Viet Nam war, the US was using even more sophisticated weapons. Among them was the Walleye bomb, which had a small television camera in its nose. This weapon was fired by a Radar Intercept Officer who sat

directly behind the pilot. Once the "guy in back" (GIB) had fixed the camera on the target, the bomb would guide itself to its destination. Another kind of "smart bomb" used a laser guidance system. The laser was aimed at the target by one plane while the bomb was dropped by another. This bomb was capable of hitting within a few feet of its target. Another advantage was that since bombs from two or more planes could track the same laser beam, an incredible amount of explosives could be concentrated on one spot.

Through the 1970s, more and more amazing fighters were developed. These jets were characterized not only by their speed and agility, but by the sophisticated electronic devices with which they were equipped.

Developed for the Navy in the early 70's, the Grumman F-14 Tomcat is a twin-engine two-seater with a top speed of Mach 2.34 (1560 mph). The F-14 features variable-sweep wings, which spread wide at takeoff and low speeds, then automatically sweep back into a delta shape at high speeds. The Tomcat also features a host of advanced avionics. Data the pilot needs for fighting—distance to target, available weapons — is displayed at eye level on a heads-up display (HUD). This enables the pilot to keep his eyes on his enemy without having to look down at an instrument panel. The F-14 also carries an updated Sidewinder, one so sensitive that it doesn't need to home in on the exhaust from an enemy jet; it can track the heat generated by the friction of a plane moving through the air.

The McDonnell Douglas/Northrop F/A-18 was originally designed for the Navy in the late 1970s as a lightweight, carrier-based fighter. After several revisions, it was decided to make the F-18 a single-seat multi-role jet. The F-18 is known for its advanced cockpit, which features three CRT displays plus an advanced HUD to provide a maximum of information to the pilot.

The newest Air Force fighter is the McDonnell Douglas F-15 Eagle. The F-15 has fixed wings but is fitted with extremely powerful engines. Two Pratt & Whitney F-100 jets provide enough force to allow an F-15 to accelerate straight up.

The cost of the F-15, however, makes it too expensive to be the primary Air Force jet. This is where the General Dynamics F-16 Fighting Falcon fills in. The F-16 pioneered the "fly-by-wire" system of flight controls. In most jets, the connection between the pilot's control stick and the rudder, ailerons, and elevators is hydraulic. In the F-16 this link is electronic. The pilot merely has to point the stick in the direction he wants to fly, and a computer directs the aircraft.

Soviet developments during this time include the MiG-23, a variable-sweep wing all-weather plane capable of Mach 2. The Soviets also build a slower ground-attack version of this plane known as the MiG-27.

Other recent developments are jets that can take off and land vertically. Great Britain's Harrier was the first jet with this capability. The Harrier makes use of vectored thrust that allows the aircraft to take off vertically, hover, and maneuver forward or backward. The Soviet Yakovlev Yak-36 also has the capability to take off and land vertically, using a pair of downward-angled jets in the front and a larger engine with rotating nozzles in the back.

subLOGIC™